APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, C.M.G., LL.D
DOMINION AGRICULTURIST	J. H. GRISDALE, B. AGR.
" HORTICULTURIST	W. T. MACOUN
" CEREALIST	C. E. SAUNDERS, PH. D.
" CHEMIST	FRANK T. SHUTT, M.A.
" ENTOMOLOGIST	C. GORDON HEWITT, D.SC.
" BOTANIST	H. T. GÜSSOW
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.	J. A. CLARK, B.S.A.
" " FARM, NAPPAN, N.S.	R. ROBERTSON
" " STATION, CAP ROUGE, QUE.	GUS. A. LANGELIER
" " FARM, BRANDON, MAN.	JAMES MURRAY, B.S.A.
" " " INDIAN HEAD, SASK.	ANGUS MACKAY
" " STATION, ROSTHERN, SASK.	WM. A. MUNRO, B.A., B.S.A.
" " " LETHBRIDGE, ALTA.	W. H. FAIRFIELD, M.S.
" " " LACOMBE, ALTA.	G. H. HUTTON, B.S.A.
" " FARM, AGASSIZ, B.C.	THOS. A. SHARP

FOR THE

YEAR ENDING MARCH 31

1911

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY C. H. PARMELEE, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1911

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 31, 1911.

SIR,—I beg to submit for your approval the twenty-fourth annual report of the work done and in progress at the several Experimental Farms and Stations.

In addition to my own report, you will find appended, reports from the following Dominion officers of the Central Experimental Farm:—From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Cerealist, Dr. C. E. Saunders; from the Chemist, Mr. Frank T. Shutt; from the Entomologist, Dr. C. Gordon Hewitt; from the Botanist, Mr. H. T. Güssow and also from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms and Stations, there are reports from Mr. J. A. Clark, Superintendent of the Experimental Station for Prince Edward Island at Charlottetown; from Mr. R. Robertson, Superintendent of the Experimental Farm for Nova Scotia at Nappan; from Mr. Gus. A. Langelier, Superintendent of the Experimental Station for Central Quebec at Cap Rouge; from Mr. James Murray, Superintendent of the Experimental Farm for Manitoba at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for Southern Saskatchewan at Indian Head; from Mr. Wm. A. Munro, Superintendent of the Experimental Station for Central Saskatchewan at Rosthern; from Mr. W. H. Fairfield, Superintendent of the Experimental Station for Southern Alberta at Lethbridge; from Mr. G. H. Hutton, Superintendent of the Experimental Station for Central Alberta at Lacombe, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several Experimental Farms and Stations; of scientific research in connection with the breeding of cereals and in determining their relative value;

of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment; of careful study of the life-histories and habits of injurious and beneficial insects and the best methods to adopt for destroying the most injurious species.

In the report of the work of the Entomological Division will be found particulars of the efforts which are being made to obtain control of the Brown-Tail moth in eastern Canada. The methods of management of the Apiary are also referred to. In this Division, also, the regulations governing the importation of nursery stock into Canada are administered. In the Botanical Division, progress has been made in the investigation of several specific plant diseases, their life history has been studied and practical means for their control suggested. Continued attention has also been given to the subject of noxious weeds and to the most practical and economical methods by which they may be destroyed. To the work of the Cereal Division has been lately added the annual distribution of grain for the improvement of seed.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the Experimental Farms, the rapidly extending correspondence, and the readiness shown by farmers everywhere to co-operate with the work of the Farms in the testing of new and promising varieties of cereals and other farm crops, furnish gratifying evidence of the desire for information among this class of the community, also of the high esteem in which the work of the Farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1911

REPORT OF THE DIRECTOR

WM. SAUNDERS, C.M.G., LL.D., F.R.S.C., F.L.S.

The final report of the results of the crops grown in the Dominion of Canada for the season of 1910, as given in the December number of the Census and Statistics Monthly, shows a falling off in some of the provinces, while, in others, a decided increase is recorded. The total area of land under cultivation has increased from 30,065,556 acres to 32,711,062 acres, a net increase of 2,645,406 acres. Notwithstanding this very considerable increase in the area under cultivation, the total value of the crops was less by over twenty-five million dollars than that of the previous year.

This result has been brought about mainly by the reductions in crop in the western provinces, chiefly due to the great drought which prevailed over a large area in the Canadian Northwest during the greater part of the growing season of 1910. The final details show a falling off in production of spring wheat of over seventeen million buhels, in oats of over thirty million and in barley of over ten million bushels.

The eastern provinces enjoyed exceptionally fine weather, the crops there have been bountiful and the quality of the products excellent. These provinces show gains both in wheat and in oats. In wheat, the increase is given as 1,836,600 bushels; in oats 28,669,000 bushels.

In other crops especially important in the east, the returns have been most gratifying. The hay crop will total about 15,291,000 tons, the market value of which, computed at the local prices this year, will be over 147 million dollars. Much of this hay, which is of first quality, will be required for the building up of the stock industry. This excellent fodder material will be supplemented in the provinces east of Manitoba by a large crop of turnips and other field roots of an estimated value of $20,618,000, also by a yield of fodder corn of 2,551,000 tons, valued at $11,957,000. The total value of the hay, field roots and fodder corn is nearly 180 million dollars, being about $17,000,000 in advance of last year. Such substantial returns to the farmers of eastern Canada will provide means for a healthy growth in all branches of agriculture and must prove a stimulus to agricultural progress.

Among the eastern provinces, all of which have shared in the prosperity which a good harvest has brought about, Ontario, with her large area of land under crop, always occupies a position of prominence. While the increase in the total crop of wheat in Ontario in 1910 amounted to 1,543,000 bushels, the yield per acre of spring wheat rose from 17·45 bushels in 1909 to 20·19 in 1910; winter wheat from 24·24 to 25·24 bushels per acre, while the increase in the oat crop in 1910 was 19,725,000 bushels, with an average yield per acre of 39·40 bushels, as compared with 34·75 bushels in 1909. There was a slight decrease in the total crop of barley of 225,000 bushels, due to a smaller acreage being sown, the average yield per acre, 29·75 bushels, being slightly greater than that of the previous year, 29·04. Of corn for husking, which is

grown mainly in Essex, Lambton, Kent and Elgin, and which covered an area in 1910 of 229,040 acres, there was produced 17,853,000 bushels. The yield per acre increased from 59.61 to 59.7 bushels. The increase in the production of hay in Ontario is perhaps the most important item we have yet enumerated, amounting in all to 1,976,000 tons, with an estimated value of $8,197,000.

The following table gives the yields of the principal cereal crops in each province in the Dominion for 1909 and 1910:—

EASTERN PROVINCES.

—	Yield per Acre, 1909.	Total Yield, 1909.	Yield per Acre, 1910.	Total Yield, 1910.
	Bush.	Bush.	Bush.	Bush.
Prince Edward Island:—				
Spring Wheat	20·00	522,000	20·52	615,600
Oats	33·70	6,201,000	36·48	6,778,000
Barley	27·61	169,000	23·00	159,600
Nova Scotia—				
Spring Wheat	19·80	404,000	22·85	480,000
Oats	31·56	4,358,000	39·52	5,723,000
Barley	24·77	221,000	30·33	264,000
New Brunswick—				
Spring Wheat	20·15	395,000	19·03	371,000
Oats	27·87	5,775,000	29·69	6,351,000
Barley	29·26	94,000	35·29	73,000
Quebec—				
Spring Wheat	16·71	1,679,000	18·38	1,827,000
Oats	27·00	42,501,000	29·66	48,927,000
Barley	24·02	2,604,000	24·49	2,547,000
Ontario—				
Spring Wheat	17·45	2,176,000	20·19	2,429,000
Winter "	24·24	14,086,000	25·24	15,376,000
Oats	34·75	109,192,000	39·40	128,917,000
Barley	29·04	20,952,000	29·75	20,727,000

Total grain yield, Ontario and Eastern provinces, in 1910, spring wheat, 5,722,600 bushels; winter wheat, 15,376,600 bushels; coarse grains, oats and barley, 220,466,600 bushels.

WESTERN PROVINCES (omitting British Columbia).

—	Yield per Acre, 1909.	Total Yield, 1909.	Yield per Acre, 1910.	Total Yield, 1910.
	Bush.	Bush.	Bush.	Bush.
Manitoba—				
Spring Wheat	18·77	52,706,000	13·65	41,159,000
Oats	39·76	55,267,000	28·76	41,742,000
Barley	29·98	29,896,000	20·21	13,826,000
Saskatchewan—				
Spring Wheat	23·13	85,197,000	16·73	81,139,000
Oats	49·70	91,796,000	31·10	61,367,000
Barley	33·28	4,493,000	26·18	3,598,000
Alberta—				
Winter Wheat	24·80	2,009,000	12·59	1,234,000
Spring "	24·90	7,570,000	12·32	5,359,000
Oats	46·80	38,376,000	24·27	23,644,000
Barley	32·25	5,999,000	20·32	3,953,000

Total grain yield west of Ontario (omitting British Columbia) in 1910: Spring wheat, 127,657,000 bushels; winter wheat, 1,234,000 bushels; coarse grains, oats and barley, 148,130,000 bushels.

RESULTS OBTAINED ON TRIAL PLOTS OF GRAIN ON EXPERIMENTAL FARMS.

It may be interesting here to compare the crops which were realized during 1910 on the trial plots of grain on the Experimental Farms in the several provinces of the Dominion, showing the results obtained under good treatment of the land.

In giving these results, it should be borne in mind that they are from plots varying from one-tenth to one-sixtieth of an acre, and such plots usually give greater returns than are obtained in field lots.

Central Experimental Farm.

	Per Acre. Bush.	Lbs.
Spring wheat—Average yield of 16 varieties	35	48
Oats " " 24 "	68	8
Barley, 6 row " " 11 "	65	38
Barley, 2 row " " 10 "	45	47

Experimental Station, Charlottetown, P.E.I.

	Per Acre. Bush.	Lbs.
Spring wheat—Average yield of 13 varieties	39	19
Oats " " 21 "	121	29
Barley, 6 row " " 11 "	65	38
Barley, 2 row " " 10 "	62	19

Experimental Farm, Brandon, Man.

	Per Acre. Bush.	Lbs.
Spring wheat—Average of 8 varieties	35	14
Oats " " 16 "	83	3
Barley, 6 row " " 10 "	43	29
Barley, 2 row " " 9 "	52	12

Experimental Farm, Indian Head, Sask.

	Per Acre. Bush.	Lbs.
Spring wheat—Average of 7 varieties	50	14
Oats " " 16 "	77	..
Barley, 6 row " " 10 "	62	2
Barley, 2-row " " 9 "	59	25

Experimental Station, Lethbridge, Alta. (non-irrigated).

At this Station, the crops suffered very much from drought.

	Per Acre. Bush.	Lbs.
Winter wheat—Average of 9 varieties	11	3
Spring wheat " " 12 "	11	..
Oats " " 16 "	21	13
Barley, 6 row " " 10 "	9	12
Barley, 2 row " " 9 "	10	13

On the irrigated part of the land, where water was applied, the yields were larger. but the irrigated land this year had not all the advantages it should have had, for the

reason that the water was not available until some time in June, owing to the ditches being under repair, and, as the spring was exceedingly dry, an earlier watering of these crops would have been very beneficial.

Experimental Station, Lethbridge, Alta. (irrigated).

						Per Acre. Bush.	Lbs.
Spring wheat—Average of			4	varieties		25	52
Oats	"	"	5	"		71	10
Barley, 6 row	"	"	4	"		33	36
Barley, 2 row	"	"	2	"		48	26

The season of 1910 was so very exceptional in respect of drought that it is not to be wondered at that the crops were small. No such season has been experienced in the memory of the oldest inhabitants in that part of Alberta, and it is hoped it may not occur again in our time. Still, the average of eleven bushels per acre on 'dry farming' land is not bad, considering the averages that were got in those drier states which border on Canada where most of the yields were less.

Experimental Station, Lacombe, Alta.

At the Experimental Station at Lacombe, there were unusually large returns this year. Those of spring wheat are most remarkable, but are strictly accurate.

						Per Acre. Bush.	Lbs.
Spring wheat—Average of			10	varieties		63	7
Oats	"	"	17	"		74	24
Barley, 6 row	"	"	10	"		69	34
Barley, 2 row	"	"	9	"		60	18

Experimental Farm, Agassiz, B.C.

						Per acre. Bush.	Lbs.
Spring wheat—Average of			9	varieties		26	51
Oats	"	"	17	"		72	23
Barley, 6 row	"	"	10	"		39	2
Barley, 2 row	"	"	9	"		43	14

The details herewith submitted show that the average returns from the plots of grain on the several Experimental Farms are a long way in advance of the average yields obtained by the farmers of the several provinces. There is no doubt that these latter will materially increase as the farmers gain a better knowledge of successful crop-growing.

YIELDS OF PRINCIPAL GRAIN CROPS IN THE UNITED STATES FOR THE YEARS 1909 AND 1910.

The following table gives some of the details of the yields of the principal grain crops in the United States for the seasons of 1910 and 1909, taken from the 'Crop Reporter,' the official organ of the United States' Department of Agriculture. The average yield per acre of the entire wheat crop of that country is given, also that of several of the States individually, namely, North Dakota, South Dakota, Kansas, Minnesota and Nebraska, where the yields, owing to somewhat similar climatic conditions, are to a certain extent comparable with those of the Canadian Northwest.

—	Yield per Acre, 1910.	Yield per Acre, 1909.	Average Yield for Ten Years.
	Bush.	Bush.	Bush.
Oats—			
United States, entire crop	31·0	31·9	29·5
North Dakota	7·5	32·0	29·7
South Dakota	23·4	30·0	31·6
Minnesota	28·7	33·0	31·7
Nebraska	28·0	25·0	26·4
Kansas	33·0	22·0	24·4
Barley—			
United States, entire crop	22·4	24·3	25·7
North Dakota	5·7	21·0	23·0
South Dakota	18·2	19·5	25·3
Minnesota	21·9	23·6	25·7
Nebraska	18·5	22·0	24·0
Kansas	18·0	18·0	19·8
Spring Wheat—			
United States, entire crop	11·8	15·8	13·7
North Dakota	5·5	10·7	12·1
South Dakota	12·8	14·1	12·1
Minnesota	16·0	16·8	13·0
Nebraska	13·9	14·0	13·0
Kansas	8·4	11·5	11·8

This instructive summary shows that, as far as crops are concerned, the farmers of Canada have not very much cause for complaint.

NEW EXPERIMENTAL STATIONS.

SCOTT, SASKATCHEWAN.

During the past year, the site for a new Experimental Station has been chosen for northern Saskatchewan. This has been located on the line of the Grand Trunk Pacific Railway, a short distance from the town of Scott, on the opposite side of the railway track and fronting on the railway for about half a mile. The town was started in 1909, and in April, 1910, was said to have a population of about five hundred. Mr. Duncan Anderson selected this site and it was subsequently visited and approved by the Director and other officers of the Farms. Mr. Anderson, who has resided at Scott during the greater part of the past year, has supervised the breaking and preparation of the land, has prepared plans of the buildings and superintended their erection and has written that report of the work which has been accomplished under his careful supervision which appears on a subsequent page.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC.

A farm of 380 arpents (about 320 acres) has been chosen for this purpose at Cap Rouge, about ten miles from the City of Quebec. This property, known as the Stadacona Farm, is situated a short distance west of Cap Rouge.

Mr. J. H. Grisdale, Dominion Agriculturist, who carefully examined the property and reported on it, says: 'Stadacona Farm, the property of Mr. Gus. A. Langelier, is situated on the high land just west of Cap Rouge village. It fronts on the main road leading to Quebec from the northern tier of counties of the province. It commands an extensive view of the St. Lawrence River and is prominently in view from that river. It lies at the crossing of the Transcontinental and Great Northern railways and is plainly in view from either road. It is crossed at the rear or north end by the Transcontinental and the Great Northern passes within two hundred yards of

the southern end. The station on the Great Northern is situated about six hundred yards from the farm buildings; no stations are yet located on this part of the Transcontinental line.

'This property lies about ten miles from the City Hall, Quebec. The soil is a clay loam, for the most part. It is underlaid at various depths with shale. It has been, in a large measure, underdrained. The soil is not, however, apparently very fertile. The farm is well fenced and nicely laid out in fields. The buildings, with the possible exception of the horse-barn, are quite such as would be required on an Experimental Station and will probably be sufficiently commodious for years to come.

'Of the 380 arpents comprising the farm, about 225 have been brought under cultivation, and about fifty arpents more could, with moderate expenditure, be brought under the plough. This large area would permit of work of all kinds being satisfactorily carried on, as, for instance, horse-breeding, sheep-breeding and pork production, as well as dairying, crop-production, variety tests and horticultural work. The soil would probably not be very suitable for apple production, but would suit most other fruits and vegetables.'

Subsequently, this farm was purchased, and Mr. Gus. Langelier was appointed as Superintendent, dating from January 1, 1911.

The new Superintendent has prepared a brief report, which will be found following that of the Superintendent of the Nova Scotia Farm.

EXPERIMENTAL STATION AT STE. ANNE DE LA POCATIÉRE.

This site was examined by the Hon. Sydney Fisher, in company with Mr. J. H. Grisdale, accompanied by several residents of the district who were interested in agriculture. Mr. Grisdale reported on this farm as follows: 'This farm is composed of two holdings, one of eighty-four arpents occupied by Mr. Antonio Gendron and a part of that occupied by Mr. Georges Hudon, about sixty arpents, making 144 arpents, or about 120 acres, in all.

'These properties lie immediately west of the station on the Intercolonial Railway. They are traversed from east to west by the main travelled road of the counties of Kamouraska and L'Islet. A much-used road to the southward starts on the west side of the Gendron property.

'These farms consist each of a stretch of level land extending south from the Intercolonial Railway for about 1,100 yards to the foot of a hill, from which point they rise for another 1,000 yards or thereabouts. The level part of the land consists of heavy clay soil, possible of drainage, which would be needed. The upper or rising land consists of porous, gravelly soil, in some parts covered, to a greater or lesser extent, with boulders. The hill land is, in part, arable, or capable of being made so. The lots are each about 120 yards wide. The land would be very suitable for experimental work, as it is quite typical, in character and situation, of the land of this district.'

This property was subsequently purchased, but no work has yet been done on the place.

EXPERIMENTAL STATION AT KENTVILLE, N.S.

A site comprising about 240 acres in all has been chosen at Kentville, N.S. On this Station, fruit-growing is expected to hold a prominent place. While the Department has only recently taken possession of this property, some preparatory work has already been done, including the brushing of a few acres and some breaking.

EXPERIMENTAL STATION AT INVERMERE, B.C.

This land, which has recently been acquired by the department in the Invermere district, consists of about thirty-five acres in all, adjacent to the Invermere townsite.

No work has yet been done in connection with this Station. Here, also, it is expected that the experimental work will consist mainly of tests of varieties of fruits to ascertain those suitable for the district.

EXPERIMENTAL STATION FOR NORTHERN SASKATCHEWAN.

Report of Mr. Duncan Anderson on the work which has been done at Scott, Saskatchewan, during the past fiscal year.

'SCOTT, SASK., March 31, 1911.

'Dr. WM. SAUNDERS, C.M.G.,
'Director, Dominion Experimental Farms,
'Ottawa.

'SIR,—This farm is situated on the main line of the Grand Trunk Pacific Railway, close to the town of Scott. The town has a population of about 600, and is 103 miles west of Saskatoon, and 223 miles east of Edmonton. Scott is the centre of a large area of splendid grain-growing country. The famous Tramping Lake region lies directly south and the well-known Cut-Knife section to the north and west.

The Farm.

'The farm consists of 198½ acres and is bounded on the east by the main travelled road leading into the well-settled Tramping Lake District, on the north by the railway and on the south and west by division lines. The surface of the farm is undulating, open prairie, unbroken by either brush or sloughs. One or two small pot-holes and here and there a few stones can be seen.

The Soil.

'The soil is a chocolate-coloured clay loam, of very uniform quality, from twelve to fifteen inches deep, underlaid with a clay subsoil. With the exception of an acre in the north-east corner, which had been ploughed by a homesteader, the farm was in a primitive condition.

'Farming operations were begun on this property on the 16th of May, when drilling for a well was started and in a few days an abundant supply of water was obtained at a depth of sixty-five feet. The flow of the spring is five barrels per hour. The well is situated twenty feet from the south-west corner of the house.

Breaking.

'Between May 25 and June 7, one hundred and five acres were broken; seventy-three acres of this were backset and the balance, thirty-two acres, was broken deeply and surface-worked. All the breaking was packed directly after the ploughs and thus considerable moisture from the June rains was stored in the soil.

Breaking and Backsetting.

'On seventy-three acres, breaking was done shallow, from two and a half to three inches deep, well packed, and left till after harvest, when it was backset five inches

deep, single-disced and double-harrowed. As all team work was done by contract, it is easy to get at the cost per acre:—

Breaking	$3 75
Packing	0 25
Backsetting	3 75
Single discing	0 50
Double harrowing	0 50
Total cost	$8 75

'The backsetting will require some cultivation in the spring to work up a good seed bed.

Deep Breaking.

'Thirty-two acres were broken, about four and a half inches deep, packed, and left until the middle of July, when it was double-disced and double-harrowed. Again in October it was double-disced and double-harrowed, and cost as follows, per acre:—

Breaking	$3 75
Packing	0 25
July—Double-disced	1 00
Double-harrowed	0 50
October—Double-disced	1 00
Double-harrowed	0 50
	$7 00

'The surface-worked, deep breaking is in fine tilth and in good condition for the seed.

'In both deep breaking and backsetting, the sod was thoroughly decayed, showing the beneficial results of breaking and packing early in the season.

Fencing.

'In the month of August, the farm was enclosed with a substantial wire fence. Cedar posts not less than six inches at the small end were set twenty feet apart and three feet in the ground. All corner and anchor posts were planted four feet deep and firmly braced and on these was stretched woven wire four feet high and securely stapled to the posts. A strand of barbed wire was extended six inches above the woven wire and all the posts sawn off two inches above the barbed wire, with the woven wire raised three to four inches from the ground. This makes the fence about five feet high. A double gate sixteen feet wide gives access to the barn and stable and a single ten-foot gate and a small four-foot gate give entrance to the house.

'To ensure a straight line of posts, the following method was adopted—

'A stout wooden peg was driven every two hundred yards on a surveyed line. A wire was tightly stretched along these so as not to blow with the wind, and every twenty feet along it a small wooden pin was driven to mark the place for a post. These pins were driven close to the wire. A piece of tin, nine inches in diameter, cut round, with a hole in the centre, was prepared. The pin marking the place for a post was pulled out, the tin placed over the hole thus made and a small iron pin was driven into the ground through the hole in the tin into the same place that the wooden pin was in. With a sharp spade, the sod was cut three inches deep around the tin; when this round piece of sod was lifted out, it marked the exact place where a post was to be set. Care was exercised in placing the posts, to have the straightest side turned to the wire. This easy method of laying out post holes gives an exactly straight fence-line.

Buildings.

'A house and a barn are in course of erection and will be ready for occupancy in the spring.

House.

'The Superintendent's house in outside measurement is 30 feet by 32 feet. The summer kitchen is 14 feet by 14 feet. The basement is the full size of the house and the summer kitchen, and is divided into three parts, in one of which a furnace has been installed, also a coal bin and a soft water tank. The second is for vegetables, potatoes, fruits, etc., and the third provides an outside entrance to the cellar. The ground floor has four rooms, parlour, dining room, kitchen and office. There are four good-sized bed-rooms and a bath upstairs, and a commodious attic. A spacious verandah, eight feet wide, extends along the east and north sides of the house. A small balcony on the north side overlooks the railway and a vestibule protects the main entrance on the east side. The house is substantially built of good material.

The Water Supply.

'This is obtained from the well and is forced up into a tank in the attic. A sixty-barrel galvanized tank has been placed in the cellar, to receive the rainfall and will furnish a sufficient supply of soft water for household use.

Sewerage.

'A septic tank 10 feet by 6 feet and 8 feet deep has been built of concrete cement with a reinforced concrete roof. The tank is situated forty-five feet from the house. The outlet from the tank is a four-inch glazed tile drain, well connected at the joints, which empties into a large disposal pit which is filled in with loose stones and covered over with earth so as not to interfere with the plough. From the septic tank to the disposal pit is 225 feet.

'The aim in planning these buildings has been to have them as convenient as possible and to utilize all space, also to secure a plentiful supply of hard and of soft water and to have the best sanitary conditions possible surrounding a rural home.

Barn and Stable.

'The combined barn and stable is 62 feet by 38 feet with twenty-foot posts and a hip roof. This gives a large, roomy barn with plenty of space for storing hay and fodder.

Horse Stable.

'The stable is in the east end of the building and has accommodation for nine horses; six single stalls, one double stall and a loose feed box, also a five-foot passage, in which the hay hatch, oat, bran and crushed-grain bins are conveniently arranged. A large bin for oats with a capacity of two thousand bushels has been provided in a corner of the barn and a chute conveys the grain to a smaller bin in the feed passage. The floors are laid in concrete. The stalls are planked on top of the concrete, except the loose box, which has a clay floor.

'The water supply is obtained from the tank in the house attic. A pipe line connects the stable with the house, with a hydrant standing in the feed passage. From a small tank at the hydrant, water will be siphoned into a watering trough in the yard

'A large, air-tight, ventilating shaft connects the stable ceiling with the cupola on the roof; this will carry off the impure air from the stable. Four cold air inlets, two on each side of the stable, provided with shut-offs, will cause a circulation of pure air.

'The west of the lower part of the barn will be used to keep wagons, sleighs, implements, etc., in. A driveway twelve feet wide, with roller doors on each side, divides the stable from the wagon house. The barn, like the house, is constructed of good material. The foundation is of concrete cement fourteen inches thick, goes down three feet into the ground and rests on two foot wide footings. The barn is securely anchored into the foundations with twenty iron rods three and a half feet long. The height of the foundation above the ground level is about eighteen inches.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) DUNCAN ANDERSON.

On March 1, 1911, Mr. R. E. Everest was appointed Superintendent of the Experimental Station at Scott, and entered upon his duties without delay. He has purchased horses and the necessary implements for carrying on the work and expects to have some crops to report on as the results of next season's work. Mr. Everest has had experience on some of the best farms in Ontario, is a graduate of the Ontario College of Agriculture at Guelph, and has had two years' experience in the Canadian Northwest as foreman on the Experimental Station at Lacombe under Mr. G. H. Hutton.

CO-OPERATIVE EXPERIMENTS BY FARMERS THROUGHOUT CANADA.

Another distribution was made this year from the Experimental Farms of samples of seed of high quality for the improvement of crops. The object in view in this distribution is to ascertain by test the relative merits of the different sorts under trial, as to quality, productiveness and earliness in ripening. In conducting these trial plots, farmers everywhere have readily undertaken to co-operate with the Experimental Farms and to report the results of their experiments. These joint efforts have been productive of much good and a great deal of information has thus been gathered as to the suitability of these different varieties to the climatic conditions prevailing in different parts of Canada.

During the season of 1910, the number of Canadian farmers who have united in these experiments was 43,385. The value of this work in all parts of the Dominion has been abundantly demonstrated.

A change was made this year in the system of distributing samples; these, with the exception of potatoes, are now sent out from the Central Farm, and all applications for samples should be addressed to the Dominion Cerealist, Central Experimental Farm, Ottawa. The regular distribution of samples of grain from the Branch Experimental Farms has been discontinued, and the surplus grain grown there will be sold in lots of one bushel or more, to farmers for seed purposes.

The samples sent out from the Central Farm have weighed as follows:—Wheat and barley, five pounds each, and oats four pounds, sufficient in each case to sow one-twentieth of an acre. The samples of Indian corn, peas and potatoes have weighed three pounds each.

DISTRIBUTION of samples by Provinces.

Name.	P.E.I	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Oats	509	931	1,141	5,172	1,593	603	938	729	63
Barley	53	310	177	1,804	316	191	397	292	33
Wheat	246	529	620	3,473	451	855	3,025	1,284	56
Peas	33	192	329	1,199	275	122	330	292	58
Indian Corn	15	86	98	698	294	79	73	68	17
Potatoes	52	594	505	2,361	1,747	773	1,867	1,381	434
Total	908	2,642	2,870	14,707	4,676	2,623	6,630	4,016	661

Total number of samples distributed, 39,763.

Total number of packages of each sort distributed—

Oats	11,679
Barley	3,573
Wheat	10,539
Peas	2,830
Indian corn	1,428
Potatoes	9,714
Total	39,763

DISTRIBUTION FROM THE CENTRAL FARM.

The following list shows the number of samples of the different varieties which have been sent out from the Central Experimental Farm—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		SPRING WHEAT.	
Banner	4,858	Red Fife	3,672
Wide Awake	1,370	Marquis	2,112
White Giant	1,366	Preston	1,712
Abundance	972	White Fife	810
Improved Ligowo	963	Bobs	526
Thousand Dollar	955	Chelsea	483
Danish Island	946	Stanley	461
Daubeney	249	Pringle's Champlain	385
		Huron	378
Total	11,679	Total	10,539
BARLEY—(Six-Row).		INDIAN CORN.	
Mensury	1,778	Longfellow	439
Odessa	739	Selected Leaming	278
Mansfield	369	Compton's Early	268
		Angel of Midnight	267
BARLEY—(Two-Row).		White Cap Yellow Dent	149
Invincible	383	Early Mastodon	36
Standwell	179		
Canadian Thorpe	125	Total	1,428
Total	3,573	POTATOES.	
PEAS.		Rochester Rose	4,705
		Gold Coin	1,678
Golden Vine	1,395	Money Maker	1,517
Arthur	1,082	Carman No. 1	1,049
Daniel O'Rourke	353	Irish Cobbler	765
Total	2,830	Total	9,714

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the branch Experimental Farms as follows—

Experimental Farm, Nappan, N.S.

Spring wheat	62
Oats	314
Barley	71
Buckwheat	87
Potatoes	280
Total	814

Experimental Farm, Brandon, Man.

Potatoes	114

Experimental Farm, Indian Head, Sask.

Spring wheat	309
Oats	163
Barley	39
Peas	84
Sundries (flax, rye)	19
Potatoes	440
Total	1,054

Experimental Station, Lethbridge, Alta.

Winter wheat	13
Potatoes	833
Total	846

Experimental Farm, Agassiz, B.C.

Oats	140
Barley	68
Peas	132
Potatoes	454
Total	794

By adding the number of farmers supplied by the branch Farms to those supplied by the Central Farm, we have a total of 43,385. The average number of samples sent out each year for the past eleven years has been over 38,000.

It is remarkable how rapidly a supply of grain may be built up from a single four or five-pound sample. Take, for instance, a sample of oats. The four pounds received will, if cared for, usually produce from three to four bushels. This sown on two acres of land, will, at a very moderate estimate, give one hundred bushels, and sometimes much more, but taking the lower figure as the basis for this calculation, the crop at the end of the second year would be sufficient to sow fifty acres, which, at

the same moderate comparison, would furnish 2,500 bushels available for seed or sale at the end of the third year.

The critical point of these tests is the threshing of the grain at the end of the first season, and it is here that some farmers fail to get the full advantage of the experiment. The product of the one-twentieth acre plot is sometimes threshed in a large machine, which it is difficult to thoroughly clean, and in this way the grain becomes mixed with other varieties and with weed seeds and is practically ruined. At the Central Experimental Farm we thresh the produce of many of the small plots of grain by cutting off the heads, placing them in sacks and beating them with a stick, then winnowing until most of the chaff is got rid of, and the grain made clean enough for sowing.

Where the farmer is to use this seed for his own sowing it is not necessary that the sample be entirely free from chaff. It is, however, most essential, if he is to get the full benefit of his experiment that the grain be quite free from all admixture with other sorts of grain or with weeds. Farmers are expected to harvest the product of their experiment plot separately, and store it away carefully, threshing it by hand either with a flail or in such other manner as they may prefer. The results to be gained will abundantly repay the cost of careful handling of the grain.

Every season after the regular free distribution of the samples has been provided for, the surplus grain grown on the Experimental Farms not required for sowing is sold to farmers in quantities of from two to six bushels or more each. In this way, a considerable number of farmers are supplied every year with seed grain in these larger quantities, especially from the branch Farms at Brandon, Manitoba; Indian Head, Saskatchewan; and at Lethbridge, Alberta.

CORRESPONDENCE.

The correspondence carried on during 1910-11, between the farmers of Canada and the officers of the Experimental Farms and Stations has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters and reports sent out at the Central Experimental Farm from April 1, 1910, to March 31, 1911—

	Letters Received.	Letters Sent.
Director	45,325	8,558
Agriculturist	3,915	6,218
Horticulturist	2,859	2,692
Cerealist	18,108	19,370
Chemist	2,067	2,203
Entomologist	2,476	3,845
Botanist	899	1,245
Poultry Manager	5,002	6,329
Accountant	1,644	2,917
	82,295	43,377

Many of the letters received by the Director are applications for samples of seed grain or for the publications issued by the Experimental Farms; most of these are answered by mailing the material asked for, accompanied in most instances by circular letters. This will explain why the number of letters received by that officer so much exceeds the number sent out.

DISTRIBUTION OF REPORTS, BULLETINS AND CIRCULAR LETTERS.

Reports and Bulletins mailed	242,470
Circulars and letters relating to samples of seed grain ..	44,624

BRANCH EXPERIMENTAL FARMS AND STATIONS.

The correspondence conducted by the Superintendents of the Branch Experimental Farms and Stations is also large, as is shown by the following figures:—

		Letters Received.	Letters Sent.
Experimental	Station, Charlottetown, P.E.I.	532	500
"	Farm, Nappan, N.S.	2,536	2,212
"	Station, Cap Rouge, P.Q.	390	510
"	Farm, Brandon, Man.	3,545	3,394
"	Farm, Indian Head, Sask.	10,191	9,974
"	Station, Rosthern, Sask.	396	342
"	Station, Lethbridge, Alta.	2,600	2,380
"	Station, Lacombe, Alta.	3,710	3,591
"	Farm, Agassiz, B.C.	4,983	4,869
		28,883	27,772

Much additional information has also been sent out from the branch Farms and Stations by printed circulars. By adding the correspondence conducted at the Branches to that of the Central Farm, the total number of letters received is found to be 111,178 and of those sent out 71,149.

BULLETINS AND PAMPHLETS ISSUED DURING THE YEAR ENDING MARCH 31, 1911.

In addition to reprints of Bulletins No. 47, Trees and Shrubs tested in Manitoba and the Northwest Territories, and No. 49, the Potato and its Culture, four new bulletins were issued during the year—

Bulletin No. 66 of the Experimental Farm series was prepared by the Dominion Cerealist, Dr. C. E. Saunders. This treats of the results obtained on all the Dominion Experimental Farms from trial plots of grain, fodder corn, field roots and potatoes, in 1910, and is the sixteenth issue of this publication. The average results obtained for the last five years are also given of those varieties which have been long under trial and these records are arranged in the order of their yield. These trial plots are conducted with the object of gaining information as to the relative productiveness of the different sorts tested and their earliness in ripening in the different climates of Canada. The returns show much variation in the weight and earliness of the crops grown, and point to the importance of care in the choice of varieties of seed for sowing.

Bulletin No. 67, entitled Mangels, Sugar Mangels and Sugar Forage Beets was prepared by the Dominion Agriculturist, Mr. J. H. Grisdale. This treats of the feeding values of these roots and full information is given as to the proper method of preparing the land, sowing, cultivation, harvesting, housing and feeding them. An appendix to this bulletin has been prepared by the Dominion Chemist, Mr. Frank T. Shutt, treating of the chemical constituents of these roots.

Bulletin No. 68 of the regular series, entitled Progress in the Breeding of Hardy Apples for the Canadian Northwest, was prepared by myself. This bulletin presents, in a convenient form, the results so far attained in the endeavour to produce varieties of apples which will be sufficiently hardy for the Northwestern provinces.

Bulletin No. 6 of the second series, entitled 'Western Prairie Soils: Their Nature and Composition,' by the Dominion Chemist, Mr. Frank T. Shutt, deals with some of the chief characteristics of the soils of the western provinces of the Dominion, giving the results of a number of analyses of these soils which the author has made, with some deductions as to the effects of continuous cropping of the prairie soils. Some notes are made of the chief features of agriculture in the west and in the bulletin is included a report from Dr. Edward J. Russell, Rothampstead Experiment Station, Harpenden, England, on the mechanical characteristics of these soils. A map is also included, showing the prairie and wooded areas and the lines of the first and second steppes of the provinces of Manitoba, Saskatchewan and Alberta.

Pamphlet No. 7, by the Dominion Chemist, Mr. Frank T. Shutt, on the 'Preservation of Fruits for Exhibition Purposes,' treats of the experiments which have been conducted by the author and myself with various preservatives for this purpose, and the formulæ are given of those which have proven the most successful.

REPORT OF THE EXPERIMENTAL STATION AT PEACE RIVER, ALBERTA, FOR THE YEAR ENDING MARCH 31, 1911.

FORT VERMILION,
PEACE RIVER, ALBERTA, October 12, 1910.

DR. WILLIAM SAUNDERS, C.M.G.,
Director, Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the third annual report of the work done at the Experimental Station, Fort Vermilion, during the past season, and also on agricultural conditions in general throughout this district.

The spring of 1910 opened early, and I was able to start seeding April 26, but seeding was not general until May 1. The germination of the grain was slow owing to the lack of moisture due to the small snowfall during the winter. The month of May was very dry and also the early part of June; when the first rains came, in the latter month, growth was very rapid. The first heavy rainfall was on June 18; the wheat was, at the time, not more than six or eight inches high, and the barley and oats not so far advanced, through having been sown later.

On June 28 we experienced a very heavy frost and the following plants received a severe set-back: Beans, melons, squash, cucumbers, corn and some of the peas; the potato tops were also badly touched in places.

Good growing weather prevailed throughout the rest of the month, with sufficient moisture. July opened favourably with abundant sunshine and frequent showers. No frost occurred during this month. The first of July saw Riga, Marquis, Ladoga

and Bishop wheats fully headed out, and Red Fife and Kubanka followed four days later. Oats commenced heading out on the 9th.

The hay crop was light on the high land owing to the dry season, but was plentiful in the swamps and around the lakes and, as a result, there is no shortage of feed in this district.

The conditions of the early part of August were favourable to all crops. On the night of the 14th, a slight frost occurred, but apparently did little damage; on the night of the 16th, however, there was a very heavy frost; the wheat on and around the Experimental Station was uninjured, but in other parts of the district it was badly damaged, especially on the north side of the river. The barley and oats were so far advanced that they escaped and are well up to the average. There will be about 5,000 bushels of wheat of saleable quality in the neighbourhood out of a possible 30,000 bushels, had the frost not occurred. Most of the injured wheat, though not saleable, will be good enough for grists and the rest for feed. This partial failure of the crops will thus not cause such distress as might appear. This frost also prevented the tomatoes from ripening and cut down the potato crops.

The first harvest work was done with barley, which was cut on August 13. The first wheat was cut on the 7th, and harvest became general on the 22nd. In this district, the crops were generally light, potatoes especially so.

Stacking was completed about September 24. Threshing has not yet been commenced.

The fruit trees and ornamental shrubs have done remarkably well. Some of the lilacs and other flowering shrubs were in bloom the greater part of the summer, and were the source of admiration and surprise to all who saw them. Many of the flowers are still in bloom (October 12), especially the pansies, which are still very brilliant, in spite of the many frosts.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) ROBERT JONES.

EXPERIMENTS WITH CEREALS.

All the wheats, oats, barleys and peas were sown in plots of 1-60 of an acre each, twenty-two feet long by thirty-three feet wide with paths between the different plots so that the grain might not become mixed; sown in drills about seven inches apart.

EXPERIMENTS WITH SPRING WHEAT.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Ladoga	Apr. 27	Aug. 26	122	46	6	3	Bearded	6,420	47	40	64
2	Riga	" 27	" 17	113	43	10	3½	Bald	6,505	46	40	64·5
3	Preston	" 26	" 27	124	42	8	4	Bearded	5,960	44	..	62
4	Red Fife	" 26	" 26	121	41	10	4¾	Bald	5,186	43	44	62
5	Marquis	" 26	" 26	123	42	10	4¼	"	7,008	40	..	65
6	Bishop	" 26	" 16	113	40	10	3¼	"	6,656	38	24	63

The average yield in 1910 of the six varieties of wheat under trial was 43 bushels 24 lbs. per acre.

	(Durum or Macaroni Wheat,											
1	Kubanka	Apr. 29	Aug. 25	121	56	5	2½	Bearded	7,600	52	..	63·5

EXPERIMENTS WITH OATS.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Banner	Apr. 28	Aug. 15	109	56	8	9½	Br'nch'g	7,240	120	..	37·3
2	Tartar King	" 28	" 18	112	48	10	8	Sided	6,892	95	10	36·7
3	Excelsior	May 11	" 21	102	47	10	8½	"	5,020	72	..	36
4	Improv'd Ligowo	Apr. 29	" 18	111	48	8	8	Br'nch'g	6,020	70	20	39

The average yield in 1910 of the four varieties of oats under test was 89 bushels 10 lbs. per acre.

EXPERIMENTS WITH SIX-ROW BARLEY.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw, including head	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1.	Claude	Apr. 29	Aug. 8	101	48	8	3½	4,960	71	2	49.5
2.	Mensury	" 29	" 12	105	41	5	3	4,768	57	16	50.0
3.	Champion	May 11	" 19	100	44	10	3	4,288	49	24	41

The average yield in 1910 of the three varieties of six-row barley under trial was 55 bushels 27 lbs. per acre.

EXPERIMENTS WITH TWO-ROW BARLEY.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw, including head.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre		Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1.	Sidney	Apr. 29	Aug. 19	112	42	7	3¼	4,760	66	38	51·5
2.	Canadian Thorpe	" 29	" 15	108	39	5	3	4,130	66		53·0

The average yield in 1910 from the two varieties of two-row barley tested was 66 bushels 19 lbs. per acre.

EXPERIMENTS WITH PEAS.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Average Length of Straw.	Average Length of Pod.	Size of Pea.	Yield per Acre		Weight per measured bushel after cleaning.
						In.	In.		Bush.	Lbs.	Lbs.
1.	Arthur	Apr. 27	Aug. 16	111	strong	39	3	medium	36	13	62

EXPERIMENTS WITH FIELD ROOTS.

These were all sown in drills 2½ feet apart.

CARROTS—Test of Varieties.

No.	Name of Variety.	When Sown.	When Pulled.	Size.	Yield.	
					Tons.	Lbs.
1	Ontario Champion	April 30	Sept. 22	Large	29	320
2	Improved Short White	May 2	" 20	Medium	24	960
3	Half-long Chantenay	"	" 20	"	23	80

TURNIPS—Test of Varieties.

No.	Name of Variety.	When Sown.	When Pulled.	Size.	Yield.	
					Tons.	Lbs.
1	Perfection Swede	May 3	Sept. 25	Large (some 19 lbs.)	22	432
2	Good Luck	"	"	Small	20	4

SUGAR BEETS—Test of Varieties.

No.	Name of Variety.	When Sown.	When Pulled.	Size.	Yield.	
					Tons.	Lbs.
1	Klein Wanzleben	May 3	Sept. 25	Large	20	1,904
2	New Danish	"	"	Medium	17	1,840
3	Vilmorin's Improved	"	"	Very small	15	720

MANGELS—Test of Varieties.

No.	Name of Variety.	When Sown.	When Pulled.	Size.	Yield.	
					Tons.	Lbs.
1	Giant Yellow Globe	May 4	Sept. 26	Large	24	896
2	Mammoth Red	"	"	Medium	21	1,904

POTATOES.—Test of Varieties.

No.	Name of Variety.	When Sown.	When Pulled.	Size.	Yield.
1	Early Rose	May 2 and 4	Sept. 24	Medium	416½ bushels.
2	Carman No. 1	" 11	" 19	Large	52 lbs. from 7 lbs seed.
3	Gold Coin	" 11	" 19	Medium	30 lbs. from 2 lbs seed.
4	Irish Cobbler	" 11	" 19	Small	14 lbs. from 2 lbs seed.

INDIAN CORN—Test of Varieties.

No.	Name of Variety.	Height.	Sown in hills.	Yield per Acre.	
		Inches.		Tons.	Lbs.
1	Longfellow	50	May 11	7	592
2	Compton's Early	54	"	7	80
3	Extra Early Adams	44	"	5	720

All these varieties of corn were very green and frosted when cut on August 23, and their growth had been much retarded by drought. Two varieties of table corn. Malakoff and Golden Bantam, were sown, but did not succeed owing to the dry weather.

EXPERIMENTS WITH GRASSES AND CLOVERS.

SAINFOIN.—A small plot was sown on May 11. It produced a very strong growth. standing 3 feet high when cut on August 13.

ALFALFA.—The small plots of Alfalfa sown on May 16 did not do well. The plots were cut by hand on July 30, but there was not enough to rake up.

TIMOTHY AND BROME GRASS.—Sown last year. Did not yield over 1½ tons per acre. Timothy, Brome and Western Rye grass sown with a nurse crop of oats this year were a fairly good catch.

ORCHARD GRASS.—This was sown on a small plot of summer-fallow, without a nurse crop and is looking well.

VEGETABLES.

SOWN IN THE OPEN.

Lettuce.—Sown May 5; fit for use June 1.

Cabbage.—Produced some very fine specimens.

Radish.—Early Scarlet White Tip. Sown May 5; fit for use May 30. French Breakfast; sown May 5, fit for use May 25.

Parsnips.—Hollow Crown. Sown May 5. Very large; part left in ground for winter.

Table Carrots.—Guerande. Sown May 5; fit for use July 15; of very fine flavour.

Onions.—Danver's Yellow; sown May 5. Large Red Wethersfield; sown May 5. Both these varieties were taken up September 15 and were of medium size.

Table Turnips.—Early White Strapped.—Sown May 5; fit for use June 8. Of quite large size.

Parsley.—Extra Curled. Sown May 5; fit for use July 11.

Asparagus.—Conover's Colossal. Sown May 6. Did fairly well. Plants from last year did very well.

SOWN IN HOT-BEDS.

Sown April 19. Set out May 24 and 26.

Cabbage.—Premium Large Late Flat Dutch. In use August 20; average weight 9 lbs. A very good variety; at the time of taking up, some of them weighed 16 lbs. each. Hanson. In use August 14; average weight 7½ lbs.; very solid. Extra Early Paris Market. In use July 12. Average weight 8 lbs. A very good variety. Early Jersey Wakefield. In use July 20; average weight 6½ lbs; a very fine variety. Marble Head Mammoth. In use August 30; average weight 9 lbs. Very large and solid; on October 2, some of these weighed 18 lbs. each.

Cauliflower.—Henderson's Snowball. In use August 1; average weight 5 lbs. A fine, solid variety, some of them weighing 9 lbs. each.

Extra Early Erfurt.—In use July 20; average weight 4½ lbs. A good variety.

June Cauliflower.—In use July 15; average weight 6 lbs.; had good large heads at the time of taking up.

Celery.—White Plume. In use September 1; very small in size.

Squash.—White Bush Scallop, Boston Marrow, Vegetable Marrow. These three varieties were very much set back by spring frost and were quite small. Golden Hubbard. Taken up September 4; some of this variety weighed 6 lbs. each.

Cucumbers and melons were killed by the spring frosts.

THE FLOWER GARDEN.

Variety.	Sown in Open.	In Bloom from.	Remarks.
Sweet Peas—			
King Edward	May 12	Aug. 8	These were all in bloom on Oct. 12.
St. George	" 13	" 9	
Dorothy Eckford	" 13	" 4	
George Herbert	" 13	" 3	
Mrs. Collier	" 13	" 2	
Superb New Spencer	" 13	" 6	
Queen Victoria	" 13	" 6	
Helen Lewis	" 12	" 3	
Prince Olaf	" 12	" 8	
Mixed varieties (S.B. & Co.)	" 5	July 20	
Centaurea (Corn Flower)	" 13	" 21	Very good.
Heliotrope	" 12		Did not germinate.
California Poppy	" 12	July 2	Profuse bloom.
Candytuft (Empress)	" 12	" 2	Good.
Alyssum	" 12	" 21	Very fine.
Clarkia Mixed	" 12	" 7	Did well.
Coreopsis	" 12	" 30	Bloomed freely.
Godetia	" 12	Aug. 2	Grand show.
Iceland Poppy	" 12	" 16	Only 3 plants did well.
Pansies, 4 varieties	" 13	July 30	Very handsome colours.
Portulaca	" 13	" 25	Bloomed well.
Asters, 4 varieties	" 13	Aug. 2	Fair.
Ice Plant	" 13		Very good; large.
Stocks	" 13	July 30	Good.
Scabiosa, 2 varieties	" 13	Aug. 2	Did well.
Poppy, 4 varieties	" 13	July 6	Did well.
Balsam, Camelia Flowered	" 5		Killed by frost Aug. 16.
Salpiglossis	" 5	Aug. 1	Very good.
Sunflower, Globe of Gold	" 5	July 16	Bloomed well.
Delphinium (Larkspur)	" 5		Good growth.
" "	Sown last year	July 2	Great show of bloom.
Daisies	May 7	Sept. 1	Very fine.
Mignonette	" 7	July 4	Fine bloom.
Nasturtium, climbing	" 14	" 16	Great show of bloom.

SOWN IN HOT-BED, April 13. Planted out May 20.

Verbena hybrida, Mammoth.
Antirrhinum, 2 varieties. None of these was in bloom till September 15.
Dianthus, 2 varieties.
Phlox Drummondi.
Nasturtium, Dwarf, May 14; July 23. Very fine bloom.
Marigold, May 13; July 16. Did very well.

FRUITS, TREES AND SHRUBS,

Of the cross-bred apples under test at Fort Vermilion, the following are reported, under date of September 10, 1910, as doing well: Alberta, Tony, Prince, Golden, Magnus, Silvia, Pioneer and Robin. These have all proved hardy and have made good growth. Robin had one specimen of fruit last year which Mr. Jones picked and forwarded to Ottawa. It reached its destination safely, but had been picked too soon; it was not much more than about half size. Some seedlings of the cross-bred apples have been grown and are doing well; they are seedlings of Alberta, Golden, Jewel, and Silvia. Several Russian apples are also reported as doing well, namely, Charlamoff, Varna and Morden.

Among the plums still surviving and reported as doing well are Aitken, Odegard, Mankato and seedlings of Carsterson. As the plums have not yet fruited, Mr. Jones expresses the fear that the climate of Fort Vermilion may be a little too severe for them.

The black currants, of which there are eleven varieties growing, are all doing well, having made a strong growth. The birds, however, have kept a watchful eye on the ripening fruit and appropriated a large proportion of that which has matured. The red and white varieties have also made good growth and have fruited well.

Of raspberries, the Herbert and Heebner are both doing satisfactorily. Strawberries have suffered much from the severe climate and all the plants have died.

Of the ornamental trees and shrubs, the following are reported as doing well:—

Acer dasycarpum.
" *negundo.*
" *tataricum ginnala.*
" *pictum.*
Amelanchier vulgaris.
Betula alba.
" " *laciniata.*
Berberis sinensis.
" *Thunbergii.*
Caragana arborescens.
" *frutescens.*
" *grandiflora.*
" *pygmaea.*
Of *C. pygmaea,* Mr. Jones says that it was blooming all summer.
Clematis montana.
Cotoneaster tomentosa.
Crataegus Arnoldiana.
" *carrieri.*
Celtis occidentalis.
Ceanothus Americanus.
Diervilla lutea.
Eleagnus Augustifolia (Russian Olive)
Euonymus Europaeus ovatus.
" *linearis.*
Fraxinus Pennsylvanica lanceolata. (Green Ash).
Hydrangea paniculata grandiflora.
Ligustrum amurense.
Lonicera alpina.
" *Fenzlei.*
" *mundeniensis* (has bloomed well)
" *Sullivanti.*
" *virginalis alba.*
Lycium Europaeum.
Philadelphus Mont Blanc.
Populus angustfolia.
Quercus rubra.
Rhamnus frangula.
Ribes aureum.
Roses—
Persian Yellow.
Souvenir Philemon Cochet.
Delicata,
and two other varieties, the names of which are lost. These have all bloomed well.

Spiraea arguta (very fine. In bloom May 25).
" *Billardi* (in bloom July 13).
" *sorbifolia* (in bloom July 8).
Salix Voronesh.

Syringa amurense.
" *Japonica.*
" *Pekinensis.*
" *rothomagensis.*
" *villosa* (in bloom June 1).
" *vulgaris,* Chas. Joly (in bloom June 1).
" " Chas. X.
" " Congo.
" " Emilie Lemoine.
" " Jacques Calot.
" " Mad. Abel Chatenay.
" " Mad. Casimir Perier.
" " Mdlle. Fernande Viger.
" " Michel Buchner (in bloom June 5.)
Viburnum molle.

EVERGREENS.

Abies remonti (doing very well).
Picea pungens (growing very slowly).
Pinus strobus, White Pine (doing well).
" *sylvestris,* Scotch Pine (doing fairly well).
Retinospora pisifera (doing well).
Pseudotsuga Douglasii, Douglas Spruce (doing finely).
Thuya occidentalis (doing well).
" " *Columbia* (doing finely).
" " *globosa* (doing very well).
" " *Hoveyii* (doing well).

Several plants of *Delphinium,* raised from seed grown at Indian Head, have done very well and bloomed profusely.

SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River, Alberta

	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
	°	°	°				
APRIL.							
Ottawa	47·69	76·0	22·0	2·06	0·87	174·5	5·81
Fort Vermilion	35·68	62·9	16·0	0·32	0·30	144·1	4·80
MAY.							
Ottawa	51·16	79·5	34·0	1·86	0·50	198·4	6·40
Fort Vermilion	46·93	79·2	19·5	0·39	0·31	217·0	7·00
JUNE.							
Ottawa	64·80	89·4	32·5	1·24	0·27	231·4	7·71
Fort Vermilion	56·10	89·5	29·0	1·73	1·09	302·6	10·08
JULY.							
Ottawa	70·40	92·8	52·0	2·38	0·62	265·1	8·55
Fort Vermilion	59·98	81·1	38·0	2·33	0·90	308·2	9·94
AUGUST.							
Ottawa	66·74	87·2	42·4	4·32	0·97	237·6	7·66
Fort Vermilion	53·48	84·0	24·8	0·97	0·40	322·5	10·40
SEPTEMBER.							
Ottawa	55·70	77·0	35·8	2·06	1·06	202·0	6·73
Fort Vermilion	46·01	77·0	20·1	1·01	0·25	152·3	5·07
OCTOBER.							
Ottawa	46·92	73·0	25·0	3·76	1·47	153·1	4·93
Fort Vermilion	34·80	63·9	7·5	0·60	0·19	116·3	3·75
NOVEMBER.							
Ottawa	32·27	57·2	17·0	1·79	0·45	46·8	1·56
Fort Vermilion	5·75	33·9	—26·2	0·77	0·35	47·1	1·57
DECEMBER.							
Ottawa	11·80	35·5	—25·2	1·64	0·67	93·1	3·00
Fort Vermilion	—5·16	35·5	—52·9	0·85	0·30	39·3	1·26

SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River, Alberta.—*Continued.*

JANUARY.

	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
	°	°	°				
Ottawa	11·38	40·0	—17·8	1·56	0·50	98·1	3·16
Fort Vermilion	—29·55	3·2	—78·0	0·97	0·30	71·9	2·31

FEBRUARY.

Ottawa	12·34	38·7	—17·0	2·82	0·85	113·2	4·04
Fort Vermilion	—4·00	44·0	—59·6	0·20	0·10	114·9	4·10

MARCH.

Ottawa	21·67	46·2	—7·0	2·22	0·90	189·1	6·10
Fort Vermilion	14·46	49·0	—40·2	0·41	0·15	151·4	4·88

RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1910, to March 31, 1911.

Month.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	24	6	144·1	4·80
May	30	1	217·0	7·00
June	29	1	302·6	10·08
July	28	3	308·2	9·94
August	31	0	322·5	10·40
September	23	7	152·3	5·07
October	25	6	116·3	3·75
November	13	17	47·1	1·57
December	15	16	39·3	1·26
January	19	12	71·9	2·31
February	24	4	114·9	4·10
March	29	2	151·4	4·88

(Signed) WILLIAM T. ELLIS,
Observer.

TABLE of Meteorological Observations taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1910, to March 31, 1911, showing maximum, minimum, and mean temperature, also highest and lowest for each month with date of occurrence; also rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall	Snowfall.	Total precipitation.	Number of days. Precipitation.	Heaviest in 24 Hours.	Date.
	°	°	°	°	°		°							
April	46·02	25·35	20·67	35·68	62·9	29th	16·0	6th	.....	3·25	0·32	2	0·30	20th.
May	61·12	33·06	27·74	46·93	79·2	6th	19·5	15th	0·39	.....	0·39	3	0·31	29th.
June	70·21	42·00	28·20	56·10	89·5	12th	29·0	3rd	1·73	.....	1·73	6	1·09	18th.
July	72·63	47·35	25·27	59·98	81·1	13th	38·0	30th	2·33	.....	2.33	11	0·90	2nd.
August	67·77	39·19	28·58	53·48	84·0	6th	24·8	26th	0·97	.....	0·97	5	0·40	28th.
September	57·76	34·27	23·48	46·01	77·0	16th	20·1	24th	1·01	.....	1·01	9	0·25	21st.
October	45·24	24·37	20·87	34·80	63·9	9th	7·5	27th	0·60	.....	0·60	5	0·19	9th.
November	16·90	− 5·38	22·26	5·75	33·9	16th	−26·2	7th	.....	7·75	0·77	4	0·35	11th.
December	7·60	−17·31	24·31	− 5·10	35·5	22nd	−52·9	29th	.....	8·50	0·85	6	0·30	8th.
January	−18·80	−40·23	21·47	−29·55	3·2	5th	−78·0	11th	.....	9·75	0·97	8	0·30	6th.
February	+12·05	−20·05	32·10	− 4·00	44·0	24th	−59·6	2nd	.....	2·00	0·20	3	0·10	9th.
March	27·67	1·59	25·75	14·46	49·0	19th	−40·2	11th	.....	4·25	0·41	5	0·15	13th.
									7·03	35·50	10·55	67		

REPORT OF EXPERIMENTS IN AGRICULTURE AND HORTICULTURE AT KAMLOOPS, B.C.

The following report, under date of March 31, 1911, has been received from Mr. E. W. Calhoun, Superintendent of the Harper ranch, Kamloops, B.C., on the results of some experiments which have been conducted, under the instructions of the Minister of Agriculture, by the Director of Experimental Farms, on ten acres of land set aside for that purpose.

It is proposed to conduct, from year to year, on this land, experiments with winter wheat and spring grains; a portion also has been set aside for the testing of varieties of apples. These tests are being arranged so as to gain experience as to the best methods to follow in growing grains and fruit trees under the dry conditions which prevail in the vicinity of Kamloops.

HARPER RANCH, KAMLOOPS, B.C., March 31, 1911.

To Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I beg to submit herewith a report of the work done during the past season on the ten acres of land placed at the disposal of the Dominion Department of Agriculture on the Harper ranch, Kamloops, B.C.

After fencing, this land was first broken in May, 1909, and backset in June; the ground was very dry at the time, but the fall grains were seeded in August, and the packer was used as directed. During the following winter, we had a very light snowfall which did not exceed four inches in all, and only lasted for three days. In a climate like this, where the evaporation is so great and the snowfall so very light, the land was really drier in the spring when the vegetation should have started, than it was in August when the grain was seeded.

On January 9, two samples of winter wheat which had been grown on one acre of the land seeded August 31 at the rate of one bushel per acre, were sent to the Experimental Farm at Ottawa. This grain headed out about June 2, 1910, and was cut on July 5.*

The plot seeded at the rate of about thirty lbs. per acre, owing to the unfavourable season, yielded very little, while the spring grains, for the same reason, were practically a failure.

APPLE TREES.

We received from Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm at Agassiz, sixty-one yearling apple trees which were planted on April 8 about four inches deeper than they had been in the nursery. Each tree was given about three gallons of water at the time of planting and on May 3 a similar watering was given, removing enough of the loose earth from the surface so as to hold the water close to the tree, and, as soon as it had soaked into the ground so that it would not puddle, we filled it again with the dust mulch so as to retain the moisture. In June, a similar watering was given. With the exception of three trees, they all survived, and apparently went into the winter in good condition.

Yours truly.

(Sgd.) E. W. CALHOUN.

* When received, this wheat was handed to the Dominion Cerealist, who reports on it as follows:— 'The sample of Kharkov winter wheat which has been received from Kamloops from the crop raised there last season, is excellent, hard wheat, of admirable appearance, and weighing a little over 65 lbs. per bushel.'

Driveway leading to Director's House, Central Farm, Ottawa.

Photo by FRANK T. SHUTT.

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The following report includes tests of grain and other seeds grown on the several Experimental Farms, as well as those bought with the object of growing them on the Farms. The list also includes tests of the vitality of a number of specimens of grain grown in the several provinces of the Dominion, from the samples distributed from the Central Experimental Farm. These tests have been made with the object of ascertaining what climatic conditions are most favourable for producing seed of high vitality, and how far this desirable quality is likely to be influenced by variations in character of season. Formerly, these tests included a number of doubtful samples which were believed, by the parties sending them, to have been injured in their vitality by exposure to unfavourable conditions. All such samples are now referred to the Seed Commissioner, Department of Agriculture, Ottawa, for report. The results reported on here are the average proportions of vitality shown by samples of grain grown in different parts of the several provinces of Canada, under healthy and normal circumstances. In the following table, showing the results by provinces, the total percentage of vitality is given, also the percentage of strong kernels and of those of weak growth.

RESULTS OF TESTS OF SEEDS FOR VITALITY, 1910-11.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
Wheat	506	100·0	59·0	90·2	2·1	92·3
Barley	433	100·0	51·0	89·3	3·5	92·8
Oats	454	100·0	28·0	90·4	2·8	93·2
Rye	11	99·0	67·0	85·0	2·8	87·8
Peas	113	100·0	60·0	.....	.....	89·9
Beans	7	100·0	72·0	.....	.....	94·2
Flax	20	91·0	49·0	.....	.....	76·2
Grass	1	12·0	12·0	.....	.....	12·0
Maple	1	9·0	9·0	.....	.....	9·0
Ash	1	2·0	2·0	.....	.....	2·0
Total number of samples tested, highest and lowest percentage	1,547					

TABLE SHOWING RESULTS OF GRAIN FOR EACH PROVINCE FOR 1910-11.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
ONTARIO.						
Wheat	141	100·0	70·0	92·0	2·2	94·2
Barley	114	100·0	53·0	92·1	2·2	94·4
Oats	76	100·0	88·0	96·0	1·5	97·5
QUEBEC.						
Wheat	30	100·0	62·0	90·8	1·7	92·5
Barley	31	100·0	77·0	93·0	1·7	94·7
Oats	35	100·0	73·0	91·4	2·6	94·0
MANITOBA.						
Wheat	50	100·0	81·0	93·5	1·4	94·9
Barley	40	100·0	80·0	89·4	3·5	93·0
Oats	45	100·0	28·0	91·8	2·2	94·1
ALBERTA.						
Wheat	102	100·0	66·0	86·3	2·4	88·8
Barley	82	100·0	65·0	89·1	2·7	91·8
Oats	90	100·0	30·0	86·1	4·2	90·4
SASKATCHEWAN						
Wheat	80	100·0	67·0	91·2	2·1	93·3
Barley	47	100·0	51·0	91·8	1·7	93·6
Oats	52	100·0	44·0	84·2	3·7	88·0
NOVA SCOTIA.						
Wheat	33	99·0	71·0	88·8	2·0	90·9
Barley	61	100·0	72·0	81·3	8·2	89·5
Oats	51	100·0	52·0	90·4	2·7	93·2
NEW BRUNSWICK.						
Wheat	26	100·0	59·0	88·5	1·7	90·2
Barley	8	100·0	71·0	86·7	5·8	92·6
Oats	32	100·0	77·0	91·2	2·5	93·8
PRINCE EDWARD ISLAND.						
Wheat	32	99·0	59·0	86·8	2·5	89·4
Barley	29	99·0	55·0	84·3	5·6	89·9
Oats	53	100·0	75·0	91·2	2·8	94·0
BRITISH COLUMBIA.						
Wheat	12	100·0	86·0	95·1	1·6	96·8
Barley	21	100·0	92·0	94·6	2·9	97·5
Oats	28	100·0	87·0	96·1	1·3	97·6

(Signed) WILLIAM T. ELLIS.

METEOROLOGICAL OBSERVATIONS.

TABLE of meteorological observations taken at the Central Experimental Farm, Ottawa, from April 1, 1910, to March 31, 1911, giving maximum, minimum and mean temperature for each month, with date of occurrence, also the rainfall, snowfall and total precipitation.

Month	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
April	57·81	37·57	20·24	47·69	76·0	5th	22·0	13th	2·06	·5	2·06	13	0·87	18th
May	64·31	44·01	20·30	54·16	79·5	29th	34·0	13th	1·86	.....	1·86	14	0·50	30th
June	76·34	53·27	23·06	64·80	89.4	22nd	32·5	4th	1·24	.....	1·24	14	0·27	6th
July	81·88	58·93	22·95	70·40	92·8	9th	52·0	29th	2·38	.....	2·38	15	0·62	3rd
August	77·94	55·56	22·37	66·74	87·2	3rd	42·4	27th	4·32	.....	4·32	16	0·97	18th
September	66·56	44·84	21·72	55·70	77·0	17th	35·8	22nd	2·06	.....	2·06	13	1·06	6th
October	55·21	38·32	17·21	46·92	73·0	5th	25·0	13th	3·69	0·75	3·76	14	1·47	6th
November	36·98	27·56	9·42	32·27	57·2	1st	17·0	21st	0·85	9·50	1·79	12	0·45	30th
December	20·13	3·49	16·63	11·80	35·5	24th	−25·2	31st	.....	16·50	1·64	16	0·67	30th
January	22·99	−0·20	23·17	11·38	40·0	3rd	−17·8	18th	0·02	15·50	1·56	15	0·50	9th
February	21·38	3·31	18·06	12·34	38·7	26th	−17·0	6th	0·20	26·25	2·82	10	0·85	12th
March	31·36	11·99	19·36	21·67	46·2	26th	−7·0	4th	0·26	19·75	2·22	14	0·90	22nd
									18·94	88·25	27·71	166		

Rain or snow fell on 166 days during the 12 months.

Heaviest rainfall in 24 hours, 1.47 inches on October 6.

Heaviest snowfall in 24 hours, 9.00 inches on March 22.

The highest temperature during the 12 months was 92.8° on July 9.

The lowest temperature during the 12 months was 25.2° on December 31.

During the growing season rain fell on 13 days in April, 14 days in May, 14 days in June, 15 days in July, 16 days in August and 13 days in September.

February shows the lowest number of days with precipitation, viz., 10 days.

Total precipitation during the 12 months 27.72 inches, as compared with 34.51 inches during 1909-10.

RAINFALL, SNOWFALL AND TOTAL PRECIPITATION from 1890 to 1910-11, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·72
1991	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906 January 1 to March 31	1·90	24·50	4·34
1906-07	21·73	72·50	28·94
1907-08	24·73	134·75	38·18
1908-09	22·13	107·90	32·91
1909-10	28·40	61·25	34·51
1910-11	18·94	88·25	27·72
Total for 21 years and 3 months	543·39	1,936·25	736·68
Average for 21 years	25·87	91·91	35·08

RECORD OF SUNSHINE at the Central Experimental Farm, Ottawa, from April 1, 1910. to March 31, 1911.

Month.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day
April	27	3	174·5	5·81
May	26	5	198·4	6·40
June	29	1	231·4	7·71
July	29	2	265·1	8·55
August	30	2	237·6	7·66
September	27	3	202·0	6·73
October	25	6	153·1	4·93
November	16	14	46·8	1·56
December	22	9	93·1	3·00
January	22	9	98·1	3·16
February	20	8	113·2	4·04
March	28	3	189·1	6.10

(Signed) WILLIAM T. ELLIS,
Observer.

EXPERIMENTS IN THE DECREASE OF VITALITY OF GRAIN THROUGH AGE.

FIRST EXPERIMENT.

In 1898, some experiments were begun to gain information as to the relative decrease of vitality which occurs with age when the important cereals are kept under the conditions which prevail in an ordinary office, the grains being stored in cotton bags.

Three varieties of wheat were used, Red Fife, Preston and Red Fern; three varieties of oats, Banner, Prize Cluster and Scottish Chief; two varieties of barley, one of two-row, Canadian Thorpe, and one of six-row Mensury; two of peas, Daniel O'Rourke and White Marrowfat and one variety of flax.

These samples, at the time of selection, were of high vitality, ranging from 81 to 100 per cent, and were plump and well-developed.

In all these tests one hundred kernels have been used in each case, and the test has invariably been made in the soil. The work of testing has been done under my supervision, by Mr. W. T. Ellis, who is a most careful experimenter and observer.

The rapid decrease in the vitality of the wheat in the fourth year of testing is very striking and is still more marked in the fifth year. The Red Fern is a very strong growing sort, but why it should show a greater vitality than Red Fife or Preston I am unable to suggest any explanation.

With reference to the oats also, the decrease is not serious until the fifth year, but the vitality falls quite low in the sixth and seventh years. The vitality of the two-row barleys was very fully run out by the fourth year and was entirely exhausted on the fifth. The six-row varieties show a much higher and more enduring degree of germinating power. The same may be said of the peas.

This series of experiments was carried on for seven years, from 1898 to 1904.

DECREASE IN THE VITALITY OF GRAIN WITH AGE.

FIRST EXPERIMENT.

Variety.	1898.			1899.			1900.			1901.			1902.			1903.			1904.		
	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.
Wheats—																					
Red Fife, I.H.	91	83	8	83	67	16	75	73	2	19	15	4	3	2	1	...	...	...	...	...	...
Preston, C.E.F.	87	82	5	89	82	7	84	76	8	39	36	3	4	1	3	...	...	...	...	...	...
Red Fern, C.E.F.	62	48	14	75	71	4	73	68	5	54	43	11	38	34	4	17	17	...	...	...	...
Oats—																					
Banner, I. H.	81	72	9	94	87	7	86	80	6	71	64	7	56	48	8	39	33	6	23	17	6
Banner, C.E.F.	92	86	6	93	85	8	87	76	11	71	63	8	75	69	6	45	38	7	29	15	4
Prize Cluster	94	89	5	93	88	5	71	66	5	70	62	8	67	65	2	30	22	8	28	23	5
Scottish Chief	94	84	10	92	86	6	69	61	8	56	44	12	18	16	2	4	3	1	7	5	2
Barleys—																					
Canadian Thorpe	94	91	3	84	78	6	60	56	4	11	7	4	...	...	...	...	...	...	...	...	...
Mensury	100	98	2	98	96	2	97	91	6	61	59	2	39	35	4	15	15	...	2	2	...
Peas—																					
Daniel O'Rourke	98	...	...	92	...	...	98	...	...	70	...	...	76	...	...	6	...	...	10	...	...
Large White Marrowfat	90	...	...	98	...	...	78	...	...	58	...	...	52	...	...	6	...	...	10	...	...
Flax	81	...	...	82	...	...	75	...	...	49	...	...	26	...	...	24	...	...	2	...	...

DECREASE IN THE VITALITY OF GRAIN WITH AGE.

FIRST EXPERIMENT.

Year.	Highest Vitality. Variety.		Lowest Vitality. Variety.		Average.
	Wheats.	p. c		p. c.	p. c.
1898..	Red Fife, I.H.	91	Red Fern, C.E.F.	62	80·00
1899..	Preston, C.E.F.	89	Red Fern, C.E.F.	75	82·33
1900..	Preston, C.E.F.	84	Red Fern, C.E.F	73	77·33
1901..	Red Fern, C.E.F.	54	Red Fife, I.H	19	37·33
1902..	Red Fern, C.E.F.	38	Red Fife, I.H.	3	15·00
1903..	Red Fern, C.E.F.	17	Red Fife, I.H. Preston, C.E.F.	00	5·66
1904..	None	.....	None	.....	
	Oats.				
1898	Prize Cluster. Scottish Chief.	94	Banner, I.H.	81	90·25
1899..	Banner, I.H.	94	Scottish Chief	92	93·00
1900..	Banner, C.E.F.	87	Scottish Chief	69	78·25
1901	Banner, I.H. Banner, C.E F	71	Scottish Chief	56	67·00
1902..	Banner, C.E.F	75	Scottish Chief	18	54·00
1903..	Banner, C.E.F.	45	Scottish Chief	4	29·05
1904..	Banner, C.E.F.	29	Scottish Chief	7	15·00
	Barley.				
1898..	Mensury	100	Canadian Thorpe	94	97·00
1899..	Mensury	98	Canadian Thorpe.	84	91·00
1900.	Mensury	97	Canadian Thorpe	60	78·05
1901..	Mensury	61	Canadian Thorpe	11	36·00
1902..	Mensury	39	Canadian Thorpe	00	19·05
1903..	Mensury	15	Canadian Thorpe	00	7·05
1904..	Mensury	2	Canadian Thorpe	00	1·00
	Peas.				
1898..	Daniel O'Rourke	98	White Marrowfat	90	94·00
1899..	White Marrowfat	98	Daniel O'Rourke	92	95·00
1900..	Daniel O'Rourke	98	White Marrowfat	78	88·00
1901..	Daniel O'Rourke	70	White Marrowfat	58	64·00
1902..	Daniel O'Rourke	76	White Marrowfat	52	64·00
1903	Daniel O'Rourke White Marrowfat.	6 6	.....	.....	6·00
1904	Daniel O Rourke White Marrowfat	6	.....	.....	6·00

SECOND EXPERIMENT.

In 1903, a larger series of trials of samples of grain was planned and put into effect, the experiments being continued to the present, being nine years in all.

Two sets of samples were provided for this test, one set being kept under the same conditions as obtained in the First Experiment. The grain was put up in cotton bags and kept on a shelf in an office building where the temperature varied widely and where they were subjected to artificial heat during the winter. The other series were put up in the same way and were placed in a room in the upper part of a barn where there was no artificial heat and where the temperature in winter was very much the same as that out-of-doors. The experiment with those samples kept in a warm place was commenced in 1903, and those exposed to cold were tested for the first time a year later.

In this series of trials, fifteen varieties of spring wheat and three varieties of fall wheat, twenty varieties of oats, sixteen of six-row barley, ten of two-row barley and seventeen varieties of peas, were tested.

Under the influence of cooler temperatures, the loss of vitality in all the samples was slower than where kept in warmer temperatures. All the samples selected were from seed grown the previous year and were all of high vitality, plump and well developed. All samples marked C. E. F. were grown at the Central Experimental Farm, those marked Br. at Brandon, Man., and those marked I. H. at Indian Head, Sask.

Among the wheats, the winter varieties retained a high proportion of germinating power longer than the spring wheats but the difference is not marked after the sixth year, by which time, the specimens both in warm and in cold storage had almost entirely lost their germinating power.

Referring to the varieties of oats tested, the samples showed reasonably good vitality for five years and then dropped rapidly.

In the six-row barley, the original proportion of vitality was retained in cold storage for at least six years, after which it dropped materially, while in the warm house, the vitality was maintained in good proportion for five years and after that fell off rapidly.

Two-row barley in the warm room dropped considerably below fifty per cent on the fifth year, while that in the cold room reached the same position on the sixth year.

The main decrease in the vitality of the peas tested in the warm room occurred on the sixth year, dropping to 36 per cent, while those in the cold room showed 45 per cent of germinating power on their seventh year.

These experiments serve to show that it is safe to sow many sorts of seed when two or three years old, in case it is more convenient to do so, but the facts brought out seem to discredit the stories related about grain germinating after having been kept for long periods.

Wheat.	Jan., 1903.			Mar., 1904.			Mar., 1905.			Mar., 1906.			Mar., 1907.			Feb., 1908.			Mar., 1909.			Mar., 1910.			Mar., 1911.		
	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.
Stanley, Br. ... warm	93	81	12	83	81	2	74	72	2	71	65	6	53	46	7	8	6	2	2	1	1	1	....	1	....	....	....
" Br. ... cool	....	....	....	84	82	2	86	74	12	79	75	4	75	69	6	84	78	6	21	19	2	11	10	1	5	3	2
Wellman's Fife, Br. ... warm	96	88	8	71	63	8	80	74	6	84	80	4	70	63	7	21	21	....	26	22	4	11	9	2	2	1	1
" Br. ... cool	....	....	....	91	84	7	84	56	28	92	82	10	92	83	9	83	80	3	31	25	6	19	17	2	13	12	1
White Fife, Br. ... warm	99	96	3	89	78	11	88	82	6	86	82	4	67	61	6	26	25	1	33	26	7	12	11	1	2	1	1
" Br. ... cool	....	....	....	94	89	5	92	72	20	82	77	5	92	84	8	89	85	4	29	25	4	26	24	2	17	15	2
White Russian, Br. ... warm	98	94	4	96	93	3	89	89	....	99	97	2	84	77	7	35	34	1	32	28	4	10	8	2	....	....	....
" Br. ... cool	....	....	....	96	90	6	94	75	19	96	92	4	86	82	4	89	85	4	51	44	7	23	18	5	15	13	2
Dawn, I.H. ... warm	92	85	7	82	74	8	70	54	16	73	65	8	74	71	3	46	41	5	4	3	1	6	4	2	....	....	....
" I.H. ... cool	....	....	....	77	70	7	66	54	12	85	77	8	73	65	8	72	67	5	23	19	4	26	23	3	24	23	1
Early Riga, I.H. ... warm	94	91	3	82	77	5	64	56	8	68	59	9	73	68	5	42	41	1	23	20	3	5	4	1	....	....	....
" I.H. ... cool	....	....	....	92	89	3	76	60	16	90	83	7	75	66	9	69	61	8	28	24	4	30	23	7	20	17	3
Laurel, I.H ... warm	92	90	2	79	70	9	66	56	10	83	77	6	64	52	12	4	2	2	4	2	2	....	....	....	....	....	....
" I.H. ... cool	....	....	....	85	79	6	82	65	17	89	80	9	75	57	18	68	58	10	6	4	2	5	4	1	2	....	2
McKendry's Fife, I.H ... warm	96	95	1	72	65	7	82	75	7	67	61	6	56	49	7	6	5	1	....	....	....	....	....	....	....	....	....
" I.H. ... cool	....	....	....	92	89	3	78	61	17	77	70	7	61	52	9	58	49	9	1	1	....	....	....	....	....	....	....
Plumper, I.H. ... warm	92	90	2	84	80	4	70	66	4	82	78	4	67	60	7	40	34	6	7	7	....	4	4	....	1	1	....
" I.H. ... cool	....	....	....	92	92	....	92	76	16	86	83	3	82	72	10	86	80	6	33	26	7	24	22	2	22	19	3
Red Fife, I.H. ... warm	96	94	2	85	68	17	72	65	7	75	69	6	47	37	10	2	1	1	....	....	....	....	....	....	....	....	....
" I.H. ... cool	....	....	....	86	78	8	88	72	16	86	81	5	80	68	12	70	61	9	1	1	....	....	....	....	....	....	....
Red Fern, I.H. ... warm	93	86	7	73	59	14	74	69	5	71	67	4	69	57	12	28	25	3	23	22	1	1	1	....	2	1	1
" I.H. ... cool	....	....	....	78	70	8	80	70	10	80	72	8	71	63	8	61	56	5	39	34	5	24	23	1	9	7	2
Lakefield, C.E.F. ... warm	100	90	10	74	72	2	79	75	4	60	54	6	43	42	1	7	4	3	1	1	....	....	....	....	....	....	....
" C.E.F. ... cool	....	....	....	87	82	5	88	83	5	85	79	6	83	79	4	80	75	5	19	15	4	17	12	5	1	1	....
Minnesota 163, C.E.F. ... warm	92	88	4	92	89	3	87	77	10	76	66	10	56	52	4	10	9	1	1	1	....	....	....	....	....	....	....
" C.E.F. ... cool	....	....	....	95	91	4	91	79	12	89	83	6	83	76	7	69	65	4	19	17	2	2	1	1	1	1	....
Monarch, C.E.F. ... warm	96	95	1	94	88	6	88	83	5	90	87	3	85	81	4	58	55	3	34	32	2	4	3	1	....	....	....
" C.E.F. ... cool	....	....	....	99	97	2	88	82	6	92	88	4	87	83	4	94	90	4	34	30	4	24	22	2	15	14	1
American Bronze, C.E.F. ... warm	96	91	5	95	93	2	87	85	2	97	92	5	89	84	5	51	46	5	52	48	4	10	10	....	5	5	....
" C.E.F. ... cool	....	....	....	99	95	4	93	82	11	93	85	8	89	88	1	92	89	3	54	45	9	33	30	3	31	27	4
Buda-Pesth, C.E.F. ... warm	100	97	3	93	85	8	83	75	8	87	81	6	79	71	8	44	41	3	53	47	6	25	23	2	4	2	2
" C.E.F. ... cool	....	....	....	95	93	2	81	44	37	89	83	6	84	77	7	75	70	5	44	36	8	32	28	4	37	32	5
Early Red Clawson, C.E.F. ... warm	97	94	3	93	90	3	75	68	7	81	78	3	85	77	8	53	47	6	61	55	6	37	35	2	5	4	1
" C.E.F. ... cool	....	....	....	90	85	5	87	72	15	88	86	2	91	83	8	86	78	8	69	56	13	55	50	5	44	42	2
Huron, C.E.F. ... warm	....	....	....	84	77	7	67	62	5	83	75	8	73	70	3	18	16	2	28	25	3	....	....	....	....	....	....
" I.H. ... cool	....	....	....	91	87	4	73	44	29	85	79	6	72	66	6	63	60	3	16	10	6	23	21	2	5	4	1

Oats.	Jan., 1903.			Mar., 1904.			Mar., 1905.			Mar., 1906.			Mar., 1907.			Feb., 1908.			Mar., 1909.			Mar., 1910.			Mar. 1911.		
	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.
Abundance, I.H ....warm	90	79	11	91	79	12	84	64	20	84	77	7	46	32	14	31	21	10	20	12	8	3	2	1	1	....	1
" I.H....cool	....	....	....	82	74	8	67	36	31	82	69	13	69	51	18	67	62	5	21	13	8	16	10	6	21	17	4
Banner, I.H ....warm	97	91	6	85	75	10	78	53	25	76	73	3	47	38	9	52	46	6	25	11	14	5	4	1	1	....	1
" I.H....cool	....	....	....	81	65	16	63	40	23	72	64	8	88	80	8	65	56	9	36	30	6	20	13	7	28	25	3
Bavarian, I.H....warm	93	88	5	85	74	11	73	67	6	77	73	4	42	28	14	34	26	8	7	5	2	8	8	....	1	1	....
" I.H ....cool	....	....	....	79	66	13	69	53	16	72	61	11	64	57	7	67	60	7	26	21	5	20	16	4	17	11	6
Black Beauty, I.H....warm	94	87	7	82	76	6	91	62	30	81	81	....	69	61	8	38	33	5	8	6	2	11	8	3	5	2	3
" I.H....cool	....	....	....	84	76	8	74	44	30	89	84	5	74	66	8	75	67	8	44	33	11	32	30	2	22	14	8
Columbus, I.H....warm.	90	83	7	74	60	14	72	61	11	75	71	4	45	38	7	36	34	2	14	5	9	6	5	1	4	3	1
" I.H ....cool	....	....	....	74	65	9	80	65	15	72	64	8	51	42	9	56	45	11	26	21	5	25	21	4	29	25	4
Danish Island, I.H....warm	95	88	7	87	80	7	90	73	17	80	73	7	51	44	7	54	45	9	29	18	11	18	15	3	8	5	3
" I.H....cool	....	....	....	80	67	13	66	49	17	87	79	8	67	53	14	65	55	10	38	30	8	27	22	5	32	28	4
Golden Beauty, I.H....warm	91	89	2	93	85	8	84	69	15	85	83	2	64	53	11	42	34	8	20	16	4	5	2	3	2	1	1
" I.H....cool	....	....	....	87	77	10	72	57	15	93	91	2	67	59	8	75	67	8	29	23	6	29	27	2	24	21	3
Mennonite, I.H....warm	96	90	6	89	82	7	74	53	21	67	58	9	42	31	11	33	21	12	27	23	4	2	2	....	1	1	....
" I.H....cool	....	....	....	79	66	13	72	45	27	81	73	8	46	39	7	71	61	10	26	17	9	25	23	2	21	13	8
Thousand Dollar, I.H....warm	93	86	7	65	58	7	71	58	13	77	72	5	42	32	10	37	24	13	26	12	14	....	....	....	5	2	3
" I.H....cool	....	....	....	70	61	9	62	50	12	69	63	6	40	30	10	64	52	12	21	14	7	21	19	2	15	11	4
Tartar King, I.H....warm	90	79	11	72	61	11	69	38	31	76	66	10	31	20	11	44	39	5	22	17	5	1	1	....	4	2	2
" I.H....cool	....	....	....	82	70	12	53	42	11	60	51	9	51	36	15	62	51	11	21	12	9	21	19	2	17	13	4
Aitken's Black, C.E.F....cool	....	....	....	91	85	6	95	55	40	98	83	15	97	90	7	97	91	6	43	22	21	47	39	8	56	54	2
American Beauty, C.E.F....cool	....	....	....	100	89	11	90	71	19	98	94	4	98	91	7	89	85	4	47	31	16	61	51	10	91	85	6
Banner, C.E.F....cool	....	....	....	98	84	14	98	56	42	95	89	6	97	93	4	76	73	3	53	40	13	41	31	10	66	59	7
Brandon, C.E.F....cool	....	....	....	100	91	9	96	73	23	100	96	4	91	80	11	91	82	9	71	64	7	66	62	4	70	63	7
Danish Island, C.E.F....cool	....	....	....	100	92	8	82	54	28	100	95	5	90	85	5	97	86	11	50	41	9	72	64	8	50	44	6
Early Gothland, C.E.F....cool	....	....	....	100	90	10	92	52	40	100	95	5	94	85	9	90	79	11	55	45	10	61	54	7	66	60	6
Goldfinder, C.E.F....cool	....	....	....	100	93	7	92	73	19	98	94	4	91	77	14	86	80	6	61	46	15	64	52	12	70	59	11
Liberty, C.E.F....cool	....	....	....	100	89	11	95	71	24	100	93	7	90	70	20	80	71	9	41	36	5	61	50	11	69	59	10
Prolific Black Tartarian, C.E.F.cool	....	....	....	100	89	11	88	66	22	100	93	7	92	82	10	94	89	5	42	31	11	67	57	10	75	62	13
Rennie's Prize White, C.E.F..cool	....	....	....	99	92	7	96	80	16	100	93	7	93	86	7	97	91	6	68	52	16	77	69	8	63	55	8

Six-row Barley.	Jan., 1903.			Mar., 1904.			Mar., 1905.			Mar., 1906.			Mar., 1907.			Feb., 1908.			Mar., 1909.			Mar., 1910.			Mar., 1911.		
	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.
Baxter's, I.H. ... warm	100	95	5	91	62	29	90	80	10	75	66	9	73	59	14	39	32	7	49	44	5	15	14	1	8	7	1
" I.H. ... cool	....	....	....	93	86	7	93	73	20	94	62	32	87	65	22	81	67	14	29	24	5	20	16	4	9	8	1
Champion, I.H. ... warm	100	97	3	92	78	14	86	67	19	76	67	9	78	61	17	41	31	10	35	31	4	3	2	1	3	2	1
" I.H. ... cool	....	....	....	98	86	12	91	73	18	93	81	12	87	64	23	83	72	11	24	17	7	20	15	5	18	14	4
Claude, I.H. ... warm	97	95	2	91	77	14	85	56	29	86	75	11	69	46	23	44	40	4	45	38	7	19	15	4	15	12	3
" I.H. ... cool	....	....	....	97	80	17	90	70	20	100	86	14	94	68	26	86	74	12	41	28	13	24	12	12	35	33	2
Mensury, I.H. ... warm	99	99	0	89	72	17	83	70	13	86	70	16	77	65	12	63	54	9	39	33	6	30	29	1	19	17	2
" I.H. ... cool	....	....	....	86	78	8	94	70	24	83	74	9	86	79	7	80	73	7	41	32	9	38	34	4	40	38	2
Oderbruch, I.H. ... warm	92	88	4	93	71	22	91	83	8	92	88	4	80	61	19	60	55	5	50	36	14	30	24	6	11	10	1
" I.H. ... cool	....	....	....	93	93	0	92	70	22	86	79	7	86	80	6	83	66	17	49	30	19	43	38	5	36	29	7
Odessa, I.H. ... warm	93	93	0	86	74	12	87	71	16	90	78	12	80	53	27	66	60	6	38	33	5	26	25	1	12	11	1
" I.H. ... cool	....	....	....	98	88	10	90	68	22	89	87	2	85	74	11	88	79	9	50	33	17	60	53	7	41	39	2
Rennie's Improved, I.H. ... warm	....	....	....	96	92	4	87	78	8	89	76	13	73	51	22	83	80	3	54	49	5	30	28	2	23	18	5
" " I.H. ... cool	....	....	....	95	92	3	100	90	10	87	86	1	93	85	8	87	67	20	67	47	20	47	40	7	64	54	10
Trooper, I.H. ... warm	95	87	8	97	93	4	81	69	12	80	64	16	64	52	12	51	45	6	31	25	6	9	8	1	7	6	1
" I.H. ... cool	....	....	....	98	95	3	90	80	10	95	91	4	80	68	12	81	58	23	31	15	16	21	19	2	26	25	1
Yale, I.H. ... warm	96	93	3	89	80	9	78	57	21	93	88	5	82	71	11	34	31	3	30	24	6	12	10	2	5	5	0
" I.H. ... cool	....	....	....	91	85	6	86	71	15	88	77	11	90	85	5	73	53	20	21	12	9	21	15	6	21	20	1
Baxter, C.E.F. ... warm	97	94	3	100	94	6	93	84	9	93	88	5	94	86	8	48	42	6	71	66	5	53	49	4	28	25	3
" C.E.F. ... cool	....	....	....	98	97	1	100	96	4	98	96	2	94	78	16	98	94	4	89	78	11	82	72	10	35	34	1
Brome, C.E.F. ... warm	99	94	5	95	92	3	94	89	5	89	83	6	89	85	4	35	35	0	63	60	3	22	18	4	10	6	4
" C.E.F. ... cool	....		....	100	96	4	100	92	8	99	89	10	85	76	9	95	90	5	56	46	10	46	42	4	59	52	7
Nugent, C.E.F. ... warm	100	97	3	97	91	6	96	91	5	95	94	1	83	72	11	66	59	7	35	29	6	26	23	3	1	1	0
" C.E.F. ... cool	....	....	....	99	98	1	96	90	6	97	91	6	94	89	5	98	95	3	71	58	13	65	55	10	47	38	9
Odessa, C.E.F. ... warm	100	97	3	98	91	7	95	89	6	95	94	1	82	68	14	54	52	2	40	33	7	26	21	5	1	1	0
" C.E.F. ... cool	....	....	....	100	97	3	98	92	6	94	87	7	95	90	5	98	89	9	59	47	12	51	49	2	32	29	3
Rennie's Improved C.E.F. ... warm	100	98	2	99	95	4	98	90	8	100	99	1	94	84	10	77	74	3	70	65	5	35	33	2	39	36	3
" C.E.F. ... cool	....	....	....	100	97	3	100	95	5	90	85	5	94	92	2	95	87	8	78	67	11	72	69	3	78	73	5
Stella, C.E.F. ... warm	100	98	2	95	91	4	95	88	7	91	79	12	84	77	7	56	53	3	42	38	4	2	1	0	0	0	0
" C.E.F. ... cool	....	....	....	98	97	1	90	70	20	95	89	6	79	75	4	92	85	7	71	62	9	35	3	4	43	38	5
Yale, C.E.F. ... warm	100	95	5	94	91	3	96	89	7	89	78	11	76	50	26	34	30	4	41	38	3	22	20	2	3	2	1
" C.E.F. ... cool	....	....	....	97	96	1	95	85	10	94	89	5	93	91	2	96	92	4	62	52	10	42	38	4	29	28	1

Two-row Barley.	Jan., 1903.			Mar., 1904.			Mar., 1905.			Mar., 1906.			Mar., 1907.			Feb., 1908.			Mar., 1909.			Mar., 1910.			Mar., 1911.		
	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.	Total.	Strong.	Weak.
Beaver, I. H. ..... warm	97	93	4	90	83	7	88	82	6	68	62	6	51	43	8	14	10	4	7	5	2	....	....	....	....	....	....
" I.H ..... cool	....	....	....	93	88	5	88	64	24	85	69	16	86	70	16	67	61	6	7	6	1	....	....	....	5	3	2
Canadian Thorpe, I.H. ..... warm	100	95	5	95	83	12	90	81	9	60	55	5	46	32	14	18	16	2	5	5	....	1	1	....	....	....	....
" I.H. ..... cool	....	....	....	91	82	9	87	70	17	86	73	13	78	62	16	56	46	10	6	4	2	2	2	....	....	....	....
Clifford, I.H. ..... warm	97	96	1	91	84	7	78	69	9	84	75	9	72	58	14	37	34	3	33	27	6	15	11	4	12	5	7
" I.H. ..... cool	....	....	....	95	90	5	88	73	15	89	67	22	80	71	9	76	66	10	35	18	17	34	28	6	43	33	10
Danish Chevalier, I.H ..... warm	97	93	4	95	87	8	90	71	19	56	50	6	12	10	2	....	....	....	....	....	....	....	....	....	....	....	....
" I.H. ..... cool	....	....	....	88	83	5	83	57	26	80	73	7	44	40	4	29	27	2	1	1	....	1	1	....	....	....	....
French, I.H. ..... warm	93	91	2	86	69	17	77	64	13	48	35	13	12	10	2	3	3	....	....	....	....	....	....	....	....	....	....
" I.H. ..... cool	....	....	....	74	59	15	71	50	21	65	56	9	28	22	6	29	26	3	1	....	1	1	1	....	1	1	....
Gordon, I.H. ..... warm	94	93	1	91	88	3	85	78	7	82	76	6	57	49	8	22	19	3	15	10	5	7	6	1	2	1	1
" I.H. ..... cool	....	....	....	95	89	6	83	70	13	84	77	7	66	5	8	72	63	9	15	11	4	14	13	1	11	11	....
Invincible, I.H. ..... warm	96	92	4	82	67	15	89	78	11	66	65	1	28	21	7	6	4	2	....	....	....	1	....	1	....	....	....
" I.H. ..... cool	....	....	....	94	85	9	83	61	22	79	69	10	59	45	14	48	38	10	4	3	1	....	....	....	....	....	....
Sidney, I.H. ..... warm	94	89	5	88	79	9	66	51	15	72	63	9	50	33	17	31	29	2	5	3	2	6	5	1	....	....	....
" I.H. ..... cool	....	....	....	91	87	4	85	74	11	82	78	4	83	75	8	75	60	15	29	17	12	10	9	1	14	12	2
Standwell, I.H. ..... warm	96	92	4	95	76	19	68	52	16	36	28	8	13	10	3	....	....	....	....	....	....	....	....	....	....	....	....
" I.H. ..... cool	....	....	....	91	85	6	90	60	30	79	75	4	61	50	11	50	38	12	4	1	3	1	1	....	....	....	....
Beaver, C.E.F. ..... warm	98	86	12	93	74	19	89	83	6	89	86	3	85	81	4	18	14	4	42	39	3	10	9	1	6	6	....
" C.E.F. ..... cool	....	....	....	93	88	5	94	81	13	96	78	18	95	84	11	84	78	6	39	32	7	17	16	1	....	....	....

Peas.	Jan., 1903.	March, 1904.	March, 1905.	March, 1906.	March, 1907.	Feb., 1908.	March, 1909.	March, 1910.	March, 1911.		
	Total.	Total.	Total.	Total.	Total.	Total.	Total.	Total.	Total.	Strong.	Weak.
Agnes, I.H. warm	98	98	100	100	60	62	74	32	18	16	2
" I.H. cool	....	100	100	86	52	98	76	76	62	34	28
Arthur, I.H. warm	96	92	94	98	48	76	98	14	24	12	12
" I.H. cool	....	94	88	78	64	100	50	66	16	10	6
Black-eye Marrowfat warm	96	94	86	66	30	8	14	....	....	....	....
" " I.H. cool	....	94	100	90	28	66	20	10	2	....	2
Carleton, I.H. warm	98	84	80	76	64	6	28	2	....	....	....
" I.H. cool	....	92	72	78	58	70	38	14	8	6	2
Crown, I.H. warm	100	98	100	98	92	48	32	2	10	8	2
" I.H. cool	....	100	94	100	92	98	84	38	24	14	10
Dan O'Rourke, I.H. warm	100	94	94	92	60	38	12	8	2	....	2
" " I.H. cool	....	98	100	94	92	74	54	56	18	6	12
Early Britain, I.H. warm	100	86	80	82	88	48	40	4	8	6	2
" " I.H. cool	....	92	100	92	90	76	78	46	40	32	8
Golden Vine, I.H. warm	100	96	92	74	86	30	4	2	....	....	....
" " I.H. cool	....	100	100	96	94	92	50	42	42	30	12
Macoun, I.H. warm	94	72	44	54	66	18	2	10	2	....	2
" I.H. cool	....	80	80	72	44	84	22	8	2	2	....
Mummy, I.H. warm	96	96	88	90	46	24	18	10	4	2	2
" I.H. cool	....	98	88	96	84	94	18	16	12	10	2
Perth, I.H. cool	....	96	94	90	86	84	32	24	22	10	12
Pride, I.H. cool	....	98	96	96	64	74	58	18	20	4	16
Bright, C.E.F. cool	....	76	96	72	52	62	28	22	4	2	2
Chancellor, C.E.F. cool	....	80	82	86	20	60	....	14	62	34	28
Crown, C.E.F. cool	....	94	98	92	54	68	46	42	26	12	14
Early Britain, C.E.F. cool	....	90	100	96	82	98	98	74	88	78	10
Harrison's Glory, C.E.F. cool	....	100	88	84	58	82	16	16	40	16	24

WHEAT—Summary of Tests.

YEAR.	KEPT WARM.		KEPT COOL.		KEPT WARM.		KEPT COOL.		WARM.	COOL.
	Highest Percentage Vitality.		Highest Percentage Vitality.		Lowest Percentage Vitality.		Lowest Percentage Vitality.		Average Vitality.	Average Vitality.
	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	p. c.	p. c.
1903..... 1st year, warm.	Lakefield, C.E.F.....	100			Dawn, I.H.....	92				
					Laurel, I.H.....	92				
					Minnesota, 163, C.E.F...	92				
					Plumper, I.H.....	92			95·44	
1904..... 2nd year, warm. 1st year, cool.	White Russian, Br	96	Monarch, C.E.F.	99	Wellman's Fife, Br.....	71	Stanley, Br.....	84	84·5	90·17
			American Bronze, C.E.F.	99						
1905..... 3rd year, warm. 2nd year, cool.	White Russian, Br.....	89	White Russian, Br.....	94	Early Riga, I.H.....	64	Dawn, I.H.....	66	77·5	84·39
1906..... 4th year, warm. 3rd year, cool.	White Russian, Br.....	99	White Russian, Br	96	Lakefield, C.E.F.....	60	Dawn, I.H.....	77	79·61	86·84
1907..... 5th year, warm. 4th year, cool.	American Bronze, C.E.F.	89	Wellman's Fife, Br.....	92	Lakefield, C.E.F.....	43	McKendry's Fife, I.H...	61	68·61	80·61
			White Fife, Br..... ...	92						
1908..... 6th year, warm. 5th year, cool.	Monarch, C. E. F.....	58	Monarch, C.E.F.....	94	Red Fife, I.H.....	2	McKendry's Fife, I.H...	58	27·72	77·22
1969..... 7th year, warm. 6th year, cool.	Early Red Clawson, C.E.F.	61	Early Red Clawson, C.E.F.	69	Red Fife, I.H.....	0	McKendry's Fife, I.H ..	1		
					McKendry's Fife, I.H...	0	Lakefield, C.E.F.....	1	21·5	28·77
1910..... 8th year, warm. 7th year, cool.	Early Red Clawson, C.E.F.	37	Early Red Clawson, C.E.F.	55	Laurel, I.H.....	0	McKendry's Fife.....	0		
					McKendry's Fife, I.H...	0	Red Fife.....	0	.....	20·77
					Red Fife, I.H.....	0				
					Lakefield, C.E.F.....	0				
					Minnesota 163, C.E.F....	0				
					Huron, C.E.F.....	0			7·0	

WHEAT—Summary of Tests.—*Continued.*

Year.	Kept Warm. Highest Percentage Vitality.		Kept Cool. Highest Percentage Vitality.		Kept Warm. Lowest Percentage Vitality.		Kept Cool. Lowest Percentage Vitality.		Warm. Average Vitality.	Cool. Average Vitality.
	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	p. c.	p. c.
1911..... 9th year, warm. 8th year, cool.	American Bronze, C.E.F.	5	Early Red Clawson, C.E.F.	44	Stanley, Br.....	0	McKendry's Fife.....	0	.....	14·5
	Early Red Clawson, C.E.F.	5			White Russian, Br.....	0				
					Dawn, I.H.....	0				
					Early Riga, I.H..	0				
					Laurel, I.H.....	0				
					McKendry's Fife, I.H..	0				
					Red Fife, I.H.....	0				
					Lakefield, C.E.F.....	0				
					Minnesota 163, C.E.F..	0				
					Monarch, C.E.F	0	....	....	1·15	
					Huron, C.E.F.....	0				

OATS.—Summary of Tests.

1903... ..... 1st year, warm.	Banner, I.H.....	97			Abundance, I.H..... ..	90	....	...	92·9	
					Columbus, I.H.....	90				
					Tartar King, I.H.....	90				
1904..... ... 2nd year, warm. 1st year, cool.	Golden Beauty, I.H.....	93	Prolific Black Tartarian, C.E.F.	100	Thousand Dollar, I.H...	65	Thousand Dollar, I.H...	70	74·1	89·3
			Liberty, C.E.F.....	100						
			American Beauty, C.E.F.	100						
			Brandon, C.E.F.....	100						
			Danish Island, C.E.F. .	100						
			Early Gotham, C.E.F...	100						
			Goldfinder, C.E.F.....	100						
1905..... 3rd year, warm. 2nd year, cool.	Black Beauty, I.H.....	92	Banner, C.E.F.....	98	Tartar King, I.H.....	69	Tartar King, I.H.....	53	78·7	80·1

1906..... 4th year, warm. 3rd year, cool.	Golden Beauty, I.H....	85	Brandon, C.E.F..... Danish Island, I.H..... Early Gothland, C.E.F. Liberty, C.E.F..... Prol. Blk. Tarta'n, C.E.F. Rennie's Prize White, C.E.F.	100 100 100 100 100 100	Mennonite, I.H.....	67	Tartar King, I.H.....	60	77·8	88·3
1907..... 5th year, warm. 4th year, cool.	Black Beauty, I.H.....	69	American Beauty, C.E.F.	98	Tartar King, I.H.....	31	Thousand Dollar, I.H...	40	47·9	77·5
1908..... 6th year, warm. 5th year, cool	Danish Island, I.H.....	54	Danish Island, C.E.F.... Aitkens' Black, C.E.F..	97 97	Abundance, I.H... ...	31	Columbus, I.H.	56	40·1	78·2
1909..... 7th year, warm. 6th year, cool.	Danish Island, I.H.....	29	Rennie's Prize White, C.E.F.	68	Bavarian, I.H....	7	Abundance. I.H.. ..... Thousand Dollar, I.H... Tartar King, I.H.	21 21 21	19·8	40·95
1910..... 8th year, warm. 7th year, cool.	Danish Island, I.H.....	18	Rennie's Prize White, C.E.F.	77	Thousand Dollar, I.H...	0	Abundance, I.H.....	16	5·9	42·65
1911..... 9th year, warm. 8th year, cool.	Danish Island, I.H.....	8	American Beauty, C.E.F.	91	Abundance, I.H..... Banner, I.H..... .... Bavarian, I.H. ..... Mennonite, I.H.	1 1 1 1	Thousand Dollar, I.H...	15	..... 3·2	45·1

Six-Row Barley—Summary of Tests.

1903..... 1st year, warm.	Baxter, I.H..... Champion, I.H.... .... Nugent, C.E.F..... Odessa, C.E.F..... Rennie's Improved, C. E.F. Stella, C.E.F... ..... Yale, C.E.F.....	100 100 100 100 100 100 100	....	....	Oderbruch, I. H.....	92	....	....	....97·87	
1904..... 2nd year, warm. 1st year, cool.	Baxter, C.E.F.....	100	Brome, C.E.F..... Odessa, C.E.F..... .. Rennie's Improved, C. E.F.	100 100 100	Odessa, I.H..... ...	86	Mensury, I.H.....	86	93·88	96·31
1905..... 3rd year, warm. 2nd year, cool.	Rennie's Improved, C. E.F.	98	Rennie's Improved, I.H.. Baxter, C.E.F .... Brome, C.E.F..... Rennie's Improved, C. E.F.	100 100 100 100	Yale, I.H..... ..	78	Yale, I.H.....	86	89·69	94·06

SIX-ROW BARLEY—Summary of Tests—*Continued.*

Year.	Kept Warm. Highest Percentage Vitality. Variety.	p. c.	Kept Cool. Highest Percentage Vitality. Variety.	p. c.	Kept Warm. Lowest Percentage Vitality. Variety.	p. c.	Kept Cool. Lowest Percentage Vitality. Variety.	p. c.	Warm. Average Vitality. p. c.	Cool. Average Vitality. p. c.
1906..... 4th year, warm. 3rd year, cool.	Rennie's Improved, C. E.F.	100	Claude, I. H.....	100	Baxter, I.H.....	75	Mensury, I.H.....	83	88·67	93·25
1907..... 5th year, warm. 4th year, cool.	Baxter, C.E.F..... Rennie's Improved, C. E.F.	94 94	Claude, I.H..... Baxter, C.E.F ..... Rennie's Improved, C. E.F.	94 94 94	Trooper, I.H.	64	Stella, C.E.F.....	79	79·88	88·88
1908..... 6th year, warm. 5th year, cool.	Rennie's Improved, C. E.F.	83	Baxter, C.E.F..... Nugent, C.E.F..... Odessa, C.E.F.....	98 98 98	Yale, I.H..... Yale, C.E.F.....	34 34	Yale, I.H.....	73	53·19	88·38
1909..... 7th year, warm. 6th year, cool.	Baxter, C.E.F	71	Baxter, C.E.F.....	89	Yale, I.H.....	30	Yale, I.H.....	21	45·81	52·44
1910..... 8th year, warm. 7th year, cool.	Baxter, C.E.F.....	53	Baxter, C.E.F.....	82	Stella, C.E.F.....	2	Baxter, I.H..... Champion, I.H.....	20 20	22·38	42·94
1911..... 9th year, warm. 8th year, cool.	Rennie's Improved, C. E.F.	39	Rennie's Improved, C. E.F.	78	Stella, C.E.F.....	0	Baxter, I.H.....	9	11·56	38·31

TWO-ROW BARLEY—Summary of Tests.

1903..... 1st year, warm.	Canadian Thorpe.....	100	.....	....	French Chevalier.....	93	.....	....	96·2	
1904..... 2nd year, warm. 1st year, cool.	Canadian Thorpe..... Danish Chevalier..... Standwell.....	95 95 95	Clifford..... Gordon.....	95 95	Invincible.....	82	French Chevalier.....	74	90·6	90·5

Two-Row Barley—Summary of Tests.—*Continued.*

1905..... 3rd year, warm. 2nd year, cool.	Canadian Thorpe.....	90	Beaver, C.E.F.....	94	Sidney	66	French Chevalier.....	71	82·0	85·2
1906. ... ... 4th year, warm 3rd year, cool	Beaver, C.E.F.....	89	Beaver, C.E.F.....	96	Standwell.....	36	Invincible ..... Standwell	79 79	65·8	82·8
1907..... 5th year, warm. 4th year, cool.	Beaver, C.E.F.....	85	Beaver, C.E.F.....	95	Danish Chevalier..... French Chevalier.....	12 12	French Chevalier.....	28	42·3	68·0
1908..... 6th year, warm. 5th year, cool.	Clifford.....	37	Beaver, C.E.F.....	84	Danish Chevalier..... Standwell.....	0 0	Danish Chevalier..... French Chevalier.....	29 29	14·9	58·6
1909. ..... 7th year, warm, 6th year, cool.	Beaver, C.E.F.....	42	Beaver, C.E.F.	39	Danish Chevalier..... French Chevalier..... Invincible .... Standwell	0 0 0 0	Danish Chevalier..... French Chevalier.....	1 1	12·7	14·1
1910..... 8th year, warm. 7th year, cool.	Clifford.....	15	Clifford.	34	Beaver, I.H... ..... . Danish Chevalier..... Standwell.....	0 0 0	Beaver, I.H..... Invincible.....	0 0	4·0	7·9
1911..... 9th year, warm. 8th year, cool.	Clifford.....	12	Clifford.....	43	Beaver, I.H..... Canadian Thorpe..... Danish Chevalier..... French Chevalier..... Invincible ..... Sidney . .. . Standwell.....	0 0 0 0 0 0 0	Ca. Thorpe..... Danish Chevalier..... Invincible..... Beaver, I.H.....	0 0 0 0	2·0	7·4

Peas—Summary of Tests.

1903..... 1st year, warm.	Crown, I.H .. . . Daniel O'Rourke..... Early Britain, I.H..... Golden Vine..... .	100 100 100 100	.....	....	Macoun	94	.....	....	97·8	
1904..... 2nd year, warm. 1st year, cool.	Agnes..... Crown, I.H.....	98 98	Agnes..... Crown, I.H. ..... Golden Vine..... Harrison's Glory..... Golden Vine.....	100 100 100 100 100	Macoun	72	Bright.....	76	91·0	93·06

PEAS—Summary of Tests—*Continued.*

Year.	Kept Warm. Highest Percentage Vitality.		Kept Cool. Highest Percentage Vitality.		Kept Warm. Lowest Percentage Vitality.		Kept Cool. Lowest Percentage Vitality.		Warm. Average Vitality.	Cool. Average Vitality.
	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	Variety.	p. c.	p. c.	p. c.
1905. 3rd year, warm. 2nd year, cool.	Agnes Crown, I.H	100 100	Agnes Black-eye Marrowfat Daniel O'Rourke Early Britain, I.H. Early Britain, C.E...F.	100 100 100 100 100	Macoun	44	Carleton	72	85·8	92·71
1906. 4th year, warm. 3rd year, cool.	Agnes	100	Crown, I.H.	100	Golden Vine	74	Macoun Bright	72 72	83·0	88·12
1907. 5th year, warm. 4th year, cool.	Crown, I.H	92	Golden Vine	94	Black-eye Marrowfat	92	Chancellor	20	64 0	65 53
1908. 6th year, warm. 5th year, cool.	Arthur	76	Arthur	100	Carleton	6	Chancellor	60	35·8	81·18
1909. 7th year, warm. 6th year, cool.	Arthur	98	Early Britain	98	Macoun	2	Chancellor	0	32·2	45·18
1910. 8th year, warm. 7th year, cool.	Agnes	32	Agnes	76	Black-eye Marrowfat	0	Macoun		8·4	34·12
1911. 9th year, warm. 8th year, cool.	Arthur	24	Agnes Chancellor	62 62	Black-eye Marrowfat Carleton Golden Vine	0 0 0	Black-eye Marrowfat Macoun	2 2	.....	28·67

VISITS TO THE BRANCH FARMS AND STATIONS.

The regular visits were paid during the year to all the branch Farms and Stations. At Charlottetown, P.E.I., where the Station was just being started, a stay was made of nine days, and during this time a great change was made in the appearance of the place. The work of the season was planned, new orchards of apples, pears, plums and cherries, an arboretum, forest belts and hedges planted, and alterations to the Superintendent's house and a new implement shed arranged for. Collections of ornamental trees and shrubs were set out and beds of perennial and annual flowering plants provided for.

On May 9th to 11th, a visit was made to Nappan, N.S., where the work in progress was gone over and that for the coming season planned. As the season was late in opening, it was not possible to do much work on the land at this early period.

VISITS TO THE WESTERN EXPERIMENTAL FARMS AND STATIONS.

On May 24, I left Ottawa for the west, going straight through to Rosthern, Sask., where much planning and planting was done by the 30th. Shelter belts were set out and new orchards planted which, however, owing to the unfavourable season, subsequently made a poor record. On leaving Rosthern, a visit was paid to Scott, Sask., where the site of the new Station was examined and the location of the buildings was decided on. The 2nd and 3rd of June were spent at Lacombe, Alta., where a good deal of planting was done and the appearance of the Station much improved. Lethbridge, Alta., was visited on the 4th and 5th, Indian Head, Sask., on the 7th and 8th, and Brandon, Man., on the 8th and 9th. The work on these latter Farms was all well advanced and everything was in good order and working satisfactorily. I arrived in Ottawa on June 12.

SECOND VISIT TO THE WESTERN FARMS AND STATIONS.

On July 22nd, I left Ottawa for a second visit to the branch Farms and Stations in the west. The 25th and 26th were spent at Brandon, Man., where the crops were well advanced and gave promise of a good yield. Arriving at Indian Head, Sask., on the 26th, three days were spent on the Experimental Farm there. On the 27th and 28th, large picnics were held, when several thousand farmers had the opportunity of seeing the magnificent crops of grain which were then well in head, and of inspecting the barns and fields, also the plantations of forest and ornamental trees, the fruits, vegetables and flowers. All the visitors appeared to enjoy their outing immensely and were delighted with the opportunity of seeing so many new objects of interest. The weather was very enjoyable.

Two days were spent at Rosthern, Sask., where the unfavourable weather had produced discouraging results and rain was greatly needed. Lethbridge, Alta., was visited on the 8th and 9th of August, where everything was suffering very much from drought. Short visits were made to Salmon Arm, B.C., and Kamloops, and Agassiz, B.C., was reached on the 15th where the crops were looking well. After two days spent here, a continuous journey was made to Ottawa, arriving there on the 21st of August.

ADDITIONS TO AND CHANGES IN THE STAFF OF THE EXPERIMENTAL FARMS.

Mr. Gustave A. Langelier is the son of Chrysostome Langelier of Quebec. He was educated in both French and English in the Quebec colleges and early showed a taste for live stock, his first efforts being in poultry breeding. He, for some years, was quite prominent in poultry circles, winning many prizes in various breeds.

About 1900, he bought Stadacona Farm at Cap Rouge and established there herds of Ayrshire cattle, Yorkshire swine and a stud of Clydesdale horses. He has been very successful in his breeding and feeding operations with dairy cattle and Yorkshire swine especially, winning many prizes in all parts of the province of Quebec and some parts of the province of Ontario and in the United States. He also, during that time, made a specialty of growing a variety of oats and a variety of potatoes which were disseminated in considerable quantities from his farm.

When Stadacona Farm was purchased by the Dominion Government as an Experimental Station, he was appointed its Superintendent, on January 1, 1901.

Mr. R. E. Everest, B.S.A., Superintendent of the Experimental Station at Scott, Sask., is a graduate of the Ontario Agricultural College at Guelph. In addition to considerable experience in farming in Ontario, he has had two years' experience as foreman on the Experimental Station at Lacombe, where he has had an opportunity of familiarizing himself with the agricultural problems peculiar to the western provinces.

During the year we have lost the services of Mr. Jas. Murray, Superintendent of the Experimental Farm at Brandon, Man. During the time he has held the position of Superintendent, he has proved a very careful and accurate experimenter and observer and the results obtained in the crops grown on the Experimental Farm have been most creditable. His persistent work has also resulted in a considerable improvement in all parts of the work undertaken, including stock. His courteous bearing towards all with whom he had to do, resulted in most kindly feelings between the public and himself and his stay, although short, has been a benefit to the Farm and his leaving us at this time is a matter of much regret. The position he has accepted is one of much responsibility and we have no doubt that he will fill it to the satisfaction of his employers and of the public generally.

The farms have been fortunate in securing the services of Mr. W. C. McKillican as his successor. He was born and brought up on his father's farm and early acquired a taste for agriculture. He received his early training in the public schools and, after attending the High School at Vankleek Hill, Ont., entered the Ontario Agricultural College at Guelph, where he won several prizes for scholarship. In 1904, he took the second highest individual score in the students' judging competition at Chicago. On graduating with the degree of B.S.A., he received the appointment of representative of the Seed Branch in Alberta, which position he held for six years and was quite successful in the work under his charge, especially in the development of seed fairs, which rose from practically an unknown thing to a total of thirty-five in Alberta this past season. This work has given him an excellent opportunity of learning western conditions and of meeting western men, which will, without doubt, prove of great benefit to him in his present position.

Mr. W. W. Thomson, foreman of the Cultural and Rotation Work at the Experimental Farm at Indian Head, Sask., was born at Carberry, Man., and after a public school and business college training, entered the Manitoba Agricultural College in 1906, being a member of the pioneer class of that institution. During his four years'

course there, he held first-class honour standing each year and in his final year won, in addition, the university silver medal for the highest standing in general proficiency. Graduating in 1911 with the degree of Bachelor of Science in Agriculture, after holding the position of Assistant Managing Director of Agricultural Societies for Manitoba for a year, he was appointed to his present position.

During the year assistants were appointed to the Dominion Agriculturist, to the Dominion Horticulturist, to the Dominion Cerealist and to the Dominion Chemist.

Mr. O. C. White, B.S.A., assistant to the Dominion Agriculturist, was born in 1887 in the county of South Ontario. After the usual training in the public and high schools, he entered the Ontario Agricultural College, Guelph in 1906, where in his fourth year, he was a member of the stock judging team at Chicago, winning the gold medal on that occasion as the highest man on his college team.

Upon graduation in 1910, he was appointed to his present position.

Mr. T. G. Bunting, B.S.A., is a son of W. H. Bunting, the well-known fruit grower of St. Catharines, Ontario, and was brought up on his father's fruit farm in the Niagara district.

He graduated from the Ontario Agricultural College in June, 1907, as a specialist in horticulture. Since graduating, he has spent eight months on the Pacific coast, in California, Oregon, Washington and British Columbia, studying the fruit industry of that section. Since then, he has spent one year at home on a fruit farm and one year at the New Hampshire Agricultural College and Experiment Station as assistant in vegetable gardening. He severed his connection there in August, 1910, to accept his present position of assistant to the Dominion Horticulturist.

Mr. H. Sirett, B.S.A., assistant to the Dominion Cerealist, was born at Rousseau, Muskoka, in 1882. He was educated at the public schools and afterward at the Mount Forest high school. He entered the Ontario Agricultural College in the autumn of 1905, graduating in June, 1909.

At college he was the winner of the Governor General's medal for general proficiency for two years, 1905 and 1907, and graduated with first-class honours in chemistry and field husbandry.

For the year previous to accepting his present position, he was employed by the Ontario Department of Agriculture as district representative in the county of Carleton.

Mr. Edward Blake Carruthers, M.A., Assistant Chemist, was born at Lindsay, Ontario. He received his preliminary education at the Jamieson Ave., Collegiate Institute, Toronto, and matriculated in 1905 with first-class honours in every department, winning the Gibson Scholarship. He took his degree of B.A. in 1909, at Toronto University, with honours in the course of Chemistry and Mineralogy. He spent the following year as Instructor in Chemistry at Toronto University, taking the degree of M.A. in 1910.

He entered on his present position in the Chemistry Division at the Central Farm on August 1, 1910.

Mr. Clifford H. Robinson, Assistant Chemist, was born near Florence, Ontario, in 1888.

He received his preliminary education in the Collegiates of Chatham and Ridgetown. He entered Toronto University as the holder of the first Edward Blake Scholarship in Mathematics and Science, in the class of 1909, in the course of Chemistry and Mineralogy. He held the scholarships granted in this department in his first and third years, taking his degree of B.A. with first-class honours in 1909.

The following year was spent as Assistant in Chemistry at Toronto University. He entered the Chemical Division of the Experimental Farms on August 1, 1910.

Mr. A. T. Stuart, B.A., Assistant Chemist, was born in 1882, at Hamilton, Ontario. He attended the Hamilton public schools and Collegiate Institute. He entered Toronto University, with Honour Matriculation standing, in the class of

1906, in the course of Chemistry and Mineralogy. He was a fellow in Chemistry at the University in 1907 and 1908, and has since been employed as Chemist with various manufacturing companies including the International Harvester Co., The Canada Iron Furnace Co., The National Electrolytic Co., The Acker Process Co., and the Potash Syndicate Co. He was appointed to his present position on August 1, 1910.

ACKNOWLEDGMENTS.

I acknowledge, with a deep sense of indebtedness, the services of all the members of the Experimental Farm staff for their kind co-operation in the various branches of the work conducted on all the Experimental Farms and Stations throughout the Dominion. The results given in the present report bear abundant evidence of their earnest endeavour to render such service in their several spheres of labour as will stimulate the progress of agriculture. I also tender sincere thanks to those members of the staff who have aided me in those branches of the work of which I have had personal charge:—To the foreman in charge of the lawns and ornamental grounds at the Central Farm for the taste and industry which he has displayed and to the foreman of the greenhouse for his careful management of the plants and shrubs under propagation, also for the useful work he has done in testing the vitality of seeds and in the taking of meteorological records. I also desire to bear testimony to the valuable services rendered me by my assistant and to the faithful work done by my secretary. The employees of all the Farms have also my thanks for the interest they have manifested in their work and for the careful manner in which they have discharged their respective duties.

REPORT OF

THE DOMINION AGRICULTURIST

J. H. GRISDALE, B. AGR.

OTTAWA, March 31, 1911.

Dr. WILLIAM SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision on the Central Experimental Farm during the past year.

I have to report a very successful year in the different lines of work in my Division.

Weather conditions in 1910 were probably quite up to the average as favouring crop production in this part of Canada. The reports of the different fields show the beneficial effects of such weather by increased crop returns as compared with such dry years as were 1906, 1907 and 1908.

The enlargement of my position from Agriculturist at the Central Experimental Farm to Dominion Agriculturist in charge of Agriculture and Live Stock work on all the branch Experimental Farms and Stations as well as on the Central Experimental Farm has necessarily meant more frequent and more prolonged absences from this Farm. One result has been a somewhat smaller amount of experimental work with live stock during the past year. As readjustment gradually takes place, it is hoped, however, that more, rather than less, investigational work, not only at Ottawa but on all the Branch Farms and Stations, may be got under way, and consequently the usefulness of this Division relatively increased.

The added work consequent upon the extension of my supervisory duties made the appointment of an assistant to the Dominion Agriculturist most necessary. Mr. O. C. White was named to this position in June, 1910, and has proven most capable and painstaking in every way. I am deeply indebted to him for much assistance in both office and outside work.

Mr. D. D. Gray, Farm Foreman, during the past year has had almost complete charge of the field work. My frequent long absences have made it more and more necessary to put all note-taking and reporting on results into his hands. I am glad to be able to say that the added work has been done exceedingly well and most cheerfully. Mr. Gray has, in addition, had charge of the pigs during the past two years with most gratifying results as witness the brief financial statement in the text of the attached report.

In the preparation of this report, Mr. White, my Assistant, and Mr. Gray, Farm Foreman, have done practically all the work, as my other duties have been such as to effectully prevent my doing anything more than exercise a more or less close supervision and offer suggestions as to methods of presenting results.

To Mr. Giguere, my Secretary, I am especially indebted for most intelligent co-operation in working out plans for experimental work on Branch Farms and Stations,

and for untiring and willing extra effort whenever necessary, as has been frequently the case during the past year.

Mr. Meilleur during the past year has, under my supervision, found it possible to introduce some new lines of work in our dairy here. Some brief paragraphs will be found dealing with this branch of dairying, in the body of my report.

I am sorry to have to report another change of herdsman, the present herdsman, Mr. J. Haining, having relieved Mr. Gibson in September last.

During the year I have attended a large number of meetings, assisted at various short courses and judged live stock at some of the principal fairs in various parts of Canada, in addition to my regular duties as Dominion Agriculturist.

From April 1, 1910, to March 31, 1911, 3,915 letters were received and 6,218 dispatched by the Agricultural Division.

I have the honour to be, sir,

Your obedient servant,

J. H. GRISDALE,

Dominion Agriculturist.

LIVE STOCK.

The live stock now (April 1, 1911) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding work horses, as well as experiments to determine the comparative values of different foods as forage for same.

The horses are eighteen in number, made up at present of:—

Thirteen heavy horses of Clydesdale and Percheron blood.

Four heavy driving horses.

One light driver.

CATTLE.

There are representatives of five breeds of cattle, namely: Shorthorn, Ayrshire, Guernsey, Canadian and Holstein. There are, besides, a number of grade cattle and steers. The cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure-bred breeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

Pure Bred Breeding Cattle.

The pure-bred cattle in the barn at present are as follows:—

Twenty-eight Shorthorns, including 4 bulls and 24 females.

Thirty-seven Ayrshires, including 5 bulls and 32 females.

Twenty-two Guernseys, including 3 bulls and 19 females.

Twenty-eight Canadians, including 5 bulls and 23 females.

Two Holsteins, including 1 bull and 1 female.

Grade Cattle.

The grades number 22 head, made up of:—

Six Shorthorn grades, 5 Ayrshire grades, eight Guernsey grades and 3 Canadian grades.

Steers.

Nineteen steers are under feed at present. They are of different ages and breeding, and their number is made up of 1 calf and 18 yearlings.

SHEEP.

There are now 68 pure-bred sheep in the pens. Two breeds are kept, namely: Shropshire and Leicester.

There are 50 Shropshires, as follows: 19 aged ewes, 4 yearling ewes, 8 yearling rams, 12 spring ewe lambs and 7 spring ram lambs.

There are 18 Leicesters, as follows: 7 aged ewes, 3 yearling ewes, 5 spring ewe lambs, 2 spring ram lambs and one breeding ram.

Besides the above pure-breds there are 20 mixed grade wethers.

SWINE.

One hundred and seventy-four swine of all classes are now in the pens, being fed experimentally, or being kept for breeding purposes. The breeds kept are Berkshire, Yorkshire and Tamworth.

The Yorkshires are 100 in number, including 2 stock boars, 33 breeding sows, 11 young sows, 40 young pigs and 14 feeders.

The Berkshires are 30 in number, including 2 stock boars, 18 brood sows, 4 young sows and 6 young pigs.

The Tamworts are 44 in number, including 2 stock boars, 13 breeding sows, 8 young sows, 12 young pigs and 9 feeders.

HORSES.

There are usually 19 horses in the stables. These horses are expected to do the work in the various divisions during the year. The work on the '200-acre farm' is but a part of their duties. They work in addition for the Horticultural and Cereal Divsions, as well as upon the lawns and in the arboretum. In addition, a large amount of hauling or cartage in connection with the different divisions, as well as road making and messenger service, takes up much of their time.

HORSE LABOUR.

During the year, from April 1, 1910, to March 31, 1911, the work done by the horses kept in the stables here was equivalent to 5,638·6 days' work, distributed as follows: Live stock, hauling feed, marketing stock, etc., 136·7 days; farm work, '200-acre form,' 841·6 days; draining and care of roads, including removing snow and breaking roads in winter, 171·8 days; manure on '200-acre farm,' 368 days; Horticultural Division, 761·9 days; Cereal Division, 645·5 days; lawns, etc., 185·6 days; bulletins and reports, from and to farm offices, 105·1 days; poultry, 40·4 days; mail, and milk delivery, 57·5 days; omnibus service, including one horse for omnibus, two horses for general driving, and one horse for supervision of work, 1,460 days; work about greenhouse, outbuildings, sidewalks, exhibitions, etc., 703 days; arboretum, 161·5 days.

FEEDING THE WORK HORSES.

The horses here are fed by one man. Each teamster is responsible for the cleaning of his horses and harness, but has nothing to do with the feed.

Generally speaking, the horses are fed on mixed hay, given long, oats and bran, about 5 parts of whole oats to 2 parts of bran. These two are mixed and fed dry. On Saturday nights a bran mash of 5 or 6 lbs. per horse takes the place of the regular oat and bran mixture. When horses are on very heavy work, the ratio between oats and bran is usually changed to 5 of oats and 1 of bran. The horses receive from 1 to 1¼ lbs. of the oat and bran mixture and about 1 lb. of hay a day for each 100 lbs. of their weight. That is to say, a 1,600-lb. horse would get from 16 to 20 lbs. of grain mixture and about 16 lbs. of hay each day. The amount of grain or grain mixture fed depends upon the work being performed. The harder the work, the larger the amount of meal fed. That is, of course, subject to change, according to the health of the animals and various other minor considerations, such as degree of fatigue at night, temperature, etc.

The feeding of the horses follows regular lines and is done at regular hours. The first feed for the day is given at 5 a.m. It consists of about three-eighths of the total amount of meal or grain mixture to be fed during the day and about one-quarter of the hay. The noon feed is about the same thing. The evening feed consists of about one-quarter or two-eighths of the meal or grain mixture for the day and about one-half the hay.

Water is given between 6 and 7 in the morning, at noon, at 6 o'clock, or as the horses come in from work, and in winter at about 8 p.m. The water is given at 8 o'clock at night in the winter for the reason that the horses come in an hour earlier at night and go out an hour later in the morning.

DAIRY CATTLE.

The herd of dairy cattle during the year 1910-11 consisted of 75 milch cows all told. They were:—

Ayrshires	21
Guernseys	11
Canadians	15
Shorthorns	14
Grades (various breeding)	14

FEEDING THE DAIRY COWS.

The year 1910-11 has been a very satisfactory year from the dairy farmers' point of view. Grass started fairly early in the spring, and continued good throughout the remainder of the year, the fall months especially being very moist.

SUMMER FEEDING.

As during the previous four years, the dairy cattle were allowed only a small area for pasture. They depended for the most part upon soiling crops and corn silage. As pasture there was available only eighteen acres. Fourteen acres of this had been seeded down the previous year with a mixture per acre of, Red clover 10 lbs., Alfalfa 6 lbs., Alsike, 2 lbs. and Timothy 6 lbs. This seeding made such a strong growth in late May and early June that it was considered advisable to pasture only six acres, and to cut the remainder for soiling purposes. Four acres were seeded down in the spring to an annual pasture mixture of 60 lbs. oats, 25 lbs. sorghum, 5 lbs. Red clover and 20 lbs. vetches. This mixture made rapid growth, and proved very acceptable to the cows.

For August, provision had been made by holding over a supply of corn ensilage. This material was fed more or less every day during the summer. During August, however, it formed the staple part of the ration. In September, grass was again plentiful, so very materially lessened the quantity of forage required to supplement the grass.

Practically all farmers require more or less feed to supplement pasture grass, unless the area down to grass is, relative to the number of cows, very large. Corn silage is, no doubt, for most parts of Canada, the best forage to use for such a purpose.

In many cases, however, silos are not yet in use, and for such farmers a good plan would be to make use of the information contained in a 'Notice' or leaflet of instruction sent out very widely from this Division the last few years, a copy of which appears below.

NOTICE FROM THE EXPERIMENTAL FARM TO DAIRY FARMERS.

Every year every dairy farmer loses much money on account of the scarcity of grass or by reason of the unprofitably large area of land that has to be used to insure good pasture during the months of July and August.

If the average dairy herd is to be profitable, every cow must be kept up to her full capacity during those two months, as well as during the preceding and succeeding months.

The quantity of milk produced during September, October and November is very materially influenced by the way in which the cattle are fed in July and August.

Cows receiving insufficient food during those two months naturally decrease very rapidly in milk flow. Once the milk yield is materially decreased for any considerable length of time, it cannot during that season be again brought up to what it might otherwise have been.

Hence, although pastures are usually good or feed plentiful during the months of September, October and November, when prices for cheese and butter are high, we must, in order to get the full benefit of these high prices and abundant supplies of feed, have been feeding well during the months of July and August.

The cheapest, easiest and most certain plan of insuring an abundance of food during the months of July and August is to make use of soiling crops.

Experiments at the Experimental Farm as well as elsewhere would seem to indicate vetches, peas, oats, clover and corn as the most suitable crops for the purpose.

For 10 Cows.

Dairy farmers are, therefore, recommended to prepare and feed somewhat as follows for each 10 cows in their herds:—

1. Clover, 1 acre—To have been sown with the mixture of peas and oats the previous year as described below.

Feed off June 20 to July 15.

2. Peas and oats, ½ acre—Sow 1 bushel peas, 1½ bushel oats and 5 lbs. red clover seed on one half-acre of land about the first week in May, or earlier if possible.

Feed off July 15 to 31.

3. Peas and oats, ½ acre—Sow same mixture on another half-acre about third week in May.

Feed off August 1 to 15.

4. Corn, ½ acre.—Sow 10 lbs. Longfellow corn (or other small variety) in hills 3 feet apart each way. Sow third week in May or as early as possible. Sow on well drained land, clover sod manured at rate of 20 loads (tons) per acre.

Feed off August 15 to 30.

5. Corn, ½ acre.—Sow 12 lbs. Leaming (or other medium variety) same way as above.

Feed off in September.

WM. SAUNDERS, *Director.*

J. H. GRISDALE, *Agriculturist.*

WINTER FEEDING.

The winter feeding was carried on under quite as favourable conditions as the summer. Feed was plentiful and of good quality. Cattle entered the barns in good flesh and have done well.

The winter ration has been on the average about as follows:—

Hay	5 lbs.
Corn ensilage	30 lbs.
Roots	10 lbs.
Straw	4 lbs.
Meal	7 lbs.

The hay was mixed red clover and timothy. The corn silage was of good quality, rich in grain and well preserved.

The roots were mangels, sugar mangels, sugar beets and turnips. They were usually pulped and mixed with the ensilage.

The straw was, of course, oat and was of good feeding quality. It was cut and mixed with the pulped roots and ensilage.

The meal usually consisted of a mixture of 800 lbs. bran, 300 lbs. gluten and 200 lbs. oil-cake meal.

The meal was scattered on the roughage mixture of roots, ensilage and cut straw after it was before the cattle. The hay given was fed uncut, after the other material had been cleaned up.

Of course the amount of roughage fed depends on the appetite of the cow; the amount of meal is influenced rather by the amount of milk being produced by the cow in question.

Her meal ration is gradually increased after calving until at three or four weeks in milk she is supposed to be on full feed. The amount of meal is judged by the milk produced. If she responds freely to the increases in meal, she is fed the more liberally, usually up to that point where an increase in meal does not seem to induce a relatively liberal increase in milk flow. One pound of meal for four pounds of milk is liberal feeding; one pound of meal for three pounds of milk, to leave a profit, necessitates selling milk at a higher price than the average farmer may hope for. In this connection it may be observed that the quality or composition of the meal ration is usually an important factor affecting the milk yield. It is exceedingly important, however, to remember that palatability in the meal as well as in the roughage is an influence that is not infrequently underestimated. Variety in meals fed is advisable, but variety should mean a blending of meals, not a substitution of one for another at frequent intervals. To illustrate, it is much better to feed a mixture of bran, oats, barley, oil-meal, gluten, cottonseed meal, etc., than to feed any one of them for a time, to be subsequently replaced by some other.

Generally speaking, the meal ration for dairy cows should be rich in protein, palatable, easily digested and fairly finely ground and blended to suit the roughage ration with which it is fed. Meals vary greatly as to composition and effect upon the digestive organs of the cattle. While some are laxative, some are constipating in effect, and while some seem to develop appetite, others have the opposite tendency.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season 1910, save in the case of ensilage and roots, which are charged for at the rate usually affixed in the experimental feeding in all parts of America.

Pasture per month	$ 1 00	per cow
Bran	20 00	per ton
Gluten meal	28 00	"
Oil meal	35 00	"
Oats	25 00	"
Barley	22 00	"
Clover hay	7 00	"
Chaff	4 00	"
Roots and ensilage	2 00	"

In estimating the value of the product, 26 cents per pound is allowed for the butter and 20 cents per 100 lbs. for the skim milk. The butter sells at from 25 to 35 cents per pound.

DAIRY HERD RECORDS.

The Central Experimental Farm dairy herd records as given below make a moderate showing. Where cattle are soiled, the cost of feeding during the summer months is, of course, increased, since more labour is necessary.

Records are given for cows that have milked for a sufficiently long time during the year to give a fair indication of their ability as producers. A number of heifers that calved just shortly before the thirty-first day of March, and a few cows that were sold soon after the beginning of the fiscal year are, therefore, not reported upon.

Name of Cows.	Age.	Date of Dropping last Calf.	Number of Days in Milk.	Daily Average Yield in Milk.	Total Milk for Period.	Per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 26c. per pound.	Value of Skim Milk at 20c. per cwt.	Total Value of Product.	Amount of Meal eaten, at 14c. per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of Hay eaten, at $7 per ton.	Amount of Straw eaten, valued at 20c. per cwt.	Months on Pasture, at $1 per month.	Total Cost of Feed for Period.	Cost to Produce 100 lbs. of Milk.	Cost to Produce 1 lb. of Butter, Skim Milk neglected.	Profit on 1 lb. Butter, Skim Milk neglected.	Profit on Cow during Period, Labour neglected.
				Lbs	Lbs.	p. c.		$	$	$	Lbs.	Lbs.	Lbs.	Lbs.	No.	$	Cts.	Cts.	Cts.	
Alma G.G.	10	Aug. 15, '10	282	24·9	7,034	4·70	389·27	101.21	13.29	114.50	1,955	10,647	5,453	1,066	4	60.30	85·7	15·8	10·2	54·20
Flavia A.	9	Mar. 25, '11	292	31·4	9,168	3.76	406·24	105.62	17.71	123.33	2,613	11,097	5,691	1,220	4	70.12	76·5	17·2	8·8	53·21
Dora G.G.	8	May 7, '10	335	19·7	6,493	5·15	393·14	102.22	12.20	114.42	2,163	10,049	5,673	998	4	62.95	97·0	16·0	10·0	51·47
Inoquette C.	7	Apr. 28, '10	284	25·8	7,339	4·39	379·38	98.64	13.92	112.56	2,129	10,407	5,816	1,039	4	63.46	86·5	16·7	9·3	49·10
Ottawa Itchen G.	5	Nov. 25, '10	296	20·2	5,988	5·12	361·09	93.88	11.25	105 13	1,721	10,322	5,560	1,038	4	57.36	95·8	15·9	10·1	47·77
Flavia II A.	5	Jan. 6, '11	263	27·7	7,276	4·28	366·60	95.31	13.82	109.13	1,874	11,890	5,700	1,132	4	61.52	84·5	16·7	9·3	47·61
La Belle C.	6	Mar. 17, '10	329	21·0	6,895	4·53	367·61	95.58	13.05	108.63	2,277	9,708	5,358	905	4	62.73	90·9	17·1	8·9	45·90
Denty IV A.	4	Mar. 21, '11	283	27·7	7,829	3·91	360·20	93.65	14.94	108.59	2,179	10,745	5,714	1,067	4	64.12	81·9	17·8	8·2	44·47
Rejane, 2ème d'Ottawa C.	4	Nov. 21, '10	317	17·7	5,598	5·34	351·58	91.41	10.49	101.90	1,884	9,835	5,339	997	4	58.07	104·0	16·5	9·5	43·83
Maggie of C A.	13	June 4, '10	298	30·5	9,091	3·38	362·19	94.16	17.45	111.61	2,664	10,667	5,700	1,157	4	70.22	77·2	25·1	·9	41·39
Illuminata III S.	7	Nov. 25, '10	327	26·2	8,555	3·77	379·74	98.73	8.18	106.91	2,314	10,827	5,890	1,096	4	66.57	77·8	17·5	8·5	40·34
Marjorie II A.	5	Sept. 5, '10	251	27·2	6,829	4·26	342·22	88.98	12.97	101.95	1,916	11,250	5,816	1,202	4	61.96	90·7	18·1	7·9	39·99
Ottawa Kate A.	4	Dec. 23, '10	335	22·3	7,457	3·83	335·93	87.34	14.24	101.58	2,196	9,689	5,410	1,060	4	62.20	83·4	18·5	7·5	39·38
Queenie G.G.	13	Apr. 24, '10	340	13·7	4,654	6·11	334·55	86.98	8.64	95.63	1,746	9,978	5,709	1,031	4	57.85	124·0	17·2	8·8	37·78
Gurta II G.A.	3	July 27, '10	304	20·6	6,264	4·25	313·49	81.50	11.90	93.40	1,784	9,842	5,161	1,017	4	56.23	89·8	17·9	8·1	37·17
Marjorie A	9	Mar. 20, '11	270	30·0	8,113	3·44	327·82	85.23	15.57	100 80	2,291	11,169	5,723	994	4	65.83	81·0	20·1	5·9	34·97
Fanny G. C.	6	Feb. 8, '10	865	16·4	6,004	4·31	304·41	79.15	11.40	90.55	1,799	9,437	5,532	954	4	57.20	95·3	18·8	7·2	33·35
Fortune 4ème C.	4	Feb. 15, '10	344	18·3	6,287	4·24	313·85	81.60	11.95	93.55	2,122	9,789	5,412	966	4	61.19	97·3	19·5	6·5	32·36
Marjorie IV A.	3	Nov. 17, '10	132	24·0	3,172	4·07	151·82	39.47	6.04	45.51	673	3,606	710	350	....	15.20	47·9	10·0	16·0	30·31
Denty III A.	5	May 16, '10	316	20·4	6,435	4·13	312·61	81.28	12.24	93.52	2,165	10,598	5,724	1,036	4	63.75	99·1	20·4	5·6	29·77
Aromaz C.	3	Mar. 28, '11	329	15·8	5,204	4·92	300·98	78.25	9.81	88.06	1,871	9,116	6,100	956	4	59.77	115·0	19·8	6·2	28·29
Duchess III S.	3	Oct. 26, '10	155	21·8	3,386	4·51	178·60	46.44	6.41	52.85	1,101	6,252	1,276	574	....	25.93	76·6	14·5	11·5	26·92
Zamora C.	15	Nov. 13, '10	350	14·4	5,040	4·97	294·79	76.65	9.49	86.14	1,847	10,368	5,747	977	4	59.52	118·0	20·2	5·8	26·62
Ottawa Marchioness IV S.	2	Nov. 21, '10	130	24·2	3,140	4·33	159·96	41.59	5.96	47.55	937	5,270	1,016	437	....	21.41	68·2	13·4	12·6	26·14
Denise Duchesse C.	7	Apr. 17, '10	346	18·3	6,342	3·95	294·85	76.66	12.09	88.76	2,234	9,733	5,451	1,000	4	62.74	98·9	21 3	4·7	26·01
Dona Clatina G.	4	Sept. 14, '10	350	12·7	4,448	5·39	282·19	73.37	8.33	81.70	1,774	9,177	5,395	960	4	56.16	126·0	19·9	6·1	25·54
Alice G.A.	3	Dec. 7, '10	110	22·6	2,482	4·81	140·52	36.53	4.68	41.21	696	3,661	792	320	....	15.77	63·5	11·2	14·8	25·44
Denty A.	12	July 2, '10	369	23·7	6,362	3·77	282·68	73.50	12.16	85.66	1,975	11,022	5,520	1,180	4	61.38	96·4	21·7	4·3	24·27
Soncy of Nappan A.	5	Mar. 28, '10	356	19·2	6,831	3·56	286·40	74.46	13.09	87.55	2,248	9,671	5,579	943	4	63.29	92·7	22·1	3·9	24·26
Pearly Prize G.	6	Mar. 15, '11	321	14·6	4,700	5·11	282·65	73.49	8.83	82.32	1,820	9,846	5,601	990	4	58.18	124·0	20·6	5·4	24 14
Janet S.	11	Mar. 5, '11	265	21·7	5,755	4·17	282·58	73.47	10.94	84.41	1,823	10,955	5,786	1,180	4	60.34	105·0	21·4	4·6	24·07
Maggie 10th A.	3	Nov. 24, '10	124	25·9	3,211	3·93	148·47	38 60	6.13	42.84	897	4,511	906	405	....	19.70	61·4	13·3	12·7	23·14

Dolly	G.A.	8	Mar. 25, '10	275	24·9	6,835	3·56	286·05	74·37	13·10	87.47	2,493	10,581	5,613	970	4	65.33	95·6	22·8	3·2	22·14
Alma II.	G.G.	5	Aug. 28, '10	303	15·4	4,679	4·91	270·38	70·30	8·82	79.12	1,737	9,756	5,682	1,013	4	57.39	123·0	21·2	4·8	21·73
Maggie 5th	A.	5	May 20, '10	254	22·4	5,702	3·85	258·48	67·20	10·89	78·09	1,767	9,671	5,479	1,029	4	56.99	99·9	22·0	4·0	21·10
Inoquette III.	C.	2	Jan. 8, '10	365	12·9	4,700	4·63	256·20	66·61	8·89	75·50	1,749	9,103	5,152	957	4	54.90	117·0	21·4	4·6	20·60
Ottawa Lass	S.	9	Feb. 21, '10	365	17 5	6,384	3·73	280·44	72·91	12·21	85·12	2,170	10,836	5,912	1,102	4	64.89	102·0	23·1	2·9	20 23
Itchen Lady	G.	13	Mar. 14, '11	214	21·9	4,700	4·07	259·88	67·57	8·88	76.45	1,812	9,492	5,638	960	4	57.79	123·0	22·2	3·8	18·66
Soncy R.	A.	6	Nov. 15, '10	314	15·8	4,959	4·11	239·49	62·27	9·44	71.71	1,633	9,342	5,138	1,017	4	53.76	108·0	22·4	3·6	17·95
Illuminata 5th	S.	4	Oct. 31, '10	231	18·1	4,174	3·90	191·48	49·78	7·97	57.75	1,203	4,945	4,643	578	4	41.40	99·2	21·6	4·4	16·35
Archer's Spot	G.	2	Dec. 27, '10	79	18·3	1,448	5·29	90 05	23·41	2·72	26.13	509	2,700	540	224	....	11.40	78·7	12·7	13·3	14·73
Maggie Pulchrae	A.	2	Dec. 3, '10	105	19·8	2,080	4·11	100·52	26·14	3·96	30 10	713	3,611	726	320	....	15.70	75·5	15·6	10·4	14·40
Soncy III.	A.	2	Sept. 21, '10	182	14·7	2,677	3·79	119·57	31·08	5·11	36.19	956	5,305	1,146	500	....	22.26	83·1	18·6	7·4	13·93
Marjorie III	A.	3	Feb. 24, '10	286	17·3	4,948	4·11	239·31	62·22	9·42	71.64	1,853	9,332	5,579	970	4	57.96	117·0	24·2	1·8	13·68
Ottawa Marchioness III	S.	5	Aug. 8, '10	256	17·9	4,587	4·17	224·82	58·45	8·72	67.17	1,800	10,192	4,486	962	4	54.31	118·0	24·2	1·8	12·86
Fortune Précoce	C.	4	Mar. 6, '11	287	18·1	5,187	4·00	231·84	60·28	9·91	70.19	1,926	9,217	5,268	935	4	57.61	111·0	24·8	1·2	12·58
Jessie E.	A.	10	Aug. 30, '10	251	19·3	4.836	3·77	214·39	55·74	9·24	64.98	1,504	9,700	5,200	987	4	52.67	109·0	24·6	1·4	12·31
Jessica of Elmhurst III	S.	3	Sept. 15, '10	224	19·5	4,356	4·19	214·64	55·81	8·28	64.09	1,373	9,848	5,400	1,038	4	51.99	119·0	24·2	1·8	12·10
Fortune d'Oka	C.	14	Apr. 2, '10	280	15·8	4,420	4·14	215·14	55·94	8·41	64.35	1,659	8,265	5,196	869	4	52.94	120·0	24·6	1·4	11·41
Ottawa Marchioness II	S.	6	Dec. 4, '10	275	18·3	5,029	3·99	236·31	61·44	9·59	71.03	1,878	10,676	5,793	1,118	4	60.68	121·0	25·7	·3	10·35
Duchesse 5ème	C.	4	Dec. 29, '10	181	21·5	3,895	4·32	197·87	51·45	7·39	58.84	1,271	9,225	5,679	1,119	4	51.24	132·0	25·9	·1	7·60
Duchesse Perdue	C.	5	June 6, '10	313	14·6	4,562	3·96	212·72	55·31	8·70	64.01	1,810	9,377	5,386	965	4	56.79	124·0	26·7	*·7	7·22
La Poupée	C.	8	Apr. 14, '10	151	23·5	3,550	4·79	200·04	52·00	6·70	58.70	1,379	9,766	5,557	1,011	4	52.47	147·0	26·2	*·2	6·23
Whitie	G.S.	7	Mar. 24, '11	247	21·5	5,319	3·91	244·80	63·65	10·15	73.80	2,510	10,961	5,700	1,057	4	68.40	120·0	27·9	*1·9	5·40

* Loss.

"CANADIANS."

Names of Cows.	Age.	Date of Dropping last Calf.	Number of Days in Milk.	Daily average Yield in Milk.	Total Milk for Period.	Per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 26 cents per Pound.	Value of Skim Milk at 20 cents per cwt.	Total Value of Products.	Amount of Meal eaten at 1¼ cents per lb.	Amount of Roots and Ensilage eaten at $2 per ton.	Amount of Hay eaten at $7 per ton.	Amount of Straw eaten valued at 20c. per cwt.	Months on Pasture at $1 per month.	Total cost of Feed for Period.	Cost to produce 100 lbs. of Milk.	Cost to produce 1 lb. Butter, Skim Milk neglected.	Profit on 1 lb. of Butter, Skim Milk neglected.	Profit on Cow during Period, Labour neglected.
	Yrs.			Lbs.	Lbs.	p.c.	Lbs.	$	$	$	Lbs.	Lbs.	Lbs.	Lbs.	Mos.	$	Cts.	Cts.	Cts.	
Inoquette	7	Apr. 28, '10.	284	25·8	7,339	4·39	379·38	98.64	13.92	112.56	2,129	10,407	5,816	1,039	4	63·46	86·5	16·7	9·3	49·10
La Belle	6	Mar. 17, '10.	329	21·0	6,895	4·53	367·61	95.58	13.05	108.63	2,277	9,708	5,358	905	4	62·73	90·9	17·1	8·9	45·90
Réjane 2ème d'Ottawa	4	Nov. 21, '10.	317	17·7	5,598	5·34	351·58	91.41	10.49	101.90	1,884	9,835	5,339	997	4	58·07	104·0	16·5	9·5	43·83
Average	6		310	21·5	6,611	4·75	366·19	95.21	12.48	107.70	2,096	9,983	5,504	980	4	61·42	93·8	16·8	9·2	46·23

"GRADES."

Alma	10	Aug. 15, '10.	282	24·9	7,034	4·07	389·27	101.21	13.29	114.50	1,955	10,647	5,453	1,066	4	60·30	85·7	15·8	10·2	54·20
Dora	8	May 7, 10.	335	19·7	6,493	5·15	393·14	102.22	12.20	114.42	2,163	10,049	5,673	998	4	62·95	97·0	16·0	10·0	51·47
Queenie	13	Apr. 24, '10.	340	13·7	4,654	6·11	334·55	86.98	8.64	95.63	1,746	9,978	5,709	1,031	4	57·85	124·0	17·2	8·8	37·78
Average	10		319	19·4	6,060	5·32	372·32	96.80	11.38	108.18	1,955	10,225	5,612	1,032	4	63·70	102·2	16·3	9·7	48·15

"SHORTHORNS."

Illuminata	7	Nov. 25, '10.	327	26·2	8,555	3·77	379·74	98.73	8.18	106.91	2,314	10,827	5,890	1,090	4	66·57	77·8	17·5	8·5	40·34
Janet	11	Mar. 5, '11.	265	21·7	5,755	4·17	282·58	73.47	10.94	84.41	1,823	10,955	5,786	1,180	4	60·34	105·0	21·4	4·6	24·07
Ottawa Lass	9	Feb. 21, '10.	365	17·5	6,384	3·73	280·44	72.91	12.21	85.12	2,170	10,836	5,921	1,102	4	64·89	102·0	23·1	2·9	20·23
Average	9		319	21·8	6,898	3·89	314·25	81.70	10.44	92.15	2,102	10,872	5,866	1,126	4	63·93	94·9	20·7	5·3	28·21

"AYRSHIRES."

Flavia	9	Mar. 25, '11.	292	31·4	9,168	3·76	406·24	105.63	17.71	123.33	2,613	11,097	5,691	1,220	4	70·12	76·5	17·2	8·8	53·21
Flavia II.	5	Jan. 6, '11.	263	27·7	7,276	4·28	366·60	95.31	13.82	109.13	1,874	11,890	5,700	1,132	4	61·52	84·5	16·7	9·3	[illegible]
Denty IV	4	Mar. 21, '11.	283	27·7	7,829	3·91	360·20	93.65	14.94	108.59	2,179	10,745	5,714	1,067	4	64·12	81·9	17·8	8·2	[illegible]
Average	6		279	28 9	8,091	3·98	377·68	98.20	15.49	113.68	2,222	11,244	5,702	1,140	4	65·25	80·9	17·2	8·8	[illegible]

"GUERNSEYS."

Ottawa Itchen	5	Nov. 25, '10.	296	20·2	5,988	5·12	361·09	93 88	11.25	105.13	1,721	10,322	5,560	1,038	4	57·36	95·8	15·9	10·1	47·77
Dona Clatina	4	Sept. 14, '10.	350	12·7	4,448	5·39	282·19	73.37	8.33	81.70	1,774	9,177	5,395	960	4	56·16	126·0	19·9	6·1	25·54
Pearly Prize	6	Mar. 15, '11.	321	14·6	4,700	5·11	282·65	73.47	8.83	82.32	1,820	9,846	5,601	990	4	58·18	124·0	20·6	5·4	24·14
Average	5		322	15·8	5,045	5·21	308·64	80.25	9.47	89.72	1,772	9,782	5,519	996	4	57·23	115·3	18·8	7·2	32·48

DAIRY COW RECORDS.

KEEPING RECORDS.

An increasingly large number of dairy farmers avail themselves of the offer made by this Division to supply, free of cost, forms whereon to keep records of the milk produced each day, or one day in each week, by each cow. This fact points to progress along right lines. It is only when one knows the individuals in one's herd that one can hope to improve the general quality of the herd.

The forms supplied are for week-long periods, as illustrated below, or for month-long periods, as may be preferred by the dairyman. In addition, forms for summarizing the month's work, as well as forms whereon to enter up the year's record, are sent on application.

DAILY MILK RECORD.

Herd belonging to.....
Post office.....
Record for week ending.....

(This form supplied free by Live Stock Division, Central Experimental Farm, Ottawa, Ont.)

COWS.

Day.	Time.																		Total for day.
Sunday	Morning																		
	Evening																		
Monday	Morning																		
	Evening																		
Tuesday	Morning																		
	Evening																		
Wednesday	Morning																		
	Evening																		
Thursday	Morning																		
	Evening																		
Friday	Morning																		
	Evening																		
Saturday	Morning																		
	Evening																		
Total	Week																		

(Reverse.)

CENTRAL EXPERIMENTAL FARM.

Wm. Saunders, Director. J. H. Grisdale, Live Stock and Agriculture.

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pound of milk each year. To know the value of a cow, her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk record of their individual cows. A study of such records will soon indicate which cow should go to the butcher. We should be pleased to receive a summary of your record. If you have no summary forms, write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the thing a trial, if you are a dairyman? It will increase your milk product. It will lighten your labour since your interest will be increased in your work and 'interest lightens labour.' It will show you the unprofitable cow, the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the milk a simple spring balance may be secured for from one and a half to five dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing to J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

DISPOSAL OF MILK.

For a number of years, the milk produced on the Central Experimental Farm has been manufactured into butter and the skim milk fed to calves or pigs, this of course, with the exception of the small amounts of milk and cream sold daily to people living on the Farm or coming to the Farm to buy what they require. Disposing of the milk in this way has, during the last ten years, netted us an average price of about $1.65 per 100 lbs. of milk as drawn from the cow. Butter manufactured in our dairy has usually commanded a slight premium over the current market price. The average milk from our herd shows about 4½ per cent butter fat. We value the skim milk at 20 cents per 100 lbs. when feeding to calves or pigs. In each case, as will have been noted, we have more or less of an advantage over the average dairy farmer in Eastern Canada, so enabling us to net a price somewhat higher than the average.

CHEESE MAKING.

Our herd has been growing of recent years and the most profitable disposition of our milk product has become a more difficult problem on account of the rather limited demand for a high-class article of butter in this city. It is in summer more particularly that it is found difficult to dispose of all the butter manufactured, hence it was decided to attempt the manufacture of some small cheeses. During the past year accordingly, quite a number of Coulommier cheese and soft cream cheese have been manufactured here and sold in the local market.

The demand has not been found to be very great for either sort of cheese. As no advertising has been done, it is probably hardly fair to judge of the market possibilities by what we have been able to do here.

We have found, however, that milk made up into either one of these two sorts of soft cheese and sold at prices easily obtainable in Ottawa, or quite probably in any other city in Canada, brings about double what might be expected from it when sold in any other form.

Since the manufacture of either one of these is not at all a difficult process, the brief outline of the method of manufacture as practised here would probably be sufficient to enable anyone possessed of a fair amount of intelligence, to successfully manufacture either the one or the other after a few trials.

The notes on cream cheese have been prepared by myself with the help of Mr. Meilleur, our dairyman. The notes on Coulommier cheese are, by permission of Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner, taken from a bulletin issued from the Dairy Commissioner's Branch, and specially prepared by Miss Janet McNaughton, N.D.D., late Instructor in Home Dairying, Macdonald College, Quebec.

CREAM CHEESE.

The cream cheese seems, if anything, to be the more popular. It is a cheese very easy to manufacture and requiring very little special apparatus. It has brought us in about $3 per 100 lbs. for our milk when manufactured and handled as described here.

The Cream.

A suitable quantity of cream wherewith to work is two gallons or about 20 lbs. The cream should be fresh and should test from 12 to 18 per cent butterfat. It should be brought to a temperature of about 80° F.

A Starter.

When at this temperature, and to this amount of cream, a starter of about half a cup of good butter milk or sour cream having a pleasant flavour should be added and well stirred in.

Rennet.

For this amount of cream dissolve 40 drops rennet in 1 ounce water and pour slowly into the cream, stirring well while adding to insure thorough mixing. Let the material stand for from 1½ to 2 hours or until the curd is fairly firm. A suitable degree of firmness may be said to have been reached when the curd breaks clean in front of a lead pencil or similar article moved slowly through the mass.

Straining.

When the curd is fairly firm, it should be removed from the whey with a skimmer or ladle and laid gently on the straining cloths which should line a couple of pails preparatory to receiving the curd straining. Huckaback towelling is about the most suitable material to use as a strainer. The strainers should be about 2 feet square. The curd from 2 gallons of cream should be divided into 2 fairly equal portions for straining. It should be allowed to hang for 24 hours.

Salting and Pressing.

When the whey has been fairly well strained out, say in about 24 hours, the cloth should be changed, fine salt added to suit, then rewrapped and put under slight pressure for a few hours. The degree of pressure and the length of time to be kept under pressure will be indicated by the condition of the curd when salted. A soft curd would need, say 8 lbs. pressure for 7 or 8 hours, while a fairly dry, firm curd might require only 4 lbs. pressure for 4 or 5 hours. A common brick weighs 4 lbs., and one or two serve as very suitable weights for pressing the cheese.

Moulding.

Pressure should be removed when the curd is dry enough, and as soon as convenient, the curd should be moulded into some suitable form. A very good shape is a cylinder from 1 to 1½ inches deep and about 3 inches across. Such a cheese weighs from 5 to 6 ounces. When moulding, the cheese should be pressed into a cheese cloth cover, just enough to protect the curd from too ready contamination and to help lend firmness to the cheese.

Selling.

Cheeses of this size sell for 15 cents and 2 gallons cream, 16 per cent butterfat, will make 20 or 21 of them. Besides the cheese cloth, an envelope, card-board or stiff

paper carton should be provided as a protection against either hard or readily disintegrating substances likely to spoil the appearance or injure the quality of the delicate product.

Keeping Qualities.

Such cheese keeps for a short time only and had better be used when quite fresh.

COULOMMIER CHEESE.

Accommodation.

Any clean room with good ventilation and where a fairly even temperature can be maintained will do to make the cheese in. The cleanliness, however, is very important. Perhaps a clean, air cellar is best of all, because there is a fairly even temperature can be maintained, and it is cool in summer. It must, however, be free from dust and smells, as cheese, like all milk products, is very easily tainted and very readily absorbs surrounding odours. The best room temperature is from 60° F. to 65° F. If the room gets overheated, the cheese is apt to drain too quickly, there is loss of fat and a hard, dry cheese is the result. If, on the other hand, the room is too cold, the cheese does not drain quickly enough and it may develop a bad or bitter flavour.

Milk.

Sweet and clean new milk of good quality makes the best cheese. All the fat or cream should be left in the milk. Skim milk makes a very hard, dry, unpalatable cheese. Acid milk also makes a harsh, dry cheese.

Rennet.

Rennet may be used in either the extract or tablet form. Where only small quantities are used, the tablets are best, as they are easier to obtain fresh in small quantities and keep better. Rather less should be used than that recommended in the directions for junket, as in this case a soft curd is wanted, which will take from two to three hours to coagulate.

Salt.

Pure dairy salt with a fine grain which will dissolve readily, should be used. It may not be generally known that salt absorbs surrounding odours almost as readily as milk. It should, therefore, be kept in a pure atmosphere.

Appliances—Vessels to Hold Milk.

Wooden tubs with lids are best, but are by no means absolutely indispensable. Wood is a poor conductor of heat and we want to maintain an even temperature of the milk after setting, for two reasons. In the first place if the temperature of the milk falls much before ladling, the curd will not drain so well in the mould. In the second place, cream always rises best on the milk in a falling temperature. If we let the temperature fall much during coagulation, we shall have a thick layer of cream on the top of the curd. The consequence of this will be that some of the fat will pass off in the whey and be lost, while what remains in the curd will not be evenly distributed, but will appear in streaky masses throughout the finished cheese. Oak is the best wood, as it is most durable and, being hard, it is easily cleaned. If tubs are not convenient, pails of either tin or enamel may be used instead.

Draining Table.

The table on which the cheeses are set to drain should slope slightly and should have an outlet at the lower end for carrying off the whey. A pail should be placed

under the outlet to receive the whey. Wooden tables are often made with a ridge round the edge and covered with galvanized tin. This is the most suitable style for the early stages of making where there is a large amount of drainage

Another style of table is made of hardwood with grooves leading to an outlet in the centre where the whey drains off into the pail. This table is more suitable for draining the cheese the second day after it is turned. A shelf may be fitted up in the same way. To begin with, however, an ordinary table may be tilted a little at one end, so that the whey will drain to a given corner where it can be caught, or a board may be laid in a sloping fashion on the table and the cheese moulds set on that.

Moulds.

Moulds for holding the curd are round and made of tin in two pieces to facilitate the turning of the cheese. They are 5¼ inches in diameter and 5 inches in height. The lower half is two inches high and the top half or collar is three inches high. They cost about thirty-five cents each and can be bought from the Canadian Dairy Supply Company, Youville Square, Montreal.

Boards and Straw Mats.

These are required to lay the cheese on. No pressure is given to the cheese. The straw mats are placed on the boards underneath the moulds into which the curd is ladled, and the whey drains off through the straw. Each board and mat holds two moulds. The boards are fourteen by eight inches and half an inch in thickness. These can be easily made at home. The straw mats are the same size as the boards and can also be made at home in spare moments. They are usually made by the peasantry in the north of France of wheat or rye straw very neatly and evenly threaded together. They cost about five cents each. Where, however, time is too scarce to make them and there is difficulty in obtaining them ready made, a double fold of coarse, open linen may be used instead. After using, the mats should be rinsed in cold water, then in warm water and scalded or boiled, and placed, if possible, in the sun to dry. If washed carefully, they will last a long time.

Ladle.

A ladle is necessary for transferring the curd from the pails to the moulds. This ladle may be of tin or enamel. The edge should be sharp, so that it will make as clean a cut as possible. If it is thick or rough, it will tear the curd and there will be loss of fat.

Thermometer.

A reliable floating dairy thermometer is a necessity. They can be got for twenty-five cents each. No uniformity can be obtained by rule of thumb, and a mistake of a few degrees in temperature may make a considerable difference in the character of the cheese.

Measuring Glass for Rennet.

When rennet extract is used, it is well to invest in a small drachm glass for measuring the rennet. These glasses can be got from any chemist, graded to show the number of drops. They cost twenty-five cents each.

Paper and Boxes.

Grease-proof parchment paper will be required to wrap the cheese in, if it is to be sent to market. It can be obtained from any dairy supply house. Cardboard boxes can be had from any of the folding-box manufacturers and cost from three to five dollars per thousand.

Method of Making.

Requirements for two cheese:—

One gallon new milk
Fifteen drops rennet extract.
One ounce pure dairy salt.

1. Strain the milk into a clean pail or other suitable vessel.

2. Get the milk to a temperature of 80° F.

3. Dilute the rennet with about ten times its bulk of water, in order to get it evenly mixed and more easily distributed. Add it to the milk and stir gently to bottom of the pail for three minutes.

4. Cover the pail with a clean cloth in order to retain heat. Four folds of butter muslin will do nicely. If the temperature of the room is low, it is advisable to set the vessel containing the milk in another containing water two degrees higher in temperature than the milk. If the temperature of the water falls below 80° F. a little warm water may be added to it. 60 to 65° F. is the best room temperature.

5. Stir the surface of the milk gently with the end of the thermometer to keep the cream from rising. Do this every ten minutes or so for the first half hour. Do not stir after the milk has begun to coagulate.

6. Lay the board with the straw mat on it and the two moulds with collars, where they can drain undisturbed in as even a temperature and as free from draughts as possible. The time the curd takes in draining will depend to a considerable extent on the temperature of the room and on the manner in which the curd is ladled. If the temperature falls much below 60° F. the curd will take too long to drain and may have a bitter flavour. If kept at too high a temperature, or if ladled roughly, there will be a loss of fat and the result will be a harsh, dry cheese. If ladled in thin slices, it will drain more quickly than if ladled in thick slices. When a nice soft coagulum has formed, which ought to be in from two to three hours, take out a large ladleful of curd and set it aside to form smooth tops for the cheese. Then gently ladle the rest of the curd into the moulds in thin slices, putting on last of all the curd from the ladleful which was set aside. If the tins do not hold all the curd to begin with, the remainder may be added as soon as that in the tins has sunk sufficiently.

7. When the curd has sunk to the lower edge of the collar, which should be in from twenty to thirty hours, remove the collars gently, place a clean mat and board on the top of the moulds and turn them over. Care must be exercised in removing the first mat, as the curd is apt to adhere to it. It is best to roll it backwards gently like a roll of paper.

8. Sprinkle the top of the curd with good salt, about ¼ oz. between two cheeses.

9. Wash the draining table, replace the cheese on it and let the cheese drain for another twenty-four hours.

10. At the end of that time, turn as before and sprinkle the other side with a similar amount of salt. In twenty-four hours after this, the cheese should be ready for eating, if they are used fresh, but if not disposed of, the moulds may be removed and the cheese turned daily.

11. Wrap neatly in grease-proof parchment paper, pack in cardboard boxes and send to market.

BEEF PRODUCTION.

The experiments conducted with beef cattle this year have not been wholly of a comparative nature.

The work here reported upon includes three lots of Angus steers purchased in Wellington county and put on feed April 1, 1910, and two lots of Shorthorn steers carried over from the previous year. The latter were reported upon last year as steer calves, dropped in June, 1909.

Lot 1.

Number of steers in lot		
First weight, gross, April 1, 1910	lbs.	3,458
First weight, average	"	864·5
Finished weight, gross, January 16, 1911	"	5,335
Finished weight, average	"	1,333·7
Total gain in 290 days	"	1,877
Average gain per steer	"	469·2
Daily gain per steer	"	1·62
Daily gain per lot, 4 steers	"	6·48
Gross cost of feed	$	155 79
Cost of 100 lbs. of gain	cts.	8·3
Valuation put on beef, April 1, 1910	$	207 48
Total cost to produce beef		363 27
Sold 5,335 lbs. at $7.50 per 100 lbs., less 5 per cent		380 10
Profit		16 83
Profit per steer		4 20
Average valuation per steer to start		51 87
Average selling price per steer		95 02
Average increase in value		43 15
Average cost of feed per steer		38 95
Amount of meal eaten per lot of 4 steers	lbs.	7,064
Amount of ensilage and roots eaten	"	31,621
Amount of hay eaten	"	8,514
Amount of straw eaten	"	3,752

Meal consisted of bran, 4,238·4 lbs.; gluten, 1,412·8 lbs.; oil cake meal, 1,413·8 lbs. The roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only. They were pulped and mixed with ensilage in the proportion of one part of the former to five parts of the latter.

Lot 2.

Number of steers in lot		4
First weight, gross, April 1, 1910	lbs.	2,770
First weight, average	"	692·5
Finished weight, gross, January 16, 1911	"	4,480
Finished weight, average	"	1,120
Total gain in 290 days	"	1,710
Average gain per steer	"	427·5
Daily gain per steer	"	1·47
Daily gain per lot, 4 steers	"	5·89
Gross cost of feed	$	129 98
Cost of 100 lbs. gain	cts.	7·6
Valuation put on beef, April 1, 1910	$	166 20
Total cost to produce beef		296 18
Valued, 4,480 lbs. at $7.50 per 100 lbs., less 5 per cent		319 20
Profit		23 02
Profit per steer		5 75
Average valuation per steer to start		41 55
Average value price per steer at finish, January 16, 1911		79 80
Average increase in value		38 25
Average cost of feed per steer		32 49
Amount of meal eaten per lot of 4 steers	lbs.	5,249

Amount of ensilage and roots eaten	lbs.	29,002
Amount of hay eaten	"	8,502
Amount of straw eaten	"	3,338

Meal consisted of bran, 3,149·4 lbs.; gluten, 1,049·8 lbs.; oil cake meal, 1,049·8 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only. They were pulped and mixed with ensilage in the proportion of one part of the former to five parts of the latter.

Lot 3.

Number of steers in lot		4
First weight, gross, April 1, 1910	lbs.	1,793
First weight, average	"	448·2
Finished weight, gross, January 16, 1911	"	3,570
Finished weight, average	"	892·5
Total gain in 290 days	"	1,777
Average gain per steer	"	444·2
Daily gain per steer	"	1·53
Daily gain per lot, 4 steers	"	6·12
Gross cost of feed	$	86 01
Cost of 100 lbs. gain	cts.	4·8
Valuation put on beef, April 1, 1910	$	89 65
Total cost to produce beef		175 66
Valued 3,570 lbs. at $6.50 per 100 lbs., less 5 per cent		220 45
Profit		44 79
Profit per steer		11 19
Average valuation per steer to start		22 41
Average selling price per steer		55 11
Average increase in value		32 70
Average cost of feed per steer		21 50
Amount of meal eaten per lot of 4 steers	lbs.	3,041
Amount of ensilage and roots eaten	"	18,678
Amount of hay eaten	"	7,334
Amount of straw eaten	"	2,144

Meal fed consisted of bran, 1,824·6 lbs.; gluten, 608·2 lbs.; oil cake meal, 608·2 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only. They were pulped and mixed with ensilage in the proportion of one part of the former to five parts of the latter.

Lot 4.

Number of steers in lot		5
First weight, gross, April 1, 1910	lbs.	2,801
First weight, average	"	560
Finished weight, gross, January 16, 1911	"	5,165
Finished weight, average	"	1,033
Total gain in 290 days	"	2,364
Average gain per steer	"	472·8
Daily gain per steer	"	1·63
Daily gain per lot, 5 steers	"	8·15
Gross cost of feed	$	159 94
Cost of 100 lbs. gain	cts.	6·77
Valuation put on beef, April 1, 1910	$	140 05
Total cost to produce beef		299 99

Valued, 5,165 lbs. at $6.50 per 100 lbs., less 5 per cent....		342 97
Profit..		42 98
Profit per steer..		8 59
Average valuation per steer to start..		28 01
Average selling price per steer..		68 59
Average increase in value..		40 58
Average cost of feed per steer..		31 98
Amount of meal eaten per lot of 5 steers..	lbs.	7,764
Amount of ensilage and roots eaten	"	33,668
Amount of hay eaten..	"	6,650
Amount of straw eaten..	"	3,759

Meal consisted of bran, 4,658·4 lbs.; gluten, 1,552·8 lbs.; oil cake meal, 1,552·8 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during winter months only. They were pulped and mixed with ensilage in the proportion of one part of the former to five parts of the latter.

Lot 5.

Number of steers in lot		3
First weight, gross, April 1, 1910	lbs.	1,252
First weight, average	"	417·3
Finished weight, gross, January 10, 1911	"	2,770
Finished weight, average	"	923
Total gain in 290 days	"	1,518
Average gain per steer	"	506
Daily gain per steer	"	1·74
Daily gain per lot, 3 steers	"	5·22
Gross cost of feed	$	99 31
Cost of 100 lbs. gain	cts.	6·54
Valuation put on beef, April 1, 1910	$	62 60
Total cost to produce beef		161 91
Value, 2,770 lbs. at $6.50 per 100 lbs., less 5 per cent ..		171 03
Profit		9 12
Profit per steer		3 04
Average valuation per steer to start		20 86
Average selling price per steer		57 01
Average increase in value		36 15
Average cost of feed per steer		33 10
Amount of meal eaten per lot of 3 steers..	lbs.	5,290
Amount of ensilage and roots eaten	"	18,730
Amount of hay eaten	"	3,185
Amount of straw eaten	"	2,190

Meal consisted of bran, 3,174 lbs.; gluten, 1,058 lbs.; oil cake meal 1,058 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only. They were pulped and mixed with ensilage in the proportion of one part of the former to five parts of the latter

Owing to the fact that on January 16, some of the steers from different lots were sold, and some others purchased, a re-grouping was necessary. The purchased steers were put into the pens on January 28, and for that reason the following lots are reported upon from that date, rather than from January 16.

Lot 6.

Number of steers in lot		5
First weight, gross, January 28, 1911	lbs.	5,500
First weight, average	"	1,100
Finished weight, gross, March 31, 1911	"	6,120
Finished weight, average	"	1,224
Total gain in 62 days	"	620
Average gain per steer	"	124
Daily gain per steer		2·0
Daily gain per lot, 5 steers		10·0
Gross cost of feed	$	52 20
Cost of 100 lbs. gain	cts.	8·4
Average cost of feed per steer	$	10 42
Amount of meal eaten per lot of 5 steers	lbs.	2,800
Amount of ensilage and roots eaten	"	8,925
Amount of hay eaten	"	1,890
Amount of straw eaten	"	1,115·2

Lot 7.

Number of steers in lot		5
First weight, gross, January 28, 1911	lbs.	5,690
First weight, average	"	1,138
Finished weight, gross, March 31, 1911	"	6,370
Finished weight, average	"	1,274
Total gain in 62 days	"	680
Average gain per steer	"	136
Daily gain per steer	"	2·2
Daily gain per lot, 5 steers	"	11·0
Gross cost of feed	$	45 31
Cost to produce 100 lbs. gain	cts.	6·66
Average cost of feed per steer	$	9 06
Amount of meal eaten per lot of 5 steers	lbs.	2,240
Amount of ensilage and roots eaten	"	8,925
Amount of hay eaten	"	1,890
Amount of straw eaten	"	1,115·2

Lot 8.

Number of steers in lot		4
First weight, gross, January 28, 1911	lbs.	3,725
First weight, average	"	931
Finished weight, gross, March 31, 1911	"	4,210
Finished weight, average	"	1,052·5
Total gain in 62 days	"	485
Average gain per steer	"	121
Daily gain per steer	"	1·95
Daily gain per lot, 4 steers	"	7·82
Gross cost of feed	$	32 61
Cost of 100 lbs. gain	cts.	6·72
Average cost of feed per steer	$	8 15
Amount of meal eaten per lot of 4 steers	lbs.	1,624
Amount of ensilage and roots eaten	"	5,714
Amount of hay eaten	"	1,575
Amount of straw eaten	"	714

Lot 9.

Number of steers in lot		4
First weight, gross, January 28, 1911	lbs.	3,860
First weight, average	"	965
Finished weight, gross, April 8, 1911	"	4,335
Finished weight, average	"	1,084
Total gain in 70 days	"	475
Average gain per steer	"	118·7
Daily gain per steer	"	1·69
Daily gain per lot, 4 steers	"	6·79
Gross cost of feed	$	44 87
Cost of 100 lbs. gain	cts.	9·44
Average cost of feed per steer	$	11 22
Amount of meal eaten per lot of 4 steers	lbs.	2,506
Amount of ensilage and roots eaten	"	6,384
Amount of hay eaten	"	1,743
Amount of straw eaten	"	798

SHEEP.

Another fairly successful year may be reported so far as breeding operations with sheep are concerned. We seem to have learned how to guard against internal parasites, though stocking heavily on a small area. The feeding of more or less soiling crop and the following of a short rotation appears to be the proper method to follow. Leaving sheep more than one year on a pasture closely fed down has invariably resulted disastrously for us. The keeping them for only one year on the pasture has for two seasons now seemed to overcome practically all danger from the stomach or intestinal worm.

EXPERIMENT IN FATTENING LAMBS.

In order to gain further information on the relative value of corn silage and of roots for fattening lambs, an experiment similar to that conducted in 1909-1910, was undertaken.

Twenty mixed grade wethers, three pure-bred Leicester ewes and four pure-bred Shropshire ewes, all about seven months of age, were used in this trial. The wethers were purchased in Carleton county, and as they had come from rough pasture, they were in just fair shape before being placed under experiment. The ewes were of our own breeding and were in a thrifty condition but not fat.

Some days before being grouped they were dipped.

On the morning of December 7, 1910, they were divided into three lots of nine each, and put on test. The experiment covered a period of 124 days.

Lot No. 1.—Seven wethers, 1 Leicester ewe and 1 Shropshire ewe weighed 953 lbs.

Lot No. 2.—Seven wethers, 1 Leicester ewe and 1 Shropshire ewe weighed 953 lbs.

Lot No. 3.—Six wethers, 1 Leicester ewe and 2 Shropshire ewes weighed 954 lbs.

Until December 22, they received clover hay only, at the rate of 3 lbs. per head per diem. From the morning of that date they were fed as follows:—

Each lamb of each group received 8 ozs. per diem during the first week, 10 ozs. the second week, 12 ozs. the third week, 14 ozs. the fourth week, 16 ozs. the fifth week, 18 ozs. the sixth and seventh weeks, 20 ozs. the eighth and ninth weeks, 22 ozs.

the tenth and eleventh weeks, and 24 ozs. for the remainder of the feeding period, of a meal mixture constant in composition: 200 lbs. bran, 200 lbs. oats and 100 lbs. nutted oil cake.

As roughage, lot 1 were given as much turnips as they would eat; lot 2 were given as much ensilage as they would eat; lot 3 were fed as much turnips and ensilage as they would take, in the proportion of about 7 of roots to 6 of ensilage. Of good clover hay, each lamb in each lot received 1½ lbs. per day throughout the entire experiment.

The meal was mixed with the turnips and ensilage in each case, and was fed twice daily.

The hay was given three times daily.

The morning feed was given between 8 and 8.30, the noon feed between 11.45 and 12, and the night feed between 4.15 and 4.45.

It was aimed to feed as much turnips and ensilage as the animals would consume without inducing scouring. Turnips from a comparatively small amount at first, were gradually increased until they received about 7½ lbs. per lamb per diem. Of ensilage, the lambs would eat up clean only about 5 lbs. per diem, and of the mixture of ensilage and turnips, 6½ lbs. was the maximum amount consumed per lamb per diem.

They all remained in good health throughout the experiment.

The first weighing was made at 10 a.m. the day lambs were placed on trial; the second weighing was made 16 days later. Subsequently they were weighed every two weeks at the same hour of the day till the last day of the experiment.

In calculating the cost of feeding, the following prices were charged:—

	Per ton.
Roots (turnips)	$ 2 00
Ensilage (corn)	2 00
Hay (clover)	7 00
Bran	20 00
Nutted oil cake	35 00
Whole oats	25 00

TABLE I.—Lamb Feeding Experiment.

(Weights, Gains and percentage dressed.).

Ear Tag Number.	First Weight.	Last Weight.	Gains.	Weight of Carcass.	Percentage Dressed.	Daily gain per sheep.
Lot 1	Lbs.	Lbs.	Lbs.	Lbs.	%	Lbs.
Number 116	90	136	46	65	47·8	·37
" 107	96½	123	26½	50	40·7	·21
" 120	99	129	30	52	40·3	·24
" 114	100½	131½	31	59	44·9	·25
" 77	101	122	21	Not killed..	....	·17
" 29	114	124½	10½	" ..	....	·08
" 110	110	142	32	73	51·4	·26
" 113	114	158	44	72	45·6	·35
" 10[illegible]	128	155	27	72	46·5	·22
Total	953	1,221	268	443	....	....
Average	106	136	30	63	45·3	·24
Lot 2.						
Number 104	91	128	37	60	46·9	·30
" 105	93	133½	40½	65	48·7	·33
" 118	102½	141	38½	70	49·6	·31
" 106	103	153½	50½	70	45·6	·41
" 108	107½	133	25½	66	49·6	·21
" 73	100	129	29	Not killed .	...	·23
" 20	119½	141½	22	" ..	....	·18
" 101	117½	158½	41	80	50·5	·33
" 112	119	163	44	80	49·1	·35
Total	953	1,281	323	....	....	....
Average	106	142	36½	70	48·6	·29
Lot 3.						
Number 117	92½	134½	42	70	52·0	·34
" 76	99½	126	26½	Not killed..	....	·21
" 102	96	129	33	61	47·3	·27
" 119	97	150	53	70	46·6	·43
" 103	106½	137	30½	70	51·1	·25
" 28	108	131	23	Not killed..	....	·19
" 115	106	144	38	68	47·2	·31
" 82	115½	144	28½	Not killed..	....	·23
" 111	133	162	29	75	46·3	·23
Total	954	1,257½	303½	....	....	....
Average	106	139½	33½	69	48·4	·27

TABLE 2.—Lamb Feeding Experiment.

(Summary—27 lambs.)

First weight, three lots, 27 lambs	lbs.	2,860
Average first weight	"	106
Rate of gain per day, average	"	·269
Final weight of whole lot	"	3,759·5
Final weight, average	"	139
Cost of feeding 27 lambs, 124 days	$	70 23
Total gain in period	lbs.	899·5
Cost of 1 lb. gain for whole lot	cts.	7·8

Amount of various kinds of feed consumed for 1 lb. gain live weight during 124 days:—

Bran	lbs.	1·50
Oats	"	1·50
Oil cake	"	·75
Hay	"	5·76
Turnips	"	5·96
Ensilage	"	4·98
Amount dry matter consumed for one pound gain during period	"	9·83

TABLE 3.—Lamb Feeding Experiment.

(Table of weights and gains).

Date of Weighing.	Lot 1.		Lot 2.		Lot 3.	
	Total weights by lots.	Gain per lamb per day.	Total weights by lots.	Gain per lamb per day.	Total weights by lots.	Gain per lamb per day.
December 7, 1910	953	....	953	....	954	....
" 22 "	1,002	·31	988	·24	996½	·23
January 5, 1911	974½	·22*	994½	·05	985½	·09*
" 19 "	1,006½	·25	1,022½	·22	1,013	·22
February 2 "	1,036½	·24	1,052½	·21	1,053	·32
" 16 "	1,094	·46	1,131½	·63	1,099½	·37
March 2 "	1,131½	·30	1,156	·20	1,132	·26
" 16 "	1,194½	·50	1,228	·57	1,213	·64
" 30 "	1,229½	·28	1,271	·34	1,254½	·33
April 9 "	1,221	·09*	1,281	·11	1,257½	·03
Average	.....	·24	.....	·29	.....	·27

* Loss.

TABLE 4.—Lamb Feeding Experiment.

GENERAL STATEMEMT.—Turnips vs. Corn Ensilage as Succulent Feed for Fattening Lambs.

		Lot 1.	Lot 2.	Lot 3.
Number of lambs in lot		9	9	9
Number of days in experiment		124	124	124
Total weight at beginning of experiment	lbs.	953	953	954
Total weight at end of experiment	"	1221	1,281	1,257½
Gain per period	"	268	328	303½
Gain per head	"	30	36½	33½
Gain per head per day	"	·24	·29	·27
Quantity of meal eaten by lot for period	"	1127	1,127	1,127
Quantity of clover hay eaten by lot for period	"	1728	1,728	1,728
Quantity of roots (turnips) eaten by lot for period	"	3496	.....	1,866
Quantity of ensilage (corn) eaten by lot for period	"	.....	2,999	1,570
Total cost of feed	$	23·63	23·04	23·56
Cost of feed per head	"	2·63	2·56	2·62
Cost of feed per head per day	cts.	2·11	2·06	2·11
Cost to produce one pound gain	"	8·8	7·03	7·76
Original cost of sheep at 6·25 cents per lb. live weight	$	59·56	59·56	59·62
Original cost of sheep plus cost of feed	"	83·19	82·66	83·18
Sold at 7·50 cents per lb. live weight	"	91·57	96·07	94·31
Net profit on lot	"	8·38	13·41	11·13
Net profit per lamb	"	·93	1·49	1·23

TABLE 5.—Lamb Feeding Experiment.

Some Scientific Findings in Connection Therewith.

	Lot 1.	Lot 2.	Lot 3.
Pounds dry matter required to produce one pound increase in live weight	10·4	9·4	9·8
Nutritive ratio of ration	1 : 3·6	1 : 3·6	1 : 3·6
Meal required to produce one pound increase in live weight ... lbs.	4·2	3·4	3·7
Roughage " " " " ..... "	19·5	14·1	17·
Hay " " " " ..... "	6·4	5·3	5·7
Roots " " " " ..... "	13·	.....	6·1
Ensilage " " " " ..... "	.....	8·9	5·2
Pounds digestible matter consumed to produce one pound increase in live weight	6·5	5·5	5·9

Compared with the results obtained last year, ensilage as against turnips showed up to better advantage. Whereas last year the cost to produce one pound gain was 10 cents with turnips and 9 cents with ensilage, this year the gain with turnips cost 8·8 cents per pound, and with ensilage 7·03 cents per pound. Both these tests, therefore, indicate superiority of ensilage over turnips for fattening lambs, and, while the results representing the difference may not be taken as final, it is quite evident that ensilage can be profitably used as a part of the roughage ration.

SWINE.

During the year as already indicated above, a new piggery has been erected in the place of that part of the piggery known as the main piggery. The building operations effectually prevented the carrying on of any experimental work, so no report of feeding operations is submitted save the following summary.

SUMMARY OF PIGGERY OPERATIONS, 1910-11.

Total sales during year	$2,979 53	
Value of manure produced	200 00	
Value of pigs on hand, April 1, 1911	4,371 20	
		$7,550 73
Cost of feed during year	$1,930 41	
Cost of bedding	60 00	
Stock bought during year	155 00	
Cost of labour	975 00	
Value of stock on hand, April 1, 1910	2,425 00	
		5,545 41
Profit for one year		$2,005 32

FINANCIAL STATEMENT.

Below are submitted inventories and returns from the various classes of live stock under my charge during the year April 1, 1910, to March 31, 1911.

Class.	April 1, 1910.		April 1, 1911.		Returns.	Gross returns made up of increase in value of products and value of animals sold.
	No.	Value.	No.	Value.	Value.	
		$ cts.		$ cts.	$ cts.	$ cts.
Horses	19	.....	18	.....	3,947 02	3,947 02
Breeding cattle	121	16,705 00	139	17,650 00	6,336 28	7,281 28
Steers	22	740 00	19	1,369 00	713 56	1,342 56
Sheep	54	775 00	88	1,139 00	148 05	512 05
Swine	65	2,425 00	174	4,371 20	3,024 53	5,070 53
Total	281	20,645 00	438	24,529 20	14,169 44	18,153 44

SUMMARY OF LIVE STOCK OPERATIONS.

Returns.

Gross returns from animals of all classes, including value of products, value of services and increase in value of young stock	$18,153 44
Manure, 1,500 tons at $1 per ton	1,500 00
Total	$19,653 44

EXPENDITURE—VALUE OF FOOD CONSUMED.

Meal, grain, etc. (market price)	$ 5,366 18
Hay at $7 per ton	1,286 04
Roots, ensilage, green feed at $2 per ton	1,911 90
Whole milk, 23,600 lbs. at $1 per 100 lbs.	236 00
Skim milk, 243,000 lbs. at 20 cents per 100 lbs.	486 00
Straw, 165 tons at $5 per ton	825 00
Total	$10,111 12

Cost of labour in connection with care of horses, cattle, sheep and swine:—

Herdsman	$ 720 00
One man	600 00
Four men at $528	2,112 00
One man	500 00
Extra help, teaming, etc.	246 00
	$ 4,178 20
Total expenditure	14,289 32
Balance	5,364 12
Less cost of new stock purchased, 1910-11	735 00
Net balance	$ 4,629 12

SUMMARY OF FARMING AND LIVE STOCK OPERATIONS ON 200-ACRE FARM, 1910.

Returns.

Total value of returns from fields	$ 5,761 28
Total value of returns from live stock	19,653 44
Total returns	$25,414 72

Expenditure.

Total cost of field operations	$ 2,806 75
Total cost of live stock operations	14,289 32
Expended, buying stock	735 00
Total expenditure	$17,831 07
Balance	7,583 65

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1910 inclusive. (200 Acre Farm includes 7 Acres of Roads.)

Year.	Grain.		Hay.		Roots and Corn.		Pasture.		Soiling Crop.		Pig Pasture.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899.....	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	.....	Generally considered a good year for all crops.
1900.....	80	126,621	53	138	40	743	20 and aftermath.	49	....	.....	...	.....	Season very favourable for most crops.
1901.....	79	114,472	58	210	40	702	16 and aftermath.	52	....	.....	....	.....	" " "
1902.....	74	144,914	60	216	39	665	20 and aftermath.	62	....	.....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903.....	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904.....	67	112,009	60	192	46¾	674	13·75	98	3	" " ..	3	" " ..	Season unfavourable for grain and corn, good for hay and roots.
1905.....	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, peas, roots and alfalfa.	Season favourable for hay, corn and roots, too wet for grain on mucky land.
1906.....	69	125,516	62	140	48	774½	14	105	5	" " ..	3	" " ..	Very bad season. Meadows winter killed. Summer too dry.
1907.....	61	102,494	73	227	46	704	13·75	110	5	" " ..	3	" " ..	Bad hay year. Grain fair. Corn and roots poor.
1908.....	61	63,003	62	175	49	670	14	120	5	" " ..	3	" " ..	Very bad year for all classes of crops. Too dry.
1909.....	65	106,572	57	142	49	878	14	142	5	" " ..	3	" " ..	Bad hay year. Grain fair. Corn and roots good.
1910.....	59	110,128	60	190	53	880	14	160	5	" " ..	3½	" " ..	Fairly good year for all crops.

Of the area indicated as having been used as pasture for swine in 1905, 3 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in '200 Acre Farm' is used as partial pasture and run for about 20 head of young stock. These cattle receive ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each day part of the time.

The variety of crops grown and the varying areas under each crop each year, make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products and the return of each year valued accordingly.

Fixing prices as follows:—Grain, $1 per 100 lbs.; roots and ensilage, $2 per ton; hay, $7 per ton; summering cattle, $8 per season, and an area used as pasture for pigs, $15 per acre, the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899, $4,110.21 in 1900, $4,434.72 in 1901, $4,787.14 in 1902, $4,148.19 in 1903, $4,741.09 in 1904, $5,714.32 in 1905, $4,669.16 in 1906, $4,931.94 in 1907, $4,631.33 in 1908, $5,502.15 in 1909 and $5,761.28 in 1910.

REMARKS ON ROTATION EXPERIMENTS.

The true farmer will ever have two objects in view when managing his farm: to so manage as to increase gradually but surely the margin of profit and, at the same time, render his farm more productive. Many factors will necessarily unite to produce such desirable results, but of one feature we may be certain, there will be followed on such a farmer's farm a regular rotation of crops, for no other single practice in farm management can compare with this in importance. The rotation or rotations adopted will, of course, depend upon the line of farming followed, and to some extent upon the character of the soil and the physical peculiarities of the farm as a unit, but a rotation there will be.

Crop rotation means a certain succession of crops which regularly repeats itself each time the course is run. It really means further that the crops follow each other in such order as to insure each having such supplies of plant food of such a character as to aid in securing good returns from each particular crop.

Hence, in arranging a rotation, it is very necessary to have some knowledge of the food requirements of different crops and to know something of the values of the residues from the different crops included. Certain forage crops, such as corn, roots, potatoes and hay require an immense amount of food for stem, leaf and root production—that is an abundance of nitrates as is found in clover or other sod turned down and in well-manured lands. Other crops, such as cereals, can get along best with a lighter supply of nitrates, but need more phosphates, hence do well after some forage crop has taken up the superabundance of free nitrates found after sod. It is evident, therefore, that a good rotation will include (1) meadow or pasture, (2) roots or corn, and (3) some cereal crop.

Various combinations of these three classes are possible, and the natural aim of experimental work will be to determine (1) the comparative values of rotations as soil improvers, and (2) their relative suitability for different lines of farming.

Five or six years experience with a rotation of five years' duration showed such remarkable results here, that, in 1904, it was decided to begin an experiment that would include a variety of rotations.

Rotation 'A.'

First year.—Land ploughed in August, well worked, ribbed in October; seeded next spring to oats, and 10 lbs. clover sown per acre; allowed to grow one year and turned under as fertilizer for corn.

Second year.—Corn, manure applied in winter or spring, 25 tons per acre; shallow ploughed, corn planted.

Third year.—Grain, seeded down, 8 lbs. red clover, 2 lbs. alsike, 10 to 12 lbs. timothy per acre.

Fourth year.—Clover hay, two crops expected.

Fifth year.—Timothy hay.

Rotation 'B.'

First year.—Grain, land ploughed previous autumn. Seeded down 10 lbs. red clover, 2 lbs. alsike, 5 lbs. timothy per acre.

Second year.—Clover hay, two crops expected.

Third year.—Corn, manured in winter, 20 to 25 tons per acre; spring ploughed.

Fourth year.—Grain, seeded down, red clover 10 lbs. alsike 2 lbs. and 5 lbs. timothy per acre. Land fall-ploughed after corn; very shallow furrow.

Fifth year.—Clover hay, two crops; late fall ploughed.

Rotation 'E.'

First year.—Manured and handled as 'Z.'

Second year.—Oats, seeded down, 10 lbs. red clover, 6 lbs. alfalfa, 2 lbs. alsike, 6 lbs. timothy per acre.

Third year.—Pasture. Cattle.

Rotation 'Z.'

First year.—Manure, 12 to 15 tons per acre, applied winter; shallow ploughed in spring; well worked and planted to corn.

Second year.—Oats, seeded down, 10 lbs. red clover, 2 lbs. alsike, 6 lb. alfalfa and 6 lbs. timothy per acre.

Third year.—Clover hay; two crops expected.

Rotation 'S.'

Shallow ploughing; deep cultivation by means of stiff tooth cultivator or subsoiler.

First year.—Roots or corn, ploughed August, 4 inches deep; manure 15 to 20 tons per acre; work at intervals, ridge up in fall, sow to roots in spring.

Second year.—Grain, seeded down, 10 lbs. red clover, 12 lbs. timothy per acre.

Third year—Clover hay.

Fourth year.—Timothy hay.

'Rotation 'D.'

Deep ploughing; plough August, 7 inches deep; manure 15 to 20 tons per acre; work with cultivator at intervals. Land ploughed late autumn, 7 inches; roots or corn next spring.

Second, third and fourth year.—Same as 'S.'

Rotation 'H.'

First year.—Manured in fall and manure ploughed in, well worked; sown to roots next spring.

Second year.—Different grain mixtures suitable for feeding green. Different grass seed mixtures suitable for pasture and soiling next year.

Third year.—Pasture. Swine.

Rotation 'T.'

Sheep pasture.

Crops just as in 'S' save that various mixtures of grain and grass seed are used to test their value for sheep feeding and pasturing.

Rotation 'A' Fertilizer.

Using barn-yard manure only. Four years duration. Roots, grain, hay, hay. Barn-yard manure 15 tons per acre for roots.

Rotation 'B' Fertilizer.

Commercial fertilizer but no barn-yard manure. Four years' duration. Roots, grain, hay, hay. Commercial fertilizer: 300 lbs. superphosphate; 75 lbs. muriate of potash; 100 lbs. nitrate of soda, before sowing to roots. Each other year 100 lbs. nitrate of soda only.

Rotation 'C' Fertilizer.

Half usual dressing barn-yard manure and commercial fertilizer besides. Four years' duration. Roots, grain, hay, hay. Barn-yard manure 7½ tons per acre for roots; commercial fertilizer at same time, 150 lbs. superphosphate; 37½ lbs. muriate of potash and 50 lbs. nitrate of soda. Besides, 100 lbs. nitrate of soda each year in hay or grain.

RETURNS PER ACRE.

To compare results under such varied crop and cultural conditions is a rather difficult matter. The plan adopted has been to place an arbitrary and uniform valuation on all products and on pasturing various classes of stock. Following this plan, the returns per acre have been about as follows, the average of six years' work, save in cases of fertilizers 'A,' 'B' and 'C,' which are for one year only.

Rotation 'A.'

Average value of crop per annum—$22.79.

Rotation 'B.'

Average value of crop per annum—$23.10

Rotation 'E.'

Average value of crop per annum—$21.04.

Rotation 'Z.'

Average value of crop per annum—$25.43.

Rotation 'S.'

Average value of crop per annum— $25.59.

Rotation 'D.'

Average value of crop per annum—$25.45.

Rotation 'H.'

Average value of crop per annum—$28.43.

Rotation 'T.'

Average value of crop per annum—$19.55.

Rotation 'A' Fertilizer.

Average value of crop per acre—$26 13.

Rotation 'B' Fertilizer.

Average value of crop per acre—$27.61.

Rotation 'C' Fertilizer.

Average value of crop per acre—$28.44.

PROFITS PER ACRE.

The values placed on products were: Roots or silage stored, $2 per ton; hay, $7 per ton; grain, $1 per 100 lbs.; oat straw, $4 per ton; pasturing cows, $1 per month. Sheep and swine pastured, one cent per day.

In estimating cost of operation, labour is charged at prices paid, machinery is put at 30 cents per acre, rent at $3 per acre and manure at $3 per acre.

The average net profits, after paying all expenses, were as follows per acre:—

'A' net profit per acre	$8 78
'B' " "	8 70
'E' " "	7 26
'Z' " "	9 34
'S' " "	7 46
'D' " "	7 42
'H' " "	8 05
'T' " "	3 78
'A' Fertilizer net profit per acre	6 27
'B' Fertilizer " "	5 32
'C' Fertilizer " "	7 33

VALUE OF DIFFERENT ROTATIONS.

A study of the various rotations would lead one to remark upon them briefly as follows:—

Rotation 'A.'—This rotation has been in use here for 12 years and has proven to be most excellent where carefully followed and cultural operations well performed.

Where all land was under cultivation, it would be found necessary to devote a certain area to soiling crops. It might be extended to six years by leaving down to pasture for two years instead of one.

Rotation 'B.'—This rotation has been fairly successful here, but, for certain reasons not easily enumerated, I do not feel as though I could either criticise or praise as yet and feel sure of my ground.

Rotation 'E.'—This rotation would not be suitable for the average farmer but might suit the man who had to buy rough forage.

Rotation 'Z.'—This would be a most excellent rotation to put into practice where sufficient rough land was available to serve as pasture. It is the rotation that would most likely supply the greatest amount of forage of the best description for dairying or beef production. It is better suited for heavy than for light soils.

Rotation 'S.'—This is a rotation that has been in use for a number of years on the Agricultural College Farm at Guelph, where it has given satisfactory results. It is possibly open to the criticism of having too small a proportion of land under grain. Where live stock is, however, the mainstay, this is a very minor fault. The turning of a shallow furrow when ploughing sod has been found to be good practice here when preparing for grain or corn. In preparing for roots, the regular plough with subsoiler is to be advised.

Rotation 'D.'—This rotation is the same as rotation 'S' so far as crops are concerned. The results so far obtained show the advantage in favour of either shallow ploughing and deep cultivation or deep ploughing.

Rotation 'H.'—The area devoted to pigs (some 10 acres) where this rotation is followed has given very satisfactory returns, and would, I feel confident, prove profitable to any one who followed it carefully.

Rotation 'T.'—Sheep. The returns from this rotation are not strictly comparable with those from others, since many side experiments materially affect the results. It has, however, proven very satisfactory for this class of stock.

As already stated, the rotation experiments have been under way for five years now. Three out of the five years have been what might be called 'lean years' in the Ottawa valley, hence these rotations can hardly be said to have yet shown what they are capable of doing in the way of influencing crop production.

The few facts given above are, however, strictly comparable each with the others, excepting possibly 'T' or sheep, where some rather disturbing conditions have been introduced.

THE ROTATIONS IN 1910.

The experiment to determine the values of the different rotations as discussed above is being followed up, and below the detailed report of the labour on each plot and the return therefrom, will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation 'A.'—Five years. Clover hay, timothy hay, grain, corn, grain.

Rotation 'B.'—Five years. Clover hay, grain, clover hay, corn, grain.

Rotation 'E.'—Three years. Pasture, corn, grain.

Rotation 'Z.'—Three years. Clover hay, corn, grain.

Rotation 'S.'—Four years. Shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation 'D.'—Four years. Deep ploughing, clover hay, timothy hay, roots, grain.

Rotation 'H.'—Three years. Hog pasture, roots, grain or soiling crops.

Rotation 'T.'—Four years. Sheep pasture, roots and soiling crops, grain, clover hay.

Rotation 'A' Fertilizer.—Four years. Roots, grain, hay, hay. (Barn-yard manure).

Rotation 'B' Fertilizer.—Four years. Roots, grain, hay, hay. (Commercial fertilizer).

Rotation 'C' Fertilizer.—Four years. Roots, grain, hay, hay. (Commercial fertilizer and barn-yard manure).

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: If to the corn land in rotation 'Z,' 15 tons of manure per acre is applied, this is equivalent to 5 tons per acre per annum, as 'Z' is a three-year rotation. Then, in applying manure to 'B' 25 tons would be applied, as 'B' is a five-year rotation. Since manure must vary in quantity each year, $3 per acre per annum is charged in each rotation.

COMPARATIVE VALUES OF ROTATIONS ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 6 tons ensilage and roots, 1 ton straw, 4 month pasture and 1,000 lbs. meal in a year, this would amount to about $37 or $38 as the cost of feeding an animal for a year. Keeping these figures in mind, the stockman can form some idea of the comparative values of the different rotations for live stock farming.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crops. 1909.	1910.	Items of Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.			$ cts.	$ cts.
A 1	W.S. 3	30	45	....	....	25	....	....	9·96	Hay	Grain	59 76	15 64
A 2	L.S. 1	30	65	5	....	....	....	....	8·90	Hay	Hay	53 40	11 57
A 3	A.S. 14	10	15	20	20	15	....	20	10·20	Grain	Corn	61 20	18 26
A 4	W.P.G.S. 1. F.S. 1	70	20	10	....	....	....	....	8·89	Grain	Hay	53 34	11 55
A 5	F.S.B. 3	....	35	30	10	15	10	....	8·56	Corn	Grain	51 36	13 22
	Aggregate								46·51			279 06	70 24
	Average per acre in 1910											6 00	1 51
	Average for six years											6 00	1 56

ROTATION

B 1	W.S. 4	5	35	5	50	5	....	....	10·00	Corn	Grain	60 00	15 80
B 2	L.S. 2	20	70	....	5	5	....	....	8·83	Hay	Grain	52 98	13 26
B 3	A.S. 15	20	60	5	....	15	....	....	10·20	Grain	Hay	61 20	13 26
B 4	W.P.G.S. 2	20	60	15	....	5	....	....	9·15	Grain	Hay	54 90	11 89
B 5	F.S. 2	....	30	30	40	....	....	....	8·93	Hay	Corn	53 58	16 10
	Aggregate								47·11			282 66	70 31
	Average per acre in 1910											6 00	1 49
	Average for six years											6 00	1 51

Rotation 'A.'

This rotation of five years' duration includes grain, hay (two years), grain and corn or roots, in order named. The grain crop mentioned first, comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for two years; then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year, or until corn seeding time the following spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested, the land is ploughed shallow and left till next spring.

The crops on this rotation have been fairly satisfactory this year.

From 'A 1' a good crop of grain was harvested. 'A 2' was in hay and only gave a fair crop. On 'A 3' the crop grown was corn and gave a good yield. 'A 4' was in hay, but, on account of dry weather, the second crop was light, bringing the yield somewhat below the average. On 'A 5' a very good crop of oats was grown.

"A."

Expense in raising Crop in 1910.								Particulars of Crop in 1910.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per Acre.	Profit per Acre in 1910.
Hrs.	$ cts.	Hrs	Hrs.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
35	5 25	....	185½	54 81	12 31	147 77	14 83	17,593	18,767	.....	.....	213 46	21 43	6 60
50	7 50	6	25¼	9 07	....	81 54	9 17	.....	.....	38,790	.....	135 76	15 25	6 08
349	52 35	17	184	63 50	.....	195 31	19 14	.....	.....	.....	299,240	299 24	29 33	10 19
74	11 10	10½	48	17 02	.....	93 01	10 46	.....	.....	60,220	.....	210 77	23 70	13 24
32	4 80	....	84	30 84	13 53	113 75	13 28	19,334	21,301	.....	.....	235 94	27 56	14 28
540	81 00	33½	526¾	175 24	25 84	631 38	.....	36,927	40,068	99,010	299,240	1,095 17	.....	.....
11·6	1 74	·7	11·1	3 76	0 55	.....	13 56	794	861	2,128	6,433	.....	23 54	9 98
14·3	2 26	4·1	10·1	4 16	0 33	.....	14 47	629	759	1,899	6,142	.....	22 78	8 78

"B."

40	6 00	....	92½	35 21	13 18	128 19	12 81	18,840	22,960	.....	.....	234 32	23 43	10 62
28	4 20	....	108	35 81	8 71	115 00	13 03	12,454	12,566	.....	.....	149 67	16 96	3 93
75	11 25	11½	52½	18 62	.....	104 33	10 22	.....	.....	61,670	.....	215 84	21 16	10 94
83	12 85	8½	54	18 44	.....	97 68	10 67	.....	.....	70,980	.....	248 43	27 15	16 48
290	43 50	73	181	76 87	.....	190 05	21 28	.....	.....	.....	231,450	231 45	25 91	3 63
516	77 80	93	488	182 95	21 89	635 25	.....	31,294	35,526	132,650	231,450	1,079 71	.....	.....
10·9	1 65	1·9	10·35	3 88	0 46	.....	13 48	664	754	2,815	4,912	.....	22 91	9 44
12·7	2 48	4·7	9·6	4 32	0·33	.....	14 72	566	950	2,499	6,011	.....	23 11	8 70

Rotation 'B.'

This rotation of five years' duration includes grain, hay, grain, hay and corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover, 10 lbs.; alsike, 1 lb. and timothy, 5 lbs., is sown with grain each time. When grain follows hay, the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation were fairly satisfactory.

'B 1' was in grain (Banner oats) and gave a fair crop.

'B 2' was in grain also, but only returned a light crop.

From 'B 3' a good crop of hay was harvested.

'B 4' was also in hay and returned a very good crop.

On 'B 5' the crop grown was corn and gave a fair yield.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crops. 1909.	1910.	Items Rent and manure.	Seed, twine and use of machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.			$ cts.	$ cts.
E 1	W.S. 1	40	40	....	....	15	5	....	14·00	Pasture	Corn	84 00	23 90
E 2	L.S. 4	10	60	....	10	20	....	....	13·75	Grain	Pasture	82 50	13 75
E 3	Morn	30	60	5	....	....	5	....	13·80	Corn	Grain	82 80	22 74
		Aggregate							41·55			249 30	60 39
		Average per acre in 1910										6 00	1 45
		Average for six years										6 00	1 74

ROTATION

Z 1	W.S, 2	40	40	....	....	15	5	....	6·00	Hay	Corn	36 00	11 00
Z 2	L.S. 3	10	60	10	....	20	....	....	5 81	Grain	Hay	34 86	7 55
Z 3	Obs	10	60	20	10	....	....	....	4·20	Corn	Grain	25 20	6 66
		Aggregate							16·01			96 06	25 21
		Average per acre in 1910										6 00	1 57
		Average for six years										6 00	1 73

Rotation 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 2 lbs. alsike, 6 lbs. alfalfa and 6 lbs. timothy seed per acre. If weather permits, the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z.' This rotation and rotation 'Z' were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. It was expected that the corn crop after the pasture would in a measure make up for the difference in favour of the no-pasture rotation 'Z,' but the returns are on the whole a good deal short of those from 'Z.'

Corn follows the pasture. Manure is applied during the fall and winter and turned under with the growth of clover and grass in the spring.

Crops were all good on this rotation in 1910.

"E."

OF EXPENSE IN RAISING CROP IN 1910.								PARTICULARS OF CROP 1910.						
Manual labour.		Horse labour.												
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per Acre.	Profit per Acre in 1910.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts	$ cts.	$ cts.
537	80 55	18	278	93 54	.....	281 99	20 14	.....	.....	.....	477,400	477 40	34 10	13 96
.....	....	...	...	.....	.....	96 25	7 00	.....	.....	.....	.....	137 50	10 00	3 00
52	7 80	4	99½	37 84	17 60	168 78	12 23	25,149	27,601	.....	.....	306 69	22 22	9 99
589	88 35	22	377½	131 38	17 60	547 02	.....	25,149	27,601	.....	477,400	921 59	.....	.....
14·1	2 12	·5	9·1	3 16	0 42	.. ..	13 16	605	664	.....	11,489	.....	22 18	9 01
15·7	1 88	2·4	9·4	5 65	0 39	.....	14 38	563	779	.....	9,189	.....	23 43	7 26

"Z."

180	27 00	8	114½	40 70	.....	114 70	19 11	.....	.....	.....	204,400	204 40	34 06	14 95
54	8 11	4½	32	10 72	.....	61 23	10 53	.....	.....	38,730	.....	135 55	23 33	12 80
18	2 70	.....	55½	18 78	7 32	60 66	14 44	10,471	8,729	.....	.....	122 16	29 08	14 64
252	37 81	12½	202	70 20	7 32	236 59	....	10,471	8,729	38,730	204,400	462 11	.....	.....
15·7	2 36	·7	12·6	4 38	0 45	.....	14 77	654	545	2,419	12,767	.....	28 86	14 09
16·2	2·70	5.1	8·9	3 83	0 27	.... .	12 93	544	768	2,142	9,895	.....	24 54	9 34

Rotation 'Z.'

This rotation of three years' duration includes corn, grain and clover hay in the order named.

Corn comes after the clover hay. The manure is applied during the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure, late fall growth and spring growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about five inches deep, and the land is then disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 2 lbs. alsike, 6 lbs. alfalfa and 6 lbs. timothy seed per acre. The hay is cut twice and the last aftermath allowed to grow up to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture, or to one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

Crops on this rotation were all good in 1910.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crops. 1909.	1910.	Items of Rent and manure.	Seed, twine and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.			$ cts.	$ cts.
S 1	E.P.G.S. 1.	20	80	....	....	....	....	....	2	Hay	Hay	12 00	2 60
S 2	E.P.G.S. 3.	20	80	....	....	....	....	....	2	Hay	Corn	12 00	3 70
S 3	E.P.G.S. 5.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 15
S 4	E.P.G.S. 7.	60	40	....	....	....	....	....	2	Grain	Hay	12 00	2 60
	Aggregate								8			48 00	12 05
	Average per acre in 1910											6 00	1 50
	Average for six years											6 00	1 28

ROTATION

D 1	E.P.G.S. 2.	20	80	....	....	....	....	....	2	Hay	Hay	12 00	2 60
D 2	E.P.G.S. 4.	20	80	....	....	....	....	....	2	Hay	Corn	12 00	3 70
D 3	E.P.G.S. 6.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 15
D 4	E.P.G.S. 8.	60	40	....	....	....	....	....	1·56	Grain	Hay	9 36	2 02
	Aggregate								7·56			45 36	11 47
	Average per acre in 1910											6 00	1 51
	Average for six years											6 00	1 26

Rotation 'S.'

(Shallow Ploughing).

This rotation is of four years' duration and includes grain, two years' hay, roots or corn.

The grain crop follows the hoed crop, the land being ploughed (or cultivated) to a depth of about four inches after the hoed crops are harvested in the fall. With the grain is sown 10 lbs. red clover and 12 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field; that is, it is not pastured off as is usually done. In the second hay year, two crops are cut if possible, and the land ploughed in August with a shallow four-inch furrow. If manure is applied before ploughing, a subsoiler is attached to the plough to loosen up the soil to a depth of 8 or 9 inches. If manure is not applied, this end is attained by means of a strong, deep-reaching cultivator after the sod has rotted in the fall or the next spring.

'S 1' was under hay this year and gave a fairly good crop.

'S 2' was under corn and returned only a fair crop.

'S 3.' From this field a light crop of grain was harvested which had suffered somewhat from drought.

'S 4' gave an excellent crop of hay.

'S".

Expense in Raising Crop in 1910.								Particulars of Crop in 1910.						
Manual Labour.		Horse Labour.												
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per Acre.	Profit per Acre in 1910.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
16	2 40	2¼	7¼	2 73	.....	19 73	9 86	.....	.....	10,570	.....	36 99	18 49	8 63
57	8 55	2½	65	20 81	.....	45 06	22 53	.....	....	.....	59,460	59 46	29 73	7 20
4½	0 67	....	16¾	5 76	2 22	23 80	11 90	3,180	3,830	.....	.....	39 46	19 73	7 83
17½	2 62	3	9½	3 60	.....	20 82	10 41	.....	.....	14,580	.....	51 03	25 51	15 10
95	14 24	7¾	98½	32 90	2 22	109 41	.....	3,180	3,830	25,150	59,460	186 94	.....	.....
11·8	1 78	·97	12·3	4 11	0 27	....	13 67	397	478	3,143	7,432	.....	23 36	9 69
37·3	5 53	5·6	11·3	5 25	0 21	....	17 97	568	548	3,004	10,273	.....	25 59	7 46

"D".

16	2 40	2¼	7¼	2 73	.....	19 73	9 86	.....	.....	10,290	.....	36 01	18 00	8 14
57	8 55	2½	78⅔	24 86	.....	49 11	24 55	.....	.....	.....	60,860	60 86	30 43	5 88
4½	0 67	....	16¾	5 76	2 17	23 75	11 87	3,107	3,473	.....	.....	38 01	19 00	7 13
14	2 10	2	8¼	2 97	....	16 45	10 54	.....	.....	12,450	.....	43 57	27 92	17 38
91½	13 72	6¾	110¾	36 32	2 17	109 04	.....	3,107	3,473	22,740	60,860	178 45	.....	.....
12·1	1 81	·89	14·6	4 80	0 28	.....	14 42	410	459	3,007	8,050	.....	23 60	9 18
32·4	5 58	4·7	12·0	6 08	0 19	.....	18 21	595	536	2,982	10,455	.....	25 47	7 42

Rotation 'D.'

(Deep Ploughing).

This rotation is of four years' duration and includes grain, two years' hay and corn or roots.

The grain crop follows hoed crop, the land being ploughed to a depth of about seven inches, or cultivated after the hoed crops are harvested in the fall. With the grain is sown 10 lbs. red clover and 12 lbs. timothy seed per acre. The clover hay is cut twice in the season, and the second aftermath left on the field; that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep seven-inch furrow.

'D 1' was under hay this year and gave a fairly good crop.

'D 2' was under corn and only returned a fair crop.

'D 3.' From this field a light crop of grain was harvested suffering somewhat from drought.

'D 4' gave an excellent crop of hay.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crops. 1909.	1910.	Items of Rent and manure.	Seed, twine and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.			$ cts.	$ cts.
H 1	H.S. 1	30	40	20	10	....	....	....	3·35	Grain	Pasture	20 10	3 35
H 2	H.S. 2	25	4	20	10	....	....	....	3·15	Pasture	Roots	18 90	4 09
H 3	H.S. 3	10	20	50	20	....	....	....	2·85	Roots	Hay	17 10	3 70
		Aggregate							9·35			56 10	11 14
		Average per acre in 1910										6 00	1 18
		Average for 6 years										6 00	1 09

ROTATION

T 1	S.S. 1	10	90	....	....	....	....	....	1·51	Hay	Hay	9 06	1 96
T 2	S.S. 2	15	85	....	....	....	....	....	2·78	Roots	Hay	16 68	3 61
T 3	S.S. 3	....	100	....	....	....	....	....	3·33	Pasture	Pasture	19 98	3 33
T 4	S.S. 4	15	85	....	....	....	....	....	2·50	Pasture	Roots	15 00	3 25
		Aggregate							10·12			60 72	12 15
		Average per acre in 1910										6 00	1 19
		Average for 6 years										6 00	1 37

Rotation 'H.'

(Hog Farm.)

This rotation is of three years' duration, and includes soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured. It is disced the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of varied character, including mangels, sugar mangels, sugar beets and turnips, devoted to pork production for the most part, the surplus being charged to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is charged to the cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seeds being sown, as far as possible, at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

'H 1.'—This plot was used for pasture.

'H 2.'—Was under roots (mangels) and a good crop was harvested.

'H 3.'—From this field a very good crop of peas and oats was harvested, part of which was cut for green feed and part for hay.

'H'.

Expense in Raising Crop in 1910.								Particulars of Crop 1910.						
Manual labour.		Horse labour.												
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per Acre.	Profits per Acre in 1910.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
.....	.....	.....	.....	.....	.....	23 45	7 00	.....	.....	.....	.....	33 50	10 00	3 00
173	25 95	29	78	30 95	.....	79 89	25 36	.....	.....	.....	137,950	137 95	43 79	18 43
22	3 30	3	31½	11 28	....	35 38	12 41	.....	.....	180,70	.....	63 24	22 18	9 77
195	29 25	32	109½	42 23	.....	138 72	.....	.....	.....	180,70	137,950	234 69	.....	.....
20·8	3 12	3·4	11·7	4 51	.....	. .	14 83	.....	.....	1,932	14,754	. . .	25 10	10 27
38·4	4 27	5·1	9·4	4 27	14	.....	14 22	167	377	462	17,826	.....	28 43	8 05

'T'.

5	75	1	4	1 45	.....	13 22	8 75	.....	.....	5,300	.....	18 55	12 28	3 53
20	3 00	2	35½	12 11	.....	35 40	12 73	.....	.....	16,680	.....	58 38	21 00	8 27
.....	.....	.....	.....	.....	.....	23 31	7 00	.....	.....	.....	.....	33 33	10 00	3 00
218	32 70	8	70	25 52	.....	76 46	30 58	.....	.....	.....	100,530	100 53	40 21	9 63
243	36 45	11	109½	39 08	....	148 39	.....	....	.....	21,980	100,530	210 79	.....	. . .
23·8	3 60	1·0	10·8	3 86	....	. ...	14 66	.....	.....	2,172	9,933	. .....	26 82	6 16
27·3	4 03	4·5	9·3	3 97	.....	.....	15 27	.....	282	16·80	8,774	.....	19 55	3 78

Rotation 'T.'

(Sheep Farm.)

This rotation of four years' duration includes roots, grain, hay and pasture.

The area devoted to sheep farming is rather limited, about 11.06 acres. This area is not included in the '200-acre' farm. The whole area has been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields, susceptible of further subdivision, and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, swedes, cabbage, kohl rabi, thousand-headed kale, etc. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows on the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used for soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been in hay the previous year. Alfalfa, red clover, alsike clover, brome grass (*bromus inermis*) and timothy are the clovers and grasses used.

The crops on this rotation were fair this year.

FERTILIZER

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Hardpan.	Gravel.	Area in Acres.	Crops. 1909.	1910.	Items. Rent and Manure.	Seed, twine and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.			$ cts.	$ cts.
A 1	A. S. 2	....	25	75	....	....	....	....	1	Grain	Hay	5 25	1 30
A 2	A. S. 5	....	25	75	....	....	....	....	1	Hay	Roots	5 25	1 30
A 3	A. S. 8	....	....	10	....	90	....	....	1	Corn	.....	.....	.....
A 4	A. S. 11	....	....	20	....	80	....	....	1	Hay	Roots	5 25	1 30
	Aggregate								4	.....	.....	15 75	390
	Average per acre in 1910								....	.....	.....	5 25	1 30
	Average per acre for 2 years								....	.....	.....	5 25	1 38

FERTILIZER

B 1	A. S. 3	....	25	75	....	....	....	....	1	Grain	Hay	7 50	1 30
B 2	A. S. 6	..	5	85	....	10	....	....	1	Hay	Roots	7 50	1 30
B 3	A. S. 9	..	....	....	....	100	....	..	1	Corn	.....	.....	.....
B 4	A. S. 12	....	....	50	....	50	....	....	1	Hay	Roots	7 50	1 30
	Aggregate								4	.....	.....	22 50	3 90
	Average per acre in 1910								....	.....	.....	7 50	1 30
	Average per acre for 2 years								....	.....	.....	7 50	1 30

FERTILIZER

C 1	A. S. 4	....	25	75	....	....	....	....	1	Grain	Hay	6 60	1 30
C 2	A. S. 7	....	....	70	....	30	....	....	1	Hay	Roots	6 60	1 30
C 3	A. S. 10	....	....	....	....	100	....	....	1	Corn	.....	.....	.....
C 4	A. S. 13	....	....	30	....	....	50	20	1	Hay	Roots	6 60	1 30
	Aggregate								4	.....	.....	19 80	3 90
	Average per acre in 1910								.....	.....	.....	6 60	1 30
	Average per acre for 2 years								.....	.....	.....	6 60	1 38

ROTATION 'A.'

OF EXPENSE IN RAISING CROPS IN 1910.								PARTICULARS OF CROPS IN 1910.						
Manual labour.		Horse labour.												
Hours.	Cost of manual labour.	No. of hours with single horse.	No. of hours with team.	Value of horse labour	Threshing.	Total cost.	Cost per acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crops per Acre.	Profit per Acre in 1910.
No.	$ cts.	No.	No.	$ cts.	cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
8½	1 27	1½	6	2 17	.....	10 74	10 74	.....	.....	6,900	.....	24 15	24 15	13 41
133½	20 02	10	16½	7 93	.....	34 50	34 50	.....	.....	.....	35,950	35 95	35 95	1 45
133½	20 02	10	16½	7 93	.....	34 50	34 50	.....	.....	.....	37,570	37 57	37 57	3 07
275½	41 31	21½	39	18 03	.....	79 74	.....	.....	.....	6,900	73,520	97 67	.....	.....
91·8	13 77	7·1	13	6·01	.....	.....	26 58	.....	...	2,300	24,506	.....	32.55	5 97
50·8	7·70	4·0	12·9	5·26	13·5	.....	19 86	182	340	2,305	15,570	.....	26 13	6 27

ROTATION 'B.'

10	1 50	1½	6	2 17	.....	12 47	12 47	.....	.....	7,230	.....	25 30	25 30	12 83
141	21 15	10	16½	7 93	.....	37 88	37 88	.....	.....	.....	40,726	40 72	40 72	2 84
136	20 40	10	16½	7 93	.....	37 13	37 13	.....	.....	.....	37,550	37 55	37 55	·42
287	43 05	21½	39	18 03	.....	87 48	.....	.....	.....	7,230	78,276	103 57	.....	.....
95·6	14 35	7·1	13	6 01	.....	.....	29 16	.....	..	2,410	26,092	.....	34 52	5 36
52·7	7 99	4·0	12·9	5 26	14·5	.....	22 29	202	342	2,355	16,582	.....	27 61	5 32

ROTATION 'C.'

10	1 50	1½	6	2 17	.....	11 57	11 57	.....	.....	7,860	.....	27 51	27 51	15 94
135	20 25	10	16½	7 93	...	36 08	36 08	.....	.....	.....	42,960	42 96	42 96	6 88
135	20 25	10	16½	7 93	.....	36 08	36 08	.....	.....	.....	38,330	38 33	38 33	2 25
280	42 00	21½	39	18 03	.....	83 73	.....	.....	.....	7,860	81,290	108 80	.....	.....
93·3	14 00	7·1	13	6 01	..	.....	27 91	.....	.....	2,620	27,096	.....	36 26	8 35
51·5	7·82	4·0	12·9	5 26	14	.....	21·21	197	347	2,579	16,853	.....	28 44	7 33

'A.'—This rotation is of four years' duration and includes grain, hay two years, roots. The grain follows roots, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover, 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible. Then the land is manured at the rate of 15 tons, barn-yard manure, per acre, and ploughed in August 5 inches deep, worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and sown to roots.

'B.'—This rotation is of four years' duration and includes grain, hay two years, and roots. The grain follows roots or corn, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover, 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible. Then the land is ploughed in August 5 inches deep and worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and 300 lbs. superphosphate, 75 lbs. muriate of potash and 100 lbs. nitrate of soda is applied before being sown to roots or corn. In addition to the above, the land receives a dressing of 100 lbs. nitrate of soda per acre each year that the field is in hay or grain. This application is given in early spring on the grass and just as the grain is coming through, when under grain.

'C.'—This rotation is four years' duration and includes grain, hay two years, roots. The grain follows the roots or corn, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover, 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible; then the land is manured at the rate of 7½ tons barn-yard manure per acre and ploughed in August 5 inches deep, worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and 150 lbs. superphosphate, 37½ lbs. muriate of potash and 50 lbs. nitrate of soda is applied before being sown to roots. In addition to the above the land receives a dressing of 100 lbs. nitrate of soda per acre each year that the field is in hay or grain. This application is given in early spring on the grass and just as the grain is coming through, when under grain.

REPORT OF THE DOMINION HORTICULTURIST

W. T. MACOUN.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-fourth Annual Report of the Horticultural Division.

While all the work done in this Division is not recorded in this report, the results from some of the most important experiments being conducted are given, with other material which it is hoped will prove of value.

Previous to this year, my work as Horticulturist of the Central Experimental Farm was confined mainly to the provinces of Ontario and Quebec, and the Central Experimental Farm at Ottawa. This year the title of the position was changed to Dominion Horticulturist and a wider field of work was opened. In addition to my work at Ottawa, I was instructed to visit the Branch Farms from time to time as necessary and discuss, in consultation with the Superintendents, the experiments being conducted with fruits, garden vegetables, forest and ornamental trees, shrubs and herbaceous plants.

In order to provide the assistance which was required on account of this greater field of work, Mr. T. G. Bunting, B.S.A., was appointed my Assistant in August, 1910, and has been able to render substantial and valuable help since.

I visited the branch Experimental Farms and Stations at Brandon, Man., Indian Head, Sask., Rosthern, Sask., Lacombe, Alta., Lethbridge, Alta., Agassiz, B.C., Charlottetown, P.E.I., and Nappan, N.S., during the growing season and went carefully over the plantations, making suggestions for future experiments and taking notes in regard to future work. I also visited the new Stations at Scott, Sask., Kentville, N.S., and Cap Rouge, Que., and the sub-station at Kamloops, B.C.

During the past winter, I have worked out a uniform system of recording notes of horticultural experiments at the branch Farms which it is hoped will add to the usefulness of the information obtained.

Material for the new Stations at Scott and Cap Rouge and additional stock for some of the other Farms has been ordered for next season.

I have the honour to be, sir,
Your obedient servant,
W. T. MACOUN,
Dominion Horticulturist.

CHARACTER OF SEASON.

The frost was out of the ground enough to dig in the nursery at the Central Experimental Farm by March 28, 1910, and the upper part of the orchard could have been ploughed on that date. The average date when the frost had been out enough to dig for the previous twelve years was April 11, although, leaving out the two exceptionally early years 1902 and 1903, the average date for the remaining ten years is April 14. The season up to the end of April was earlier than the average. The highest temperature in April was 76° Fahr., on the 5th, and the lowest 22° Fahr. on the 13th. May was a rather cool month on the whole and comparatively late. The highest temperature was 79·5° Fahr. on the 29th and the lowest 34° Fahr. on the 13th. No frosts were recorded during the month of May and, although the lowest temperature recorded in June was 32·5° Fahr., on June 4, frost affected crops that night. Strawberry flowers were much injured. The foliage of tomato plants was frozen and the plants in most cases killed to the ground. Grapes were more or less injured on the Farm and, in some parts of Ottawa, the crop was destroyed. Some Americana plums, which were just setting, were injured. While the fore part of the month was cool, the latter part of the month was warm to very warm, the temperature being 80° Fahr. on sixteen out of the eighteen days between the 13th and the end of the month, although the nights were comparatively cool. The highest temperature was 89·4° Fahr. on the 22nd. There was little precipitation in June. Strawberries were suffering badly from lack of moisture on the 25th, and the crop proved almost a failure owing to the drought. Those which ripened had, most of them, hard tips. There was a very heavy drop of apples during the last week in June, doubtless owing to the drought. The closely-planted Wealthy orchard, which is in sod, lost most fruit and a crop that promised to be good became light. The grass of the lawns was much burned during the last week of June and continued burned until August 4.

The month of July was warm and dry. The highest temperature was 92·8° Fahr. on the 9th, and on the 6th it was 92·0° Fahr. It was 80·0° Fahr. and above on twenty-two days of the month. While the days were warm, the nights, on the whole, were comparatively cool. Showers started on the 21st, and, from that time on there were frequent rains throughout the rest of the growing season, though vegetation did not begin to recover much until after a heavy rain on August 4, as the previous showers had been light. The highest temperature in August was 87·2° Fahr. on the 3rd; the nights continued comparatively cool through this month. September was moderately warm with a maximum temperature of 77° Fahr. on the 17th. There was no frost recorded in September, the lowest temperature observed being 35·8° Fahr. on the 22nd. In October, the highest temperature was 73° on the 5th. The first autumn frost was on October 8, when the temperature was 31° Fahr. The foliage of tender plants, such as tomatoes, squash, etc., was injured in some situations. In other places, the foliage was little, if any, injured. On the 13th, the temperature dropped to 25° Fahr., when the tenderer things were killed. The foliage of the grape vines was injured on this date. The growth of fruit trees was late, the wood did not ripen as well as was desirable in the autumn, and it is probable there will be considerable winter injury on this account. November was a cool month with fairly even temperatures, the highest being 57·2° Fahr. on the 1st, and the lowest 17° Fahr. on the 21st.. Winter set in on the 27th with the ground frozen to a depth of three or four inches.

The weather in December, January, February and March was cold, the thaws being of short duration. The first time the temperature rose as high as 40° Fahr. from November 5 was on March 20.

While the temperature did not go to twenty degrees below zero except on December 31, when it was 25·2° Fahr., the coldest day of the winter, it was below zero fifty times during the winter, thirteen in December, eighteen in January, thirteen in Febru-

ary and six in March. In the winter of 1903-4, it was fifty-eight times below zero, and twenty and more below zero fifteen times, so that, although this was a severe winter, it was not so cold as that one.

The last day when the temperature was below zero was on March 24, when it was 0·1° Fahr. below zero. The ground has been covered with snow since December 2, when enough fell for sleighing, but there was only about six inches in depth all through December, and little more than two feet during the winter. There is still sleighing in the country on March 31, with about a foot of snow on the level.

FRUIT AND VEGETABLE CROPS.

The apple crop was less than usual in Canada in 1910. The crop in Nova Scotia, Prince Edward Island, New Brunswick and Quebec was, on the whole, light. In Ontario and some parts of Quebec, the summer and autumn varieties yielded a medium to good crop. In Ontario, the crop of winter apples was light in most places, although in some sections the crop was a medium one. In the prairie provinces, trees which had reached the bearing age had the blossoms or fruit-buds killed by spring frosts. In British Columbia, the crop was good. Pears were a medium to good crop where grown. Plums were light in eastern Canada, but good in British Columbia. Peaches were a medium crop, and grapes medium to good. Small fruits were an average crop in most parts, but in eastern Ontario suffered from drought, making the crop little more than light.

Vegetables were an average crop in most places. At the Central Experimental Farm, there was a medium crop of apples and plums, and few cherries. The small fruit crop was much reduced by drought and could not be called more than light. Grapes were considerably injured by spring frosts and the crop was not more than medium. While a large number of varieties ripened, they were not so sweet as usual. Vegetables, on the whole, were an average crop, though the crop of potatoes was rather light, except from new seed.

MEETINGS ATTENDED, PLACES VISITED AND ADDRESSES GIVEN.

During the past year, the writer has, as usual, attended a number of meetings and given addresses on horticultural subjects. This year, owing to the enlargement of the field of work, more places than usual have been visited.

On April 1, 1910, an address was given before the Hamilton Horticultural Society on 'The Intelligent Care of Garden Plants'; Ottawa Horticultural Society, October 4, 1910, on 'Bulb Culture for the House and Garden.' Two addresses were given before the New Brunswick Fruit Growers' Association on November 1 and 2, one on 'Growing Nursery Stock in Northern Climates,' and one on 'The Care of Bearing Orchards'; the St. John, N.B., Arboricultural Society, November 2, on 'Street Improvement'; Ontario Fruit Growers' Association, November 16, 1910, on 'Standards for Judging Fruits'; Ontario Horticultural Association, November 17, 18, 1910, on 'Novelties,' and a paper on 'The Best Lilies' was prepared for the Nomenclature Committee of that Society. Quebec Pomological Society, December 6, 1910, 'Pear Culture in the Province of Quebec'; the Ramsay Farmers' Club, Almonte, Ont., January 14, 1911, on 'Small Fruit Culture'; the Northumberland and Durham Apple Growers' Association, January 26, 1911, on 'Care of Young Orchards'; and the 'Care of Bearing Orchards,' the Short Course in Horticulture at the Macdonald College, Que., February 1, 1911, on 'Improvement of Plants'; the Niagara Peninsula Fruit Growers' Association, Grimsby and St. Catharines, Ont., March 1, 2, and 3, 1911, 'Results and Conclusions as to Best Varieties of Strawberries and Raspberries for Market,' 'Plums, Pears, and Apples—Best Varieties for the Commercial Orchard'; the Horticultural Club, Macdonald College, March 27, 1911, 'Horticulture at the Dominion Experimental Farms,' and 'Keeping Horticultural Records.' In May,

1910, I visited the Agricultural College, Guelph, Ont., and in June the Arnold Arboretum, Jamaica Plain, Mass., and the Agricultural College, Durham, New Hampshire. On July 20, 1910, I left for the west on a visit to the Experimental Farms and other places among which were Winnipeg, St. Charles, Brandon, and Morden, Man.; Indian Head, Regina, Rosthern, Saskatoon, and Scott, Sask.; Lethbridge, Lacombe, Calgary, Edmonton, Wainwright and Laggan, Alta., Salmon Arm, Kamloops, Agassiz, Vancouver, Victoria, Sidney, Vernon, Summerland, Penticton, and Kelowna, B.C., also the Agricultural College and Experiment Stations at Fargo, N.D., Brookings, S.D., St. Anthony Park, Minn., and Ames, Iowa, at all of which places I learned something which should prove useful in the development of horticulture in Canada.

During October, 1910, I visited the Experimental Farms at Nappan, N.S., and Charlottetown, P.E.I., and also examined the proposed site of the new Station at Kentville, N.S., and in December, I made a further examination to assist in deciding on the area to be selected. On December 30, 1910, I visited the Experimental Station at Cap Rouge, Que.

ACKNOWLEDGMENTS.

I desire again to acknowledge my indebtedness to farmers, fruit growers, and market gardeners throughout Canada and other countries for their kind co-operation in helping to make the work of the Horticultural Division of greater value by furnishing information on various matters, and also by their friendly attitude towards the work we are attempting to do.

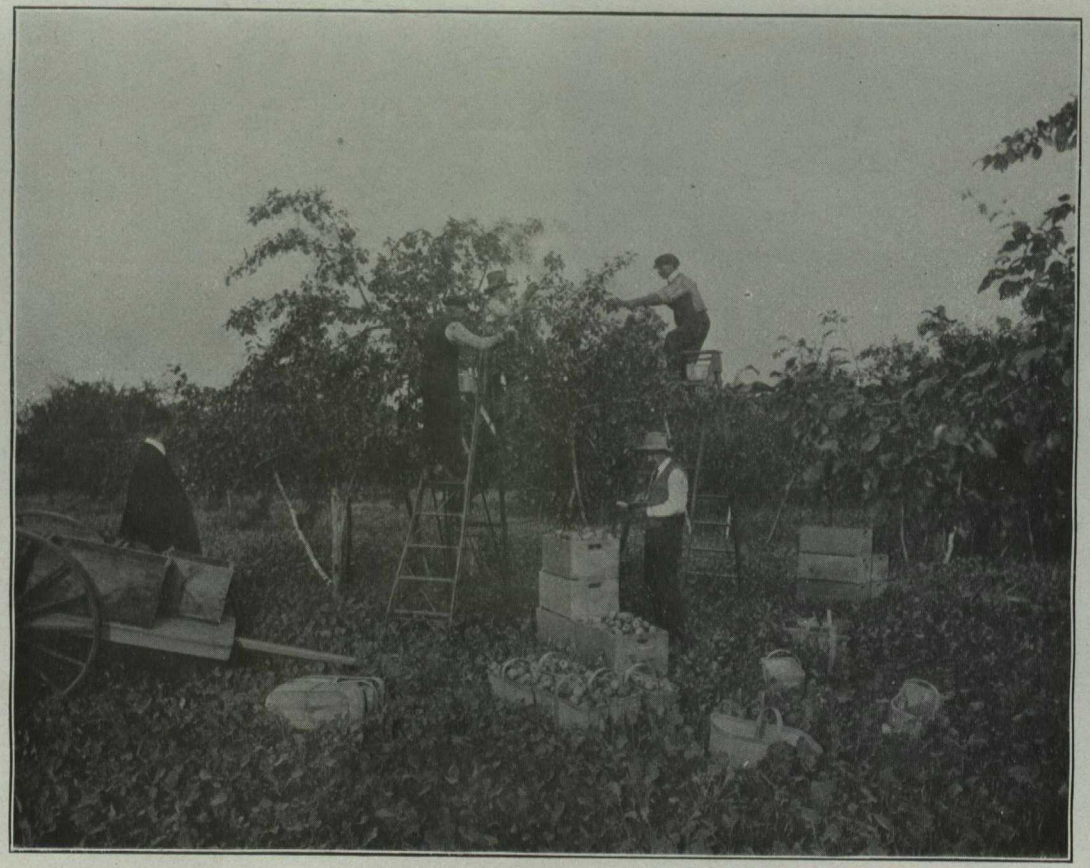
It is also a pleasure to be able, through this annual report, to record my appreciation of the faithful and efficient work of those who have assisted me at Ottawa during the past year, those in charge of the various branches of the work and to whom I particularly refer being: Mr. T. Gordon Bunting, Assistant; Mr. J. F. Watson, Secretary; Mr. H. Holz, Foreman; Mr. H. Read, Assistant Foreman; and Mr. Frank Horn, Foreman in the Arboretum and Botanic Garden. To the other men who have done a large part of the physical labour, I wish also to express my thanks for their loyal support.

DONATIONS.

Numerous donations of seeds and plants and other material are received each year by the Horticultural Division from institutions and from persons who are interested in experimental work. This year we have much pleasure in acknowledging the receipt of the following donations:—

Donations during Calendar Year, 1910.

Sender.	Donation
Adney, Tappan, Upper Woodstock, N.B.	Apples, scions of 10 varieties.
Alexander, A., Hamilton, Ont.	Plants Dianthus latifolius atrococcineus, seed of *Papaver umbrosum*.
Allison, J. G., Napanee, Ont.	Seed Yellow Transparent potato.
Botanic Gardens, Durban, Natal, South Africa	Collection of seeds.
Botanic Gardens, Suphur, India	Collection of seeds.
Botanic Gardens, St. Petersburg, Russia	Collection of seeds.
Botanic Gardens, Copenhagen, Denmark	Collection of seeds.
Botanic Gardens, Siena, Italy	Collection of seeds.
Beatty, I. C., Birmingham, Ala.	Plants of Citrus trifoliata (Wild orange).
Beach, Prof. S. A., Ames, Iowa, U.S.	Scions Fall Orange, Delevan Colorado Orange, apples.
Bittorf, Geo., Hopeville, Ont.	Potatoes, Sensation, Early Superior, New King.
Bishop, Mr. Guelph, Ont.	Scions Seedling Bellflower Apple.
Braslan Seed Growers' Co., San José, Cal., U.S.	Seed of Red Wethersfield and Globe Danvers Onions.



Picking and Recording crop of Apples from individual trees, at Central Experimental Farm, Ottawa, Ont., 1910.

Sender.	Donation.
Brill, Fr. Hempstead, N.Y., U.S.	Cabbage Seed, Volga, New Flat and others.
Brown, John, West Lochaber, N.S.	Potatoes Seedling, 2 varieties.
Buchanan Nurseries, St. Charles, Man.	Norway Poplars.
Criddle, N. Treesbank, Man.	Bulbs Lilium andinum.
Crow, Prof. J. W., Guelph, Ont.	Scions Woodhouse Seedling Apple.
Dode, L. A., Paris, France	Willow cuttings, Maple seed.
Dubuc, Azarias, Richelieu, Que.	Potatoes grown by sender for 35 years, look like Peachblow.
Dunlop, J., Union Hall, Ont.	Scions Dudley, Seedling of Duchess, Early Green Seedling Apples.
Ewing & Co., Montreal	Seed Duplessis Large Red Wethersfield and Duplessis Danvers Onions.
Flower City Plant Co., Rochester, N.Y., U.S.	Walkers' Excelsior Plant Food.
Fowler, L. U., Bedeque, Que.	Potatoes which took first prize, P.E.I. fair
Frier, Mrs. M. D., Franklin Centre, Que.	Potato seedling.
Fuller, Mr., Aylmer, Que.	Apple scions.
Hainge, H. F., Bangor, Sask.	Potatoes, Up-to-date.
Hall, Rev. Geo., Quorn, Australia	Seed, Glory Pea.
Hewitt, Mrs. Annie G., Toronto	Seeds from New South Wales.
Hitchcock, G. R., Massawippi, Que.	Strawberry plants.
Hodges, Mrs. Flora E., Skidegate, B.C.	Potatoes.
Keyes, P. G., Ottawa, Ont.	Scions Apple, Oakland County, Seek-no-further.
Leonard, E. K., Paradise, N.S.	Scions Red Seedling Apple.
Laidlaw, Thos., Rothbury, Sask.	Potatoes, Scotland's Pride.
Lilley, Miss Mary, Dollar, Ont.	Potatoes, Seedling Early Thorburn.
Limlaw, David E., Nutt's Corners, Que.	Seed Illinois Purple Tomato.
Lindsay, Jas., Oxford Mills, Ont.	Potatoes.
Mackinnon, W. A., Birmingham, Eng.	Seed Choux Moellier Cabbage.
Marrison, R. A., Cataraqui, Ont.	Scions Kingston Sugar Plum.
Morse & Co., San Francisco, U.S.	Red Wethersfield and Yellow Globe Danvers Onions.
Murphy, Jas. E., Augustine Cove, P.E.I.	Potato, McIntyre.
McKay, John, Creemore, Ont.	Scions Eureka Seedling Apple.
McIntosh, H. A., Dundela, Ont.	Scions apple thought to be a cross between McIntosh and Salome.
Newman, C. P., Lachine Locks, Que.	25 Plants King Raspberry.
O'Brien, H. T., Noel, N.S.	Potatoes, Prince Albert.
Ogilvie, Wm., North Georgetown, Que.	Cuttings Sweetwater Grape.
Peart, Edwin, Nelson, Ont.	Scions Homestead Apple.
Pieters, A. J., Hollister, Cal., U.S.	Seed Wethersfield, Yellow Globe Danvers Onions.
Oueviemont, Geo. W., Torrance, Ont.	Potato Seedling.
Strubler, Phil., Napierville, Ill.	Three Seedling Currant bushes.
Stephens, N. J., Bracebridge, Ont.	Burpee's Extra Early Potatoes.
Taylor, F. S., White's Cove, N.B.	Scions Seedling Apple.
Taylor, Wm. A., Dept. Agriculture, Washington, D.C., U.S.	Scions Buckskin (46555), Martin (46559) Apples.
Todd, W. H., Ingersoll, Ont.	Potato Seedling, Seed of Todd's selected Lettuce.
Weightman & Son, Awahuri, New Zealand, per F. W. Godsal, Cowley, Alta.	Root of seedless Rhubarb.
Wilson, A. E., Clarence, Ont.	Native Plums, 2 jars of preserved. Scions of Native Plums.
Wooton, F. H., Wellman's Corners, Ont.	Scions Crown Apple.

ARBORETUM AND BOTANIC GARDEN.

The Arboretum and Botanic Garden of the Central Experimental Farm, of which the writer has had charge since 1895 and of which he has been curator since 1898, was transferred on January 1, 1911, to Mr. H. T. Güssow, Dominion Botanist. It seems, therefore, a fitting time to review the history of this part of the Central Experimental Farm and the work which has been done in connection with it.

When the Dominion Experimental Farms were organized in 1886, sixty-five acres were selected for the Arboretum and Botanic Garden on the east side of the Farm. The site chosen was a good one, as most of the land is high and a fine view is obtained of the city of Ottawa on the north and east, while to the south there is a pleasing view across country with glimpses of the Rideau River in the distance. The Arboretum is

bounded on the south side by the Rideau canal, which, at this point, has marshy banks that take away the sameness which the canal banks have in many places.

The late Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, took charge of the Arboretum and Botanic Garden when the first planting was done in the autumn of 1889 and continued in charge until 1895, when the writer, who was then the Director's Assistant and Foreman of Forestry, took up the work. The transfer is recorded in the Report of the Entomologist and Botanist for 1896, where the following statement is published: 'The practical work of the Arboretum and Botanic Garden, which was done to a large measure under my direction until last spring, was then at my request, handed over to Mr. W. T. Macoun, the Foreman of Forestry, who, having men under his control, was in a better position to look after the necessary labour, such as cultivation, planting, tidying up, etc., than I was with only one man, whose time is fully occupied with the grass and fodder experiments. In addition to the above reason, Mr. Macoun is specially well qualified for this work from his natural tastes and knowledge of plants. I had, therefore, very much pleasure in recommending to you that this work should be entrusted to him.'

In 1898, the writer was appointed Curator of the Arboretum and Botanic Garden by Order-in-Council.

In the writer's report for 1895, the following statement is made which shows the number of species and varieties which had been set out up to that time. 'During the spring, 246 species and varieties of trees and shrubs were added to the number recorded last year, making the total of 935 living in the autumn of the present year. The perennial flower border was extended in the autumn from the main entrance to the northern gate, and the greater part of this was planted with 735 additional species and varieties, making a total of 863 now in the Arboretum.' In the autumn of 1910 there were living in the Arboretum and Botanic Garden 3,419 species and varieties of trees and shrubs represented by 4,911 specimens and 2,007 species and varieties of herbaceous perennials. No doubt some of these are synonyms, but the number cannot be very large. This makes one of the most extensive collections of hardy plants in America. It has been brought to its present size by a gradual but regular increase in the collection from year to year, as, by being constantly on the look-out for new things from other institutions, botanic gardens, nurserymen and private individuals, it has been possible to add a considerable number of species and varieties annually.

The original plan was to arrange the trees, shrubs and herbaceous plants in their proper botanical order. This has, to some extent, been adopted, but the large number of species which has been planted has made it practically impossible to keep all plants of one genus in a single group, and in some cases even three separate groups have been made. Furthermore, in many instances, the soil was not suitable where a certain genus would come if kept in the proper sequence, and it was thought better to place the plants in the soil most suited to them, where this could be done.

The trees and shrubs are, in most cases, planted far enough apart to permit of their developing into full-sized specimens without being crowded. The herbaceous perennial border is a prominent feature of the Botanic Garden, and is situated on the east and south-east side of an arbor-vitae hedge. It has a total length of nearly half a mile. The border is twelve feet wide and the plants are in rows three by three feet apart.

Most of the arboretum has been seeded down to lawn grass during the past fifteen years and the grass of a large proportion of the area is kept cut regularly with a pony lawn mower. In order that the trees and shrubs should not be checked in their growth by growing in sod, circles free of sod have been kept cut around them and in this the surface soil is loosened with the hoe during the growing season.

The specimens in the Arborteum and Botanic Garden have been neatly, though not conspicuously, labelled with a zinc label fastened to a stiff wire which is pushed into the ground near the specimen. There is a duplicate zinc label fastened to the tree,

so that, if one is broken off, the other is almost sure to be found. Each label bears a number which corresponds to a number and name in the record book.

While there are, no doubt, some plants which are incorrectly named, the great majority are, we believe, true to name. In most cases, the plant has been labelled with the name under which it was received, awaiting the time when more critical examination was possible.

Every year during the past fifteen years the trees, shrubs and herbaceous plants have been examined and notes taken on each individual specimen. These notes have been mainly horticultural in character and relate to the hardiness, height and growth of the plants. Popular descriptions of many of the flowers of herbaceous plants have been made and published.

In 1899, a 'Catalogue of the Trees and Shrubs in the Arboretum and Botanic Garden' was prepared and published jointly by Dr. Wm. Saunders, Director, and the writer, in which is a list of 3,071 species and varieties, with notes on their relative hardiness. In 1908, there was prepared and published by the writer, as Bulletin No. 5, Second Series, a 'List of Herbaceous Perennials tested in the Arboretum and Botanic Garden' with popular descriptions of the flowers, blooming season and height to which the plants grow.

The collection was also used from time to time as a basis for various lists of plants recommended for ornamental purposes.

In 1910, the work done in the Botanic Garden was much as usual, notes of the hardiness and growth of the plants were taken, labels were written for plants which needed them and the whole herbaceous border was re-labelled with a larger zinc label than had been used before. The total number of species and varieties of trees and shrubs added in 1910 was 100, represented by 154 specimens. There was an average amount of injury from the winter of 1909-10.

SEEDLING FRUITS RECEIVED FOR EXAMINATION, 1910-11.

Each year a number of seedling fruits are sent to the Horticultural Division for examination and for a report as to their merits. In order that a record may be kept, a full or partial description is made of most of those received. In the past, partial descriptions of the poorer ones have been published in the Annual Report and full descriptions of the most promising, but this year descriptions are published of the better ones only. Following is a list of seedlings sent in, with names of the senders and record number. Of these, those received from Mr. Tappan Adney, Upper Woodstock, N.B., are of special interest, being, most or all of them, varieties originated or brought together by the late F. P. Sharp, Woodstock, N.B., who did much in his day for the advancement of horticulture in his province.

501—WILEY from Tappan Adney, Upper Woodstock, N.B. (See full descriptios.)
502—'MARK No. 6', 'BITTERSWEET', from Tappan Adney, Upper Woodstock, N.B. (See full description.)
503—PEABODY GREENING, from Tappan Adney, Upper Woodstock, N.B. (See full description.)
504—MUNRO SWEET (SHARP'S), from Tappan Adney, Upper Woodstock, N.B. (See full description.)
505—'MARK No. 19', from Tappan Adney, Upper Woodstock, N.B.
506—'MARK No. 31', from Tappan Adney, Upper Woodstock, N.B.
507—'MARK No. 24', from Tappan Adney, Upper Woodstock, N.B.
508—'MARK No. 21', from Tappan Adney, Upper Woodstock, N.B.
509—'MARK No. 28', from Tappan Adney, Upper Woodstock, N.B.
510—'MARK No. 30', from Tappan Adney, Upper Woodstock, N.B.
511—'MARK No. 29', from Tappan Adney, Upper Woodstock, N.B.
512—'MARK No. 5', from Tappan Adney, Upper Woodstock, N.B.
513—'MARK No. 26', from Tappan Adney, Upper Woodstock, N.B.
514—'MARK No. 20', from Tappan Adney, Upper Woodstock, N.B.
515—'MARK No. 33', from Tappan Adney, Upper Woodstock, N.B.
516—'MARK No. 27', from Tappan Adney, Upper Woodstock, N.B.
517—'RAYMOND RED', CRAB, from Tappan Adney, Upper Woodstock, N.B.

518—SEEDLING APPLE, from George W. White, Woodstock, N.B., sent by Tappan Adney, Upper Woodstock, N.B.
519—'WOODSTOCK BLOSSOM', grown by Mr. Harrison, sent by Tappan Adney, Upper Woodstock, N.B.
520—'MARK No. 34', from Tappan Adney, Upper Woodstock, N.B.
521—'MARK No. 18,' Seedling, from Tappan Adney, Upper Woodstock, N.B.
522—SEEDLING APPLE, from Mr. Wylie, St. Andrew's, N.B. (See full description.)
523—SPORT OF PEWAUKEE, from G. D. Morse, Nictaux, N.S.
524—APPLE OR CRAB APPLE, from C. L. Stephens, Orillia, Ont.
525—APPLE, from C. L. Stephens, Orillia, Ont.
526—SEEDLING, from W. J. Kerr, Woodroffe, Ont. (See full description.)
527—APPLE, No. 1, from C. B. St. George, Tramore, Ont.
528—APPLE No. 2, from C. B. St. George, Tramore, Ont.
529—APPLE, No. 3, from C. B. St. George, Tramore, Ont.
530—APPLE, NORFOLK BEAUTY (Strawberry King), from J. E. Johnson, Simcoe, Ont. (See full description.)
531—APPLE from Geo. Bowman, Spring Valley, Ont.
532—APPLE, from F. S. MacLeod, Hintonburgh, Ont.
533—SEEDLING APPLE, from W. Judge, Orangeville, Ont. (See full description.)
534—SEEDLING APPLE No. 1, from T. C. Paddon, Toronto, Ont.
535—SEEDLING APPLE No. 2, from T. C. Paddon, Toronto, Ont.
536—SEEDLING APPLE No. 3, from T. C. Paddon, Toronto, Ont.
537—SEEDLING CRAB, from M. G. Hagerman, Toronto, Ont.
538—SEEDLING APPLE, from Geo. L. Moore, Belleville, Ont.
539—SEEDLING APPLE, from Alex. McNeill, Ottawa, Ont.
540—'MARK No. 13', from Tappan Adney, Upper Woodstock, N.B.
541—APPLE, from A. D. Verreault, Villages des Aulnaies, Que.
542—APPLE, from W. R. Taylor, Aylmer, Que. (See full description.)
543—APPLE, from Mrs. Dennis Darcy, Sheenboro, Que. (See full description.)
544—PLUM SEEDLING, from J. Kilpatrick, 276 Turner St., Ottawa, Ont.

501. Wiley.—Above medium size, roundish; ribbed; cavity open; medium depth; stem short, stout; basin open, medium depth, wrinkled; calyx closed; colour, greenish-yellow, almost covered with attractive crimson; predominant colour, attractive crimson; dots few, pale, indistinct; skin moderately thick, tender; flesh white with traces of red, tender, juicy; core medium; subacid, little flavour; above medium quality; season evidently September.

Tree originated with James Wiley, Jacksontown, Carleton Co., N.B. Thought to be a seedling of New Brunswicker. Top grafts were fruiting with F. P. Sharp, Woodstock, N.B., in 1890.

An attractive-looking apple, but not as good as Langford Beauty, and no handsomer. May be useful. Specimens from Tappan Adney, Upper Woodstock, N.B.

502. 'Mark No. 6,' 'Bittersweet.'—From Tappan Adney, Upper Woodstock, N.B. —Medium size; oblate to roundish, flattened at ends; cavity open, medium depth; stem short, moderately stout; basin open, deep, wrinkled; calyx open; colour, pale yellow, streaked and splashed on sunny side with carmine; dots obscure; skin moderately thick, tender; flesh, yellow and white, sometimes with traces of red, crisp, tender, juicy; core medium; subacid, pleasant flavour; quality good to very good; season evidently late September and October.

A good dessert apple, but not quite attractive enough and shows bruises too easily for market. Said by Tappan Adney to be one of Mr. Sharp's earliest crosses between New Brunswicker and St. Lawrence.

503. Peabody Greening.—Medium size; roundish, flattened at ends, ribbed; cavity medium depth and width, russeted at base; stem short, moderately stout; basin deep, open, wrinkled; calyx open; colour, greenish-yellow with traces of red on sunny side; predominant colour greenish-yellow; seeds above medium, acute; dots obscure; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core medium, open; pleasant flavour; good quality; season evidently December to February, or later.

Thought to have originated in Carleton Co., N.B., with the Peabody family. Resembles Grimes' Golden a little in outward appearance and character of flesh. May

be desirable for home use in New Brunswick and cold districts. Specimens received from Tappan Adney, Upper Brunswick, N.B.

504. Munro Sweet (Sharp's).—Medium size; roundish conical; cavity open, medium depth; stem short, stout; basin narrow, medium depth, slightly wrinkled; calyx open; colour, pale yellow, well washed with bright crimson; predominant colour bright crimson; dots moderately numerous, yellow, distinct; skin thick, tough; flesh white, tender, moderately juicy; core medium; sweet, pleasant flavour; above medium to good quality; season evidently early to mid-winter.

Said to be a cross made by F. P. Sharp, Woodstock, N.B., between New Brunswicker and an unknown variety about 1869, at which time seed was planted in orchard of David Munro. The first fruit was in 1879. A handsome apple. Specimens received from Tappan Adney, Upper Woodstock, N.B.

522. Seedling Apple from Mr. Wylie, St. Andrews, N.B.—Medium to below in size; roundish conical; cavity narrow, shallow, russeted; stem short, stout; basin very shallow, open, wrinkled; calyx closed or partly open; colour, yellow well washed with orange-red and crimson; predominant colour orange-red; seeds medium size, acuminate; dots moderately numerous, conspicuous; skin thick, moderately tough; flesh white, tinged with red about basin, crisp, firm, tender, juicy; core medium; subacid, pleasant flavour; good quality; season evidently late September and October.

An attractive looking apple and promising, if hardier than Wealthy.

The tree was found wild on the property of Mr. Wylie, near St. Andrews, N.B. Specimens received from R. C. Treherne, St. Andrews, N.B.

526. Seedling apple from W. J. Kerr, Woodroffe, Ont.—Medium size; oblate, perhaps to roundish; cavity deep, medium width, russeted; stem short, stout; basin deep, medium width; calyx open; colour yellow, washed and splashed with carmine; predominant colour carmine; seeds medium size, broad, acute; dots few, yellow, indistinct; skin moderately thick, tough; flesh dull white, tender, juicy; core medium; subacid, little flavour; above medium quality; beginning of season said to be same as Duchess, but said to keep much longer.

530. Norfolk Beauty (Strawberry King).—Large; roundish, ribbed; cavity open, shallow to medium, russeted; stem short, stout; basin medium to deep, medium width, wrinkled; calyx closed or partly open, colour yellow, well washed and splashed with deep orange-red to dark red; predominant colour deep orange-red to dark red; seeds few, above medium, acute, several abortive; dots moderately numerous, yellow, distinct; skin thick, moderately tough; flesh yellow, crisp, tender, moderately juicy; core medium size, partly open; subacid, high, aromatic flavour; very good quality; season evidently November to February. Originated with Mr. John Winter, Port Ryerse, Norfolk county, Ont. Mr. James E. Johnson, Simcoe, Ont., from whom specimens were obtained, writes that it was bought for Strawberry King.

Darker in colour than Tompkins' King and flesh not quite so coarse, but a little juicier. Flavour much the same as King. On the whole this seems to be a better apple.

533. Seedling apple from W. Judge, Orangeville, Ont.—Medium size; roundish, slightly angular; cavity open, medium width, stem medium length, stout; basin open, shallow, wrinkled; calyx open; colour pale yellow splashed and washed with bright red; predominant colour bright red; seeds medium, dots obscure; skin thin, tender; flesh dull white, tender; core small; subacid, pleasant flavour; good quality; season early September. Promising.

542. Apple from W. R. Taylor, Aylmer, Que.—Large; roundish conical; cavity deep, medium width, russeted near base; stem medium length, slender; basin deep,

medium width; calyx closed; colour yellow washed and splashed with attractive crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tough; flesh dull white or yellowish with traces of red, tender, juicy; core below medium; subacid, pleasant flavour; good quality; season October, probably to January.

Much like Wealthy in outward appearance, flesh and flavour, but is more pointed at apex and skin shows whiter at apex than Wealthy. It is also a better keeper.

543. Apple from Mrs. Dennis Darcy, Sheenboro, Que.—Large; oblate, ribbed; cavity deep, open; stem short, stout; basin deep, open, wrinkled; calyx partly open; colour pale yellow, washed and splashed with carmine; predominant colour carmine; dots few, white, distinct; skin moderately thick, tender, moderately juicy, coarse; core medium size; briskly subacid, pleasant flavour; above medium quality; season evidently mid-September to early October.

A large, handsome apple, said to be a seedling of Duchess and hardier than Wealthy. Too coarse for dessert. May be a good cooker.

APPLE TREES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM.

In 1910 there were 144 seedling varieties of apples originated in the Horticultural Division which fruited for the first time, making a total of 720 which have fruited from seed sown in 1898 and later.

Of the varieties which fruited, 171 have been sufficiently promising to warrant propagating for further test. Descriptions of 48 varieties originated in the Horticultural Division have been published in previous annual reports, and the following 13 are published for the first time this year.

Bingo (Northern Spy Seedling).—Fruit, above medium to large; roundish conical; cavity deep, narrow, russeted; stem short, stout; basin narrow, deep, slightly wrinkled; calyx partly open; colour, pale greenish-yellow, washed and splashed with crimson with darker splashes; predominant colour, crimson; seeds medium size, broad, acute; dots few, white, distinct; skin thick, tough; flesh yellowish with traces of red, tender, moderately juicy; core small; flavour subacid, sprightly, pleasant; quality good; season December to late winter.

Resembles Northern Spy considerably in outward appearance, flesh, and flavour. Not quite juicy enough. Promising.

Carno (McIntosh Seedling).—Medium size; oblate, regular; cavity medium depth and width; stem short, stout; basin deep, narrow, nearly smooth; calyx partly open; colour, pale yellow well washed with attractive crimson; predominant colour, crimson; seeds medium, acute; dots few, grey, indistinct; bloom bluish; skin moderately thick, tough; flesh yellowish, crisp, juicy; core small, subacid, pleasant sprightly; quality good to very good; season evidently November to January.

Resembles McIntosh in colour and Shiawassee in shape. Flavour a little like McIntosh and has an aroma like that apple. An attractive looking apple. Seems a better keeper than McIntosh.

Cora (Langford Beauty Seedling).—Above medium size; roundish, very slightly angular; cavity medium depth and width; stem short, stout; basin medium depth and width, slightly wrinkled, almost smooth; calyx closed or partly open; colour, pale yellow, almost white with a pink blush on sunny side; dots white surrounded with pink, moderately numerous, prominent; skin thin, tender; flesh white, tender, breaking, juicy; core medium; subacid, good, Fameuse-like flavour; quality good to very good; season late September to October.

Much like Princess Louise, but earlier. Flesh and flavour markedly Fameuse-like. Does not resemble Langford in outward appearance. Would be quite desirable if more attractive in appearance.

Glenton (Northern Spy Seedling).—Size above medium to large; roundish to oblate conic; cavity deep, open, russeted at base; stem medium length, stout; basin deep, medium width, wrinkled; calyx closed; colour, yellow well washed, almost covered with crimson; predominant colour crimson; seeds medium, acute; dots small, moderately numerous, pale yellow, distinct; skin moderately thick, moderately tender; flesh yellowish with traces of red, tender, moderately juicy; core medium; subacid, pleasant flavour; quality good; season evidently October to late November. Resembles Northern Spy a little in outward appearance, character, flesh and flavour.

Kildare (Langford Beauty Seedling).—Medium size; oblate to roundish conic; cavity medium depth and width; stem medium to long, slender; basin narrow, medium depth, nearly smooth; calyx partly open; colour, pale yellow, washed and splashed with crimson; predominant colour crimson; dots moderately numerous, white, distinct; skin moderately thick, tough; flesh white with traces of yellow, crisp, tender, juicy; core medium; subacid, sprightly, pleasant flavour; quality, good; season late September probably to December.

Resembles Langford Beauty a little in outward appearance and in character of flesh, and considerably in flavour. An attractive-looking apple of the season of Wealthy, but better in quality. Flesh is somewhat like McIntosh, and flavour a little also.

Kim (Langford Beauty Seedling).—Medium size; roundish, regular; cavity narrow, medium depth, russeted; stem short, slender; basin deep, open, nearly smooth; calyx open; colour, yellow, washed and splashed with crimson; predominant colour crimson; seeds medium size, acute; dots few, white, distinct; bloom pinkish; skin moderately thick, tender; flesh white with traces of red, crisp, juicy; core medium; subacid, sprightly, pleasant flavour; quality good; season December to late winter, probably.

Resembles Langford Beauty a little in outward appearance. Quite promising.

Luke (Wealthy seedling).—Above medium to large; oblate to roundish conic; cavity narrow, medium depth, russeted; stem short, moderately stout; basin open, medium depth, almost smooth; calyx open or partly open; colour pale greenish yellow washed with deep red, mostly on sunny side; dots obscure; skin thick, moderately tough; flesh dull white or yellowish, rather coarse, tender, moderately juicy; core small; subacid, pleasant flavour; quality good; season October and November, probably to mid or late December.

Resembles Wealthy considerably in outward appearance, character of flesh and flavour. A better keeper than Wealthy.

Niobe (Northern Spy Seedling).—Above medium size; roundish, regular, conical; cavity deep, medium width; stem medium to long, slender; basin deep, medium width, smooth; calyx partly open; colour greenish-yellow washed and splashed with rather dull crimson; predominant colour, rather dull crimson; seeds above medium; dots few, white, indistinct; bloom thin, pinkish; skin moderately thick, tough; flesh yellowish, crisp, tender, rather coarse, moderately juicy; core medium; mildly subacid, pleasant flavour. Quality good; season December to late winter.

Resembles Northern Spy a little in outward appearance and considerably in flavour.

Ripon (Langford Beauty Seedling).—Medium size; roundish; cavity narrow, medium depth, russeted; stem medium length, slender; basin medium depth and width, smooth; calyx closed; colour yellow well washed with crimson; dots moderately numerous, grey, distinct; skin moderately thick, moderately tough; flesh white, tinged with red, showing green about core, tender, juicy; core medium; subacid, sprightly, pleasant flavour, slightly astringent; quality good, season November, probably to January.

Resembles Langford Beauty considerably in outward appearance and character of flesh and slightly in flavour. Distinctly of Famueuse group.

Rocket (Northern Spy Seedling).—Above medium size; roundish, conical; cavity deep, medium width, stem short, stout; basin deep, narrow, slightly wrinkled; calyx partly open; colour yellow, washed and splashed with crimson; predominant colour, crimson; seeds, medium size, acute; dots moderately numerous, yellow, distinct; bloom pinkish; skin moderately thick, moderately tough; flesh yellowish, crisp, tender, juicy; core medium; subacid, pleasant, sprightly flavour; quality good; season November, probably to January or later.

Appearance, flesh, flavour and odour much like Northern Spy.

Roger (Gano Seedling).—Medium size; roundish, very slightly ribbed; cavity open, medium depth, stem long, slender; basin open, deep, slightly wrinkled, calyx open, colour yellow, washed with attractive crimson; predominant colour, attractive crimson; seeds large, obtuse; dots few, white, indistinct; bloom thin, pinkish; skin moderately thick, moderately tender; flesh yellowish, rather coarse, firm, moderately juicy; core small; subacid, pleasant flavour; quality above medium to good; season late November to late winter.

Resembles Gano very much in outward appearance. Flesh is also somewhat similar, and seeds very large like Gano. An attractive looking apple.

Rosalie (Northern Spy Seedling).—Above medium size; roundish, ribbed; cavity deep, open, russeted; stem medium length, moderately stout; basin deep, medium width, wrinkled; calyx closed; yellow, thinly splashed and washed with carmine; predominant colour, carmine; seeds above medium size, acuminate; dots obscure; skin moderately thick, tender; flesh white, crisp, tender, juicy; core medium size, open; subacid, sprightly, pleasant flavour; quality good; season late November, probably through most of the winter.

Somewhat like Northern Spy in character of flesh and flavour, but not in outward appearance. If a little higher in colour would be very promising.

Seton (McIntosh Seedling).—Medium size; roundish to oblate; cavity open, shallow to medium; stem short, stout; basin open, medium depth, smooth; calyx open; colour pale green, washed with dull pinkish-red, mostly on sunny side; seeds medium size, acute; dots obscure; skin moderately thick, moderately tough; flesh dull white, crisp, tender, juicy, core small; subacid, pleasant flavour; quality good; season late December, probably late winter.

Does not resemble McIntosh, except about cavity. Tastes somewhat like Rhode Island.

CHARACTERISTICS OF APPLE SEEDLINGS ORIGINATED IN THE HORTICULTURAL DIVISION

Descriptions are taken of the seedling apples which are originated in the Horticultural Division, whether they are good, medium or poor. By doing this, it is possible to tell after a time what parent varieties are giving the largest proportion of promising varieties, and what the least. It gives valuable information for future work in breeding apples, as showing what characteristics of the female parent are apparent or conspicuous in the seedlings.

In the following table, certain characteristics of 581 seedlings of eleven varieties are given in such a form that they can be readily compared. These seedlings were raised from seed saved from apples which fruited in 1898. The flowers were not hand-pollenized and the male parents can only be suggested by the characteristics of the seedlings and the varieties which grew nearest to the tree from which the seed was taken. Of these we have a record. While the male parent is thus not known with certainty, a study of the following table will be found very interesting and, it is hoped, suggestive. The following characteristics of the seedlings of the eleven varieties are quite marked.

Fameuse Seedlings.—It is generally supposed that seedlings of Fameuse resemble the female parent in a marked degree. In this case the number of good Fameuse seedlings has been small, while a large proportion of the seedlings of McIntosh, which is a seedling of Fameuse, have been good.

Gano Seedlings.—A large proportion of the seedlings resemble the female parent in regularity of form, in colour, in absence of flavour, and in having large seeds. A large proportion of the seedlings are winter apples like female parent.

American Golden Russet Seedlings.—It is interesting to note that of 19 seedlings which have fruited none have russet skins. Nearly ninety-five per cent are green or yellow apples. A comparatively small proportion has been propagated and none has been thought good enough to name.

Langford Beauty Seedlings.—A large proportion are handsome, fine-grained apples of the Fameuse type with a marked resemblance to the female parent or to Louise, a seedling of Fameuse.

Lawver Seedlings.—While twenty-five per cent of the seedlings are late-keeping apples like the female parent, it is interesting to note that a large proportion have a season before December. Some of the Lawver seedlings show marked signs of Northern Spy blood, particularly in character of flesh and flavour. Both Lawver and Northern Spy are late-blooming sorts and were not very far apart in the orchard in 1898.

McIntosh Seedlings.—The McIntosh is supposed to be a seedling of Fameuse and has many Fameuse characteristics. Its seedlings have been much better than the Fameuse seedlings, over one-half the McIntosh seedlings being thought worthy of propagation, while less than a fourth of the Fameuse seedlings were propagated.

Northern Spy Seedlings.—Though self-sterile, and thus doubtless pollenized by some other variety or varieties, there has been a marked resemblance to the Northern Spy in a large proportion of the seedlings in outward appearance, flesh, and flavour, and in being late-keeping apples.

Salome Seedlings.—The Salome has given some good seedlings, though the best are not from this variety. A large proportion of the seedlings bore a marked resemblance to Salome in outward appearance, flesh and flavour.

Shiawassee Seedlings.—The Shiawassee is a seedling of Fameuse. A large proportion of its seedlings had fine grained, tender flesh and were above medium to good in quality, but the percentage thought worth propagating was about the same as the Fameuse seedlings.

Swazie Seedlings.—Only a small proportion of the seedlings resemble the parent in outward appearance, though a large percentage bear a marked resemblance to Swazie in flavour. The Swazie is a small apple, but of the seedlings, over 78 per cent were medium to large.

Wealthy.—There is a general resemblance to Wealthy in a large proportion of the seedlings, particularly in colour and the regular outline of the fruit and character of flesh and flavour.

In describing the apples of which the characteristics are given in the following table, the standards adopted for size were as follows:—

Small—2¼ inches in diameter, and below.
Below medium—2¼ to 2½ inches in diameter.
Medium—2½ to 2¾ inches in diameter.
Above medium—2¾ to 3 inches in diameter.
Large—3 to 3½ inches in diameter.
Very large—Above 3½ inches in diameter.

Characteristics of the Fruit of Seedling Apples at the Central Experimental Farm.

—	Character of Parent.	Fameuse Seedlings.	Character of Parent.	Gano Seedlings.	Character of Parent.	American Golden Russet Seedlings.	Character of Parent.	Langford Beauty Seedlings.	Character of Parent.	Lawver Seedlings.	Character of Parent.	McIntosh Seedlings.	Character of Parent.	Northern Spy Seedlings.	Character of Parent.	Salome Seedlings.	Character of Parent.	Shiawassee Seedlings.	Character of Parent.	Swazie Seedlings.	Character of Parent.	Wealthy Seedlings.
Number Seedlings Fruited		33		49		19		54		44		44		27		52		56		84		119
Number Seedlings Propagated		7		8		3		23		8		24		10		13		12		27		36
Number Seedlings Named		1		1		0		6		3		5		7		4		1		5		12
Size—		%		%		%		%		%		%		%		%		%		%		%
Small		9·10		8·16		0·00		1·85		9·09		2·27		3·70		5·76		3·57	x	4·76		7·56
Below medium		36·36		10·20		10·52		9·26		6·81		11·36		11·11		19·23		14·28		16·67		14·29
Medium	x	36·36		46·94	x	52·63		53·70	x	63·64		54·55		40·75	x	40·39	x	44·64		46·43		42·02
Above medium		18·18	x	32·66		31·58	x	35·19		20·46	x	25·00		33·33		19·23		28·58		20·24	x	29·41
Large		0·00		2·04		5·27		0·00		0·00		6·82	x	11·11		15·39		8·93		11 90		6·72
Total		100·00		100·00		100·00		100·00		100·00		100 00		100·00		100·00		100·00		100·00		100·00
Form—																						
Oblate		21·21		10·20		26·31		33·33		29·54		34·09		25·93		13·47	x	62·50	x	42·86		36·13
Roundish	x	75·76	x	65·31	x	68·42	x	66·67	x	56 82	x	54·55	x	70·37	x	61·53		35·72		42·86	x	58·83
Conical		0·00		18·37		0·00		0·00		4·55		9·09	x	3·70		11·53		1·78		8·33		2·52
Oblong		3·03		6·12		5·27		0·00		9·09		2·27		0·00		13·47		0·00		5·95		2·52
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00
Colour—																						
Green or yellow		0·00		4·08		94·73		11·11		9·09		2·27		0·00		1·92		25·00		21·43		0·00
Crimson or red	x	66·67	x	83·68		5·27	x	85·19	x	68·18	x	84·09	x	81·48		57·69	x	60·72		28·57	x	78·15
Pink or pinkish red		21·21		2·04		0·00		3·70		4·55		9·09		3·70	x	11·53		7·14		9·52		2·52
Orange or orange red		12·12		10·20		0·00		0·00		18·18		4·55		14·82		28·86		7·14		25·00		19·33
Russet		0·00		0·00	x	0·00		0·00		0·00		0·00		0·00		0·00		0·00	x	14·29		0·00
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		98·81a		100·00

Flavour—																								
Sweet		6·06		10·20		0·00		3·70		20·45		13·63		7·40		9·62		1·73		10·71		13·44
Mildly subacid		12·12	x	18·37		15·79		14·82		15·90		2·27		3·70		7·69		1·78	x	4·76		1·68
Subacid	x	51·52		46·94	x	73·69	x	51·85		45·45	x	72·74	x	55·56	x	42·31	x	53·57		53·58		34·46
Briskly subacid		21·21		24·49		10·52		25·93	x	9·09		9·09		33·34		34·62		32·15		25·00	x	39·50
Acid		6·06		0·00		0·00		3·70		4·54		2·27		0·00		5·76		7·14		5·95		10·92
Total		96·97*a*		100·00		100·00		100·00		95·43*b*		100·00		100·00		100·00		96·42*b*		100·00		100·00
Quality—																								
Poor		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00		0·00
Below medium		0·00		2·04		0·00		0·00		0·00		0·00		0·00		0·00		3·57		0·00		2·52
Medium		27·27		69·39		52·63		9·26		47·72		9·09		14·81		42·31		14·28		26·81		26·89
Above medium		48·49	x	28·57		42·10		42·59		36·37		38·63		55·56		42·31		44·64		44·05		52·94
Good to very good	x	24·24		0·00	x	5·27	x	48·15	x	15·91	x	52·28	x	29·63	x	15·38	x	33·93	x	30·95	x	16·80
Total		100·00		100·00		100·00		100·00		100·00		100·00		100·00		100·00		96·42*b*		98·81*a*		99·15*a*
Season—																								
August-mid-September		15·15		0·00		0·00	x	16·67		11·36		6·82		3·70		11·53		19·64		7·14		21·00
Mid-September, October		15·15		10·20		10·52		27·76		12·73		18·18		18·52		30·77		32·15		13·09		29·41
October-November	x	48·49		14·28		42·11		22·23		22·73	x	38·64		29·63		15·39		23·21		41·67	x	27·73
December-February		12·12		24·49		5·26		24·08		9·09		18·18	x	29·63	x	17·30	x	8·93	x	10·72		12·60
December-April		9·09	x	42·86	x	42·11		7·41	x	25·00		18·18		18·52		17·30		10·72		27·38		7·56
Total		100·00		91·83*d*		100·00		98·15*a*		90·91*d*		100·00		100·00		92·29*d*		94·65*c*		100·00		98·30*b*
Resemblance—																								
In outward appearance		27·27		26·53		.....		38·89		15·90		27·27		55·55		36·52		14·28		10·72		47·90
In flesh		39·39		53·06		21·05		50·00		25·00		45·45		59·25		88·46		58·94		25·00		40·34
In flavour		33·33		40·80		36·84		22·22		.....		34·09		51·85		51·90		33·93		35·23		20·17
No resemblance		30·30		20·40		36·84		1·85		54·54		27·27		22·22		3·84		26·79		32·85		25·21
In whiteness of flesh only		9·09		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....
In form and not colour		.....		22·44		.....		.....		.....		.....		.....		.....		.....		.....		.....
In colour and not form		.....		14·28		.....		.....		.....		.....		.....		.....		.....		.....		.....
In large seeds		.....		55·09		.....		.....		47·70		.....		.....		.....		.....		.....		.....
In form only		.....		.....		26·31		29·62		4·54		.....		.....		5·76		.....		17·64		.....
In colour		.....		.....		.....		.....		.....		31·81		.....		.....		.....		14·29		.....
In colour only		.....		.....		.....		11·11		4·54		.....		.....		19·23		.....		.....		.....

Legend—*a* This character not recorded for 1 seedling. *b* This character not recorded for 2 seedlings. *c* This character not recorded for 3 seedlings. *d* This character not recorded for 4 seedlings.

YIELDS OF APPLE TREES FROM THIRD TO TWENTY-SECOND YEAR AFTER PLANTING.

There are many persons who desire to grow apple trees who would like to know when the trees will begin to bear and how much fruit they may expect to obtain at a certain time after planting. Up to the present, so far as the writer knows, no figures have been published in America giving the yields of individual trees from the time they begin to bear. At the Central Experimental Farm, the yields of individual trees have been kept since 1898, and the records from some of the trees were published under the head of 'Individuality of Fruits' in the annual reports for 1903, 1905, the Interim Report for 1905-6, 1909, and again this year, in another part of this report. These records, were, however, to show the variation in yield of trees of one variety rather than a comparison of the yields of different varieties. In some cases in this table, the yields from the time the trees began to bear are not published, as the trees were too long planted before the records began to be kept. If it had been possible, it would have been desirable to give the average yields of a large number of trees of each variety in this table, but the orchards at the Central Experimental Farm were planned for variety testing rather than from the commercial standpoint, hence there are but few trees of each variety grown. On account of the small number of trees of each variety under test, it has been thought best to publish the yields of the best-yielding tree of each variety, also, where it was possible, the yield of a young and of an older tree, and also the records of some trees which are annual bearers. In this table, it will be noticed that the Wealthy tree of which a record is given, began to bear four years after planting. The Wealthy, in many cases, bears three years after planting, if three-year old trees are set. It may be stated that, in most cases, the trees of which the yields are published were three years old when planted. The trees are grown in cultivated orchards where cover crops are used, and, although not all under such similar conditions, that an entirely accurate comparison of the yields of different varieties can be made, it is thought that the yields thus published will prove valuable to intending planters.

Yield of Fruit in Gallons, per tree, Yearly, from Date of Planting.

Record Number.	Variety.	Date of Planting	3rd year.	4th year.	5th year.	6th year.	7th year.	8th year.	9th year.	10th year.	11th year.	12th year.	13th year.	14th year.	15th year.	16th year.	17th year.	18th year.	19th year.	20th year.	21st year.	22nd year.	Total yield 1898-1910.	Number of years planted in orchard.
1	Yellow Transparent	1890	..	..	..	..	..	*27	1	17¾	0	59	1	97	25	109	10½	100	0	91	..	..	*538¼	20
2	"	1897	..	..	3	6	14	26	5	46½	0	42	0	..	..	..	..	..	..	..	..	..	142½	13
3	Duchess of Oldenburgh	1888	..	..	..	..	..	..	..	*46	22¼	66	6	82	16	100	54	143	0	126	1	131	*793¼	22
4	" "	1888	..	..	..	..	..	..	..	*32	¼	42½	1	63½	47	89	70	111½	68	100	52½	111½	*778¾	22
5	" "	1897	½	1	2½	18½	9	44	0	79½	0	78	0	..	..	..	..	..	..	..	..	..	234	13
6	Wealthy	1888	..	..	..	..	..	..	..	*33	0	52	2	93	0	111	22	96½	1½	75	5	118	*609	22
7	"	1896	..	5	3¾	12½	½	32	28½	21	51	32	52	42	..	..	..	..	..	..	..	..	279¼	14
8	Fameuse	1888	..	..	..	..	..	..	..	* ½	35	23¼	11¾	97	34	42	73	¼	39	72	13½	77	*518	22
9	"	1897	..	..	1	16½	0	20	0	10	20	25	38	..	..	..	..	..	..	..	..	..	130½	13
10	McIntosh	1890	..	..	..	..	..	*17½	26	37	6½	71½	94	12	109	3	109	41½	184	50	..	..	*761	20
11	"	1893	..	..	..	4½	0	19	2½	19	16½	64	28	..	..	..	..	..	..	..	..	..	163½	13
12	Milwaukee	1895	3	6	10	5	19	25	12	50	1	56	43½	62	1	..	..	..	..	..	..	..	293½	15
13	Baxter	1889	..	..	..	..	..	..	*8	2¼	0	0	14	28½	18	55	55½	62	36	50	20	..	*349¼	21
14	Lowland Raspberry	1888	..	..	..	..	..	..	..	*14½	0	½	1¼	15½	30	18	65½	7½	74½	14	91	13½	*345¾	22
15	"	1892	..	..	..	..	..	..	..	* ¼	0	1	8½	1	9	29	11½	46½	..	..	..	..	*106¾	18
16	Langford Beauty	1897	..	..	..	1½	1½	24	3	0	17	25	61	..	..	..	..	..	..	..	..	..	133	13
17	McMahan	1888	..	..	..	..	..	..	..	*62	0	83	2	147	1½	141	40	124	11	142	2½	133	*889	22
18	"	1888	..	..	..	..	..	..	..	*25	4½	46	½	69½	43	72	96	75	52	81	78	97	*739½	22
19	Peach of Montreal	1888	..	..	..	..	..	..	..	* 1½	27¾	32	36¾	71	47	61	82	58	54	38	55	27	*590½	22
20	Canada Baldwin	1888	..	..	..	..	..	..	..	* 8	4½	10½	2¼	29	30	17	70	17	54	11	46	27	*326½	22
21	Antonovka	1888	..	..	..	..	..	..	..	* 3	0	9½	2	57	7	88	68	105	84½	84	77	112	*637	22
22	"	1888	..	..	..	..	..	..	..	* 0	2½	12½	10	47	22	67	40	69	15	110	33	87	*515	22
23	"	1888	..	..	..	..	..	..	..	* 2½	0	14	9	15	44	12½	70	0	73	2	109	0	*351	22
24	"	1897	..	..	2½	2½	18	18	33	41	55	9½	50	..	..	..	..	..	..	..	..	..	229½	13
25	Hibernal	1888	..	..	..	..	..	..	..	*19	0	74	0	60½	0	98	18	121	22	134	3	120	*669½	22
26	"	1892	..	..	..	..	..	2	4½	4	24	7	60	0	122	½	61	0	..	..	..	..	285	18
27	Charlamoff	1888	..	..	..	..	..	..	..	*20	4½	32	6½	66	6	106¼	33	81	33	103	38	97½	*626¾	22
28	"	1897	..	..	7	12½	15	40	0	88	0	73	0	..	..	..	..	..	..	..	..	..	235½	13
29	Dudley	1891	..	..	..	..	*12	4	2	6	39	39	88	68	64	48	25	27	73	..	..	..	*495	19
30	Patten	1892	..	..	..	*27	2	35	1½	71	15	84	34	92	3	138	0	95	..	..	..	..	*597½	18
31	Bethel	1890	..	..	..	..	..	½	0	0	1½	17½	8½	1	30	3	78	0	55	20½	..	..	215½	20
32	"	1895	..	..	..	..	..	¼	½	11	0	22	34	18	44	..	..	..	..	..	..	..	129¾	15
33	Anis	1888	..	..	..	..	..	..	..	8½	0	13½	8½	76	12½	86	70	83	62	119	35½	142	*716½	22
34	"	1890	..	..	..	..	..	*13	0	5	3¼	62½	10½	69	74	65	60½	92	49	135	..	..	*638¾	20
35	"	1890	..	..	..	..	..	* 1	0	6	1½	67½	16½	80	106	8	146	0	155	½	..	..	*588	20
36	Anisim	1888	..	..	..	..	..	..	..	* 0	¾	5½	4	42	37	16	88	8	110	1½	130	52	*494¾	22

* Record previous to 1898 not kept.

INDIVIDUALITY OF APPLE TREES, AS SHOWN IN THE ORCHARDS AT THE CENTRAL EXPERIMENTAL FARM.

At the Central Experimental Farm, the yield of each individual bearing tree of apples and plums has been kept since the year 1898. The yields for these thirteen seasons have given a most valuable record of the variation in yields of trees of the same variety planted at the same time and under about the same soil and cultural conditions. Of some varieties there have been but a few trees available for comparison, but the yields even from these are very suggestive.

In the following table are published the yields of only a few of the varieties from which the returns have been kept. The records of many other varieties could be given in the same way.

APPLES, WEALTHY—Planted 1896—Yield in Gallons.

Tree.	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	Total Yield 1899-1910
1	1·0	2·25	2·75	15·0	·0	17·0	1·0	15·0	·0	17·0	0·5	12·0	83·5
2	2·0	·5	2·5	12·0	·0	14·0	8·0	2·75	Dead.	.....	.....	.. ..	41·75
3	1·75	12 0	2·25	8·0	·0	6·5	7·0	Dead.	.....	.....	.....	.....	37·5
4	9·0	2·25	15·5	20·5	27·0	1·0	28·0	1·5	25·0	24·5	37·0	12·0	203·25
5	7·5	6·5	7·75	23·0	7·5	23·0	13·0	14·0	0·	14·5	4·5	10·5	131·75
6	3·25	6·5	3·5	24·0	0·	17 5	5·0	11·5	0·	9·5	·5	2 0	83·25
7	7·5	1·0	10·0	19·0	16·0	0·	19·0	0·	1·5	6·5	17·5	2·0	100 00
8	0·	8·5	·5	21·5	0·	10·0	5·0	3·5	3·5	6·0	5·5	3·0	57·0
9	0·	11·25	·25	27·5	0·	21·0	20·0	2·25	5·0	8·5	8·5	0·	104·25
10	1·0	12·25	0·	30·0	0·	17·5	8·0	1·75	10·0	4·75	21·5	2·5	109·25
11	1·25	11·25	0·	21·5	0·	31·0	10·0	18·5	0·	11·5	22·0	13·0	140·0
12	0·	7·5	0·	18·5	0·	13·5	13·5	2·5	R'ved	.....	.....	.. ...	57·5
13	4·25	6·25	4·5	20·0	2·0	20·5	19·0	1·25	3·0	4·75	6·5	4·5	96·5
14	2·5	5·5	0·5	34·0	0·5	17·0	8·0	14·0	0·5	13·0	3·0	9·0	107·5
15	0·	2·25	3·5	21·5	0·0	31·5	16·0	25·0	0·	13·5	16·0	14·5	143·75
16	3·0	2·25	4·0	22·5	8·5	16·5	23·5	1·75	14·0	12·5	13·0	4·0	125·5
17	0·	2·0	1·0	22·5	4·5	8·5	16·0	0·	7·5	1·5	23·0	7·25	93·75
	44·0	100·0	58·5	361·0	66·0	266·0	220·0	115·25	70·0	148·0	179·0	96·25	1716·0

APPLES, MCMAHAN—Planted 1888—Yield in Gallons.

Tree.	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	Total Yield 1898-1910
1	62·0	0·	83·0	2·0	147·0	1·5	141·0	40·0	124·0	11·0	142·0	2·5	133·0	889·0
2	42·0	1·0	6·0	12·5	98·0	23·0	116·0	30·0	114·0	17·0	120·0	11·0	93·0	783·5
3	32·0	29·0	49·0	18·0	55·0	63·5	56·0	108·0	9·0	84·0	12·0	121·5	2·0	639·0
4	35·0	0·	34·5	4·0	63·0	34·0	67·0	69·0	49·0	31·0	73·0	22·0	72·0	554·5
5	0·	37·5	55·0	49·0	0·	61·0	0·	98·0	0·	54·0	0·	100·0	24·0	478·5
6	25·0	4·5	46·0	0·5	69·5	43·0	72·0	96·0	75·0	52·0	81·0	78·0	97·0	739·5
7	0·5	9·5	19·5	4.0	19·0	39·5	14 0	37·0	0·	20·0	0·	63·0	0·	226·0
8	7·0	9·0	27·0	9·0	53·0	15·5	54·0	35·5	64·0	21·0	96·0	32·5	102·0	525·5

APPLES, McINTOSH—Planted 1890—Yield in Gallons.

Tree.	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	Total Yield 1898-1910
1...	17·5	26·0	37·0	6·5	71·5	94·0	12·0	109·0	3·0	109·0	41·5	184·0	50·0	761·
2...	1·0	9·5	10·5	1·0	37·5	31·0	6·0	72·0	6·0	23·0	33·0	110·0	27·0	367·5

APPLES, PATTEN—Planted 1892—Yield in Gallons.

Tree.	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	Total Yield 1898-1910
1...	27·0	2·0	35·0	1·5	71·0	15·0	84·0	34·0	92·0	3·0	138·0	0·	95·0	597·5
2...	2·0	6·0	14·0	19·0	24·0	55·5	7·5	66·0	0·	82·0	0·	88·0	1·0	365·0
3...	2·0	31·0	1·5	40·5	22·0	67·0	26·0	69·0	0·5	71·0	6·0	70·0	0·	445·5
4...	13·0	0.	6·5	0·	12·0	15·0	45·0	45·0	13·0	48·0	12·0	52·0	30·0	291·5
5...	1·0	0·	19·0	0·5	17·5	21·0	54·0	75·0	0·5	74·0	0·	68·0	0·5	331·0

PLUMS.

There was a medium to light crop of plums in 1910. There was promise of a good crop until June 4, when a frost, just as the fruit was setting, caused a large proportion of the crop to drop. New varieties of plums are being tested every year in the effort to obtain hardier and more useful ones. Seedlings from early ripening varieties of the native plum *Prunus nigra* are being raised in the effort to obtain better early plums. Early native plums bring good prices in some parts of Canada and are the only ones which can be grown successfully in other sections. The tree of the native plum does not break down as readily from snow as *Prunus Americana,* which is a great advantage. The skin of the fruit of the latter is also much thicker, as a rule, than *Prunus nigra.*

One of the most promising seedling plums that fruited this year of those originated at Ottawa is a seedling of the Caro, which is a seedling of the Wolf; a description of this follows:

DARA (Caro seedling).—Roundish to oval; large; cavity open, medium depth; suture a distinct line, very slightly depressed; apex rounded; colour, yellow, mottled and thinly washed with red; dots obscure; skin thick, moderately tender; flesh yellow, juicy; stone medium size, oval, almost free; sweet, pleasant flavour, skin acid: good quality. A good late plum.

CHERRIES.

There were practically no cherries in 1910. While there would have been a fair crop owing to the comparatively mild winter of 1909-10, when less fruit buds than usual were killed, the frost of June 4 destroyed what promise there was. The Downy-

leaved Cherry (*Prunus tomentosa*), a bush cherry described in the annual report for 1908, had a medium crop of fruit. This is hardier than the tree cherries and promises to be a very useful fruit for the colder parts of Canada. The writer saw this cherry growing at Brandon, Man., in 1910, and the seedlings under the parent bush showed that the bush had fruited there.

GRAPES.

The grape vines came through the winter well in 1910, as they usually do, and there was promise of a good crop until June 4, when the frost lessened it very much On the whole, however, there was a medium crop. Vines in this vicinity suffered more, in some cases, than those at the Experimental Farm, the crop being entirely destroyed. Where grapes have to be covered with soil in winter, as they have at Ottawa, it is important to leave them covered in the spring as late as possible without breaking off the young shoots, as spring frosts are more to be feared than winter injury. The autumn being one without killing frosts until October 13, it made a long ripening season, but, on account of the cool nights, the grapes did not ripen as quickly as they generally do and, although 97 varieties ripened, they were not of as good flavour as usual.

SMALL FRUITS.

The crops of currants and of gooseberries were medium ones in 1910, but raspberries and strawberries were light, owing to the drought in June and July and there were few blackberries, as usual. The Ruby raspberry continued to be a promising red sort. The Count and Brighton, two early red varieties originated by Dr. Wm. Saunders, are very productive. The King is proving one of the hardiest varieties in the prairie provinces. Herbert is still the best red raspberry at Ottawa, but growers who ship berries long distances find that it is not firm enough for them. No new varieties of strawberries under test were of special promise in 1910. The Paul Jones was one of the best. The following description was made of it in 1910.

Paul Jones (Imperfect).—Fruit conical; above medium size; calyx medium; external colour bright scarlet, glossy; flesh bright scarlet; seeds moderately prominent; core tender; juicy; pleasant, acid; above medium quality; season medium early; moderately firm; plant vigorous; many runners; foliage good; very little rust.

Appears productive. Is attractive in appearance.

Obtained from R. W. Johnson, Northboro, Mass., in 1909, and said to be a cross between Haverland and Brandywine.

VEGETABLES.

For the past twenty-three years, experiments with vegetables have been an important part of the work of the Horticultural Division. During that time, hundreds of varieties have been tested and many cultural experiments conducted, some of which are reported upon each year. As it is important to have early varieties of vegetables in many parts of Canada, extra early strains of some of the more important sorts are being developed by selection in order to show, if possible, how each farmer could raise and improve his own seed. Good results have already been obtained with beans, tomatoes and corn.

FARMERS' LIST OF BEST VEGETABLES.

The Faramers' List of Best Vegetables, which has been published from time to time in the annual report, has been much appreciated. This list is really a summary

of the variety tests and gives, in a comparatively small space, the names of those vegetables which are considered the best. The following list has been revised up to the autumn of 1910:—

Asparagus.—Palmetto is proving a better variety than Conover's Colossal for general planting, as it is not so subject to the disease known as Asparagus Rust. Argenteuil is also a good variety.

Beans.—Round Pod Kidney Wax and Wardwell's Kidney Wax are two of the best yellow-podded or wax bush beans, and are both early. Stringless Green Pod, Early Red Valentine and Early Refugee are three good, green-podded varieties. Refugee or Thousand to One is one of the best later sorts. Among Lima beans, the dwarf or bush forms are the most satisfactory.

Beets.—Metoer, Early Model, Electric, Egyptian and Eclipse are some of the best.

Borecole or Kale.—Dwarf Green Curled Scotch.

Brocoli.—White Cape.

Brussels Sprouts.—Improved Dwarf. The dwarf varieties have been found more satisfactory than the tall-growing ones.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Danish Ballhead and Drumhead Savoy (late), Red Dutch (red) is a good list. Houser has been found freer from disease than most. For extra early use, Paris Market is desirable, being nearly a week earlier than Early Jersey Wakefield.

Cauliflower.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required, the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow) (early), French Success, Noll's Magnificent, Perfection Heartwell, Triumph, Winter Queen are all good late varieties. London Red is a good red one.

Corn.—Malakoff, Peep O' Day (extra early), Early Fordhook, Early Cory (early), Crosby's Early, Golden Bantam, Metropolitan (second early), Perry's Hybrid, Early Evergreen and Black Mexican (medium) Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably and is of fine quality. Golden Bantam is the best second early for home use. It is of excellent quality.

Cucumbers.—Peerless White Spine or White Spine, Davis Perfect, Cool and Crisp, and Giant Pera are some of the most satisfactory. Boston Pickling and Chicago Pickling are good pickling sorts.

Egg Plant.—New York Improved and Long Double Purple succeed best.

Lettuce.—Black-seeded Simpson (early curled), Iceberg, New York, Giant Crystal Head, Crisp as Ice, and Improved Hansen (curled cabbage), Improved Salamander (uncurled cabbage). Grand Rapids is the best variety for forcing. Iceberg remains headed longest in summer. Trianon and Paris are two of the best Cos varieties.

Melons, Musk.—Long Island Beauty and Hackensack are two of the earliest and best of the Nutmeg type. Montreal Market is later, but of larger size and finer flavour. Emerald Gem and Paul Rose are two of the best yellow-fleshed melons.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early are some of the most reliable.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best and most reliable. Australian Brown is also good. Prize Taker is a good variety for transplanting.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Chili, Cardinal. The Early Neapolitan is one of the earliest of the large peppers.

Peas.—Gregory's Surprise (extra early), Thos. Laxton, Gradus, American Wonder, Nott's Excelsior, Sutton's Early Giant (early), Sutton's Excelsior, Premium Gem (second early), McLean's Advancer, Heroine and Stratagem (medium to late). The foregoing varieties, not being tall growers, may be grown without supports. Telephone and Champion of England are two of the best tall-growing sorts

Potatoes.—Early: Rochester Rose, Early Ohio (pink), Irish Cobbler, Eureka Extra Early, Early Petoskey, New Early Standard (white), Bovee (pink and white), Main crop: Carman No. 1, Gold Coin, Factor, Dalmeny Beauty, Money Maker (white).

Radishes.—Early: Scarlet White-tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red), Icicle (white), Late: White Strasburg, Long White Vienna. Winter: Long Black Spanish, Chinese Rose-coloured, New White Chinese or Celestial.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Islands.

Spinach.—Victoria, Thickleaved.

Squash.—White Bush Scalloped, Summer Crook Neck. Late: Delicious, Hubbard.

Tomatoes.—Early: Sparks' Earliana, Chalk's Early Jewel, Bonny Best, Dominion Day (scarlet). Medium: Matchless, Trophy (scarlet), Livingston's Globe, Plentiful (purplish pink).

Turnips—Early: Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

POTATOES.

Experiments with potatoes were continued in the Horticultural Division in 1910. Varieties were tested for comparison of yields, relative immunity from blight, improvement of strain, and to test the relative values of seed of the same variety grown in different parts of Canada. Spraying experiments were also conducted during the year.

The season of 1910, was not a good one for potatoes in the Ottawa district. The latter part of June and the month of July, when potatoes should be forming, was very dry and the number and size of tubers was, on this account, very much lessened, especially where seed of low vitality was used. The advantage of seed of strong vitality was very apparent in a season like 1910, as they made a quick, strong growth and the roots were well down before the drought set in.

The potatoes in the uniform test plots where 136 varieties were grown, were planted on May 17, on good, sandy loam soil where a bush fruit plantation had been the previous year. The soil was manured in the autumn of 1909, with well-rotted barnyard manure. The ground was ploughed in the spring and harrowed once with the disc and once with the smoothing harrow, shortly before planting time. The drills were opened thirty inches apart with the double mouldboard plough. Sixty-six sets

of each variety were planted. The sets were cut so that they would have at least three good eyes each, and were dropped one foot apart in the rows, and were covered with the hoe to ensure greater uniformity. The land was harrowed when the potatoes were coming up to destroy weeds and loosen the surface soil to conserve moisture. During the growing season the soil was cultivated eight times. At the last cultivation a little soil was drawn towards the plants and thus almost level cultivation was adopted. The vines were sprayed with Bordeaux mixture six times and a mixture of eight ounces of Paris green and one and one-half lbs. of Arsenate of Lead to a barrel of water was used to kill the potato beetles. The potatoes were dug on October 13 and 14. There was very little rot in the uniform test plots as these were sprayed with Bordeaux mixture. There was much rot in unsprayed plots.

TWELVE MOST PRODUCTIVE VARIETIES OF POTATOES—Average of Five Years.

Number.	Name of Variety.	Number of years under test	Season.	Colour.	Quality.	Average Yield per Acre, 1906-1910.	
						Bush.	Lbs.
1	Dalmeny Beauty	7	Medium late	White	Good	276	19
2	Carman No. 1	7	"	"	"	245	51
3	Hard to Beat	5	"	"	"	228	22
4	Gold Coin	8	"	"	"	178	38
5	Late Puritan	17	"	"	"	178	12
6	Empire State	23	"	"	"	177	19
7	Ashleaf Kidney	7	"	"	"	172	16
8	Rochester Rose	16	Early	Pink	"	171	10
9	Sharpe's Victor	6	Medium late	White		168	44
10	Dewey	6	"	"	Good	160	36
11	Early Hero	6	Early	Pink	"	153	31
12	Holborn Abundance	22	Late	White	"	153	14

THIRTY MOST PRODUCTIVE VARIETIES OF POTATOES IN UNIFORM PLOTS, 1910.

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.		Quality.	Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.		
1	Empire State	448	48	413	36	35	12	Good	White.
2	Ashleaf Kidney	443	18	434	30	8	48	"	"
3	Rochester Rose	429	..	376	12	52	48	"	Pink.
4	Prince Albert	411	24	380	36	30	48	Medium	White.
5	Carman No. 1	402	36	376	12	26	24	Good	"
6	Late Puritan	402	36	347	36	55	..	"	"
7	Dalmeny Beauty	402	36	354	12	48	24	"	"
8	Gold Coin	399	18	331	6	68	12	"	"
9	Reeve's Rose	374	..	301	24	72	36	"	Pink.
10	Queen of Thanet	347	36	310	12	37	24	"	White.
11	Moreton	342	6	291	30	50	36	"	"
12	Factor	334	24	305	48	28	36	"	"
13	Irish Cobbler	332	12	301	24	30	48	"	"
14	President Kruger	332	12	303	36	28	36	Medium	"
15	Money Maker	319	..	288	12	30	48	Good	"
16	White Wonder	319	..	292	36	26	24	"	"
17	Pink Seedling from A.D. Smith, Glendale N.S.	312	24	301	24	11	..		Pink.
18	Myatt's Ashleaf	310	12	294	48	15	24	Good	White.
19	Chapman	292	36	268	24	24	12	"	"
20	Queen of the Earth	292	36	272	48	19	48	"	"
21	Late Petoskey	288	12	244	12	44	..		"
22	Eldorado	282	48	244	12	38	36		"
23	Sutton's Superlative	266	12	248	36	17	36	Good	"
24	Seedling from P. Barrett, Truro, N.S.	257	24	226	36	30	48		
25	King's Champion	255	12	224	24	30	48	Good	"
26	Blue Seedling from A.D. Smith, Glendale, N.S.	248	36	239	48	8	48		Bluish.
27	Michigan Rose	246	24	237	36	8	48	Good	White.
28	Cottar	244	12	239	48	4	24		"
29	Planet	242	..	226	36	15	24		"
30	King of All	237	36	222	12	15	24		"

TEN MOST PRODUCTIVE VARIETIES—33 Sets Planted, 1910.

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Early Surprise from G. Bittorf, Hopeville, Ont	444	24	413	36	30	48
2	Sensation, from G. Bittorf, Hopeville, Ont	440	..	431	12	8	48
3	Seedling, from W. H. Todd, Ingersoll, Ont	418	..	409	12	8	48
4	King Seedling, from Steele & Briggs Seed Co., Toronto, Ont	378	24	330	..	48	24
5	McIntyre, from J. C. Murphy, Cape Traverse, P.E.I	369	36	352	..	17	36
6	New King, from G. Bittorf, Hopeville, Ont	365	12	338	48	26	24
7	Burpee's Extra Early, from N. J. Stephen, Bracebridge, Ont	349	48	334	24	15	24
8	Prince Albert, from H. J. O'Brien, Noel, N.S.	316	48	316	48	..	..
9	Epicure, from Chas. Scott, Elphinstone, Man	290	24	220	..	70	24
10	Seedling No. 1, from R. A. McCloskey, Dawson, Yukon	255	12	224	24	30	48

TEN MOST PRODUCTIVE VARIETIES—16 and 8 Sets Planted, 1910.

Number.	Name of Variety.	No. of Sets Planted	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Flourball, from Johnson Seed Co.	8	501	36	475	12	26	24
2	Seedling from Miss. Mary Lilley, Dollar, Ont.	16	448	48	431	12	17	36
3	Purple potato, from John Brown, West Lockaber, N.S.	8	440	..	422	24	17	36
4	Potato, from John Brown, West Lockaber, N.S.	8	422	24	404	48	17	36
5	Seedling from G. W. Queviemont, Lorraine, Ont.	16	387	12	352	..	35	12
6	Green Mountain, from Jas. Lindsay, Oxford Mills, Ont.	16	387	12	352	..	35	12
7	Vulcan, from Jas. Lindsay, Oxford Mills, Ont.	16	382	48	374	..	8	48
8	Bruce, from Jas. Lindsay, Oxford Mills, Ont.	16	369	36	334	24	35	12
9	Potato, from Miss Flora E. Hodges, Skidegate, B.C	8	352	..	334	24	17	36
10	Unknown potato, from A. C. Atkinson, Regina, Sask.	16	334	24	237	36	96	48

POTATOES—TWELVE MOST PRODUCTIVE VARIETIES WHEN NOT SPRAYED WITH BORDEAUX MIXTURE, 1908-1910.

Since 1905, those varieties which have proven productive and freest from blight when sprayed with Bordeaux mixture have been grown by themselves and have not been so sprayed. In all, fifty-three varieties have been grown in this way. A large proportion of these have been discontinued as they have not done well when unsprayed. In the following table are the names of twelve tested during the past three years, with yields. These are all medium late or late sorts and it has been noticed for several years that the potatoes freest from late blight are the later varieties. These were planted on May 17, and dug on October 19, 1910.

TWELVE VARIETIES OF POTATOES. NOT SPRAYED WITH BORDEAUX MIXTURE, 1908-1910.

Number.	Name of Variety.	Season.	Number of Years Under Test.	Shape.	Colour.	Depth of Eyes.	Quality.	Yield per Acre Sound Tubers, 1910.		Yield per Acre Diseased Tubers, 1910.		Average Yield per Acre, Three Years 1908-1910.	
								Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	King Edward	Late	5	Roundish to oval, flattened	White	Shallow	Good	195	48	4	24	245	40
2	Dalmeny Beauty	Medium late	7	Oval to roundish, flattened	"	"	"	182	36	6	36	213	48
3	Factor	"	5	" "	"	"	"	147	24	6	36	203	8
4	Hard to Beat	"	5	" "	"	"	"	96	48	..	..	202	24
5	Highlander	"	4	" "	"	"	"	129	48	6	36	188	31
6	Duchess of Cornwall	"	5	" "	"	"	"	75	54	4	24	177	50
7	White Giant	"	4	Oblong	"	Medium	"	147	24	..	..	154	44
8	Dr. Maerker	Late	12	Roundish	"	Medium to deep	Medium	92	24	13	12	154	0
9	Sirdar	Medium late	4	Roundish, flattened	"	Shallow	Good	41	48	68	12	106	20
10	Holborn Abundance	Late	22	Roundish	"	Medium to deep	Medium	107	48	4	24	101	56
11	Carman No. 1	Medium late	16	Oblong to roundish	"	Shallow to medium	Good	83	36	46	12	93	52
12	State of Maine	"	21	" "	"	Medium to shallow	"	55	0	35	12	74	4

SPRAYING POTATOES WITH BORDEAUX MIXTURE FOR THE PREVENTION OF LATE BLIGHT AND ROT.

Experiments with Bordeaux mixture for the prevention of late blight and rot were begun at the Central Experimental Farm in 1892, and from time to time since the results have been published. The value of spraying has been so well proven by the experiments conducted here and in many other parts of this and other countries that, if it were not for the large number of persons who every year grow potatoes for the first time, it would not be necessary to demonstrate the value of spraying. In 1910, rot was very bad where potatoes were not sprayed, and the following experiment shows most strikingly the value of spraying. In one plot, the potatoes were sprayed with an insecticide only, namely, Paris green in the proportion of eight ounces to forty gallons of water. Another plot was sprayed with Bordeaux mixture and Paris green on June 27, July 9, July 26 and August 11. At the last spraying, no insecticide was used. Another plot was sprayed with Soda Bordeaux (Burgundy mixture) and Paris green on the same dates, and a fourth plot with Paris green only until August 2, when Bordeaux was used for the first time. A second application of Bordeaux was given on August 11. Each plot in this experiment was one-forty-fourth of an acre in extent. The potatoes were planted on May 17, and dug on October 15.

	Yield per acre. Bush.	Lbs.
Not sprayed with Bordeaux mixture	117	20
Sprayed with Bordeaux mixture	234	40
Not sprayed wtih Bordeaux mixture until August 2	200	12
Sprayed with Soda Bordeaux (Burgundy mixture)	190	18

This experiment shows that, in years like that of 1910, it will pay well to spray even as late as August 2, but it is advised to begin spraying with Bordeaux mixture not later than July 15, and it is wiser to begin even with the first spraying for the Colorado Potato beetle, in order to protect the plants from the flea beetles, as the edges of the holes in the leaves made by these insects are places from which the Late Blight spreads, and it has been found that Bordeaux mixture prevents much injury from them.

POTATOES—CHANGE OF SEED.

The results obtained from growing potatoes from Nappan, Nova Scotia, for comparison with seed potatoes grown at Ottawa, which were published in the annual reports for 1909 and 1910, were so striking that, in 1910, seed was obtained from the Experimental Farm, Indian Head, Sask., with the remarkable results given in the table. The illustration in this report shows the great difference, in the size of the tops of the potato plants, between the Ottawa seed and the Indian Head seed. The vines from the latter seed made a quick, vigorous growth and, when the drought came in the latter part of June and through July, the roots were well down and thus able to withstand it better than those which had made slower and weaker growth. Seed potatoes from parts of the country or possibly even from particular soils where the plants grow comparatively late, have more vitality or vigour than those which have been grown where the growing season is shortened by hot weather and severe droughts which cause a drying-up of the tops and check the development of the tubers. The potatoes in this test were planted on May 17, 1910 and dug on October 13.

INDIAN HEAD, SASK., SEED VERSUS OTTAWA, ONT. SEED IN 1910.

Number.	Name of Variety.	Indian Head Seed. — Yield per Acre.		Ottawa Seed. — Yield per Acre.		Difference in favour Indian Head Seed.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Empire State	448	48	107	48	341	..
2	Ashleaf Kidney	443	18	41	48	401	30
3	Dalmeny Beauty	402	36	160	36	242	..
4	Late Puritan	402	36	39	36	363	..
5	Gold Coin	399	18	119	54	279	24
6	Reeve's Rose	374	..	118	48	255	12
7	Rochester Rose	363	..	136	24	226	36
8	Irish Cobbler	332	12	127	36	204	36
9	Money Maker	319	..	70	24	248	36
10	Carman No. 1	289	18	94	36	194	42
11	Morgan Seedling	279	24	46	12	233	12
	Average	368	30	96	42	271	48

TOMATOES—SELECTION TO DEVELOP SUPERIOR EARLY STRAINS.

Wherever possible, the farmer and market gardener should have his own tomato seed, as he should know better than anyone else what kind of tomato he should grow. Experiments are being carried on in the Horticultural Division partly for the purpose of studying the relative values of different methods of selection, and partly to demonstrate, if possible, the advantage of home-grown seed when selected in the best way.

In the year 1901, seed was saved of the earliest ripe fruit of the Sparks' Earliana tomato grown at the Central Experimental Farm. Selection from the earliest single tomato each year of all the tomatoes of this variety grown each year was continued each year until 1904, when several selections were made from the plants of that year. One selection was a single tomato from the plant giving the largest crop of early and most uniform fruit in 1904; another selection from a single tomato from the plant giving the largest crop of early fruit without regard to uniformity; another selection from a single tomato from the plant giving the largest crop of uniform fruit without regard to earliness, and a fourth selection from the first good tomato ripened in these or other plots, regardless of the individual plant from which it came. These selections have been made each year since, the seed being taken from the first good tomato ripened on the individual plant in each of the first three selections which was nearest like the kind of crop sought for by that selection. The fourth selection was made each year from the plant, wherever it might be, which gave the first ripe fruit.

The results presented in the following table show that the results from all of the selections are in the direction in which the selection was made. The largest crop of early fruit selected from individual plants each year is much greater than where the selection was made at random. The tomatoes ripened eight days earlier in the selections for earliness than in the selections for productiveness and uniformity without regard to earliness.

Improvement in uniformity has not yet been marked.

It will be noticed that the yields were much larger in 1910, than in previous years. This is very interesting. The plants were frozen to the ground on June 4, but several strong new shoots came up from the base of the plant, producing apparently the same effect as the pruning experiments recorded in the annual reports for 1904, 1905, and 1906, when plants which were pinched back in order to make laterals develop gave larger crops than those not so treated.

Experiment showing importance of change of seed. Taller plants from Indian Head seed, lower-growing plants of the same varieties from Ottawa seed.

TOMATOES—RESULTS FROM SELECTION

Selected for	No. of plants grown.	Average date of first ripe fruit.	Average yield of early ripe fruit per plant.	Average total yield of ripe fruit per plant.	Average yield of early ripe fruit per acre	Average total yield of ripe fruit per acre.	Uniformity.
1910.			Ripe to Aug. 23. lbs. oz.	lbs. oz.	Ripe to Aug. 23. lbs.	lbs.	
Most uniform and largest crop of early fruit	55	Aug. 17	0–14	27– 2·5	39·7	1232·2	100·0
Most productive and most uniform.... .	29	" 26	0– 3	21– 4·25	8·5	970 0	87·3
Largest crop of early fruit.....	25	" 18	0–15·5	21–13·	43·9	989·7	85·3
Earliest ripe fruit.....	20	" 22	0– 7	21–13·5	19·8	991·1	78·6
1909.			Ripe to Aug. 18.		Ripe to Aug. 18.		
Most uniform and largest crop of early fruit	42	Aug. 4	4-11·5	14– 3	214·1	643·7	100·0
Most productive and most uniform.....	42	" 11	1– 4	14– 8·5	56·7	659·3	87·6
Largest crop of early fruit	41	" 7	1–12·5	14– 5	80·6	649·4	93·1
Earliest ripe fruit.....	28	" 2	2– 8·5	12– 1·5	114·8	548·7	96·5
1908.			Ripe to Aug. 18.		Ripe to Aug. 18.		
Most uniform and largest crop of early fruit	40	July 27	1– 3	14– 1	53·9	638·1	100·0
Most productive and most uniform.	54	Aug. 15	0– 9·3	18– 2	26·4	822·4	80·3
Largest crop of early fruit.....	54	" 5	0–15	12–15·5	42·5	588·4	90·9
Earliest ripe fruit.....	25	" 1	1– 4·5	13– 2·8	58·1	597·8	97·8
1907.			Ripe to Aug. 16.		Ripe to Aug. 16.		
Most uniform and largest crop of early fruit	18	Aug. 13	1– 7·3	13– 4·75	66·0	603·2	100·0
Most productive and most uniform.	21	" 13	1– 6·5	12– 7·5	63·6	565·7	93·6
Largest cropof early fruit.....	24	" 12	1– 9·5	10–10·5	72·1	483·5	99·1
Earliest ripe fruit.....	1	" 6	0–11	4–11	31·2	212·7	81·8
Average for four years, 1907 to 1910.							
Most uniform and largest crop of early fruit	39	Aug. 8	2– 1	17– 3	93·6	779·8	100·0
Most productive and most uniform..	36	" 16	0–14	16– 9·5	39·7	752·9	87·2
Largest crop of early fruit.....	36	" 11	1– 5	14–15	59·5	677·7	92·1
Earliest ripe fruit.....	18	" 8	1– 4	12–15	56·7	587·0	88·6

SPRAYING EXPERIMENTS.

SPRAYING TO CONTROL OYSTER SHELL SCALE OR BARK LOUSE.

Experiments conducted in the years 1899, 1900, and 1901, by the Horticultural Division for the control of Oyster Shell Scale proved conclusively, in our judgment, that the scales could be removed by the application of lime and water. Several formulas were tried, but the following statement published in the annual report for 1901, gives the conclusions reached and the formulas recommended.

CONCLUSIONS REACHED UP TO DECEMBER, 1901.

1. Lime slacked in water and sprayed on apple trees infested with the oyster shell bark louse has the effect of loosening the scales.

2. The scales, when loosened, are removed from the trees by rain, ice, wind, and probably by other means.

3. As the scales contain the eggs from which the young insects hatch about June 1, it is necessary, in order to get the best results, that the trees be sprayed as soon as

possible after the leaves fall in autumn, so that the loosened scales may be exposed to the weather for a long time before the eggs hatch.

4. The lime appears to have no injurious effect on the eggs within the scales.

5. Lime used in various proportions in the several experiments had no apparent injurous effect on apple or peach trees. Even when the leaf buds were opening, no injury occurred.

6. As the action of the lime seems to occur soon after the trees are sprayed, it is not necessary to use any substance other than water to help bind it to the tree. On the contrary it would appear that such substances counterbalance the effect of the lime, for a time, by glueing the scales to the trees.

7. It is important to use good stone lime, which has not been air-slacked.

8. The most economical and satisfactory formula, so far, has been found to be 1 lb. lime, 1 gallon water, and 3½ ozs. salt, or, for a barrel of mixture, 40 lbs. lime, 40 gallons water, 8 lbs. salt. This should be sprayed on the tree twice, the second application being made as soon as the first is dry. The same proportions of lime and water without the salt have given quite satisfactory results also, and the salt is not necessary, but, when used, the bark of the trees was cleaner and brighter.

9. It is necessary to make at least two applications, as those scales with which the mixture does not come into contact will not be affected by it, hence it is not possible to do the work thoroughly with one spraying.

10. The bark of the trees sprayed with the lime mixture is much brighter afterwards than on trees not sprayed, and it is possible that fungus germs are destroyed.

It will be noticed that it is recommended to spray the trees in autumn in order that the loosened scales may fall from the trees before the eggs are hatched.

As lime-sulphur is now being used quite generally as a fungicide and insecticide when the trees are dormant in early spring, it seemed desirable to learn what effect it would have on the oyster shell scale, and, as the reports from its use elsewhere for this purpose were not always favourable, an additional 20 lbs. of lime was added to each barrel of commercial lime-sulphur, as recommended by Mr. Caesar, O.A.C., Guelph, Ont.

This mixture, which was sprayed on apple trees on April 15 and 22, 1910, gave very satisfactory results, trees which had a large number of scales before the application having but relatively few on January 20, 1911, when notes were taken on the results. On trees sprayed with lime and water on April 20th and 22nd, in the proportion of 1 lb. lime to 1 gallon of water, (two applications on the same day), there was no apparent decrease in the number of scales, which shows the importance of spraying with lime and water in the autumn, if that formula is to be effectual.

LIME-SULPHUR FOR GOOSEBERRY MILDEW.

For the third season, gooseberry bushes were sprayed with lime-sulphur for the control of American Gooseberry Mildew, in 1910. Twenty-two varieties were sprayed, on April 13, when the leaves were beginning to unfold, with lime-sulphur in the proportion of 1 gallon to 9 gallons of water. In most cases five bushes were sprayed and one not sprayed. As in the two previous seasons, the beneficial results from the spraying were not marked. It would seem from our experiments that, if spraying with lime-sulphur is to be effective at all, spraying in spring must be followed up by summer sprays.

EXPERIMENTS WITH INSECTICIDES FOR CONTROLLING THE COLORADO POTATO BEETLE.

The importance of applying poison to potato plants to protect them from the Colorado Potato Beetle is well known to every one who grows potatoes where this insect is troublesome. It is also well known that the larvæ or young beetles eat rapidly, hence a poison must be applied as soon as the larvae appear and this poison must be sufficiently powerful to kill and must be quick-acting. Farmers use Paris green in

much greater strength than is necessary to kill the beetle, but they desire to kill them quickly. Sometimes so much Paris green is used that it injures the leaves. Arsenate of lead, while it does not seem to kill quite as quickly as Paris green, adheres to the foliage much better, hence is especially valuable in showery weather. It has been found that a mixture of Paris green and Arsenate of lead gives good results, as shown in the following table. This gives the quick action of the Paris green with the adhesive qualities of the Arsenate of lead. Two pounds of Arsenate of lead alone to 40 gallons water are shown by this experiment not to be sufficient to kill the beetle promptly; from 2½ to 3 lbs. are necessary. It will be seen that Bordeaux mixture, applied with either Paris green or Arsenate of lead, makes these insecticides more effective. This is, no doubt, partly due to the adhesive properties of the Bordeaux, which cause the insecticides to remain longer on the plants.

Experiments with Insecticides for Controlling Colorado Potato Beetle.

Number of Plot.	Insecticide Used.	1st Spraying. Number of young beetles. June 28, 1910. Before spraying.	Results of 1st Spraying. Number of young beetles. July 4, 1910.	2nd Spraying. Number of young beetles. July 11, 1910. Before spraying.	Results of 2nd Spraying. Number of young beetles. July 13, 1910.
1	Arsenate of Lead (Vanco), 2 lbs. to 40 gallons water	Fairly numerous	Numerous	None	None
2	Arsenate of Lead (Vanco), 2 lbs. to 40 gallons Bordeaux mixture	"	Few	Fairly numerous	"
3	Arsenate of Lead (Grasselli), 2 lbs. to 40 gallons water	"	Very few	Numerous	"
4	Arsenate of Lead (Vreeland), 2 lbs. to 40 gallons water	"	"	Fairly numerous	"
5	Arsenate of Lead (Vanco), 2½ lbs. to 40 gallons water	"	"	"	"
6	Arsenate of Lead (Vanco), 2½ lbs. to 40 gallons Bordeaux mixture	"	"	Few	"
7	Arsenate of Lead (Grasselli), 2½ lbs. to 40 gallons water	"	"	"	"
8	Arsenate of Lead (Vreeland), 2½ lbs. to 40 gallons water	"	"	"	"
9	Arsenate of Lead (Vanco), 3 lbs. to 40 gallons water	"	None	"	"
10	Arsenate of Lead (Grasselli), 3 lbs. to 40 gallons water	"	"	"	"
11	Arsenate of Lead (Vreeland), 3 lbs. to 40 gallons water	"	"	"	"
12	Paris green, 8 ozs. to 40 gallons water	"	Very few	Fairly numerous	"
13	Paris green, 8 ozs. to 40 gallons Bordeaux mixture	"	"	Few	"
14	Paris green, 12 ozs. to 40 gallons water	"	None	"	"
15	Paris green, 16 ozs. to 40 gallons water	"	"	Very few	"
16	Paris green, 8 ozs., Arsenate of Lead 1½ lbs. to 40 gallons water	"	"	Few	"
17	Paris green, 8 ozs., Arsenate of Lead 1 lb. to 40 gallons water	"	"	"	"

NOTE.—Owing to the large number of young beetles alive after the first spraying, Plot 1 was sprayed a second time on July 4th, but no spray was necessary when the other plots were sprayed a second time on July 11.

FOREST BELTS.

The forest belts at the Central Experimental Farm extend along its northern and western boundaries, the belt on the western boundary being 165 feet wide, and that on the northern boundary 65 feet wide. Their total length is nearly 1¾ miles. One of the principal objects for which the forest belts were planted was to obtain information relating to the growth of the best timber trees when grown on different soils at different distances apart, in blocks of single species, and in mixed plantations, the distances chosen at first being 5 x 5 feet, 5 x 10 feet, and 10 x 10 feet apart.

The first planting was done in 1887. As the soil varied considerably in character, it has been possible to note that which seems most suited to the different species. The trees which were planted 5 x 5 feet apart, in blocks of single species, are, in most cases, making the best trees from a timber standpoint, as more of the side branches are killed in the early history of the tree. They were for a time taller, in most instances, than those 10 x 10 feet apart, but the latter are catching up and in some cases are now taller than those 5 x 5 feet apart, and are considerably greater in diameter. The trees 5 x 5 feet apart protect themselves better and there is a less proportion of broken tops at that distance. There is a further advantage in planting the trees fairly closely in that, during their first years, in order to get thrifty growth the soil should be shaded. A better distance than 5 x 5 feet would, we believe, be 4 x 4 feet. In mixed plantations, it is difficult to so arrange the trees that one kind will not overshadow the other and kill too large a number of them. In nature, the proper proportion of fast and slow-growing, shade-enduring and light-needing trees is gradually adjusted as the trees develop. Hence in artificial planting it is desirable to use very few kinds if more than one kind is used. Three quick-growing trees which shade the ground rapidly, will not destroy other kinds for a long time, and are all useful for timber, are the White Pine, Scotch Pine and Norway Spruce. The Canoe Birch, European White Birch, American Elm, and European Larch make a large amount of wood during the first twenty years and are among the most useful for fuel at this stage. They shoot up rapidly and, getting a fair supply of light, make a good trunk development. Being thin-foliaged, these trees do not quickly destroy other kinds that have not grown so rapidly, and can be removed before they do serious harm. Individual specimens of Black Locust which have done well have probably made as much wood as birch or elm, but they are so subject to borers and sucker badly and are so troublesome to get through, that, from our experience, we should not recommend them for a farmer's plantation. These quick-growing trees may be mixed with the Spruce and Pine which, because of their better ability to endure shade, will kill the side branches of the deciduous trees. Other trees, such as Hard Maple and Red Oak, which mature later, should be included in the plantation. Some White Ash should also be grown. This is a fast grower and its wood serves a very useful purpose on the farm. A few trees of White Oak and Black Walnut are desirable as these are valuable when large trees. If the trees mentioned are judiciously mixed, the farmer may have a supply of fuel and wood for timber and other purposes with little labour in the production of it. In planting, we should, from our experience, plant those which are to remain a long time, such as pines, hard maple, oak and walnut at least ten feet apart, with the others between them.

At the Central Experimental Farm, the measurements are taken of the height and diameter of some of the trees every year, the same trees being used annually in nearly every case, and the following table shows the measurements for the past four years. In most cases, the average of three trees is given, in some case, of six trees, and, in a few of less.

GROWTH OF TREES IN THE FOREST BELTS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height. 1907.		1908.		1909.		1910.		Average Diameter 4 ft. 6 in. from ground. 1910.
				Year.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Inches.
Black Walnut, Juglans nigra.	Low sandy loam..	1888	5 x 5	1 "	14	1	14	2	14	4a	14	5a	2·375
" " "	" "	1888	10 x 10	1 "	10	5	10	7	10	8	11	0	3·19
" " "	Sandy loam, small stones.....	1889	5 x 5	2 "	21	1	21	4	21	6	21	9	3·66
" " "	" "	1889	10 x 10	2 "	15	7	15	8	15	9	15	10	3·42
" " "	Clay loam.....	1888	10 x 5	1 "	21	8	21	11	22	6	23	6	3·725
Butternut, Juglans cinerea, (b)	Low sandy loam..	1889	5 x 5	1 "	11	4	11	4	11	4	11	4	2·125
" " "	" "	1888	10 x 10	1 "	11	5	11	5	11	5	11	5	2·125
Silver-leaved Maple, Acer saccharinum (b).....	Light sandy loam	1889	5 x 5	3 "	32	9	33	0	33	0	33	0	3·37
" " "	" "	1889	10 x 10	3 "	26	3	26	4	All dead.				4·25c
Canoe Birch, Betula papyrifera.....	" "	1889	5 x 5	3 "	36	3	36	6	37	7	38	6	4·37
" " "	" "	1889	10 x 10	3 "	39	1	39	6	40	2	40	10	6·12
Yellow Birch, Betula lutea...	" "	1889	5 x 5	3 "	26	7	27	6	28	7	29	9	3·25
" " ..	" "	1889	10 x 10	3 "	29	3	30	6	31	7	32	9	5·00
White Elm, Ulmus americana	Sandy loam.....	1889	5 x 5	3 "	21	6	21	6	22	1	22	4	2·71
" "	"	1889	10 x 10	3 "	25	3	25	9	27	6	28	7	5·21
Black Ash, Fraxinus sambucifolia.....	Black muck.....	1889	5 x 5	2 "	25	0	27	1	28	4	30	2	2·83
Green Ash, Fraxinus viridis..	"	1889	5 x 5	3 "	30	2	31	2	32	2	33	2	3·87
" " "	Low sandy loam..	1889	10 x 10	3 "	24	5	24	9	25	6	26	3	4·33
Red Ash, " pubescens	Black muck.....	1889	5 x 5	2 "	33	5	34	4	36	4	37	6	4·08
" " "	Light sandy loam	1889	10 x 10	2 "	26	3	27	3	28	3	29	10	4·08
White Ash, " americana	Black muck.....	1889	5 x 5	3 "	30	6	31	1	31	10	32	10	2·92
" " "	Light sandy loam	1889	10 x 10	3 "	31	8	32	5	33	1	33	9	4·33
Black Cherry, Prunus serotina	Light sandy loam and gravel.....	1889	5 x 5	3 "	26	0	26	3	26	4	26	8	3·21
" " "	" "	1889	10 x 10	3 "	36	3	37	4	38	9	39	5	5·5
Scotch Pine, Pinus sylvestris.	Sandy loam with gravel.....	1888	5 x 5	18 in.	31	0	32	0	32	11	34	3	4·46
" " "	" "	1888	10 x 10	18 in.	27	10	28	11	29	1	29	7	5·83
" " "	Low sandy loam and gravel.....	1888	5 x 5	18 in.	29	11	30	4	31	4	32	2	3·66
" " "	Low sandy loam..	1888	10 x 10	18 in.	29	0	29	10	30	6	31	4	6·04
" " "	Light sandy loam	1888	10 x 5	18 in.	33	7	34	10	36	10	38	6	9·17
" " "	Clay loam.....	1888	10 x 5	18 in.	27	6	28	4	29	2	30	0	6·83
" " "	Light sandy loam, gravel.....	1888	10 x 5	18 in.	30	0	32	0	33	8	35	3	7·67
" " "	" "	1887	3 x 3	9 in.	33	7	34	10	36	10	38	6	9·17
Austrian Pine, Pinus austriaca	Light sandy loam	1889	5 x 5	18 in.	25	1	29	4	30	8	32	0	5·37
" " "	" "	1889	10 x 10	18 in.	27	0	28	5	29	3	30	8	7·54
" " "	" "	1888	10 x 5	15 in.	26	6	28	1	29	9	31	2	6·96
" " "	Clay loam.....	1888	10 x 5	15 in.	27	3	28	4	29	3	30	7	6·53
" " "	Light sandy loam, gravel.....	1888	10 x 5	15 in	29	1	29	7	30	10	32	5	7·21
" " "	" "	1887	3 x 3	15 in.	27	5	28	7	29	10	31	2	3·87
White Spruce, Picea alba....	Light sandy loam	1889	5 x 5	15 in.	17	7	17	11	18	7	19	1	3·12
" " "	" "	1889	10 x 10	15 in.	20	3	21	0	22	0	22	10	4·81
" " "	" "	1889	5 x 5	3 ft.	23	11	24	7	25	5	26	2	5·125
" " "	" "	1889	10 x 10	3 ft.	23	1	24	0	25	0	25	11	6·00
Norway Spruce, Picea excelsa	Light sandy loam	1889	5 x 5	18 in.	25	0	26	7	28	3	30	7	3·87
" " "	" "	1889	10 x 10	18 in.	28	8	30	2	31	10	34	1	5·96
" " "	" "	1888	10 x 5	15 in.	34	10	36	7	37	2	37	10	6·75
" " "	Clay loam.....	1888	10 x 5	15 in.	36	8	38	0	38	11	40	3	7·75
American Arbor-vitæ, Thuya occidentalis.....	Low sandy loam and black muck	1889	5 x 5	18 in.	21	2	21	11	22	9	23	3	3·79
" " "	Low sandy loam..	1889	10 x 10	18 in.	19	10	20	7	21	9	22	6	3 96

GROWTH OF TREES IN THE FOREST BELTS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.—*Concluded*

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height.				Average Diameter 4 ft. 6 in. from ground.
					1907.	1908.	1909.	1910.	1910.
					Ft. In.	Ft. In.	Ft. In.	Ft. In.	Inches.
European Larch, Larix europæa	Low sandy loam	1888	5 x 5	2 ft.	34 1	34 8	35 7	36 4	4·33
" " "	" "	1888	10 x 10	2 ft.	33 4	33 10	35 1*a*	35 9*a*	5·38
White Pine, Pinus strobus	Light sandy loam and gravel	1889	5 x 5	8-10 in	32 11	33 5	34 0	34 9	4·87
" " "	" "	1889	10 x 10	8-10 in	31 1	31 9	33 1	34 4	7·54

a.—Average of two trees. *b.*—For one tree only. *c.*—Average diameter for 1908.

NOTE.—The low, wet, cold, sandy soil in which the Black Walnut and Butternut are growing appears quite unsuitable for these trees and the growth of them is very poor. A light sandy soil in which some of the White Spruce are is not very suitable for that tree, nor is the cold sandy loam where the American Elm is growing. These trees are all making more growth in other soils.

REPORT OF THE DOMINION CEREALIST.

CHARLES E. SAUNDERS, B.A., PH.D.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the eighth Annual Report of the Cereal Division.

The past season was, on the whole, unusually favourable for cereals throughout the greater part of Canada. Good progress was therefore made at most of the Branch Farms and Stations in the testing of varieties and in the propagation of such sorts as were required for seed purposes. At Ottawa, the dry weather in the early summer seriously reduced the crop on some kinds of soil; but, where the ground was naturally retentive of moisture, good yields were obtained.

The milling and baking tests of standard and of new varieties of wheat have been carried on as usual during the winter months, but on a somewhat larger scale than before. Many interesting new wheats of very high baking strength have been tested for the first time. The investigations into the effect of storage on wheat and flour have also been continued.

The transfer to the Cereal Division of the work connected with the annual distribution of samples of seed grain has very greatly increased the correspondence, which now claims a considerable part of my time.

The duties of the head of the Division have also been extended to include the inspection of all the work done with cereals at the Branch Experimental Farms and Stations. In this connection, visits were paid to Nappan, N.S., and Charlottetown, P.E.I., about the middle of August, but it was not found practicable to visit the western Farms and Stations this year.

Mr. H. Sirett, B.S.A., whose appointment as Assistant was made last summer, has rendered valuable service in the various kinds of field and office work which come within the scope of this Division.

Mr. Geo. J. Fixter, the foreman of the field work and of the distribution of seed grain, has discharged his duties in a very careful and painstaking manner.

My thanks are due, not only to my principal assistants, but also to all the members of the permanent staff of the Division, whose loyalty and interest in the work I greatly appreciate.

In the following pages, there are presented some of the most important results of the work carried on between April 1, 1910, and March 31, 1911.

I have the honour to be, sir,
Your obedient servant,
CHARLES E. SAUNDERS,
Dominion Cerealist.

MEETINGS ATTENDED.

The most important meetings attended during the year were those held in Washington, D.C., in November, when a new society, known as 'The American Society of Milling and Banking Technology' was organized. The need of some standardization of the methods employed in making milling and baking tests of wheat and flour and in the processes of chemical analysis and mechanical examination to which wheat and flour may be subjected is very great, and the objects of the new society are to devise and promulgate satisfactory methods of investigation and analysis. Hitherto each investigator has worked more or less independently, so that his results have been of comparatively little use to other workers. It is believed that, by the employment of standard methods of proved efficiency, not only will the accuracy of all such research work be increased, but the labours of every investigator will be of service to the others.

The first work undertaken by the new society was to send out six samples of wheat, grown in different parts of the United States and Canada, to each member willing to make tests of them. The results of these comparative tests will be used as a basis for the determination of the value of the various methods of procedure and of the unavoidable experimental errors involved in the work. This set of samples is being analysed and tested at this Farm by the Chemist and Cerealist.

VISITS TO BRANCH EXPERIMENTAL FARMS AND STATIONS.

In the month of August, as soon as the harvest at Ottawa was sufficiently far advanced to allow me to leave, I visited the Branch Farm at Nappan, N.S., and the Station at Charlottetown, P.E.I.

At Charlottetown, the plots of cereals were in excellent condition, and the small fields of grain were also very good. All gave promise of a large yield, which the threshing returns later fully confirmed. Considering that this was the first season for this new Station, the appearance of the fields and plots was remarkably good. About two days were spent in driving through some of the neighbouring parts of the Island to become familiar with agricultural conditions. The general character of the district was most attractive, and very good crops were seen on almost every farm.

The plots and fields at Nappan also gave every indication of large yields. Some damage was being done to a few plots by birds; but this seemed unavoidable, though much to be regretted, as it quite destroys the accuracy of the plot experiments.

CROSSING AND SELECTION OF CEREALS, ETC.

As the quantity of material now on hand which has been produced from the crosses accomplished during the past few years is so large as to be almost unmanageable, no new crosses in cereals were made last season. Some work was done with flax, however, using as parents the selected strains which are now being grown at Ottawa, and of which the oil-content has been determined. Aside from the scientific interest, the objects of immediate practical importance in view are to combine as far as possible in one variety a large yield and a high oil-content with such height of plant as may be most desirable. Most of the work undertaken is with a view to the production of flax seed rather than of fibre, but the latter feature is not being overlooked.

Attention is given every year to the selection of cereals not only as part of the necessary procedure to fix the various types produced by cross-breeding, but also in order to obtain improved strains of commercial sorts. The method employed is that of propagating a series of separate strains each starting with a single mother plant. The best strain is chosen after several years' study. This method, which the Cerealist

has persistently advocated for some years, is now recognized almost universally as being the best, and the older methods, which involve continuous selection through a series of years, are rapidly becoming obsolete.

DISTRIBUTION OF SAMPLES OF SEED GRAIN AND POTATOES.

The annual distribution of seed grain and potatoes, which has hitherto been under the immediate charge of the Director, has been transferred to the Cereal Division.

Certain changes in details have been made at the same time. In order that duplication may be avoided, it has been arranged that, in future, the regular distribution of samples of spring wheat, oats, barley, peas and Indian corn will be carried on from the Central Farm only, while potatoes are to be sent out from all of the principal Farms, the Central Farm supplying only the provinces of Ontario and Quebec. For this year, however, the new plans could not be fully carried out as the Branch Farms had not, in all cases, a sufficient stock of potatoes to enable them to meet the demand for samples.

It is intended that the surplus grain at the Branch Farms shall be sold for seed purposes, in quantities of (usually) two to five bushels to each purchaser.

The samples sent out free by mail are of the following weights, 5 lbs. of wheat and barley, 4 lbs. of oats and 3 lbs. of peas, Indian corn and potatoes.

Applicants writing for a sample are expected to give particulars in regard to the soil on their farm and the varieties which they have already tested, so that a suitable kind may be sent. Only one sample can be sent to one farm.

It is imperative that the crop raised from the sample should be threshed by hand unless a very small threshing machine, which can be thoroughly cleaned, is available. Such hand threshing may involve some care and labour, but the distribution is not expected to be of benefit to farmers who are unwilling to take any trouble to propagate their grain in pure condition.

Though the distribution is not quite finished at the time of writing this report, the figures published will be revised before the report is printed so as to include the whole of the samples sent out. In this way it will be possible to publish in the present report the details in regard to the distribution carried on during the winter and spring months of 1910-11; which would otherwise not be made public until the issue of the next report a year later.

The seed grain distributed this winter was grown chiefly at Indian Head, Sask., and Brandon, Man., last season. Some of the potatoes and a small amount of the seed grain were grown at Ottawa.

The following table gives the weight per bushel and the percentage of vitality of the most important lots of seed distributed, also the farm where grown and the yield per acre on the field from which the seed was obtained.

The determinations of the vitality were made before the grain was cleaned for distribution. In most instances, the seed as distributed would show a higher percentage of germination than that given in the table.

VITALITY AND WEIGHT PER BUSHEL OF GRAIN DISTRIBUTED.

Variety.	Where and When Grown	Yield per Acre.		Weight per Measured Bushel.	Germination.
		Bush.	Lbs.	Lbs.	Per cent.
Wheat—					
Bobs	Indian Head, 1910	36	9	63	91
Early Red Fife	"	42	42	63	81
Early Red Fife	Brandon, 1910	27	..	60	97
Huron Selected	Indian Head, 1910	33	11	63	94
Marquis	"	*48	24	65	95
Preston H	"	41	11	62·5	95
Red Fife II	"	*35	19	63	95
Stanley A	"	39	42	62	92
White Fife	Brandon, 1910	31	36	62·5	100
Oats—					
Abundance	Indian Head, 1910	91	13	41·7	82
Banner	"	*85	8	39·5	92
Banner	Brandon, 1910	33	26	39·5	96
Danish Island	Indian Head, 1910	69	16	37	94
Improved Ligowo	"	60	31	41·5	92
Wide Awake	"	88	30	42	92
Barley—					
Manchurian	"	54	24	52	94
Mensury	"	67	32	51·7	98
Peas—					
Arthur Selected	"	*33	3	64	88
Golden Vine	"	*34	27	65·3	98

*Average of two fields.

SUMMARY OF DISTRIBUTION OF SAMPLES FROM CENTRAL EXPERIMENTAL FARM.

Name.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Oats	208	635	530	4,231	1,150	475	1,202	883	96
Barley	48	239	97	1,618	308	185	489	330	37
Wheat	163	464	505	3,228	403	878	3,618	1,584	81
Peas	8	170	168	732	170	130	403	305	69
Indian Corn	7	73	54	595	251	82	135	97	24
Potatoes	1	627	370	1,754	1,494	823	1,945	34	10
Total	435	2,208	1,724	12,158	3,776	2,573	7,792	3,233	317

Total number of samples distributed, 34,216.

Total number of packages of each sort distributed:—

Oats	9,410
Barley	3,351
Wheat	10,924
Peas	2,155
Indian corn	1,318
Potatoes	7,058
Total	34,216

The samples of potatoes for Prince Edward Island, Alberta and British Columbia, were sent out almost entirely from the Branch Farms or Stations in those provinces. Part of the distribution for Nova Scotia, New Brunswick, Manitoba and Saskatchewan was carried on from the Experimental Farms at Nappan, Brandon and Indian Head. The above figures include only the samples sent out from Ottawa.

The following shows the number of packages of the different varieties which have been sent from the Central Experimental Farm.

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
Oats—		Peas—	
Banner	4,424	Golden Vine	1,509
Wide Awake	1,292	Archer	401
Improved Ligowo	1,180	Arthur	170
Abundance	987	Daniel O'Rourke	75
Danish Island	803		
Thousand Dollar	698	Total	2,155
Daubeney	26		
Total	9,410	Indian Corn—	
		Compton's Early	447
Barley (six-row)—		Longfellow	385
Mensury	2,601	Angel of Midnight	328
Manchurian	398	White Cap Yellow Dent	113
Barley (two-row)—		Selected Leaming	33
Standwell	195	Early Mastodon	12
Invincible	154	Total	1,318
Total	3,351		
		Potatoes—	
Spring Wheat—		Gold Coin	3.391
Marquis	3,894	Rochester Rose	1,849
Red Fife	3,131	Empire State	1,187
Early Red Fife	997	Queen of Hebron	154
White Fife	838	Canadian Standard	154
Preston	728	Irish Cobbler	151
Stanley	564	Money Maker	103
Huron	388	Carman No. 1	69
Bobs	356	Total	7,058
Bishop	19		
Pringle's Champlain	9		
Total	10,924		

The number of samples of each variety distributed does not always give a correct idea as to the demand; because it occasionally happens that the supply of those sorts which are most sought after is exhausted before all the applications which have been received within the prescribed time limit have been filled.

MILLING AND BAKING TESTS.

An unusually lengthy series of milling and baking tests was carried on during the past winter. The tests included many in connection with the problems of storage of wheat and flour. Some samples of wheat grown in various sections of the United States and Canada were also examined in connection with the investigations into milling and baking methods instituted by the new Society of Milling and Baking Technology. The principal work, however, was the testing of over a hundred new cross-bred varieties of spring wheat produced at Ottawa. Among these sorts were found many of good baking strength and a few which surpassed Red Fife in this respect. Most of these are early-ripening varieties of hard, red wheat suitable for the Northwest provinces, where they will no doubt prove of great value.

For several years past, the investigations carried on in this Division in regard to problems associated with milling and baking have been mentioned only in an incomplete manner in the annual reports. It is expected that a bulletin covering these experiments will be issued before long. No attempt will, therefore, be made in this report to give a full account of the year's work in these directions.

SMALL PLOTS OF CEREALS.

In addition to the numerous small plots of cereals of cross-bred origin which are not yet fixed in character, there were grown at Ottawa last year in plots of less than one-sixtieth of an acre.

15 selected strains from named varieties of spring wheat.
186 new cross-bred varieties of spring wheat.
6 selected strains from named varieties of oats.
7 new cross-bred varieties of oats.
5 selected strains from named varieties of barley.
68 new cross-bred varieties of barley.
24 new cross-bred varieties of peas.
6 selected strains from commercial sorts of flax.

Making a total of 32 selected strains and 285 new cross-bred varieties.

The annexed plate is from a photograph taken in July, 1910, and shows in the foreground some of the small plots of cereals, and in the distance some of the sixtieth-acre plots of spring wheat.

UNIFORM TEST PLOTS OF CEREALS, ETC.

The regular test plots of grain at Ottawa are one-sixtieth of an acre each in extent, and those of field roots one-hundredth of an acre each.

The number of these test plots during the past season was as follows: Spring wheat, including the durum varieties, 102; winter wheat, 13; emmer and spelt, 16; oats, 62; six-row barley, 58; two-row barley, 39; peas, 28; spring rye, 2; winter rye, 3; field beans, 7; flax, 14; turnips, (Swedes), 20; mangels, 16; carrots, 20; sugar beets 6; Indian corn, 30; making a total of 426 plots and representing about 350 varieties and selected strains.

As compared with the previous year, the list shows a large increase in most of the grains. This is due to the introduction into the regular plots of many new, cross-bred sorts produced from the cross-fertilizing done by the Cerealist in the year 1903.

WEATHER.

The spring of 1910 opened very early, and an unusually good opportunity was afforded for sowing cereals. The sowing of the wheat plots was begun on April 13. The weather remained cool for several weeks and frost did some damage to beans and potatoes at the end of May. For cereals, however, conditions were very good until a period of rather severe drought occurred in the early summer. This did not seriously affect those plots which were situated on the best land; but on those portions of the fields where the soil was easily dried out, the crop was very greatly reduced. The later part of the season was of about a normal character.

SPRING WHEAT.

EARLY-RIPENING VARIETIES.

The most important early-ripening varieties of wheat recently introduced are Marquis and Early Red Fife. Both are beardless sorts similar to Red Fife, but ripening earlier. The kernels of Early Red Fife are indistinguishable from the ordinary Red Fife, but the kernels of Marquis are somewhat shorter and of a slightly deeper colour as a rule. Both are hard wheats, giving flour of first-class strength and colour for bread-making.

These two wheats have now been tested at various points, and while it is yet too soon to draw a final conclusion as to their relative merits, it may be said that the general opinion favours Marquis. This wheat is proving extraordinary successful in the prairie provinces. Early Red Fife has also done very well, but it appears to be rather more subject to rust than Marquis. Further experience will be needed before this point can be considered as definitely settled, but, in the meantime, Marquis can be recommended as the best early-ripening spring wheat at present available for Manitoba, Saskatchewan and Alberta.

In the eastern and western provinces, these two varieties can scarcely be said to have proved of remarkable value. Additional trials are necessary. Such sorts as Preston and Huron, though somewhat inferior in baking strength, have given excellent returns, and the advantage of Marquis and Early Red Fife from a baker's point of view counts for comparatively little in the older provinces where many farmers still continue to grow White Russian and Colorado, both very poor wheats for bread making, the latter being indeed one of the poorest sorts in cultivation.

Marquis wheat has attracted a good deal of attention outside of Canada and in response to requests received, samples have been sent for test to the United States, Great Britain, Austria, South Africa and elsewhere.

TEST OF VARIETIES AT OTTAWA.

The regular test plots of spring wheat were sown on April 13 and 14, the seed being used at the rate of about one and one-half bushels to the acre. The durum varieties were sown separately on April 22, using about one and three-quarter bushels of seed per acre. It has been thought best to include these varieties in the table with the ordinary sorts of spring wheat, so that the relative yields of the different kinds may be more readily seen.

The following table includes only the most important plots. The varieties mentioned without names are new cross-bred sorts, produced by the Dominion Cerealist, which are not yet ready for distribution. Those varieties which have a letter after the name are new strains propagated from single selected plants.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

The character of the straw is indicated by marks on a scale of ten points, according to the proportion of the plot standing erect at harvest time.

* Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inch.		Inches.	Lbs.	Bu. Lbs.	Lbs.
1	Early Russian*	Apr. 13.	July 23..	101	44	7	3½	3,060	51 ..	64·0
2	197 C	" 14.	" 22..	99	37	10	3	2,970	49 30	63·3
3	422 B	" 14.	" 24..	101	38	10	3	2,940	49 ..	63·0
4	234 B	" 14.	" 24..	101	45	10	3½	2,880	48 ..	62·8
5	341 A	" 14.	" 21..	98	40	10	2¾	2,850	47 30	63·5
6	Chelsea*	" 13.	" 23..	101	44	8	3½	2,790	46 50	62·0
7	427 B	" 14.	" 29..	106	50	9	4	2,790	46 30	64·2
8	Hungarian White B*	" 13.	" 24.	102	35	10	3	2,730	45 30	63·5
9	362 C. 3	" 14.	" 22..	99	42	6	2½	2,730	45 30	62·0
10	Hungarian White D*	" 13.	" 24..	102	35	10	3	2,670	44 30	64·0
11	354 C	" 14.	" 20..	97	38	10	3	2,670	44 30	63·7
12	364 C	" 14.	" 21..	98	38	9	3¼	2,610	43 30	63·0
13	410 B	" 14.	" 20..	97	42	6	3	2,610	43 30	63·2
14	Stanley A*	" 13.	" 25..	103	37	10	3½	2,580	43 ..	61·0
15	397 D	" 14.	" 22..	99	42	9	3	2,580	43 ..	64·0
16	351 A	" 14.	" 19..	96	38	10	3¼	2,550	42 30	63·0
17	Goose (Durum)	" 22.	Aug. 4..	104	47	5	2¾	2,550	42 30	64·0
18	334 C	" 14.	July 22..	99	38	10	3¼	2,520	42 ..	65·0
19	378 A	" 14.	" 22..	99	38	10	3½	2,520	42 ..	62·5
20	199 B	" 14.	" 20..	97	41	10	3	2,490	41 30	64·5
21	201 D	" 14.	" 22..	99	40	10	3¼	2,460	41 ..	63·2
22	363 C	" 14.	" 24..	101	43	9	3	2,460	41 ..	63·5
23	Huron Selected*	" 13.	" 24 .	102	36	10	3	2,430	40 30	63·5
24	195 F	" 14.	" 20..	97	35	10	2½	2,430	40 30	65·0
25	363 D	" 14.	" 15..	92	36	10	3	2,430	40 30	62·5
26	363 E. 1	" 14.	" 19..	96	35	10	3	2,430	40 30	63·0
27	Roumanian (Durum)	" 22.	Aug. 4..	104	50	5	2¾	2,400	40 ..	65·0
28	Pringle's Champlain C.*	" 13.	July 24..	102	42	10	3¼	2,400	40 ..	62·7
29	Prospect*	" 13.	" 23..	101	42	9	3½	2,400	40 ..	62·0
30	86 D 2.	" 14.	" 24..	101	35	10	2½	2,400	40 ..	64·0
31	177 A	" 14.	" 15..	92	40	10	3¼	2,400	40 ..	62·0
32	222 B	" 14.	" 19..	96	41	9	2¾	2,400	40 ..	63·5
33	Yellow Cross*	" 13.	" 20 .	98	37	10	2¾	2,370	39 30	65·0
34	106 B	" 14.	" 19..	96	36	10	3	2,370	39 30	64·0
35	446 H	" 14.	" 30..	107	48	5	3¾	2,370	39 30	64·2
36	Preston H.*	" 13.	" 24..	102	42	10	3¾	2,340	39 ..	61·0
37	74 B.	Apr. 13.	July 24..	102	40	10	3	2,340	39 ..	63·5
38	226 B	" 14.	" 24..	101	42	10	3½	2,340	39 ..	62·5
39	362 A	" 14.	" 29 .	106	44	10	3½	2,340	39 ..	64·0
40	372 A	" 14.	" 23..	100	43	10	4	2,340	39 ..	60·0
41	444 A	" 14.	" 24..	101	41	6	3	2,310	38 30	64·0
42	Kubanka (Durum)	" 22.	Aug. 4..	104	50	7	2½	2,310	38 30	64·0
43	Outlook*	" 13.	July 27..	105	40	10	4	2,280	38 ..	63·0
44	Yellow Queen*	" 13.	" 22..	100	36	10	3	2,280	38 ..	64·3
45	Bobs	" 13.	" 23..	101	40	8	3½	2,220	37 ..	64·5
46	6 F 2	" 13.	" 28..	106	36	10	4½	2,220	37 ..	63·0
47	107 A	" 14.	" 22..	99	42	10	3½	2,220	37 ..	63·5
48	128 B	" 14.	" 25..	102	44	10	3	2,220	37 ..	62·0
49	Early Red Fife*	" 13.	" 28..	106	40	10	4	2,190	36 30	64·0
50	129 D	" 14.	" 25..	102	44	10	3	2,190	36 30	64·0
51	319 B.	" 14.	" 15..	92	38	10	3	2,190	36 30	63·3
52	168 B	" 14.	" 29..	106	51	9	4	2,160	36 ..	63·6
53	Alpha Selected*	" 13.	" 25..	103	39	10	3¼	2,130	35 30	62·0
54	86 B	" 14.	" 19..	96	35	10	3	2,130	35 30	64·0
55	109 B	" 14.	" 22..	99	42	9	3½	2,100	35 ..	65·0
56	265 B.	" 14.	" 25..	102	38	10	3½	2,100	35 ..	63·0
57	Red Fife H*	" 13.	" 29..	107	35	10	3¼	2,070	34 30	63·5
58	Gatineau*	" 13.	" 29..	107	44	9	3¾	2,010	33 30	62·6
59	White Fife C*	" 13.	" 29..	107	35	10	3½	2,010	33 30	63·5
60	9 G.	" 13.	" 27..	105	40	10	2½	2,010	33 30	62·1
61	135 B	" 14.	" 15..	92	41	10	2	2,010	33 30	64·9
62	Downy Riga*	" 13.	" 18..	96	46	10	3	1,980	33 ..	63·0
63	83 E	" 13.	" 19..	97	35	10	3	1,980	33 ..	63·7
64	113 B	" 14.	" 19..	96	42	10	2½	1,950	32 30	63·7

SPRING WHEAT—Test of Varieties.—*Concluded.*

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre	Yield of Grain per Acre	Weight per measured bushel after cleaning.
					Inch.		Inches.	Lbs.	Bu. Lbs.	Lbs.
65	Red Fife M*..	Apr. 13.	July 29..	107	35	10	3¼	1,920	32 ..	63·0
66	7 J 4	" 13.	" 29..	107	42	10	3¼	1,890	31 30	62·0
67	Aurora*....	" 13.	" 15..	93	38	8	3	1,860	31 ..	61·0
68	7 E 3.....	" 13.	" 28..	106	40	10	3¼	1,800	30 ..	61·0
69	Bishop*.....	" 13.	" 23..	101	38	10	3	1,680	28 ..	63·5
70	Marquis*.....	" 13.	" 26..	104	37	10	3½	1,620	27 ..	63·0
71	Red Fern C*.....	" 13.	Aug. 4..	113	37	10	4	1,290	21 30	62·0
72	Red Fern B*.....	" 13.	" 4..	113	37	10	4	1,080	18 ..	62·5

The average yield of the 72 plots was 2,310 lbs. (38 bushels 30 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF SPRING WHEAT.

Among the ordinary sorts of spring wheat, the following varieties have shown unusual productiveness for a series of years at Ottawa: Preston, Huron, Pringle's Champlain and Bishop. The first three are hard, red wheats with bearded heads. Bishop is a beardless, early, white wheat, not usually soft in character. These four varieties are good for flour production though the flour is not in the first rank for strength and colour.

Somewhat lower in yield but superior in the strength of their flour are Red Fife, Marquis and White Fife, all beardless.

In the prairie provinces, Marquis stands very high for yield and should be used to replace the other early-maturing varieties as far as possible, on account of its greater value for export.

The durum wheats, which, owing to their peculiar character and their unpopularity with millers, should only be grown for special purposes, give good yields at Ottawa, but are especially productive in rather dry climates, where they usually produce larger crops than the ordinary types of spring wheat.

EARLIEST VARIETIES OF SPRING WHEAT.

Some very early kinds of spring wheat have been grown on this Farm for several years past but are not being distributed or recommended for general cultivation. Farmers applying for very early sorts should remember that extreme earliness is frequently associated with a rather small yield, short straw, liability to rust or some other defect to which the more vigorous wheats are less subject. Many new varieties of cross-bred origin are now under trial at Ottawa and the Branch Farms, and it is expected that one or two very early sorts of particular merit will be available for distribution in about two years.

The earliest wheats which are at present included in the regular distribution of seed grain from this Farm are Marquis and Stanley (beardless and having red kernels). Bobs and Bishop are early beardless sorts which are not generally distributed because the pale colour of their bran would cause them to be graded below their actual value in the Manitoba Inspection Division. Where this objection does not apply, they are well worthy of test. The six varieties here mentioned are all earlier in ripening than Red Fife or White Fife.

WINTER WHEAT.

The plots of winter wheat were sown on August 31, 1909, the seed being used at the rate of about one and three-quarter bushels to the acre. The soil selected for these plots was of a light and rather sandy character as it is found necessary, in the climate of Ottawa, to sow winter wheat only on land where water cannot lie in spring or during any thaw in the winter months. The wheat made good growth in the autumn, stood the winter well, and gave a large yield.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

WINTER WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Turkey Red No. 380....	Aug. 31	July 15	318	53	3	2¼	3,270	54	30	62·5
2	Buda Pesth.....	" 31	" 14	317	58	10	3	3,210	53	30	63·5
3	Jones' Winter Fife.....	" 31	" 14	317	56	10	3¾	3,120	52	..	62·5
4	Dawson's Golden Chaff.	" 31	" 14	317	52	10	3½	3,090	51	30	62·
5	Early Red Clawson.....	" 31	" 14	317	57	9	3½	3,060	51	..	61·
6	Imperial Amber..	" 31	" 14	317	58	10	3½	3,060	51	..	63·
7	Red Velvet Chaff	" 31	" 14	317	59	10	3½	3,030	50	30	64·
8	American Banner.....	" 31	" 14	317	52	10	3¼	2,910	49	..	62·
9	Egyptian Amber.....	" 31	" 16	319	53	9	3¾	2,820	47	..	64·
10	Tasmauia Red.....	" 31	" 16	319	59	8	3¼	2,790	46	30	64·

The average yield of the ten plots was 3,039 lbs. (50 bush. 39 lbs.) per acre.

RECOMMENDED VARIETIES OF WINTER WHEAT.

The climate of Ottawa being rather too severe for the regular production of good crops of winter wheat, the average yields obtained here would scarcely serve as a satisfactory guide for farmers in southern Ontario. Some recommendations in regard to varieties of winter wheat may, however, be given.

One of the best varieties in the field is Dawson's Golden Chaff (beardless). It has the disadvantage, however, of giving flour which is low in baking strength and therefore suitable for crackers, cakes, etc., but not for light bread. The gluten content of this variety is not high enough to make it quite satisfactory for the production of rolled wheat and other similar cereal products, though it is used for these purposes.

Turkey Red (bearded) yields the strongest flour, but does not as a rule give, in Ontario, as large a yield of grain per acre as some of the other sorts.

Egyptian Amber (bearded) and Tasmania Red (bearded) give good yields of grain and produce very good flour for bread making.

Imperial Amber (bearded) is another variety which can also be recommended both for its high yield and the very fair strength of its flour.

EMMER AND SPELT.

The plots of Emmer and Spelt were sown on May 13, the seed being used at the rate of about one hundred and twenty pounds (or four bushels by measure) to the acre. The soil was a loam of medium character.

Common Emmer (often incorrectly called 'Speltz') is one of the best varieties, being less coarse and containing a larger proportion of kernel than most of the other sorts.

The varieties without names are new cross-bred sorts produced by the Dominion Cerealist.

EMMER AND SPELT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					Inches.		Inches.	Lbs.	Lbs.
1	Smooth Spelt	April 22	Aug. 8	108	45	10	5	2,820	31
2	White Spelt	" 22	" 8	108	45	10	5	2,550	30
3	Common Emmer	" 22	" 2	102	35	8	2¼	2,520	41
4	44 G	" 13	July 25	103	47	10	2	2,220	45·5
5	45 E	" 13	" 23	101	35	10	2	2,100	41.3
6	43 F	" 13	" 29	107	40	7	2¼	2,070	36·5
7	44 A	" 13	" 29	107	40	5	3½	2,070	39
8	44 D	" 13	" 29	107	46	5	2¼	2,070	42·5
9	Double Emmer	" 22	" 31	100	34	6	2	2,070	31·3
10	Red Emmer	" 22	Aug. 7	107	42	10	3	2,040	37·5
11	44 F	" 13	July 28	106	40	9	2	1,980	50
12	9 K 2	" 22	" 28	97	30	10	2	1,980	35
13	9 J 3	" 22	Aug. 1	101	40	9	3½	1,890	37
14	43 E	" 13	July 28	106	38	10	2¼	1,830	36
15	55 C	" 13	" 22	100	36	10	2	1,740	43·3
16	Red Spelt	" 22	Aug. 9	109	40	10	4½	1,410	30

The average yield of the sixteen plots was 2,085 lbs. per acre.

OATS.

Alpine, Early Blonde and Swedish Black are new varieties received from Prof. G. Martinet, Director of the Botanical Station at Lausanne, Switzerland. They are early-ripening sorts of considerable interest.

The varieties under numbers are new cross-bred kinds produced at Ottawa. All of them have the Chinese Naked oat as one parent and have inherited from that variety the peculiarity of threshing out free from hull.

The oat plots were sown April 27 to 29, the seed being used at the rate of about two bushels per acre for most varieties, but in greater quantities whenever the oats were of unusually large size.

The yield per acre is expressed in pounds and also in 'bushels' of thirty-four pounds.

* Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	American Beauty C*	April 27	July 29	93	35	10	7¼	2,760	81	6	35
2	Tartar King	" 28	" 25	88	40	10	8	2,760	81	6	33
3	Banner B*	" 27	" 29	93	38	10	8	2,670	78	18	32
4	Gold Rain (yellow)	" 28	" 28	91	41	10	7½	2,550	75	..	37
5	Swedish Select	" 28	" 28	91	40	10	8	2,550	75	..	35
6	Abundance A*	" 27	" 28	92	38	10	7	2,520	74	4	37·5
7	Danish Island	" 27	Aug. 1	96	35	10	7½	2,460	72	12	34
8	Swedish Ligowo	" 28	July 27	90	40	10	7½	2,460	72	12	37·8
9	Thousand Dollar	" 28	" 28	91	42	10	7½	2,460	72	12	36
10	American Beauty B*	" 27	" 29	93	35	10	7¼	2,430	71	16	35
11	Improved American	" 28	Aug. 1	95	43	10	8	2,430	71	16	33
12	Abundance D*	" 27	July 28	92	38	10	7	2,400	70	20	36·5
13	Irish Victor	" 28	Aug. 1	95	44	10	8½	2,400	70	20	34
14	Bergs (black)	" 27	July 27	91	38	10	7½	2,340	68	28	34
15	Victory	" 28	Aug. 2	96	46	8	7½	2,340	68	28	30·6
16	Excelsior	" 28	July 27	90	36	10	7½	2,310	67	32	34
17	Black Mesdag	" 27	" 24	85	41	10	8	2,280	67	2	35
18	Lincoln	" 28	Aug. 2	96	48	8	8¼	2,280	67	2	31·5
19	Sixty Day White*	" 28	July 15	78	33	10	5	2,280	67	2	33
20	Twentieth Century	" 28	Aug. 1	95	44	8	7	2,280	67	2	34·2
21	Abundance C*	" 27	July 25	89	32	10	7	2,220	65	10	35
22	Abundance, Garton's 'Regenerated'	" 27	" 27	91	38	10	7	2,220	65	10	37
23	Improved Ligowo	" 28	" 31	94	44	9	7½	2,220	65	10	36
24	Daubeney Selected*	" 27	" 18	82	30	10	5½	2,190	64	14	35·8
25	Alpine	" 27	" 22	86	42	10	7½	2,160	63	18	34·5
26	Wide Awake	" 28	" 29	92	40	10	8	2,160	63	18	35·2
27	Siberian	" 29	" 31	94	38	10	8	2,100	61	26	33·5
28	White Giant Selected*	" 28	Aug. 1	95	44	8	8½	2,100	61	26	30
29	Early Ripe E*	" 28	July 17	80	33	10	5	2,040	60	..	35·5
30	Early Ripe F*	" 28	" 15	78	33	10	5	2,040	60	..	32
31	Swedish Black	" 28	" 25	88	40	10	7½	2,040	60	..	34
32	Pioneer (black)	" 28	" 25	88	35	10	7¼	2,010	59	4	35·8
33	White Wonder	" 28	" 19	82	36	10	8	1,980	58	8	42·5
34	Virginia White	" 28	" 31	94	46	7	8¼	1,950	57	12	32
35	Early Ripe G*	" 28	" 15	78	33	10	5	1,890	55	20	31
36	477 D	" 29	" 28	90	40	8	6	1,860	54	24	42·3
37	479 N	" 29	Aug. 2	95	45	5	7½	1,800	52	32	45
38	Early Blonde	" 28	July 28	91	40	10	8	1,770	52	2	33
39	477 T	" 29	Aug. 1	94	38	5	7½	1,740	51	6	46
40	479 P	" 29	" 2	95	43	5	7½	1,680	49	14	38·7
41	479 Q	" 28	" 3	96	46	3	8	1,650	48	18	42
42	480 A	" 29	July 30	92	42	5	6½	1,650	48	18	46·8
43	479 B	" 29	Aug. 3	96	40	7	7¼	1,620	47	22	43
44	477 G	" 29	July 30	92	40	5	8	1,590	46	26	45·5
45	479 D	" 29	" 27	89	38	5	6	1,590	46	26	49
46	477 Q	" 29	Aug. 7	100	42	6	7	1,560	45	30	43
47	479 A	" 29	" 2	95	40	5	7¼	1,350	39	24	44·5
48	480 J	" 29	July 28	90	38	5	6½	1,290	37	32	48
49	480 L	" 29	" 28	90	38	9	7	1,290	37	32	47·5
50	477 H	" 29	Aug. 7	100	40	3	7	1,080	31	26	40

The average yield of the fifty plots was 2,072 lbs. (60 bush. 32 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF OATS.

Among the most productive kinds of oats, the following white varieties deserve special mention: Thousand Dollar, Twentieth Century, Improved American, Banner, Garton's Abundance and Danish Island. One or more of these kinds can be obtained from any good seedsman. Gold Rain is a very productive yellow oat. Among black oats, the English varieties, Pioneer and Excelsior, have given the best returns on the Central Farm during the past few years, but they have not proved so productive as the best white kinds.

EARLIEST VARIETIES OF OATS.

The varieties called Sixty Day and Early Ripe are extremely early in ripening, but cannot be recommended for general purposes, though they may be useful in certain special cases.

Somewhat less early, but probably more satisfactory as a rule, are Daubeney and Tartar King. These oats are obtainable in commerce, but farmers will usually find some of the later varieties more productive.

SIX-ROW BARLEY.

The plots were sown on April 22 to 27, the seed being used at the rate of about two bushels to the acre. The land on which it was necessary to place the plots varied so much in character, within short distances, that the yields given in the following table have not much significance.

The variety known as O.A.C. No. 21 is a selected strain produced by Prof. C. A. Zavitz, of Guelph, Ontario, from Mandscheuri barley.

Early Indian is a selected strain from a very early barley grown at high elevations in northern India.

The yield per acre is expressed in pounds, and also in 'bushels' of forty-eight pounds.

The varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist. Many of them are hulless, as may be seen from their high weight per bushel.

* Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Odessa C*	April 22	July 16	85	36	8	3	3,780	78	36	47
2	Alber *	" 22	" 16	85	40	9	3	3,720	77	24	46·5
3	Mandscheuri	" 22	" 19	88	42	4	3	3,720	77	24	47
4	Mensury	" 22	" 16	85	40	5	2¾	3,720	77	24	46·3
5	Black Japan	" 22	" 18	87	34	10	2¼	3,660	76	12	48·2
6	Taganrog A*	" 22	" 19	88	32	6	2½	3,630	75	30	47
7	Manchurian H*	" 22	" 16	85	38	8	3¼	3,540	73	36	47
8	Oderbruch	" 22	" 18	87	37	10	3¼	3,420	71	12	49
9	O.A.C. No. 21	" 22	" 16	85	40	9	2½	3,390	70	30	47·1
10	Manchurian G*	" 22	" 16	85	38	10	3¼	3,360	70	..	48
11	Escourgeon	" 22	" 19	88	37	9	3	3,300	68	36	47·5
12	Odessa D*	" 22	" 19	88	36	10	3	3,300	68	36	50
13	Stella A*	" 22	" 17	86	35	10	3	3,300	68	36	49·5
14	Manchurian A*	" 22	" 18	87	38	4	3¼	3,270	68	6	46
15	Stella C*	" 22	" 16	85	35	10	3	3,120	65	..	49·1
16	Blue Short Head C*	" 22	" 23	92	28	10	1¾	3,000	62	24	46
17	Nugent*	" 22	" 16	85	32	10	3¼	3,000	62	24	47·6
18	476 E	" 27	" 25	89	26	10	2	3,000	62	24	46
19	Blue Short Head A*	" 22	" 23	92	28	10	1¾	2,940	61	12	48
20	Stella G*	" 22	" 15	84	29	10	3	2,940	61	12	48·5
21	Trooper*	" 22	" 16	85	33	10	3	2,850	59	18	48
22	Small Blue Naked	" 22	" 22	91	30	9	3¼	2,790	58	6	59·2
23	Mansfield*	" 22	" 19	88	36	9	2½	2,760	57	24	49
24	471 D 3	" 27	" 16	80	27	9	1½	2,730	56	42	61·5
25	Claude*	" 22	" 15	84	31	10	2¾	2,700	56	12	49
26	Odessa F*	" 22	" 15	84	29	10	3	2,610	54	18	48·5
27	462 D	" 23	" 20	88	32	8	2	2,610	54	18	62
28	Success B*	" 22	" 12	81	36	10	2½	2,460	51	12	46
29	465 A 2	" 25	" 15	81	30	9	1¾	2,460	51	12	63
30	472 A	" 27	" 18	82	29	8	2¼	2,310	48	6	62
31	463 A	" 25	" 15	81	28	10	2	2,220	46	12	51
32	476 C	" 27	" 25	89	27	10	2¼	2,190	45	30	44
33	464 A	" 25	" 16	82	26	10	2	2,160	45	..	61·5
34	475 C	" 27	" 21	85	21	10	2½	2,130	44	18	47
35	Early Indian*	" 22	" 10	79	32	8	1¾	2,100	43	36	45
36	464 E	" 25	" 17	83	30	10	2¼	2,100	43	36	60
37	469 B	" 27	" 25	89	26	10	2¼	2,100	43	36	61 5
38	471 C	" 27	" 29	93	27	10	2½	2,010	41	42	59
39	462 C	" 23	" 20	88	30	10	2¼	1,980	41	12	61
40	476 D	" 27	" 25	89	26	10	2	1,950	40	30	43
41	465 B	" 25	" 18	84	26	10	2	1,920	40	..	62·3
42	469 D	" 27	" 25	89	26	10	2¼	1,890	39	18	60
43	466 A	" 25	" 15	81	24	10	2	1,800	37	24	59·2
44	460 A	" 23	" 14	82	26	10	1½	1,740	36	12	61
45	459 B	" 23	" 16	84	22	10	1	1,620	33	36	62
46	468 B	" 27	" 25	89	20	10	2	1,620	33	36	60
47	475 B	" 27	" 15	79	24	10	2	1,560	32	24	43
48	467 B	" 27	" 16	80	25	10	2	1,530	31	42	61
49	462 B	" 23	" 16	84	22	10	1½	1,500	31	12	62
50	468 A	" 27	" 22	86	20	10	2¼	1,350	28	6	58·5
51	467 C	" 27	" 19	83	20	10	2	1,110	23	6	59

The average yield of the fifty-one plots was 2,588 lbs. (53 bush. 44 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF SIX-ROW BARLEY.

Among the most productive sorts which have been tested for several years at this Farm are Manchurian A and Odessa. Manchurian is a selected strain of Mensury. This selection has surpassed in yield both the original Mensury from which it was derived and the closely-related Mandscheuri. These two are therefore being discontinued.

EARLIEST VARIETIES OF SIX-ROW BARLEY.

Manchurian and Odessa are among the earliest sorts of six-row barley that have been tested. Some of the new varieties, which appear in the plots this year for the first time, mature more rapidly. These are not yet available for distribution.

BEARDLESS SIX-ROW BARLEY.

The variety known as Champion has been discontinued, and a selection made from Success is being grown instead. Success is earlier than Champion, but neither variety gives a large yield. Several of the new cross-bred sorts mentioned in the list for the first time this year are beardless. It is hoped that some of them will prove superior to the older, named sorts.

HULLESS SIX-ROW BARLEY.

The common sorts of hulless barley known as Hulless White and Hulless Black are characterized by such weak straw that they have been dropped from our list. Several of the new cross-bred sorts introduced this year are hulless and some of them display a fair strength of straw.

TWO-ROW BARLEY.

The plots were sown on May 22 to 27. The seed was used at the rate of about two bushels to the acre. The soil varied considerably in character, which caused very irregular returns from the plots.

The new early-ripening variety grown under the name Kutais is a selected strain from a Russian barley.

The varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist.

* Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

TWO-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Kutais*	April 23	July 15	83	32	9	3	2,910	60	30	53
2	Gordon E*	" 23	" 17	85	34	10	2½	2,610	54	18	54
3	Early Chevalier*	" 23	" 15	83	32	10	2¾	2,580	53	36	53
4	Gordon A*	" 23	" 15	83	34	10	2½	2,460	51	12	53
5	Leader	" 23	" 25	93	26	10	2½	2,460	51	12	52
6	Gordon D*	" 23	" 17	85	34	10	2½	2,430	50	30	53
7	Duckbill C*	" 23	" 22	90	25	10	2½	2,400	50	..	51·3
8	Swan's Neck	" 23	" 20	88	27	10	2½	2,400	50	..	51
9	Invincible	" 23	" 25	93	26	10	2¾	2,340	48	36	51·5
10	Canadian Thorpe D*	" 23	" 25	93	25	10	2½	2,280	47	24	53
11	Hannchen	" 23	" 18	86	24	10	2¾	2,280	47	24	53
12	Caucasian Hulless	" 23	" 14	82	28	10	3	2,220	46	12	61·5
13	Duckbill B*	" 23	" 22	90	25	10	2¼	2,220	46	12	52
44	Gordon B*	" 23	" 15	83	34	10	2½	2,220	46	12	49
15	Black Two-row	" 22	" 27	96	24	10	3	2,190	45	30	52·2
16	Canadian Thorpe E*	" 23	" 25	93	25	10	2½	2,190	45	30	53
17	French Chevalier	" 23	" 20	88	30	10	3	2,160	45	..	53·5
18	Jarvis*	" 23	" 19	87	36	10	4	2,130	44	18	52
19	Primus	" 23	" 25	93	26	10	3	2,100	43	36	54
20	Standwell	" 23	" 20	88	31	10	3¼	2,100	43	36	53
21	Beaver B*	" 22	" 16	85	28	10	4	1,920	40	..	50
22	Swedish Chevalier	" 23	" 27	95	27	10	3¼	1,920	40	..	54
23	476 B	" 27	Aug. 1	96	28	10	2¾	1,920	40	..	46
24	Beaver D*	" 22	July 16	85	28	10	4	1,800	37	24	51
25	Beaver E*	" 22	" 16	85	28	10	4	1,800	37	24	51
26	Jewel	" 23	" 31	99	24	10	3¼	1,800	37	24	51
27	476 A	" 27	" 25	89	27	10	3½	1,800	37	24	48
28	Hofbrau	" 23	" 28	96	25	10	4	1,680	35	..	52·5
29	475 M	" 27	" 15	79	28	10	3	1,680	35	..	50
30	Clifford*	" 23	" 18	86	30	10	3¼	1,530	31	42	50
31	475 E	" 27	" 23	87	28	10	3½	1,530	31	42	48·5
32	Danish Chevalier	" 23	" 28	96	25	10	3½	1,170	24	18	51
33	475 J	" 27	" 25	89	25	10	3	1,170	24	18	47·5
34	475 D	" 27	Aug. 1	96	22	10	2½	1,140	23	36	52

The average yield of the 34 plots was 2,045 lbs. (42 bushels 29 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF TWO-ROW BARLEY.

The following varieties are among the most productive: Hannchen (a Swedish selection of the famous Hanna barley), Swan's Neck, Standwell, Clifford, Canadian Thorpe, Beaver and the different strains of Chevalier.

EARLIEST VARIETIES OF TWO-ROW BARLEY.

Among the earlier sorts are Hannchen, Beaver, Clifford and some strains of Chevalier.

BEARDLESS AND HULLESS TWO-ROW BARLEY.

The varieties of beardless and of hulless two-row barley which have been tested at Ottawa have not, as a rule, shown sufficient strength of straw to make them profitable sorts for farmers to cultivate. The variety called Caucasian Hulless, which has now been tested for four years, has given good yields, but it cannot be recommended without further trial, as the straw has shown decided indications of weakness in some seasons.

Small plots of Cereals in foreground. Sixtieth-acre plots of Spring Wheat in the distance, at Central Experimental Farm, Ottawa, July, 1910.

PEAS.

The plots of peas were sown April 27, the seed being used at the rate of two or three bushels to the acre, according to the size of the pea.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

Varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist.

* Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
						Inches.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Prussian Blue	Medium	April 27	Aug. 8	103	60	2¼	2,580	43	.	64
2	Wisconsin Blue	"	" 27	" 11	106	75	2¼	2,520	42	.	64
3	Prince*	Large	" 27	" 8	103	65	2¼	2,490	41	30	64
4	White Marrowfat	"	" 27	" 11	106	75	2½	2,460	41	.	64
5	English Grey	Medium	" 27	" 11	106	60	2	2,280	38	.	62
6	Picton*	"	" 27	" 6	102	65	2¼	2,010	33	30	64
7	Golden Vine	Small	" 27	" 8	103	55	2	1,920	32	.	64·5
8	37 D	Medium	" 27	" 3	98	40	2¼	1,890	31	30	61
9	22 E	"	" 27	" 11	106	60	2¼	1,860	31	.	62
10	Zulu	Large	" 27	" 9	104	70	2½	1,800	30	.	60
11	31 C	Medium	" 27	" 5	100	38	1¾	1,800	30	.	64
12	Daniel O'Rourke	Small	" 27	" 8	103	65	2	1,650	27	30	63·5
13	Paragon*	Medium	" 27	" 2	97	45	2¼	1,530	25	30	63
14	Chancellor	Small	" 27	" 1	96	60	2¼	1,440	24	.	64
15	20 E	Medium	" 27	" 3	98	50	2¼	1,350	22	30	64
16	35 D	"	" 27	" 3	98	40	2	1,350	22	30	62
17	36 A	"	" 27	July 29	93	35	1¾	1,320	22	.	63
18	19 F	"	" 27	Aug. 1	96	30	2¼	1,260	21	.	64
19	Mackay*	"	" 27	" 2	97	50	2½	1,200	20	.	64
20	37 B	"	" 27	" 8	103	65	2¼	1,110	18	30	63·2
21	Canadian Beauty	Large	" 27	" 9	104	60	2¼	1,080	18	.	63·5
22	30K 2	Medium	" 27	July 29	93	45	2¼	1,080	18	.	64·5
23	Arthur Selected*	"	" 27	" 29	93	30	1¾	990	16	30	65
24	19 B 1	"	" 27	Aug. 2	97	35	2	840	14	.	61
25	37 E	"	" 27	July 29	93	30	2¼	780	13	.	60
26	Black-Eye Marrowfat	Large	" 27	Aug. 11	106	50	2¼	750	12	30	63·5
27	23 H	"	" 27	July 29	93	30	2	570	9	30	61
28	23 R 1	Medium	" 27	Aug. 11	106	25	1¾	540	9	.	64

The average yield of the 28 plots was 1,445 lbs. (24 bushels 5 lbs.) per acre.

RECOMMENDED VARIETIES OF PEAS.

Prussian Blue, Arthur and Chancellor are among the most productive sorts, and are also early in ripening. The Marrowfat varieties and Golden Vine are somewhat later in maturing. Most of these varieties can be obtained from seedsmen in Canada.

SPRING RYE.

The plots of spring rye were sown on April 22, the seed being used at the rate of about one and one-half bushels to the acre.

The yield per acre is expressed in pounds and also in 'bushels' of fifty-six pounds.

SPRING RYE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Ottawa Select	April 22	Aug. 2	102	60	5	3½	3,060	54	36	58
2	Common	" 22	" 2	102	60	5	3½	2,880	51	24	59

The average yield of the two varieties was 2,970 lbs. (53 bushels 2 lbs.) per acre.

WINTER RYE.

The plots of winter rye were sown on August 31, 1909, the seed being used at the rate of about one and one-half bushels to the acre. The rye made good growth in the autumn and stood the winter well.

The yield per acre is expressed in pounds and also in 'bushels' of fifty-six pounds.

WINTER RYE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Dominion	Aug. 31	July 18	321	72	7	4½	2,520	45	..	56
2	Mammoth White	" 31	" 18	321	74	6	4	2,100	37	28	54·5
3	Thousandfold	" 31	" 18	321	74	5	4¼	1,860	33	12	52·2

The average yield of the three varieties was 2,160 lbs. (38 bush. 32 lbs.) per acre.

FIELD BEANS.

Seven plots of beans, one-sixtieth of an acre each, were sown on May 16. All of the varieties sown were selected strains of field beans or of early-maturing garden sorts which may prove useful in localities where it is desired to obtain ripe seed in a short season.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

FIELD BEANS—Test of Varieties.

Number.	Name of Variety.	Distance between Rows.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Plant.	Average Length of Pod.	Yield of Seed per Acre.	Yield of Seed per Acre.		Weight per measured bushel after cleaning
		In.				In.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Norwegian Brown Selected	16	May 16	Aug. 17	93	12	4	1,800	30	..	61·5
2	Golden Wax Selected	16	" 16	" 17	93	12	3½	1,470	24	30	65
3	White Field Selected	20	" 16	" 28	104	17	3½	1,080	18	..	64·5
4	Challenge Black Wax Sel.	16	" 16	" 9	85	10	3	960	16	..	59·
5	Marrowfat Selected	20	" 16	" 30	106	24	4	960	16	..	66·
6	California Pea Selected	16	" 16	" 30	106	12	3½	810	13	30	64·5
7	Stringless Kidney Wax Sel.	16	" 16	" 17	93	10	2¾	750	12	30	63·

The average yield of the seven varieties was 1,118 lbs. (18 bush. 38 lbs.) per acre.

FLAX.

As mentioned in the last report, it has been found necessary to make selections from the various commercial sorts of flax in order to obtain uniform types. Fourteen of these new selections were grown in sixtieth-acre plots in 1910, and thirteen of them are being retained for further trial.

The seed was sown on May 23, at the rate of sixty pounds to the acre. The unfavourable, dry weather caused the crop to be small.

The yield of seed per acre is expressed in pounds and also in 'bushels' of fifty-six pounds.

FLAX—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Plants.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.	Lbs.	Bush.	Lbs.	Lbs.
1	La Plata B	May 23	Aug. 22	91	24	840	15	..	52·8
2	Novarossick B	" 23	" 20	89	26	840	15	..	54·2
3	White Flowering B	" 23	" 8	77	28	840	15	..	55·5
4	Russian A	" 23	" 7	76	28	750	13	22	56·5
5	La Plata A	" 23	" 24	93	24	720	12	48	53·5
6	White Flowering A	" 23	" 6	75	28	720	12	48	55·3
7	La Plata C	" 23	" 12	81	25	600	10	40	54
8	Common D	" 23	" 8	77	28	570	10	10	56
9	Russian B	" 23	" 7	76	34	540	9	36	55
10	Common A	" 23	" 8	77	32	450	8	2	55·3
11	Common C	" 23	" 8	77	32	450	8	2	56·5
12	Common B	" 23	" 8	77	32	360	6	24	56
13	Common S	" 23	" 8	77	38	300	5	20	55·

The average yield of the thirteen varieties was 614 lbs. (10 bush. 54 lbs.) per acre.

FIELD ROOTS.

The advantage of late pulling for field roots having been clearly proved by the experience of several years, comparative tests, by pulling on two different dates about two weeks apart, have been discontinued. All the roots were harvested at the one time but the harvesting was left until quite late, so as to enable the roots to make as large a growth as possible.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

The soil on which the field roots were grown was a heavy loam.

It is probable that, in some instances, varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

TURNIPS (SWEDES).

Two sowings were made of each variety, the first on May 12, and the second on May 26. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about eight or ten inches apart in the rows.

The roots were pulled on October 25.

TURNIPS (SWEDES)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Bangholm Selected	36	350	25	800
2	Hall's Westbury	34	1,300	28	1,500
3	Good Luck	34	500	31	600
4	Magnum Bonum	34	..	30	1,000
5	Carter's Elephant	30	1,700	22	100
6	Jumbo	30	1,500	24	700
7	Halewood's Bronze Top	30	400	25	1,200
8	Perfection Swede	28	800	25	1,100
9	Mammoth Clyde	27	100	21	400
10	Hartley's Bronze	26	1,000	26	..

The average yield from the first sowing was 31 tons 565 lbs. per acre.

The average yield from the second sowing was 26 tons 140 lbs. per acre.

MANGELS.

Two sowings were made of each variety, the first on May 12 and the second on May 26. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about twelve inches apart in the rows. The roots were pulled October 26.

MANGELS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Selected Yellow Globe	70	200	43	..
2	Yellow Intermediate	63	600	40	..
3	Giant Yellow Intermediate	60	600	50	..
4	Half Sugar White	58	1,600	47	200
5	Perfection Mammoth Long Red	56	400	40	1,600
6	Giant Yellow Globe	50	1,600	47	800
7	Prize Mammoth Long Red	50	1,000	46	600
8	Gate Post	38	800	33	700

The average yield from the first sowing was 43 tons 988 lbs. per acre.
The average yield from the second sowing was 56 tons 100 lbs. per acre.

CARROTS.

Two sowings were made of each variety, the first on May 12, and the second on May 26. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about six inches apart in the rows. The roots were pulled October 27.

CARROTS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre from 1st Sowing		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Half Long Chantenay	41	200	33	..
2	Mammoth White Intermediate	37	100	34	1,300
3	Improved Short White	35	1,700	35	800
4	Ontario Champion	32	800	29	800
5	White Belgian	27	1,400	27	700

The average yield from the first sowing was 34 tons 1,640 lbs. per acre.
The average yield from the second sowing was 31 tons 1,920 lbs. per acre.

SUGAR BEETS.

Two sowings were made of each variety, the first on May 12, and the second on May 26. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about six inches apart in the rows. The roots were pulled on October 27.

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	French Very Rich	28	800	20	400
2	Klein Wanzleben	24	100	19	1,800
3	Vilmorin's Improved	23	500	19	1,500

The average yield from the first sowing was 25 tons 466 lbs. per acre.
The average yield from the second sowing was 19 tons 1,900 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown May 17, and the corn was cut green for ensilage September 17. The yield has been calculated from the weight of crop cut from two rows, each sixty-six feet long. The soil was a rather heavy loam.

For the making of ensilage, the corn should be cut when the kernels are in the doughy stage; but the summer at Ottawa is not always warm enough to bring the late varieties to this stage of maturity before it is necessary to cut the crop to avoid serious frost.

In Canada the ton contains 2,000 pounds.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
				Inches.		Tons.	Lbs.	Tons.	Lbs.
1	Eureka	May 17	Sept. 17	115	Early milk	36	600	36	50
2	Champion White Pearl	" 17	" 17	100	"	30	1,160	25	100
3	Compton's Early	" 17	" 17	100	Doughy	29	1,620	27	10
4	Superior Fodder	" 17	" 17	130	Early milk	29	1,620	27	450
5	Wood's Northern Dent	" 17	" 17	105	"	29	1,510	33	220
6	Angel of Midnight	" 17	" 17	75	Glazed	28	650	23	860
7	Selected Leaming	" 17	" 17	118	Doughy	28	650	23	530
8	Early Mastodon	" 17	" 17	100	Glazed	25	50	19	720
9	Longfellow	" 17	" 17	105	"	24	730	25	3[illegible]0

The average yield from the first sowing was 25 tons 466 lbs. per acre.
The average yield from the second sowing was 19 tons 1,900 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming and Longfellow. The seed was sown May 17, and the corn was cut for ensilage September 17. Sixteen rows of each variety were sown; that is, four rows at each of

the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was sixty-six feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height.	Condition when Cut.	Weight per Acre Grown in Rows.	
	Inches.		Inches.		Tons.	Lbs.
Champion White Pearl	21	Strong	110	Early milk	31	1,693
" "	28	Very strong	115	"	31	1,450
" "	35	Strong	100	"	30	1,160
" "	42	Very strong	125	"	36	920
Selected Leaming	21	Strong	105	Doughy	23	700
" "	28	Very strong	115	"	32	155
" "	35	"	118	"	28	650
" "	42	"	120	"	27	1,930
Longfellow	21	Strong	100	Glazed	26	542
"	28	Very strong	105	"	25	760
"	35	"	105	"	24	730
"	42	"	120	"	27	520

POTATOES.

The land that is available each season for potatoes is divided into small fields, such varieties being grown as will be of service in the annual distribution of samples from this Farm. The areas devoted to the different varieties vary considerably, but they are usually from one-half to one and one-half acres. The variety called Gold Coin was grown in three small fields. Rot was prevalent on most varieties, but Gold Coin was almost free from disease. This was partly due to the lighter character of the soil on which this sort was planted.

The dates of planting were from May 13 to June 1, and the harvesting from October 11 to the 15th.

The following table gives the yield per acre (of sound potatoes only) expressed in pounds and also in 'bushels' of sixty pounds.

FIELD PLOTS OF POTATOES.

Number.	Variety.	Time of Maturing.	Colour.	Yield per Acre.	Yield per Acre.
				Lbs.	Bush.
1	Gold Coin	Mid-season to late	White	9,345	155
2	"	" "	"	8 360	139
3	"	" "	"	8,090	134
4	Irish Cobbler	Early	"	7,600	126
5	Money Maker	Medium	"	7,500	125
6	Rochester Rose	Very early	Pink	7,365	122
7	Carman No. 1	Mid-season to late	White	4,120	68

REPORT OF THE DOMINION CHEMIST.

FRANK T. SHUTT, M.A., F.I.C., F.C.S., F.R.S.C.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-fourth Annual Report of the Chemical Division of the Experimental Farms.

In continuance of the policy followed since the establishment of the Division we have, in addition to the prosecution of research and investigation in connection with problems affecting the general agriculture of the Dominion, endeavoured to assist the practical farmer in his everyday work. This latter involves the examination of many samples of an agricultural nature sent in by farmers and the giving of advice, in response to inquiries, in matters relating to the management of soils, the value, care and use of farm manures, the nature and choice of fertilizers, the nutritive values of fodders and feeding stuffs, the composition and preparation of insecticides and of fungicides and many other allied subjects. As this branch of our work continues to increase, it will be evident that the annual report can contain but a part of the labours of the year. It is gratifying, in this connection, to be able to record the wide appreciation of this phase of the work; farmers are more and more availing themselves of the opportunity offered to obtain information on many matters of prime importance to them.

During the year, Bulletin No. 6 (Second Series) entitled 'Western Prairie Soils; their Nature and Composition,' has been issued. It gives in concise form the results and conclusions of our work during the past twenty years on the soils of the great plains and satisfies a demand that has long been felt, both in Canada and elsewhere, for information respecting the nature and fertility of the soils of the Northwestern provinces. Our data have established the great uniformity, the richness in plant food and the favourable physical condition of the soils covering large areas and they have also shown that exclusive grain growing and fallowing, now so commonly the practice, must give place to more rational methods of farming if these prairie soils are to be maintained in their present high state of fertility.

In the accompanying pages will be found the results of the more important investigations carried on since April 1, 1910, several of which have been under study for a number of years past. It will be noticed that these researches cover a wide field and furnish information of a useful and practical nature to those engaged in the specialized branches as well as to those in general farming.

Wheat and Flour.—In 1905, we began the study of the influence of environmental conditions on the composition of the wheat-grain and, as a result, evidence of a very satisfactory character is now available to show that soil moisture, more particularly during the development and ripening of the kernel, is an important factor in determining the gluten-content of the grain. It would seem that conditions which bring about a rapid maturation, *e.g.*, high temperatures and absence of excessive moisture

produce a 'hard' glutinous wheat, while on the other hand, cool and wet seasons, which would prolong the vegetative period and delay ripening, result in a 'soft,' starchy grain. Other things being equal, the soil moisture-content has been found to markedly influence the character of the grain. Thus, very considerable differences have been observed between wheat grown under 'dry farming' conditions and under irrigation in Southern Alberta, the product from the former being much the richer in gluten.

In this investigation we have now included barley, and the results, generally, accord with those from wheat. They show that the grain grown under irrigation has a much lower protein-content than that from 'dry' areas. This work was conducted in Southern Alberta, and our finding points to the strong probability that a low protein barley, particularly valuable for malting, can be grown on irrigated areas in that province.

The study to ascertain the influence of age on the quality of wheat and flour has been further prosecuted. This investigation, commenced in 1907, has been carried on in conjunction with the Dominion Cerealist who planned the details of the experiment and conducted the milling and baking tests. In this Division, the intention was to learn what changes in the composition of the wheat and flour might occur during storage and, if any, to correlate them with the baking results. The analytical data obtained at the end of the first storage period—16 months—were reported in 1909, and showed that certain changes, though minor in character, had taken place. The data from the recent analyses now presented do not record significant changes in the samples during the second storage period—January, 1909, to January, 1911.

Nitrogen enrichment of Soils through the growth of Clover.—The soil of this plot, an exceedingly poor, sandy loam at the beginning of the experiment, 1902, has again been sampled and analysed. Its nitrogen-content continues to increase, though the rate of increase shows a falling off as the land is longer and longer under experiment. In the nine years, the nitrogen-content of the soil has practically doubled.

Cultural Methods as affecting Soil Moisture.—The effect of sub-surface packing on the soil moisture-content has again been studied, the work of the past year being carried on at Lethbridge, Southern Alberta. The results are somewhat more favourable to the practice than those previously reported, but it is quite evident that the physical character of the soil has much to do with the benefit to be derived from this operation—the lighter soils receiving the greater advantage.

Inoculation for the Growth of Legumes.—No indications of material advantage have been observed from the use of 'cultures' for clover and alfalfa on the trial plots on the Experimental Farm, Ottawa. It would seem from our work, not only of this year but of previous seasons, that special inoculation is not *generally* necessary in the older cultivated lands that have been kept in good condition by rational methods of farming. This statement is not at variance with the experience of many in the northwestern provinces, where inoculation has frequently proved most effective. There the land is at the present time virgin, or practically so, and, not having borne crops of clover or alfalfa, it does not contain the necessary nitrogen-fixing bacteria which play the useful part of enriching their hosts with nitrogen, and thus encouraging growth.

Field Roots and Sugar Beets.—The composition of mangels, turnips and carrots as grown during the past season on the Experimental Farm, Ottawa, is given, and from the data is deduced the relative feeding value of the varieties under experiment.

The factory values of the three leading varieties of sugar beets grown for the production of sugar, have been determined. The roots analysed were grown on the several Experimental Farms, and consequently the results, which are quite satisfac-

tory, indicate what is possible in growing beets suitable for sugar extraction at widely distant points in the Dominion.

Fertilizing materials.—Under this caption, the manurial value of a considerable number of naturally-occurring materials is discussed. These include mucks. muds, peats, marls, limestone, gypsum, etc., etc., analysed during the year. An account of our examination of several varieties of sea-weed collected in the lower St. Lawrence is also given, the analyses showing the very considerable value of this material for supplying potash and nitrogen.

The Fertilizing Value of Rain and Snow.—The fourth year's work in this investigation is presented. The total amount of nitrogen thus furnished, per acre, during the year ending February 28, 1911, was 5·271 lbs., of which 4·424 lbs. was contained in the rain and ·847 lbs. in the snow.

Well Waters from Farm Homesteads.—The examination of waters from farmers' wells, dairies and cheese factories is a work we have always considered of much practical value. The data are given for the past season's work in this connection, together with a brief report as to quality and wholesomeness.

Samples received for Examination.—A classified list of the samples received for examination during the past year is presented in the following table:—

SAMPLES RECEIVED FOR EXAMINATION AND REPORT FOR THE TWELVE MONTHS ENDED MARCH 31, 1911.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	95	88	56	22	20	33	4	16	1	335	149
Muds, mucks and marls	8	1	1	....	4	3	5	7	8	37	7
Manure and fertilizers	3	....	....	....	14	32	..	9	1	59	1
Forage plants and fodders	9	15	5	8	90	8	2	17	4	158	25
Waters	12	10	17	8	189	42	5	3	3	289	....
Miscellaneous, including dairy products, preservatives, fungicides and insecticides	2	6	5	4	12	42	3	18	4	212	18
Totals	129	120	84	42	449	160	19	70	21	1,090	200

While every effort is made to furnish information respecting samples of a purely agricultural nature, we wish to advise our readers that it does not come within our province to analyse and report upon food stuffs and commercial fertilizers. Correspondents desiring such analyses should communicate with the Inland Revenue Department, Ottawa. Nor can we undertake the assays or analyses of minerals or mineral waters. Questions relating to minerals may be addressed to the Department of Mines, Ottawa. And lastly, we cannot make any analysis, the results of which we do not consider of general value to the agricultural public. Examination in connection with suspected poisoning cases of animals is not undertaken.

There is always a large amount of analytical work in hand, and it is seldom possible on receipt of the sample to proceed immediately with its analysis, and we beg our correspondents to bear this in mind. As far as may be practicable, samples and correspondence are dealt with in the order received.

Meat Inspection Division, Health of Animals Branch, Department of Agriculture.—For the past three years, the work of examination of samples sent in by the Meat Inspection Division has been carried out in the Farm laboratories. Between March 31, 1910, and April 1911, we analysed and reported upon eighty-six samples, a classification of which is as follows:—

	Samples.
Lard, beef fat and tallow	13
Dye stuffs and colouring matters	36
Preservatives and pickling solutions	28
Spices and condiments	5
Preserved meats	2
Fillers for sausages	2
	86

These had been collected by the Government Meat Inspectors at the various packing houses in the Dominion.

The chemical and microscopical work involved in the examination of these samples had for its object the determination of their nature and purity.

The Staff—Acknowledgments.—The two vacancies on the staff referred to in our last report were filled by competitive examination in July last. At the same time and in the same manner, a further and third appointment was made, chiefly that we might be enabled to more effectively deal with the work submitted by the Meat Inspection Division, which had increased very considerably. The Assistant Chemists thus added to the staff are Mr. E. Blake Carruthers, M.A., Mr. C. H. Robinson, B.A., and Mr. A. T. Stuart, B.A., to all of whom I would tender my thanks for much valuable assistance in carrying on the work of the Division. My thanks are also due to Mr. A. T. Charron, M.A., who for the past thirteen years has held the post of First Assistant Chemist, and who has continued to discharge the varied duties that devolve upon him with skill and faithfulness and to my entire satisfaction.

And now, in conclusion, may I be permitted to express my regret at learning that advancing years and impaired health have compelled you to relinquish the work you have so long and so successfully carried on as Director of the Dominion Experimental Farms. We have been associated since the establishment of the Farm system and I would thank you for many kindnesses and an ever-ready and keen appreciation of my work, during that long period. I hope that with restored health you may long be spared to enjoy your well-earned rest.

I have the honour to be, sir,

Your obedient servant,

FRANK T. SHUTT,

Dominion Chemist.

WHEAT AND BARLEY.

THE COMPOSITION OF THE GRAIN AS INFLUENCED BY THE SOIL MOISTURE-CONTENT.

This investigation, now in the sixth year of its progress, was continued during the past season on the Experimental Station at Lethbridge, Southern Alberta, growing wheat and barley under 'dry farming' conditions and under irrigation. In addition to the analysis of the parent seed and of the crop, determinations of the soil moisture-content of the several plots have been made at intervals throughout the season. It was expected from the data so obtained to find a relationship between the moisture-content of the soil during the vegetative period and the protein-content of the grain, for previous work had shown that the latter is always higher when development is hastened by a scanty supply of moisture and high temperatures than when ripening is retarded by ample moisture and cool weather.

Wheat.—The moisture-content of the irrigated and non-irrigated areas, as determined several times during the season, to a depth of fourteen inches, may be stated as follows:—

MOISTURE-CONTENT OF WHEAT PLOTS.

Date.	Irrigated. p.c.	Non-irrigated. p.c.
May 25, 1910	11·57	11·75
June 21, 1910	6·73	7·19
July 4, 1910	13·62	7·14
July 10, 1910	8·87	6·61
July 18, 1910	13·20	6·05
August 1, 1910	8·19	5·22

The plots used in this investigation, on the irrigated and non-irrigated areas alike, had been summer-fallowed in 1909, so that we might expect but slight differences, if any, in their moisture-content at the opening of the season, 1910. That such is the case will be seen from the data for May 25. A month later (June 21), the moisture-content on both areas, though considerably reduced, was still practically identical. Since the seed was sown on April 1, it is evident that the environment, in so far as soil-moisture is concerned, had been the same for the wheat on both areas during the major period of its growth. And, further, this period was an exceedingly dry one, certainly the driest since reliable meteorological observations have been recorded at Lethbridge.

Immediately after the collection of the second set of samples, the first irrigation was made (June 22), and the third series was not taken till a fortnight later (July 4), when the irrigated plots contained approximately twice the amount of moisture present in the non-irrigated area. The percentage of moisture in the latter was practically the same as on June 21. On July 10, the moisture was decidedly low on both areas, though there was a difference of 2 per cent in favour of the irrigated land.

The second irrigation was on July 13, and the fifth collection of samples was made five days later, July 18. We find moisture conditions very similar to those of July 4—a very low moisture-content in the soil of the non-irrigated area with approximately twice the amount in the irrigated soil. The sixth and last collection was on August 1, when the crop on both areas was harvested. Again, we find the soil very dry; in the non-irrigated land there was but 5·22 per cent, while in the irrigated area the soil only contained 8·19 per cent.

Our conclusions from these data may be summed up as follows: (1) That both plots started with practically the same moisture-content, a very fair but not exces-

sive amount. (2) That the non-irrigated area dried out continuously until the grain was harvested. The lowering of the moisture-content was more rapid, it will be seen, during the first examination period, May 25 to June 21, than during any subsequent similar period. In this connection we may infer, judging from results on the irrigated area, that the low moisture-content at the latter date had obtained for some time previous to this second examination. (3) That on the 'irrigated' area, until the first flooding (June 22), the soil was not more moist than that of the 'non-irrigated,' indeed it would seem to be somewhat the drier of the two; further, that the drying out of the irrigated plots after each flooding was very rapid, from which it is clear that the crops upon them were, for the most part, in a fairly dry soil and only intermittently enjoyed an abundant supply of moisture.

Two samples of Red Fife wheat were used for sowing these areas; the one grown on non-irrigated land, the other on irrigated. Both of these parent seeds had been obtained in this investigation at the Experimental Station, Lethbridge, Alta., the previous season, 1909

WHEAT, 1910.

Expt.	Laboratory No.	Designation of Sample.	Weight of 1,000 Kernels.	Protein (N×5·7).
A...	7793	Red Fife, parent seed, grown on irrigated land, 1909	36·6653	12·31
	8316	" grown on irrigated land, 1910	30·8576	16·53
	8318	" grown on non-irrigated land, 1910	25·8823	16·82
B...	7794	" parent seed, grown on non-irrigated land, 1909	31·2698	16·13
	8315	" grown on irrigated land, 1910	30·2744	15·22
	8317	" grown on non-irrigated land, 1910	26·1502	17·16

Attention may first be directed to the great difference in protein-content, almost 4 per cent, between the two parent seeds, the crop of 1909; the higher—in accord with our previous work—being from the non-irrigated area.

In Experiment A, the crops from both irrigated and non-irrigated areas are practically identical in protein-content and very much higher than the parent seed which had been raised on irrigated land the previous season. That the wheat harvested from the non-irrigated area should be richer in protein than its parent was fully expected from our results of the past five years, but that the crop from the irrigated area should be similarly high can only be explained on the ground that the moisture conditions of this plot during an important period in the life of the plant did not differ materially from those of the non-irrigated area. The data, indeed, seem to point to the conclusion that until the first irrigation, 83 days from seeding, the soil of the irrigated area was even drier than that of the non-irrigated.

In experiment B, wheat from non-irrigated land (1909) was employed, and as a consequence a high protein seed was sown. Its product on non-irrigated land was still richer in protein, a result in accord with our conjecture that the season was one of unusual dryness. The crop from the irrigated land was found to be about 1 per cent lower in protein than the parent seed. This is certainly not a large difference, but it is one in the direction expected from previous results. That it is not larger may be accounted for by the facts alluded to in discussing Experiment A.

Barley.—The foregoing experiments were repeated with barley, using seed from the crop of 1909, grown on irrigated and non-irrigated areas, respectively.

MOISTURE-CONTENT OF BARLEY PLOTS.

Date.	Irrigated.	Non-Irrigated.
	p. c.	p. c.
May 25, 1910.	10·58	12·99
June 21, "	7·06	7·68
July 4, "	15·22	8·17
July 10, "	10·72	7·74
July 18, "	13·36	6·74
Aug. 1, "	8·19	6·47

Comparing the moisture-content of the two plots at the outset, the soil of the 'irrigated' area was decidedly the drier and this relationship obtained until the date of the first irrigation, June 22. After this date, the irrigated plots showed considerably more moisture than the non-irrigated, which steadily declined until the close of the season. It is of interest to note that the percentages of moisture for these irrigated barley plots were, subsequent to the first irrigation, higher than for the corresponding plots under wheat.

BARLEY, 1910.

Expt.	Laboratory No.	Designation of Sample.	Weight of 1000 Kernels.	Protein (N x 5·7)
A.	8323	Mensury, parent seed, grown on irrigated land, 1909.	39·0392	10·20
	8320	" grown on irrigated land, 1910.	33·6761	10·26
	8322	" grown on non-irrigated land, 1910	27·4728	14·59
B.	.....	" parent seed, grown on non-irrigated land, 1909.	.....	.....
	8319	" grown on irrigated land, 1910.	33·9888	10·20
	8321	" grown on non-irrigated land, 1910.	28·6248	14·71

In Experiment A, the seed used had been grown on irrigated land in the year previous and was characterized by a low protein-content. The product on irrigated soil was found to be identical in nitrogen with its parent. It is clear that the conditions on these irrigated areas are distinctly favourable to the development of a low protein barley. It would further appear that these conditions must have been very similar during both seasons. Whether the lowest limit in nitrogen for this particular variety has been reached is not conclusively shown, but such is probably the case.

The product on non-irrigated soil is seen to be more than four per cent higher in protein than its parent, evidence that this cereal, like wheat, is readily influenced by soil moisture conditions.

Experiment B. The parent seed in this experiment had been grown at Lethbridge on non-irrigated land. Unfortunately, we are unable to present figures as to its protein-content, as the sample through some error or accident failed to reach the laboratory. The data from its progeny, however, tell the same tale as those in Experiment A, viz.: that the irrigated crop gave a low protein grain while that grown under 'dry

farming' conditions furnished a product very rich in protein. Indeed, it is significant that the results for the two irrigated plots are practically identical and similarly also for the barleys from the two non-irrigated areas.

Considered as a whole, these, our first results with barley, prove that the composition of this grain may be profoundly influenced by conditions of growth, probably to a greater degree than wheat, and that protein-content is by no means a matter entirely of heredity. In relation to barley, this investigation has a particular and important interest, since a low protein grain is highly prized for malting purposes.

INFLUENCE OF AGE ON WHEAT AND FLOUR.

In September, 1907, the Dominion Cerealist instituted a series of experiments to obtain, if possible, definite information respecting the influence of age (storage) on wheat and flour. Side by side with the milling and baking work, this Division undertook to trace chemically such changes in composition as might take place in the samples being studied. This was done in the hope that an explanation of a satisfactory character would be forthcoming for such improvement in strength as might be noted.

The series consisted of ten samples, comprising seven varieties of wheat. Three members of the series were stored as both wheat and flour, the remaining four being kept over as grain only. Those stored as grain were milled at the close of the periods determined upon, the resultant flours being analysed with those which had been put away at the beginning of the investigation. The analyses and the baking tests were conducted simultaneously.

The first storage period was from September, 1907, to January, 1909, and the results covering this time were given and discussed in the Report of the Experimental Farms for the latter year. The Cerealist found 'that when the material is kept over in the form of flour there is a more rapid improvement in colour and strength than when it is kept as wheat. The changes are not always regular, and a few exceptional cases were found. In every instance, however, there was a gain in water absorbing power, and as a rule this gain was considerable, amounting sometimes to more than four per cent after sixteen months of storage. There was also invariably an improvement in the shape of the loaf. In regard to volume of loaf, some irregularities occurred for which no satisfactory explanation can be offered at present.' The chemical data showed that during the sixteen months of storage in the larger number of instances the protein-content increased slightly in both wheat and flour, the increase being, as a rule, greater in the samples kept as flour. This increase, it was thought, was most probably due to a slow oxidation and consequent destruction of the carbohydrates. A tendency towards an increase in the gliadin was also observed as a result of storage. An improvement in the physical character of the gluten was also noted in two of the varieties that had been kept as wheat and which initially possessed gluten of inferior quality. Very possibly a more marked improvement would have been noticed had this sample been kept as flour.

The results of the past season have been interpolated in the following table, which presents the data from the series since the beginning of the investigation in a form easy of comparison.

The second storage period was from January, 1909, to January, 1911, and we may now inquire if the chemical work indicates any change in the wheat or flour during this time. Considering first those samples kept as flour, we do not observe any marked alteration in protein-content; in one case there is a slight decrease, in another the percentage is practically stationary, and in the third, there is a very small increase but the differences are such as might be ascribed to unavoidable error in sampling or analysis. In gliadin, the tendency to increase, noted for the first storage period, continues, so that the data for January, 1911, are percept-

INFLUENCE OF AGE ON THE QUALITY OF WHEAT AND FLOUR.

ANALYSIS OF FLOURS—RESULTS CALCULATED TO BASIS OF 8 P.C. MOISTURE-CONTENT.

Designation of Sample.	Date of Analysis and Baking.	Laboratory Number.	Milling Number.	Ash.	Protein (N x 5·7).	Gliadin (N x 5·7).	Percentage of Protein in the form of Gliadin.	Gluten. Wet.	Gluten. Dry.	Gluten. Ratio of Dry to Wet.	Physical Characters. Resiliency.	Physical Characters. Elasticity.	Physical Characters. Colour.	Baking Strength. (Cerealist's marks.)
				p. c.	p. c.	p. c.		p. c.	p. c.					
Huron Selected, original	Sept. 1907	5143	152	·54	11·74	4·96	42·2	39·81	14·09	2·82	Good...	Good...	Yellow.	87
" kept as flour	Jan., 1909	6533	152	·50	12·23	5·57	45·5	39·60	14·23	2·78	" ...	" ...	Sl. yell..	100
" kept as wheat	" 1909	6532	231	·69	11·89	5·57	46·9	42·74	14·52	2·94	" ...	" ..	" ..	84
" kept as flour	" 1911	8607	152	·55	11·78	5·69	48·3	37·98	13·74	2·76	" ..	" ...	" ..	109
" kept as wheat	" 1911	8608	358	72	12·19	5·55	45·5	40·37	13·98	2·88	" ...	" ...	" ..	99
Red Fife H., original	Sept., 1907	5146	155	·50	14·28	6·50	45·5	47·15	16·66	3·03	" ...	" ...	Good...	100
" kept as flour	Jan., 1909	6535	155	·49	14·54	6·66	45·8	44·58	16·03	2·78	" ...	" ...	" ...	108
" kept as wheat	" 1909	6534	232	·61	14·46	6·55	45·3	47·46	17·31	2·74	" ...	" ...	" ...	105
" kept as flour	" 1911	8609	155	·48	14·23	6·72	46·4	42·75	15·37	2·78	" ...	" ...	" ...	107
" kept as wheat	" 1911	8610	359	·72	14·58	6·53	44·8	49·38	16·96	2·91	" ...	" ...	" ...	106
Yellow Cross, original	Sept., 1907	5147	156	·57	13·09	5·61	42·9	41·99	15·32	2·87	" ...	" ...	" ...	75
" kept as flour	Jan. 1909	6539	156	·57	12·98	5·83	44·9	45·53	17·15	2·65	" ...	" ...	" ...	101
" kept as wheat	" 1909	6538	235	·66	13·10	5·72	43·6	46·75	16·93	2·76	" ...	" ...	" ...	87
" kept as flour	" 1911	8611	156	·59	13·17	5·91	44·8	42·58	16·02	2·65	" ...	" ...	" ...	112
" kept as wheat	" 1911	8612	362	·72	13·21	5·70	43·1	48·21	18·03	2·66	" ...	" ...	" ...	101
Stanley A, original	Sept., 1907	5144	153	·51	9·89	4·19	42·3	34·46	12·67	2·72	" ...	" ...	" ...	81
" kept as wheat	Jan., 1909	6537	234	·68	10·82	4·52	41·8	35·20	12·71	2·77	" ...	" ...	" ..	81
" kept as wheat	" 1911	8613	363	·69	10·71	4·37	40·8	34·70	12·94	2·68	" ...	" ...	" ...	101
Chelsea, original	Sept., 1907	5145	154	·51	10·51	4·71	44·8	33·96	12·49	2·72	Fair....	Fair....	" ...	86
" kept as wheat	Jan., 1909	6536	233	·68	12·11	4·93	40·7	32·47	12·99	2·50	Good...	Good...	" ...	90
" kept as wheat	" 1911	8614	364	·69	10·78	4·83	44·8	34·11	13·26	2·57	" ...	" ...	" ...	104
Dawson's Golden Chaff, original	Sept., 1907	5148	157	·46	11·13	5·06	45·4	38·35	14·11	2·72	Poor ...	Poor ...	" ...	70
" " kept as wheat	Jan., 1909	6531	229	·54	11·45	5·18	45·2	40·65	13·03	3·12	Fair....	Fair....	" ...	77
" " kept as wheat	" 1911	8615	366	·56	11·40	5·08	44·5	41·62	14·81	2·81	Poor ...	Poor ...	" ...	90
Turkey Red No. 380, original	Sept., 1907	5149	158	·49	10·41	4·54	43·6	34·81	11·53	3·02	Good...	Good...	" ...	95
" " kept as wheat	Jan., 1909	6530	228	·58	10·49	4·33	41·2	33·62	11·29	2·97	" ...	" ...	" ...	89
" " kept as wheat	" 1911	8616	365	·56	10·85	4·43	40·8	35·75	12·07	2·96	" ...	" ...	" ...	104

ibly higher than those of September, 1907. Similarly, there would appear to be an increase in the 'gliadin ratio' or percentage of protein in the form of gliadin. The gluten results are somewhat lower than they were two years ago, but the nature of this determination precludes the possibility of drawing conclusions from small differences.

Stored as wheat, five of the seven members of the series show very slight increases in protein, indicating that the tendency in this direction is more or less continuous for some years under the conditions of this investigation. In the larger number of cases the percentage of gliadin is exceedingly close to that obtained in 1909, and in no case perhaps is the difference greater than might be expected between duplicate analyses. The larger percentages of ash observable in the 1911 'kept as wheat' samples, when compared with the similar samples of 1909, evidently arise from slight differences in milling, a more complete removal of the bran elements being effected in the previous milling.

Nitrogen-and-ash-free Extract and Volume of Loaf.—The process used in the determination of nitrogen-and-ash-free extract is not one, perhaps, that permits of slight differences being recorded with accuracy, and we therefore hesitate to use the results given in the following table for the purpose of making fine distinctions. However, it may be safely concluded that they do not indicate a marked change in any one direction throughout the storage period 1907-1911.

A consideration of the results from the determinations of the nitrogen-and-ash-free extract and those from the volume of loaf does not indicate that there is any relationship between these data. The contention that volume of loaf increases with the amount of extract receives no support from this investigation.

NITROGEN-AND-ASH-FREE EXTRACT AND VOLUME OF LOAF.

Designation of Sample.	Date of Analysis and Baking.	Laboratory Number.	Milling Number.	Nitrogen-and-ash-free Extract.	Volume of Loaf. — (Cerealist's marks.)
Huron Selected—original	Sept., 1907	5143	152	3·39	433
" " kept as flour	Jan., 1909	6533	152	2·14	474
" " kept as wheat	" 1909	6532	231	4·45	395
" " kept as flour	" 1911	8607	152	3·25	524
" " kept as wheat	" 1911	8608	358	4·40	483
Red Fife H.—original	Sept., 1907	5146	155	3·19	534
" " kept as flour	Jan., 1909	6535	155	3·08	539
" " kept as wheat	" 1909	6534	232	3·65	539
" " kept as flour	" 1911	8609	155	3·14	521
" " kept as wheat	" 1911	8610	359	4·04	535
Yellow Cross—original	Sept., 1907	5147	156	4·28	402
" " kept as flour	Jan., 1909	6539	156	3·44	484
" " kept as wheat	" 1909	6538	235	2·62	421
" " kept as flour	" 1911	8611	156	3·95	548
" " kept as wheat	" 1911	8612	362	4·53	504
Stanley A.—original	Sept., 1907	5144	153	3·85	402
" kept as wheat	Jan., 1909	6537	234	5·21	366
" " "	" 1911	8613	363	4·61	468
Chelsea—original	Sept., 1907	5145	154	3·67	415
" kept as wheat	Jan., 1909	6536	233	4·58	420
" " "	" 1911	8614	364	4·43	491
Dawson's Golden Chaff—original	Sept., 1907	5148	157	3·26	374
" " kept as wheat	Jan. 1909	6531	229	3·43	392
" " " "	" 1911	8615	366	3·44	472
Turkey Red, No. 380—original	Sept., 1907	5149	158	4·08	485
" " kept as wheat	Jan., 1909	6530	228	4·39	407
" " " "	" 1911	8616	365	4·22	497

Ratio of Soluble Ash to Total Nitrogen and Shape of Loaf.—It is of interest to note in the first place that the chemical data given in the subjoined table reveal no differences or changes in those samples kept as flour. In two of the three, the results for any particular flour for 1907, 1909 and 1911 are practically identical, and in the third instance the figures for the first and last examination agree very well, indicating that the 1909 data for this sample, from some cause, are not correct.

RATIO TO TOTAL NITROGEN OF SOLUBLE CONSTITUENTS AND SHAPE OF LOAF.

Designation of Sample.	Date of Analysis and Baking.	Laboratory Number.	Milling Number.	Ratio to Total Nitrogen of Soluble.			Shape of Loaf (Cerealist's marks).
				Ash.	Alkali as K_2O.	Phosphoric Acid as P_2O_5.	
Huron Selected—original	Sept., 1907	5143	152	6·0	20	16	·61
" kept as flour	Jan., 1909	6533	152	7·0	20	16	·73
" kept as wheat	" 1909	6532	231	4·0	15	11	·67
" kept as flour	" 1911	8607	152	6·3	21	17	·74
" kept as wheat	" 1911	8608	358	4·1	12	15	·70
Red Fife H.—original	Sept., 1907	5146	155	7·6	21	21	·63
" kept as flour	Jan., 1909	6535	155	7·4	22	20	·73
" kept as wheat	" 1909	6534	232	6·0	19	15	·71
" kept as flour	" 1911	8609	155	7·7	21	19	·72
" kept as wheat	" 1911	8610	359	5·8	14	18	·71
Yellow Cross—original	Sept., 1907	5147	156	6·4	16	17	·56
" kept as flour	Jan., 1909	6539	156	4·9	14	11	·75
" kept as wheat	" 1909	6538	235	6·1	16	13	·70
" kept as flour	" 1911	8611	156	6·1	15	13	·77
" kept as wheat	" 1911	8612	362	5·1	13	13	·72
Stanley A.—original	Sept., 1907	5144	153	5·0	15	15	·60
" kept as wheat	Jan., 1909	6537	234	3·9	12	9	·68
" kept as wheat	" 1911	8613	363	3·8	10	8	·73
Chelsea—original	Sept., 1907	5145	154	5·0	14	14	·65
" kept as wheat	Jan., 1909	6536	233	4·7	14	11	·72
" kept as wheat	" 1911	8614	364	3·6	12	10	·73
Dawson's Golden Chaff—original	Sept., 1907	5148	157	6·6	18	20	·56
" kept as wheat	Jan., 1909	6531	229	7·0	17	16	·66
" kept as wheat	" 1911	8615	366	4·9	14	17	·71
Turkey Red, No. 380—original	Sept., 1907	5149	158	5·9	17	17	·64
" kept as wheat	Jan., 1909	6530	228	5·0	14	12	·71
" kept as wheat	" 1911	8616	365	5·7	15	15	·73

As witnessed in 1909, lower ratios were again obtained for the samples stored as wheat than as flour, in such as were kept in both conditions. These differences are probably attributable to milling, for, as already noticed, the ash in the flours milled in 1909 and 1911, is considerably higher than that in the corresponding flours milled in 1907. In those samples kept only as wheat, the agreement is fairly close.

Slightly higher marks for shape of loaf are accorded by the Cerealist, than at previous bakings, though in the larger number of cases the differences between the 1909 and the 1911 figures are slight.

As stated in our comments on the 1909 results, there is no evidence that there exists a relationship between the 'ratio of soluble ash to total nitrogen' and shape of loaf.

THE MOISTURE-CONTENT OF PACKED AND UNPACKED SOILS.

In our report last year we drew attention to certain results obtained at Lethbridge and Lacombe, Alta., relative to sub-surface packing as a means for conserving soil-moisture.* This work has been continued and we now present data from packed and unpacked areas under experiment last year at Lethbridge.

The land under examination was summer-fallowed in 1909, being ploughed in the early part of July. Part of it was immediately packed and the whole seeded in August with winter wheat. The samples for analysis were taken to a depth of fourteen inches, the first collection being made May 25, and the last on July 18, 1910, a few days previous to the harvesting of the wheat.

MOISTURE CONTENT OF PACKED AND UNPACKED SOILS, LETHBRIDGE, ALTA.

Date.	Percentage of Moisture.	
	Packed.	Unpacked.
May 25, 1910	8·34	7·66
June 11, 1910	7·60	5·76
" 21, 1910	5·86	6·17
July 4, 1910	6·71	7·03
" 13, 1910	6·17	6·19
" 18, 1910	5·72	5·77

From the results of the two first sets of samples, we may, I think, conclude that the packed land starts the season with the more moisture, though the difference in its favour is not a large one.

From the third week in June until the date of harvesting, however, the moisture-content of the packed plot was either the same as, or lower than, that of the unpacked plot. The explanation for this may be in the larger moisture requirements of the crop on the packed area, for we may well suppose, other conditions begin equal, a more leafy development on the land which contained the more moisture during the earlier weeks of growth.

The results obtained in 1909 showed no very great advantage from the use of the subsurface packer, the determinations being made on plots under fallow and in crop. The conclusions from the trials of 1910, the plots carrying a crop of winter wheat, are much of the same character, though somewhat more favourable to the view that this operation is conducive to moisture conservation. As indicated in our previous article on this subject, the physical character of the soil determines in a measure the benefit derived from this operation, the lighter loams receiving the greater advantage.

* Report of Dominion Chemist 1910, pp. 214-5.

NITROGEN-ENRICHMENT OF SOILS THROUGH THE GROWTH OF CLOVER.

The importance of clover as a manurial agent led us to inaugurate in 1902 a number of experiments with the object of learning to what extent the nitrogen-content of a soil could be increased through the growing and turning under of this crop. Of these one plot has been constantly in clover since it was first seeded, the crop being cut as often as occasion required and the material allowed to decay on the soil. Every second year, the plot has been dug over and re-sown. At the outset it was dressed with superphosphate at the rate of 400 lbs., and muriate of potash at the rate of 200 lbs. per acre. The plot was limed at the rate of one ton to the acre in the spring of 1909.

From time to time, the soil of this plot has been sampled and its nitrogen-content determined. The following table presents the results to date:—

NITROGEN-ENRICHMENT OF SOIL DUE TO GROWTH OF CLOVER.

—	Date of Collection.	Nitrogen.	
		Percentage in Water-free Soil.	Pounds per Acre to Depth of 4 Inches.
Before experiment	13-5-02	·0437	533
After two years	14-5-04	·0580	708
After four years	15-5-06	·0608	742
After five years	30-5-07	·0689	841
After six years	23-5-08	·0744	908
After seven years	4-5-09	·0750	915
After nine years	5-5-11	·0824	1,005
Increase in nitrogen due to nine years' growth	.....	·0387	472

This soil, it will be observed, continues to increase in nitrogen, though the figures afford evidence of a falling in the rate of increase as the experiment progresses. It is equally evident, however, that the limit of enrichment has not yet been reached.

The total nitrogen of the soil has practically doubled in the nine years of the experiment; averaging the results there has been an annual increase of 52·4 lbs. per acre.

INOCULATION EXPERIMENTS WITH NITRAGIN FOR LEGUMES.

As reported last year, trials were begun on the Central Farm in the spring of 1909, with Hiltner's Nitragin, as prepared by the Dr. Reiche Nitragin Company, of Milwaukee, Wis., U.S.A. Cultures for Red Clover, Alfalfa and Peas were used, and the methods of soil and seed inoculation employed.

The 1909 results, viewed generally, showed no marked advantage from the use of the cultures. The soil used in these experiments was extremely poor and sandy, and had not carried a leguminous crop for at least nine years, yet we found the roots of the plants in the uninoculated soil well supplied with nodules—a fact that serves to confirm our deductions, previously made, that the nitrogen-assimilating bacteria are widely disseminated in the soils of cultivated districts. It further may furnish the reason for the apparent inefficiency of the cultures.

The plots in clover and alfalfa were those of the previous year, and consequently have afforded data for the second year's growth of these crops. Each series comprised three plots: 'uninoculated,' 'seed inoculated,' and 'soil inoculated.'

Red Clover.—There was a good 'stand' on all three plots at the opening of the season. Later, for some reason that was not apparent, the crop of the 'soil-inoculated' plot was not so vigorous as on the other two.

CLOVER, 2ND YEAR CROP.

Dates of Cutting.	Uninoculated.				Seed Inoculated.				Soil Inoculated.			
	Fresh.		Air-dried.		Fresh.		Air-dried.		Fresh.		Air-dried.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
First cutting, June 15	67	14	9	14	68	..	9	..	50	1	8	2
Second " July 18	10	6	1	10	15	11	2	8	7	14	1	4
Third " Aug. 29	19	0	4	5	16	1	3	10	10	6	2	8
	97	4	15	13	99	12	15	2	68	5	11	14

At the time of the first cutting (June 15), all three plots might be said to be in full bloom, and all equally advanced. The yields on the 'uninoculated' and 'seed inoculated' plots, weighed both green and as hay, were very close, and considerably higher than that on the soil-inoculated area.

On July 18, the cutting on the 'seed-inoculated' plot was the heaviest, the yield from the 'soil-inoculated' still remaining the lightest. At the third cutting, August 29 the position of the two former plots as regards yields was reversed, the 'uninoculated' crop being, weighed green, three pounds heavier.

Considering totals, we have results in accord with those of the first cutting, viz., no differences of importance (or, at least, from which it would be safe to make deductions) between the yields of the 'uninoculated' and 'seed-inoculated' areas, with a decidedly lower yield from the 'soil-inoculated' plot.

Alfalfa.—The crop made a very good start on all three plots, and was exceedingly healthy and vigorous throughout the season. Notes made at the times of cutting state that while excellent crops were cut on every plot, that on the 'uninoculated' was, throughout the season, from appearances, the heaviest.

ALFALFA, 2ND YEAR CROP.

Dates of Cutting.	Uninoculated.				Seed Inoculated.				Soil Inoculated.			
	Fresh.		Air-dried.		Fresh.		Air-dried.		Fresh.		Air-dried.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
First cutting, June 15.....	49	13	10	9	33	6	8	12	49	11	10	12
Second " July 18.....	33	..	6	4	30	4	5	15	30	7	5	12
Third " Aug. 29.....	40	9	12	4	37	0	11	4	38	1	11	7
	123	6	29	1	105	10	25	15	118	3	27	15

On June 15, when the plots were first cut, the plants were just coming into bloom and the yield, from appearances. somewhat lighter on the 'seed inoculated' than on either of the other two plots. The weights bear out the impression from an inspection of the series: those for the crops, both green and as hay, for the 'uninoculated' and 'soil inoculated' were practically identical, with that from the 'seed-inoculated' decidedly lighter.

The crop was an excellent one and in full bloom on all three plots at the time of the second cutting. The yields were very close, with a slight margin in favour of the 'uninoculated' plot.

When cut the third time, August 29, about three-fourths of the crop was in bloom and an excellent growth on all three plots. Again, the results are slightly in favour of the 'uninoculated' area.

The totals show that the heaviest yield was obtained from the 'uninoculated' plot the lightest from the 'seed inoculated' that from the 'soil inoculated' area occupying a position midway between them.

So far as the present experiment is concerned, there are no indications of material advantage from inoculation. Trials with various cultures made by us here and elsewhere in the Dominion during the past twenty years have all pointed towards inoculation being generally unnecessary when the soil is under a rotation, in a good state of cultivation and well drained. Many instances of benefit arising from inoculation are known to the writer, but very few of them have occurred in the older and best-farmed districts. The larger number of the most striking cases, where a response has followed inoculation, have been in the Northwestern provinces, upon newly broken land, and it seems quite probable that such soils are but poorly supplied with the particular organisms capable of assisting the farm legumes. Cases of improvement following inoculation have also been reported from the maritime provinces, generally from areas covered with soils poor in humus and upon which no rational rotation has been followed. Failure to obtain a catch of clover or other legume does not necessarily imply the absence of nitrogen-assimilating bacteria; it is perhaps more often due to deficiency of moisture, an unsuitable seed bed, an acid condition of the soil or to a lack of proper drainage. Seed of a low germinative value has also been found answerable for an imperfect catch. Before concluding that inoculation is necessary, it would therefore be the part of wisdom to inquire whether the lack of success may not be due to one or more of these unfavourable conditions, or to poor seed.

Where inoculation is thought to be necessary or desirable, we believe that soil from the surface of a field that is growing the legume (clover or alfalfa, as the case may be), will be found more effective than 'cultures.' According to the reports we have received, this method has almost invariably proved more successful than the use of the purchased preparations. The soil should be broadcasted, as soon as may

be possible after its collection, on the thoroughly prepared land to be sown and immediately harrowed. The application may be at the rate of 100 to 300 lbs. per acre, and the operation is the more likely to be successful if carried out on a cool, damp, cloudy day.

THE RELATIVE VALUE OF FIELD ROOTS.

In this investigation, analysis is made season by season of the mangels, turnips and carrots, as grown on the Central Experimental Farm, Ottawa. This work has been carried on with the view of obtaining data respecting the relative feeding value of the leading varieties of field roots and of ascertaining the differences in composition that might result from varying seasonal conditions. This work has been carried on since 1903.

MANGELS.

The eight varieties grown in 1910, have been cropped here for a number of years past and are all well-known mangels. In the following table they are arranged according to their richness in dry matter. The percentage of sugar, which as a rule, but not invariably, follows the dry matter-content, and the average weight of root, are also given.

ANALYSIS OF MANGELS, C. E. F., OTTAWA, ONT., 1910.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
Giant Yellow Intermediate	88·43	11·57	5·38	5	3
Prize Mammoth Long Red	88·50	11·50	5·84	4	8
Yellow Intermediate	89·04	10·96	5·59	5	2
Perfection Mammoth Long Red	89·21	10·79	5·14	5	14
Half Sugar White	89·90	10·10	3·95	5	4
Gate Post	90·41	9·59	4·26	6	8
Selected Yellow Globe	92·01	7·99	2·79	6	0
Giant Yellow Globe	92·20	7·80	2·74	6	13

Between the first and the last, the richest and the poorest of this series, considerable differences are to be noted. Thus, in dry matter we find a difference of 3·77 per cent, and in sugar of 2·64 per cent, from which we may conclude that the poorest variety is approximately one-third less nutritive than the richest. In so far as the nutrients are concerned, this means that one ton of the latter is equivalent to about 3,000 lbs. of the former.

Averages from the results of the past seasons are given in the following table:—

MANGELS—Yield and Average Composition, 1904-1910.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lbs.	Oz.	Tons.	Lbs.	p. c.	p. c.
1904	10	2	11	30	1,277	11·69	6·62
1905	17	3	9	39	369	10·04	4·67
1906	16	2	7	31	1,5[illegible]9	11·63	5·93
1907	10	2	11	27	680	12·64	7·46
1908	12	2	2	23	690	11·87	5·33
1909	14	3	5	28	920	11·21	6·21
1910	8	5	10	56	57	10·04	4·46
Average for 7 years, 1904-10	.....	.....		.....		11·30	5·81

It will be seen that in dry matter and sugar the mangels of 1910 fall considerably behind those of former years. In all probability this is to be attributed to the large size of last season's roots, the average weight being 5 lbs. 10 ounces, as compared with weights generally somewhat less than 3 lbs in previous years. The character of the season has naturally a great influence on the size of the root and the latter, as is well known, is an important factor in determining composition—the larger the root, other things being equal, the poorer its quality. The relation between weight of root and yield per acre is a fairly constant one when comparing crops under the same cultural treatment, a very large root will mean a heavy crop. In consequence we find a lower feeding value, weight for weight, when the yield is extraordinarily large than when the crop is a medium one.

INFLUENCE OF HEREDITY IN MANGELS.

For eleven seasons we have analysed the Gate Post and the Giant Yellow Globe, varieties representing two distinct types of mangels. The roots submitted to analysis have always been grown side by side so that as far as soil, seasonal and cultural conditions were concerned, the environment has been practically identical for both varieties. If characteristics of composition can be transmitted; if, in other words, heredity is a factor influencing the percentage of dry matter and the sugar content, evidence thereof should be forthcoming from the results of this investigation. The data are presented in the following tabular scheme:—

DRY MATTER AND SUGAR IN GATE POST AND GIANT YELLOW GLOBE MANGELS.

Season of Growth.	GATE POST.				GIANT YELLOW GLOBE.			
	Average Weight of One Root.		Dry Matter.	Sugar in Juice.	Average Weight of One Root.		Dry Matter.	Sugar in Juice.
	Lbs.	Oz.	p. c.	p. c.	Lbs.	Oz.	p. c.	p. c.
1900	.....		11·14	6·15	.....	.....	8·19	2·64
1901	2	9	9·41	4·15	3	3	9·10	4·08
1902	3	2	13·90	9·39	3	9	10·24	5·24
1903	3	3	12·93	7·38	3	13	10·89	6·17
1904	2	14	12·64	7·62	2	13	9·24	5·26
1905	2	13	12·07	6·83	3	12	8·64	3·55
1906	2	2	12·90	6·59	1	8	12·73	6·45
1907	3	10	12·53	7·25	2	7	10·78	6·34
1908	1	11	12·02	4·94	2	4	10·66	4·47
1909	3	14	11·82	6·64	3	7	10·95	5·82
1910	6	8	9·59	4·26	6	13	7·80	2·74
Average for 11 years	.....		11·90	6·47	.....		9·93	4·79

The Gate Post, it will be observed, has invariably proved the superior root; seasonal conditions and size of root have from year to year caused considerable fluctuations in composition, but the relative position of the two varieties under examination has always remained unchanged. This fact points unmistakably to the conclusion that the composition of a root is in a large measure controlled by hereditary influences, and lends weight to the view that improvement in field roots, as regards feeding value, might be brought about by well directed breeding experiments.

TURNIPS.

Ten varieties have been examined. The differences in composition are not so pronounced as in mangels, but are nevertheless sufficiently large to warrant the conclusion that all varieties are not of equal feeding value. In this series, one ton of the richest is equivalent in dry matter to 2,308 lbs. of the poorest.

ANALYSIS OF TURNIPS, C.E.F., OTTAWA, ONT., 1910.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
Perfection Swede	88·18	11·82	1·42	4	5
Halewood's Bronze Top	88·73	11·27	1·32	3	15
Hartley's Bronze	88·88	11·12	1·22	3	13
Good Luck	88·97	11·03	1·00	2	1
Hall's Westbury	89·02	10·98	0·90	2	15
Carter's Elephant	89·27	10·73	1·13	3	13
Jumbo	89·54	10·66	1·01	2	15
Magnum Bonum	89·49	10·51	0·51	3	12
Mammoth Clyde	89·64	10·36	1·33	5	8
Bangholm Selected	89·76	10·24	0·91	3	15

The roots of the past season were larger than usual and this, no doubt, furnishes the explanation for the somewhat low percentages of dry matter and sugar recorded in the foregoing table.

The averages for the past six years' work with this root are as follows:—

TURNIPS—Average Composition, 1905-1910.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lbs.	Oz.	Tons	Lbs.	p. c.	p. c.
1905	20	2	13	30	1,060	10·09	1·10
1906	20	1	10	15	1,890	12·18	1·78
1907	14	3	5	33	142	10·14	1·11
1908	13	3	12	27	1,033	9·87	1·52
1909	13	2	10	29	512	11·30	1·43
1910	10	3	11	31	565	10·87	1·07
Average for 6 years, 1905-10						10·78	1·33

Though probably no direct relationship exists between size of root and composition, these data indicate clearly that the smaller roots are the richer; almost invariably increase in size is accompanied by decrease in dry matter content, when individual roots of the same variety are compared, and, in a large degree, this observation also holds true when comparing averages from a number of varieties, from crops of different seasons.

CARROTS.

The five varieties examined and here reported on are among those which have been grown and analysed for a number of years past.

ANALYSIS of Carrots, C.E.F., Ottawa, Ont., 1910.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lbs.	Oz.
Ontario Champion	89·04	10·96	5·92	1	3
Half Long Chantenay	89·64	10·36	3·44	2	1
Improved Short White	89·85	10·15	2·33	1	3
Mammoth White Intermediate	89·97	10·03	3·25	2	1
White Belgian	90·62	9·38	1·22	1	3

While the differences in dry matter content, throughout the series, are not large, considerable variations in sugar—the chief nutrient—may be observed. It would appear from this, as from previous work, that there is not the same close relationship between dry matter and sugar in carrots as is found in other farm roots.

The average results for the past six years are appended.

CARROTS—Average Composition, 1905-1910.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lbs.	Oz.	Tons.	Lbs.	p. c.	p. c.
1905	11	1	3	25	1,510	10·25	2·52
1906	10	1	2	19	1,605	10·59	3·36
1907	6	1	1	24	1,517	10·30	3·02
1908	6	1	3	22	133	10·89	3·34
1909	6	1	0	17	1,680	10·40	2·39
1910	5	1	9	34	1,640	10·17	3·23
Average for 6 years, 1905-10						10·43	2·96

It is interesting to note, comparing the results from the commencement of the investigation, that the annual averages for dry matter and sugar—and more especially for the former—are so close.

SUGAR BEETS FOR FACTORY PURPOSES.

The three leading varieties of sugar beets—Vilmorin's Improved, Klein Wanzleben and Très Riche—have, in accordance with our custom for many years past, been grown on the several Experimental Farms and Stations. The sugar-content, co-efficient of purity and other data, obtained from the roots grown during the past season, are tabulated as follows:—

SUGAR BEETS grown on the Dominion Experimental Farms, 1910.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of One root.		Yield per Acre.	
				p.c.	Lbs	Oz.	Tons.	Lbs.
Vilmorin's Improved	Charlottetown, P.E.I...	14·54	17·88	81·3	2	14	14	809
	Nappan, N.S.....	18·24	20·49	89·0	1	1	11	1,760
	Ottawa, Ont..... ...	18·72	21·49	87·1	1	5	23	500
	Brandon, Man.....	19·23	21·89	87·8	1	11	12	552
	Lacombe, Alta.....	13·40	17·37	77·1	1	11	6	1,728
	Agassiz, B.C.....	19·92	21·37	93·2	0	13	13	400
Klein Wanzleben...	Charlottetown, P.E.I...	13·96	16·83	82·9	1	9	14	1,832
	Nappan, N.S.....	16·13	18·43	87·5	0	13	10	1,625
	Ottawa, Ont.....	16·43	19·40	84·7	1	5	24	100
	Brandon, Man.....	18·87	22·09	85·4	1	9	13	1,192
	Lacombe, Alta.....	12 94	16·63	77·8	1	11	5	1,220
	Agassiz, B.C.....	20·08	22·03	91·1	0	14	11	440
Très Riche.....	Charlottetown, P.E.I...	14·26	17·26	82·6	2	6	18	1,372
	Nappan, N.S.	14·92	17·40	85·8	1	1	13	1,225
	Ottawa, Ont.....	14·18	16·80	84·4	2	2	28	800
	Brandon, Man.....	17·11	22·19	77·1	1	3	8	1,424
	Lacombe, Alta.....	11·73	15·40	76·1	1	12	6	1,728
	Agassiz, B.C.....	17·55	19·11	91·8	0	14	9	1,965

With the exception of the beets grown at Lacombe, Alta., the roots generally have given very satisfactory results. Considering sugar-content and purity, those from Agassiz, B.C., stand at the head of the series, closely followed by the beets grown at Brandon, Man., Nappan, N.S., and Ottawa, Ont. No doubt the small size of the root recorded for Agassiz—less than a pound—may account in some measure for the very superior quality of the beets from that Farm.

Again climatic conditions at Lacombe (Northern Alberta) have been unfavourable to good returns. This is the fourth season of the investigation at this Experimental Station, and so far the results—both as to quality and yield—have not indicated the locality to be one suitable for the profitable culture of this crop.

By an unfortunate oversight, beets for analysis were not received from Indian Head, Sask., and Lethbridge, Alta.

Averages from the three varieties for the past nine years are presented in the following table:—

AVERAGE Percentage of Sugar in Juice in Sugar Beets grown on Experimental Farms, 1902-1910.

Locality.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
Charlottetown, P.E.I.	.....	.....	.....	.....	.....	.....	.....	.....	14·25
Nappan, N.S	15·87	15·33	14·41	16·52	17·08	.....	17·53	16·74	16·43
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37	15·44	16·30	14·84	16·44
Brandon, Man.	.....	11·36	16·62	11·09	15·50	16·99	15·82	18·83	18·40
Indian Head, Sask.	15·15	16·54	15·24	14·94	14·91	15·92	15·66	17·16	.....
Lethbridge, Alta., irrigated	.....	.....	.....	.....	.....	.....	16·09	17·91	.....
" " non-irrigated	.....	.....	.....	.....	.....	.....	16·73	18·36	.....
Lacombe, Alta	.....	.....	.....	.....	.....	13·34	11·21	12·77	12·69
Agassiz, B.C.	.....	17·44	8·10	17·32	14·23	17·65	17·15	18·30	19·18

The results do not differ materially from those of 1909. They clearly indicate that beets of superior quality for factory purposes may be grown at widely distant points in the Dominion.

FODDERS AND FEEDING STUFFS.

The official examination of Feeding Stuffs being now under the direction of the Inland Revenue Department, this laboratory has been relieved from the necessity of analysing samples of this character, generally, though analyses are still made in connection with our own feeding experiments or to obtain data of general interest. In the subjoined figures, the results are given of a few brands of oil cake and cotton seed cake that it has been found desirable during the past year to submit to examination.

COMPOSITION OF OIL CAKE AND COTTON SEED MEAL.

Laboratory No.	Name.	Particulars.	Moisture.	Crude Protein.	Fat or Oil.	Carbohydrates.	Fibre.	Ash.
			p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
8015	Oil Cake	Sherwin-Williams Paint Co.	8·85	34·06	8·73	.....	.....	5·13
8016	"	Dominion Linseed Oil Co.	8·59	36·19	11·93	.....	.....	5·22
8658	" meal	" "	.....	31·31	7·62	.....	.....	.....
8681	Linseed meal	Sherwin-Williams Paint Co.	.....	37·75	8·47	.....	.....	.....
7749	Cotton Seed meal	R. Cummings	.....	39·06	7·23	.....	.....	.....
8465	" "	Dominion Feed Co.	6·89	37·31	6·73	29·80	13·13	6·14
8603	" "	DixieBrand, Humphreys, Godwin Co., Memphis, Tenn.	.....	37·81	7·39	.....	.....	.....
8835	" "	Humphreys, Godwin & Co., Memphis, Tenn	6·44	39·88	8·74	.....	9·57	.....
8836	" "	The American Cotton Oil Co., St. Louis, Mo.	6·59	39·00	7·74	.....	8·76	.....
8874	" "	Bartlett Co., Detroit.	7·60	40·81	7·30	.....	8·63	.....
8875	" " cake	H. S. Conn, Ottawa.	9·13	19·94	9·28	.....	23·95	.....
8938	" "	" "	10·96	21·02	10·60	.....	23·47	.....

The oil cakes and oil cake meals have always been found genuine and of good quality, though, as might be expected, differences in protein and oil-content have been noticed. The present samples, while all genuine, similarly exhibit differences in

nutritive value, making it highly desirable to purchase on guaranteed analysis as to protein and oil-content. From the results tabulated, it will be observed the range in protein is from 31·3 to 37·7 per cent, and in oil from 8·4 to 11·9 per cent.

Considerable care and scrutiny should be exercised in purchasing cotton seed cakes and cotton seed meals, since great variations in composition exist among the many brands on the market, not a few of which have been found of very inferior quality. These inferior grades are characterized by the presence of excessive amounts of hull discernible as dark, coarse, hard fragments, or by containing cotton fibre, very easily detected from the woolly appearance of the meal or of the cake when freshly broken. Much hull or husk is most undesirable, as it means a meal not only low in protein and oil but one of impaired digestibility and possessing marked astringency. Good cake or meal from thoroughly decorticated (hulled) seed should not contain more than seven per cent of fibre, with a protein-content of about 40 per cent and 8 to 10 per cent of oil. A few years ago, 15 per cent of oil was not uncommon. Undecorticated cake, made from the unhulled seed, may not contain more than 25 per cent protein and perhaps 5 per cent of oil, with an excessive amount, 20 to 30 per cent. of fibre.

The presence of cotton fibre arises from imperfect 'ginning' the fine downy layer immediately covering the seed being somewhat difficult to remove. It is a most objectionable feature, not merely in lowering the amounts of the important nutrients present but rendering the meal undesirable generally, and quite unsuitable as a feeding material for young stock.

Of the samples recently examined the greater number are of very fair quality. though the data make it evident that a guarantee as to protein, oil and fibre is necessary even when purchasing meal or cake of high grade. Thus, for example, comparing Nos. 8465 and 8836, the former possesses but 1·7 per cent protein and 1 per cent oil less than the latter. We notice, however, a very decided difference in fibre which most markedly emphasizes the superior feeding value of the latter sample.

Samples of undecorticated meals, Nos. 8875 and 8939 are distinctly inferior grades. Their protein-content is practically but half that in good brands, and their fibre is excessively high, due to the presence of both hulls and cotton. Though careful inspection would have revealed their inferior character, it would have been impossible to classify or rank properly such samples without the analytical data and hence we again urge purchasers to insist on a certified or guaranteed analysis, carefully comparing the figures of competing brands with the standards here outlined. A very considerable saving may frequently be effected, not necessarily by buying the cheapest brand in the market, but one presenting the greatest food value for the money. It is the analysis that furnishes the very best basis for comparison, and in this case we must not only look for high protein and oil but also see that the fibre-content is not excessive, remembering that a high percentage not merely lowers the content of the more valuable nutrients, but at the same time depresses their nutritive value.

BURNET—*(Poterium Canadense).*

This forage plant has been used in Newfoundland as sheep pasturage, for which according to our correspondent, Mr. Chas. Dodd, The Log Cabin, Nfld., it has a good reputation. He writes 'this plant forms the bulk of my sheep pasture and I should be glad to know its true feeding value. I believe it is the plant that causes our cariboo to fatton so quickly. It gives a big crop from the middle or end of May till late in the autumn.'

As received, the sample consisted of stems with leaves attached, quite green, fresh and succulent. The plants had been cut close to the ground and were about 18 inches in length. When air-dried they were found to be brittle, but not tough, and apparently not unusually fibrous. Our analysis afforded the following data:—

ANALYSIS OF POTERIUM CANADENSE.

Constituents.	Sample as Received.	Results calculated to Water-free Basis.
	p.c.	p.c.
Water	80·24	.....
Protein	3·87	19·62
Fat or oil	·24	1·20
Carbohydrates	4 11	20·80
Fibre	9·75	49·34
Ash	1·79	9·04
	100·00	100·00

Judged from the standpoint of composition, this plant compares favourably with many forage grasses of recognized value. Cut at the stage of growth represented by this sample—well grown but not in flower (cut May 22)—its hay would contain about 16 per cent protein, which must be considered very satisfactory.

The feature to which objection might be urged is the somewhat high fibre-content. This constituent would increase not only in amount but in indigestibility as the season advances, and therefore early cutting is to be advised, when the crop is intended either for the silo or to be made into hay. Besides this deterioration in food value, there would no doubt be also a falling off in palatability.

In response to our request for information regarding experience with this fodder in the United States, Dr. A. C. True, Director, Office of Experiment Stations, Washington, D.C., writes: 'The presumption is the *Poterium canadense* has considerable nutritive value, but we do not recall any experiments which have been made to determine its true value as a feedstuff, and we do not know of any one who can give you the information desired.'

'*Poterium canadense* differs but little from *P. sanguisorba*, the common Burnet. The latter at one time had quite a reputation for sheep pasturage, but it is now considered inferior to sainfoin.'

FERTILIZING MATERIALS.

'NATURAL FERTILIZER.'

Under this name we received, during the early summer months of 1910, several samples, both in the ground and unground condition, of a rock held to possess distinct value as a fertilizer. Though our correspondents lived in various parts of the maritime provinces, it was evident that all the samples were originally from a deposit or deposits in the neighbourhood of Dunvegan, Inverness county, Nova Scotia. Sales of it, in the finely ground condition, were reported in many districts in Nova Scotia, and a considerable quantity had been disposed of for fertilizer purposes in Prince Edward Island. The prices quoted varied from $4 to $14 per ton—the price, presumably, being largely influenced by the freight charges. As in certain localities this material was receiving wide advertisement and the reports concerning its practical value were conflicting, it was thought desirable to submit it to analysis and publish the data for the benefit of maritime farmers.

The rock as quarried is a dark gray, laminated shale, showing many small fossils; it is fairly soft, and may be readily reduced to a powder. The analytical data from the examination of three samples of this material are as follows:—

COMPOSITION OF 'NATURAL FERTILIZER.'

Constituents.	A.	B.	C.
	p. c.	p. c	p. c.
Organic and volatile matter	12·55	12·01	13·48
Mineral matter insoluble in acid	43·28	54·53	59·69
Oxide of Iron and Alumina	9·50	12·69	12·87
Carbonate of Lime	30·23	19·56	14·00
Sulphate of Lime	2·94	.....	.....
Phosphate of Lime	·77	·68	·80
Carbonate of magnesia	·82	·28	?
Undetermined	.....	·25	.....
	100.09	100·00	100·84
Phosphoric Acid	·35	·32	·37
Nitrogen, in organic matter	·18	·16	·13

This rock contains, it will be seen, considerable, though somewhat variable, amounts of carbonate of lime and organic matter. The amounts of phosphoric acid and nitrogen do not exceed those in many soils, and as regards availability are certainly not more valuable. Potash is absent, or practically so. It is evident, therefore, that this material is not in any sense comparable to commercial fertilizers, which are characterized by notable percentages of nitrogen, phosphoric acid and potash, more or less immediately available for plant growth.

Though not a fertilizer in the ordinary acceptation of the word, this rock in the finely ground condition might act as an 'amendment' for certain classes of soils.

The benefit from its use would be due chiefly to the carbonate of lime it contains, and to some extent possibly to the influence it would exert on the physical condition or texture of the soil. It might, for these reasons, be expected to improve peaty and muck soils, heavy clay loams, those which are sour, ill-drained and all those naturally deficient in lime. These benefits are, of course, those which might be expected from any ordinary limestone applied in a fine condition.

LIMESTONES.

Attention has been directed in recent years to the agricultural value of finely-ground limestone, not merely to furnish lime when the soil is deficient in this element, but to correct sourness, promote nitrification and improve tilth. While we have as yet very little direct testimony in Canada on the use of ground limestone, we may safely predict a favourable response when applied to such soils as we enumerated when speaking of the use of the so-called 'Natural Fertilizer,' quarried and ground in Nova Scotia. It must not, however, be supposed to act as a panacea for all soil troubles, nor can its use alone be expected, even when a good rotation is followed, to maintain fertility. It does not supply humus-forming material (so necessary for the conservation of moisture and the 'life' of the soil) as do the farm manures, nor does it contain the more important elements necessary for plant growth—nitrogen, phosphoric acid and potash—as do both manures and fertilizers. It cannot, therefore, be regarded in any sense as a substitute for these, nor as we have pointed out, can it be regarded as a newly discovered material that can solve satisfactorily all soil problems. Experience throughout the known agricultural world has made very clear the high fertility of soils naturally rich in lime and the excellent character of the crops and of the stock raised thereon. It has also taught us concerning the use and abuse of lime; how it may be used occasionally to advantage, but also how its exclusive and

continued employment has worked disaster. From history, therefore, we can learn something as to the part that ground limestone may play in economic agriculture. We have no doubt it will in time find a place in Canadian farming and prove of great value to those whose soils are, from the chemical or physical standpoint, in need of lime; but to those who would place sole reliance upon it as a means of increasing and maintaining soil fertility, we do not hesitate to say that the end will be disappointment and loss.

Inquiries are also received from time to time as to the qualities of certain limestones to be used in the preparation of Lime-sulphur wash, the purity of the lime employed in this manufacture being a matter of considerable importance.

To furnish information as to the suitability of certain limestones for the purposes we have discussed, analyses of several samples have been made, the data of which are as follows:—

COMPOSITION of Limestones from New Brunswick.

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Rock matter, insoluble in acid	·05	·21	3·03	1·74	3·02	2·68
Oxide of Iron and Alumina	·13	·34	1·23	1·06	1·03	0·31
Carbonate of Lime	99·59	99·77	96·41	95·88	96·50	97·13
Carbonate of Magnesia	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.
	99·77	100·32	100·67	98·68	100·55	100·1

No. 1—From quarry of P. & G., St. John, N.B.
2— " S. C. & Co., St. John, N.B.
3— " R. B. & Co., St. John, N.B.
4— " C. M., St. John, N.B.
5— " L. R., Brookfield Station, N.B.
6— " L. R., Brookfield Station, N.B.

No very marked difference exist among these limestones, and all may be considered of good quality. The practical freedom from magnesia indicates their suitability for the manufacture of lime to be used in the preparation of the Lime-sulphur wash. The value of these analyses lies chiefly in the fact that the samples examined were all taken from quarries about St. John, N.B., which, it is stated, supply all the lime used in New Brunswick and a considerable part of Nova Scotia.

A sample from Grand Forks, B.C., afforded the following data:—

Carbonate of lime	94·32	per cent.
Carbonate of magnesia	·12	"
Oxide of iron and alumina	·76	"
Mineral matter insoluble in acid	4·90	"
	100·10	"

This is evidently a good quality limestone and one suitable for all agricultural purposes.

A sample sent from Victoria, B.C., had the following composition:—

Carbonate of lime	80·47	per cent.
Oxide of iron and alumina	·70	"
Mineral matter insoluble in acid	18·51	"
Undetermined (by difference)	·32	"
	100·00	"

The somewhat large amount of insoluble rock matter present renders this a limestone of fair quality only.

LIME.

The following data were obtained on a sample of lime being used in Wolfville, N.S., in the manufacture of Lime-sulphur wash:—

Lime (CaO)	96·50	per cent.
Magnesia (MgO)	very slight traces	
Mineral matter insoluble in acid	·91	"

This lime had slightly carbonated, due to exposure to the air, but may be considered a good sample and one quite suitable for the purpose specified.

REFUSE LIME FROM BEET SUGAR FACTORY.

This sample of waste lime, used in the purification of sugar, was forwarded from Wallaceburg, Ont. It was found to have the following composition:—

Moisture	3·32	per cent.
Carbonate of lime	82·32	"
Oxide of iron, magnesia (by difference)	1·58	"
Mineral matter insoluble in acid		
Organic and volatile matter	12·78	"
	100·00	"
Nitrogen	·35	"

Practically, this refuse is carbonate of lime with some 12 per cent of organic matter extracted from the beet juice in the purification process. It would prove of value for all soils deficient in lime, as well as for those that are sour and ill-drained. It contains a small amount of nitrogen, which would be of some agricultural value, but for practical purposes this refuse could only be considered as an amendment equal in merit to marl of good quality.

MARL.

During the year several samples of this naturally-occurring amendment have been analysed

ANALYSIS of Marls.

Constituents.	No. 1.	No. 2.	No. 3.	No. 4.
	p. c.	p. c.	p. c.	p. c.
Moisture	.....	·60	5·08	.....
Carbonate of Lime	34·4	88·87	79 30	88·75
" Magnesia	.....	·75	·33	.....
Oxide of Iron and Alumina	3 6	1·50	·79	.....
Clay, sand, etc.	58·2	3·62	3·28	1 50
Organic matter, etc., (by difference)	3·8	4·66	11·22	.....
	100·00	100 00	100 00	.....
Nitrogen	.....	·324	·47	
Phosphoric Acid	.....	trace.	trace.	

No. 1.—A deposit from Mabou Harbour Mouth, N.S., containing about one-third of its weight of carbonate of lime. Though of somewhat poor quality, it is likely to prove of value for soils needing lime.

Nos. 2 and 3 are shell marls of excellent quality, from the neighbourhood of New Richmond, Quebec.

No. 4.—A very good shell marl from S. R., Grey county, Ontario.

Marl is an amendment of considerable value for all soils that would be chemically or physically benefited by lime. It may be used to improve the texture or tilth of both heavy clays and sandy loams, to neutralize sourness and promote nitrification, and as a supplier of lime (an element necessary for plant growth) for all soils deficient in that constituent. From these functions, marl, it will be seen, may be used to advantage on a very large class of soils, but it cannot be regarded as a substitute for barnyard manure. Neither can it rightly be styled a fertilizer, a term restricted in commerce to those materials which furnish one or more of the essential constituents of plant food—nitrogen, phosphoric acid and potash.

Marl is known sometimes, agriculturally, as 'mild lime,' and this term is justified largely by the fact that an excessive application does not work that injury to the soil which follows large applications of quick or caustic lime.

GYPSUM OR LAND PLASTER.

Gypsum is a naturally-occurring sulphate of lime, and samples of good quality show very little foreign matter. When crushed or ground it forms the well-known land plaster. Three samples are now reported upon.

ANALYSIS of Gypsum.

——	No. 1.	No. 2.	No. 3.
	p.c.	p.c.	p.c.
Sulphate of Lime	92·79	93·82	46·19
Mineral matter insoluble in acid	2·76	·12	53·53
Undetermined	4·45	6·06	·28
	100·00	100·00	100·00

No. 1.—Windsor Plaster Co., Windsor, N.S.

No. 2.—Great Northern Mills, Cape Breton, N.S.

No. 3.—Forwarded by farmer at Beloeil, Que.

Nos. 1 and 2 are samples of excellent quality, but No. 3 is decidedly inferior, containing more than half its weight of insoluble rock matter.

Land plaster must be regarded as an amendment rather than as a fertilizer, and its agricultural value will depend largely on the nature of the soil and the character of the crop to be sown. Though furnishing lime for the growth of crops it is of no value to correct sourness, and therefore cannot be used in the place of lime, ground limestone or marl, on soils suffering from acidity. It improves the physical condition of heavy clay loams and of soils affected with 'black alkali.' Its chief value, however, would appear to lie in its ability to liberate potash from the inert stores in the soil, and it is for this reason probably that its application has proved beneficial to legumes, and especially to clover and peas. The best way to use it is through the stable. If sprinkled daily on the floor it will perform a most valuable service in preventing loss of ammonia from the liquid portion of the manure, and, of course, will eventually find its way to the soil with the application of the manure.

MUDS.

The samples of these materials examined since the issue of the last report are briefly discussed in the following paragraphs:—

Laby. No. 8776.—From Elliott Vale, P.E.I., and underlying a deposit of black, swamp muck. As received it furnished the following analytical data:—

Moisture	18·73	per cent.
Organic and volatile matter	31·15	"
Carbonate of lime	42·33	"
Clay, sand, etc.	6.64	"
Undetermined	1·15	"
	100·00	
Nitrogen	1·15	"

This 'mud' is especially rich in carbonate of lime.

Though not of the highest quality, it would be found useful for the improvement of soils deficient in lime and those poor in vegetable matter.

Laby. No. 8573.—From St. George, N.B. A typical 'mussel mud,' consisting of many mussel shells embedded in a matrix of clay rich in organic matter. The air-dried sample contained 24·90 per cent carbonate of lime and 14·98 per cent of organic matter. In fertilizing constituents the following results were obtained:—

Nitrogen	·417	per cent.
Phosphoric acid	·16	"
Potash	·25	"

This is one of the best samples of mussel mud we have examined, both as to lime and nitrogen content. An occasional application to soils requiring enrichment in these constituents would no doubt give a good return.

Laby. No. 8259.—From Pedder Bay, Metchosin, B.C. This was forwarded under the name of 'clam-shell mud,' though evidence of the presence of clams was not apparent. It is reported as covering the flats of the bay to a depth of six inches or so. It is very slimy, tenacious and has a disagreeable smell. Its application, according to accounts has usually resulted in increased yields. In the air-dried condition it afforded the following data:—

Moisture	2·18	per cent.
Organic and volatile matter	3·15	"
Carbonate of lime	3·55	"
Clay and sand	87·09	"
Phosphoric acid	·21	"
Potash	·14	"
Undetermined	3·68	"
	100·00	"
Nitrogen, in organic matter	·08	"

The amounts of plant food present are not larger than in soils of medium fertility. Possibly its value lies, in part, in its effect upon the physical condition of the soil and in part in the fair degree of availability of its fertilizing constituents.

Laby. No. 7656.—From Little Harbour, P.E.I. This was dug from the bed of a river. It consisted essentially of clay more or less rich in organic matter, with a few shells. Air-dried it contained 3·0 per cent of carbonate of lime and 16·94 per cent of organic matter. The nitrogen content was .78 per cent.

The value of this 'mud' would, in all probability, be most apparent on light soils, poor in humus. As it is so low in manurial elements, its profitable use would be largely governed by the expense in digging and putting on the land.

MUCKS.

Laby. No. 8039.—Swamp muck from a deposit 7 to 10 feet in depth, on the Nashwaak River, near Fredericton, N.B. Its analysis, after air-drying, furnished the following figures:—

Moisture	8·43	per cent.
Organic matter	49·46	"
Clay, sand, etc. (by difference)	42.11	"
	100·00	"
Nitrogen, in organic matter	1·50	"

Though not a muck of the highest quality, it might be worth using on soils that are not well supplied in humus. By composting the muck, as with barn-yard manure, its value no doubt would be enhanced; in the crude, raw condition, its application would not be likely to give any immediate response.

Laby. Nos. 8387-8.—Two mucks from Cambridge Station, N.S. The following data were obtained on the air-dried samples:—

MUCKS FROM CAMBRIDGE STATION, N.S.

Constituents.	No. 8387.	No. 8388.
	p.c.	p.c.
Moisture	8·36	7·73
Organic and volatile matter	83·30	84·48
Clay, sand etc. (by difference)	8·34	7·79
	100·00	100·00
Nitrogen, in organic matter	1·78	1·73

These are good mucks, though somewhat peaty in character. If first used as a litter or composted, their plant food would be rendered more available.

Laby. No. 8623.—A muck from West Summerland, B.C. As received, it had the following composition:—

Moisture	17·52	per cent.
Organic and volatile matter	59·74	"
Carbonate of lime	13·15	"
Clay, sand, etc.	8·62	"
Undetermined	·97	"
	100·00	"
Nitrogen, in organic matter	1·95	"

The distinguishing features of this sample are the high lime-content and the richness of its organic matter in nitrogen.

Laby. No. 8645.—Muck from S.R., Grey County, Ontario:—

Moisture	4·13	per cent.
Organic and volatile matter	14·59	"
Clay, sand, etc	70·80	"
Undetermined	10·48	"
	100·00	"
Nitrogen, in organic matter	·38	"

This, is properly speaking, not a muck, but rather a soil rich in vegetable matter, and one that if well drained and worked should give good results.

Laby. No. 8389. From Churchill, Ont. This sample of muck or muck soil, afforded the following analytical data:—

Moisture	8·37	per cent.
Organic and volatile matter	35·74	"
Clay, sand, etc. (by difference)	55·89	"
	100·00	"

Fertilizing constituents—

Nitrogen	1·38	"
Phosphoric acid	·34	"
Potash	·22	"
Lime	2·92	"

This might also be classed as a soil, though considerably richer in vegetable matter than the foregoing sample. Its successful culture would, in the first place, depend upon good drainage.

PEAT.

Two samples of prepared peat from the Government bog at Alfred, Ontario, were submitted to analysis with a view to determining their agricultural value.

Analysis of Peat.

—	No. 1. — Laboratory No. 8661.	No. 2. — Laboratory No. 8662.
Moisture	24·07	27·78
Organic and volatile matter	71·23	67·81
Mineral matter or ash	4·70	4·41
	100 00	100·00
Nitrogen	1·28	1·27
Composition of Ash—		
Mineral matter insoluble in acid	19·30	17·46
Oxide of Iron and Alumina	23·30	20·20
Lime	23·80	25·00
Phosphoric Acid	·80	·60
Potash	·65	·48

A sample of the ash of peat, as produced in an open grate, was forwarded with an inquiry respecting its manurial value as compared with wood ashes. It gave the following data:—

Lime	26·45	per cent.
Phosphoric acid	·80	"
Potash	·69	"

Though distinctly inferior to good, unleached wood ashes, it is evident that the peat ashes have a fertilizing value, and would be found more particularly useful for soils deficient in lime.

CREMATORY ASHES.

Two samples of ashes from the crematory at Vancouver, B.C., were received in September (No. 1), and October (No. 2), 1910, with a request for information as to the fertilizing value of this refuse.

ANALYSIS OF CREMATORY ASHES.

Constituents.	No. 1. — Laboratory No. 8240.	No. 2. — Laboratory No. 8401.
	p. c.	p. c.
Moisture	1·45	·93
Organic and volatile matter	6·24	5·70
Insoluble mineral matter	41·23	42·15
Mineral matter soluble in acid (by difference)	51·08	51·22
	100·00	100·00
Fertilizing constituents—		
Nitrogen	·041	·087
Phosphoric Acid	1·40	1·81
Potash	·92	1·27
Lime	19·90	19·74

The percentages of phosphoric acid and potash are such as to give the ashes a distinct value as a source of these elements of plant food, but it is as a material rich in lime that it must be chiefly regarded. It should prove a useful amendment for soils naturally deficient in lime, sour, ill-drained soils and muck or peaty lands, and also for improving the tilth of heavy clay loams. The larger proportion of the lime exists as carbonate, and as such is well adapted for application to most soils.

Two samples of ashes from this crematory were analysed in 1896, and a very marked difference between them and those now reported upon—more especially in phosphoric acid—is to be observed.

FERTILIZING CONSTITUENTS IN CREMATORY ASHES.

(Pounds per ton.)

—	1896.		1910.	
	A.	B.	No. 1.	No. 2.
Phosphoric Acid	233	26	28	36
Potash	35	43	18	25

The large phosphoric acid content of the 1896 samples (collected in August and November) is accounted for by the fact that a very considerable proportion of the garbage then burned consisted of bones. From the present samples it may be concluded that the bones are now otherwise disposed of, and as a result the crematory ashes are the poorer.

ASHES FROM REFUSE PAPER, SWEEPINGS, ETC.

Laby. No. 7786.—In the following data are given the fertilizing value of ashes from the burning of waste paper, floor sweepings, etc., etc., as resulting from the daily cleaning of a large educational institution in Quebec province. The figures no doubt are fairly representative of material of this kind:—

Moisture	·64	per cent.
Organic and volatile matter	9·30	"
Mineral matter insoluble in acid	71·37	"
Mineral matter soluble in acid (by difference)	18·69	"
	100·00	"
Nitrogen	·17	"
Phosphoric acid	·34	"
Potash	·64	"
Lime	4·87	"

The results indicate a very low fertilizing value, but the ashes would on some soils—both heavy and light—be of additional use from their lime-content.

SOOT.

A sample of soot, Laby. No. 7706, taken from the bottom of a large power-house chimney, St. John, N.B., has been examined. Coke, it is stated, was the principal fuel used.

Moisture	6·74	per cent.
Organic and volatile matter	49·19	"
Ash	44·07	"
	100·00	"
Nitrogen	1·76	"
Phosphoric acid	·14	"
Potash	·27	"

A sample of soot collected last summer from a chimney in one of the residences on the Experimental Farm, Ottawa, the fuel used being hard coal, gave 1·53 per cent nitrogen; and one from St. Catharines, Ont., 1·04 per cent nitrogen.

The chief fertilizing value of soot lies in the nitrogen it contains which is very largely present as sulphate of ammonia, a form readily available for plant growth. It contains, in addition, small quantities of phosphoric acid and potash. Soot is a variable material, and particularly so as to its nitrogen-content, and hence samples obtained under different circumstances have often widely different values.

Its principal use has been as a top dressing for cereals and pastures. It is also employed in the greenhouse and garden, where it acts beneficially both as a fertilizer and in preventing the attack of certain pests.

WHEAT STRAW ASH.

Over large areas in the Northwestern provinces, the only practical method at present of disposing of the large amount of straw from the wheat fields is by fire. The straw may be burnt in large piles and, again, may be used as fuel for threshing

machines. From the agricultural standpoint, the burning of straw is a wasteful process, depriving the land of considerable amounts of nitrogen and humus-forming material, which with the aid of stock would naturally enrich the soil. But it may be asked, is there any loss of mineral matter—ash constituents—in the burning of the straw? To answer this inquiry we submitted to analysis a sample of the clinker ash obtained by a correspondent at Macleod, Alta. The ash heap had been formed by the burning of large quantities of wheat straw. The sample was quite black, of a vitreous, lava-like character and brittle. On analysis it was found to have the following composition:—

Organic and volatile matter (chiefly carbon)	17·95	per cent.
Mineral matter insoluble in acid (chiefly silica)	76·39	"
Oxide of iron and alumina	·64	"
Lime	·39	"
Magnesia	·37	"
Potash	4·06	"
Phosphoric acid	·19	"
Undetermined	·01	"
	100·00	"
Potash, by lixivation with cold water	·425	"
Potash, after treatment with caustic lime and lixivation with water	·461	"

While it is quite evident that this ash has a decided fertilizing value, chiefly from its notable percentage of potash, it is equally evident since wheat straw contains from 10 per cent to 15 per cent of potash, that there has been a very considerable loss in this element, due to volatilization in the burning of the straw or to subsequent leaching of the ash heap by rain.

SEA-WEED.

In several of our former reports (1894, 1901, 1905) we have called attention to the manurial value of the sea-weeds as cast up both on the Atlantic and Pacific coasts of the Dominion, giving data as to their composition and indicating how they may be profitably used by those whose farms are not too far distant from the shore. We are fully aware that large numbers of farmers, more especially in Nova Scotia, are cognizant of the worth of sea-weed, and employ it liberally in the upkeep of the fertility of their soils, but we also know there are very many who could readily obtain this sea manure at small cost but who, possibly from ignorance as to its value, neglect to gather it.

Our results in the past have pointed to considerable variation in composition among sea-weeds, so that certain species appear to be much richer in the fertilizing elements than others; and, further, it has been shown that the composition of any particular species or kind may vary markedly with the season at which it is collected. It was to obtain further information of a definite character respecting the manurial value of a number of varieties occurring in the lower St. Lawrence that the following analyses have been made. The samples were collected towards the end of October at Isle Verte, on the south shore of the river, 131 miles below Quebec, the sea-weeds being taken out of the water at some little distance from the shore, allowed to drain until apparently free from all mechanically held water and forwarded to the laboratory in hermetically sealed jars.

A brief description of the sea-weeds examined, with their scientific and common names, has been kindly furnished by Mr. H. T. Güssow, Dominion Botanist.

No. 1. *Fucus vesiculosus,* L. Common Bladder Wrack.—This is one of the larger and commoner sea-weeds. The body of the plant (thalus or 'frond') is dark brown or almost black in colour and much branched, the method of branching being a repeated forking of a branch or segment into smaller ones. The whole plant may reach a length of three feet and the segments a breadth of two inches. Each branch is a ribbon-like structure with a distinct mid-rib. It is usually provided with prominent air-bladders, spherical or more usually elongated in form, arranged in pairs, one on each side of the mid-rib so as to form two regular rows.

No. 2. *Ascophyllum nodosum,* (L), Le Jolis.—This is somewhat similar to the preceding but the branching is more of a feathery (pinnate) type, the thallus branches have no mid-rib and the air-bladders are arranged in a single row along the middle line of each.

No. 3. *Porphyra laciniata,* (Lightf.) Ag.—In this species, the thallus is extremely thin and delicate, being almost transparent in places. It is broad and somewhat leaf-like in form, and irregularly slit or indented into a number of lobes; the margins wavy; the colour bluish or greenish with various shades of brown or red-purple, often becoming violet in drying. The entire plant is from four to six inches in length.

No. 4. *Laminaria longicruris,* Dela. Pyl.—This resembles Nos. 1 and 2 in being a brown sea-weed but is totally different in form. The frond is a long, flat expansion resembling the blade of a leaf, and supported below by a tough and very flexible stalk. This in turn is attached at its base to a root-like organ. The blade is without any mid-rib or air-bladders and the margin may be more or less wavy.

ANALYSIS OF FRESH SEA-WEED.

	No. 1. *Fucus vesiculosus.*	No. 2. *Ascophyllum nodosum.*	No. 3. *Porphyra laciniata.*	No. 4. *Laminaria longicruris.*
	p. c.	p. c.	p. c.	p. c.
Water	88·29	75·14	79·42	88·30
Organic matter	7·61	19·30	15·15	7·15
Ash	4·10	5·56	5·43	4·55
	100·00	100 00	100·00	100·00
Nitrogen	·182	·273	·928	·251
Phosphoric Acid	·037	·070	·068	·134
Potash	·615	·619	·619	1·546
Lime	·194	·421	·545	·075
Value per ton	$1.27	$1.63	$3.86	$2.56

Very considerable differences are to be noted in the water-content, and hence in the 'dry matter,' of these varieties. This is possibly explained in part by differences in the stage of growth or maturity of these sea-weeds at the time of collection. It is of interest to note that while the varieties differ so widely in their organic matter content, they do not show corresponding differences in ash; thus we have, comparing the extremes in organic matter (7·15 and 19·30) a difference proportionately twice that found between the extremes in ash (4·10 and 5·56). We do not find that the percentage of dry matter is any sure indication of relative fertilizing value, for No. 4 with 11·7 per cent dry matter contains 1·546 per cent potash, while No. 2 with 24·86 per cent, contains less than one-half that amount, namely, ·619 per cent potash. This variation will be more apparent when considering the data given in the next table, in which is considered the composition of the dry matter. Of the varieties now com-

pared, *Porphyra laciniata* is by far the richest in nitrogen and *Laminaria longicruris* the richest in potash. In phosphoric acid, the percentage of which is always low in sea-weed, the differences are not of the same economic interest.

The difference in total ferttlizing value of the sea-weeds has been brought out by assigning to their nitrogen, phosphoric acid and potash the prices given to these elements in commercial fertilizers, and the results of the calculation give figures ranging from $1.27 to $3.86 per ton.

SEA-WEED—Composition of Dry Matter.

—	No. 1. — *Fucus vesiculosus.*	No. 2. — *Ascophyllum nodosum.*	No. 3. — *Porphyra laciniata.*	No. 4. — *Laminaria longicruris.*
	p. c.	p. c.	p. c.	p. c.
Organic matter	64·98	77·63	73·61	61·11
Ash	35·02	22·37	26·39	38·89
	100·00	100·00	100·00	100·00
Nitrogen	1·56	1·09	4·50	2·14
Phosphoric Acid	·32	·28	·33	1·14
Potash	5·25	2·48	3·00	13·21
Lime	1·66	1·69	2·64	·64

In the above table, the composition of the dry matter of the sea weeds is given. Nos. 1 and 4 are fairly similar as regards organic matter and ash, and the same may be said respecting Nos. 2 and 3. In the former group the ash constitutes about one-third and in the latter about one-fourth, of the dry matter.

The nitrogen-content of the dry matter varies greatly, and consequently the air-dried sea weeds would possess widely different values from the standpoint of a nitrogenous fertilizer. *Porphyra laciniata* is exceptionally high in nitrogen, while *Laminaria longicruris* contains twice as much as *Ascophyllum nodosum,* which is the poorest of the series.

In phosphoric acid the first three members of the series are much alike, containing an amount approximately one-fourth that in the *Laminaria.* Sea weed is not generally regarded as a phosphatic fertilizer, though no doubt its ready decay in the soil makes the small amount of phosphoric acid contained quickly available and hence valuable.

Sea-weed is essentially a potassic manure, though, as we have seen, it also furnishes a notable amount of nitrogen. The percentages of potash in the dry matter of the specimens analysed, it will be observed, vary very considerably, from 2·48 per cent in the *Ascophyllum* to 13·21 per cent in the *Laminaria,* the latter apparently being an exceptionally high result.

The fertilizing value of sea-weed is enhanced by its ready decomposition in the soil; it quickly liberates its constituents in forms available for plant nutrition. Though furnishing a considerable amount of organic matter, its decay does not probably add much to the humus-content of the soil, so complete may be its decomposition. For the reason that its plant food is so readily available, there is no necessity for allowing it to rot before application to the soil. Little loss, however, can ensue if composting is resorted to by mixing it with good manure, muck or other material which would absorb the decomposition products. On the whole, however, its immediate incorporation with the soil would appear to be the best plan.

Piling it on the sea shore and allowing it to partially dry out will certainly lessen the haulage to the field, but it must be remembered that if during this process it is exposed to heavy rains, much of its potash will be washed out and lost. The weathering of sea-weed has been demonstrated to be a wasteful process.

Sea-weed can be used for all classes of crops, but those most benefited are roots, vegetables and others which produce an abundance of foliage, since it is essentially a potassic and nitrogenous fertilizer. This latter fact prompts the suggestion that if a complete fertilizer is required it should be supplemented by an application of superphosphate or basic slag.

Dried, Ground Sea-weed.—Some months ago we received from a correspondent a sample of dried, ground sea-weed prepared, according to statement, from 'Rock Weed' (probably *Fucus furcatus*), gathered on the Nova Scotian coast and dried at a gentle heat. The object had been to produce from sea-weed a fertilizer sufficiently rich in plant food to allow of inland transportation, and which could conveniently be applied to the land. It was a coarse, dark-green powder, and one which might, we think, be readily broadcasted or applied by the fertilizer attachment of the drill.

ANALYSIS.

Moisture	9·48	per cent.
Organic matter	72·61	"
Mineral matter or ash	17·91	"
	100·00	"
Nitrogen	1·32	"
Phosphoric acid	·29	"
Potash	2·26	"
Lime	1·72	"

These data are fairly in accord with those obtained from the analysis of fresh Rock weed, calculated to the same moisture-content as the sample examined. We may conclude, therefore, that there had been no marked losses in the plant food constituents during the drying of the weed, and I think we may further safely infer that the operation has not impaired their availability.

Attempts have been frequently made in Europe to prepare an easily-handled, concentrated fertilizer from sea-weed, but it would appear that so far mechanical and other difficulties have been such as to prevent the manufacture of the material being a profitable undertaking.

DOG FISH SCRAP.

Since 1905 at the request of the Department of Marine and Fisheries, we have annually analysed samples of the dogfish scrap from the government reduction works in the maritime provinces. Two samples from the works at Canso, N.S., received at the laboratory in December, 1910, furnished the following data:—

ANALYSIS.

	No. 1.	No. 2.
	p.c.	p.c.
Moisture	3·15	5·32
Nitrogen	9·41	9·50
Phosphoric acid	4·05	3·56
Total mineral matter	11·85	11·01
Mineral matter insoluble in acid	·74	·07
Oil	26·50	25·11

These samples are essentially the same and practically of equal fertilizing value. The data agree fairly closely with those obtained in previous years, and show that this material is to be regarded more particularly as a nitrogenous fertilizer. It is, however, one, also, that may furnish a notable amount of phosphoric acid. Valuing its nitrogen at 13c., and phosphoric acid at 5c. per pound, No. 1 is worth $29.02, and No. 2, $28.26, per ton.

The use of dogfish scrap on the farm and in the garden has been dealt with in previous reports, and various formulæ have been given for the preparation of fertilizers to meet special needs. For information of this character the reader is more particularly directed to the report of this Division for 1906.

INSECTICIDES AND FUNGICIDES.

LIME-SULPHUR WASHES.

This spray continues to grow in popularity, both as an insecticide and a fungicide. With many orchardists, its use has entirely taken the place of Bordeaux mixture. At first employed simply as a winter spray on dormant wood to destroy scale insects, it is now still more widely, in a diluted form, coming into favour for summer use to combat the attacks of injurious fungi.

The tendency now among orchardists is to purchase the commercial concentrated article rather than to go through the somewhat troublesome operation of preparing the wash on the farm from its constituents, lime and sulphur. The commercial wash keeps well if air is carefully excluded, and simply requires dilution to be ready for use. In the annual report of this Division for 1908 and 1909, the whole subject of these lime-sulphur sprays has been discussed, giving formulæ and directions for the home preparation of the wash and the composition of the more important commercial brands on the market.

The analyses given in the subjoined table have been obtained from the examination of certain samples sent in during the past year. They represent, for the most part, the composition of brands newly introduced on the Canadian market.

LIME-SULPHUR WASHES.

Laboratory No.	Brand or Manufacturer.	Specific Gravity.	Sulphur in Solution.	
			Total.	As Sulphide.
			p. c.	p. c.
8181	Acadia brand, Wolfville, N.S.	1·191	15·51	13·31
8182	Niagara brand, Burlington, Ont.	1·306	21·97	21·60
8840	Lion brand, Brooklyn, N.Y.	1·300	26·09	25·39
8910	Acadia brand, Wolfville, N.S.	1·302	25·72	25·33
8934	Pendray & Sons, Victoria, B.C.	1·301	26·58	26·12
8935	Victoria Chemical Co., Victoria, B.C.	1·300	25·36	24·83
8936	Ortho Lime-sulphur solution, Calif. Spray Chemical Co.	1·311	26·26	25·70

No. 8181.—This sample was from one of the first batches made at the recently established factory at Wolfville, N.S. It is seen to be decidedly lower in sulphur-content than the brands now generally put upon the market. Possibly this inferiority

in quality was the result of faulty preparation. That it was not the intention of the manufacturers to sell a wash of inferior quality may, we think, be deduced from the figures of No. 8910, a sample of the same brand sent in some two months later and which was found to be quite satisfactory and of normal strength.

The sample of Niagara brand (No. 8182) is practically identical in composition with that previously analysed, indicating a carefulness to obtain, from year to year, uniformity in strength.

No. 8840.—The Lion brand, manufactured by the James A. Blanchard Company, Brooklyn, N.Y. This is a satisfactory and well-made wash, of full strength both as regards total sulphur and that present as sulphides.

Nos. 8934, 8935 and 8936, are brands sold in British Columbia, the first two being of Canadian manufacture and the last imported from California. The data indicate that these samples are very similar in composition and of full strength. Relatively they would be placed in the order of their 'sulphur as sulphide' since it is upon the soluble sulphides that the efficiency of the spray depends.

A determination of the total soluble sulphur-content and that of the sulphur present as sulphide requires chemical analysis, but it may be of some assistance to the orchardist to remember that a well-made, full strength lime-sulphur wash is of a deep orange-red colour, clear or with very little sediment.

ARSENATE OF LEAD.

The composition of the better-known commercial brands of Arsenate of Lead and the preparation of the home-made article, were discussed in the report of this Division for 1909. No general examination of the brands of this insecticide has been made during this past year, but an example of faulty preparation, resulting in an impure product, having been brought to our notice we were able by analytical work and advice to assist the manufacturer in eventually turning out a satisfactory product of full strength.

Another case brought to our notice was that of an impure lead arsenate, which contained a very large percentage of free arsenious acid and consequently was quite unsuitable for use as an insecticide. This, on our representations, was withdrawn from the market.

In addition to the foregoing, three brands not hitherto reported on by us have been analysed, the results being as follows:—

ANALYSIS OF ARSENATE OF LEAD.

Constituents.	Laboratory No. 8180.	Laboratory No. 8839.	Laboratory No. 8949.
Water	49·99	40·17	50·00
Total arsenic oxide	14·73	14·60	12·65
Total lead "	31·56	41·38	31·80
Soluble impurities	2·98	2·00	4·83
Insoluble " (by difference)	·74	1·85	·72
	100·00	100·00	100·00
Soluble arsenic oxide	·14	·44	·21
" lead "	nil.	nil.	nil.

Laby. No. 8180—Merrimac Chemical Co., Boston, Mass., U.S.A.
" 8839—Lion Brand, Jas. A. Blanchard Co., N.Y., U.S.A.
" 8949—Acadia Brand, Wolfville, N.S.

As regards moisture content, Nos. 8180 and 8949 are practically identical, but the former is somewhat the more satisfactory brand of the two, being richer in arsenic and containing less soluble impurities. No. 8839 is also a genuine and well-made brand and quite satisfactory as to strength and purity.

THE FERTILIZING VALUE OF RAIN AND SNOW.

The fourth year's work in this investigation closed on February 28, 1911. The data obtained, together with the precipitation results, allow us to calculate, approximately, the amount of combined nitrogen furnished to the soil per acre, in the vicinity of Ottawa, for the year preceding that date. In the following table are recorded the totals for the precipitation, the average amounts of nitrogen present in the three forms and the pounds of nitrogen per acre so supplied.

RAIN and Snow at Ottawa for the Year ending February 28, 1911.

Month and Year.	Precipitation in Inches.			Nitrogen.				Pounds of Nitrogen per Acre.
	Rain.	Snow.	Total as Inches of Rain.	In Free Ammonia.	In Albuminoid Ammonia	In Nitrates and Nitrites.	Total.	
1910.				p.p.m.	p.p.m.	p.p.m.	p.p.m.	
March	·99	4·50	1·44	·381	·520	·420	1·321	·431
April	2·06	.....	2·06	·412	·223	·295	·930	·434
May	1·86	.....	1·86	·767	·096	·253	1·116	·470
June	1·24	.....	1·24	·374	·064	·202	·640	·180
July	2·38	.....	2·38	·805	·133	.373	1·311	·707
August	4·32	.....	4·32	·613	·078	·269	·960	·940
September	2·06	.....	2·06	·575	·072	·365	1·012	·472
October	3·69	·75	3·76	·496	·037	·244	·777	·662
November	·85	9·50	1·80	·353	·050	·160	·563	·230
December	.....	16·50	1·65	·525	·077	·140	·742	·277
1911.								
January	02	15·50	1·57	·338	·051	·088	·477	·169
February	·20	26·25	2·83	·163	·132	·171	·466	·299
Total for 12 months	19·67	73·00	26·97	.....	.....	.....	.....	5·271

The total precipitation for the year was 26·97 inches, practically 10 inches below the average for this locality. The rainfall was 19·67 inches and the snowfall 73·00 inches, both considerably less than usual. The precipitation during the four months—April, May, June and July—though fairly well distributed was very much lighter than for the same months during the past four years and the totals for November and December are also decidedly lower than those which we have hitherto recorded for these months.

The total amount of nitrogen furnished per acre for the year is 5·271 pounds, about one pound more than we obtained for the first year of observation, but markedly less than the abnormally high results obtained for the year ending February, 1909, (8·364 pounds per acre), which were accounted for by the fact that for two months of the summer of 1908 the atmosphere in this vicinity was heavily charged with smoke from bush fires. The present figure (5·271 lbs.) is practically the mean of the quantities recorded for the two years 1908 and 1910 (5·596 lbs.) as may be deduced from the results in the following tabulated statement:—

PRECIPITATION AND AMOUNT OF NITROGEN PER ACRE, OTTAWA, 1908-1911.

—	Rain in Inches.	Snow in Inches.	Total Precipitation in Inches.	Pounds of Nitrogen per Acre.
Year ending February 29, 1908	24·05	133·0	37·35	4·322
" " 28, 1909	22·99	96·25	32·63	8·364
" " 28, 1910	28·79	80·75	36·87	6·869
" " 28, 1911	19·67	73·00	26·97	5·271
Average for 20 years	25·23	91·58	34·39	

Of the total amount of nitrogen furnished per acre, 5·271 lbs., approximately 84 per cent, or 4·424 lbs. was furnished by the rain, and 16 per cent, or ·847 lbs. by the snow. These proportions (though not the amounts) are practically identical with those of the previous year.

AVERAGE NITROGEN-CONTENT OF RAIN AND SNOW.

(Amount of Nitrogen per acre, as Free and Albuminoid Ammonia and as Nitrates and Nitrites.)

—	Number of Samples Analysed.	Precipitation in Inches.	Nitrogen.								
			Parts per Million.				Percentage of Total.			Per Acre.	
			In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	Total.	In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	As Free and Albuminoid Ammonia.	As Nitrates and Nitrites.
										Lbs.	Lbs.
Rain	51	19·67	·575	·122	·295	·992	58	12	30	3·109	1·315
Snow	30	73·00	·286	·092	·134	·512	56	18	26	·624	·223

In the case of the rain, 70 per cent of its nitrogen appeared as free and organic ammonia, and 30 per cent as nitrates and nitrites. In the snow we find 74 per cent as free and organic ammonia and 26 per cent as nitrates and nitrites.

From the data in the above table, we also find that of the total amount of nitrogen per acre, 5·271 lbs., there are 3·733 lbs. present as free and albuminoid ammonia and 1·538 lbs. as nitrates and nitrites.

THE WATER SUPPLY OF FARM HOMESTEADS.

What is the nature of this supply? From correspondence and observation, we learn that on the larger number of farms it is still the shallow well, dug to a depth of say 9, 15, 25 feet, in the barn-yard, in one of the farm buildings, near the back door or in some similar location. Such wells are in great danger of pollution, by soakage through soil possibly saturated with excrementitious filth and from surface washing. We have enlarged in many of our former reports upon the menace to health from the

use for domestic purposes of a water charged with organic matter of an excretal origin and possibly, therefore, we need not here repeat in detail the dangers of a polluted supply. But we feel compelled to add that the more experience we gain the more we are assured that these wells do not long escape contamination. For a few years after the homestead is established the water may remain good, but sooner or later, according to the nature of the soil and other conditions, the ground becomes unable to perform its useful work of filtration and purification, allowing the water percolating through it to carry its load of manurial matter to the well. It seems almost inevitable that the shallow, unprotected well, situated as we have indicated, must become polluted. Some protection is assured by lining the well, say to a depth of 10 feet or so, with concrete or puddled clay several inches thick and protecting the mouth of the well against the entrance of surface water, frogs, etc., but it does not altogether remove the objection to shallow wells placed in proximity to sources of contamination.

The problem of finding an ample supply of pure, wholesome water may be in certain parts of the three Northwestern provinces a difficult one, and recourse must frequently be had to distillation to obtain water free from alkaline or saline matter and fit for drinking purposes. But in British Columbia, Ontario and eastern Canada generally, this difficulty does not exist, and on the majority of farms pure water of excellent quality may be obtained. This may at times be a matter of some expense, but it is money well spent, for there is nothing on the farm more valuable, looked at from any standpoint, than a never-failing supply of pure wholesome water. Apart from lakes, unpolluted streams and natural springs so situated that their waters must of necessity be pure, the farmer must look, in the larger number of instances, to the drilled, bored or driven well for his supply. By such means, he taps those subterranean reservoirs that yield water of the highest degree of organic purity and free from disease-producing germs. This is the class of wells we advise. These deep-seated waters are as a rule satisfactory in every respect, and we are glad to find them more and more replacing the shallow, barn-yard well on the Canadian farm homestead.

Our work in the examinations of waters from farms, cheese factories and creameries has been continued uninterruptedly from the establishment of the Experimental Farms. As a result, we have on record the analyses of several thousand well waters. This work is, we believe, bearing good fruit, in the improvement of supplies and in directing attention to the matter of the proper location of the well and its subsequent protection from contamination. Every year sees an increased correspondence from all parts of the Dominion on this important, indeed, vital subject, and the assistance we have been able to give, by advice and analysis, has, we feel, been of considerable value towards the establishment and maintenance of pure water supplies for the rural home. As far as may be possible or practicable, we are pleased to advise farmers in this matter, and those desirous of an analysis of their supply are asked to write to the Chemical Division, Experimental Farm, Ottawa, for a copy of the directions to be followed in the collection and shipment of the sample.

During the year 289 samples were received, but of these only 130 were submitted to a complete sanitary analysis. Of the remainder some were examined as to the presence of alkali or an excessive saline content, while many had to be rejected for the reason that in one particular or another the instructions had not been followed in the collection of the sample. The table of 'samples received,' on page 163, indicates the number sent from the several provinces.

In the appended table, the analytical data of the 130 waters, together with a brief pronouncement as to their quality, are given. We conclude that of these 43 were pure and wholesome, 36 suspicious and probably dangerous, 33 seriously polluted and 18 saline.

ANALYSES OF WELL WATERS, 1910-11.

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
1	Grenfell, Sask.	T.S.	April 11	·012	·450	·175	10·0	5432·0	4654·0	778·0	None	Saline.
2	Brandon, Man.	J.M.	" 12	·010	·055	·005	26·0	600·0	488·0	112·0	"	Suspicious.
3	Semans, Sask.	A.S	" 12	·065	·330	2·450	54·0	1668·0	1357·6	310·4	"	"
4	Harrisville, N.B.	A.M.N.	" 13	·020	·010	1·235	9·0	121·6	99·2	22·4	Free	Free from organic pollution.
5	Bathgate, Alta.	W.A.B.	" 29	·105	1·230	20·946	29·0	3326·0	3016·0	310·0		Saline.
6	Penticton, B.C.	E.G., No. 1	" 29	·012	·345	·039	4·5	466·0	364·0	102·0		Wholesome.
7	"	E.G., No. 2	" 29	Trace.	·210	Free.	4·5	432·0	354·0	78·0		"
8	Milner, B.C.	H.A.McD.	May 2	·680	·060	Trace.	500·0	1304·0	1249·6	54·4	Free	Saline.
9	Crystal City, Man.	R.G.	" 16	·065	·91	20·07	422·0	5232·0	4540·0	692·0	Hy. traces	"
10	Fulford, Que.	F.T.E.	" 21	·05	4·11	14·95	62·0	442·4	388·0	54·4	V. s. trace	Very seriously polluted.
11	Brightwater, B.C.	H.R.	" 23	·06	·06	·024	9·0	1523·2	1224·8	298·4	Free	Wholesome.
12	Lake Coteau, Sask.	P.S.H.	" 25	·26	·08	·094	6·0	769·6	689·6	80·0	"	Suspicious.
13	Kirk's Ferry, Que.	A.F.B.	" 31	·03	·23	1·342	Free.	141·6	85·6	56·0	Hy. traces	Free from pollution.
14	Lancaster, Ont.	D.McL.	" 31	·265	·070	·119	49·0	614·4	485·6	128·8	Trace	Very seriously polluted.
15	Vankleek Hill, Ont.	J.A.R.	June 2	3·38	·32	16·45	140·0	1190·4	1024·8	165·6	Sl. trace	Seriously polluted.
16	Almonte, Ont.	J.R.	" 4	·05	·03	·214	15·0	388·0	333·6	54·4	Free	Suspicious.
17	Carleton Place, Ont.	J.McK.	" 4	·345	·17	4·821	80·0	561·6	435·2	126·4	"	Very suspicious.
18	Salisbury, N.B.	P.J.G.	" 6	Trace.	·02	Trace.	6·2	288·8	272·8	16·0	"	Free from contamination.
19	North Bedeque, P.E.I.	A.F.	" 16	·04	·07	2·19	35·0	227·2	196·0	31·2	Trace	Very suspicious.
20	Hurdman's Bridge, Ont.	O.F.	" 16	·08	·95	8·499	186·0	1003·2	792·0	211·2	Free	Very seriously polluted.
21	Chelsea, Que.	P.C.	" 18	·03	·09	2·81	1·0	212·0	184·0	28·0	Trace.	Excellent.
22	Aylmer, Que.	G.C.W.	" 18	·02	·072	·082	6·0	117·6	94·4	23·2	"	Free from organic contamination.
23	City View, Ont.	J.W.	" 20	·17	·27	1·219	208·0	796·0	640·0	156·0	"	Very suspicious.
24	Almonte, Ont.	Dr. D.P.L.	July 2	·03	·10	7·082	14·0	505·6	427·2	78·4	"	Highly suspicious.
25	Lancaster, Ont.	D.McL.	" 8	·024	·07	·029	55·2	676·0	533·6	142·4	"	Suspicious.
26	Chedoke, Ont.	A.E.M.	" 15	Trace.	·086	3·27	112·0	1874·4	437·4	437·0		Polluted.
27	Kingsmere, Que.	J.G.	" 18	·044	·054	·432	4·8	98·8	76·8	22·0	Free	Suspicious.
28	Brandon, Man.	J.M.	" 18	·026	·070	·139	33·2	645·0	455·0	190·0	"	Very suspicious.
29	Chateauguay Bassin, Q.	H.E.B.	" 20	·307	·228	6·86	32·0	553·6	444·0	109·6	Hy. traces	Polluted.
30	Westboro, Ont.	W.S.	" 20	·065	·075	·105	19·2	414·4	302·4	112·0	Free	"
31	Cannington, Ont.	Mrs. W. J. C.	" 25	·345	·070	1·149	8·8	313·2	219·2	94·0	Sl. trace	"
32	Gananoque, Ont.	E. C.	" 30	·09	·03	·074	5·2	274·8	148·8	126·0	Free	Suspicious.
33	Alberta	D.D.K.	Aug. 4	4·99	·835	Free.	193·0	12472·0				Very saline.
34	Chateauguay Bassin, Q.	H.E.B.	" 6	·235	·12	2·76	20·8	496·8	317·6	179·2	Sl. trace	Contaminated.

ANALYSES OF WELL WATERS, 1910-11—*Continued.*

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
35	Kinburn, Ont.	W.G.	Aug. 10	·48	·15	·025	280 0	883·6	809·6	74·0	Free	Contaminated.
36	Winchester, Ont.	E.B.	" 15	·07	·05	3·664	211·0	897·6	618·0	279·6	"	Very suspicious.
37	Port Bruce, Ont.	J.E. McC	" 16	15·735	·04	·705	10800·0	25224·0	20076·9	5148·0	"	Strongly saline.
38	Winchester, Ont.	Mrs. R.W	" 16	Free.	·04	Free.	30·6	447·2	294·0	153·2	V. s. trace	Suspicious.
39	Aylmer, Que.	F.G.W.	" 17	·07	·03	·058	13·5	438·8	288·0	150·8	"	"
40	Sonya, Ont.	Mrs. R.W.	" 19	·02	·155	23·639	367·0	1740·0	1040·0	700·0	Trace	Probably seriously contaminated.
41	Irish Creek, Vernon, B. C.	E.G.	" 22	Free.	·04	Free.	2·6	526·0	333·0	193·0	Free	Free from pollution.
42	Woodlawn, Ont.	J.J.M	" 24	3·17	·115	Free	3880·0	9412·8	6882·4	2530·4	"	Saline.
43	Breboeuf, Q.	A.C., No. 1.	" 26	Free.	·066	·165	Free.	89·0	23·0	66·0	"	Free fr. pollution—wholesome
44	"	A.C., No. 2.	" 26	Free.	·03	·23	3·2	39·6	17·2	22·4	"	" "
45	Lynnfield, N.B.	A.B.G.	Sept. 7	·01	·02	·31	2·5	75·2	24·4	50·8	"	Free from contamination.
46	Aylmer, Que.	F.G.W.	" 7	·09	·02	·01	13·0	432·8	256·8	176·0	Sl. trace	Probably free from pollution.
47	"	W.H.McL.	" 7	·13	·07	·03	3·9	302·8	172·8	130·0	Free	Very suspicious.
48	"	J.L.G.	" 7	·06	·04	Free.	70·0	583·2	378·0	205·2	Hy. trace	Suspicious.
49	Brightwater, B.C.	C.H.L.	" 8	·03	·47	Free.	4·0	130·8	52·0	78·8	Free.	Free from contamination.
50	Lakeview, Que.	S.L.K., No. 1.	" 19	Free.	·07	1·11	7·0	374·4	294·4	80·0	"	Free from pollution.
51	"	S.L.K., No. 2.	" 19	Free.	·01	·74	4·0	306·0	192·8	113·2	"	" "
52	Irish Creek, Vernon, B.C.	E.G.	" 20	Free.	·025	Free.	Trace.	530·0	359·0	171·0	"	Excellent.
53	Dunham, Que.	Miss. A.J.H.	" 23	·06	·05	·58	2·5	162·0	108·0	54·0	"	Very suspicious.
54	Moore's Mills, N.B	G.O.D.	" 26	·02	·09	4·54	69·6	486·0	274·0	212·0	"	"
55	Elmsdale, P.E.I.	W.C.McK., No 1	" 30	Free.	·08	2·77	20·0	163·6	106·0	57·6	Hy. trace	Free from contamination.
56	"	W.C.McK., No 2	" 30	·02	04	4·53	40·0	264·8	132·0	132·8	"	Suspicious.
57	Theodore, Sask.	W.T.S.	" 30	·67	·09	1·65	160·0	2062·0	1680·0	382·0	Free	Contaminated.
58	Belleville, Ont.	J.T.B.	Oct. 7	3·81	·16	Free.	3000·0	5453·0	4340·0	1118·0	Trace	Strongly saline.
59	Okanagan Mission, B. C.	F.T.	" 10	Free.	·22	Free.	2·0	461·2	281·2	180·0	"	Free from contamination.
60	Sandwich, Ont.	A.B.	" 12	Free.	·22	·31	72·0	588·8	374·8	114·0	Free	Suspicious.
61	Hamilton, Ont.	W.A.	" 13	Free.	Free.	·17	7·0	2213·0	1956·5	256·5	"	Free from contamination.
62	Ottawa, Ont.	C.E.F.	Oct. 13	·004	·18	·10	·4	44·0	8·0	36·0	"	Wholesome.
63	Sutton, Que.	W.A.W., No. 1.	" 19	Free.	·04	·03	Free.	54·0	18·0	36·0	"	Free from pollution.
64	"	" No. 2.	" 19	Free.	·08	Free.	Free.	52·0	12·0	40·0	"	" "
65	Birchtown, Que.	J.O.B.	" 20	1·05	·14	Free.	7·0	198·0	132·0	66·0	Trace	Very suspicious.
66	St. Hyacinthe, Que.	M.M.St.J.	Nov. 2	4·17	·38	Free.	1550·0	3760·0	3578·8	181·2	Hy. trace	Saline.
67	Ottawa, Ont.	J.M.P.	" 2	Free.	·20	Free.	8·5	540·4	196·4	344·0	Trace	Suspicious.
68	Windthorst, Sask.	R.H.	" 2	·01	·02	·21	Free.	272·8	216·0	56·8	Free	Free from pollution.
69	Herbert, Sask.	P.M.	" 3	5·27	·77	Free.	75·0	5213·3	4666·0	547·3	Hy. trace	Saline.

70	Birchy Cove, Nfld.	B.M.	Nov.	4	Free.	·01	·07	Free.	89·6	33·6	56·0	Free	Free from contamination.
71	Bertdale, Sask.	G.P., No. 1.	"	7	·10	·08	Free.	17·0	520·7	376·0	44·7	"	Free from organic pollution.
72	"	" No. 2.	"	7	1·40	·07	·16	190·0	2514·7	2309·3	205·4	Sl. trace	Suspicious.
73	Maxville, Ont.	Dr D.McE., No. 1	"	7	·77	·36	Free.	24·5	490·0	396·0	94·0	"	Contaminated.
74	"	" No 2	"	7	·10	·60	·57	3·0	68·0	32·0	36·0	Trace	Very suspicious.
75	Priceville, Ont.	D.H.	"	12	·01	·24	Free.	4·5	266·0	96·0	170·0	Free	Free from pollution.
76	Bradford, Ont.	H.E.S.	"	14	Free.	·21	12·9	700·0	2428·0	2114·0	314·0	Sl. trace	Very suspicious.
77	Eldon Station., Que.	P.R.McE.	"	18	25·5	22·3	Free.	21000·0	42800·0	30760·0	12040·0	Free	Strongly saline.
78	St. Tite, Que.	P.C., No. 1.	"	19	·08	6·89	·05	250·0	900·0	530·0	370·0	Hy. trace	Seriously contaminated.
79	"	" No. 2.	"	19	6·88	1·05	·83	34·0	277·0	149·0	128·0	"	" "
80	St. Alphonse, Man.	H.M.	"	21	1·13	·08	Free.	14·5	2074·0	1658·0	416·0	Free	Polluted.
81	Mansewood, Ont.	Rev. W.L.M.	"	23	2·15	·09	Free.	126·0	664·0	564·0	100·0	Hy. trace	Contaminated.
82	Melton West, Ont.	W.M.	"	23	·33	·01	Free.	46·0	356·0	296·0	60·0	Free	Suspicious.
83	Bowesville, Ont.	L.S.M.	"	28	·016	·05	·07	4·6	270·0	187·5	82·5	"	Free from pollution.
84	L'Epiphanie, Que.	J.B.T.R.	Dec.	1	·75	·56	Free.	14·8	636·0	490·0	146·0	Hy. traces	Contaminated.
85	St. Tite, Que.	J.P.C.	"	5	8·04	1·23	Free.	72·0	339·6	218·0	121·6	"	"
86	Lochiel, Ont.	D.A.McM.	"	7	·04	·07	6·75	106·0	730·8	530·8	200·0	Free	"
87	St. Isidore de Prescott, Ont.	O.A.L., No. 10.	"	8	2·23	·29	Free.	40·0	522·4	.....	.....	Hy. traces	Seriously contaminated.
88	" "	" No. 15.	"	8	Free.	·17	Free.	16·0	422·0	296·0	126·0	"	Free from contamination.
89	Quill Lake, Sask.	H.S.P., No. 1.	"	20	·04	·17	Free.	15·0	1524·4	1186·4	338·0	Free	Saline.
90	" "	" No. 2.	"	20	·90	36	Free.	9·5	1170·4	949·6	220·8	"	"
91	Cummings Bridge, Ont.	M.C.	Jan.	11	6·2	·3	1·85	6800·0	10553·2	9963·2	590·0	"	Strongly saline.
92	Bowesville, Ont.	L.S.M.	"	25	Free.	·02	·02	2·5	241·2	149·6	91·6	"	Excellent.
93	Aylmer Road, Que.	L.D.S.	"	26	·01	·09	1·68	3·0	87·2	57·2	30·0	"	Probably wholesome.
94	Rose Corner, Ont.	V.B., No. 5.	"	27	1·38	·05	·90	26·5	433·0	327·0	106·0	Sl. traces	Contaminated.
95	"	" No. 8.	"	27	·15	·46	1·59	106·0	641·0	386·5	254·5	Hy. traces	"
96	Gatineau Point, Que.	W.C.E.	"	30	·04	·15	·14	2·0	49·6	10·0	39·6	"	Unpolluted.
97	Rockland, Ont.	"	"	30	·06	·045	1·31	8·5	482·4	396·4	86·0	Free	"
98	St. Hyacinthe, Que.	Sr. P.M.	"	31	·48	·05	Free.	66·0	587·2	400·0	187·2	Trace	Very suspicious.
99	Rockville, N.S.	M.H.H.	Feb.	4	·06	·63	2·24	66·0	233·6	166·0	67·6	Free	Decidedly suspicious.
100	Billings Bridge, Ont.	J.A.H.	"	7	·01	·03	2·19	70·0	436·0	346·0	90·0	"	Suspicious.
101	Renfrew, Ont.	J.B.L.	"	8	·03	·02	·81	4·0	252·0	152·0	100·0	"	Wholesome.
102	St. Isidore de Prescott, Ont.	H.W.R.	"	11	1·78	·28	Free.	190·0	960·0	866·8	93·2	Hy. traces	Very seriously contaminated.
103	Alexandria, Ont.	J.McM., No 1.	"	15	Free.	·19	14·52	250·0	1130·8	817·6	313·2	Free	" polluted.
104	"	" No. 2.	"	15	Free.	·06	2·97	18·0	356·8	300·0	56·8	"	Contaminated.
105	Gloucester, Ont.	E.A.H.	"	16	·62	·05	Free.	60·0	345·5	315·5	30·0	"	Very suspicious.
106	St. Dominique, Que.	N.N.	"	23	10·7	·164	Free.	4600·0	8420·0	7776·0	644·0	Hy. traces	Seriously polluted.
107	Dalmeny, Ont.	W.A.McC.	"	25	·68	·02	2·25	1600·0	3530·4	2406·4	1124·0	Free	Contaminated.
108	Merrivale Road, Ont.	J.R.B., No. 1.	"	27	Free.	Free.	·64	4·0	192·0	160·0	32·0	"	Free from organic pollution.
109	" "	" No. 2.	"	27	Free.	Free.	·07	6·0	298·8	226·8	72·0	Hy. traces	Free from pollution.
110	" "	H.J.R.	"	28	Free.	Free.	5·0	13·0	357·6	289·6	68·0	Free	"
111	Dalmeny, Ont.	W.A.McC.	Mar.	1	·68	·02	2·25	1600·0	3530·4	2406·4	1124·0	"	Suspicious.
112	Chelsea, Que.	D.G.G.	"	6	·01	·06	·06	1·5	85·2	51·2	34·0	"	Excellent.
113	Ottawa, Ont.	Y.M.C.A.	"	7	·002	·14	·14	2·0	58·0	20·8	37·2	"	Wholesome.
114	"	C.E.F.	"	7	·002	.13	·14	1·5	57·6	23·6	34·0	"	"
115	Ste. Rose de Lima, Que.	M.P.R.	"	8	12·94	·31	Free.	1100·0	20144·4	18244·4	1900·0	"	Strongly saline.
116	Lowe Farm, Man.	J.J.A.	"	9	8·0	1·20	Free.	2450·0	5246·6	3546·6	1700·0	"	"
117	Woodroffe, Ont.	R.E.H.	"	10	Free.	·04	1·40	27·5	383·5	283·5	100·0	Hy. traces	Decidedly suspicious.
118	Fassett, Que.	D.L.	"	11	3·52	·48	Free.	3800·0	6518·0	6009·6	508·4	Free	Saline.

ANALYSES OF WELL WATERS, 1910-11.—*Concluded.*

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
119	City View, Ont.	S.A., No. 1.	Mch. 13	Free.	·04	2·71	10·0	184·0	136·4	47·6	Free	Free from contamination.
120	"	" No. 2.	" 13	Free.	·07	1·01	22·0	280·0	196·4	83·6	"	Suspicious.
121	Grondines, Que.	J.A.T.	" 21	·89	·10	·19	40·0	515·2	406·0	109·2	"	Contaminated.
122	Notch Hill, B.C.	S.J.	" 22	1·58	·15	1·17	4·0	440·0	270·0	170·0	V. s. trace.	Probably contaminated.
123	Chatham, N.B.	A.N.McK.	" 22	Free.	·12	Free.	2·5	54·8	26·8	28·0	Free	Free from pollution.
124	Hurdmans Bridge, Ont.	P.H.C.	" 23	1·00	·07	Free.	30·0	574·8	453·2	121·6	V. s. trace.	Contaminated.
125	Rockland, Ont.	W.C.F.	" 25	Free.	·07	1·40	8·5	408·0	328·0	80·0	Free	Suspicious.
126	Ottawa South, Ont.	G.E.A.	" 27	Free.	Free.	8·50	10·5	354·4	206·4	148·0	"	Very suspicious.
127	St. Isidore de Prescott, Ont.	J.St.D., No. 5.	" 29	2·53	·02	Free.	12·0	435·0	300·5	134·5	Hy. traces.	Contaminated.
128	" "	" No. 8.	" 29	1·22	Free.	Free.	2·0	486·5	.....	.....	"	Free from drainage pollution.
129	" "	" No. 9.	" 29	Free.	Free.	2·31	30·0	497·0	296·0	201·0	Sl. traces.	Contaminated.
130	St. Thomas Lefaivre, Ont.	L.D.	" 31	3·18	·22	Free.	3300·0	5917·6	5480·0	437·6	Free	Saline.

REPORT OF THE DOMINION ENTOMOLOGIST

C. GORDON HEWITT, D.Sc.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the work of the Division of Entomology, with an account of certain of the insects whose depredations received our attention and concerning which advice was given during the year ending March 31, 1911.

During the past year, which is the second succeeding the establishment of a separate Division and the re-organization of the work, there has been a very great increase in the executive and administrative work in addition to that carried out in the field. This increase is indicated to a certain extent by the correspondence of the Division, which was more than double that of the previous year; 2,476 letters were received and 3,845 letters were despatched.

The most important step which has been taken in Canada with a view to combating insect and other pests and plant diseases has been the enactment of 'The Destructive Insect and Pest Act.' With the rapid growth of the country, large quantities of trees, plants and other vegetation classed as 'nursery stock' are being brought into Canada annually from all countries of the world. The importation of such vegetation means the introduction into Canada of insects, pests and plant diseases of various kinds, some of which, such as the San José Scale and the Brown-tail and Gipsy moths, have already inflicted enormous losses as a result of their introduction and subsequent spread in the United States and Canada. In view of this danger, it was of the utmost importance that measures should be taken to prevent, so far as it is practicable, not only the further introduction of seriously injurious insects, pests, and plant diseases but also the spread of such insects and other pests already established in the Dominion. The Act and Regulations issued thereunder will be found in the following pages. The action at present taken in virtue of the powers given under the Act may be briefly summarized as: the fumigation with hydrocyanic acid gas at the fumigation stations established at certain ports on the frontier under the San José Scale Act of 1895, of stock liable to be infested with that scale; the inspection of vegetation from Europe, Japan and six of the New England States liable to be infested with the Brown-tail and Gipsy moths and certain other injurious insects; and the carrying on of extermination work in localities where pests, such as the Brown-tail moth and San José Scale are already established.

A new fumigation and inspection station has been erected at Vancouver, B.C., to meet with the increase which is taking place in the amount of nursery stock imported into British Columbia, and to enable us to inspect stock at the port of entry. This inspection is carried on in conjunction with that required by the British Columbia Board of Horticulture and I am pleased to record the satisfactory manner in which the work has been accomplished. A conference with the Provincial Board of

Horticulture at which the Minister of Finance and Agriculture of British Columbia was present, was held in Victoria, B.C., on October 10, 1910, when I explained the workings of the Destructive Insect and Pest Act.

The work against the Brown-tail Moth is described in the succeeding pages. The situation is more serious owing to the increase in the area infested in Nova Scotia, and the invasion of that portion of New Brunswick adjoining the infested region of the State of Maine. The Division has now undertaken, with the co-operation of the Departments of Agriculture in Nova Scotia and New Brunswick, a systematic campaign against the moth and a thorough scout of the infested district is being made. A study of the insect and its parasites is being carried on and I hope to arrange with Dr. L. O. Howard, Entomologist of the United States Department of Agriculture, for the importation of useful parasites.

In order to increase the opportunities for making the work of the Division more useful to the farmers and fruit growers in Canada, arrangements have been made through the willing co-operation of the heads of other Branches of the Department for the receipt of information concerning injurious insects through their crop reports and correspondence. The Dairy and Cold Storage Commissioner, Mr. J. A. Ruddick, is asking for such information concerning the depredations of fruit insects from the reporters of the fruit crop; the Census and Statistics Branch, through the co-operation of Mr. Blue, reports on insects affecting farm crops from the crop reporters of the Branch. The Veterinary Director General, Dr. J. G. Rutherford, has kindly issued to the Veterinary Inspectors of the Branch, a circular which I prepared in reference to obtaining information concerning species of insects affecting live stock. Mr. R. H. Campbell, Superintendent of the Forestry Branch of the Department of the Interior is also obtaining information from his field officers concerning outbreaks of forest insects. This co-operation is certain to result not only in making the work of the Divtsion of value to a larger number of those whose interests are affected by injurious insects, but also in the accumulation of information and material which will be of very great value to us in our investigations. I should like again to express my indebtedness to these officers and also to those of the Provincial Governments for their co-operation and assistance from time to time.

Reference is made in the succeeding pages of this report to those insects whose injuries have been sufficiently serious to merit attention. Large numbers of the commoner insects are received with requests for advice as to their treatment. Attention should be called to the Narcissus Fly in British Columbia, an insect which has been imported on bulbs. The Larch Sawfly and the Spruce Budworm are being studied both in the field and in the laboratory and as these investigations are in progress, brief mention only is made of them. The control of these and other insects by means of their parasites is receiving special attention and it is becoming increasingly evident that in future we shall have to assist nature in re-adjusting the balance which man is constantly upsetting by cultivation and other means.

The following is a brief account of the visits which were made to the various provinces in connection with the work of this Division:—

At the beginning of the year (1910) I was in Nova Scotia in connection with the Brown-tail Moth extermination work, returning to Ottawa on April 6. From June 6 to June 25, I was absent in the United States to inquire into the extent of the danger existing with regard to the introduction of the Brown-tail and Gipsy Moths into Canada, and also to study the methods employed by the Federal and State Governments in combating these insects. The official and other entomologists at the following places were visited and consulted: New York Agricultural Experiment Station, Geneva, N.Y.; Cornell University, Ithaca, N.Y.; Department of Agriculture, Albany, N.Y.; New York where the State Entomologists of New Jersey and Massachusetts were met; Connecticut Agricultural Experimental Station and Yale University, New Haven, Conn.; Rhode Island Agricultural Experiment Station, Kingston, R.I.; Bussey Institution and Harvard University, Cambridge, Mass.; State Forestry Depart-

ment, Boston, Mass.; Gipsy Moth Parasite Laboratory, Melrose Highlands, Mass.; New Hampshire Agricultural Experiment Station, Durham, N.H.; Department of Agriculture, Augusta, Me.; Maine Agricultural Experiment Station, Orono, Me.; Vermont Agricultural Experiment Station, Burlington, Vt. I should like to express again my sincere thanks to those of my fellow-workers whom I met, for their kindness and help. One result of the inquiries made during the visits was the passing of a regulation by Order-in-Council, under the Destructive Insect and Pest Act, providing for the inspection of nursery stock from the States of Vermont, New Hampshire, Maine, Massachusetts, Connecticut and Rhode Island for the Brown-tail and Gipsy Moths.

The annual meeting of the Canadian Horticultural Association at St. Catharines, Ont., was attended on August 11 at the request of the Association to explain the Destructive Insect and Pest Act as affecting the importation of florist stock into Canada. As the result of a consideration of their representations some amendments in the regulations were made to obviate hardships which might otherwise occur.

On September 19 I left Ottawa for the western provinces and British Columbia in connection with the inspection and fumigation work of the Division and to discuss with the provincial Departments of Agriculture means of co-operation in respect of controlling injurious insects and reporting their occurrences, etc. In so wide a country such co-operation is essential and I am convinced that the meetings which I had will help to forward the work. By arrangement with the provincial and civic Medical Officers of Health I lectured in the following cities on the relation of house flies to public health: Winnipeg, Man.; Regina and Saskatoon, Sask.; Edmonton, Alta.; Vancouver, B.C.; and before the Natural History Society of British Columbia in Victoria, B.C. On Vancouver Island, the outbreak of the Spruce Budworm was again investigated, and I travelled as far as Nanaimo. This year I visited the Okanagan Valley and again passed through the Kootenay region. After visiting Lethbridge, Alta., I returned direct to Ottawa, arriving back on October 29.

The annual meeting of the Entomological Society of Ontario was attended on November 3 and 4. Mr. Gibson also attended and accounts of our work were given. On November 28 a public lecture was delivered at Halifax, N.S., on the Tussock and Brown-tail Moths, at the request of the citizens. I addressed the annual meeting of the Nova Scotia Fruit Growers' Association at Windsor, N.S., on November 29 and the annual meeting of the Prince Edward Island Fruit Growers' Association at Charlottetown, P.E.I., on December 1. After visiting Truro and Quebec I addressed the annual meeting of the Quebec Pomological Society at St. Hyacinthe, P.Q., on December 6.

The Canadian Forestry Association convention, which was held at Quebec on January 18 and 20, was attended and I delivered an illustrated lecture on the Spruce Budworm and Larch Sawfly. After the convention I visited the Chicoutimi region to study the outbreak of the Spruce Budworm, and afterwards, on January 31 to February 2, the depredations of the same insect were investigated in the Rouge River in the neighbourhood of St. Jovite and Trembling Mountain, P.Q., on which visit I was accompanied by Mr. G. C. Piché, Chief Forestry Engineer of the Forest Service of Quebec.

Full use has been made of the collections of Canadian insects belonging to the Division, by collectors, teachers and students of entomology in all parts of Canada. Slowly but surely we are arranging and building up the collection. I must again sincerely thank all those specialists in Canada and the United States, especially Dr. Howard and his staff of the Bureau of Entomology, at Washington, D.C., for their oft repeated kindnesses in determining material for us. Many of the injurious insects are being mounted in Riker cases for exhibition purposes and they have already proved of considerable assistance in educational work.

During the summer months, from May to October, w[illegible] occasional visits in the winter, the work of spraying in keeping in order the orc[illegible] of the Indian reserves in British Columbia has been carried on by the Division [illegible] Department of Indian

Affairs. Mr. Tom Wilson has been in charge of the work, and in addition to the actual work in the orchards he visited many of the schools where practical demonstrations on methods of orchard cultivation were given to the children. I am pleased to record the satisfaction that this work is giving, especially to those settlers whose fruit growing was previously jeopardized somewhat by the condition in which many of the neighbouring Indians maintained their orchards. The work is also proving beneficial to the Indians, a number of whose orchards are producing excellent fruit. Its further extension will be of undoubted value to the industry in the province.

I am pleased to have this opportunity afforded me of gratefully acknowledging the help and work of my Chief Assistant, Mr. Arthur Gibson. Mr. R. C. Treherne, B.S.A., and Mr. George E. Sanders, B.S.A., have been appointed as field officers in connection with the Brown-tail Moth inspection and extermination work, which duties they are carrying on in a most satisfatory manner. Of their work and of that of my secretary, Mr. J. A. Letourneau, I wish to express my cordial appreciation.

The war against insect pests becomes annually more serious. No group of animals affects man in so great a variety of ways. Their prevention, eradication and control make increasing demands for a more thorough knowledge of their life histories, habits and natural enemies, which can only be gained by careful study both in the laboratory and in the field. It is becoming more generally realized that methods to prevent and reduce losses entailed by insect attacks must necessarily accompany any system of soil culture, or utilization, whether it be on the farm, in the orchard or in the forest.

I have the honour to be, sir,
Your obedient servant,

C. GORDON HEWITT,
Dominion Entomologist.

DIVISION OF ENTOMOLOGY.

THE DESTRUCTIVE INSECT AND PEST ACT, 1910.

In May, 1910, Parliament passed 'An Act to prevent the introduction or spreading of Insects, Pests and Diseases destructive to vegetation.' The danger of the introduction of injurious insects, pests and plant diseases is probably greater in Canada than in any other country. This is due to the fact that, owing to the rapid development and opening up of the country, a large amount of vegetation of all kinds, trees, shrubs, seedlings, etc., is imported into Canada from countries in various parts of the world. All this vegetation, collectively termed 'nursery stock' is liable to be infested with insects and other pests and diseases which do not occur in Canada. Introduced in this manner, however, in many instances they become established. The seriousness of such an establishing of an introduced insect in a new country is enormously increased by the fact that their means of control in their native country, namely, their native parasites, are not usually brought with them. Their tendency, therefore, is to increase as we see the Gipsy and Brown-tail Moths increasing in the United States. It is estimated that 50 per cent of the insect pests in the United States are introduced insects. In Canada a number of introduced insects have already established themselves and in certain cases have resulted in great losses. The San José Scale, originally introduced into the United States, was first recorded in Canada about 1894; the Brown-tail Moth introduced into the State of Massachusetts about 1890 from Europe, was discovered in Nova Scotia in 1907; the Narcissus Fly, which would appear to be a native of Europe, has been introduced into British Columbia on bulbs from Holland. Numerous other instances of the introduction of injurious insects into Canada and their subsequent spread might be adduced, indicating this danger to which we are exposed.

The introduction of the San José Scale and the previous experience of its destructive powers in the United States were responsible for the passage of the San José Scale Act in 1898, which prohibited the importation of nursery stock from countries in which this scale occurred. In 1901 by an Order-in-Council, fumigation stations were established at six ports through which stock was allowed to enter at certain periods of the year after having been fumigated with hydrocyanic acid gas. Certain classes of stock, not likely to be infested with San José Scale, were exempt from fumigation.

Except for this power to fumigate certain classes of nursery stock at six of the ports of entry, the Federal Government had no authority to take action to prevent the introduction of further insect pests and the spreading of these, or of pests already in Canada. In 1909, winter webs of the Brown-tail Moth were found in Canada and the United States in shipments of nursery stock from France. As this insect had already established itself in Nova Scotia, it was important that the Minister should have the necessary powers to prevent the introduction of the pest into those parts of Canada not already infested. Accordingly, the Destructive Insect and Pest Act was passed, under which regulations could be issued providing for the prohibition of entry, fumigation on entry or inspection subsequent to entry, of nursery stock and defining other conditions under which nursery stock and other vegetation might be introduced into Canada. Regulations were passed by Order-in-Council in virtue of provisions of section 3 of the Act on May 1, and July 27, 1910. These regulations were rescinded by regulations passed by Order-in-Council on February 27, 1911.

The text of the Act and the regulations issued thereunder are as follows:—

THE DESTRUCTIVE INSECT AND PEST ACT.

AN ACT TO PREVENT THE INTRODUCTION OR SPREADING OF INSECTS, PESTS AND DISEASES DESTRUCTIVE TO VEGETATION.

(9-10 Edward VII., Chap. 31, assented to May 4, 1910.)

His Majesty by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as *The Destructive Insect and Pest Act.*

2. In this Act, unless the context otherwise requires, 'the Minister' means the 'Minister of Agriculture.'

3. The Governor in Council may make such regulations as are deemed expedient to prevent the introduction or admission into Canada, or the spreading therein, of any insect, pest or disease destructive to vegetation.

4. Such regulations may provide:—

(*a*) for the prohibition generally, or from any particular country or place, of the introduction or admission into Canada of any vegetable or other matter likely to introduce any such insect, pest or disease;

(*b*) the terms or conditions upon, and the places at which any such vegetable or other matter may be introduced or admitted into Canada;

(*c*) for the treatment and manner of treatment to be given to any vegetation, vegetable matter or premises in order to prevent the spreading of any such insect, pest or disease, and may prescribe whether such treatment shall be given by the owner or by a person appointed for such purpose;

(*d*) for the destruction of any crop, tree, bush or other vegetation or vegetable matter or containers thereof infested or suspected to be infested with any such insect, pest or disease;

(*e*) for the granting of compensation for any such crop, tree, bush or other vegetation or containers thereof so destroyed, such compensation not to exceed two-thirds of the value of the matter so destroyed and to be granted only by the Governor in Council upon the recommendation of the Minister.

(*f*) for the prohibition of the sale of any vegetable matter infected with any such insect, pest or disease;

(*g*) that the occupier of the premises on which is discovered any such insect, pest or disease shall forthwith notify the Minister and shall also send specimens of any such insect, pest or disease;

(*h*) for the confiscation of any vegetable matter and the container thereof, if any, in respect of which a breach of this Act, or any regulation made thereunder is committed and generally for any other purpose which may be deemed expedient for carrying out this Act, whether such other regulations are of the kind enumerated in this section or not.

5. The Minister may appoint inspectors and other officers for carrying out this Act and the regulations thereunder.

2. Such appointments, if not confirmed by the Governor in Council within thirty days of the date thereof, shall lapse and cease to be valid.

6. Any inspector or other officer so appointed may enter any place or premises in which he has reason to believe there exists any such insect, pest or disease, and may take specimens thereof and also any vegetable matter infested or suspected of being infested therewith.

7. The Minister, upon the report of any inspector setting forth a reasonable belief of the existence of any such insect, pest or disease in any area defined in such report, may prohibit the removal from such area or the movement therein of any vegetation,

vegetable or other matter which, in his opinion, is likely to result in the spread of such insect, pest or disease.

8. Every person who contravenes any provision of this Act, or any regulation made thereunder, shall be liable, upon summary conviction, to a fine not exceeding one hundred dollars, or to imprisonment for a term not exceeding six months, or to both fine and imprisonment. Any vegetable or other matter imported or brought into Canada contrary to this Act, or to any regulation made thereunder, shall be forfeited to the Crown.

9. Every Order-in-Council and regulation made under this Act shall be published in *The Canada Gazette,* and shall be laid, by the Minister, before Parliament within fifteen days after the commencement of the then next session.

10. *The San José Scale Act* is repealed.

Regulations issued under the Destructive Insect and Pest Act.

(By Order-in-Council of February 27, 1911).

1. 'Inspector' means a person appointed for carrying out the provisions of the Destructive Insect and Pest Act and the regulations made thereunder.

2. No tree, plant or other vegetation or vegetable matter infested with any of the insects, pests or diseases to which this Act applies, shall be imported into Canada, except as hereinafter provided.

3. Nursery stock, including all trees, shrubs, plants, vines, grafts, scions, cuttings or buds which are not hereinafter exempted, entering Canada shall be imported only through the ports and during the periods respectively hereinafter mentioned, that is to say:—

Vancouver, B.C., from October 1 to May 1.

Niagara Falls, Ont., from October 1 to May 15.

Winnipeg, Man., and St. John, N.B., from March 15 to May 15, and from October 7 to December 7.

Windsor, Ont., and St. Johns, P.Q., from March 15 to May 15, and from September 26 to December 7.

At these points of entry, the importations shall be fumigated in the fumigation houses provided for that purpose, and a certificate of fumigation will be issued, without which no stock may be taken out of bond.

Importations by mail shall be subject to the same regulations.

All nursery stock originating in Japan or in any one of the states of Vermont, New Hampshire, Maine, Massachusetts, Connecticut and Rhode Island, six of the United States of America, shall, after fumigation, be subject to inspection as provided by section 6 of these regulations.

Provided, however, that the following vegetation and florist's stock shall be exempt from fumigation and may be imported at any season of the year and through any port without inspection:—

(*a*) Greenhouse-grown plants, including roses in foliage which have been grown in pots up to three inches in diameter but not larger. A certificate that the plants have been grown under glass must accompany the invoice and shall be signed by the consignor.

(*b*) Herbaceous perennials (the stems of which die down in winter) such as perennial phlox, pæonies, sunflowers, etc.

(*c*) Herbaceous bedding plants (such as geraniums, verbenas, pansies, etc.)

(*d*) Bulbs and tubers (such as hyacinths, lilies, narcissi and other true bulbs and also the tubers of dahlias, irises, etc.).

(*e*) Cottonwood or Necklace Poplar (*Populus deltoides*) when shipped from and grown in Dakota or Minnesota, two or the United States of America.

4. The port by which it is intended that the nursery stock shall enter shall be clearly stated on each package, and all shipments made in accordance with these regulations will be entirely at the risk of the shippers or consignees, the government assuming no responsibility whatever.

5. All persons importing nursery stock, except such as is exempt from fumigation or inspection under section 3 of these regulations, shall give notice to the Dominion Entomologist, Experimental Farm, Ottawa, within five days of despatching the order for the same, and they shall again notify the Dominion Entomologist on the arrival of the shipment in Canada.

Notice shall also be given to the Dominion Entomologist by all transportation companies, custom house brokers or other persons importing or bringing into Canada nursery stock that is subject to inspection as hereinafter provided, immediately such a consignment is received by them. Such notice shall include the name of the consignor and the consignee, the points of origin and destination, the name of the company carrying the nursery stock, as well as the nature, quantity and origin of the same.

6. Nursery stock, not including such stock as is exempt under section 3 of these regulations, originating in Europe, shall be imported only through the ports and during the periods specified under section 3 for stock requiring fumigation, with the addition of the ports of Halifax, N.S., Sherbrooke, P.Q., and Montreal, P.Q., through which ports such European stock may enter from September 15 to May 15. Such European nursery stock, and such other imported vegetation as the Minister may determine, entering Canada, shall be exempt from fumigation, but shall be inspected either at the port of entry or at its destination to which it may be allowed to proceed, but in the latter case it must not be unpacked except in the presence of an inspector.

7. If, on inspection, nursery stock or other vegetation or vegetable matter is found to be infested with any of the insects, pests or diseases hereinafter specified, it shall be destroyed to the extent deemed necessary by the inspector and in his presence. All cases, packages, and packing in which such stock has been contained shall also be destroyed in the same manner.

8. Any inspector entering any lands, nursery or other premises where there is reason to believe that any of the insects, pests or diseases hereinafter specified are or may be present, shall give instructions for the treatment or destruction of any tree, bush, crop or other vegetation or vegetable matter or the containers thereof, which may be found or suspected to be infested with any of the insects, pests or diseases hereinafter specified, and such instructions shall be carried out by the owner or the lessee of the infected or suspected vegetation, vegetable matter or containers thereof, and such remedial treatment shall be carried out and continued until the insect, pest or disease shall be deemed by the inspector to have been exterminated.

9. Compensation, not exceeding two-thirds of the value assessed by the inspector, of the vegetation or vegetable matter or containers thereof destroyed by the instructions of an inspector, shall be granted by the Governor in Council upon the recommendation of the Minister.

10. It shall be illegal to sell, offer for sale or in any way dispose of or receive any trees, shrubs or other plants, vegetable matter or portions of the same, if the same are infested with any of the insects, pests or diseases hereinafter specified.

11. The owner, occupier or lessee of any premises or place where any of the insects, pests or diseases specified herein shall be found, shall immediately notify the Minister, and shall also send to him specimens of such insects, pests or diseases.

12. The destructive insects, pests or diseases to which the said Act shall apply shall include the following:—

The San José Scale (*Aspidiotus perniciosus*).
The Brown-tail Moth (*Euproctis chrysorrhœa*).
The Woolly Aphis (*Schizoneura lanigera*).
The West Indian Peach Scale (*Aulacaspis pentagona*).

The Gipsy Moth (*Porthetria dispar*).
Potato Canker (*Chrysophlyctis endobiotica*).
Parasitic diseases affecting potatoes externally or internally.
Branch or Stem Canker (*Nectria ditissima*).
Gooseberry Mildew (*Sphærotheca mors-uvæ*).
White Pine Blister Rust (*Peridermium strobi*).

13. The importation of potatoes into Canada from Newfoundland or the Islands of St. Pierre or Miquelon is prohibited.

14. The Minister may, upon special request to that effect, authorize the importation into Canada of any insect, pest or disease hereinafter specified, but for scientific purposes only.

15. The regulations made under the *San José Scale Act* are repealed.

BROWN-TAIL MOTH.

The work directed against the Brown-tail Moth (*Euproctis chrysorrhœa*) has again comprised the inspection of all shipments of European and certain other classes of imported nursery stock for the winter webs or nests of the insects, and, in addition, the inspection of the areas infested or liable to be infested in Nova Scotia and New Brunswick.

INSPECTION OF IMPORTED NURSERY STOCK.

The inspection of shipments of European nursery stock was concluded at the end of May last (1910), and as it was in progress at the close of the previous fiscal year, it was impossible to report upon it at an earlier date. In eastern Canada over two and a half million plants and trees were examined and 310 winter webs of the Brown-tail Moth were found. They were distributed on the different species of plants as follows:—

Apple	234
Pear	40
Plum	19
Ornamentals	5
Spiraea	5
Cherry	4
Quince	2
Berberis	1

All the infested stock was of French origin and the webs were found in the following proportions on the stock of the different shippers:—

Messrs. Choplin, Maze	165
" L. Courant, Angers	57
" L. LeRoy, Angers	48
" V. LeBreton, Angers	23
" Detrichi, Angers	10
" Colombe, Senault & Huet, Calvados	4
" Andre LeRoy, Angers	3

These figures do not include the stock imported into British Columbia which was inspected by the Inspector of Fruit Pests of the province and his officers.

A letter was sent to each of the above nurserymen calling their attention to the seriously infested nature of their stock, and we understand from them and from Dr. L.

O. Howard, Entomologist of the United States Department of Agriculture, who visited Angers, that efforts are being made by the nurserymen and by the French Government to institute a better system of nursery inspection than has existed hitherto. This inspection in Canada is now being carried on under the Destructive Insect and Pest Act. The scarcity of nests in the French shipments during the present season would indicate either that greater care is being taken by the nurserymen or that the outbreak of the insect in the localities in which the nurseries are located was less severe last season. It is probable that the scarcity of nests is due to both causes.

FIELD INSPECTION IN NOVA SCOTIA.

As in the year following the first discovery of the Brown-tail Moth in Kings County, Nova Scotia, in 1907, Prof. M. Cumming, Secretary for Agriculture for the province arranged for the inspection of the infested regions, and the destruction of the winter webs was carried on by Messrs. H. G. Payne and H. R. Brown. Their work was supplemented by Mr. G. H. Vroom, Dominion Fruit Inspector. Their work was confined to a careful survey of the orchards and adjoining wild thickets, and the collection of the winter webs. Altogether 1,484 winter webs were destroyed, which is an increase over the number destroyed in 1909, when over 800 nests were destroyed.

The following list of localities and numbers of winter webs which were destroyed in the same, which has been supplied by Mr. Vroom, indicates the degree of infestation in the different localities in the years 1909-1910.

Bridgetown	344
Deep Brook	417
Bear River	390
Nictaux	235
Middleton	40
Smith's Cove	24
Laurencetown	16
Paradise	8
Clements Port	5
Round Hill	3
Lequille	2
Total	1,484

It will be seen from the above that the region which was inspected during the winter of 1909-10, was about 50 miles in extent. Mr. Vroom reported that the webs were larger and contained more caterpillars than those collected during the previous winter. The presence of a large number of webs at Nictaux indicates an increase in that region where only two or three webs had been obtained previously.

During the past year the Federal Department of Agriculture took over the responsibility for the conduct of the Brown-tail Moth extermination work in the province with the co-operation of the Provincial Department of Agriculture who are continuing, in co-operation with our officers, work of the same extent as in the previous year. The federal and provincial officers are working together under our direction and are divided into two parties: a western party commenced work in the vicinity of Yarmouth and is working eastwards and an eastern party commenced work at Windsor, and is working westwards to meet the other party in the most thickly infested region.

The reports up to date indicate that the situation is more serious this year. Scattered winter webs have been found between Yarmouth and Weymouth and in the vicinity of Weymouth more nests have been found than in any single vicinity pre-

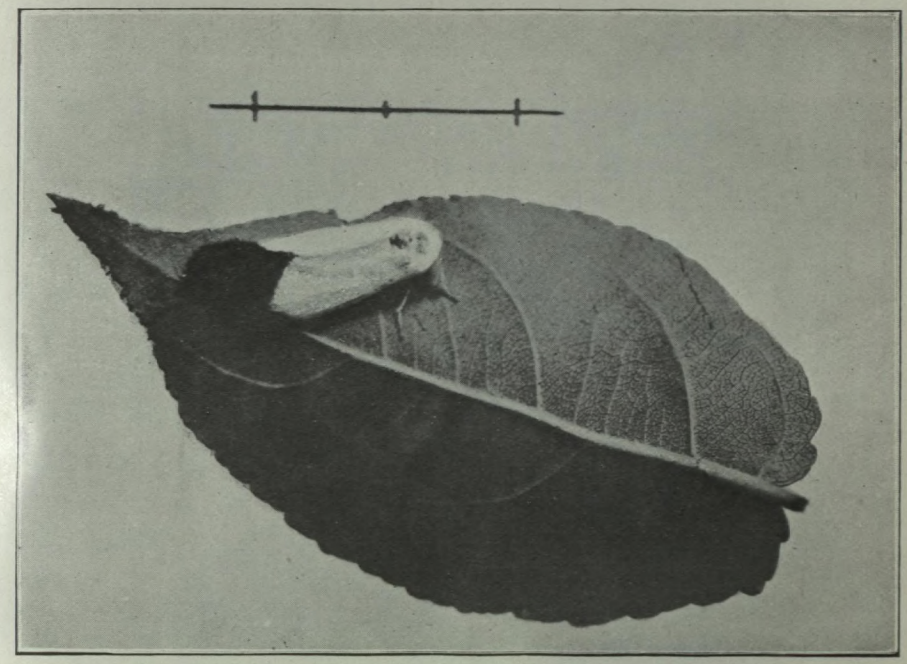


FIG. 4. Female Brown-tail Moth (*E. chrysorrhoea L.*) depositing egg-mass on underside of apple leaf. (Slightly enlarged).

FIG. 5. Full grown caterpillar of Brown-tail Moth (natural size).
(*Photos by H. T. Güssow.*)

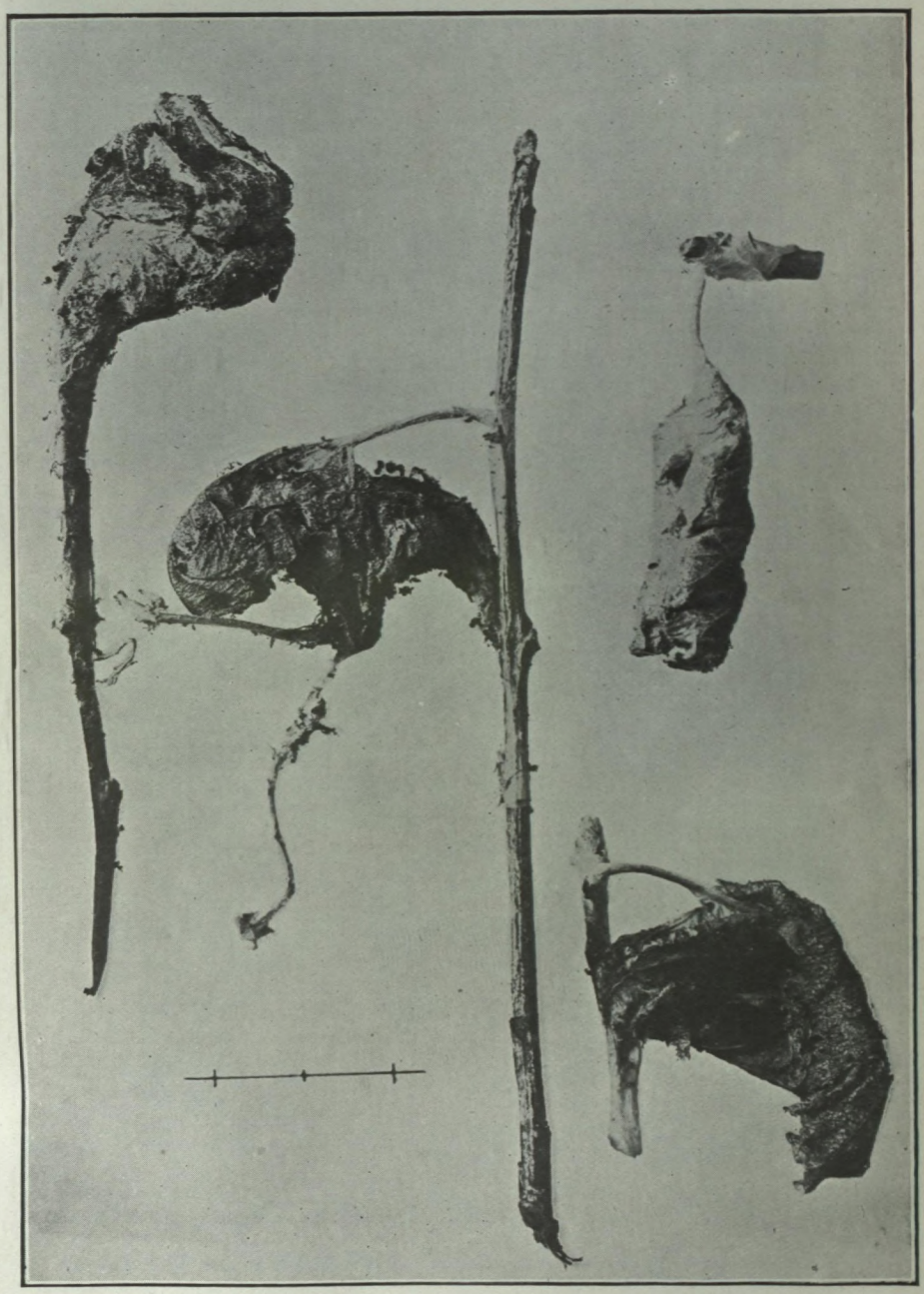


FIG. 6. Winter webs or nests of the Brown-tail Moth collected in Nova Scotia. Note the characteristic white silken attachment to the twig.

Photos by H. T. Güssow.

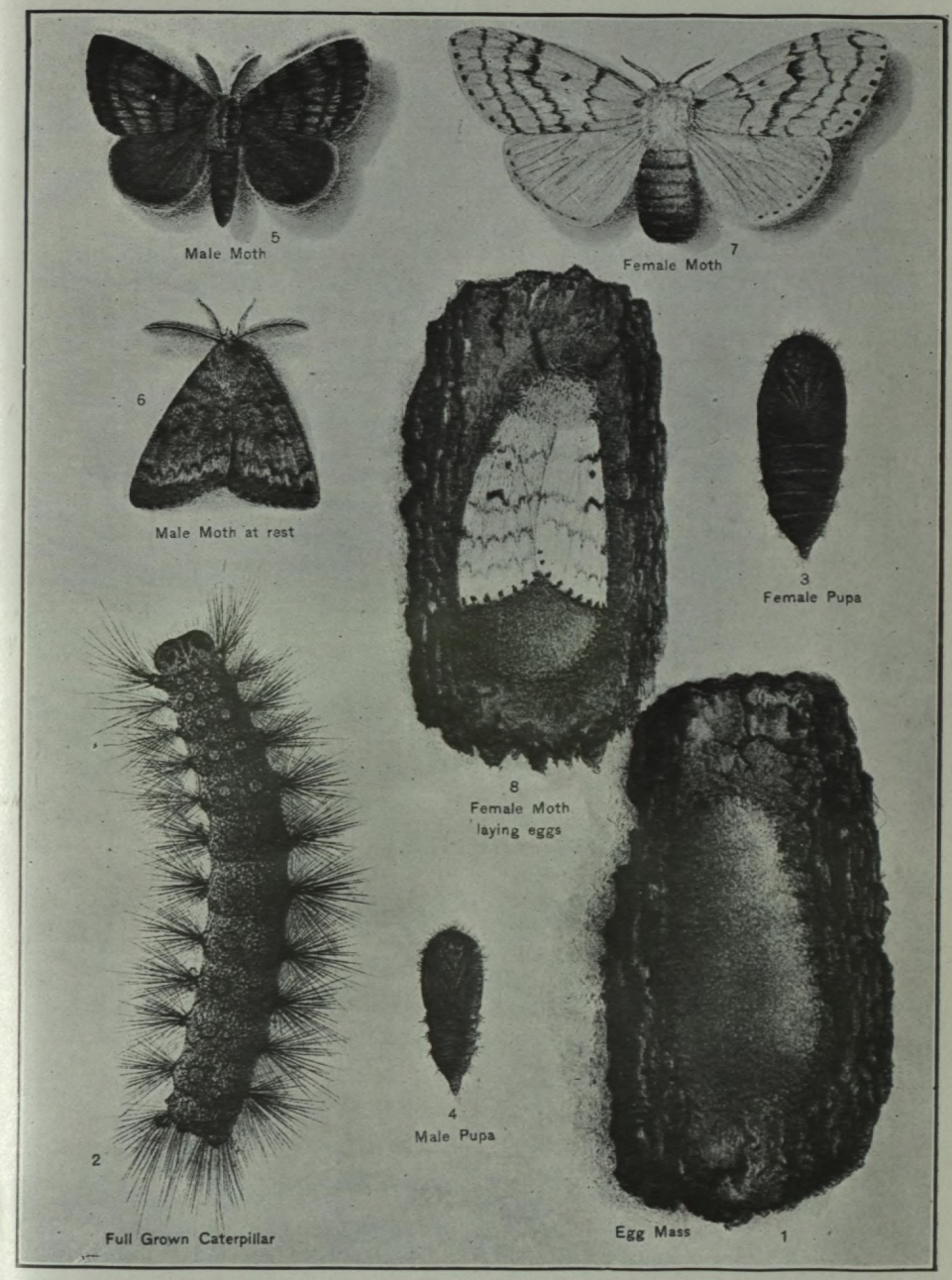


FIG. 7. The Gipsy Moth, (*Porthetria dispar L.*) the different stages of its life-history. Natural size. (*This illustration is from a coloured card circular issued by the State Forester of Massachusetts.*)

viously. This is due to the fact that the vicinity was not inspected last season and a few winter webs were found there in 1909. The importance of making this thorough and systematic inspection is indicated by the fact that some of the wnter webs, which might be left were the inspection not thorough, have been found to contain an abnormally large number of caterpillars. One web was found to contain as many as 1,785 young caterpillars. Most of these winter webs are found on apple trees in small orchards and especially in trees near to the windows of houses. Observations in the field indicate the extent to which the lights from the windows serve to attract the night-flying female moths.

There is no doubt that the chief manner in which the Brown-tail Moth has been introduced into Nova Scotia has been by means of small vessels trading between Boston and other New England ports, where the insect is so abundant, and the small ports of Weymouth; Bear River and Bridgetown. On investigation I found at these points all the conditions necessary for a successful landing in the port of the caterpillars and moths. Wild apple and thorn, on both of which the caterpillars feed, occur in close proximity to the wharves where the vessels are unloaded and where any goods upon which caterpillars had been carried across the Bay of Fundy, would lie. The absence of any serious outbreak at Yarmouth is explained probably by the entire absence of these trees near the wharves. But where trees are near the wharves as is the case at Weymouth, Bear River and Bridgetown, there we have discovered heavy infestations of the caterpillars. In other cases the moths may be transported across from the New England States, either on vessels or by the wind. That the latter method of dispersal is not improbable is shown by the fact that male specimens of the Brown-tail Moth have been captured on the coast and inland near lights in Yarmouth County. In one case a nest was found on a tree in front of the window of a farm house some distance from the coast. During the flying period the light from the windows illuminated this tree and no doubt a female moth was attracted on this account and deposited her eggs. Other instances were found of the influence of lights attracting the female moths in flight to trees situated near to windows habitually illuminated during the flying period. This flying period commences about the second week of July.

INSPECTION IN NEW BRUNSWICK.

Owing to the fact that the Brown-tail Moth had extended along the coast of the State of Maine as far as the international boundary, the St. Croix River, and had been recorded at Princeton, Maine, it was considered necessary to have the southeastern region of the province of New Brunswick carefully examined for signs of the insect's invasion. Mr. W. McIntosh in previous years has taken moths at lights in St. John, N.B., but no traces of the insect having established itself in the province had been discovered by the investigations which Mr. McIntosh had made on behalf of the provincial government. Accordingly, two of our field officers, Messrs. G. E. Sanders, and R. C. Treherne, were sent to that region at the beginning of June and a careful survey was made, lasting to the end of October, of the south-eastern region of the province which was most likely to be infested. They also visited Grand Manan and other islands and during the flying season light traps were employed but with little success. Mr. Wm. McIntosh reported the taking of moths at light from July 6 to 16th and males were received from the light house on Grand Manan on August 2. The first evidence of the moth breeding in New Brunswick was a single egg mass sent to the Division on August 15, 1910, by Mr. W. S. Poole, St. Stephen, N.B., who found it on an apple tree about two miles inland from the frontier. From this egg mass we reared eight specimens of the small hymenopterous egg parasite *Pentarthrum minutum* Riley (*Syn. Trichogramma pretiosa*) which emerged on August 24 and were kindly identified for us by Mr. A. A. Girault. The hostile reception which the Brown-tail Moth thereby appeared to be receiving was of interest. Beyond this discovery no fur-

ther evidence of the insect having established itself in the province could be discovered at that time. On March 21, 1910, however, Mr. W. W. Hubbard, Secretary for Agriculture for New Brunswick, reported the discovery of a single nest of the Brown-tail Moth found by Mr. Fred McInnis at Pomeroy Ridge, Charlotte County.

A few days later an inspection by Mr. Wm. McIntosh of the Provincial Department of Agriculture, resulted in the discovery of 34 nests, indicating that the insect

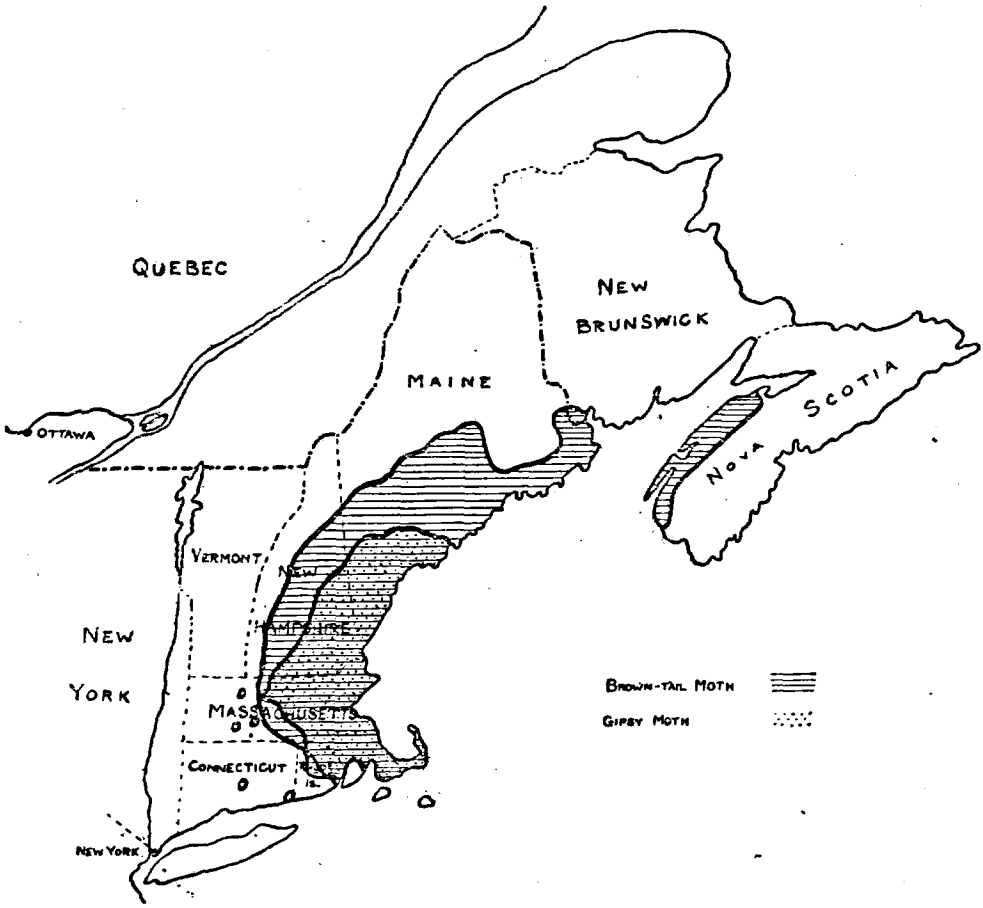


FIG. 1. Distribution of the Brown-tail and Gipsy Moths in the United States and Canada in 1910.

has now established itself in the province. Our officer, Mr. G. E. Sanders, was immediately sent to the district to make a thorough inspection assisted by an officer of the Provincial Department of Agriculture.

The history of the Brown-tail Moth in Canada is briefly as follows:—

1902. Mr. Wm. McIntosh of St. John, New Brunswick, took a single male specimen about 20 miles from St. John, N.B. Mr. G. Leavitt also took one.

1905. In July, Mr. John Russell took a specimen of the Moth at Digby, Nova Scotia.

1907. A single winter web was received by the Division from Mr. C. P. Foote, Lakeville, Kings County, Nova Scotia. Immediate investigation revealed the presence of several thousand webs in Annapolis and Kings Counties.

1909. Winter webs containing living caterpillars were found in shipments of seedling nursery stock imported into Ontario, Quebec and British Columbia, from France, as a result of the inspection of these shipments.

1910. A single egg mass received in August, from St. Stephen, New Brunswick.

1911. Winter webs discovered at Pomeroy Ridge, Charlotte County, N.B., being conclusive evidence of the establishment of the insect in New Brunswick. The infestation in Nova Scotia also discovered to be greater.

The life history and habits of the Brown-tail Moth have been described in previous reports of the Division (1906 and 1909). By the distribution of these reports, by public lectures and communications to the press, the public are becoming acquainted with the facts and the nature of the serious results which would follow the firm establishment of the pest in Canada. The financial loss alone would be enormous. We have the experience of the New England States in fighting the Gipsy and Brown-tail Moths to indicate the importance and necessity of taking every possible means, no matter what it may cost, to maintain control of, if not to eradicate, this pest while we are able, as I am convinced we are at present. Some idea of the amount which has been expended in the State of Massachusetts alone on the work of preventing the spread of the Gipsy and Brown-tail Moths may be gathered from the following figures. The work was commenced in 1890, and continued until 1900, during which period the total expenditure amounted to $1,175,000. In 1900, the work was discontinued at a time when control was being obtained and the spread was being prevented. Owing to this most serious mistake, both of the moths spread rapidly and in 1905, the State was compelled to undertake the work of preventing the spread, but now on a far larger scale as may be judged from the expenditure. The State of Massachusetts has expended from May, 1905, to January, 1910, the sum of $5,500,000, and the Federal Government has expended $417,763.84, making the enormous total of $5,917,763.84. This does not include the amounts spent by corporations and individuals in fighting the insect. I am informed by Mr. F. W. Rane, State Forester of Massachusetts that over $1,000,000 is being expended annually in that state in the fight against the Gipsy and Brown-tail Moths.

EFFECT OF TEMPERATURE ON THE BROWN-TAIL MOTH.

Two factors will govern the distribution of the Brown-tail Moth in Canada: the coniferous forests and the minimum temperature. Unlike the Gipsy Moth, the Brown-tail Moth does not feed upon coniferous trees and therefore the presence of these trees in a pure condition will limit the distribution of this species of moth.

The limiting power of a minimum temperature, however, is an extremely important one to take into account in considering the possible distribution of the Brown-tail Moth in Canada, where in certain regions an extremely low temperature may be maintained for some length of time. For this reason, therefore, the experiments of Grevillius* are of very great interest and importance. He carried out with the aid of various freezing mixtures by means of which very low temperatures could be produced, a large series of experiments on the effect of low temperatures on the hibernat-

* Grevillius, A. Y. 'Zur Kenntnis der Biologie des Goldafters (*Euproctis chrysorrhœa* L. Hb) und der durch denselben verursachten Beschädigungen' *Botanische Centralbl.* Vol. 38, Abt. II., pp. 222-322, 8 figs. 1905.

ing larvæ in the nests. It was found that the larvæ in rather small nests were killed by exposure for a short time to a temperature of —30 degrees C. (equals —22 degrees F.) In larger nests containing about 120 to 350 larvæ, all the larvæ were killed with a minimum temperature of —35 degrees C. (equals —31 degrees F.). Many of the winter webs found in Nova Scotia are considerably larger than those used by Grevillius in his experiments and a much lower temperature would, therefore, be needed to kill all the larvæ contained in such large nests. Sanderson* has studied the effects of a low temperature on the mortality of the larvæ of the Brown-tail Moth in Maine and New Hampshire. He found that in the case of average-sized nests containing 300 or 400 larvæ, 72 per cent to 100 per cent of the larvæ were killed by a minimum temperature of—24 degrees F. or lower, a less percentage being killed in the case of larger nests. Grevillius records the interesting fact that at Kasan, which is the northern limit of the Brown-tail Moth in Russia, the mean annual minimum temperature is about—26 degrees F. which is practically the same temperature as that which his experiments indicated as being the lowest at which the larvæ could exist.

Although these experiments and observations would appear to indicate the possibility of predicting the approximate distribution of the Brown-tail Moth in eastern Canada, there are other factors governing the distribution which prevent the attainment of positive conclusions from a study of the minimum isotherms alone.

THE GIPSY MOTH (*Porthetria dispar L.*)

This insect has not yet reached Canada, but as it is spreading northward through the State of Maine and is slowly approaching the frontier, it is of the greatest importance that its appearance in the various stages should be known in Canada. It is liable to be carried in many ways. The caterpillars may the transported on freight and other goods shipped into Canada by railroad or boat from the infested region which is shown in the accompanying map. They are also carried on vehicles. The egg masses also may be transported on goods, especially on lumber. The various stages in the life-history of the insect are illustrated herewith. (This illustration is from one published and distributed by the State Forester of Massachusetts).

The eggs are deposited in yellowish or light-brown felt-like masses which are about three-quarters of an inch long. They are usually deposited on the trunks of the trees and in crevices, but they may also be found in all kinds of situations: on buildings, on fences and lumber, in boxes and among rubbish. The eggs hatch about the beginning of May and the caterpillars immediately begin to feed. They feed on the foliage of practically all trees, orchard, shade and forest trees and shrubs. As defoliating insects they are more serious than the Brown-tail Moth owing to the fact that they strip coniferous trees which are killed by repeated defoliation. They will also attack garden and field crops and even grass. As the caterpillars become larger they feed at night, hiding in clusters during the day in crevices, etc. By the beginning of July the caterpillars are usually full-grown. The full-grown caterpillar is from two to three inches in length, dark-brown or greyish in colour with two rows (four pairs) of blue spots succeeded by two rows (six pairs) of red spots along the back. The body is provided with tufts of long hairs. They pupate in those situations in which the egg masses are found and also in the foliage.

The moths emerge about the end of July or beginning of August, according to the locality and season. The male moth is yellowish brown or light brown in colour, having the fore wings banded with wavy darker brown bands, as shown in the illustration. It measures about one and a half inches across the wings. The antennæ are feather-like. The female moth is almost white in colour. The fore wings are banded with four wavy dark lines and there is a series of black dots around the outer margin of both pairs of wings. The wing expanse is about two and a quarter inches. As the

*Sanderson, E. D. 'The influence of minimum temperatures in limiting the Northern Distribution of Insects.' *Jour. Econ. Entom.* Vol. I., pp. 245-262, 7 maps, 1908.

female is very heavily bodied, she does not fly but deposits the eggs to the number of about five hundred in the characteristic felt-like masses.

The young caterpillars are destroyed by spraying the trees with an arsenical poison; lead arsenate is the usual poison employed. When the larvæ are older they are more difficult to kill; advantage is taken of the fact that they descend the trees in the early morning to shelter during the day. On ascending the trees they are caught either by means of a strip of folded burlap or a band of 'tanglefoot' or other sticky substance around the tree. Probably the most effective method of destroying this pest is the destruction of the egg masses, which can be accomplished any time from the end of August to the middle of April. They are easily seen and usually accessible and are destroyed by the application of a dab of creosote. This can be done by means of a small stiff-bristled brush.

Most careful watch should be kept for this species and any suspected insects should be immediately mailed to the Division of Entomology for identification. Those regions which are specially liable to become infested with the Gipsy Moth are the regions already infested with the Brown-tail Moth, namely, those parts of New Brunswick, adjoining the State of Maine and the maritime regions of Nova Scotia, especially where there is any communication with the ports of Massachusetts and southern Maine.

FUMIGATION WITH HYDROCYANIC ACID GAS.

During the year a number of cases have occurred where buildings such as houses, warehouses and mills required fumigation for insects. When general infestations of certain insects occur in buildings, fumigation with hydrocyanic acid gas is the most effective mode of eradication. In many of our Canadian flour mills very serious losses are incurred by the presence of the Mediterannean Flour Moth, *Ephestia kuehniella* Zell, which may also occur in warehouses. We have also received specimens of the larvæ of the Spider Beetle (*Ptinus fur L.*) from flour mills in Manitoba and Saskatchewan. These and other mill infesting insects, but not all species, can be destroyed successfully by fumigation. Occasionally houses may become seriously infested with a species of insect which it may be desirable to eradicate: such eradication can be effected only by fumigation.

Fumigation is effected by hydrocyanic acid gas which is generated in the building. *This gas is one of the most deadly poisons existing and consequently the greatest care must be taken in carrying out these fumigation operations, otherwise the results may be fatal.*

Before fumigating a building, all the openings to the exterior, except the door, must be sealed up. Cracks and crevices may be filled with wet paper or covered with strips of paper and the room or rooms made gas-tight. Provision must be made for the ventilation of the room or rooms from the outside after fumigation. All moist foods and liquids should be removed before fumigation or they may take up the poison. Where mills are to be fumigated they should be thoroughly cleaned previous to fumigation. The cubical contents of the space to be fumigated must be calculated by multiplying the height of the chamber or room by the length and this by the breadth; this will give the number of cubic feet.

The gas is generated by adding dilute sulphuric acid to potassium cyanide. In practice this is reversed. The proportion of the chemicals are as follows for every 100 cubic feet of space:—

Potassium cyanide	1 oz. by weight.
Commercial sulphuric acid	1 " "
Water.	2 fluid ozs. by measure.

The potassium cyanide must be 98 per cent pure. The sulphuric acid should be concentrated, having a specific gravity of 66 degrees Beaume. If the building is poorly

constructed it will be necessary to double the quantities for each 100 cubic feet. The most convenient method of generating gas is as follows: Supposing the chamber to be fumigated is 20 feet long, by 20 feet broad and 10 feet high, the cubic capacity would be 4,000 cubic feet. As each 100 cubic feet requires one ounce of potassium cyanide and the remaining chemicals in equivalent proportion, we should require 40 ounces of potassium cyanide, 40 ounces of commercial sulphuric acid and 80 fluid ounces of water (4 pints). Two deep, fairly wide-mouthed earthenware vessels will be required. Into each pour forty ounces of water and slowly add 20 ounces of the commercial sulphuric acid. The potassium cyanide should be divided into two equal parts of 20 ounces each; each part to be wrapped in thin paper. All is now ready for the generation of the gas, if the chamber has been securely sealed. Stand each of the generating jars containing the dilute sulphuric acid on the floor on several sheets of paper to prevent any injury should the acid splash over. As quickly as possible drop the cyanide tied up in this paper into the jars; the one farthest from the door should be dropped in first and the next immediately after so that the door may be reached before much of the gas has been generated. The door should then be tightly closed and sealed for three or four hours, or, if possible, overnight. The greatest care must be taken that no person enters the room until it has been thoroughly ventilated after the fumigation is complete. After fumigation the ventilators should be opened from the outside, as provided and the room must be thoroughly ventilated for at least one hour before it is entered. A single person should not carry on these fumigation operations or an accident might prove fatal.

It is not advisable to fumigate one room of a house only. The gas is lighter than air and very permeable, in consequence of which it would penetrate other rooms and have serious effects. It is always advisable to fumigate the whole house in case of

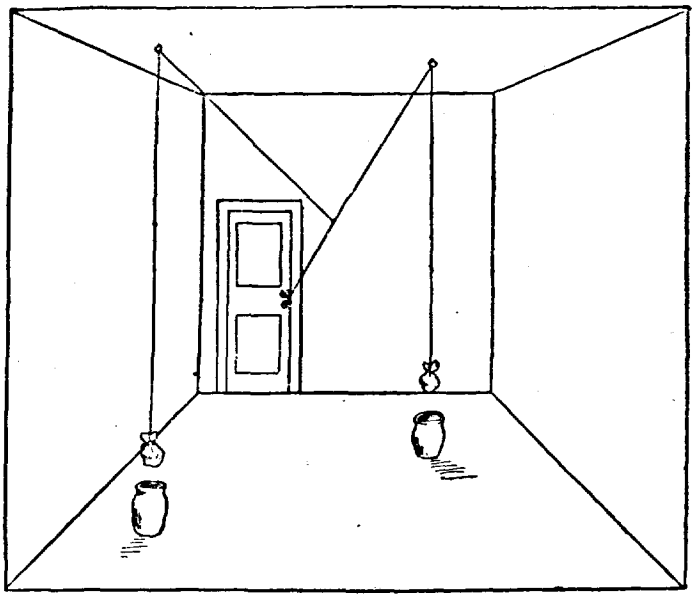


FIG. 2. Diagram illustrating method of stringing a room for fumigation with hydrocyanic acid gas.

serious infestations, beginning with the upper rooms, as the gas is light. Notices should be given to those in adjoining houses and others who might be affected by the gas, and a person should remain outside while the operation is being carried on. Too many precautions cannot be taken in using a gas of the fatal and powerful nature of hydrocyanic acid gas.

In most cases it would be more convenient and considerably safer to arrange for the dropping of the cyanide into the sulphuric acid to be controlled from the outside. This can be done as shown in the illustration. The cyanide wrapped up in thin paper is suspended over the dilute sulphuric acid in the generating jar by means of a string. This string passes through a ring in the ceiling immediately over the jar and is controlled through a small hole in the door. In this manner the cyanide may be lowered into the generating jar after having sealed up the door. By the use of additional rings and strings any number of jars may be used according to the size of the chamber to be fumigated. In the case of large rooms, greenhouses and mills, where several jars are required, this practice should always be followed. It is not advisable to use more than 1½ to 2 lbs. of cyanide to each jar. After the room or building has been ventilated care should be taken in the disposal of the chemicals remaining in the generators which should be most carefully cleaned out and the contents buried or thrown into a sewer. Fumigation with hydrocyanic acid gas will kill the adults and larvæ of many of the insect pests, but it will not destroy the eggs nor all the chrysalids of the moths. In order, therefore, to prevent a reinfestation by the hatching out of eggs or the emergence of moths from the chrysalids which have survived the fumigating process, it will be necessary to fumigate a second time about three weeks later.

Some interesting experiments have been recently carried on by Prof. R. Harcourt* of the Ontario Agricultural College, Guelph, on the effect of mill fumigants on flour and the results are of practical importance. Carbon bisulphide, which is sometimes used as a fumigating agent, has a very marked injurious effect on both wheat and flour. It was found that bread made from flour which had been fumigated with carbon-bisulphide in the usual proportions did not rise well and had a poor colour and texture. On the other hand, fumigation with hydrocyanic acid gas did not affect in the least the baking qualities of the flour, in fact, Prof. Harcourt stated, it would almost seem to have improved the flour.

INSECTS AFFECTING LIVE STOCK.

In the western provinces, horses and cattle are affected to no small degree by various species of biting flies, popularly known as 'Horse Flies' or 'Gad Flies,' most of which belong to the classes of two-winged flies known as the *Tabanidae,* and the *Chrysopidae* which include the smaller biting flies with banded wings. These insects inflict very painful bites upon horses, cattle and other animals, including man. The larvæ are carnivorous and live in water or moist earth. Correspondents have asked if there are no means of protecting horses, etc., from the bites of these and other flies such as the Black Flies (*Simulium* spp.). Many solutions having a repellant odour have been used for this purpose with varying success. The chief difficulty is that the repellent is not effective for long and when such repellents are used they must be applied about twice a day. A solution of oil of tar has been found to be as effective as most of the repellents and it is made as follows:—

A quantity of coal tar is placed in the bottom of a large shallow receptacle and a small quantity of oil of tar or oil of turpentine is stirred in. The vessel is then filled with water which is left standing for several days until it is well impregnated with the odour. The animals are then washed with this as often as may be deemed necessary.

THE WARBLE FLY (*Hypoderma lineata* Villiers).

Throughout Canada 'warbles' occur on cattle. From reports received they appear to be very abundant in the western provinces of Manitoba, Saskatchewan and Alberta, and the losses which result from their occurrence are an

* *Thirty-sixth Annual Report of the Ontario Agricultural College and Experimental Farm*, 1910 (Toronto) pp. 87-92, 1911.

enormous tax on farmers, stock raisers and tanners. Their presence entails the following: loss of flesh in beef and milk cattle, reduction in the milk producing power and other strains on dairy cows and very great loss in the manufacture of the hides owing to the presence in them of the holes made by the maggots. I am informed that it is customary to deduct two dollars from the value of every steer on account of warbles. Thirty years ago it was estimated that the annual loss in the United States caused by the warble fly was about ninety million dollars. Yearlings and heifers suffer most from the attacks of this insect. It is undoubtedly one of the most serious insect pests attacking cattle and at the same time one that is difficult to control. The 'warbles' are tumours caused by the larvae or 'maggots' of the warble fly. The larva sets up irritation beneath the skin with the consequent production of pus and blood upon which it feeds. The warble flies are abundant during the summer and fly in the fields from June to the end of August. They are about half an inch long and covered with hairs like a bumble bee, the hairs being black, white and yellow or reddish brown. They fly in the bright sunshine but do not bite or sting which makes all the more remarkable the fact that their presence will cause cattle to stampede and rush wildly about. The eggs are laid on the hairs of the animals by the fly during the summer and are firmly attached to the hairs. It is believed that most of the eggs are laid on the legs and heels of the cattle and rarely on the backs and sides. How the maggot reaches its final position beneath the skin has not been determined with certainty. It may either bore straight into the skin or it may be licked into the mouth and from there work its way through the tissues to reach its final position beneath the skin. Prof. Carpenter, of Dublin, Ireland, who for six years has been conducting experiments on this insect and its method of control* has found young maggots imbedded in the tissues of the gullet of young cattle slaughtered in August and October. Strose† has found that in the case of *Hypoderma bovis*, which probably does not occur in North America, some of the larvæ probably enter the body through the skin. He also found that the full-grown larvæ leave the host chiefly during the night and early morning. By whatever way the maggots gain entrance they finally arrive beneath the skin on the backs of the animals about February and then give rise to the 'warbles.' When the maggots are wandering through the tissues before reaching the back they are smooth but having arrived beneath the hide they moult and become spiny. A hole is now made in the warble through which the maggot breathes by means of two openings or spiracles at its tail end. The maggot becomes full grown about the end of April or beginning of May (in Eastern Canada) being now about an inch long. The 'ripe' maggot works its way out of the warble and falls to the ground where its skin hardens to form a brownish black case or puparium from which the fly escapes in about four to six weeks.

Remedial Measures.—It was formerly thought, and the belief is still widely prevalent, that the flies could be deterred from depositing their eggs on the backs of cattle if various dips and smears were applied during the summer months. Prof. Carpenter's investigations have shown that no reliance can be placed on such supposed preventives. Nevertheless there is much evidence to show that the systematic destruction of the maggots in the spring before they leave the warbles is productive of very beneficial results. It will be readily understood, that if the maggots are thus destroyed in all the herds throughout a whole district, the number of warble flies will be considerably reduced. Co-operation is necessary. In Denmark ||, this method has been adopted with considerable success and co-operation in the systematic destruction of the maggots has resulted in a marked decrease in the prevalence of warbles in those districts in which the work has been carried on. There is no doubt that, if this work

* *Journ. Dept. Techn. Instr., Ireland*, Vol. 8, pp. 227-246, Vol. 9, pp. 465-476 & Vol. 10, pp. 642-650 (1910).

† *Arb. K. Gesundhtsamt*, Vol. 34, pp. 41-73 & figs. 1910.

|| *Bulletin de la Société Nationale d'Agriculture*, Nos. 3 & 6, 1910.

is thoroughly done, the warbles in any given locality can be reduced to harmless proportions. Further, by the employment of a special man, the cost has been shown to be very small, in Denmark from two to five cents per head.

The best method of destroying the maggots is that of squeezing them out of the warbles which can be easily done when they are ripe. The first examination and destruction should take place in April, and two others in May and June respectively. If the skin is hard it may be softened by washing with a solution of salt and water, using half a pound of salt to three gallons of water. The maggots may also be destroyed by smearing the warbles with a mixture of equal parts of kerosene and pine tar carefully mixed. This mixture fills up the breathing pores of the maggot which dies in consequence. This method, however, is to be less recommended than that of squeezing out the maggots, and it should not be confused with the summer smearing of the backs of the cattle which was formerly recommended, but which has been shown to be useless as a preventive. Wherever it is possible cattle should be allowed to have access to shade trees and water in the summer as the warble flies dislike water and are most active in bright sunshine.

TICKS ON HORSES.

In the spring of 1910, and again in the present year (1911) specimens of ticks were received which Dr. Nathan Banks kindly identified for me as *Dermacentor albipictus* Packard. Mr. G. E. Parham of Penticton, B.C., found them on horses. Through the co-operation of the Veterinary Director General of this Department, further specimens were received from Mr. Ransom, of Vancouver, B.C., who took them from a horse in quarantine at Huntingdon, B.C. This horse had been imported from Elgin, Oregon, and had been running wild all winter. Dr. A. E. Moore, of the Veterinary Branch, also brought specimens obtained from elks imported into Quebec from Wyoming, U.S.A. A study of the life history of this species was begun in 1910, but the records unfortunately were lost. Egg laying commenced at the end of April, and single females deposited from 3,000 to 5,000 eggs during the succeeding months of May and June. These eggs were deposited in the characteristic manner and began to hatch early in July. The young six-legged 'seed ticks' soon climbed up the leaves of grass and collected in large numbers on the tips of the leaves awaiting an opportunity to reach the hairs of the host. When they reach the host such as a horse or elk they crawl over the hair and attach themselves to such a place as the inside of the thighs. Here they moult and now have eight legs. The males are more active than the females which, after mating, increase in size and drop to the ground to deposit their eggs. This species occurs throughout the northern parts of the United States where it has been found on cattle, horses and certain wild animals such as the elk, upon which it is common, and the moose. It has also been found on the beaver.

Two methods of eradication are possible, namely, the destruction of the ticks on the host and in the pasture. They may be destroyed in the pasture either by excluding the horses and cattle for a certain length of time, thus starving out the ticks, this method being called the rotation method, or by allowing the horses to have access to the infested pastures and afterwards destroying the ticks upon the hosts by treating them with certain washes or dips. For the destruction of the ticks upon the host the United States Department of Agriculture* as the result of a long series of experiments recommended an emulsion of crude petroleum made according to the following formula:—

Hard soap	1 lb.
Soft water	1 gallon.
Beaumont crude petroleum	4 gallons.

* U.S. Dept. Agric. Farmers Bulletin No. 378. 1909.

This makes 5 gallons of 80 per cent. emulsion. The soap should be cut up and dissolved in the requisite amount of water by boiling, adding water to make up for that which is lost by evaporation. The soap solution and oil are mixed thoroughly to form an emulsion. This stock solution will keep, and for use a 25 per cent solution should be made by using one part of the stock solution to 2½ parts of water. Beaumont oil is recommended as being less injurious than the heavier varieties of oil, and not so volatile as the lighter oils. Cattle should be sprayed with a 20 to 25 per cent. emulsion every fortnight. Every part of the animal, especially the inside of the thighs and elbows and dewlap should be thoroughly sprayed. Horses should be freed by picking. Certain species of ticks carry organisms of serious diseases, as for example the tick *Margaropus annulatus* of the southern United States, which is the carrier of the organism causing the dangerous Texas Fever. Redwater Fever is also transmitted by ticks.

THRIPS ATTACKING CEREALS.

During the last few years frequent inquiries have been made in reference to the 'blighted' appearance of the heads of oats and wheat and a number of samples of the injured plants were received. Oats were chiefly attacked with the production of the characteristic 'silver top' or 'white top' appearance. Most of the reports of injury were received from Alberta and Saskatchewan. One correspondent from Vancouver Island, B.C., stated that over 50 per cent of a fourteen acre field of oats were attacked. On heads of oats received from Saskatchewan from fifty to seventy per cent of the ears were destroyed and had the typical bleached appearance. Mr. A. Mackay, the Superintendent of the Experimental Farm at Indian Head, Sask., informs me that he has noticed the 'silver-top' on oats for several years, but especially during the last year or two.

We were unable to obtain specimens of the insects from most of the samples as they were dry on arrival here, owing to the long journey and the few insects obtained were too dessicated to make their identification possible. This species may be the Grass Thrips (*Anaphothrips striatus* Osborn), and Mr. F. M. Webster, of the United States Bureau of Entomology showed me a record which he had of this species attacking oats. The Grass Thrips produces 'white' or 'silver top' in a number of grasses, especially in Kentucky Blue Grass (*Poa pratensis*). Dr. Fletcher recorded the occurrence of 'white top' in 1888 and 1892 in *P. pratensis* and also in Timothy (*Phleum pratense*) and Couch Grass (*Triticum repens*). 'White top' in wheat is usually caused by the work of the Wheat-stem Maggot (*Meromyza americana* Fitch), but the specimens of white top in wheat which we received were undoubtedly caused by thrips.

Other species attacking oats are *Æolothrips fasciatus* L. (which also attacks wheat, grasses and weeds) and *Limothrips cerealium* Hal. It is not unlikely that these species occur in Canada.

These insects are minute and in consequence generally escape observation. The Grass Thrips (*A. striatus*) measures about one-sixteenth of an inch in length and is yellow or brownish yellow in colour. The adults are provided with four narrow wings fringed with long hairs and are very active. There is, however, considerable variation in the possession of wings and in the condition of the same in this peculiar family of insects. Their mouth parts are adapted for both sucking and biting, but they appear to take most of their food by sucking the juices of the plants. According to Hinds* the life history is briefly as follows: The females continue to deposit their eggs on the leaves of the grass and the young develop through the fall until the snow covers the ground. The adults hibernate and appear to be able to withstand exposure to tempera-

* Hinds, W. E., 'Contribution to a Monograph of the insects of the order Thysanoptera inhabiting North America.' *Proc. U.S. Nat. Mus.* Vol. 26, pp. 79-242, 11 pls, 1902.

ture of -21 degrees F. The females become active in the spring, probably as soon as the snow disappears and the eggs then begin to develop. The length of the egg state in the spring is from ten to fifteen days and in the summer from four to seven days. The larvæ are similar in general form to the adults. The length of the larval stage varies from two weeks in the early spring to about four days in midsummer. The first winged adults appear in May or June. The whole life cycle occupies from twelve to thirty days.

Korolikoff* has recently investigated several species of thrips injurious to cereals and grasses in Russia in the neighbourhood of Moscow. He found that the insects passed the winter in the green, soft tissues in the leaf sheaths of young plants, and when the spring comes they migrate to the early cereals and later to the summer crops. Their injuries to plants are caused chiefly by the fact that they feed upon the juices of the different parts of the flowers, and especially on the ovary, that is, in the cereals, the young grain. They migrate from one species of plant to another, for example, from rye to wheat and oats. He recommends the destruction of weeds, especially those belonging to the families Leguminosæ, Gramineæ and Compositæ, and the sowing of what one may term 'bait' crops such as rye or oats round the fields under cultivation. This should be done a fortnight before the time of sowing the winter cereals in order to attract the insects and afford them shelter when the crops are coming up. When the 'bait' crops are removed later, a large number of the thrips are removed also.

The various species of thrips appear to hibernate where they have been feeding: in the stems of grains which have died down, in crevices in the ground or under rubbish. In the case of species infesting cereals and grass crops they can be attacked only by the adoption of cultural methods. The hibernating stage is the most convenient stage of their life history to combat them. The burning of the grass or stubble in the fall and, either as an additional measure or as an alternative, the deep ploughing of the soil, will result in the destruction of a large portion of the hibernating individuals. Grain which has been infested should be cut as early as possible in the spring to remove the individuals recently emerged from hibernation before they have reproduced in any considerable numbers. After threshing, the screenings and chaff which contain large numbers of the insects, should be burnt.

THE WHITE-MARKED TUSSOCK MOTH (*Hemerocampa leucostigma* S. and A.)

This insect was extremely abundant in certain places in Ontario, New Brunswick, Nova Scotia and Prince Edward Island during the summer of 1910. In the cities of Halifax, N.S., and Charlottetown, P.E.I., and Kingston, Ont., its defoliation of the shade trees, well known in Toronto, caused the citizens some alarm. In Charlottetown, I found on examination that the larvæ had been fairly well parasited, and to some extent also in Halifax. Further observations on collected material indicate the same fact. It is not improbable that the outbreaks will be checked by natural means, but the uncertainty of the operation of such natural controlling agencies as the experience of the insect in Toronto exemplifies, necessitates the employment of thorough eradicative measures in cities where the value and importance of shade trees is unusually great.

Life history.—During the winter the conspicuous white or cream-white egg masses having a frothy appearance may be found on the trunks and branches of trees, on fences and other places to which the caterpillars crawled when full grown. The young caterpillars hatch out at the end of May or early in June, and become full grown towards the middle or end of July. The mature caterpillar is distinct in form

* Korolikoff, D. M., 'Tripsi jivoustchie na nacikh Slakakh.' Isviestiia Moskowskago Selskhosiaistvennnago Instituta. (Annals of Agron. Inst. Moscow), Vol. 16, pp. 192-204. Moscow, 1910.

and colouration. It is hairy and measures from one and a quarter to one and a half inches in length. The upper side is dark with two longitudinal yellow stripes along the back. The head is coral red and there are a pair of tufts of black hairs projecting over the head in horn-like manner; a similar but single tuft of hairs projects from the hind end of the body. On the back of the caterpillar, beginning in the fifth segment, there are four white brush-like tufts of hairs and behind these there are two small, glandular projections of a brilliant red colour. The caterpillars usually leave the smaller branches when they have finished feeding and are full grown and wander down the trees to the larger limbs and trunks where they spin their cocoons in the crevices of the bark. Large numbers of the full-grown caterpillars wander some distance, finally spinning their cocoons on fences, the sides of houses and other places. In about a fortnight the moths emerge. The peculiarity of this insect is that the female moth is wingless and consequently is unable to fly. After emerging, the female rarely leaves the neighbourhood of the cocoon, but after mating deposits one to five hundred eggs in a white frothy mass on the outside of the cocoon. The male moth is grayish and measures about one and a quarter inches across the wings; the antennæ are large and feather-like, and a white spot in the outer hind angle of each of the fore wings gives the insect its popular name.

Natural enemies.—A number of species of birds feed on the hairy caterpillars of this insect, including the robin. Surprise has frequently been expressed to me that the English sparrow does not appear to feed on the caterpillar. The English sparrow not only does not feed on this insect, but it drives away those birds which do so, and is itself one of the greatest pests on this account, as it has driven away and thereby reduced in number many of our useful insectivorous birds. The most important natural enemies are parasitic insects.

Means of control.—The most effectual method of controlling this insect is by the destruction of the egg masses during the winter months. As the insect is in this stage for about six months or longer, ample time is afforded for the carrying out of a systematic campaign of egg destruction. The egg masses may be either collected and burned or destroyed on the trees by applying creosote by means of a small brush which may be attached to a long pole. On fences and other places they may be killed by means of a gasolene torch lamp such as painters use. When all the egg masses on a tree have been destroyed, a band of 'tanglefoot' about three inches wide should be painted round the trunk. This should be done before May and it will prevent any caterpillars which have hatched from eggs which have not been destroyed, from ascending the trunks of the trees; as all the egg masses on the tree will have been destroyed, no caterpillars will be able to gain access to the leaves on account of the band of 'tanglefoot.' A sticky substance similar in nature to 'tanglefoot' may be made by boiling together equal parts of castor oil and resin. The bands on the trees should be scraped from time to time with a wooden comb to keep the sticky surface fresh.

When the egg masses have not been destroyed, the trees should be sprayed before the end of June with an arsenical spray such as lead arsenate. This is used in the proportion of 3 or 4 lbs. of lead arsenate to 40 gallons of water. All cities having valuable shade trees attacked by this or other defoliating insects, should have a power sprayer. Nothing is more injurious to the tree or unsightly to the eye than the defoliation by caterpillars. Many of the cities of the United States regularly spray their shade trees, realizing their value as civic assets; in certain cases the losses which they have suffered in the past compel them to do this.

THE NARCISSUS FLY (*Merodon equestris* F.).

During the past few years this insect has been noticeably present in British Columbia. It was recorded in 1908 by Prof. R. C. Osborn*, having been caught by Mr. Harvey frequenting especially the flowers of the Salmon Berry (*Rubus spectabilis*). Professor Osborn believes that it properly belongs to our North American fauna, but I am unable to agree with him on account of its history in Canada and other countries. I am of the opinion that it has been introduced into Canada on imported bulbs, as I have found the larvæ during the present year on bulbs imported into Ontario from Holland. It had been previously captured on Mount Royal, Montreal, by Mr. G. Chagnon in 1903. In British Columbia, it is now a serious pest of bulbs, and Mr. A. E. Wallace reported it as attacking narcissus and daffodil bulbs near Victoria, B.C., about 50,000 bulbs having been destroyed in the year. Mr. G. Norman has kindly furnished me with particulars as to many of its habits in that locality which was visited in October. The perfect insect in seen from March to September and appears to begin to breed in May. The eggs are probably deposited in the centre of the leaf crown. The larvæ are found in the centre of the bulb, having made their entrance through the base of the bulb. The bulbs are destroyed by the larvæ or maggots eating away the flattened stem at the base of the bulb and afterwards destroying the centre of the bulb. Professor Ritzema Bos, State Entomologist of Holland, who has written the most complete account† of this insect, records the eggs as being laid in the soil adjoining the foliage. He informs me that it attacks chiefly *Narcissus tagetta* and *Jonquillas* in Holland. Mr. Norman has observed that the early varieties of daffodils, such as 'Golden Spur' and 'Henry Irving' are not attacked and that such varieties of narcissus as *N. poeticus ornatus* and *N. p. poetarum* suffer considerably.

The method of eradication which has been found most simple and efficient in Europe is the annual lifting of the bulbs and the destruction of all those which are found to be attacked by the maggots, as can readily be seen. This method has been found effective in England, and also, Professor Ritzema informs me, in Holland. Soaking in water is of no value and the destruction of the pupæ in the soil by the removal of the latter in the spring is impracticable in a large scale. Satisfactory results may possibly be obtained by poisoning the adult flies with sweetened arsenical baits, and experiments on this are being carried on in British Columbia.

NOTES ON THE MORE IMPORTANT INSECTS REPORTED TO THE DIVISION DURING THE YEAR.

The following notes refer to a number of the most prevalent insects which have been reported to and received by the Division during the past year (April, 1910. to March, 1911). Lack of space prevents a detailed treatment of these insects, but their occurrence is recorded for the sake of future reference, and for those who may desire such information as to the distribution and occurrence of certain of the more prevalent insect pests.

INSECTS AFFECTING FIELD AND ROOT CROPS.

Wireworms and White Grubs were reported most frequently. They were destructive to grass lands, cereals,, roots and other field crops. Root maggots were destructive to cabbages, cauliflowers, turnips, radishes and onions throughout Canada. The experiments which we are conducting on means of controlling these insects confirm our opinion as to the efficacy of the method of protecting the cauliflowers and cabbages by means of the tarred felt paper cards. This method is fully described in the report

* *Canadian Entomologist*, Vol 40, p. 10.
† 'La mouche du Narcisse (*Merodon equestris* F.)' *Arch. Musee Teyler*, Vol. 2, pp. 45-95.

for last year. For the protection of radishes and onions, the application of the hellebore decoction, using two ounces of hellebore to one gallon of water and watering the plants about once a week, has given the most success.

The Potato Beetle (*Leptinotarsa decemlineata* Say) was unusually abundant in Ontario, and was responsible for considerable loss to growers. Mr. Norman Criddle also reported them from Manitoba where the worst outbreak on record was experienced. This insect is gradually spreading through the west, and I found that it had already arrived in the region of Edmonton, Alta.

The Blister Beetles, namely, the Western Blister Beetle (*Cantharis nuttalli* Say), the Grey Blister Beetle (*Epicauta cinerea* Forst.), and the Black Blister Beetle (*E. pennsylvanica* De G), were abundant and destructive, especially to beans. The first was especially abundant in Manitoba and their prevalence in such numbers may be correlated possibly with the abundance of grasshoppers and locusts which were similarly reported as injurious to cereals in Manitoba. Mr. Criddle described an extensive migration of the locusts in July at Aweme, Man. The chief species were the Lesser Migratory Locust, *Melanoplus atlanis* Riley, and Packard's Locust, *M. packardii* Scudd.

The weevil *Sitones hispidulus* Germ., whose larva destroys clover, was abundant at Orillia, Ont. *Nysius ericæ* Schill, was reported from Medicine Hat, Alta., where it was abundant and was attacking spinach, radishes, strawberries, lettuce, turnips and corn. The Flea Beetle *Haltica evicta* Lec. was very destructive to turnips and cabbages at Halfway Lake, Alta., and the Hop Flea Beetle was again serious in the hop yards of British Columbia. The Red Spider, however, was more injurious to the hops than the Flea Beetle. I was informed that it was compelling them to cease growing hops in some localities. Instead of a crop of six or seven hundred pounds to the acre, two hundred pounds to the acre were produced and these of very poor quality. The mite could be destroyed by winter treatment of the poles on which it hibernates; they could be dipped in a caustic solution or in coal oil.

The Pea Aphis (*Macrosiphum destructor* Johnson) was present in most parts of Ontario. It appeared to check the vigour of the growing vines.

INSECTS AFFECTING FRUIT AND FRUIT TREES.

The commoner pests were reported in the usual abundance, and as the life history and means of controlling certain of these, such as the Codling Moth (*Carpocapsa pomonella* L.), the Budworm (*Tmetocera ocellana* Schiff), the Apple Maggot (*Rhagoletis pomonella* Walsh), the Plum Curculio (*Conotrachelus nenuphar* Herbst), Oyster Shell Scale (*Lepidosaphes ulmi* L.) and Cankerworm were considered in the report for last year, it is not necessary to repeat them at length.

The Cherry and Pear slug (*Eriocampa cerasi* Peck), was injurious to cherry, apple and pear orchards in Quebec, Ontario and British Columbia.

Tent Caterpillars (*Malacosoma* spp.) were again extremely abundant in certain provinces, namely in New Brunswick and British Columbia. One of our officers, Mr. Tom Wilson, found the larvæ in millions at and west of Mission, B.C., and at other places in the valley of the Fraser River. Driving down to Upper Sumus, he found that the whole country had been devastated by the caterpillars, no leaves being left on the trees and the fruit hanging was half grown.

The Red-humped Apple-tree Caterpillar (*Schizura concinna* S. and A.) was very common in Ontario and was also recorded from Waneta, B.C., and Holmfield, Man. In Ontario it was found to be fairly heavily parasitised by the ichneumon, *Limneria guignardi*.

The Cherry Leaf Beetle (*Galerucella cavicollis* Lec), which feeds on the wild cherry, was reported from Halifax, N.S., as attacking cultivated cherries. Mr. L. Cæsar, of Guelph, found the Cherry Fruit Fly (*Rhagoletis cingulata* Loew) attacking

some cherries near Homer, Ont. It is not improbable that this insect is also attacking cherries in Quebec from which reports of similar injury were received. This imported insect was recorded by Dr. Fletcher in 1906*. He received it from Mr. W. R. Palmer, Victoria, B.C., where it was injuring some cherries. This was its first recorded appearance in Canada, and Mr. Palmer stated that he first noticed the holes in cherries in 1904. Infected cherries should be destroyed as soon as the injury to fruit is noticed. The Raspberry Cane Borer (*Oberea bimaculata* Oliv.) was reported generally from Ontario and Quebec, in some instances being particularly abundant. The Strawberry Flea Beetle (*Haltica ignita* Jll) was destructive to strawberry plants at Nelson, B.C.; over 180 specimens were collected from a single plant by jarring. This species also feeds upon other Rosaceæ. In Prince Edward Island the Strawberry Crown Borer (*Tyloderma fragariæ* Riley) was seriously injurious to the plants, and growers report that it is becoming more abundant annually. The only remedy is to dig up and burn infested plants before the fruiting season closes, that is, before the insect leaves the plant. Old beds should be thoroughly ploughed in the fall.

INSECTS AFFECTING FOREST AND SHADE TREES.

The Spruce Budworm (*Tortrix fumiferana* Clemens). The inquiries and reports received by the Division during last summer indicated that the depredations of the insect were more extensive than in the previous year to which reference was made in my last report. So serious did the situation appear, that many of the holders of timber limits were not unnaturally alarmed and feared the destruction of the spruce.

As the Department of Lands and Forests of the Government of the Province of Quebec, has a body of forest rangers throughout the province, arrangements were made by Mr. G. C. Piché, Chief Forestry Engineer of the Province, to obtain reports from them as to the distribution of the insect, and we drew up a questionnaire. The results of this inquiry and of the information which the Division of Entomology has received indicate that the insect is abundant in certain areas from Lake Timiskaming on the west to Lake St. John on the east and is sparingly distributed throughout the whole province down to the international boundary. The most serious devastations have been recorded from the region having River Desert and the upper Gatineau on the west to the Rouge River and Lake Ouareau on the east, from the region southeast of Lake St. John and from the River St. Maurice. In British Columbia, where I visited the infested areas last year and again this year, the most severely infested region is the southeast region of Vancouver Island from Salt Spring Island and Maple Bay south to the Saanich Peninsula. The accompaying map shows the recorded distribution of the Spruce Budworm in Canada at the present time.

In British Columbia some of the second growth Douglas Fir has been killed as a result of the repeated defoliation by the caterpillars. Visits were made to the Chicoutimi and Rouge River regions in Quebec in January. In both these regions it was found that the balsams had suffered more than the spruce. The tops of the trees were denuded not only of foliage but also of buds. The injuries had caused severe bleeding. The tops of some of the trees which were felled were dead, but otherwise no injury could be found. Nor was there any evidence of an unusual secondary invasion by bark beetles. Cocoons of Braconid parasites indicated that these natural agencies were at work. From material which Mr. Arthur Gibson collected at Baskatong in 1909, a new parasite was reared. This has been described under the name of *Nasonia tortricis* by Mr .C. T. Brues, in '*The Canadian Entomologist*,' vol. 42, p. 259, 1910.

* In *Can. Ent.*, Vol. 41 p. 70, this species is described under the name *Rhagoletis intrudens* *n.* sp., by J. M. Aldrich.

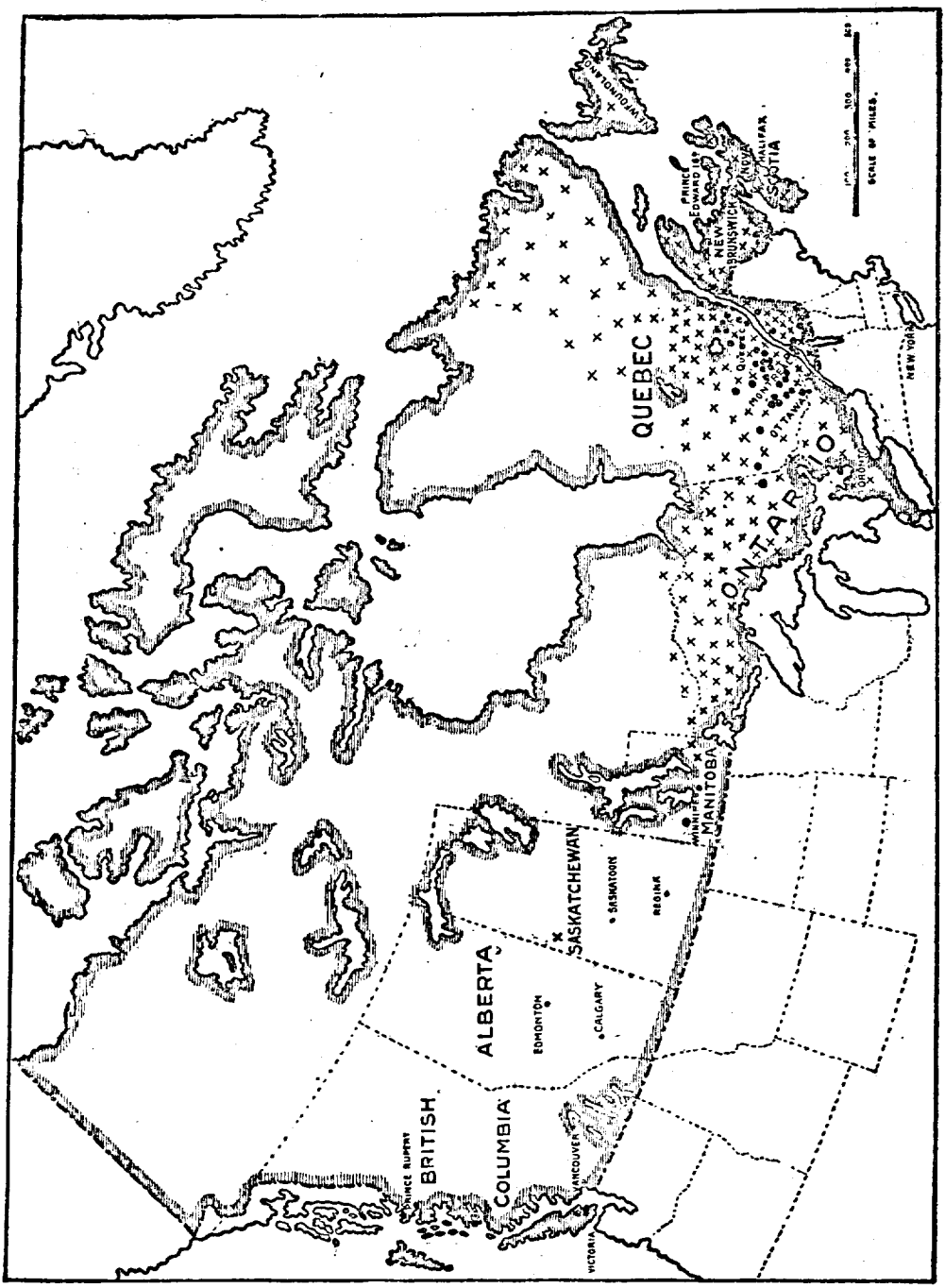


FIG. 3. The distribution of the Spruce Budworm (*Tortrix fumiferana* clem.) and the Larch Sawfly (*Lygaeonematus erichsonii* Hartig.) in Canada in 1910. Spruce Budworm indicated by black circles, the Larch Sawfly by crosses.

Arrangements have been made for the study of the parasites of this insect and this will be carried out during the coming summer. Only by a knowledge of the character and extent of parasitism can the results of this outbreak be foretold with any degree of certainty. If the parasites are found to be increasing rapidly in number, as is frequently the case in outbreaks of insects native to the country, they will control the pest before it has accomplished the severe destruction which alarmist minds might be inclined to predict from the appearance of the forests last year.

THE LARCH SAWFLY. (*Lygæonematus erichsonii* Hartig).—The study of this insect was continued. A beginning of the study of the European parasites of this insect had been made by me before leaving England. This study was continued on account of its importance in relation to the serious nature of this insect's history in Canada. I am of the opinion that it was imported into North America and am supported in this belief by the history of the Sawfly since it was first recorded on this side of the Atlantic ocean, in 1881.

My investigations showed, and were confirmed by the continued study in England by Mr. Joseph Mangan, that the parasite, *Mesoleius aulicus* Grav., was not only the chief parasite as had been previously shown*, but had increased sufficiently rapidly to control the sawfly which was actually the case. It was found that over sixty per cent of the sawfly larvæ were parasitised. Accordingly arrangements were made for the collection of the cocoons in that region in England where the parasites had been found in so great abundance, and these parasitised cocoons are now on their way to Canada. An endeavour will be made to establish the chief parasite, *M. aulicus,* in different localities within the infested region which extends from Winnipeg, Man., to Cape Breton, N.S., as shown in the accompanying map. A beginning has also been made of the study of the native parasites attacking the sawfly larvæ. The chief of these appears to be a small Pteromalid *Coelopisthia nematicida* Packard, which deposits its eggs inside the cocoon on the hibernating larva and this is destroyed. The European and North American larvæ and adults of the sawfly were studied side by side and there is no doubt as to their being the same species.

The Birch Sawfly (*Hylotoma pectoralis* Leach) defoliated birches in the neighbourhood of Quebec and in Charlevoix county, Que., and was very destructive near Charlottetown, P.E.I. The larva is about three-quarters of an inch in length, yellowish in colour spotted with black and is usually abundant on birches in August and September. The Fir Sawfly (*Lophyrus abietis* Harr.) was abundant on spruce in Algonquin Park, Ont. Many pine trees near Magog, Que., were defoliated by Abbot's Pine Sawfly (*Lophyrus abbotii* Leach) the larva of which is yellow, spotted black and having a black head. The full grown larva measures about an inch in length.

The Spruce Gall Louse (*Chermes abietis* Chol.) was, as usual, abundant and injurious to White and Norway spruce in Ontario and Quebec. *Chermes similis* Gillette, was reported from Richmond, Que., and *C. floccus* Patch from Halifax, N.S., where it was rather seriously affecting spruce. Miss Patch finds that this species migrates to the needles of the white pine. *C. pinicorticis* was also abundant on the bark of white pine. The Green Striped Maple Worm (*Anisota rubicunda* Fabr.) defoliated maples near Newboro, Ont., and also along the shore of Georgian Bay. *A. virginiensis* defoliated oaks in the former locality. The White Cedar Twig Borer (*Argyresthia thuiella* Pack.) which causes the death and consequent brown appearance of the green tips of the cedar was abundant in Algonquin Park and other regions in Ontario.

INSECTS AFFECTING GARDEN AND GREENHOUSE.

A small Collembolan which Dr. Folsom kindly identified as *Xenylla humicola* (O. Fabr.) Tull., was received from Toronto and also from St. Thomas, Ont., where it occurred in enormous numbers forming patches several inches across. The Tarnished

* The Large Larch Sawfly, *Nematus erichsonii* Hartig. *Journ. Board of Agr.* vol. 15, pp. 649-660. 1908.

Plant Bug (*Lygus pratensis* L.) attacked and was destructive to dahlias and carnations in Victoria, B.C., also in Montague, P.E.I. Numerous inquiries were made concerning the Grape Vine Leaf Hopper (*Typhlocyba comes* Say), which attacks the grape vine and Virginian creeper, making the latter especially unsightly. It is a small insect about one-eighth of an inch long and is frequently wrongly called 'thrip' by gardeners. The injuries are caused by the insect puncturing the leaves and sucking the sap. The best eradicative measures are clearing away and burning fallen leaves and debris in the fall to destroy the hibernating adults and spraying the vines with kerosene emulsion soon after the leaves are fully developed.

APICULTURE.

It is gratifying to be able to report progress in this increasingly important subject. In three of the provinces, namely, Ontario (1906), Quebec (1908), and British Columbia (1911), legislation for the suppression of bee-diseases now exists, and officers are being appointed to assist in carrying out the objects of such legislation. The Province of Ontario has a Provincial Apiarist, Mr. Morley Pettit, who is not only carrying on excellent educational work at the Ontario Agricultural College, but is endeavouring to place apiculture on the right basis. In Ontario it is estimated that there are at least 5,000 bee-keepers with an aggregate number of 100,000 hives. Estimates based on crop reports place the total amount of honey produced in the province at 5,000,000 lbs. This, however, does not represent a fourth part of the amount of honey produced in Ontario, which means that millions of pounds of honey are wasted annually.

Apiculture is not only important as a means of producing honey, but is an essential adjunct to fruit growing. No fruit grower should be without several hives of bees at least, as their important function as cross-pollinators is well known, and it has been repeatedly shown that their presence increases the amount of fruit produced. To the farmer who grows alsike and alfalfa they are similarly essential, increasing the amount of seed produced and also yielding honey of excellent quality; in some cases alsike is a failure owing to the absence of bees.

The most serious difficulty in the keeping of bees is the prevalence of two bee diseases. These are known as American and European foul brood respectively, and the legislation which exists has been enacted with a view to the prevention and control of these diseases, both of which are possible. Bee-keepers whose bees show signs of disease, such as the dying of the brood, the sinking and perforation of the cappings, etc., should immediately communicate with the Department of Apiculture of the Province in which they live or with this Division, to which samples of the diseased combs should be sent properly packed in tin or wooden boxes which may be mailed free.

The following advice is given for the benefit of those who contemplate keeping bees:—

Do not begin with too many colonies, one or two hives will be sufficient for the first year.

Obtain your bees from an apiary which is certified free from disease, otherwise it may result in the introduction of disease into new localities.

Have all your colonies in modern frame hives, and do not buy colonies in box hives unless they are to be transferred to frame hives. The Langstroth frame hive is recommended as being the standard hive.

The best time to purchase bees is during May, that is, before the honey flow begins.

It is advisable to consult a neighbouring bee-keeper of experience, if possible, before purchasing the bees and necessary appliances. The benefit of his experience will be of great value and may result in a reduction of the initial expense.

THE APIARY.

The following is a report on the apiary which is maintained by the Division for experimental purposes. Mr. J. I. Beaulne was placed in charge of the apiary during the summer of 1910.

The bees were taken out of the winter quarters and placed on the summer stands on March 31, 1910. They appeared to be in good condition until an inspection on June 8 revealed the presence of European Foul Brood. This disease was found to be very prevalent throughout the district and across the river in the province of Quebec. All of the thirty-eight colonies were given the 'shaking' treatment for this disease. By this means the bees were shaken off the old combs into clean hives containing new frames with starters, thereby removing all the infected material and compelling the bees to start the building of new combs. The bees are also forced to turn whatever infected honey they contain into wax. A second 'shake' on to full sheets of foundation was given in a few days and the bees immediately drew out the foundation. A number of weak colonies were united, giving twenty-one colonies, of which nineteen were in good condition for the honey flow.

In spite of this set-back, and the drying-up of the white clover caused by the drought between June 8 and July 15, the colonies did remarkably well. About 1,516 lbs. of honey was gathered, yielding over 70 lbs. of honey per hive. The greatest yield for a single colony was 144 lbs. and eight colonies gave an average of over 100 lbs. All the supers were removed on August 27. Between August 28 and September 9, twenty pure Italian queens were introduced in the hope of making the colonies more resistant to disease. Eighteen queens were accepted and began to lay immediately after leaving the introducing cages. By October 1 all the colonies contained large numbers of young Italian bees.

The colonies were brought into winter quarters on November 23 and 24, the average weight being 49½ lbs. At the time of writing (March 31) they are still in winter quarters and have come through the winter excellently so far. The temperature of the bee cellar from November 23 to March 31 varied from 41·80° F. to 45·20 F.; the temperature of the bee cellar should range about 40° to 45° F. not more nor less.

REPORT OF THE DOMINION BOTANIST

H. T. GÜSSOW.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Canada.

SIR,—I have the honour to submit herewith the second Annual Report of the Division of Botany. The report is divided into two parts (1), Diseases of plants, their identification and methods of treatment, and (2), Agricultural botany, under which division will be found accounts of work in connection with fodder and forage plants, weeds, and poisonous or otherwise injurious plants. The work of the Division has made active progress, the correspondence and inquiries dealt with having doubled since the last report. The increasing number of the letters plainly shows that an encouraging interest is being taken in the work by the farmers and fruit-growers of the Dominion.

I am able to report that, apart from the more common diseases attacking the grain and potato crops, no serious epidemic has appeared. There are, however, some specific diseases attacking the peach in the Niagara district, the rhubarb plant in the western provinces, and apples and plums all over Canada, which have come under my notice and which are being closely investigated. Satisfactory progress has also been made concerning the study of the more common smut diseases affecting grain, corn, millet, etc. It was found necessary to repeat a good deal of former work as there exists an unfortunate confusion as to the nature of attack and propagation of the different smut fungi, and also as to their correct method of treatment. This kind of work, requiring a whole season and longer for any reliable results to be obtained, seemingly makes slow progress, but it is hoped that the coming year will permit of collating valuable results, when they will be published.

I here take an opportunity to acknowledge and thank my assistant, Mr. Herbert Groh, B.S.A., and my secretary, Mr. Edward Lisle, for faithful and satisfactory services rendered. It is with regret that I have to announce the resignation of Mr. Groh, who has decided to go 'back to the land' where I trust he will be as successful in his work as he has been while connected with the Experimental Farm.

Since the first of January, in compliance with the wish expressed by the Hon. the Minister of Agriculture, I have taken over the control and management of the Botanic Gardens and Arboretum. A long-felt want was supplied in the provision of an experimental greenhouse for the carrying on of infection and other experiments during the winter months, which has already been found of the great value claimed for such facilities.

I have been absent during two months from the Division of Botany on an official visit to the west. This, being my first visit to the 'Great West,' has been found of great value in making field observations and in becoming familiar with the general conditions of the country.

In view of your approaching retirement from the position of Director of the Dominion Experimental Farms, I take this opportunity of expressing my appreciation of your courteous readiness to advise me in matters concerning the organization of this practically new Division, now under my charge, the establishment of which was largely due to your foresight in providing for this important branch of agricultural research.

I have the honour to be, sir,
Your obedient servant.

H. T. GÜSSOW,
Dominion Botanist.

PART I.

PLANT DISEASES IN 1910.

During the past year, a large number of diseases have been dealt with by this Division. Owing, however, to the fact that our work in this direction is as yet not sufficiently known, these cases, though over one hundred and fifty in number, are not cited as giving a comprehensive review of the plant diseases of Canada, but merely to serve as a record of the various outbreaks reported to, or observed by, us. The close proximity of some of the United States Experiment Stations encouraged a number of associations or private individuals to seek assistance in those quarters, and, partly for this reason and, partly, owing to the indifference of some growers towards the first outbreak of disease, our records are much less complete than they would otherwise be.

The following are some of the diseases that have been investigated during the year.

DISEASES OF CEREAL CROPS.

RUST.

This is a constant enemy of the grain grower throughout the Dominion. No progress in our knowledge of the control of this disease can be recorded. The eradication of the barberry or other alternate hosts of the parasite is generally advised, though even in countries where the destruction of these plants is carried out under legislative measures, the results have not been altogether encouraging. It has been found, for instance, in Denmark, that the compulsory destruction of these carriers of the fungus, extending over the last decade, has brought no reduction in the severity of rusts. The selection of rust-resistant varieties appears to be the only practicable means of control, with our present knowledge. Such selection work should, however, be carried on in the particular locality where the seed is to be used, since it has been found that the same variety may diminish appreciably in its resistance when transferred to another region. Probably the best method available to the farmer is the selection for seed purposes of the plump, full-weight grain to be found in a crop which has suffered from rust during a season when the disease has been severe. Such grain is the produce of individual plants which have been rust-resistant to a marked degree, and the plants grown from these seeds will most probably inherit this property.

SMUT.

Stinking smut of wheat, in spite of the ease of its control, continues to seriously reduce the yield in some quarters. The smuts of oats, and covered smut of barley are likewise easy to control, yet a tax caused by these is voluntarily paid by the farmer in the form of a diminished yield, of a value which would excite a very vigorous protest if levied in the orthodox manner.

Loose smut of wheat and barley are advancing slowly in the western provinces. These latter kinds of smut are not affected by the seed treatments so successful with the forms just mentioned, and ignorance on the part of farmers of this difference in their nature has led some to question the value of seed treatment for any form of the

disease. This different response to treatment is due to the different modes of infection of the plants. The whole question of smut treatment and infection will be discussed in a separate bulletin to be issued after concluding our experiments on this subject. In the meantime we shall of course be pleased to assist any inquirer who may wish to know the methods of treatment.

Corn Smut and Smut of German Millet occurred in various localities.

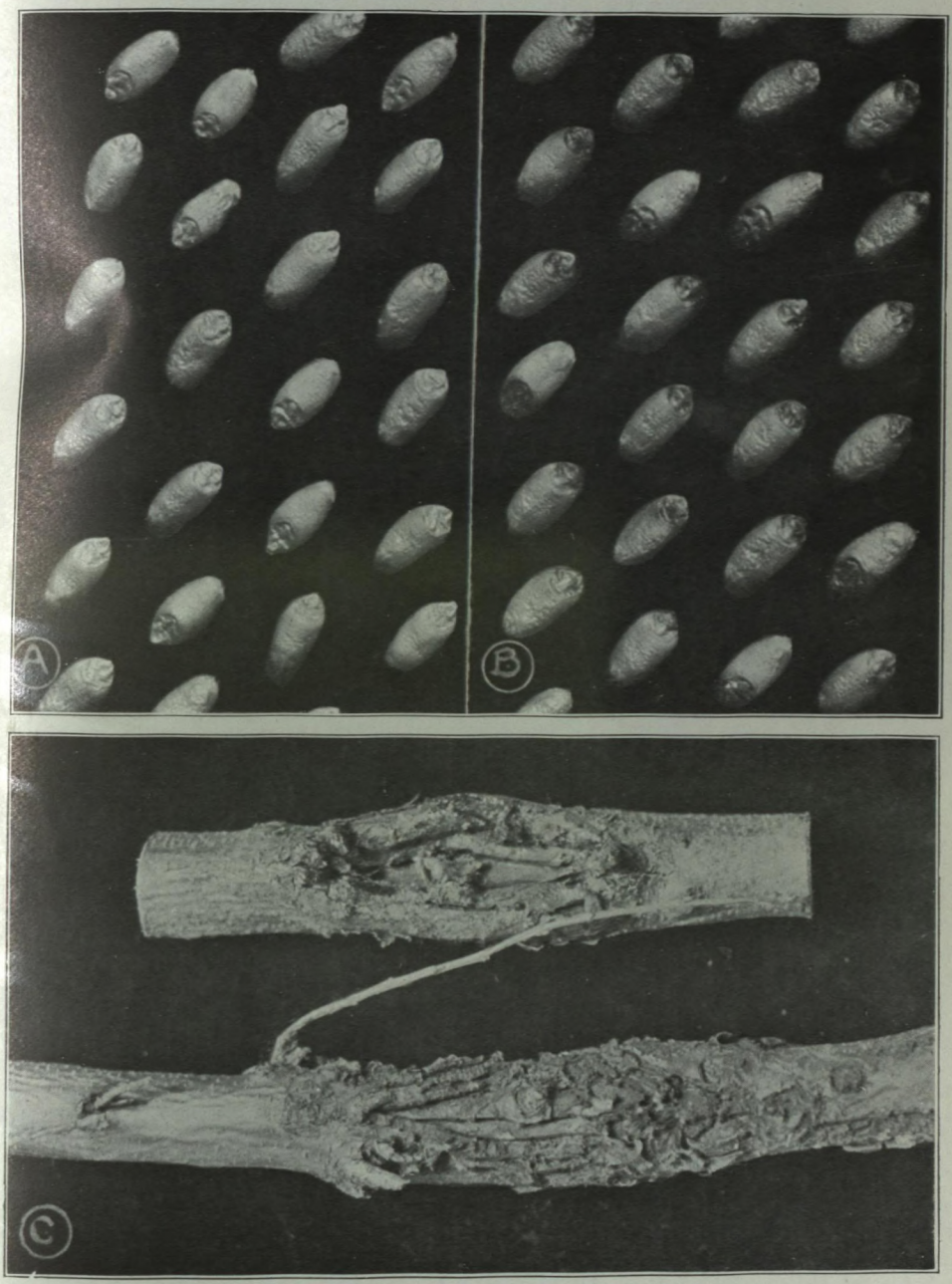
MILDEW OF WHEAT (*Erysiphe Graminis*, D.C.)

This fungus made its appearance in some experimental plots on the Farm and was twice reported from other localities. In spite of the leaves of the plant being densely covered with the greyish mildew, the plants suffered in no perceptible manner. The disease is said to be of some importance in low-lying, shady ground. An experimentalist would hardly choose such places for his plots and the adverse conditions referred to are not wide-spread on farms.

FROSTED WHEAT.

Complaints have been made by some farmers about unevenness in the ripening of the grain. This phenomenon may be due to physical causes such as drought acting locally upon undrained portions of the field, or to the mechanical or chemical condition of the soil, which may vary considerably in large fields. While sometimes no injury may result from frost, by cutting unevenly-ripened wheat, yet when frosty nights appear while the wheat is still in the field, though already cut, a large percentage of the grain is likely to be injured. It was noticed that when frosts came while the wheat was still uncut, no injury resulted, the power of the living plant seeming to be sufficient to prevent it. As a result of frost-injury, the grains become much shrivelled and darker in colour than sound ones; the weight per bushel is less and the germination may be considerably impaired. If such grain be subsequently used for seed it is only natural that, owing to unevenness in germination, which hence extends over a longer period, the produce of such grain will again ripen unevenly. It is evident, therefore, that frosted wheat should not be sown in the first instance, but attention should also be directed to the correction of defects of drainage, or of the chemical or mechanical conditions of the soil.

In this connection, mention may be made of a curious discolouration present in wheat grains received from localities far apart (Ontario and Saskatchewan). These samples contained a large proportion of grains (according to our experience, 8 per cent), apparently quite normally developed and plump, but the embryo exhibited signs of a brownish discolouration, which in some cases extended all over that portion of the body of the grain itself. The grains did not appear unlike barley grains injured by the fungus, *Helminthosporium*, where, however, it is the opposite end that is browned. Our correspondents assured us that this discolouration had been noticed during the last few years quite regularly, in some cases affecting the harvest up to about 20 per cent. The germination of the grain did not seem influenced, but the young plants raised grew less well than those from sound seed. We wish now to continue our experiments in the field. A photograph of this wheat is here reproduced, (Plate 4 *a*, *b*,) showing the discolouration plainly, and any farmer who has had similar trouble will greatly oblige us by relating his experience, giving us all particulars, and by sending us a sample of the affected wheat.



A. and B. Dawson's Golden Chaff Wheat. (*a*) Sound grain with light-coloured embryo. (*b*) Grains showing dark-coloured embryo.
C. New peach disease. Two severe cankers on five year old wood.

BACTERIA INTERFERING WITH MALTING PROCESS.

The following remarks are extracts from correspondents' letters, and notes on the result of our investigation into the cause of the trouble referred to therein. For reasons it is desirable not to disclose in this report, the identity of the parties concerned, but reference is made to the subject because of its general importance in the growing of malting barley in Canada.

HISTORY OF THE BARLEY.

'Much interest has been taken during the last three or four years in producing a class of barley suitable for malting purposes, similar to the world-renowned Galatina barley produced under irrigation in the state of Montana. This is contracted for a year at a time and is produced entirely for European export. One or two importations of this barley have been made from Montana, and last year a quantity large enough for an experimental export shipment was produced. The barley in question was sent to Messrs....., a very competent firm, probably the largest maltsters in the British empire.'

NATURE OF COMPLAINT.

One correspondent stated: 'It is with the greatest regret that I have to inform you that we met with a very serious misfortune as regards the barley you sent us. We divided a parcel into two lots, one to check the other, and we have had a most extraordinary development, something I have never seen before in all my malting experience, and which some experts have put down as a species of yeast, followed by the development of bacteria, destroying the value of the grain; and it is almost dangerous to use in brewing operations. It appears at the outside of the grain at one end during the process of malting, with a peculiar pink colour, which gradually develops and stains the rootlets, and also permeates the starchy matter below the skin. So peculiar is it, that I have sent a sample of it to a number of scientific friends, knowing it will be specially interesting, and have asked for their opinion. We have taken the greatest care not to reveal where the barley came from, as I have no desire to give even the locality a bad reputation. I am rather at a loss to know what to do with it, as I am told the only method of destroying the bacteria is to subject it to excessively high temperature, which reduces its value very considerably as a malt. Can you tell me anything of how the land was treated, where this barley was produced? I presume no manure of any kind was used upon it. What was the nature of the soil upon which it was grown? So far as I can learn, they attribute it to a matter of infection, the source of which has to be discovered. It is most regrettable, as I had prepared the way for one or two of our leading brewers to make practical tests of it, and I am afraid now to submit it to them for the reasons already stated.'

From this account it would appear that the barley referred to here is not only altogether unsuitable, but even dangerous, from the risk of infesting a brewing establishment with an organism of some kind that renders the process of malting a practical impossibility. It will also be realized that if the barley is really responsible for this trouble, and not any treatment that it may have been subjected to, it would seriously compromise any industry interested in the production of a first-class barley. Further correspondence states:—

'The barley was grown on absolutely virgin prairie; it was put in on first breaking and was the first crop. The seed was most carefully handled and cleaned and was the second generation from the original importation. The first crop producing the seed from which the second crop was raised, was also put in on virgin land. The seed was treated with formalin before sowing and the solution was that laid down by the

Dominion Experimental Farm. The sacks in which the barley was shipped were new.'

The grower thus gives valuable evidence of careful treatment of this barley and, as the matter seemed of considerable importance, a careful investigation was started with the view of throwing some light on this mysterious trouble. The brewer was communicated with; a sample of the barley was obtained from him and further particulars requested and supplied as follows:—

Q. I take it the sample of barley as submitted was not subjected to any treatment whatever, but faithfully represents the bulk as actually supplied?—A. The barley has been passed over our screening plant to extract the broken corns, dust or any other extraneous matter detrimental to the process of malting. The sample submitted fairly represents the bulk, and the bulk was in our possession throughout.

Q. Kindly submit a sample of any other two-row barley that has received the same treatment as the sample sent?—A. We are sending you samples of our Scotch two-row barley which has received the same treatment.

Q. What was the germination of the barley before using?—A. Germination showed well; 98 per cent growing.

Q. The peculiar growth developed after 'steeping.' How long are the grains steeped? State the temperature?—A. The steeping referred to was in the ordinary process of malting, and the barley is kept under water for thirty-eight hours in all, although it occupies the steep for seventy-four hours. The following is the process, viz.:—

First: 14 hours under water.
12 hours water drained off (for aeration).

Second: 12 hours under water.
12 hours drained.

Third: 12 hours under water.
12 hours drained before casting on to the malting floor; the temperature of the water being 45°. The water is very pure and soft.

Q. On the malting floor, what is the height of the layer and temperature of the floor?—A. The depth of the layer on the malting floor is 9 inches and the temperature rises slowly and gradually from say 55° at time of casting to 65° before being loaded to the kiln about the 11th or 12th day.

Q. Are you aware that it is a constant occurrence in the growing floor that bacteria, yeast, etc., will appear if the sample of barley is not of a high germination. That is, in old barley?—A. Yes, we are aware of the existence of all these in all classes of barley, both old and new.

Q. I note you have made pure cultures of the peculiar pinkish growth. Would you please send me a tube and state the composition of the medium on which it was grown?—A. The growth was cultivated in a wort gelatine. We are sending you a tube with the culture.

Further observations were contained in additional letters which may be summarized as follows:—

'About the fifth day on the growing floor, there was noticed a very peculiar pinkish colouration, which started at the embryo and which eventually permeated the whole grain, discolouring the husk and also the rootlet, the rootlet being, at the same time quite fresh . . . . . .finally we discovered that the endosperm was completely converted into a slimy matter and the rootlet turned brown.'

REPORT.

The sample of barley was examined microscopically and tested for odour, germination and any outward unfavourable signs.

About 4 per cent of the barley grains showed brownish discolouration towards the tapering end, and a few spots of the same colour were also found on the body of some grains. Microscopical examination of the discoloured tissues showed the absence of fungi as *Helminthosporium*, etc., and therefore, considering the high germination of the sample, this sign was considered to be of no consequence.

The odour of the barley was neither musty nor mouldy, although not quite fresh or strong. It must be borne in mind, that this sample had twice crossed the Atlantic and naturally the odour would have been affected.

The germination was tested independently with the following results:—

Ottawa Seed Laboratory, Department of Agriculture, 96 per cent germination.
Chemical Laboratory, Central Experimental Farm, 96 per cent germination.
Botanical Laboratory, Central Experimental Farm, 97 per cent germination.

As far as germination and external appearance are concerned, this barley was an exceptionally good sample for malting purposes.

The barley was next subjected to the steeping process and was malted:—

(*a*) Under conditions providing no ventilation, a moist atmosphere and at a higher temperature, (30° C.).

(*b*) Under conditions providing good ventilation at ordinary room temperature.

About four days after being kept in the moist chamber (*a*), the barley which showed the first signs of germination after forty-eight hours, developed a peculiar pinkish colouration, appearing like fine, dew-like drops on the rootlets and the body of the grain. At that time, no such changes could be observed in the other culture (*b*). This colouration was immediately recognized as resembling a common occurrence familiar to all investigators of the germination of cereals, (barley, rye; wheat especially). In laboratories, the development of little yellowish or pinkish slime growths may often be noticed and they have been repeatedly recorded. They consist of masses of bacteria,(*Zoogloeae*). The discolouration increased visibly and soon was noticed extending all over the layer of roots that had formed on the bottom of the glass vessel used, on the sixth day. Even then no colouration of this kind could be observed in culture (*b*).

About ten days after starting this experiment, all roots were covered with this distinctly manganese-pinkish slime. It was then observed that the roots were fading and becoming brown in colour. This fact is not attributable to the action of the bacteria, but solely to the exhaustion of the food reserves by the young plant. From time to time microscopical examinations were made of the slimy roots, showing that the bacteria not only covered the surface but inhabited also the loose cells of the root cap in the form of narrow streaks. The endosperm was never observed to be permeated, but was covered to some extent externally. The sliminess observed by our correspondent is, in our opinion, due to the natural dissolution of the food material used up by the growing plant. An organism was isolated in the usual manner and pure cultures were made on a decoction of barley roots, agar, and maltose on which, after thirty-six hours, a profuse growth appeared which turned pinkish in colour after sixty hours.

On potato, the organism grew with an irregular border, moist, glossy in appearance and distinctly manganese-pink. The potato substratum all round the growing colonies was pink in colour.

On gelatine, the colonies grew readily and produced a bluish-red tint. Gelatine not liquefied. Stabs grew right to the bottom.

The bacterium appeared as rods, 1·3 to 2μ long, 0·6μ broad. Flagella, many, (peritrichial); Gram negative.

The organism was provisionally identified as Düggeli's *Bacterium herbicola rubrum** which was carefully studied in 1910 by Dr. Zikes of Vienna†.

On receiving subsequently a pure culture of an organism from our correspondent which was obtained from the pinkish slime originally observed where the grain was malted, subcultures were made on the different media already referred to, with the identical diagnostic results. The measurement of this organism also agreed with ours.

On submitting one of the subcultures to Prof. Delbrück, of Berlin, Germany, Dr. P. Lindner, in charge of this work, very courteously expressed his opinion that the organism was probably identical with Düggeli's *Bacterium herbicola rubrum.*

This organism, together with a number of yellow Zoogloeæ (*B. fluorescens liquefaciens, B. herbicola aurea,* etc.) though less common, may frequently be observed on germinating cereal seeds. There is no doubt that the presence of the bacterium on this barley is not due to any diseased condition. It is practically always possible to isolate this and related organisms from most of our cereal seeds, where they occur on the surface. In order to ascertain whether we should be successful in demonstrating this fact, some two-rowed barley grown on the Experimental Farm and the sample of Scotch barley referred to by our correspondent were subjected to the same treatment, with the result that the organisms made their appearance under close atmospheric conditions. It is evident that the organism is a surface-covering bacterium, which will, if afforded suitable conditions for development, become more or less conspicuous. It being a common practice to wash the grain with lime water before casting it upon the malting floor, to prevent any fungus or other spores from appearing during the process of malting, it was thought advisable to make this experiment on our correspondent's barley. On carrying out this experiment with it, no trouble from any organism was experienced.

We therefore suggest washing the grain with lime water before malting which would in no way interfere with the malting process, and would also prevent the recurrence of the above unpleasant experience.

The above report was submitted to our correspondents and, after settling some few points, one of which was that 'no lime water was used in the case of malting the barley under question, as it was wished to put it through the malting process in its most natural state, as a guide to us in making a first test of a new class of barley,' both correspondents expressed entire satisfaction on the results of this investigation.

In conclusion, I may say that great credit is due to both our correspondents for their discreet way in handling an affair of this kind, which might indeed have been seriously compromising to the future growing of this special barley if they had not placed their experiences, samples and cultures at our disposal.

APPLE DISEASES.

FRUIT PIT OR BITTER PIT OF APPLES.

(Plate I 'a').

Among the more obscure troubles that may cause annoyance to the apple grower, the so-called 'bitter pit' or 'fruit pit' is worthy of mention. While becoming most noticeable during cellar storage, it may also often be detected on the tree before the fruit is full grown. The early stages are visible as sunken spots on the surface of the apple up to a quarter of an inch or more in diameter. At these places, the skin is

* Düggeli; Zentralblatt für Bacteriologie, Part 2, Vol. XII., pp. 602, 695. Vol. XIII., p. 56, p. 798.

† Zikes, Dr. Heinrich, Sitzungsbericht, Kais. Akad. d. Wissensch. in Wien; Math.—Nat Klasse, Vol. CXLX, Part I., January, 1910.

not only unbroken but there is little or no alteration in colour. If cut into, however, a pocket of dead and discoloured cells will be found lying immediately below. Ultimately, this discolouration extends also to the surface layer of cells and the spots become brown, the skin still remaining unbroken. They also often increase in size and a number of them may coalesce to form one large affected area.

It is found also that the superficial changes mentioned above are generally associated with deeper-seated ones in the flesh of the apple. On cutting such an apple, brown spots may be seen scattered through it, chiefly in the more external region but sometimes extending almost to the core. Although seen in this way as isolated spots, if carefully dissected out they will be found to be of the nature of strands rather than of spots and follow the course of the vascular bundles or sap-tubes which they surround. Either the superficial or the internal appearances mentioned may, however, occur alone. In many cases, but not always, the dead masses of tissue have a bitter taste which has led to the application of the term 'bitter pit.'

Cause.

No one has succeeded in finding any organism associated with this disease, and from the work that has been done on it with negative results, it appears in the highest degree probable that it is not of a parasitic nature. Hence no kind of spraying can be of any value. It appears to be caused by some inadequacy of the water or sap supply at some stage in the development of the fruit, by which means certain of the cells are deprived of their requirements in food and water. Whether the cells are actually starved from want of food or whether the lack of water results in too great concentration of the substances in the cell sap is not clear, but the ultimate effect is the death of the cells, which now form the discoloured areas described. As in so many cases with these so-called physiological troubles it is difficult to make any recommendations. The causal factors are on the one hand, rapid loss of water from the fruit and on the other an inability to make good this loss with sufficient rapidity. Hence dry seasons or periods of drought may be expected to increase the trouble, while much difference is to be found in different varieties in their degree of susceptibility, on account of their varying powers of sap conduction, etc. There is no doubt that this is one form of the so-called 'Baldwin Spot.' On the other hand recent investigations point to a fungus (*Cylindrosporium Pomi*, Brooks), as being often the cause of this disease, and in such cases a spraying given late in June or even early in July has been found of value. The existence of two forms of disease, much alike in appearance, but of totally different nature, one due to a fungus and the other to a disturbance in the normal physiological conditions in the plant, will explain the contradictory results of spraying experiments for the so-called 'Baldwin Spot.'

A WESTERN APPLE DISEASE—APPLE TREE ANTHRACNOSE (*Gloeosporium Malicorticis*, Cordley).

Specimens of this disease have been received from British Columbia, and a personal examination was also made of trees attacked on Vancouver Island. The disease is known in the apple orchards of the Pacific Northwest of the United States, and has also been recorded from Oregon and Washington. Casual untrained observers have often confused frost injuries of the bark with this parasitic disease and, for this reason, a careful description is necessary to prevent any errors of diagnosis, which may naturally be followed by the loss of trees. Frost injuries may cause depressions and discolourations of portions of the bark, and may give rise to cracks and cankers, and thus closely resemble the Anthracnose, but the latter is readily distinguished by numerous small ruptures in the sunken-in patches formed by the fruiting layers of the

fungus causing this disease. These ruptures are rarely absent and at the proper time they contain ripe spores of the fungus which, at later periods, may no longer be found therein. So any careful observer can, by means of a pocket lens, easily determine whether an injury is due to frost or to the fungus. This confusion, no doubt, accounts for some of the unsuccessful attempts in combating the disease by sprays.

Apple-tree Anthracnose manifests itself on branches of apple trees by clearly defined, depressed, dark-brown areas of more or less large dimensions. If the disease is allowed to make unchecked progress, it will completely girdle the attacked branch, which will consequently die. There may be a large number of separate infections on a single tree. During the winter months, the progress of the fungus is almost at a standstill, but early in the spring it becomes active again, which may be noticed by the increase in circumference of the dead areas. In May or June small ruptures appear in the bark where the fungus produces a large number of single-celled colourless spores of the genus *Glœosporium*.. These spores germinate and reproduce the disease when they encounter favourable conditions for their development.

From the life-history of the fungus, we would suggest the following means of control: Remove all branches that are girdled or very nearly girdled by the disease and burn them. All trees should be sprayed with lime sulphur in autumn, not later than when all leaves are off the trees. Early in spring, this spray should be repeated to be followed shortly before the unfolding of leaves or flowers by Bordeaux mixture.

BLACK ROT (*Sphæropsis Malorum*, Peck).

Although this disease has been found on pears and quinces, our records of its occurrence in this country are confined to the apple. It may appear on the leaves, fruit, or woody parts of the tree, producing more or less characteristic effects.

On the fruit.—This is perhaps the best-known form and its appearance has led to the name 'Black Rot' being applied to it, a name now used for the disease in general. The apples are infected through some injury (wasps, curculio, hail, etc., etc.) The diseased flesh becomes discoloured, but remains firm and, later, its entire surface becomes covered with minute black pustules. Each of these black bodies is a fruiting body or *pycnidium*, inside which spores are produced. This phase of the disease is comparatively unimportant, rarely causing an appreciable loss.

On the leaves.—Here a characteristic spotting is produced. The spots vary from ⅛ to ¼ inch in diameter, and are of a brownish hue surrounded by a well-marked purplish border. The *pycnidia* do not, as a rule, develop till the leaves have fallen to the ground.

On the limbs and trunk.—It is here that the most serious effects are produced, the growth of the fungus giving rise to 'cankers' of the large limbs of old trees and of the trunk as well in the case of young trees. These differ from the cankers due to 'fire blight' in being raised rather than sunken, and in having the surface cracked and roughened instead of smooth. Later, the surface becomes covered with the little, black fruiting bodies previously referred to as occurring on the fruit. These cankers are perennial and often have a zoned appearance as a result of the growth in successive seasons. They may extend for considerable distances up and down the limb and finally work right round it, girdling it and causing its death. The damage done by this 'black rot canker' has recently created considerable alarm in certain districts in Ontario, particularly in Prince Edward county.

Control.

Prevention of the disease largely resolves itself into general care of the apple orchard and the selection of varieties hardy enough to be proof against winter injury in the locality under consideration.

In an orchard where good cultivation and the general clearing up of refuse are practised and the proper sprayings for apple scab given, the disease is not likely to be troublesome. Hardiness of the variety is important, since, apparently, the fungus can only gain entrance to the woody parts as a result of some injury such as that done by frost, sun scald, etc.

Where the cankers are already in evidence, they should be cut out with a draw-knife or other instrument. In doing this, care must be taken to cut well beyond the limits of apparent disease as shown by discolouration. The cut surface should then be treated with some good disinfectant like bichloride of mercury (Corrosive sublimate), one part in one thousand of water and painted over with coal-tar or with paint free from turpentine. In spraying, attention should be given to the covering of the limbs and trunks with the spray mixture. Rotting apples should be gathered up and destroyed.

N.B.—While corrosive sublimate is in many respects the most powerful and satisfactory disinfectant in such cases, too great caution cannot be exercised in its use on account of its intensely poisonous nature. Furthermore, it is strongly corrosive to iron and the solution should always be made up and kept in wood or glass vessels. A convenient form is the tablet, obtainable at most chemists, containing such an amount that one tablet to a pint of water gives a solution of one to one thousand strength.

BITTER ROT OF APPLES (*Glomerella Rufomaculans*, [Berk.] Spauld. & Von Sch.)

This is one of the most serious enemies of the apple crop in many of the apple-growing regions of the United States. In this country, it may be looked for in the warmer districts, but it is probable that many reported cases, particularly of canker injury, have been really due to the Black Rot.

The disease causes two well-marked and distinct effects, a canker on the twigs and young branches and a rotting of the fruit. In contrast to Black Rot, however, it is the disease on the fruit which is most destructive. A small, brown spot is first noticed, which rapidly extends under favourable conditions, the tissues becoming soft and wet. Later, the surface sinks, becomes shrivelled and wrinkled, and the dead tissues finally become dry and corky in texture. As the disease progresses, numbers of spore-pustules appear on the surface of the affected area, beginning to show near the centre and following the spread of the disease. These are filled with pink spores.

While the disease may attack the fruit at almost any stage if the climatic conditions are favourable, it is chiefly noticed as the fruit approaches maturity, and hence the term Ripe Rot is also given to it. Hot, wet weather is particularly suitable for the rapid spread of the fungus. Fruit in an advanced stage of the rot generally falls to the ground, while the less badly attacked apples may be found still on the tree.

Control.

It is important to prune out and destroy all cankered branches, since on these cankers are produced the crop of spore pustules of the parasite. Spores from these infect other twigs and give rise to a second crop which serves as a starting point of the fruit infection. Destruction of attacked fruit is also important. In addition, spraying with Bordeaux mixture or other fungicide is necessary. The first spraying should be given about forty days after the petals have fallen and be followed by three more at intervals of about two weeks. The number of sprayings, however, and the intervals between them will depend upon the prevailing weather conditions.

APPLE RUST AND CEDAR 'APPLES,' (*Gymnosporangium Macropus*, Link).

Many observers are familiar with the woody galls so frequently found on the Red Cedar (*Juniperus virginiana*) but probably few are aware that these 'cedar apples,' as they are called, are connected with the 'rust' of apple trees. Yet such is the case, and although 'apple-rust' is, in this country, rarely reported as a serious disease, it may be of interest to briefly outline the life-cycle of the fungus which gives rise to two such widely different effects.

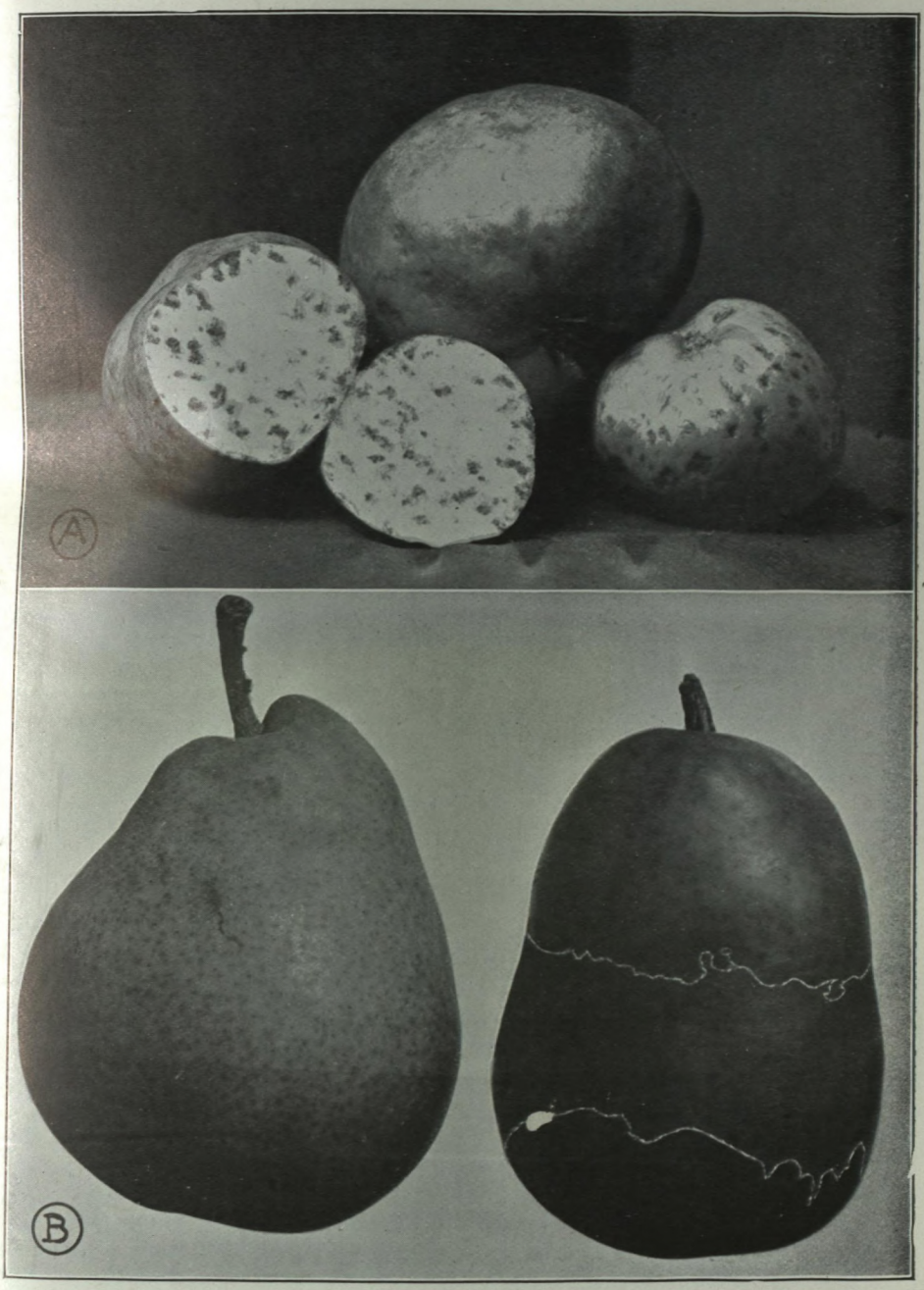
In the spring time, after rains there will be noticed protruding from the cedar-apples a number of orange-coloured, gelatinous, and usually horn-like outgrowths, produced by the swelling of the masses of resting spores inside the gall. On the surface of these protuberances, vast numbers of minute spores are formed and, as the gelatinous mass dries, these spores are scattered by the wind. If blown on to certain parts of an apple or crab tree, such as the leaf or young fruit, or occasionally the young twigs, they produce infection of this new host, and the green colour of the healthy tissue becomes changed over the infected area to a yellow or orange tint. Later on, there will be found arising from this spot small, tubular outgrowths of a yellowish or cinnamon colour, inside which are produced spores of another kind. This is the apple 'rust' and corresponds to the 'cluster-cup' stage of the common grain rust found on the Barberry leaf with the rim of the cup prolonged into a tube. The spores now borne can only produce a further development if carried to the Red Cedar where they give rise again to the cedar-apples, a process which occupies two seasons.

Control.

The only satisfactory means of preventing the disease on one of the alternate hosts is to avoid growing the other in the immediate neighbourhood. Since the apple tree is the important one, except in very exceptional cases, neighbouring red cedars should be cut down and destroyed. A certain amount of infection may still take place by spores carried from a distance but this will be found of negligible amount. In cases where it is desired to keep the red cedars for ornamental purposes, something may be done by cutting off and *burning* all cedar apples before the horn-like outgrowths have appeared in spring. Spraying has not yielded good results.

SOOTY MOULD (*Capnodium*, Sp.) ON APPLE TWIGS.

During the year, an interesting communication was received asking if a 'Black Knot' disease, similar to that on plum and cherry trees, is found on the apple. The inquiry was accompanied by a number of twigs encrusted with a black, irregular warty growth, somewhat resembling the excrescence of the familiar 'black knot.' Examination, however, showed this growth to be quite superficial in its nature; the fungus—a species of *Capnodium*—having developed and produced its fruit bodies around the twigs, but not having entered the tissues of the host. Such fungus growths are not uncommon on various plants and are usually observed in association with aphis attacks, the 'honey-dew' excreted by these insects on the leaves and branches forming a medium very favourable to the development of the fungus. Such growths are of no particular importance, as a rule, apart from their somewhat unsightly appearance, but at times may cover the surface of the leaves to such an extent as to interfere with their functions. Where insect pests are systematically combated, the conditions necessary for such a result are not likely to be found.



A. "Bitter Pit" of apples. B. "Frost Belting" of Pears. The pear to the right showed the frost belt clearly between the white lines.

16—p. 248.

DISEASES OF PEARS.

FROST BELTING' OR 'FROST BANDS' OF PEARS.

(Plate I. b).

The accompanying illustration represents the peculiar appearance of some Boussock pears which were taken off a tree growing in an orchard in British Columbia. The pears, which were quite perfect specimens as regards size and taste, showed a peculiar 'band' or 'belt' of brownish tissue just above the lower, broader portion of the fruit, resembling the well-known 'russeted' condition with which we are familiar in the well-known 'Russet' varieties of apples and pears (*Golden Russet, Sheldon, Bosc*). Medlars (*Mespilus*) as a general rule also show the 'russeted' appearance spoken of. These pear fruits however, showed only russet 'rings' about three-quarters of an inch broad, while the remaining portions were normally green. Probably eighty per cent and more of the fruits of this variety showed this appearance. It has been ascertained that apples like the common Golden Russet may be grown without exhibiting the roughish brown surface, and in consequence this condition may be considered as abnormal. Microscopical examination of all kinds of russeted fruits has shown that their appearance is due to the formation of corky cells, which certainly cannot be considered as normal on the surface of these fruits. The formation of cork cells is invariably an indication of an irritation of some kind. They may be produced artificially on any kind of fruit by very slight abrasions of the epidermal cells. Hence corky-cell patches of more or less large dimensions frequently occur when fruits 'rub' against each other or against a branch. Chemicals also produce similar effects. The most common spray injuries from Bordeaux mixture become largely apparent by the formation of cork cells, likewise any substance that is likely to act destructively upon the waxy covering of fruits, may produce similar effects. Lastly, frost has been held responsible for the changes of the epidermal cells into cork cells. In many fruits, the russeted appearance is now regarded as typical and while, strictly speaking, their appearance is due to their tender epidermal cells being injured by frost, nobody feels concerned about it. On the other hand, when any cause renders an otherwise perfect fruit 'patchy' it is natural that the grower should seek the cause, as a drop in the market price is likely to result.

The curious 'belt' on the pears in this case is due, no doubt, to the influence of low temperatures, which prevailed during certain days, as we were able to ascertain from the thermometer readings for that locality kindly supplied to us by the Meteorological Station of the Observatory in Toronto. The curious feature of this case is the fruits showing this characteristic 'belt' only, of a very uniform size and at the same place. Frequently one may observe, in these flask-shaped pears, the lower broader half totally russeted while the narrow tapering portion remains green. In some apples and pears we have observed the same phenomenon forming a ring just around the calyx of the flower. Careful study of the reason for this difference in the formation of the belts showed that some fruits of different varieties of apples and pears are covered, in their very young stages, towards the calyx with dense masses of fine hairs. Sometimes these surround the calyx only and any moisture that may naturally be present through atmospheric conditions freezes and the underlying tissues become injured. In some varieties of pears, the hairs cover the calyx end for the greater portion of the fruit and a frost belt is produced just above them, the hairs naturally providing a protection. If any one interested will carefully examine the different fruits, this observation may easily be proved, especially in the case of the Boussock pears. Varieties of fruits commonly russeted very rarely show any hair covering. The injury thus shows itself of little consequence and growers need feel no alarm.

LEAF BLIGHT OF PEAR AND QUINCE (*Entomosporium Maculatum*, Lev.)

On the leaves, this disease shows most clearly on the upper surface. It appears as spots, more or less circular in shape, becoming reddish in the centre and with a dark margin. The effect on the leaf will depend on the number of such spots, bad attacks resulting in the yellowing or browning of the leaf and its premature fall. A disease with which it may possibly be confused is the Leaf Spot, (*Septoria Pyricola*, Desm). In this latter case, however, the spots are large and more angular and there is not the same difference in appearance between the two surfaces.

On the fruit a similar spotting is produced, red at first and subsequently darker, often followed by cracking.

The disease may be controlled by the same spraying treatment as employed for pear scab.

DISEASES OF PLUM AND CHERRY.

BLACK KNOT OF PLUM AND CHERRY (*Plowrightia Morbosa*, [Schw.] Sacc).

(Plate III. b).

The striking and unsightly appearance known as 'black knot' is familiar enough to the grower of plums and cherries, and a few remarks as to its origin, nature and manner of growth may not be out of place. It may be found on nearly all varieties of plums and cherries, both wild and cultivated, and it is generally assumed that the forms occurring on these different hosts are due to the action of the same fungus. It is this fact of the disease being, presumably, transmissable from wild to cultivated trees that makes it difficult to control unless the neighbouring wild trees are eradicated. The popular name for this disease is well chosen, since, in its mature condition, it consists of a rough, black excrescence on the branches extending often for several inches up and down, but usually not going right around. It affects only the woody parts of the tree. This black mass when fully formed is full of small chambers each containing a number of spore-bearing tubes (*asci*). These spore cases develop during the winter and the contained spores are scattered during the early part of the year. The new infections appear as swellings which crack the bark and later become covered with a velvety, olive-coloured, spore-bearing layer. The formation of these 'summer' spores continues to about midsummer, when the change to the black, hard knot begins to take place.

Control.

All knots should be cut out several inches below the apparent limit of the knot, so as to be sure to remove all the mycelium of the fungus which might otherwise start into growth again. This is best done when the leaves are off the trees, but the operation should be completed early in the year, before, say, the first of March. After this a watch should be kept for knots developing during the growing season and they should be removed as soon as noticed. As mentioned above, where the disease is bad, attention should be given, if practicable, to the wild trees in the immediate vicinity. Spraying specially for this pest is hardly profitable, but the usual applications against other diseases will help also as preventives against this.

PLUM POCKETS OR BLADDER PLUMS (*Exoascus Pruni*, Fuckel).

(Plate II. a).

This disease occurs on the different wild and cultivated plums. The most characteristic effect is the malformation of the developing fruit described by the common names given above. The infected ovary is enlarged and distorted, the texture is spongy and the stone absent. The colour is at first yellowish but later becomes greyish owing to the production of spores on the surface. Finally the bladders turn black and fall.

The parasite causing this disease very closely resembles that of the Peach Leaf Curl and the treatment there given is applicable here also. It is believed, however, that the mycelium of the fungus may live from year to year in the affected twigs, growing out into the fruit buds and infecting the ovaries. Hence, pruning out and burning of attacked shoots is often recommended. In any case the pockets should be collected, before the spores form, and burned. It is also necessary to treat affected wild trees in the immediate neighbourhood in the same way, or else destroy them altogether.

A NEW DISEASE OF PEACHES.

(Plate IV. c).

Reference should be made to an outbreak of what appears to be a specific peach disease, to which attention was directed towards the close of the year. This disease occurs in the Niagara district and extends into New York state wherever peaches are grown. It manifests itself by larger or smaller cankers occurring on trees of all ages, often somewhat like the common black knot of plums and cherries. Closer examination shows, however, that these 'knots' are characteristic canker spots. They may occur on all parts of the tree, the main trunk, especially the crotch, smaller limbs and quite young wood. In some instances, the cankers encircle the whole limb rendering it liable to be broken by wind or by the weight of the fruit that may still be produced. As far as could be learned from a personal examination of a number of orchards, the disease is contagious and spreads rapidly. No variety seems exempt from an attack and the age of the tree seems to make little difference. The disease was first observed by growers about four years ago, but no steps were taken to investigate it. It has now become very serious. Photographs have been taken of specimens of the disease and they are reproduced here to enable growers to recognize the malady. They are requested to communicate news of any outbreak so that the extent of the trouble may be ascertained. The disease is now under investigation.

PEACH LEAF CURL (*Exoascus deformans*, [Berk] Fuckel).

As the name indicates, this is mainly a disease of the leaves. It does, however, attack the young twigs to a considerable extent and the flowers and young fruit occasionally. On the leaves, the effect of the parasite is to cause a marked increase in the soft tissues between the veins and especially on the upper side. Since the veins themselves do not lengthen we find that a characteristic curling and puckering of the leaf takes place to accommodate this tissue. The deformation may consist of only one or two small blister-like spots or it may involve the entire leaf, which also becomes as a whole enlarged and thickened. The colour of the attacked areas is at first a darker green, then reddish, and finally yellow or brown and the leaves fall away prematurely. The new foliage put forth will escape attack but the loss of the early leaves weakens the tree severely and, if at all extensive, the crop is either lost altogether or is of inferior quality. The disease is noticeable very early, in fact just as the young leaves are unfolding.

On the twigs, swellings and distortions are produced and the twig often dies. It was at one time supposed that much of the disease on the leaves was due to the fungus

living through the winter in these affected twigs and growing out into the leaves the succeeding spring. It is now known, however, that the mycelium very rarely lives over and that almost all infection takes place from outside as the leaves unfold.

The relation between this disease and climatic conditions is well known. The severity of an attack is much increased by cold, damp weather at the time the buds are bursting. The slower the development of the leaf, the longer it is in getting beyond the susceptible stage, whilst excess of moisture in the tissues also seems to directly favour the fungus.

Control.

There are few diseases which respond so readily to proper spraying treatment. It has been well established that one application of a suitable spray-mixture completed before the buds begin to swell, will practically control the disease. For this purpose the lime-sulphur mixture, either the home-boiled or the commercial, is recommended, since it is not only thoroughly effective against the fungus but is also an insecticide.

BACTERIAL BLIGHT OF ENGLISH WALNUT (*Juglans Regia L.*) (*bacterium* [*Pesudomonas*] *Juglandis,* Pierce).

This disease was observed at Agassiz, B.C., in the grounds of the Experimental Farm. Nearly all the walnut trees were affected and the nuts produced were practically all rendered useless. The injury manifested itself on the leaves by the production of more or less large brownish areas of dead tissue; the fruits also showed blackish spots or they had turned quite black. The shell, generally hard in sound fruits, was soft in attacked ones and the kernel had turned black and putrid. Young twigs also showed signs of the disease. They had died back for a distance of about a foot or more, the wood showing a dark centre for a considerable distance, although no external injury could be observed, with the exception of the dead tips.

The disease was first investigated by Pierce in Southern California. It is of no little interest to have observed the disease at Agassiz, where it has prevailed for some years. These trees were imported some twenty years ago from France and made quite a satisfactory growth until some years ago when this bacterial blight appeared. In Southern California, the disease caused serious alarm among the growers, who, at one stage of this disease, offered a reward of $20,000 for a satisfactory remedy, which is another instance of the serious economic importance of plant diseases. The English walnut may easily be grown in the Pacific coast regions as well as in the Niagara district, and the attention of the growers is directed to this outbreak which, in the aspect of its severity and in its cause, is identical with the Californian disease. Trees that have been attacked should be carefully pruned, all dead wood being removed and burned immediately. According to Dr. E. F. Smith, copper fungicides have been found useful in its control, and periodical spraying should be practised.

DISEASES OF SMALL FRUITS.

ANTHRACNOSE OF RASPBERRY AND BLACKBERRY (*Gloeosporium Venetum,* Speg)

This disease is found on the canes, leaf-stalks, and leaves. It is, however, on the canes that it is most serious. Here it produces purplish spots, which, as they extend, become greyish and depressed in the centre with a reddish border. When the attack is severe, these spots may coalesce in such a way as to 'girdle' the cane, which then withers and dies. Even where the injury is less marked, the conduction of sap may be

so interfered with that a crop of fruit cannot be matured. On the leaves, small but similar spots occur which often fall out, leaving a perforation. When the leaf-stalks or leaf-veins are affected, the leaf may develop in a one-sided manner and the margins are often inrolled. The spores are produced in masses in the centre of the older spots.

Control.

Treatment consists in going over the plantation as soon as the fruit is picked, cutting out the old canes and any diseased new ones, and burning them. When the disease becomes very bad, a new plantation of healthy shoots must be set out. Spraying with Bordeaux mixture to protect the young canes is sometimes recommended but it is doubtful if it is worth while.

FROST INJURING FLOWERS OF STRAWBERRIES AND RASPBERRIES.

Practically no year passes without our receiving from fruit-growers, during the time of flowering of raspberries and strawberries, a number of inquiries relating to the cause of what is popularly called 'black heart' of strawberry or raspberry flowers. The cultivated varieties of these plants are more or less subject to frost injury, which manifests itself by producing a blackened centre in these flowers. In severe cases, all flowers forming a cluster may be found affected, especially in varieties where most of the blossoms open at one time. Night frosts are capable of great injury by destroying the styles of the flowers and thus preventing the fruit from being formed. In some instances, a few styles only may be killed and the result will be a crippled, malformed fruit, which does not recommend itself by its appearance to the buyer. It has been found, especially in the case of strawberries, that the injury may be largely prevented by covering all early-flowering varieties at nights with straw or loose litter of some kind. The harvest may thus often be increased from ten to twenty per cent and more. Raspberries may be planted between sheltering hedges, or they may be covered over night with cheese cloth. Where these suggestions may not be practicable, spraying with cold water early in the morning before the rays of the sun take effect has been proved a useful preventive.

The lighting of smudge fires and keeping them alive throughout cold nights has also proved quite successful.

LEAF SPOT OF STRAWBERRY (*Mycosphaerella Fragariæ*, [Tul.] Linden).

This is the commonest disease of the strawberry, and is very frequent on both wild and cultivated plants. The spots are of medium size, and show first as a rather indefinite, reddish or purplish discolouration. Later, the dead centre of the spot becomes whitish or ash-coloured and is surrounded by a rather indefinite area of varying shades of red or purple. They often coalesce to form large blotches. During the summer months, spores are produced on the surface of the pale central portions, and these, under suitable conditions of moisture and temperature, serve to propagate the disease throughout the growing season. During the winter a second form of spores develops within the dead tissues of the leaf, and these are scattered in late winter or early spring. The injury consists chiefly in the destruction of so much leaf tissue and consequent malnutrition of the fruit, but the development of the latter may be more directly affected by the fungus attacking the fruit-stems.

Control.

In making a plantation use only healthy plants. Any spotted leaves should be picked off and burned. The first season, spraying with Bordeaux should be begun before the blossoms open and the plants kept covered with the mixture through the growing season. The second year, spray before blossoming, and after the fruit is picked either spray again or mow and burn the leaves. It is generally recommended to crop strawberry plants for two seasons only and then plough them up. By this method, the beds can easily be kept clean and free from disease and weeds.

DISEASES OF POTATOES.

PREVENTION OF POTATO SCAB.

This experiment was undertaken to show the comparative values of the different treatments generally practised to prevent 'Potato Scab.' It has been our experience that in some years the treatment has no effect whatever; it is also known that badly scabbed potatoes planted on new land may produce a perfectly sound crop. Sound tubers planted on land that has previously borne a badly scabbed crop may be found to produce sound tubers. On the other hand, sound tubers planted on soil perfectly new and never used previously for potatoes may give rise to a badly scabbed crop. These peculiarities clearly indicate that potato scab is influenced by climatic and soil conditions. In order to show the value of the treatment generally recommended these experiments will be carried on every season for some time, when it is hoped to prove which treatment is the most reliable one, if indeed any is to be recommended at all.

The potatoes used were uniformly, but not badly, scabbed and of the same source and variety. They were divided into four lots of three pounds each and subjected to the following treatments:—

Lot I.—Untreated.

Lot II.—Soaked three hours in a solution, 10 oz. Carbonate of Soda in 10 gallons of water.

Lot III.—Soaked three hours in a solution, 1 lb. formalin in 30 gallons water.

Lot IV.—Soaked three hours in a solution of Corrosive Sublimate in water, 1 in 2000.

Each lot of tubers was then cut for seed and was planted on June 4, 1910. The tubers were planted in hoe-made furrows about three inches deep. The land had grown potatoes which were quite sound the year before. Stable manure was applied uniformly over the plots when the land was being prepared.

RETURNS FROM TRIAL PLOTS CALCULATED PER STATUTE ACRE.

Lot.	Treatment.	Scabby tubers.	Sound tubers.	Total.	Percentage of Scabby Tubers.
I.	Untreated	90⅔ bush.	74⅔ bush.	165⅓ bush.	54·8%
II.	Carbonate of Soda	96 "	80 "	176 "	54·5%
III.	Formalin	53⅓ "	85⅓ "	138⅔ "	38·4%
IV.	Corr. Sublimate	85⅓ "	74⅔ "	160 "	53·3%

Sixteen bushels have been considered to be planted on an average per acre. The legal weight per bushel of potatoes, *i.e.*, 60 pounds, has been taken in making these calculations. Thus it would appear from the above table that the Carbonate of Soda lot yielded heaviest and the Formalin lowest, the latter, however, reducing the liability to scab considerably. The other treatments seem to act alike with the untreated ones. We are by no means satisfied to recommend the Formalin treatment for scab from our results obtained. Various conditions may have influenced the growth of potatoes and have resulted in a comparatively large reduction of the yield of Formalin-treated tubers. It will be interesting to see the results obtained by next season's experiments on the identical lines. This table again proves that no reliable conclusions can be drawn from a single experiment.

INTERNAL SPOTTING OF POTATO TUBERS.

(Plate II. b).

Attention has been paid during the year to samples of a potato trouble received from various sources. The potatoes appeared perfectly sound externally but showed on cutting them, towards the stem end, a curious brownish ring consisting of a large number of isolated, minute specks corresponding to the vascular system of the tubers. On peeling the tubers rather thickly, the brownish discolouration became apparent in narrow, branching streaks. Microscopical examination revealed that only the vascular bundles of the tubers were discoloured. In no case did this discolouration extend to the other end of the tuber. Its appearance is quite different from the Fusarium Rot, (*Fusarium oxysporum*), with which it is generally confused. In this case, the appearance of the discoloured portions, though within the region of the vascular system, extends into the tissues surrounding these bundles and the discolouration also appears rather blackish or sometimes bluish-brown. Microscopical examination also invariably reveals mycelial threads of a fungus within these tissues.

Some of the spotted tubers were planted on plots on the experimental ground and the plants were watched throughout the season. No difference was noticed in the case of the plants developing from the affected tubers from plants grown from selected sound tubers. On harvesting the tubers, they were found quite free from any sign of spotting and they were quite normal as regards yield. A single tuber was raised in sterile soil and behaved in the identical manner—the tubers produced showed no discolouration. Potato tubers similarly affected were again sent early in spring to ascertain whether they could be used for seed. Our experience has shown that such tubers may produce a sound crop, but is limited to one year only. We would not advise in any case the purchase of affected potatoes for seed. Some physical condition may set in, which may change this aspect considerably. Farmers are advised, when buying potatoes for seed, to cut a thin slice off at the stem end,—should any discolouration become visible, the tubers should not be used. The matter of these discoloured tubers was discussed with some plant pathologists of the United States. They also have observed identical cases and confirm our observations as regards the absence of any micro-organism. 'Apparently,' one observer states, 'the spots are due to the collapse and death of the tissues from undue withdrawal of moisture.' In the experience of the American investigators, this phenomenon is identical with the rust-like spots of collapsed tissues frequently observed in potato tubers. This spot is also well known in Europe, where it has received the names 'Sprain' (England) and 'Eisenfleckigkeit' (Germany). The microscopical observations of the diseased tissues recorded in the various European countries agree with those on this side of the Atlantic, and nearly all observers agree that the phenomenon is a physiological one. The microscopical appearance, especially of some of the spots observed, very closely resembles the so-called Baldwin Spot or Bitter Pit of apples. The most recent investigation of this trouble appears to have been made by A. S. Horne (Ann. Myc.

vii. p. 286) who considers that it is caused by a 'chytridiaceous endophyte hitherto undescribed.' Mr. Horne's note is preliminary and has not at present advanced our knowledge to any degree. It remains to be seen whether the organism will present itself again and to other observers. At present the only suggestion that may be made is the selection of varieties that remain free from any spotting of the described kind. Affected tubers have again been secured and have been planted this season. The results will be published in our next report.

LEAF SPOT OR LEAF BLIGHT OF TOMATOES (*Septoria Lycopersici*, Speg).

This disease is distinguished from others attacking the tomato crop by the characteristic 'spotting' it produces. The spots are small, numerous, often angular, with a dark border, the centre becoming paler with age. On the upper surface of the leaf, in the centre of the older spots, will be found the minute fruit bodies, black when mature. The disease begins on the tips of the lower leaves and gradually extends to the younger ones and to the stems. Badly attacked leaves wither up and fall away and the crop is seriously injured, the fruit often failing to set. The fungus probably passes the winter in the crop refuse in or on the soil. We have also observed the occurrence of these spots on the stem, petioles and unripe fruits of tomatoes.

Control.

Spraying with Bordeaux mixture is quite effective. The first application should be made before transplanting. Subsequent applications should be made often enough to keep the foliage protected and until there is danger of staining the fruit. The chief difficulty is to do the work thoroughly with unstaked plants under field conditions. It has also been found very useful, when planting out young tomato plants to dust a little powdered fresh lime into the hole and around the plants.

ONION MILDEW (*PERONOSPORA SCHLEIDENI*, UNG.).

This is a common and destructive disease of the onion crop. Although we have not received many inquiries about it during the past year, yet it is capable of becoming such a serious enemy of the onion grower that we think it advisable to give a short account of it.

The disease may appear as early as June, but occurs usually later. It is detected by the spore-bearing branches of the fungus giving rise to a velvety or furry appearance on the surface of the leaf, together with a purplish colour. Later on, the leaf collapses and withers or rots away. Summer spores are produced in great numbers and, under favourable conditions, especially wet weather, the disease spreads very rapidly. If the plant is young when attacked, it will succeed in producing another crop of leaves and, if these can be saved, a fair or even a good yield may be obtained, but if nothing is done these later leaves meet the same fate as the earlier ones, and the plant is either killed outright or the yield seriously reduced. Another kind of spore adapted for carrying the fungus over the winter (*oospore*) is produced in the tissue of the dead leaves and these resting spores, by the rotting of the leaves, are set free in the soil, or in the manure heap if any of the crop refuse is carelessly thrown there. From these spores comes the first infection of the succeeding year.

Control.

From what has been said above, it will be readily understood that complete destruction of the refuse of the diseased crop is very desirable. In any case, contamination of the manure should be avoided since the resting spores retain their vitality for a long time. Rotation of crops is also important, the disease being most destructive in regions given up largely to onion growing. In addition, spraying with Bordeaux mixture has been successfully carried out, beginning preferably before the disease makes its appearance. Owing to the smooth, polished surface of the onion leaf ordinary Bordeaux mixture does not adhere satisfactorily, and it is necessary to use Resin Bordeaux, which is made up as follows: Boil two pounds of resin and one pound of sodium carbonate (sal soda, washing soda) in one gallon of water till the mixture is of a clear brown colour. Add this mixture to each forty gallons of standard Bordeaux mixture. It may be mentioned that the addition of one pound of resin and one-half pound of sal soda, boiled in one-half gallon of water to forty gallons of Bordeaux mixture, will greatly prevent this mixture from being washed off by rain.

ALFALFA LEAF-SPOT (*Pseudopeziza Medicaginis* [Lib.] Sacc).

This trouble, known as 'rust' and 'blight' is a very common and widely distributed disease, being generally present in a greater or lesser degree wherever alfalfa is cultivated. While frequently of little or no importance, it may become serious by causing an extensive loss of leaves, especially in dry seasons. The disease appears first on the lower leaves and gradually spreads to the younger ones. An affected leaf shows a number of small spots and, if these are numerous, the whole leaf soon turns yellow and falls away. The spots are brown or blackish in colour and circular, but the margin is not very clearly defined. The first cutting is not usually affected to the same extent as the later ones. Young plants, however, may be so severely injured that the crop is destroyed, whilst in any case the loss of leaves reduces the yield of hay directly and also by reducing the growth of the plants.

Control.

No very satisfactory means of dealing with the pest under field conditions is at present known. Where the disease appears severely early in the season, it may be advisable to cut the crop at once. The subsequent growth of the plants in such a case may escape the disease. Diseases attacking crops which are grown on so large a scale that spraying becomes impracticable, as for instance rust, smut, alfalfa leaf-spot, etc., are not readily prevented. In small plots, one may succeed in preventing and even checking diseases by various methods, but these cannot possibly be employed in large areas under crop. This procedure would be far too laborious, and hence too expensive to be practised on a farm. But the farmer may, with comparative ease, select from any diseased crop one or more plants practically free from attack and save seed from these for propagation. If he perseveres in this manner he may ultimately secure a plot of disease-resisting plants, from which he finally may raise all the seed he needs for field sowing.

CLUB ROOT OF CRUCIFERS (*Plasmodiophora Brassicae,* Wor).

(Plate III. a).

During the past year, specimens of cabbages and turnips attacked with this disease have been sent in from Nova Scotia, New Brunswick and Prince Edward Island. Our records of its occurrence in the Dominion are confined to these provinces but it is highly probable that it occurs elsewhere, Ontario farmers having inciden-

tally described an affection apparently of this nature in certain localities. This is not surprising when we consider that it is particularly bad in the eastern United States, *e.g.* in the neighbourhood of Buffalo, not far from the Canadian boundary. Since the disease is at present comparatively restricted in its occurrence and at the same time very characteristic in its appearance we here give an account of it in order that farmers and others may guard against its introduction and also that we may, if possible, obtain more information as to its distribution. We shall be particularly glad to receive suspected specimens or answer inquiries to these ends.

Appearance and Cause.

Many kinds of cruciferous plants are liable to suffer from this disease. Amongst cultivated plants, the different varieties of cabbage, turnip, cauliflower and Brussels sprouts are subject to it, and amongst weeds such common ones as Shepherd's Purse, Hedge Mustard and others. The names given to it are more or less descriptive of the character of the malformation induced *e.g.* club-root, club-foot, clubbing, finger-and-toe, and others of similar significance in other languages. In England it is often known as 'anbury.' The cause of the disease is a minute parasite which invades the tissue of the root system probably by means of the root-hairs. Inside the host, the organism causes the enlargement and division of the attacked cells with the result that swellings of various forms appear. The whole root system may be converted into an irregular, knobbed mass, or the principal roots may retain their distinctness but become much thickened, these different appearances having prompted the different names already alluded to. So far as is known only the root system is attacked. The effect of this abnormal growth is to seriously interfere with the power of the root to absorb the water and other soil constituents. Attacked plants 'flag' or wilt and either die or only reach a very imperfect development. Ultimately the swollen portions become invaded by other organisms and the plant substance is reduced to a rotten mass, which gives off a very offensive odour. In the meantime, the parasite has changed into enormous numbers of minute resting spores which become in this way distributed through the soil. These resting spores finally germinate and give rise to exceedingly small active spores which again enter a suitable host plant. Although there is no evidence of the organism being able to attack any part of the plant except the root, it is thought the disease may be carried into new localities on the seed. A little consideration will show that surface soil contaminated with the spores may readily be blown on to the seed pods, and then get on to the seed during the threshing of the pods.

Control.

Great care should be taken to avoid the introduction of the disease into localities where at present it does not occur. Seed should, if possible, be obtained from a source known to be free from the disease. If seedlings are purchased they should be carefully examined before planting, and if any infected plants are found, not only should these be destroyed, but it would be well to discard them all, since the adhering soil may contain spores enough to contaminate healthy ground. The spores are said to resist the digestive juices of animals and, if diseased plants are fed to stock without being cooked, the manure is likely to prove a prolific source of new infections. The spores set free in the soil may retain their vitality from three to seven years so that a rotation which brings a cruciferous crop on the land not more than once in that time may be necessary. The destruction of weeds is important since a number of these may become infected and harbour the disease from year to year. Where the disease has become established, applications of lime every few years are of great value in diminishing the severity of the attacks. These should be at the rate of two to three tons per acre and made some little time, preferably a year or eighteen months, before the sowing or planting of the cruciferous crop.

DISEASES OF ORNAMENTAL TREES AND PLANTS.

LEAF SPOT OF ELM (*Dothidella Ulmea*, [Cchw.] Ell. & Ev.).

This is a very common trouble, confined to our elms, both native and cultivated, and, in severe cases, causing extensive premature defoliation. The disease generally attacks the leaves and shows itself as a grayish area of dead tissue in the centre of which from one to several black spots are to be found. These latter are the young fruit bodies and during the winter, as the leaves lie on the ground, the spore-sacs or asci develop within them. The spores mature in the spring and give rise to the first infection of the elm leaves.

As a means of controlling the disease, it is recommended to collect and burn the fallen leaves in the autumn so as to prevent the formation of a crop of spores from them in the spring.

A row of young elms imported from France, growing in a nursery not far from the Experimental Farm, was found to be infected by this common disease. It was here plainly observed, however, that the fungus is not exclusively confined to the leaves, but does also occur on the petioles of the leaves from which it spreads to the tips of young shoots, which twist downwards and are finally killed. The elms were carefully kept under examination, but in no case did an attacked twig make a recovery. Removing and burning these twigs where they occur would protect the trees from becoming crippled.

BLACK SPOT, TAR SPOT OR LEAF BLOTCH OF THE MAPLE (*Rhytisma Acerinum*, [Pers.] Fr).

The leaves of various species of maple are often affected with large black spots, which may injure the leaf so much as to cause it to fall. The behaviour of this fungus is much the same as the Leaf Blotch of Elm, and the same treatment is advised should it become serious enough to merit attention.

ROSE RUST (*Phragmidium subcorticum*, [Schrank] Wint).

In the earlier part of the season, the rust shows as bright orange-red spots on the leaves, petioles and stems. Later in the year, these give place to spots of a dark-brown or black tint and are composed of the resting spores. This disease is rarely serious and no control measure can be recommended as likely to give satisfaction.

Other parasitic fungi whose occurrence may be here recorded, are *Entomosporium mespili*, (D.C.) Sacc., on English Hawthorn from Nova Scotia; *Dasyscypha Willkommii*, Hart, from Nova Scotia; and *Lophodermium nervisequum*, (D.C.) Rehm, on *Abies sp.* from New Brunswick.

HOLLYHOCK RUST (*Puccinia malvacearum*, Mont.)

This is a very common and destructive disease of the Hollyhock, which also attacks other plants of the same family, being particularly abundant on the common round-leaved Mallow (*Malva rotundifolia*, L.). It is sometimes difficult to find an individual of this last species with leaves entirely free from the pustules of the disease. While most of the best-known rust fungi pass through two or three well-marked stages in their life-history, in this case only one is present, this being the teleutospore stage, or, as it would be termed in most forms, the resting spore stage. Unlike most spores of this type, however, those of the Hollyhock Rust do not require to rest or to be

exposed to winter conditions, but germinate at once, and serve to propagate the disease throughout the season. While other parts of the plant may suffer, the effects are usually most pronounced on the leaves. When infection has taken place, the leaf tissue in the immediate neighbourhood becomes changed to a bright yellow colour, which at first glance resembles the early fruiting stage of some rusts, *e.g.*, Rose Rust. Later, in these areas will be found little raised masses of a chocolate-brown colour, which are pustules of spores. Often these are so numerous that the leaf tissue is almost all destroyed with the result that the plant dies or produces a very poor show of flowers.

Control.

One of the most essential steps in the control of this disease is the eradication of all mallow plants in the vicinity of hollyhocks, otherwise the former will serve as a continual source of new infections. The remains of attacked parts of the plants should be burned, as the spores may live through the winter on such rubbish and germinate the following spring. Where the plants are few in number and grown for ornamental purposes, a careful watch should be kept as the young leaves come out, and infected leaves picked off as the pustules appear. This will prevent much later infection. Spraying with Bordeaux mixture, beginning as early as possible in the season, and repeating often enough to keep the new leaves covered, is effective but disfiguring where plants are grown for ornamental purposes. The fungus, as stated in a recent publication on the subject, is also carried on the seeds or bracts and develops when such seeds are being sown. The hollyhock is a much favoured old-fashioned garden plant and as it is a remarkably free-blossomer, easily grown, care should be exercised to prevent this disfiguring rust from attacking the plants.

PART II.

AGRICULTURAL BOTANY.

During the year, a considerable amount of the time of the Division has been claimed by those branches of botany relating to the higher plants. The usual number of weeds has been received for identification and advice upon means of eradication; and each inquiry has been dealt with as fully as was possible with the often limited information given us. In addition to these, and many other wild plants sent in small numbers, about thirty collections, with an average of fifteen plants in each, have been named for correspondents. Other inquiries have related to poisonous plants, and cases of suspected plant poisoning; or to medicinal plants, and plants supposed by the senders to be of medicinal value. A great many specimens, for instance, are sent with the request to know if they are ginseng, though, curiously enough, only one received during the year has proved to be that coveted species. Quite a number of correspondents have asked for information about various special crops like broom-corn, hemp, rape, ramie, mint, etc., and we have been frequently consulted about the values of different grasses and clovers, the seeding down of wet meadows, sandy loam, lawns, etc., and similar problems.

The work on the Herbarium of the Division has also been continued, over five hundred sheets being added this year, partly of material collected earlier by Dr. Fletcher, and partly of collections made during the summer months at Ottawa, and during my trip through the West in July and August. The collection has thus been made considerably more complete as regards the Canadian flora, for among these

specimens were many species not before represented. Since the establishment of the Division of Botany (July, 1909) close upon two hundred species have been added to the list, which was even at that time a creditable one. Vacancies still remain to be filled in, and some genera are far from being complete, but the deficiencies are now mostly of the rarer plants which happily are also less likely to be consulted. In some genera, recent revisions and advances in nomenclature have made a great deal of re-naming necessary, and some time was found for a beginning of this important work with Carex, some of the grasses and other plants. A set of Ottawa hawthorns collected by my colleague, Mr. Groh, and submitted to Mr. W. W. Eggleston for critical study, has been added to the Herbarium. These specimens in flower and fruit were taken from over sixty trees in the immediate vicinity of Ottawa, and represent fifteen species and varieties of this perplexing genus. A similar collection of Juneberries (*Amelanchier*) was also made, which provides material for a fairly exhaustive study of this genus as it occurs in the vicinity of Ottawa. The Herbarium is always at the service of any student of botany, and may be consulted daily during the official hours. Together with the Arboretum and Botanic Garden, the Herbarium affords exceptional facilities for the study of Canadian plants.

It becomes here my pleasant duty to acknowledge and thank Mrs. Wm. Saunders for the very generous contribution of upwards of one thousand sheets of mounted plants to our collection. The plants were mainly collected by the donor herself, and their careful preservation, together with the requisite data furnished, speak well for the great care with which they have been collected. They are greatly appreciated and form an important and welcome addition to our Herbarium.

ARBORETUM AND BOTANIC GARDENS.

It was the desire of the Honourable the Minister of Agriculture, that the control and management of the Arboretum and Botanic Gardens adjoining the Central Experimental Farm be transferred to the Dominion Botanist, the transfer to date from January 1, 1911. The Gardens have hitherto been in charge of Mr. W. T. Macoun, Dominion Horticulturist, who at the same time acted as Curator. The splendid collection of trees and shrubs in the Gardens is well known and many visitors from near and far spend an enjoyable and profitable time in the study of its vegetation. In past years, however, there has been no desire to make a Botanical Garden in the true and wide meaning of the term, the grounds serving mainly as a trial ground for ornamental trees and shrubs, deciduous and evergreen, arranged according to pleasing landscape effects or floral displays. Institutions like the Experimental Farms, existing for purposes of demonstration and practical application, should base their results upon established scientific facts and for this reason it will be our endeavour to develop a botanical garden for purposes of economic application and scientific study and to serve as a centre for imparting information to the visiting public.

The formation of a Botanic Garden is naturally influenced by the local climatic conditions, which may make completeness impossible even in the representation of our own flora. An important feature of a garden for our purposes should be the display of economic plants such as timber, shade and shelter trees, food and fibre plants, and those of medicinal value. Such plants, plainly labelled with their uses or the uses of their products, will no doubt have an interest with the public, second only to beautiful floral effects. In a country so vast as this, a botanic garden should also illustrate the geographical distribution of plants and their ecology or relation to environment, so far at least as climatic and other conditions will permit. The interest shown by many visitors and correspondents in the development of such gardens, the popularity enjoyed by, and the instruction and benefit derived from existing gardens all over the world, certainly justify any endeavour to improve, extend and render more practically useful the beautiful grounds set aside for such purposes.

Any assistance in making as complete a collection of plants as possible will be much appreciated. Seeds and plants from all parts of the country are much desired, and it is hoped to publish lists of the seeds and plants from the gardens available for exchange.

RHODES GRASS (*CHLORIS VIRGATA*).*

This grass has been brought into prominence during the past year, by glowing accounts of its value to stock owners, which have been furnished to the press by a gentleman from Australia. Many inquiries have come to us as a result of this publicity, so that it seems desirable that the plant should be referred to here. From all that can be learned, Rhodes grass in Australia is evidently worthy of much or of all the praise that is being bestowed upon it, but it does not necessarily follow that it will fill any really important place among our Canadian crops. The climate of the two countries and their agriculture are widely different in many respects. Fortunately, we do not have to rely solely on reports of the superiority of this grass elsewhere, for it has been experimented with for several years in this country.

From 1904 to 1908, Rhodes grass was under experiment on the grass plots at the Central Experimental Farm, Ottawa, seed both from South Africa, its native home, and from Australia being used, as well as a small amount of seed matured here, which, however, failed to germinate. It is a luxuriant annual grass, much inclined to creep by the rooting of the lower nodes of the stems, thus making it difficult to mow.

The yield of forage was quite considerable, and one year was almost equal to that of the best-yielding millets tested alongside it. It is doubtful, though, whether it would give as high an average yield over a series of years as these millets; and it is certain that our sorghums, sugar canes and corn will much surpass it as producers of annual pasturage or fodder. If it will thrive under the dry conditions which obtain in some parts of Canada (and for which conditions it is claimed to be well suited), it will be important to ascertain this fact by further tests in this country; but from all indications it would appear as though our relatively severe climate and short seasons would make it too uncertain a crop to be relied upon. It would not, of course, take the place of any of our regular or permanent pasture plants, which are expected to occupy the land for two or more years. In short it is a grass which may be worthy of further test here, but should not be thrust into prominence until our experiment stations have found it to possess some advantage over the grasses which it is to displace. In the meantime, it will be in order for farmers to make the best possible use of the hay and forage plants which are being recommended, such for example, as that far-too-little grown legume, alfalfa or lucerne.

COMPARATIVE TRIALS OF MILLET VARIETIES.

The value of millet as a 'catch crop' has long been recognized. It may be sown till late in July and will still produce a very satisfactory 'catch.' When it is too late in the season to sow corn, try millet. Its feeding value is nearly that of corn. Millet may be cut before the seeds begin to ripen, when it is well liked by all stock. It is an excellent plant to smother Couch Grass, Perennial Sow-thistle, Canada Thistle and other equally persistent weeds. Millet prefers a sandy soil and thrives luxuriantly on new land. Sow one half-bushel per acre for hay and one peck, (one-quarter-bushel) for seed. The following six varieties have done best in our trials this year:

* According to information received from Mr. Burtt-Davy, Government Botanist, Union of South Africa, the grass known in that country as 'Rhodes grass' is a perennial grass (*Chloris Gayana*) while *Chloris virgata* the annual grass is popularly known as 'Sweet grass.' No doubt the latter grass is referred to by the correspondent from Australia. We are much indebted to Mr. Burtt-Davy for a supply of seed of both grasses, which will be carefully tested.

——	Sown.	Cut.	Yield per Sq. Rd.	Yield per Acre.		Height of Plants.
			Lbs.	Tons.	Lbs.	Ft.
Cat-tail	June 12	Sept. 17	360	28	1,600	6-7
Black Japan	" 12	" 2	296	23	1,360	5
White Indian	" 16	" 1	248	19	1,680	4
Japan Barnyard	July 13	" 12	240	19	400	3
Italian	June 16	" 18	222	17	1,520	4
Hungarian grass	" 12	" 17	158	12	1,280	4

MUSHROOMS AND TOADSTOOLS.

Considerable interest is shown by some correspondents in the use of mushrooms and toadstools for culinary purposes. These terms are commonly used to describe some of the larger fungi and usually in such a way as to include the edible forms under the title of mushrooms and to designate such as are poisonous or inedible as toadstools. There is, however, no general rule to distinguish a poisonous specimen from an edible one in spite of the many more or less fantastic opinions that have been expressed on this point. It is, for instance, commonly believed that all mushrooms which turn to a bluish colour when cut and exposed to the air are poisonous, whereas this effect is simply due to the oxidation of the fatty matter contained in these particular forms. Likewise no importance can be attached to such indications as the turning black of a silver spoon when dipped in the cooked mushrooms, which is supposed to denote poisonous properties.

The common field mushroom (*Agaricus campestris*) and its cultivated forms are among the most palatable of fungi, though some closely-related ones are highly poisonous. The poisonous principles of fungi can only be established by a careful and difficult chemical analysis, but the collective experience of many individuals in testing the edibility of different kinds by the actual eating of them, has shown the larger number to be harmless and of delicious taste. In consequence of what has just been said, it will be seen that a careful study of the mushrooms is necessary to recognize any particular specimen as useful for food or the reverse. This study needs a little closer attention on account of the risks involved but otherwise does not differ from the methods of acquiring a knowledge of other wild plants. Certain common mushrooms, moreover, are so distinctive in form and appearance that they are easily recognized and a mistake is not possible.

THE COMMON MUSHROOM (*Agaricus campestris*, L.).

The common field mushroom occurs in fair numbers in fields, gardens and open woods. It varies much in size according to the place of growth and time of year. The diameter of the cap may be from one to four inches or more, while the stipe or stem may attain a length of from one to four inches, and a thickness of a quarter to one inch. The cap is hemispherical when young, becoming fairly well expanded with age. Viewed from above, the whole fungus usually appears white, but may be sometimes slightly tinted with red or brown. When turned over, the lower surface of the cap will be seen to be covered with radiating knife-like folds—the gills—which in the early stages may be pale rose but later turn dark-brown, purplish-brown or even black. In this mushroom the gills are never attached to the stipe. The stipe is white and solid, and gradually enlarges towards the base. It generally carries a 'ring' of membranous tissue, formed of the remains of a membrane covering the fungus in its earliest stage (the so-called 'buttons'), which is torn as the fungus grows and the

cap expands. The common mushroom is considered the best of all edible fungi. It is practically the only species that is artificially grown, although other fungi are known which would be easily rivals if cultivated. Those interested in the cultivation of mushrooms are referred to Pamphlet No. 7, obtainable free of charge from the Central Experimental Farm, which contains an admirable account of mushroom culture by Mr. W. T. Macoun, Dominion Horticulturist.

THE FAIRY RING FUNGUS (*Marasmius oreades*, Fr.)

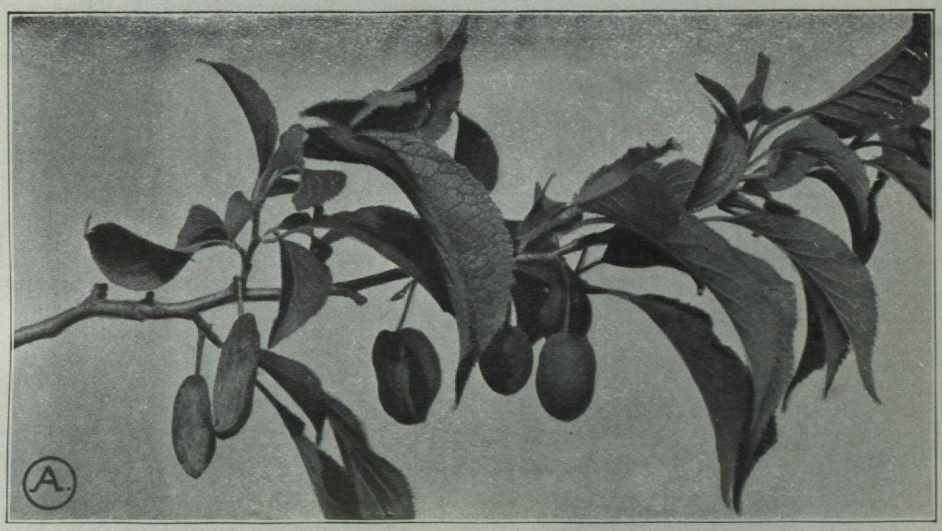
This is still more common, but its excellent culinary qualities are known only to few. It grows generally in lawns or meadows forming more or less regular circles. This mode of growth is responsible for the popular name 'fairy ring fungus.' From the beginning of summer till the snow covers the ground this fungus may be found and, although small in size, its numbers generally make it possible to collect in a short time enough for a meal. The cap measures from half an inch to one and a-quarter inches across. The centre, corresponding to the place of attachment of the stipe, is slightly raised even when the fungus is fully grown and the other part of the cap is expanded. The whole plant is pale ochre in colour. The stipe is rather leathery, one to two inches high and less than a quarter of an inch in thickness. The gills are of the same colour, rather broad, and far apart.

WILD RICE (*ZIZANIA AQUATICA*, L.)

(Fig. 1.)

From time to time, we receive requests for information on the growing of wild rice, and particularly for assistance in securing good, viable seed for sowing. The interest which has been thus shown to exist, and the general lack of success which appears to have been met with, and which has led to these inquiries, has induced us to give some attention to the subject, in the hope of being able to furnish better information than has been available heretofore. Our studies of the problems involved have not proceeded far enough yet to allow of any report on them at this time; but a brief general account of the subject, based on our observations during the last year or two, and on the meagre literature at hand, seems advisable. It should serve to draw wider notice to a little-regarded crop, which is after all, a resource of no mean importance in the natural economy of the country. Such an account at this time and place, may also help to bring us into touch with others who are directly interested in the improvement of wild rice areas, and whose practical observations may be of the greatest value to us in our investigations.

Wild rice as a food for man, holds a place of some importance, especially among certain of the Indians who continue to use large quantities of it, in preference to the cereals introduced by white men. It is said to be a highly nutritious and well-flavoured food which might be utilized to a much greater extent, if the methods of growing, harvesting and preparing it for use were improved somewhat. Whether it will become an article of commerce of much importance remains to be seen. For the present, doubtless, it is of value, less commercially, than as an attraction for water-fowl, and as a means of turning otherwise unproductive lake margins to some account. It is a favourite food of these wild game birds, and its abundance in a locality does much to bring them about in numbers. It is thus of great practical interest to the sportsman and to the owner of a water-front, who appreciates a natural cover combined with the advantages of an eagerly sought-for food for these birds. The advantages will become prominent if any practical steps are taken to improve the condition of the wild rice fields, or to introduce the crop into waters where it does not already grow.



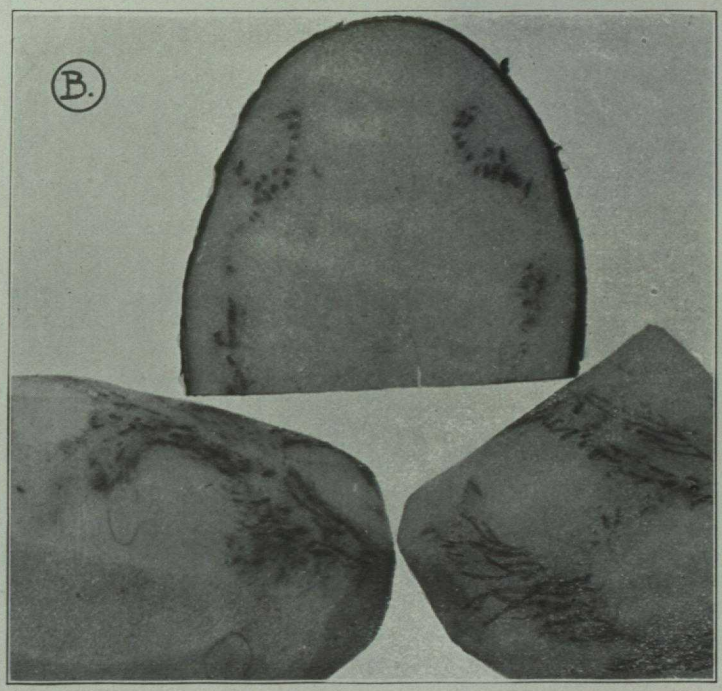


Fig. A. Branch of Plum showing three "Bladder" Plums on the left.
Fig. B. Above, section through one half of Potato tuber, showing "Internal spot". Below, some cuttings of Potato tubers showing "streaky" discoloration after paring.

16—p. 256.

A. "Club Root" of Turnip caused by *Plasmodiophora Brassicae* Wor. B. "Black Knot" of Plums and Cherries (*Plowrightia morbosa* (Schw.) Socc.)

It is certain that there are many places along our lakes and slower rivers which are perfectly suited for the growing of wild rice. All that is required is that the seed should be once sown, when the crop would in future take care of itself. There is one shore of this kind, on the Experimental Farm, which now supports a dense growth of this and other aquatic plants. Formerly, wild rice had not been a part of its vegetation, but the late Dr. Fletcher, a few years ago, scattered a quantity of the seed here, with the result that the plant was soon well established. Similar results should be possible in other places, and yet it is a fact that comparatively few attempts to introduce it are attended with success. The failures may be due to various causes, but probably most of them could be referred to the unsuitable nature of the spots chosen, or to worthless seed.

Wild rice, like every other plant, has its own special requirements, which must be provided if it is to thrive and before we attempt its propagation, we must take the pains to learn what its habits and requirements are.

The wild rice plant is a member of the large family of grasses to which belong all our cereal grains, corn, and most of the forage plants, other than the clovers. It differs from the foregoing from the farmer's point of view, chiefly in being aquatic, and therefore subject to few of the same cultural methods. Botanically, it is known as *Zizania aquatica*, L., and is characterized by its annual habit, the monoecious form of its inflorescence, etc. It is a tall stout grass with stems that are hollow, and divided into compartments by numerous transverse walls. The leaves are long and relatively broad, and are peculiar in having the midrib slightly to one side of the centre. The plants start from the seed in the spring, and by the end of July the large open panicles are fully developed. The lower, broader portion is the staminate, or pollen-producing area, while the upper portion bears the pistillate flowers, and later the grain. This arrangement provides admirably for cross-fertilization, since the pistillate flowers emerge first from the sheath, and receive pollen from other plants before their own is ready. After fertilization, the seed develops rapidly, ripening and dropping in a few weeks' time. The seed is about two-thirds of an inch in length, slender, and bearing awns often two inches in length. Its habit, just mentioned, of dropping immediately upon becoming fully ripe, and lying beneath the water until germination takes place the following spring, gives us probably our most important hint for the proper care of seed which is to be sown elsewhere.

As pointed out elsewhere, one of the principal difficulties in starting new wild rice fields, has been the securing of germinable seed. In order to overcome this difficulty, the United States Department of Agriculture has for some years had investigations under way, which have thrown much light on the subject. It has been made clear that wild rice seed which has once been allowed to become dry, will seldom germinate. Either it must be sown very shortly after it becomes ripe, or it must be stored under conditions which will as nearly as possible duplicate those of nature. The former method has the disadvantage of exposing the seed over winter to the risk of being washed away by floods to an unfavourable depth of water, of getting covered too deeply with mud, or of being eaten by wild ducks, etc. The endeavour has been, therefore, to learn how to store the seed from the time it is gathered until the time for sowing in the spring.

The conclusion reached by the United States Department's experimenters is that wild-rice seed can best be stored by keeping it during the whole of this period in water in cold storage. A temperature of 32° to 34° Fahr. appears to have been the most satisfactory. Seed kept at a temperature of 12° Fahr. and consequently imbedded in ice, was completely destroyed. If cold storage is not available, fairly good results may be had by changing the water in the storage vessels daily until the weather becomes cold. The seed should be got into storage with the least possible delay after it is gathered, and without allowing it to 'heat' or ferment, and drying out must be specially guarded against in the spring when transporting it to the place where it is to be sown.

The selection of a suitable 'field' is another important consideration. Fresh waters, not too stagnant nor yet too rapid, and from one to three feet deep, are usually adapted to wild-rice growth. A soft muddy bottom is also necessary. The mistake should not be made of sowing the seed where the water will recede and leave the young plants under unnatural conditions. If due caution is observed in these regards, and in using seed which has been properly cared for, there should be reasonable probability of success in securing a stand.

The seed of wild rice at from two to three times the price of ordinary white rice. This, it must be understood, is for table purposes only. Germinable wild-rice seed would command a much higher price, especially as hardly any is offered for sale, owing, no doubt, to the difficulty mentioned. A keen interest in the cultivation of wild rice, mainly for food and as covers for waterfowl, is being taken in England, and there is every chance for a grower to ship any quantity to England, providing he takes the necessary care to preserve germination in shipping it.

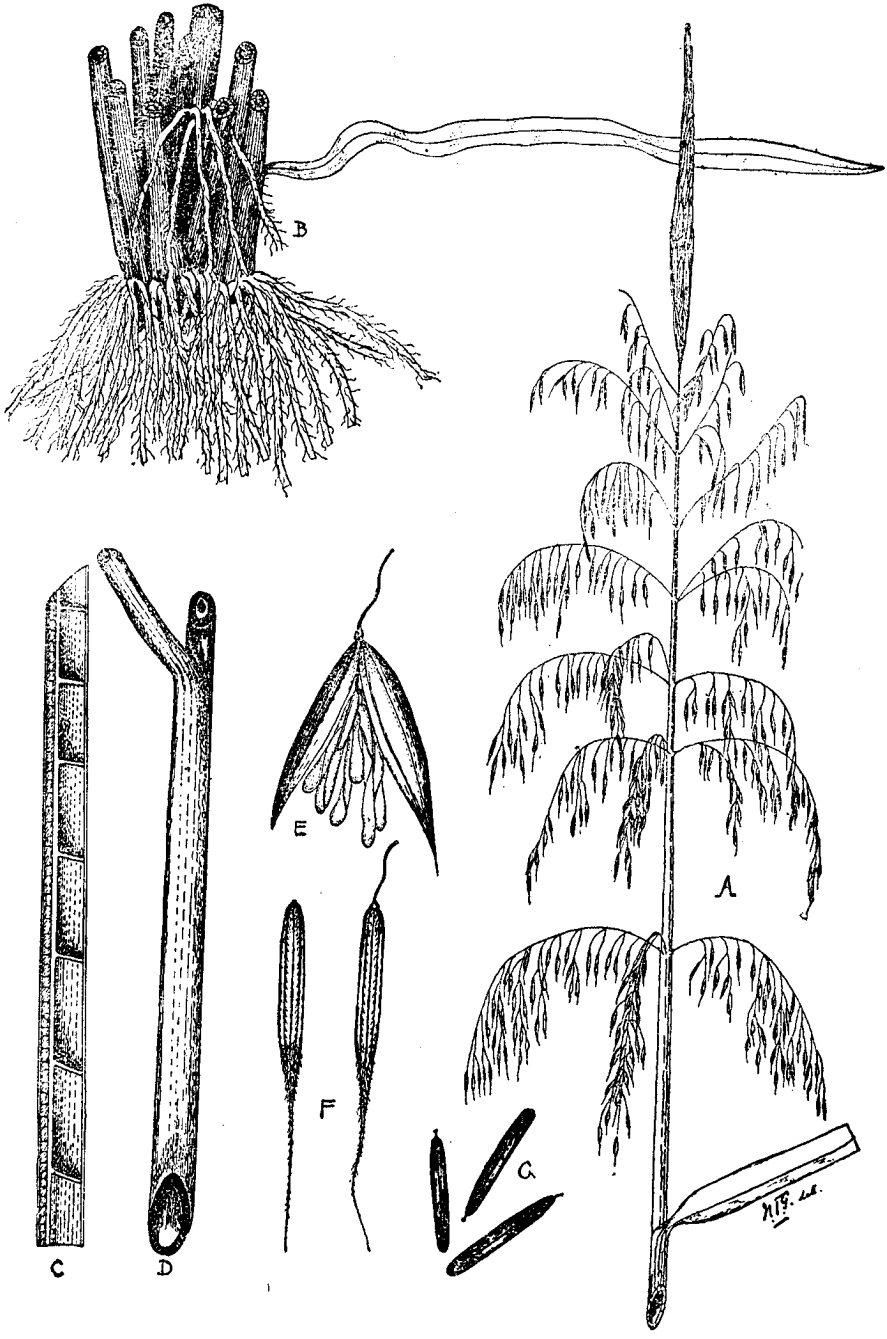


FIG. 1.

Wild Rice *(Tizania aquatica L.)*

A. Inflorescence. B. Base of plant showing floating roots and leaf. C. Section of stem showing separate compartments. D. Portion of stem. E. Male Flower. F. Fruits (nat. size). G. Seeds (nat. size).

PLANTS, POISONOUS, SUSPECTED, OR OTHERWISE INJURIOUS TO LIVE-STOCK.

A number of wild plants occurring in this country possess acrid, narcotic, or otherwise injurious juices, and have, in some instances, caused the death of animals that have eaten them. From time to time, specimens of plants are submitted for examination which have been directly poisonous or at least injurious to the health of stock. While the discriminating powers of adult animals are very pronounced, yet it is by no means rare for young animals to eat plants or portions thereof which may cause great trouble to their digestive organs followed in some cases by death. Among the well-known poisonous plants are the Larkspurs (*Delphinium spp.*) Monkshood (*Aconitum spp.*), Cowbane or Water Hemlock, (*Cicuta spp.*), and Poison Hemlock, (*Conium maculatum* L.), all of which are genuinely poisonous. Other plants like Buttercups, Spurges, etc., though hardly 'poisonous,' contain irritant juices, which have frequently caused injury. In order to put on record any poisonous or otherwise injurious plant, the co-operation of Dr. J. G. Rutherford, Veterinary Director General, has been sought, who has very courteously issued the following circular letter to his inspectors, to veterinary surgeons, and to others interested.

OTTAWA, March 8, 1911.

SIR,—Mr. H. T. Güssow, Dominion Botanist, is desirous of investigating all reported cases of plant-poisoning among live stock in Canada, and has asked me to co-operate with him in this work. I would therefore call your attention to the accompanying note which he has prepared on this subject, and would ask you to be good enough, when possible, to follow the instructions therein set forth in the event of any case of plant poisoning in animals occurring under your observation.

I have the honour to be, sir,
Your obedient servant,
J. G. RUTHERFORD,
Veterinary Director General.

INSTRUCTIONS.

In consideration of the fact that from time to time there have been reported cases of injuries to all kinds of live stock, supposedly due to the poisonous principle in certain plants, it has been thought necessary to call the attention of all inspectors under the Health of Animals Branch, and any persons who may be sufficiently interested in the subject to report any such case of injuries or death of animals, supposedly due to such causes, to the Veterinary Director General and Live Stock Commissioner, Ottawa.

Any such report of ascertained or suspected injury to live stock by plants to be accompanied (stating the age of the dead animals), by as full a description of the symptoms of the animal's or animals' sufferings (loss of appetite, foaming at the mouth or nose, constipation, looseness of the bowels, distended stomach, muscular contractions, rolling, etc., etc.) as possible. Whenever possible, the stomach of the poisoned animals should be sent, that an examination may be made of the contents of the stomach for the presence of any plant or remains thereof likely to have caused the injury. Such specimens should be submitted under strict observation of the following regulations: The stomach should be removed immediately after the animal's death. It should not be emptied of its contents, but where severed from the intestines or other parts it should be securely fastened with a string. The specimens may be packed in ice and shipped in a strong box. By mixing a quantity of finely chopped ice with sawdust a good packing will thus be obtained. In the case of ruminants, the rumen only is needed for examination.

Specimens of any suspected herb, shrub, tree or other vegetation or part thereof should be sent whenever practicable. The specimens may be packed between layers of paper and be sent under cardboard or other protective covering. Any further particulars giving a description of the grounds on which the animals have been grazing previous to death will be useful. Indicate whether the animals had access to ditches, ponds, river banks or whether the grounds were stony, dry or wet, etc.

All specimens should be addressed to the Veterinary Director General, Ottawa, and should contain, in order to be identified, the name and address of the sender. Specimens not exceeding five pounds in weight, after being securely packed to prevent leakage, are carried free by mail. Specimens over five pounds in weight should be sent by express.

Investigations of this kind involve considerable trouble both for the investigator and for the collector of material. It is hoped that farmers will go to the trouble of forwarding specimens of plants and stomachs of animals whenever opportunities occur. This work is done entirely for their benefit and success depends upon co-operation from all quarters.

POISON IVY (*RHUS TOXICODENDRON*, L.).

(Fig. 2C.)

It is safe to say that no poisonous plant in America is better known by name, than poison ivy. One would consequently expect to find it also one of the most generally known at first hand, of all our plants, but it is astonishing how many people confess themselves unacquainted with it. Not only townsfolk, but many farmers, and not a few of those who profess to be interested in natural history studies, are unable to recognize it. This being the case, it is not so strange that there are many misconceptions abroad as to its nature, and the precautions to be taken against it. This should not be so, as the plant is so plentiful in nearly every part of North America, and especially in the east, that almost everyone must have had an opportunity at one time or another, of meeting with it; and as the danger incurred by many people in coming in contact with it is so great, its recognition should be a matter of importance to all.

Poison ivy differs from the majority of poisonous plants in that it does not require to be eaten in order to produce its ill effects. Mere contact with it is sufficient; and indeed many people declare that they are affected even in its presence, though they do not touch it at all. The possibility of ivy poisoning without contact is not admitted though, by those who have studied the nature of the poison to which its effects are due. This poison has been found to be a non-volatile oil, to which the name 'toxicodendrol' has been given. All evidence tends to show that it is a mistake to suppose the poisonous principle can be diffused through the air about the plants. The poisonous substance is found in all parts of the plant, and a very little of it reaching the skin is sufficient to set up its painful irritation. Probably many cases of poisoning which appear to be explainable only on the ground of transmission through the air, might be accounted for by the contact of shoes or clothing with the weed, and then with parts of the body which may not have touched it directly.

It is well known that not all persons are equally susceptible to injury by poison ivy. Some can handle the plant freely without any fear of unpleasant consequences. It would appear also, as if animals were immune, as birds are reported to feed upon the fruit, and my colleague, Mr. Groh, whose observations are very reliable, stated that poison ivy growing along a fence, was kept almost completely eaten down on the one side, where cattle were being pastured. No effects sufficient to attract notice were suffered by any of the animals. (See note next page).

Poison ivy grows most commonly along the borders of fields and woods, by roadsides, or in open woods; or less frequently it occurs in deep woods where it may become a tall climber supporting itself on the trunks of trees. In the open it is low

and bushy, or often climbing or trailing. The leaves are all composed of three ovate, coarsely-toothed leaflets, and serve well as a means of identification. There are no other plants of similar habit in Canada with leaves which would easily be confused with them. The Virginian Creeper (Fig. 2 D) is often held in suspicion, quite needlessly though, as it has five, not three, leaflets, which spread from one point like the fingers of the hand. The poison ivy can also be known when in fruit, by its upright auxillary panicles of whitish berries of about the size of peas.

Measures of eradication must be directed toward the uprooting of the plants, as otherwise any effort to kill them would have to be repeated and continued as long as the roots retain enough vitality to send up new vegetation. It may be advisable to mow off and remove the stems before starting to grub up the roots, so as to lessen the danger of poisoning while at work. The tops may be got rid of also by spraying with a mixture of one-half pint commercial sulphuric acid in one gallon of water. As sulphuric acid is corrosive, it will be advisable to apply with a sprinkling can or an old sprayer which can be sacrificed to the purpose. Obviously too, any work among poison ivy should be done by a person who knows that he is not sensitive to the poison. Every possible effort should be made to remove this nuisance from places frequented by children and others.

It will be desirable to add a word as to the treatment to be given in cases of ivy poisoning. Washing with water alone will not remove the oil, though vigorously scrubbing the parts with soap and water and a brush will help. The most effective treatment is to scrub thoroughly and repeatedly with an alcoholic solution of lead acetate. This brings the oil into combination with the lead so that it can be washed off readily by the alcohol. This remedy should be applied early, as the skin when once inflamed can only be left to heal in the natural course.

Aside from one closely-related plant, the poison sumach, (*Rhus Vernix*), of swamps in western Ontario, we have no other plants which are capable of producing the severe skin poisoning of poison ivy. The stinging nettles (*Urtica dioica* and *U. urens*) and the wood nettle (*Laportea canadensis*) can set up painful smarting of the skin by the contact of their stinging hairs, but their effects are soon over.

NOTE.—Mr. Groh in a letter received after this report was in type states: 'I have recently had an interesting confirmation of my observation that cattle will eat Poison Ivy. The same patch referred to was again pastured down this year and I watched one of our cows last week as she munched the plants off apparently with considerable relish. She has shown no evidence of any resulting inflammation or irritation whatever.'

FIG. 2.

A. Moth Mullein.
B. Common Mullein.
C. Poison Ivy.
D. Leaf of Virginia Creeper.

WEEDS.

An examination of our correspondence shows that among the weeds most frequently inquired about this year are the following: Orange hawkweed, ribgrass, field bindweed, perennial sow-thistle, couch grass, wild mustard, wormseed mustard, rocket, chess, night-flowering catchfly, hop clover and yellow trefoil. It is evident that such a list does not indicate the relative seriousness of weeds. Some of those inquired about have interested the senders because of the difficulty they have had in dealing with them, but quite as many have been sent because they were unknown and thought to be new and possibly noxious or because some feature or other of the plant has caused it to attract attention. In the latter cases it is only necessary to point out the name and nature of the weed, and advise the ordinary measures against weeds practised on all good farms. In other cases, the serious prevalence of a weed, or its persistent character, demands the giving of special instructions for its eradication, and is often a matter of considerable moment to the farmer.

THE MULLEINS.

There are two species of mullein which are weeds of some importance in Canada. The Common Mullein (*Verbascum Thapsus*, L.) (Fig. 2 *b*) is familiar to everyone as a tall, coarse, wooly plant, occurring on roadsides, in pastures, and especially in light or worn-out soils where the grass is thin. It is not eaten by sheep or other animals, (it is not generally known that it contains a poisonous principle), and therefore remains standing even when the pasture becomes quite bare; and in winter its long stems are conspicuous objects wherever it has been growing. The treatment for its eradication consists in breaking up the sod and growing a hoed crop for a year. The land should never be left in sod longer than two years, where it can be included in a systematic rotation. Where it is to be left in permanent pasture, the mulleins may be spudded below the crown while young, or pulled when larger.

A less known, but possibly worse weed, when it becomes common, is Moth Mullein, (*Verbascum Blattaria*, L.) (Fig. 2 *a*). It is appearing in numerous localities and when neglected, soon spreads from the point where introduced. It is more slender, and usually lower than the common mullein, and is not woolly, but smooth throughout. The flowers are rather attractive, about an inch in diameter, and yellow, and are borne in a loose raceme quite unlike the cylindrical spike of the other species. The Moth Mullein, like the common mullein, is a biennial, and the same treatment may be followed in dealing with it.

FIELD BINDWEED (*Convolvulus arvensis*).

One of the weeds which is quietly but very insidiously taking possession of many farms in Canada, and has already made itself known, especially in Ontario, as a noxious weed of the first rank, is Field Bindweed or Wild Morning-glory. We hear more about perennial sow-thistle and some other weeds, which are at the present time spreading more rapidly so as to occasion more alarm, but it is doubtful if any one of them is so difficult to eradicate as this; and its occurrence too, is much more general than has been believed.

Field bindweed is not nearly so well known yet as it needs to be. We receive many specimens of it for identification, and we find that comparatively few farmers know it by name. There is also some confusion between this weed and wild buckwheat sometimes known as black bindweed, which has a similar twining habit. It is important that these two weeds should be distinguished, because the latter while everywhere abundant, is an easily destroyed annual, which need not give serious trouble. Anyone by an examination of the underground parts can satisfy himself of the difference between them. Wild buckwheat has a wiry, slender root which breaks up into many

branching smaller roots, while field bindweed, has an extensive system of white, cord-like, easily broken, perennial roots, which reach deeply into the earth when the subsoil is not too hard. From these roots, freely budding root shoots are produced, and it is by means of these that a patch once started in a field enlarges its area, and it is by their breaking up and distribution as much as by seeds, that new patches are started. It is a matter of common observation that in some localities, the seed is only very sparingly produced, although in others, unfortunately, enough is produced to provide for its constant introduction into new localities through the medium of the clover seed with which it has matured. Besides the differences noticed in the root systems, these two weeds show such dissimilarity in their flowers that they need never be confounded at that stage. The flowers of buckwheat are small and inconspicuous; those of bindweed are over an inch in diameter, white or pinkish in colour, and of the shape and appearance of small morning-glory flowers. The leaves of the two plants bear some resemblances but those of bindweed are blunter at the tip and base generally smaller. The stems in both cases twine about neighbouring plants for support, thus entangling them and dragging them down; or in the absence of any support, they creep about, forming a dense mat on the ground.

Immediately on the discovery of the first patch of bindweed in a previously clean field, steps should be taken to prevent its spread, and above all to keep it from spreading to any permanent fence or other obstruction to cultivation. If the area is not already too large, hand cultivation and hoeing will be best, as it can be more thoroughly done and greater care can be exercised to avoid the scattering of pieces of the roots. The aim should be to cut off all vegetation below the surface of the ground, throughout the entire growing season, and as promptly as possible at each new appearance. This may have to be kept up for two or more seasons, depending on how faithfully it has been done. It involves much work, but nothing less will suffice, for every day that new foliage is allowed to spread itself to the sunlight, it is replenishing the lost vitality of the roots.

The difficulty of doing the work is much increased when the area to be cleaned is greater. In this case, field implements must be used, and it is practically impossible to avoid missing some shoots. A broad-share cultivator is the best implement available on most farms, and should be used in preference to the disc-harrow for this weed. If a whole field is infested, it will be economy in the long run to keep it bare-fallow for at least one season, which applies equally to such portions of a field as may be infested. If a late-sown cultivated crop, like turnips or pasture rape in drills, succeeds a year of bare-fallow, the opportunity thus given before and during the growth of the crop, for further cultivation, will do much to subdue the weed. In its weakened condition, it can be smothered with a crop of grain thickly seeded to clover, or better still by a seeding of lucerne without the grain. Any plants which survive must thereafter be given special attention with the hoe or otherwise until disposed of, or the field will soon be as foul as before.

When bindweed gets established in berry plantations, gardens, and similar places, it will usually be best to remove the crop to another location, as very little headway can be made in fighting the weed among them and their supports.

As an alternative to cultivation and the hoe as a means of preventing growth above ground, it is frequently recommended to cover the area to be cleaned with building paper, litter, etc. This, of necessity, can be practised over only very limited areas. Even then it is doubtful whether the saving of labour is sufficient to offset the cost of the treatment. The building paper to be effective must be well overlapped, and in all probability will have to be renewed at least once before the bindweed is subdued. Any other covering must be of considerable depth, for bindweed is capable of growing through a couple feet of straw mulch. Unless there is some special condition which renders these methods desirable, better results may be expected from work such as has been outlined above. Other methods, such as the application of salt or chemicals, have not yet been demonstrated to be of much advantage.

HOP CLOVER AND OTHER COMMON WILD LEGUMES.

Among the plants frequently regarded as weeds, but which are of slight importance either as weeds or for any value which they possess, are several of the wild members of the clover family. Hop clover and yellow trefoil especially attract a great deal of notice, but can hardly be classed as noxious weeds. When present in a hay crop they may reduce the value of the hay by becoming over-ripe and woody, and may affect the yield, to the extent that they occupy the space of larger hay plants; and in clover left for seed, the free-seeding trefoil is also objectionable; but their eradication is not difficult, and they do not show much tendency to over-run regularly farmed land. In pastures they may even contribute enough to the herbage to be of value rather than objectionable. Being rich in nitrogen, and sharing the ability of all legumes to leave the soil richer in nitrogen than they found it, both these plants and also such other legumes as low hop clover, white and yellow sweet-clover, and the vetches may well be encouraged to occupy the ground in untillable places. The hop clovers and the sweet clovers thrive on sandy tracts where grasses are usually insufficient to cover the ground.

When land is to be cleaned of any of these plants, it may be used for a cultivated crop for a year, and if care is taken to prevent seeding they will not persist long as a rule. The vetches may require more attention, by means of a short rotation of crops, after-harvest cultivation, or sometimes seeding down to grass for three or four years, if a rotation is out of the question.

REPORT OF THE POULTRY MANAGER.

A. G. GILBERT.

OTTAWA, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour of submitting to you herewith the twenty-third Annual Report of the Poultry Division of the Central Experimental Farm.

The subjects discussed in this report embrace several new features. One of the most important of these is in connection with the marketing of new-laid eggs and the better quality of poultry to the better advantage of producer and consumer, by means of egg circles, based on the co-operative principle. In several instances, these egg circles have been in successful operation during the past year. Much of their future success depends upon careful and competent management. The rules governing these circles, which are described in the following pages, should be of unusual interest to farmers.

The different subjects treated in this report may be enumerated as follows:—

1. Official figures which show the rapidly increasing value of our home market.

2. A growing, but more exacting, demand for strictly new-laid eggs, and the better quality of poultry.

3. The formation of a Dominion Poultry Association and egg circles in different parts of the country, based on the co-operative principle.

4. The classification of eggs and poultry and the grading of the same.

5. Rules governing the establishment of co-operative associations or egg circles.

6. The experimental work of the past year and results therefrom.

I have to acknowledge the assistance of Mr. Fortier in carrying on the experimental work and compiling the different tables of results which will be found in their proper places. He also acted as judge at the following fairs and poultry shows held during the year, viz., L'Assomption, Sherbrooke, Quebec, Victoriaville, and Montreal, in Quebec; and Toronto and Spencerville in Ontario. He addressed meetings at: St. Valier, St. Adele, Papineauville, Maria, St. Jules, Carleton, Maria Cap, Nouvelle, Bonaventure, Pointe Gatineau, Victoriaville and St. Gilles, in the province of Quebec. He also visited the Experimental Station at Cap Rouge and the Macdonald College at St. Anne de Bellevue, Que. A large and growing correspondence in French demanded much of his time and attention.

Mr. Summers left for England in the month of April last and was replaced by Mr. W. T. Scott, who has had a large experience in poultry keeping in different establishments in Canada and the United States. He has proved himself efficient in the feeding of rations and management of breeding stock during the past winter, as also in securing a satisfactory number of eggs during that season.

Mr. Deavey was entrusted with the care and cleaning of the buildings, the feeding of the young chicks in summer and assisting in the winter feeding of the fowls, etc. His duties were discharged with satisfaction.

I had the pleasure of attending a number of fruit and poultry meetings in the district of Huron, Ontario, during the latter part of May and the beginning of June, of last year, in company with Mr. A. McNeill, Chief of the Fruit Division of the Department of Agriculture. Meetings were held at Lucan, Exeter, Hensall, Brucefield, Holmesville, Aurora, Blyth, Dungannon, Lucknow, Brussels and Port Elgin. Meetings were also attended at Toronto, Cobden, Guelph, Burk's Falls (2), Hanover, Fitzroy Harbour and Carp in Ontario; Montreal (3), and the Macdonald College in Quebec.

A feature of the year, well calculated to show greatly increased interest in poultry keeping, is the large correspondence in both English and French, as shown by the following number of letters which were received and despatched during the year:—

Number of letters received	5,002
Number of letters despatched	6,329

I have the honour to be, sir,

Your obedient servant,

A. G. GILBERT,

Manager, Poultry Division.

REPORT OF THE POULTRY MANAGER.

The rapidly increasing value of the poultry products of the country during recent years has been very marked. This gratifying development of the poultry branch of farm work merits the earnest attention of the farmers of the country to whom it should mean much that is profitable. Some of the principal points in this development may be noted as follows:—

1. The steadily increasing value of our home market.

2. A growing demand, at high prices, for strictly new laid eggs and the better quality of poultry.

3. The adoption of the co-operative principle in the marketing of eggs and poultry.

4. The establishment of egg circles in different parts of the country with the object of collecting and disposing of strictly new-laid eggs with greater despatch than by the usual methods.

5. A marked preference for eggs which are stamped when laid as a guarantee of their prime quality.

6. A greatly increased inquiry on the part of farmers for information as to up-to-date methods in the housing, breeding and feeding of poultry.

POINT I.—INCREASING VALUE OF THE HOME MARKET.

The rapidly growing value of the home market for both eggs and poultry was strikingly instanced by the increased prices of the past winter, during which time fifty cents per dozen were paid to farmers on the city markets, for strictly new-laid eggs and from sixteen to eighteen cents per pound for the best quality of poultry. Mrs. R. A. Craig, of Osgoode, near Ottawa, wrote that she received fifty cents per dozen for new-laid eggs during December and January from a Montreal dealer.

In the grocery and provision stores of this city, higher retail prices were asked and were willingly paid for choice poultry products.

The eggs which obtained the highest prices were not only new-laid, but presented a clean and inviting appearance. They were put up in neat cardboard boxes, on which was printed the name of the party who sent them, and on each egg was stamped the date when laid. Such packages found ready sale.

It is claimed that the egg and poultry trade of the Dominion occupies a position that is actually unique, for while we have decreased exports and increased production we have increased prices. But it must be borne in mind that these increased prices are for the better quality only. The following official figures show the steady decline in the export of eggs and poultry during the past eight years:—

EXPORTS OF EGGS AND POULTRY.

	Value. of Eggs.	Value. of Poultry and Game.
1902	$1,733,242	.....
1903	1,436,130	.....
1904	1,053 96	.....
1905	712,886	$131,874
1906	495,176	217,944
1907 (9 months)	556,557	157,677
1908	301,818	222,012
1909	124,315	112,579
1910	41,766	.....

It will be noticed from the above figures, that the decline in the export of eggs, particularly during the past three years, has been very marked. Speaking of this decline, Mr. John A. Gunn, president of the Montreal Produce Exchange, in a recent address, stated 'that the export trade had declined for the simple reason that, for the time being, the home demand was equal to the country's supply. A paying remedy would be found if the farmer would increase his stock of poultry and carefully study the trade conditions.' It is to be hoped the farmers will put into effect this practical advice.

POINT II. ONLY STRICTLY NEW-LAID EGGS AND THE BETTER QUALITY OF POULTRY WANTED.

There is a rapidly growing demand in the larger cities and towns of the Dominion for strictly new-laid eggs, with the delicious flavour which only such eggs have. For such an exceptionally choice article, the highest values are paid to the producer. This leads to the inquiry, what is considered a choice quality egg? An egg of such a description must fill the following rather exacting conditions, viz.:—

A.—Must not be over four or five days old when offered for sale.

B.—Non-fertilized, so as to prevent possible germ development. This forcibly applies to eggs laid in late spring and during the summer months.

C.—Of fine flavour, which can only be found in eggs laid by well and cleanly fed hens. A hen allowed to eat decaying animal or vegetable substances or drink filthy water is not likely to lay an egg of the finest flavour.

D.—Nutritious in quality and clean and inviting in appearance. If the hens are lice-infested, the lice are likely to get the nutriment which should remain in the egg. An egg laid in a dirty nest is not likely to present an attractive appearance.

E.—Should be collected as soon as possible, after being laid, and be kept in a cool, sweet-smelling cellar or cupboard so as to avoid any possible contamination. The egg shell is porous and the flavour of the egg is easily affected by surrounding substances.

F.—Having such a choice article—as an egg laid under the conditions outlined is likely to be—it is worth while putting them up in neat cases or boxes. Where there are egg circles, it is a rule that the date when the egg is laid be stamped on it as well as the name of the party who sends it.

The same care and effort is necessary in the production of the superior quality of poultry. The producer with well fleshed, carefully plucked and neatly dressed chickens is far more likely to receive a high figure than the seller who has poorly-plucked, ill-coloured, scrawny chickens. The highest price markets of to-day call for a high quality article. The producers who take the trouble to cater to this market obtain the highest figures. Those who have the inferior quality must be content with lower values. The aim of the farmers should be to cater to the highest quality trade. Farmers are certainly in the most favourable position to take advantage of the high prices. Usually they have grain, roots, clover and other articles of feed in abundance and frequently in the shape of waste. At any rate they are available at first cost. No more profitable use could be made of any kind of grain or vegetable waste than by feeding it to poultry.

Speaking of the demand for strictly new-laid eggs in Montreal last winter, a leading dealer in that city remarked: 'While we have great difficulty in supplying the increasing orders of our best class of customers for strictly new-laid eggs at high values, we have hundreds of cases of eggs, just in from the country and called fresh, but we cannot rely on them.' This statement conveys its own moral.

But where are the high prices paid is a question often asked by farmers. Again, the complaint is occasionally heard that the high prices are not received. At a recent meeting of farmers, at which the writer was present, one of the audience said: 'I send only strictly new-laid eggs to the city, but I do not get the highest value.' 'Did you make it plain that the eggs sent by you were of a superior quality?' 'No,' was the reply. The question was then asked, 'How did you send them?' 'Oh, in a crate, just as other eggs are sent.' A great mistake was made in so sending the eggs. There was nothing to distinguish them from other eggs, which are usually stale when they reach the dealer, and are paid for accordingly. Speaking of this phase of the egg trade, the manager of a large grocery establishment in this city said: 'We have no difficulty in selling eggs put up in this way'—taking up a neat cardboard box containing one dozen eggs and bearing the label—'From Henry Nest, Pulletville Farm. These eggs are guaranteed strictly new laid'—and for such a select, neatly put up article we have been paying fifty cents a dozen. At the same time we receive many cases of eggs which are paid for at thirty and thirty-five cents per dozen.' And why make such discrimination? 'Because, as a rule, farmers hold the eggs until they are stale, and when the eggs reach us they are not a first-class article. But when we know the man and the high quality of the goods he sends us, we do not hesitate to pay the best prices.' Later on in this report it is shown where, by the formation of co-operative egg circles, the farmer is helped to place his goods in the hands of the buyers with less delay and trouble than formerly.

PRICES PAID BY LEADING PURVEYORS IN DIFFERENT CITIES.

The interesting and often-times asked query as to when and where the highest prices are paid is answered in the following letters from well-known purveyors in the cities named. It will be noted that 'strictly new-laid eggs' are distinctly specified in most of the letters as follow:—

WALTER PAUL,
461 ST. CATHERINE ST. WEST,
MONTREAL, March 27, 1911.

The Manager, Poultry Department, Experimental Farm,
Ottawa.

DEAR SIR,—With regard to the prices of eggs, I find from my books that from early in November, all through till the end of December, we paid from 50 to 55 and 60 cents per dozen. After the turn of the year, eggs became more plentiful so that prices eased off a little, from 45 to 40 cents. It was not until the beginning of March that prices came to a reasonable figure.

I might add that during the months of November and December we *never get enough of strictly new-laid eggs,* and as you know we are always ready to pay the very highest price for all we can get.

Sincerely yours,
(Sgd.) WALTER PAUL.

GEORGE GRAHAM,
ST. CATHERINE AND DRUMMOND STS.,
MONTREAL, March 25, 1911.

'DEAR SIR,—We are pleased to give you the information that you request, and advise that the best prices which we paid for strictly new-laid eggs, from the beginning of November, 1910, are as follows:—

November 2, 1910, to November 26, 1910, 50 cents per dozen, delivered.
November 26, 1910, to December 23, 1910, 60 cents per dozen, delivered.
December 23, 1910, to December 28, 1910, 55 cents per dozen, delivered.
December 28, 1910, to January 3, 1911, 50 cents per dozen, delivered.
January 3, 1911, to January 19, 1911, 45 cents per dozen, delivered.
January 19, 1911, to January 30, 1911, 40 cents per dozen, delivered.
January 30, 1911, to February 13, 1911, 35 cents per dozen, delivered.
February 13, 1911, to March 13, 1911, 30 cents per dozen, delivered.

Yours very truly,
(Sgd.) GEORGE GRAHAM

E. J. QUINN, FAMILY GROCER,
WESTMOUNT, March 27, 1911.

DEAR SIR,—Yours of the 24th inst. to hand. *Re* price of eggs during winter we quote: November, 50 cents; December, 60; January, 50, 40 and 35 cents, express prepaid.

Yours truly,
(Sgd.) E. J. QUINN.

LAMB'S MARKET, LIMITED,
22A UNIVERSITY STREET,
MONTREAL, March 26, 1911.

DEAR SIR,—Enclosed find prices paid for eggs as you request:—

1910	Doz.	1911	Doz.
Nov. 14	45 cts.	Jan. 30	36 cts.
" 17	42 "	Feb. 4	34 "
" 22	45 "	" 9	34 "
" 23	48 "	" 12	37 "
Dec. 3	50 "	" 14	32 "
" 8	48 "	" 16	31 "
" 13	50 "	" 21	29 "
" 15	50 "	" 24	29 "
" 20	50 "	" 28	28 "
		" 25	31 "
1911		March 2	28 "
		" 7	27 "
Jan. 2	50 "	" 9	26 "
" 10	52 "	" 14	28 "
" 13	48 "	" 21	23 "
" 24	42 "	" 23	23 "

Yours truly,
(Sgd.) LAMB'S MARKET, LTD.

HENRY GATEHOUSE,

WHOLESALE AND RETAIL DEALER,

MONTREAL, March 27, 1911.

DEAR SIR,—Replying to your favour of the 24th, would say that we have paid the prices set out below for new laid eggs from 1st November last. If there is any further information we can give you we will be pleased to do so.

November and December from 40c. to 45c. a dozen.
January commenced 40c. to 45c.; ended 30c.
February commenced 30c. ended 25c.
March commenced 25c. now from 18c. to 20c.

Yours truly,

(Sgd.) HENRY GATEHOUSE.

POINT III.—ADOPTION OF THE CO-OPERATIVE PRINCIPLE.

It had been long felt that some means of aiding the farmers to sell their strictly new-laid eggs and better quality of poultry to greater advantage, was necessary. Assistance came in the shape of co-operation. A Co-operative Poultry Association, under the title of the 'Poultry Producers' Association of Eastern Canada,' was first formed. In the report of last year the formation of this association is noted as being the first practical step that had been taken in the establishment of co-operation among poultrymen. Later, egg circles were established in different parts of the country. These circles, which are really an outcome of the parent association, promise to become, under proper management, valuable aids to farmers. More is said of them later on.

Such success attended the first association that at the annual meeting, held on the first of February last, it was decided to enlarge the scope of the association and the title was changed to 'The Poultry Producers' Association of Canada.' In the language of the constitution, the object of the association and its branches or circles, 'is to encourage a co-operative spirit among poultry producers; to bring producers and consumers closer together; to encourage the adoption of the best breeds and types of utility poultry; to encourage the small producers to form local branches or circles, for mutual assistance and co-operation in selling; to aid in establishing a uniform and recognized standard of dressed poultry and eggs; to keep the producers in touch with those buyers who put a premium on quality; and to advance and dignify the poultry industry.'

The constitution also provides for proper officers and assigns their duties; arranges for the establishment of branches, circles, meetings, etc., etc.

PART IV.—CLASSIFICATION AND GRADING OF POULTRY AND EGGS.

The part of the constitution that will most interest farmers is the classification and grading of dressed poultry and eggs, from which we take the following condensed information:—

Definition of Terms.

Chickens.—Pullets under seven months old which have not laid and cockerels which have not developed a spur.

Broilers.—Should weigh from one to two and a half pounds.

Roasters.—Should weigh from two pounds and a half upwards.

Fowls.—Hens which have laid, or are over seven months of age.

Cocks.—Male birds having hard spurs. All mature males.

Capons.—Birds caponized when six to twelve weeks old.

Ducklings.—Birds marketed before they are ten weeks old. All over that age, ducks.

Goslings.—Young birds, marketed from seven to twelve weeks of age, before first moult.

Geese.—Older birds, over ten pounds and under.

Turkeys.—Divided into young and old birds, both male and female, and of all weights.

Pigeons.—Squabs or young birds which have not left the nest, usually four weeks old.

Pigeons.—Older birds after they have left the nest.

Poultry, How Graded.

Poultry is graded as follows—

Selects.—Birds which have been specially crate-fattened for three weeks; well fleshed, straight breast bone with fine finish and appearance. Birds of both sexes, but of uniform size, to the number of a dozen, should be packed according to sex, colour of flesh and legs, in a neat case.

No. 1.—A grade lower and should consist of well-fleshed birds of neat appearance. Packed in neat boxes holding one dozen birds of uniform size, sex, and weights.

No. 2.—Is yet a grade lower and is designated as fairly fleshed birds packed in neat boxes.

Common.—Is yet a grade lower and is described as consisting of any birds not conforming to the requirements of the above three grades, *but must not be packed in boxes similar to the other grades.*

In regard to the latter grade, it is a matter of congratulation that less of it is being found on the markets year by year. The day of the scraggy, thin and discoloured chicken is fast passing away. It should be the aim of farmers to bring in for sale no poultry but of the highest quality.

Eggs and How Graded.

Eggs are classified according to quality and are graded as follows:—

Selects.—Are strictly new-laid eggs, not over five days old, weighing not less than 24 ounces to the dozen. Clean but unwashed, of uniform size and colour, packed in substantial, neat cases, having clean fillers.

No. 1.—Are new-laid eggs, but of a lower grade. They should not be over five days old, weighing not less than 21 ounces to the dozen. Clean, packed in substantial and neat cases with clean fillers.

NOTE.—Common eggs, not covered by the foregoing grading, must not be marketed under the brand of the association.

For the ordinary trade, the above two grades of eggs should be sufficient. It is to the higher and not the lower grades that farmers should cater. Rough-shelled and abnormal eggs should not be shipped.

ASSOCIATION RULING ON NEW-LAID EGGS.

What the association rules as a strictly new-laid egg will be read with interest and is described as follows:—

All eggs must be shipped new laid. A new-laid egg is an egg that is *not over five days old when shipped;* an egg that has been gathered promptly and kept in a moderately, dry, cool place (under 60 degrees), free from foul odours and other contaminating influences. On holding a new-laid egg to the light, it will be seen that the air space in the large end is very small, not larger than a five cent piece, and the yolk almost invisible. As the age continues the air space enlarges, and the yolk becomes visible.

POINT V.—RULES GOVERNING BRANCHES OR CIRCLES.

Eggs should be collected every day and twice per day in warm weather, and put away in a clean, sweet-smelling storing place. No diseased birds or birds showing signs of disease shall be offered for sale.

The plant and poultry of members of a circle are expected to be kept clean. Inspectors will visit plants from time to time.

None but artificial eggs should be used for nest eggs. This is important, as it prevents a genuine egg being sat upon by a number of hens in succession.

All male birds should be shut up or disposed of except from January 1 to June 15.

No member is to send eggs except those laid by his own hens.

In case of a complaint by a purchaser against a branch, the manager should be able to trace any misdemeanour to the individual.

The rating of the produce by the manager of a branch is final. All members must submit to his ruling.

SUGGESTIONS FOR THE FORMATION OF BRANCHES OR CIRCLES.

It is recommended that, when necessary, farmers should be instructed as to the value to them and the benefit to the purchasers of placing their poultry products, especially eggs, as quickly as possible on the market. As aids in so doing, the formation of egg circles is recommended.

It is suggested that where there are cheese or butter factories, these factories might be utilized as aids, or the poultry work added to their sphere of action.

It is not advised that too great an area should be included in the operations of a branch or circle.

The system adopted should aim at getting the produce together at a central point which will be convenient and not costly to reach. Members of a circle may bring their own products, or they may be sent for and so collected.

The central point chosen should have convenient shipping facilities, as in the case of many cheese and butter factories. The central station should have a testing room, grading table, store room, etc. Eggs should be graded and disposed of without delay.

The officers of a branch or circle should be a manager, or president, a secretary-treasurer and a committee. All should be competent and business-like men. Much depends upon good management.

The quality of the products is safeguarded by each member of a circle having a stamp with name or branch and number of individual. Eggs and packages of poultry are stamped. Inferiority of product can thus be traced to the producer. The output of each circle bears its own stamp. Eggs should be collected or sent to the central station three times per week.

THE ORDINARY COMMERCIAL GRADING OF EGGS.

The foregoing classification of eggs and poultry according to the stringent rules of egg circles calls for a very select quality of products. This is necessary in order to secure the highest values aimed at. In comparison it will be interesting to note the ordinary commercial methods of grading eggs, as follows:—

GRADING EGGS.

Eggs are sometimes graded as follows:—

Extras.—Weight 28 to 26 ounces per dozen, naturally and absolutely clean, fresh and sound, same colour (a grade seldom used).

Firsts.—Weigh 26 to 24 ounces per dozen, sound, fresh and reasonably clean.

Seconds.—Shrunken, stale, washed, stained and dirty.

Checks.—Cracked, not leaking.

Rots.—Incubator, blood rings, dead germs and decomposed eggs.

All eggs should be bought and sold on this grading system so that an egg will bring what it is worth.

DESCRIPTION OF EGG CONTENTS.

When the candler tests the eggs he bases his judgment on the following indications:

Fresh.—Opaque, appearing almost entirely free of any contents, sometimes dim outline of yolk visible, air cell very small.

Stale.—Outline of yolk plainly visible, sometimes muddy in appearance, air cell very large.

Developed germ.—Dark spot visible, from which radiate light-coloured blood vessels.

Dead germ.—Dark spot, attached to shell, or red ring of blood visible.

Rotten.—Muddy or very dark in appearance, yolk and white mixed, air cell very large and sometimes movable.

Cracked.—White lines showing irregularity in shell.

Testing as above suggested will aid one in determining absolutely the quality of the eggs, not only for marketing, but for incubation.

The farmer should demand that his eggs be bought upon the test. The buyer should co-operate with farmers and meet such demands by buying upon condition that bad eggs be replaced by good ones.

METHODS OF SELECTION.

The methods used for the selection of eggs in the establishment of large egg dealers is called 'Candling' or 'testing.' The 'egg candle' or 'tester' is made of wood or metal, and, as a rule, is kept in a dark room. A light inside the tester shines through an opening, in front of which an egg is held by the candler. By a quick movement of the hand, the condition of the contents of the egg is quickly noted. and the egg is placed in its proper class. A good candler works rapidly and will test a large number of eggs in a day.

It is usual to purchase eggs at a flat rate, but notwithstanding, a buyer frequently goes over them in this manner and selects only the best for his select trade.

TOO MANY DOUBTFUL EGGS BROUGHT TO THE MARKET.

It is to be hoped that the farmers of the country will become members of one of the co-operative egg circles, or be so guided by the foregoing precautionary measures that a better quality of eggs and poultry will be handled by them. Speaking of the

great loss to the farmers every year, by their careless methods of marketing eggs, Mr. J. A. Gunn, of the extensive egg and poultry buying firm of Gunn, Langlois & Co., Montreal, said in a recent address to the Poultry Producers' Association of Canada:—'The loss from marketing bad eggs alone in Canada last year is estimated at $1,850,000. If eggs had been brought to market in a proper manner the great loss mentioned would not have occurred.' In an article on the 'Poultry Industry' in the Montreal Weekly *Witness* of March 21st last, Mr. E Rhoades of the Macdonald College, Que., remarks:—'The bad egg question must be considered—Let me give reports of two Quebec and Ontario merchants to prove that the loss estimated from bad eggs is not exaggerated. The Quebec merchant states that, during the period from May 15 to October 1, he handles from thirty-five to forty thousand cases of eggs (thirty dozen per case), and that two-thirds of these cases contain no new-laid eggs. The Ontario merchant handles about 20,000 cases of eggs in the same period, and says that with strict candling there would be none classed as new-laid, forty per cent of the whole would be stale or shrunken, and ten per cent bad. These merchants further state that if the bad eggs were eliminated, they could pay from two to eight cents a dozen more for eggs.

BAD PRACTICES.

A WARNING CIRCULAR FROM WHOLESALE BUYERS.

The following circular from a wholesale house, who are large purchasers of eggs, to their buyers, conveys its own moral. It it to be regretted that such vicious practices, as complained of in the first paragraph, are so common.

MONTREAL, May 15, 1911.

DEAR SIR,—Already we are commencing to receive bad eggs, which have every appearance of being taken from incubators. We want you to give the question of watching this class of eggs and also bad eggs, close attention from now out.

We understand that already there is a movement on foot among dealers to buy eggs, loss off, just as soon as the warm weather commences, so you want to prepare the farmers and storekeepers for this.

There is another thing to which we want to draw your attention, and this is that eggs are arriving without any packing on the top. This is a great mistake, as it means that we lose lots of money through cracked and broken eggs, which would be eliminated if a little care were used. Kindly give this matter your attention and if you have been guilty, have the difficulty corrected in future shipments.

Yours faithfully,

GUNN, LANGLOIS & CO., LTD.

EXPERIMENTAL WORK OF THE YEAR.

The experimental work of the year commenced on the close of the fiscal year March 31, 1910, when the following breeding pens were made up, viz.:—

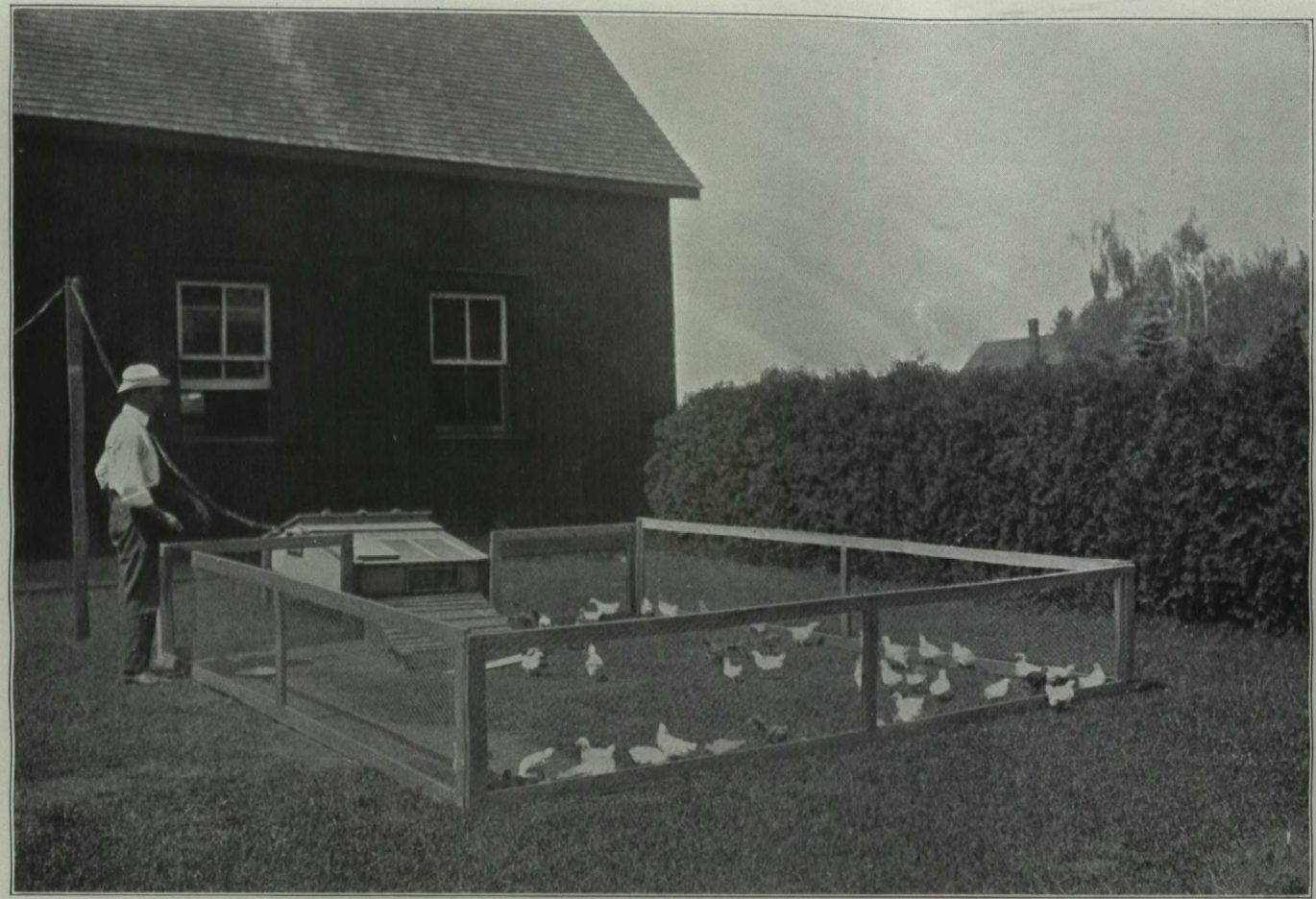
Pen No.	Varieties.	Males.	Females.
	House No. 1.		
1	White Plymouth Rocks	1 cock	14 hens.
2	" " "	1 cockerel	13 pullets.
3	" Leghorns	1 cock	28 hens.
5	" "	1 "	14 pullets.
	House No. 2.		
16	White Leghorns	1 "	9 hens and pullets.
18	Barred Plymouth Rocks	1 cockerel	5 pullets.
	House No. 3.		
20	Buff Orpingtons	1 cock	7 "
26	Black Minorcas	1 "	15 hens and pullets.
	Unheated—Cotton Front House.		
32	Buff Orpingtons	1 "	22 hens.
	Other Unheated Houses.		
33	White Wyandottes	1 cockerel	21 "
34	Barred Plymouth Rocks	1 "	29 "
35	" " "	1 cock	28 pullets.
36	White Wyandottes	1 "	20 "

EGGS SOLD FOR HATCHING PURPOSES.

As in the springtime of previous years, there was a greater demand for eggs for hatching than could be supplied. In many instances, eggs were doubtless purchased by farmers, but the great majority of orders were not received from them. It is to be regretted that such should be the case, for the eggs sold from the carefully mated breeding stock to be found in our Division, and the extremely moderate price placed on them, viz.: one dollar per setting, offer exceptional advantages for procuring pure bred foundation stock.

NATURAL AND ARTIFICIAL INCUBATION.

The following table shows the results of hatching eggs by hen and by incubator. A strong point in favour of the incubator is that it is always ready and affords opportunity for the early hatching of chickens where it is desirable and convenient to do so. The hen is not apt to prove an early sitter unless she has been a steady winter layer. If she begins to lay only in springtime, she is apt to lay her full quota of eggs before exhibiting the broody instinct, and that is usually too late in the season to have early chicks of the heavier varieties, such as Plymouth Rocks, Wyandottes, etc. The moral is obvious to those who prefer to use the hen as an early hatching medium, and that is, to have her a steady layer during winter. The fact that eggs are usually of the highest value during the winter season is another strong reason why farmers should have their hens laying during that period. Some interesting particulars in regard to hatching operations will be found in the following table:—



THE ELECTRIC MOTHER.
Chickens hatched and reared by electricity, electrobators and electro-hovers.

Photo by FRANK T. SHUTT.

16—p. 286.

TABLE II.—SHOWING NUMBER OF EGGS SET AND CHICKENS HATCHED BY HENS AND BY INCUBATORS.

Date when Eggs were Set.	Description of Eggs.	No. of Eggs.				Chickens.		Percentage Hatched.		Remarks.
		No. set or placed in incubator.	Clear.	Dead germs.	Broken by hens.	Died in shell during incubation.	Hatched.	Results from total of eggs set.	From fertilized eggs.	
1910.										
Apr. 10..	Buff Orp.; B.P.R.; Wh.Wy.	65	10	5	3	7	40	61½	85	Hatched by hens.
" 10..	B. & Wh. P. Rocks; Wh. Leg.; Wh.Wy.; Buff Orp.; B.M.; S. G. D.	169	40	29	....	27	74	43¾	74	" incubators.
" 10..	" "	241	34	54	....	52	101	42	66	" "
May 6..	" "	174	34	6	...	26	110	63	82	" "
" 6..	" "	137	12	8	....	25	92	67	78⅔	" "
" 6..	B. P. R. & Wh. Leg.....	69	17	7	3	5	37	53⅔	88	" hens.

It will be noticed from the above table that eggs of several varieties were put into the incubator at the same time.

The spring was late and unusually cold and dry.

To judge from the poor fertility of the eggs from Black Minorca and Silver Grey Dorking fowls, these breeds do not stand the limited confinement of winter quarters as well as others. It will be interesting to note whether the experience of future seasons will justify this deduction or not.

PROGRESS OF THE CHICKENS.

The progress of the chickens from the time of hatching to maturity was most satisfactory. The season was an ideal one after the warm weather set in, and full advantage was taken of the favourable conditions to push the young and rapidly growing stock to early maturity by careful treatment and by regular and generous feeding. An outline of this treatment is given, in response to frequent inquiries as to 'how should chickens be fed and managed?'

First thirty-six hours after hatching.

During this period, the chickens require brooding more than anything else. In a well-hatched and robust chicken, the yolk, which should be completely absorbed, is sufficient food for the time mentioned, or even for twelve hours longer. A mistake is often made by giving the newly-hatched chicks food and too much of it at this early stage of their existence. It may be, in the case of some unusually well-developed chicks that a little food may be desirable, when a few stale bread crumbs may be given.

After thirty-six or forty-eight hours.

Give stale bread soaked in skim milk and squeezed dry, or one part of finely-chopped hard-boiled egg and three parts of stale bread crumbs. Feed no more than the chickens will eat up without waste. If the chicks are hearty, feed every two or three hours. Continue this for a day or two and then add granulated oatmeal. Use the stale bread soaked in milk and granulated oatmeal for ten days, when finely-crushed corn may be added to the foregoing with advantage. After fourteen days, give whole wheat, in small quantity at first.

As the chicks grow older, they should be given a mash composed of stale bread, shorts, oatmeal, ground meat, etc. Finely-cut bone or meat will be found a great incentive to growth at this stage.

On the chicks becoming eight weeks of age, their rations may be reduced to three per day. Care should be taken that they are generously fed the last time for the day.

For drink, give them skimmed milk and water.

When the hen-hatched chickens are fully feathered, their mothers should be removed from them. The chickens will be found to return to their coops as usual, where they may be allowed to remain until removed to more commodious quarters in colony houses.

On the incubator-hatched chickens becoming too large for the brooders, they should be removed to colony houses.

FREE RANGE *vs.* LIMITED RUNS.

When the earlier-hatched chickens were about a month and three weeks old, a group of twelve chickens was taken from among others running in a field and were placed in a pen 10 feet x 8, with a limited run. At the same time, another group of chickens of the same varieties and as nearly as possible of the same age were taken from among the same lot running in the same field, were marked so as to make sure of their identity, weighed and let loose again. At the end of the experiment, the gain was found to be in favour of the chickens confined to limited runs as compared with those running at large. Particulars as to rations, varieties, weights of chickens, etc., are shown in the two following tables.

TABLE III.—SHOWING the gain in weight of twelve chickens as described in the following table, which were taken from a field, specially fed and kept in a pen 10 x 8 feet with a run outside of 10 x 27 feet. Compare this table with table 4 which follows.

TABLE III.—Limited Runs.

No. of Leg Band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.						Remarks.
			Months.	Days.	Beginning of Experiment.		One Month After.		On 1st September.		
					Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
74	Buff Orpingtons	C	1	20	1	5	2	1½	3	9	The rations were the same as fed to the chickens as shown in the following Table 4, viz.: —Cracked corn and wheat moistened with skimmed milk. The chickens were fed all they could eat.
25	" "	C	1	20	1	6	2	4	3	9	
49	" "	C	1	20	1	7	2	5	3	5	
78	Barred Plymouth Rocks	C	1	24	1	13	3	3½	4	10	
81	" "	C	1	24	1	9	2	6	3	8	
61	" "	C	1	20	1	4½	2	3	3	5	
8	White "	P	1	24	1	9	2	8	3	11	
10	" "	P	1	24	1	9½	2	6½	3	10	
82	" "	C	1	24	2	0	3	6	5	5	
64	White Wyandottes	C	1	24	2	1	3	3½	4	11	
24	" "	C	1	24	1	12	2	11	4	0	
35	" "	P	1	24	1	11	2	7	3	10	
	Total weight				19	7	31	1	46	13	

Average weight of each chicken at beginning of experiment. 1·9$\frac{11}{12}$ lbs.
" " " after one month . . . . . 3·14$\frac{5}{12}$ lbs.
" gain in two months of each chicken . . . . . 2·4½ lbs.

TABLE IV.—Showing the progress of twelve chickens with a run in a field as compared with the same number kept in a limited run, but fed the same rations. Compare with preceding table.

TABLE IV.—Free Range.

No. of Leg Band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.				Remarks.
			Months.	Days.	Beginning of Experiment.		On 1st September.		
					Lbs.	Oz.	Lbs.	Oz.	Rations.
32	White Plymouth Rocks	C	1	24	1	12	4	0½	Cracked corn and wheat moistened with skimmed milk.
3	" "	P	1	24	1	8	3	0	
14	" "	P	1	24	1	9	3	7	
13	Buff Orpingtons	C	1	20	1	14	4	0½	
26	"	C	1	20	1	5	3	0	
94	"	C	1	20	1	4	2	15	
81	White Wyandottes	C	1	24	2	0	4	0	
39	"	C	1	24	1	10	3	8	
62	"	P	1	24	1	6	2	12	
93	Barred Plymouth Rocks	C	1	24	1	8	3	5	
15	" "	C	1	20	1	5	3	5	
57	" "	C	1	24	1	9	3	15	
	Total weight				18	10	41	4	

Average weight at beginning of experiment. . . . . 1·8⅝ lb.
" gain in two months, on September 1. . . . . 1·15 "

FERTILIZATION OF EGGS.

HATCHING RESULTS FROM LARGE AND SMALL GROUPS OF FOWLS.

Many persons entertain the opinion that in order to have strong fertility in eggs only a small number of hens should be mated to one male bird. The following table goes to disprove this. It shows that better results followed the mating of thirty females to one male than with five hens to a single male bird. The eggs were hatched both by hens and by incubators. The fowls in the larger matings were kept in unheated houses and had a run of about 100 square feet each. The eggs marked by an asterisk were hatched by hens, the others in incubators.

TABLE No. V.—SHOWING FERTILITY OF EGGS AND CHICKENS HATCHED (from groups of hens of greater and lesser number and mated to one male bird in each case).

Date Eggs were Set.	Varieties.	1 Male, 5 Females.					1 Male, 12 Females.					1 Male, 20 Females.					1 Male, 30 Females.					Remarks.
		No. of Eggs Set.	Percentage.				No. of Eggs Set.	Percentage.				No. of Eggs Set.	Percentage.				No. of Eggs Set.	Percentage.				
			Fertilization.	Infertility.	Dead during Incubation.	Hatching.		Fertilization.	Infertility.	Dead during Incubation.	Hatching.		Fertilization.	Infertility.	Dead during Incubation.	Hatching		Fertilization.	Infertility.	Dead during Incubation.	Hatching.	
1910			%	%	%	%		%	%	%	%		%	%	%	%		%	%	%	%	
April 10	B. Ply. Rock	*43	74½	25½	37¼	37¼						*17	76½	23½	47	29½	25	88	12	28	60	*Hatched by hens.
" 10	White Leghorn																58	86¼	13¾	24⅛	62⅛	
" 10	" Ply. Rock						15	92½	6⅔	45⅔	46⅔											
" 10	Buff Orpington											*13	92¼	7¾	0	92¼						*Hatched by hens.
" 25	Black Minorca						53	66	34	37½	28½											
" 25	White Ply. Rock						74	82⅔	17⅓	31	51⅓	22	77½	22½	45½	32						
" 25	" Leghorn						58	84½	15½	41¼	43¼	*14	92½	7½	7½	85	45	91¼	8¾	20	71¼	*Hatched by hens.
" 25	Buff Orpington											54	89	11	18½	70½						
" 25	White Wyandotte											64	69	31	34½	34½	31	90	10	13	77	
" 25	B. Ply. Rock	*30	86⅔	13⅓	23⅓	63⅓											131	82	18	18	64	*Hatched by hens.
May 7	Black Minorca						33	66⅔	33⅓	30⅓	36⅓											
" 7	White Ply. Rock						52	90⅓	9⅔	23	67⅓											
" 7	Buff Orpington											*18	82¼	27¾	22¼	60						*Hatched by hens.
" 7	White Wyandotte											43	65	35	18½	46½	105	85½	14½	18	67½	
" 7	" Leghorn																40	92½	7½	17½	75	
" 7	B. Ply. Rock											*14	92½	7½	14¼	78¼	71	86	14	19½	62½	*Hatched by hens.

It will be noticed from the above table that the highest percentage of fertility was shown by eggs laid by White Leghorns and next Buff Orpingtons. White Wyandotte eggs also showed satisfactory fertility as did the eggs of Barred and White Plymouth Rocks. The largest number of chicks were obtained from 10 Buff Orpington eggs hatched by a hen. The percentage of results was 92¼.

NUMBER OF EGGS LAID DURING THE YEAR BY FIVE TWO-YEAR OLD BARRED PLYMOUTH ROCK HENS.

TABLE VI.—That hens of two years of age—even of the heavier breeds—when properly fed and of a good egg-laying strain, will lay well, particularly during the winter season, is shown by the following table.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August	September.	October.	Total of eggs laid.	Remarks.
	1909.		1910.											
10	....	....	21	11	19	11	10	12	11	15	13	5	128	
11	....	10	22	12	18	14	13	15	7	12	8	....	131	
39	....	....	22	8	14	15	1	11	9	8	13	4	105	
47	....	12	26	21	21	15	6	1	4	....	18	4	128	
49	....	2	24	11	17	10	4	20	8	6	7	....	109	
Total	....	24	115	63	89	65	34	59	39	41	59	13	601	Average 120¼.

Rations.

Morning.—Mash composed of cut clover, potatoes or turnips all boiled together and rounded up firm with wheat or other ground grain. Fed warm during winter.

Noon.—Grain thrown in the litter on the floor of the scratching sheds. We do this to make the hens search for the grain and so obtain exercise.

Afternoon.—A good feed of grain so as to send the birds to roost with their crops full.

TABLE VII.—SHOWS WHEN THE PULLETS COMMENCED TO LAY.

White Leghorns—November 1, 1910.

Barred Plymouth Rocks—November 2, 1910.

White Wyandottes—November 24, 1910.

White Plymouth Rocks—December 1, 1910.

Buff Orpingtons—December 22, 1910.

TABLE VIII.—NUMBER OF EGGS LAID DURING THE YEAR.

The following is a list of the number of eggs laid during the different months of the year, dating from April 1, 1910, to March 31, 1911:—

1910—April	2,736
May	3,005
June	2,062
July	1,205
August	507
September	441
October	65
November	241
December	1,003
1911—January	1,330
February	1,433
March	2,861
Total	16,887

STOCK AND EGGS SOLD DURING THE YEAR.

The following number of birds and eggs for breeding and eating purposes were sold during the year, viz.:—

Males for breeding	113
Females for breeding	60
Mixed breeds or culls sold for table use, males	35
Mixed breeds or culls sold for table use, females	48
Number of eggs sold for eating (dozens)	695¼
Number of eggs sold for hatching to March 31, 1911 (settings)	309

ACKNOWLEDGMENT.

I have again to acknowledge the kindness of Dr. C. H. Higgins, Pathologist of the Veterinary Laboratory, Experimental Farm, in making post mortem examinations of fowls which have died during the year. Many cases of diseases of turkeys sent from different parts of the country were also examined and reported upon by him. These reports were first made to Dr. Rutherford, Chief of the Veterinary Department, who courteously forwarded copies of them to our Division.

TABLE IX.—STOCK ON HAND ON MARCH 31, 1911.

Pen No.	Breeds.	Cocks.	Hens.	Cockerels.	Pullets.	Total.	Remarks.
1	White Plymouth Rocks	1	....	....	21	22	Heated House No. 1.
2	White Wyandottes	....	....	1	16	17	" "
3	Buff Orpingtons	....	....	1	18	19	" "
5	Barred Plymouth Rocks	...	....	1	15	16	" "
6	White Leghorns	....	....	1	27	28	" "
21	White Plymouth Rocks	....	13	1	....	14	" " 3.
22	Black Minorcas	1	....	....	7	8	" "
23	White Leghorns	1	10	....	....	11	" "
24	Black Minorcas	....	...	8	1	9	" "
26	White Leghorns	....	22	1	....	23	" "
27	Barred Plymouth Rocks	1	10	....	....	11	" "
29	" "	...	5	1	....	6	" "
32	Buff Orpingtons	....	16	1	....	17	Unheated " 4.
33	White Wyandottes	....	21	1	....	22	" " 5.
34	Barred Plymouth Rocks	....	27	1	....	28	" "
35	" "	1	....	....	24	25	" " 6.
	For breeding and eating purposes	3	....	17	14	35	In different pens in houses No. 2 and 6.
	Capons	2	....	....	....	....	
	Total	10	132	28	142	312	

RESULTS OF EXPERIMENTS WITH EGG PRESERVATIVES.

The following report of experiments in egg preservation conducted by the Dominion Chemist, Mr. Frank T. Shutt, for several years past, has been very kindly handed by him to our Division for publication. Inquiries are constantly being made for informatio on the best method of preserving eggs and authoritative information such as is contained in the following digest, cannot fail to be found timely and valuable:—

THE PRESERVATION OF EGGS.

By Frank T. Shutt, M.A., Dominion Chemist.

For the past thirteen years, experiments in egg-preservation have been carried on by the Division of Chemistry. In the course of this work, which has been reported on from time to time, many fluids and preparations proposed or sold as egg-preservatives have been tried. Our results have shown that the larger number of these utterly fail in their purpose and therefore cannot be recommended. We have further very satisfactory evidence of the efficiency of lime water for this purpose, eggs being frequently kept in this medium for more than a year, quite sound and fit for cooking purposes.

During the past season, we have repeated the trials with lime water and waterglass and also examined into the merits of a new preservative that has appeared on the market under the name of Galo. It is guaranteed that 'fresh eggs dipped in Galo will remain absolutely fresh for a period of twelve months or more, under any ordinary conditions.'

Galo is a fluid with a strongly alkaline reaction. On analysis, it is found to contain silicate of soda, casein held in solution by caustic soda and a small proportion of formaldehyde. The directions for its use are 'the daily production of eggs should be

dipped in Galo after they have been laid and then dried in an ordinary temperature. The non-porous, air-tight and almost invisible film which serves to close the pores of the outer shell, form immediately upon removal from the solution and will dry within fifteen to thirty minutes.'

The trial extended over a period of nine months from July to April, during which examinations were made three times. Saturated lime-water and a 5 per cent solution of water-glass were prepared according to the directions we have issued (and of which a copy can be obtained on application), the eggs treated with Galo were simply immersed in the fluid for one minute, removed and placed in a rack to dry at ordinary temperature. Strictly fresh eggs were, of course, used in these trials. The preserved eggs were kept in a cool, dry, dark cellar.

The first examination was made at the expiration of three months, when the eggs which had been kept in lime-water and silicate of soda were found to be in excellent condition. The 'whites' were not discoloured, the yolks were globular and there was no offensive odour. There were no visible evidences of deterioration.

The eggs treated with Galo were, so far as outside appearance is concerned, quite normal. With respect to the contents, the 'white' had become discoloured to a light reddish-brown, the yolk had become attached to the shell and the whole emitted a distinctly musty odour.

Three months later, that is, at the end of six months from the date of beginning the experiment, the eggs preserved in lime-water were practically in the same satisfactory condition remarked at the first examination. The eggs in water-glass showed a slight discolouration of the 'whites' and had developed a somewhat stale odour.

Our notes with respect to the Galo preserved eggs at this examination read as follows: outside appearance normal; 'whites' discoloured, of a light reddish-brown tint; yolks, stuck to shell; odour, stale; air space very much enlarged, showing that evaporation had taken place.

The third and last examination, made at the end of nine months, allows us to report as follows:—

Eggs in Lime-water.—In a number of cases, a very slight discolouration of the 'whites' had occurred and the yolks were not so globular as in fresh eggs. There was a slight stale, but not offensive, odour.

Eggs in Water-glass.—Some of the eggs showed marked signs of deterioration, the 'whites' having become highly tinted and somewhat limpid with a distinctly stale odour. In a number of the eggs, the yolks still retained their globular form but in some instances, in spite of the greatest care, the yolk escaped on opening the egg, due to the weakening of its enclosing membrane.

Eggs treated with Galo.—To the eye, the eggs presented no abnormal appearance but their extreme lightness was remarked. On opening them, it was found that evaporation had taken place to such an extent that the air space occupied 50 per cent of the total volume of the egg. The contents, both 'whites' and yolks, were almost solid and firmly adherent to the shell. While there were no visual signs of decomposition, the mass possessed a slightly disagreeable odour. Apart from the objection that might be raised to the drying out of the egg, the contents are not so well preserved as by either of the other fluids under experiment, even at the end of the first three months the 'whites' being markedly discoloured, the yolks degraded and the whole possessing a musty, disagreeable odour.

As regards Lime-water and Water-glass, our results of this season have corroborated those of previous experiments. Both are good egg-preservatives though it is useless to expect either can entirely arrest that 'stale' flavour commonly found in all but strictly fresh-laid eggs. Comparing the two preservatives, we can unhesitatingly say that Lime-water is superior to the Water-glass solution; no preservative has in our hands given such uniformly good results as this simply and cheaply made fluid.

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND

J. A. CLARK, B.S.A., SUPERINTENDENT.

CHARLOTTETOWN, P. E. I., March 31, 1911.

Dr. Wm. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Canada.

SIR,—I have the honour to submit herewith the second annual report of the operations on the Experimental Station for Prince Edward Island, at Charlottetown, for the year ending March 31, 1911.

CHARACTER OF SEASON.

The winter of 1909-10 began with heavy snow falls. These continued through January until three feet of snow lay on the level, without any frost being in the ground under it. A great mid-winter thaw removed the snow and allowed all the accumulated water to percolate through the unfrozen soil, which, no doubt, assisted much in making the season of 1910 a record one here for grasses, clovers and cereals.

Spring opened very early. Some ploughing was done on the 12th of April. Sweet peas were sown outside on the 14th. Snow followed this and seeding began about the usual time, May 12.

Three hoar-frosts occurred in May—on the 5th, 6th and 17th. At the Farm, the thermometer registered 33° F. on these dates. The last spring frost occurred June 6. The weather of June and July was showery and well suited to the growing crops. August and the first half of September was exceptionally dry, with moderate temperatures. This gave ideal harvest weather. The first killing frost occurred on October 14.

A snow-fall of one foot on December 16 gave a week of sleighing. This was followed by open weather, wheels being used throughout the country until January 9, when enough snow fell to make good sleighing. February had but one shower of rain and six flurries of snow. The weather of January and February being very cold, the frost entered the ground to a great depth. The first half of March was fine with moderate temperatures. The snow went slowly. The great bulk of the hauling was done during this month.

The hay crop matured slowly and proved to be the heaviest which has been cut in this province in many years. Wheat, oats and barley yielded at least 30 per cent above the average for a number of seasons. The quality was extra good. Both the hay and grain were saved in good condition owing to the harvest weather being most favourable.

Roots, vegetables and corn gave about an average yield, with the exception of potatoes which were rather a poor crop generally and rot was very prevalent among them. The apple crop, which was of fair quality, was much below an average yield.

EXPERIMENTS WITH SPRING WHEAT.

Twelve varieties of spring wheat were sown on May 12 or 13, in uniform test plots of one one-hundredth acre each. The land was a sandy loam on which potatoes had grown the year previous—1909. No manure or fertilizer was applied for this crop after possession of the property was obtained.

The land was well worked though not ploughed in the spring (1910). The seed was obtained from the Central Experimental Farm, with the exception of White Russian and Colorado Bearded, and sown at the rate of about one bushel and three pecks per acre. A mixture of six pounds common red clover, three pounds alsike clover and one pound white Dutch clover was sown per acre.

The land was full of weeds, which required a large amount of attention to keep them under control. The spudding of thistles formed a soil-mulch which was no doubt of value to the growing crop. Neither rust nor lodging occurred on any of the plots.

One variety of Durum wheat (Goose), the seed of which was obtained in Charlottetown, was sown May 13, under the same conditions as the other varieties referred to above.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Weight of Straw.	Strength of Straw on a scale of 10 points.	Kind of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
				Lbs.			Lbs.	Bush.	Lbs.	Lbs.
1	Chelsea	Aug. 20	100	5,297	10	Beardless.	2,929	48	49	
2	Huron	" 23	102	5,134	10	Bearded..	2,782	46	22	62·9
3	Marquis	" 22	102	5,068	10	Beardless.	2,756	45	56	62·5
4	Preston	" 21	100	5,206	10	Bearded..	2,725	45	25	63 5
5	Pringle's Champlain	" 23	102	5,378	10	Bearded..	2,516	41	56	61·5
6	Red Fife	" 28	107	6,106	10	Beardless.	2,459	40	59	61·6
7	Bobs	" 22	102	4,453	10	Beardless.	2,406	40	6	63·6
8	Stanley	" 24	103	4,243	10	Beardless.	2,256	37	36	62·1
9	Bishop	" 21	101	4,381	10	Beardless.	2,237	37	17	62·7
10	White Russian	" 24	103	4,543	10	Beardless.	2,031	33	51	59·7
11	White Fife	" 26	105	3,975	10	Beardless.	1,981	33	1	62·4
12	Colorado	" 22	101	4,497	10	Bearded..	1,753	29	13	63·0
	Durum Wheat (Goose)	" 26	105	4,343	9	Bearded..	1,837	30	37	62·1

TEST OF SPRING WHEAT IN ONE-QUARTER ACRE PLOTS.

Six varieties were sown in quarter-acre plots on land similar to that mentioned for the uniform test plots, between May 12 and 20. The only rust observed was on a very small area of the White Russian plot and did but slight injury.

SPRING WHEAT—Test of Varieties in Quarter-Acre Plots.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Straw.	Total Yield.		Yield per Acre.	
						Bus.	Lbs.	Bus.	Lbs.
1	White Russian	May 14	August 23	101	Medium	11	51	44	20
2	Red Fife	" 14	" 25	103	Strong	9	58⅝	39	54½
3	White Fife	" 14	" 25	103	"	9	10⅝	36	42½
4	Marquis	" 12	" 23	103	"	9	10½	36	42
5	Goose	" 14	" 26	104	Weak	8	20	33	20
6	Colorado Bearded	" 20	" 28	100	Medium	7	37	30	28

Average yield per acre: 36 bushels, 54½ lbs.

EXPERIMENTS WITH OATS.

Twenty-one varieties of oats were sown in uniform test plots of one one-hundredth acre each on May 13 at the rate of about two and one-half bushels per acre. The soil was a sandy loam on which potatoes had been grown the previous year. It was not manured nor was any fertilizer applied during the season of 1910. All varieties were strong and stiff in the straw and were not rusted or lodged at harvest time.

The seed was obtained from the Central Experimental Farm, with the exception of Early Blossom, which was registered seed obtained from Mr. Donald Innis, Tobique, N.B. Clover was sown at the rate of: Common Red, 6 lbs.; Alsike, 3 lbs.; White Dutch, 1 lb. on all these plots.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Weight of Straw.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Kind of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Lbs.	In.		In.		Lbs.	Bush.	Lbs.	Lbs
1	Abundance	Aug. 22	101	7,106	56	10	8	Branching	4,625	136	1	37·5
2	Irish Victor	" 21	100	7,112	48	10	8	"	4,593	135	3	36·0
3	Garton's "Reg." Abundance	" 21	100	6,097	55	10	7	"	4,475	131	21	37·0
4	Thousand Dollar	" 21	100	6,150	48	10	7	"	4,393	129	7	37·3
5	Wide Awake	" 22	101	6,581	42	10	7	"	4,368	128	16	36·0
6	Lincoln	" 24	103	6,912	51	10	8	"	4,300	126	16	35·5
7	Swedish Select	" 21	100	5,900	47	10	6	"	4,287	126	3	37·5
8	Improved Ligowo	" 20	99	5,678	50	10	8	"	4,281	125	31	36·9
9	Banner	" 22	101	7,025	44	10	7	"	4,275	125	25	35·5
10	Siberian	" 24	103	7,300	49	10	9	"	4,200	123	18	35·0
11	Twentieth Century	" 20	99	5,975	46	10	7	"	4,200	123	18	37·5
12	Danish Island	" 22	101	6,925	51	10	7	"	4,150	122	2	35·0
13	Gold Rain	" 19	98	6,050	45	10	7	"	4,106	120	26	37·3
14	Improved American	" 21	100	6,350	47	10	8	"	4,100	120	20	34·1
15	Pioneer	" 18	97	5,472	41	10	8	"	4,066	119	20	37·3
16	Early Blossom	" 26	105	7,028	53	10	9	Sided	4,062	119	16	39·3
17	Golden Beauty	" 20	99	5,475	43	10	8	Branching	4,050	119	4	33·6
18	Victory	" 25	104	5,587	47	10	6½	"	4,000	117	22	37·8
19	White Giant	" 22	101	6,518	47	10	7	"	3,962	116	18	34·3
20	Excelsior	" 19	98	6,218	40	10	8	"	3,681	108	9	38.0
21	Virginia White	" 20	99	3,875	44	10	7	"	3,037	89	11	36·1

WHITE OATS.

Four varieties of white oats were sown on a one-acre plot each. The soil conditions under which these grew were very diverse and so lacked uniformity within the named areas, that in the instance of Irish Victor fully one-half of the crop grew upon one-quarter of the acre.

The seed was obtained from seed merchants.

The results were as follows:—

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Total Yield or Per Acre.	
					Bush.	Lbs.
1	Banner	May 19	August 25	98	72	6
2	Newmarket	" 20	" 26	98	60	21
3	Ligowo	" 20	" 24	96	57	30
4	Irish Victor	" 20	" 25	97	39	3

Average yield per acre: 57 bushels, 15 pounds.

BLACK OATS.

Two varieties of black oats were sown in acre plots. This land was too wet to sow earlier than May 31. The soil conditions were quite different from those under which the white oats were grown, but lacked uniformity, as shown by the yields on the three plots of Norway sown at different dates, or under different soil conditions. The seed was obtained from seed merchants.

The results were as follows:—

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Total Yield or Per Acre.	
					Bush.	Lbs.
1	Norway, (No. 3).....	June 1.....	Sept. 15....	106	83	18
2	Norway, (No. 2).....	" 1.....	" 13....	104	64	8
3	Garton's Black Rival....	" 1.....	Aug. 31....	91	55	22
4	Norway, No. 1.....	May 31.....	Sept. 13....	105	42	8

Average yield per acre: 61 bushels, 14 pounds.

EXPERIMENTS WITH BARLEY.

Experiments were conducted in uniform test plots with twenty-one varieties of barley (eleven of six-row and ten of two-row) in plots of one one-hundredth of an acre each. The soil was a sandy loam on which potatoes had been grown the previous year (1909). No manure or fertilizer was used for this crop after possession of the land was obtained.

The land was worked thoroughly with spring-tooth and disc harrows, without using a plough, in the spring of 1910 and sown on May 14 at the rate of two bushels per acre. Clover was sown with these at the rate of: Common Red, 6 lbs.: Alsike, 3 lbs. White Dutch, 1 lb.

There was no rust, but the Hannchen and Swedish Chevalier were slightly lodged.

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inch's	Lbs.	Bush.	Lbs.	Lbs.
1	Albert.....	Aug. 11	89	41	10	3	3,862	80	35	49·8
2	Claude.....	" 11	89	40	10	3	3,818	79	26	51·1
3	Mensury.....	" 13	91	40	10	2½	3,800	79	8	49
4	Nugent.....	" 13	91	33	10	2½	3,387	70	27	49·2
5	Mansfield.....	" 11	89	39	10	2¾	3,168	66	0	50 5
6	Stella.....	" 13	91	35	10	2½	3,043	63	19	49·5
7	Odessa.....	" 12	90	36	10	2½	2,956	61	28	46
8	O. A. C. No. 21.....	" 13	91	36	10	2½	2,887	60	7	49
9	Trooper.....	" 13	91	35	10	2½	2,825	58	41	49·1
10	Yale.....	" 15	93	36	10	2½	2,650	55	10	50·5
11	Oderbruch.....	" 12	90	34	10	2½	2,818	48	33	46

TWO-ROW BARLEY—Test of Va ieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inch's	Lbs.	Bush.	Lbs.	Lbs.
1	Invincible	Aug. 18	96	42	9	3	4,000	83	16	50·3
2	Swedish Chevalier	" 19	97	42	9	3½	3,867	80	27	50
3	Hannchen	" 13	91	33	8	2½	3,712	77	16	53·3
4	Standwell	" 13	91	44	10	3	2,862	59	30	51
5	Clifford	" 11	89	59	10	4	2,850	59	18	52·8
6	French Chevalier	" 13	91	36	10	3	2,800	58	16	54
7	Beaver	" 11	89	58	10	4½	2,581	53	37	49
8	Canadian Thorpe	" 12	90	41	10	3	2,475	51	27	51·5
9	Jarvis	" 11	89	52	10	4	2,437	50	37	49·5
10	Danish Chevalier	" 13	91	38	10	3	2,456	49	4	49·8

ACRE PLOTS OF BARLEY.

One acre of Mandscheuri barley (six-row) was grown on heavy, wet land; the previous crop had been oats. It was injured very much by water. The seed was obtained from seed merchants, was sown on June 6, and gave a yield of 35 bushels per acre.

One acre of Duck-bill barley (two-rowed) was grown on a heavy, wet soil which flooded after the barley was up and drowned out quite a considerable area. The seed was sown on June 6, and yielded 20 bushels of a poor quality of grain.

EXPERIMENTS WITH PEAS.

Thirteen varieties of peas were grown under uniform conditions on plots of one one-hundredth of an acre each. The land was a sandy loam which had been in potatoes the previous year. The soil was worked to a fine condition of tilth and sown on May 13, at the rate of about two bushels per acre. At the same time it was sown with Common Red clover 6 lbs., Alsike 3 lbs., White Dutch 1 lb. per acre.

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Weight of Straw.	Average Length of pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Lbs.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Arthur	Medium	Aug. 27	106	4,019	2¼	2,656	44	16	65.3
2	Prince	Large	Sept. 1	111	5,200	2½	2,575	42	55	
3	Picton	Medium	Aug. 31	110	4,332	2½	2,500	41	40	64
4	Prussian Blue	"	" 29	108	4,444	2¼	2,425	40	25	64·3
5	Paragon	"	Sept. 2	112	5,250	2½	2,344	39	4	65
6	English Grey	"	" 3	113	5,900	2½	2,319	38	39	62·5
7	Daniel O'Rourke	Small	" 2	112	5,200	2¼	2,219	36	59	63
8	Black-eye Marrowfat	Large	" 3	113	*6,950	2½	2,212	36	52	63·7
9	Chancellor	Small	" 1	111	4,819	2	2,156	35	56	65
10	Mackay	Medium	" 2	112	5,450	2½	2,100	35	..	64
11	White Marrowfat	Large	" 1	111	5,138	2½	2,062	34	22	64
12	Golden Vine	Small	" 3	113	5,382	2	1,925	32	5	65
13	Gregory	Medium	" 6	118	*7,000	2¼	1,639	27	19	63·5

* Straw green when weighed.

BUCKWHEAT.

One acre of Silverhull buckwheat was grown as a cover crop to check the fall growth of the apple trees in the orchard.

Rather poor sod-land was broken in the autumn of 1909. Ten tons per acre of barn-yard manure was applied as a dressing to this in the spring of 1910. The sod was thoroughly worked up during the month of June and the Couch grass worked out of it. It was sown on July 12, and harvested the 30th day of September.

The straw was still green and did not thresh out as clean as it should. Thirty-three and one-half bushels recleaned seed was obtained from the acre.

EXPERIMENTS WITH INDIAN CORN.

Eleven varieties of Indian corn were grown for ensilage. The soil was uneven and unsuitable for uniform test plots, but was the best available for the season, 1910. The land had been in potatoes the previous year—that is, parts of it were; the remainder in stone piles, newly-cleared land and a roadway.

Nine of these varieties were grown in rows thirty-six inches apart. The plants were thinned to about six inches apart in the rows. Four of the above-mentioned sorts and two promising early varieties were also grown in hills thirty-six inches apart each way. The land was top-dressed with barn-yard manure at the rate of fifteen tons per acre. This was well worked in with disc harrows, and the seed sown on June 9.

The yields of each variety from rows and hills were calculated from two inside rows each sixty-six feet long, the outside rows being discarded.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Date of Cutting.	Average height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
			In.		Tons.	Lbs.	Tons.	Lbs.
1	Compton's Early	Oct. 3	100	Tasselled	30	60	18	1,510
2	Wood's Northern Dent	" 3	98	"	27	1,310		
3	Longfellow	" 3	104	"	27	780	20	150
4	Eureka	" 3	96	In silk	25	1,150		
5	Early Mastodon	" 3	91	Early milk	24	1,940	22	1,650
6	Selected Leaming	" 3	90	Tasselled	24	1,280		
7	Angel of Midnight	" 3	72	Late milk	23	1,300		
8	White Cap Yellow Dent	" 3	90	Tasselled	21	1 780	17	1,310
9	Superior Fodder	" 3	108	In silk	15	1,312		
10	North Dakota White	" 3	82	Tasselled	.....	...	15	140
11	Davidson's Quebec Yellow	" 3	67	Glazed, ripe	.....	.....	8	1,150

MIXED GRAINS.

On small, triangular corners of ground, mixed grains were grown. These made very rank growth and lodged. They were, in most cases, cut and fed green. The seed was mixed equal parts by weight of oats, barley and peas, and was sown at the rate of three bushels per acre. A record was kept of one-half acre which yielded 1,513 pounds mixed grain, or at the rate of 75 bushels and 26 pounds per acre, allowing 40 pounds per bushel.

EXPERIMENTS WITH TURNIPS (SWEDES).

FIRST SOWING.

Ten varieties of Swede turnips were tested on fallowed sandy loam, which was manured at the rate of twenty tons per acre early in the spring and thoroughly worked into the soil. The seed was sown in drills two and one-half feet apart and the young plants were thinned out to about twelve inches apart in the rows. This seed was sown on May 27, and the roots pulled on November 7.

TURNIPS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Pulling.	Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.	
				Tons.	Lbs.	Bush.	Lbs.
1	Hartley's Bronze	May 27	Nov. 8	32	1,604	1,093	24
2	Good Luck	" 27	" 8	30	60	1,001	..
3	Perfection Swede	" 27	" 8	28	232	937	12
4	Hall's Westbury	" 27	" 8	25	1,744	862	24
5	Halewood's Bronze Top	" 27	" 8	25	1,612	860	12
6	Mammoth Clyde	" 27	" 8	25	556	842	36
7	Magnum Bonum	" 27	" 8	25	292	838	12
8	Jumbo	" 27	" 8	24	708	811	48
9	Carter's Elephant	" 27	" 8	24	312	805	12
10	Bangholm Selected	" 27	" 8	23	68	767	48

CLUB-ROOT OF TURNIPS.

Second Sowing of Swedes.

Eleven varieties of Swede turnips were sown June 8 on land which had been in potatoes the previous year. Some improved Island-grown seed was obtained and sown with the other ten varieties mentioned.

The soil proved to be infected with the 'Fingers and Toes' disease, known as 'Club-root of Turnip.'

A row 200 feet long, in which there should have been 200 turnip plants, of each variety, was measured and on November 9 a count was taken of the actual number of turnips which had survived, the number which were affected but still growing, and the number of sound turnips which had resisted the disease. A number of the sound specimens of each variety were selected and labelled. They will be kept and seed grown from them during 1911.

The following are the results obtained:—

Number.	Name of Variety.	Turnips Living, Nov. 9.	Number Sound Turnips, Nov. 9.	Number of Rotten Turnips still Living, Nov. 9.	Per cent of sound Turnips out of possible 200.	Per cent Diseased.
1	Bangholm Selected	71	13	58	6·5	93·5
2	Carter's Elephant	48	3	45	1·5	98·5
3	Good Luck	93	53	40	26·5	73·5
4	Halewood's Bronze Top	41	23	18	11·5	88·5
5	Hall's Westbury	6	.....	6	.....	100·
6	Hartley's Bronze	60	22	38	11·	89·
7	Jumbo	36	.....	36	.....	100·
8	Magnum Bonum	147	90	57	45·	55·
9	Mammoth Clyde	68	6	62	3·	97·
10	Perfection Swede	59	3	56	1·5	98·5
11	Island Seed	64	2	62	1·	99·

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were sown on May 28 on a fallowed sandy loam, prepared in the same way as the turnip ground. The seed was sown in drills thirty inches apart and the young plants thinned to about twelve inches in the rows. Yields were computed from the product of two rows, each sixty-six feet long. The roots were pulled October 15.

MANGELS.—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	33	1,930	1,132	10
2	Selected Yellow Globe	33	1,518	1,125	18
3	Half Sugar White	30	1,809	1,030	9
4	Giant Yellow Globe	30	1,256	1,020	56
5	Gate Post	29	138	968	58
6	Giant Yellow Intermediate	28	150	935	50
7	Prize Mammoth Long Red	26	1,287	888	7
8	Perfection Mammoth Long Red	26	816	880	16

FIELD CARROTS.

Five varieties were tested on fallowed sandy loam, manured and prepared the same as for the other roots. The yield was computed in the same way. Two sowings were made, the first on May 28 and the second on June 8, and the roots were pulled on October 15.

CARROTS—Test of Varieties.

Number.	Name of Variety.	1st Sowing. — Yield per Acre.		1st Sowing. — Yield per Acre		2nd Sowing. — Yield per Acre.		2nd Sowing. — Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	15	168	502	48	9	314	305	14
2	White Belgian.....	11	308	371	48	8	1,820	297	..
3	Ontario Champion	9	1,140	319	..	9	876	314	36
4	Improved Short White	7	1,540	259	..	7	1,312	221	52
5	Half Long Chantenay.....	6	954	215	54	6	1,050	217	30

SUGAR BEETS.

Three varieties of sugar beets were sown on fallowed sandy loam, manured and prepared in the same way as for the other roots. The yields were computed in the same way. They were grown to ascertain their sugar-content, which, from the analysis made by Mr. Frank Shutt, Dominion Chemist, was low. The roots were pulled on October 15.

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Average weight of one Root.		Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.		Sugar in Juice.	Solids in Juice.	Co-efficient of Purity.
		Lbs.	Oz.	Tons.	Lbs.	Bush.	Lbs.	%	%	%
1	French Very Rich....	2	6	18	1,372	622	52	14·26	17·26	82·6
2	Klein Wanzleben.....	1	9	14	1,832	497	12	13·96	16·83	82·9
3	Vilmorin's Improved..	2	14	14	809	480	9	14·54	17·88	81·3

POTATOES.

The yield of the potato crop in 1910 was much below the average. The plants did not recover from the long drought of August and the first half of September. A large percentage of rot was reported throughout the province.

The seed was cut into sets with one or two eyes in each. These sets were soaked for one hour in a solution of one pint formalin to thirty gallons water, dried and planted in rows thirty inches apart, the sets being placed about one foot apart in the row. The plants were sprayed every ten days throughout the growing season with Bordeaux solution containing Paris green.

The land was a sandy loam, fallowed, manured and prepared as for the other roots. The yield per acre was computed from the weight of two rows, each sixty-six feet long. The potato sets were planted on May 26 and were dug on October 7.

POTATOES—Test of Varieties.

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Burbanks' Seedling	328	54	324	30	4	24	277	12	47	18	Long white.
2	American Wonder	319	..	310	12	8	48	259	36	50	36	" "
3	Everett	307	27	304	9	3	18	204	36	99	33	Oval "
4	Empire State	306	54	302	30	4	24	278	18	24	12	Long "
5	McIntyre	302	30	302	30	..	..	256	18	46	12	" blue.
6	Late Puritan	299	12	294	48	4	24	260	42	34	6	" white.
7	Morgan Seedling	294	48	292	36	2	12	245	18	47	18	" "
8	Irish Cobbler	275	..	267	18	7	42	218	54	48	24	Round "
9	Vick's Extra Early	243	6	243	6	..	..	226	36	16	30	Long "
10	Bliss Triumph	241	27	239	48	1	39	204	36	35	12	Round pink.
11	Money Maker	223	51	218	21	5	30	163	54	54	27	" white.
12	Reeves' Rose	217	15	215	36	2	12	162	48	52	48	Long pink.
13	Ashleaf Kidney	217	48	215	36	2	12	158	24	57	12	Round white
14	Carman No. 1	196	54	193	36	3	18	112	12	81	24	" "
15	Gold Coin	189	12	188	6	1	6	143	..	45	6	" "
16	Rochester Rose	168	18	168	18	..	..	144	6	24	12	Long pink.
17	Dreer's Standard	143	..	140	48	2	12	58	18	82	30	Round white
18	Dalmeny Beauty	114	24	112	12	2	12	79	12	33	..	Oval "
19	Hard to Beat	107	48	107	48	..	..	77	..	30	48	Round "
20	Factor	91	36	92	24	2	12	61	36	30	48	Long "

TIMOTHY.

Nine acres of timothy were grown. The results were as follows:—

Field.	Size in Acres.		Total Yield.		Yield per Acre.	
	Acres.	Chains.	Tons.	Lbs.	Tons.	Lbs.
Gay	2	2	7	1,530	3	1,055
Chandler	7	1·43	13	463	2	633

ALFALFA.

Alfalfa seed was sown on four quarter-acre plots on May 21. A sandy loam soil was broken during the summer of 1909 and worked during the late autumn. It was given a dressing of barn-yard manure at the rate of ten tons per acre. The ground was thoroughly worked in the spring and inoculated by distributing soil from a patch in the orchard where alfalfa had been growing three years. Eight barrels of slaked lime were spread on the acre and worked into the soil.

Plot 1 was sown at the rate of 16 lbs. alfalfa per acre without nurse crop. Two cuttings were made which were allowed to lie on the ground during the summer. This plot was in fair condition in the autumn and seems, at this date (March 31), to have wintered well. Plot No. 2 was sown with wheat at the rate of one bushel per acre as nurse crop with the same quantity of alfalfa seed as No. 1. The wheat made a strong growth, yielding at the rate of 8 bushels and 44 pounds per acre and choked out the alfalfa very much.

Plot No. 3 was sown with barley at the same rate as the wheat and at the rate of 16 pounds per acre of alfalfa seed. This plot looked much better than No. 2 but was also very unsatisfactory.

Plot No. 4 was sown with oats at the rate of one bushel per acre and with the same quantity of alfalfa seed as the others. The alfalfa on this plot was not so good as on No. 3.

On July 21, the Pear Orchard was sown with Alfalfa seed at the rate of 20 pounds per acre. This made a very rapid growth and on September 30 there was an even stand, averaging twenty-three inches in height.

ADDITION TO FARM.

Possession was taken of the small triangular portion of the 'Ravenwood' property which lies on the west side of the railway, and a crossing was put in over the railway. The area taken over was 1·55 acres making a total area now in the Charlottetown Experimental Station of 59 acres.

FENCES.

New fences were erected along the boundaries adjoining the Mount Edward road, the De Blois road and the Beer property and also along one-half of the property adjoining that owned by Judge R. R. Fitzgerald. A new fence was also erected around the entire boundary of the portion of the 'Ravenwood' property which lies west of the railroad.

BUILDINGS.

One of the buildings was moved back from near the Superintendent's residence, repaired and made into a convenient carriage house and work-shop. A temporary threshing-floor was laid in another building, on which all the threshing was done. A stable was fitted up in the largest barn which has accommodated the horses for the year. A new machine-house, 80 feet by 25 feet was built and a floor laid in the loft which has been used for a granary and sample room. Most of the material required for a new barn, 60 by 40 feet, has been bought, and stored in the machine-house.

TILE DRAINAGE.

Tile drains were laid thirty feet apart through the areas of swamp land which lie on either side of the St. Avard's road. These discharge into drainage wells. It was necessary to drill three wells beside the one mentioned in last year's report. The underlying strata of sandstone rock apparently have many fissures in them. One of these wells, sixty-five feet deep, was tested and it was found to be carrying off over 7,000 gallons per day. A drainage system consisting of a six-inch main drain, four-inch sub-mains and three-inch laterals (the latter being 33 feet apart) was laid from the Blake property across the Johnson property and one-half way along the railway front of the 'Ravenwood' property to an outlet where it discharges into the railroad ditch. A system for the higher wet areas on the Blake property was started at the boundary with the Johnson property. The main drain for this system passes through the bottom of the old Pottery pond to the De Blois road, follows parallel with this road until it discharges into the gutter at a point about 200 feet east of the railway ditch.

The springy condition of the soil made the work more difficult and expensive than it would otherwise have been, owing to a very wet season, which set in before the tile was all laid. In these systems, 15,000 feet of tile have been laid and considerably more will yet be required for the higher wet areas in the Blake property.

GENERAL WORK.

The land cleared the previous fall near the Superintendent's residence was levelled, graded and seeded down to lawns. A number of rows of trees, together with cross fences and dykes were removed from the farm and the land prepared for cultivation. Three cellars, where former buildings stood, have been filled and the uneven ground adjoining has been graded. A small pond has also been filled. This land will be ready for cultivation in the spring of 1911. The old Pottery pond, which was drained as before mentioned, has been partly filled. This work will be finished as soon as opportunity offers.

The site for the proposed barn was excavated and a part of the bridge approaches constructed. About 215 tons of manure have been hauled from the city.

HORSES.

A team of draft horses, aged four and seven years, was purchased. The draft mare purchased last year has raised a good colt. There are now on the Farm three draft horses, one draft colt eleven months old, and a driver. All are in a thrifty condition.

ORCHARDS.

An orchard containing about fifty apple trees, twenty of which are quite old, was on the 'Ravenwood' property. This had been neglected for some time. A number of the broken and decayed trees were removed and the sod was broken from around those remaining. Among the old trees are a few Ribston Pippins which gave about one-half a crop in 1909. The younger part of this orchard is not yet in bearing but appears to be largely Pewaukee trees.

Stock for new orchards was received from the Central Experimental Farm, Ottawa, and E. D. Smith, Winona, Ontario. The trees arrived in good condition and were planted early in May. The site chosen has a southerly slope, and a shelter belt of forest trees on the north and east. The soil, which is a sandy loam, has good natural drainage; it was very weedy and in a run-out condition. This old sod was ploughed down in the summer of 1910. A dressing of ten tons of barn-yard manure per acre was applied and worked in during the spring of 1910. During the early summer, the ground was continually cultivated, the couch worked out, and the other weeds killed. On July 21, cover crops were sown of buckwheat and of several mixtures of grain. The whole was seeded down to clover at the rate of ten pounds per acre.

APPLES.

The new orchard of one hundred and sixty apple trees, in which seventy varieties are represented, was planted on the west side of the field which lies between the St. Avard's road and the Superintendent's residence. These trees have all made a strong, thrifty growth. They were set thirty feet apart each way.

CHERRIES.

A cherry orchard of forty-two trees was planted adjoining the east side of the apple orchard. The trees were set twenty feet apart each way. Sixteen varieties are represented. With the exception of one dead tree (Windsor), these are strong and thrifty.

PLUMS.

A plum orchard of ninety-eight trees, representing seventy-eight different varieties was planted just east of the cherry orchard. These trees made a very vigorous growth and look promising at the present time. Two trees—'Mankato' and 'Consul'—died back but are growing from the root. One 'Cottrell' tree is dead.

PEARS.

The pear orchard was placed between the Superintendent's residence and the Mount Edward road. It lies next to the lawn which contains the beds of perennial flowers. Forty-six trees were planted representing eighteen varieties. These are all healthy and have made a very strong growth.

SMALL FRUITS.

GRAPES.

A vineyard of sixteen varieties of early hardy grapes, containing ninety-six grape vines, was planted to the east of the pear orchard. The vines were planted eight feet apart each way and made a vigorous growth, three varieties maturing fruit.

CURRANTS.

The currant plantation wintered well, made a vigorous growth, a number of the varieties maturing a small amount of fruit of good quality.

RASPBERRIES.

A plantation of raspberries was set just south of the currants in rows fifty-one feet long and six feet apart. The canes were set three feet apart in the rows. This plantation contains nine varieties of black-cap, four or red and one of white raspberries. There are fifty-one bushes of each variety. The growth of 1910 was very strong, many of the black-caps making a growth of nine feet. Several varieties matured a small amount of excellent fruit.

GOOSEBERRIES.

A plantation of ten varieties of gooseberries of six bushes each was planted in rows six feet apart. The bushes were spaced four feet apart in the rows. This plantation adjoins the black raspberries and was put on the heaviest soil on the Farm. A few bushes died, while the rest made medium growth.

BLACKBERRIES.

Ninety blackberry canes were placed in a plantation representing three varieties. These were planted south of the gooseberries in rows eight feet apart, the bushes being four feet apart in the rows and made a very strong growth. No fruit was matured.

DEWBERRY (LUCRETIA).

Sixty Lucretia dewberry plants were set in rows six feet apart, the plants being five feet apart in the rows, to the south of the raspberries.

STRAWBERRIES.

Twenty varieties of twenty-five plants each were received from Ottawa. These and one variety obtained at Charlottetown were planted, just east of the grape vineyard, in rows three feet six inches apart. The plants were set eighteen inches apart in the rows. The soil was badly infested with a small worm which destroyed a great many of the plants received from Ottawa. The variety Glen Mary had all been killed within a fortnight after being set. The plants obtained here seemed to withstand the ravages of this worm.

TREES AND SHRUBS.

A collection of 1,259 trees and shrubs was received from the Central Experimental Farm, Ottawa, to be used for ornamental purposes. These were immediately placed in nursery rows. Early in May, the greater portion of them were planted, under the direction of Dr. Wm. Saunders, about the residence, along the driveway and in two rows parallel with the railway alnog the front of the Farm. These rows are ten feet apart and the trees are ten feet apart in the rows. With the exception of one shipment (largely conifers) which was delayed in transit and very badly dried out, the trees are thrifty, and have grown well. The season is not far enough advanced yet to determine how many are winter-killed, and for this reason the list is omitted.

VEGETABLES.

The season was favourable and vegetables grew abundantly. They were protected from the frost of June 6, and suffered very little injury from insects or diseases. Complete notes on the various vegetables grown in the garden will not be attempted. A few items of particular interest will probably be sufficient. The varieties tested in each instance are named in order of merit.

Asparagus.—Two hundred asparagus roots, obtained from Steel, Briggs & Co., Toronto, were planted in a bed of rich loam which was well worked and manured. These plants grew very strongly and were covered with barnyard manure as a protection for the winter.

Beans.—Planted May 28. All the varieties ripened.
Dwarf Extra Early Edible Podded.
Dwarf Matchless.
Emperor of Russia.
Fame of Vitry.
Dwarf Wax Every Day.

Beets.—Sown May 20. Fit for table in July.
Extra Early Egyptian.
Egyptian Flat Early Extra.
Early Blood-red Turnip.
Nutting's Dwarf Red.

Brocoli.—Sown May 20. Did not mature.
Extra Early White.

Brussels Sprouts.—Sown May 20. Used November 1.
Dwarf Improved. Quality excellent.

Cabbage.—Sown April 20 in hotbed. Planted in open May 24.
Large Late Flat Dutch. Extra Early Savoy.
Early Jersey Wakefield. Fottler's Improved Brunswick.

Carrots.—Sown May 20.
Early French Horn. Amsterdam Scarlet.

Cauliflower.—Sown April 20. Transplanted May 24. Produced fine, uniform heads.
Earliest Erfurt. Early Snowball.

Corn (table).—Planted May 24. Large yield of good quality. First used as follows:—
Malakoff, August 26. Golden Bantam, September 2.
Pocahontas, September 16.

Cucumber.—Sown May 21. Light yield.
White Spine.

Lettuce.—Sown April 20. Used May 20. Three later sowings.
Wheeler's Tom Thumb. Cos Trianon.
White Wonder. Red-Edged Victoria.
Unrivalled Summer.

Onion.—Sown May 20. Injured by maggots.
Large Red Wethersfield. Danver's Yellow Globe.
Paris Silverskin.

Peas.—Planted May 30. Very prolific.
American Wonder.

Radishes.—Sown April 20. Four later sowings. Ready for use as follows:—
Forcing Turnip Scarlet, May 20. Black Spanish (Winter Radish).
Early Scarlet White Tipped, May 26.

Squash.—Sown April 20. Transplanted May 31. Abundant yield.
Hubbard. Long White Bush Marrow.
Custard Marrow. Vegetable Marrow, yellow.
Mammoth Whale.

Tomatoes.—Sown April 20. Transplanted May 30.
Spark's Earliana. A very heavy yielder of beautiful, smooth fruit.

Turnip.—
Early White Strapleaved.
Extra Early Colnt.

THE FLOWER GARDEN.

The flower garden was very satisfactory. The beds were prepared on ground which had been cleared from heavy trees the previous autumn. After grading and levelling, a number of beds were laid out, intervening spaces being re-seeded to lawn. Both annuals and perennials gave an abundance of bloom, the sweet peas and roses attracting the admiration of all visitors to the Farm throughout the season, their bloom lasting well into November.

ANNUALS—Sown April 20 in hotbeds. Set out May 21.

Varieties.	In Bloom.	
	Season.	Quality.
Asters	Early	Excellent.
Balsam	Late	"
Nasturtium, 4 varieties	Early	"
Stocks	Late	Medium.
Zinnia	"	Excellent.

ANNUALS—Sown May 21 in the open

Varieties.	Quality.
Abronia	Fair.
Brachycome	Poor.
Celosia, two varieties	Fair.
Chrysanthemums, two varieties	Excellent.
Coreoposis	Poor.
Candytuft	Excellent.
Calendula	Poor.
Eschscholtzia, two varieties	Very fine.
Gaillardia	Poor.
Helichrysum	Good.
Kochia	Excellent.
Lobelia	Fair.
Lagitoa	Poor.
Mignonette	Very fine.
Nemesia	Fair.
Phlox (2)	"
Poppy (6)	Good.
Pansy, Psyche	Fair.
Salpiglossis	Good.
Scabiosa (2)	Poor.
Sweet peas (24)	Excellent.

PERENNIALS—Planted in 1910.

The following perennials were received from the Central Experimental Farm, Ottawa, and set out early in May.

Asters—

Novi Belgii Candida,
Decorus Elegantissima,
Alpinus Superbus,
Margaret,
Maacii (2),
Newry Seedling, (2).
Spectabilis,
Amelloides,
Laevis Arcturus,
Trinervis,
Nova Angliae Roseus,
Decorus,
White Queen,
Novi Belgii Robt. Parker,
Laevis Harvardi,
Amelus Amelloides,
Novæ Angliæ Praecox,
Spectabilis Major,
Novae Angliae Var,
Amethystinus,
Mrs. J. F. Raynor,
Paniculatus,
Top Sawyer (2),
Acris,
Discolor,
Wm. Bowman.

CANNAS.

Among the Cannas, the 'Wm. Saunders' was the only one which gave a vigorous growth and abundant bloom. The list is as follows:—

Wyoming,
Pennsylvania,
Louisiania,
Indiana,
H. Wendland,
Allemania,
Jupiter,
Mrs. Geo. A. Strohlein,
William Saunders,
Queen Charlotte,
Miss B. Brunner,
America,
J. D. Eisele,
Paul Lorenz,

DAHLIAS.

Many of the Dahlias rotted in the hotbed, but any that were set out gave abundant bloom throughout the summer and up to the latter part of October. Those received were as follows:—

Bon Ton,
Cuban Giant,
A. D. Livoni,
Louis Harlot,
Earl of Pembroke,
Flossie,
Evadne,
Gloriosa,
Austin Cannell,
Standard Bearer,
Capstan,
Pendant,
Eureka,
Kingfisher,
Cyde,
Empress of India,
Blue Oban,
Island Queen,
Miss Finch,
Miss Anne Jones,
Lady H. Grosvenor,
Kyneryth,

GLADIOLI.

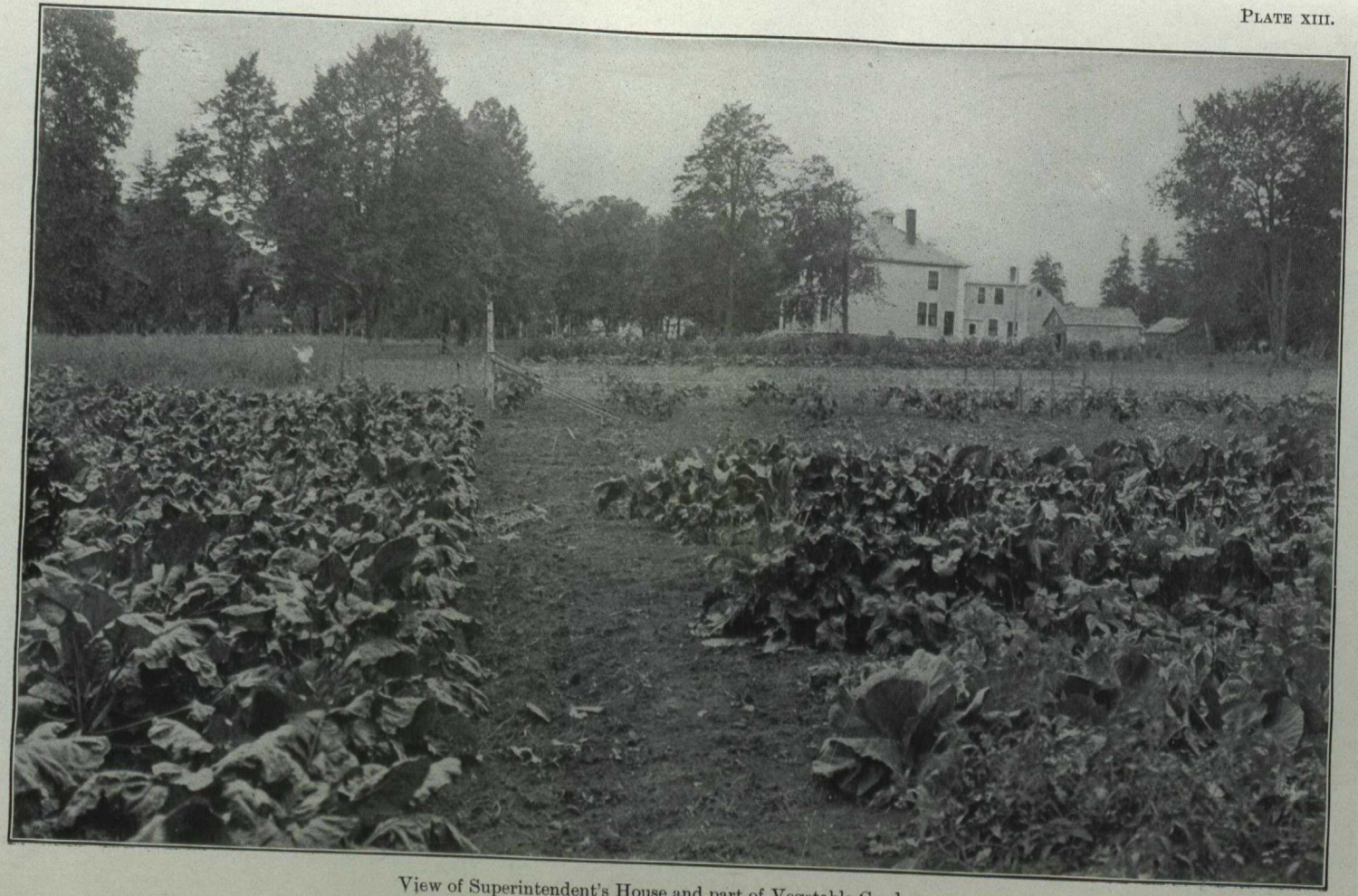
The Gladioli, though planted late, came on rapidly and made a splendid showing throughout the summer. The list was as follows:—

42 Gladioli mixed,
3 " new yellow,
3 " La Luna,
2 " Peacock Eye,
2 " Peau,
2 Gladioli Blue Jay,
2 " Dazzler,—18
1 " Dazzler,—19,
1 " Blackeye Beauty.

IRISES.

The rectangular bed nearest the residence and between it and the Mount Edward road was planted with Irises, which gave beautiful bloom early in the season. The following bulbs are strong and vigorous:—

Neglecta Sappho,
" Agathe,
" Salvatori,
Variegata Coquette,
" Honorabile,
" Ossian,
" Gracchus,
" Ganymede,
" Darius,
Jacquesiana (2),
Pallida (2),
Pallida lilacina,
Sambucina Solomon,
Amœna Julie Grise,
" Mrs. H. Darwin,
Pallida Chameleon,
Squalens Cerberus,
Amoena Duc de Nemours,
" Verschuur,
" Calypso,
Plicata Gisele,
" Madame Chereau,
" Lord Seymour,
Squalens Reine des Belges,
Fiorentina,
Orientalis (2),
Pumila,
Squalens Lady Seymour,
Monnieri,
Aurea,
Squalens,
Variegata Gracilis,
Assueris,
Variegata,
Neglecta Ariadne



View of Superintendent's House and part of Vegetable Garden.

PÆONIES.

Two rows of pæonies were placed in a rectangular bed parallel and six feet east of the Irises. These gave a very rich bloom during the month of June. The varieties are as follows:—

Gloire de Chas. Gombault,
Osman, Mechin,
Clarissa Calot,
Festiva Maxima,
Marie Lemoine,
Jules Elie,
Jeanne d'Arc,
Mme. Loise Mere,
Mr. Dupont,
Felix Crousse,
Mme. de Galhau,
Rosea Grandiflora,
Edouard Andre,
Atrosanguinea,
Illustration,
Triomphe de l'Exposition,
Bernard Palissy,
Victoire Modeste,
Potzii,
Lady Dartmouth,
Buyckii,
Comte de Neipperg,
Marshal Vaillant,
Lutea Plenissima,
Mme. Mechin,
Insignis,
Mme. Raguet,
Magnifica,
Mme. Chaumy,
Adolph Rosseau,
Baron de Rothschild,
Reine de France,
Dr. Brettoneau,
Mlle. Guerin,
François,
Duchess de Orléans,
Noemie,

ROSES.

Two parallel rows of rose bushes were set in a rectangular space six feet east of the pæonies. These attracted much attention by their beautiful bloom which continued throughout the summer and late in the autumn. The varieties planted are as follows:—

2 Baroness Rothschild,
2 Captain Hayward,
2 Charles Lefebvre,
2 Killarney,
2 Earl of Dufferin,
2 Fisher Holmes,
4 Frau Carl Druschki,
2 General Jacqueminot,
2 John Hopper,
2 LaFrance,
4 Madame Gabriel Luizet,
2 Magna Charta,
4 Margaret Dickson,
2 Merveille de Lyon,
4 Mrs. John Laing,
2 Mrs. R. G. Sharman Crawford,
2 Paul Neyron,
2 Ulrich Brunner,
2 Persian Yellow,
2 Crimson Rambler,
2 Dorothy Perkins.

MISCELLANEOUS PERENNIALS.

The following list of miscellaneous perennials were placed in a large rectangular bed containing three rows, with the asters and dahlias:—

Dahlias:—
Monarda Didymà carminata,
Epimedium sulfureum,
Helianthus Daniel Dewar,
Funkia Sieboldiana,
Sempervivum Corni di Canzo,
Aconitum uncinatum,
Vinca herbacea fl. pl.
Acorus Japonicus,
Spiraea ulmaria, fol, var.
Epimedium colchicum,
Geranium sylvaticum,
Doronicum plantagineum,
Spiraea,
Lady's Grass,
Heliopsis Pulcherrima,
Chrysanthemum lacustre,
Phlox Eclaireur,
" Helene Vacaresco,
Sempervivum tenellum,
François de Neufchateau,
Rudbeckia laciniata,
Boltonia latisquama,
Centaurea montana,
Lady Florence Hastings,
Thermopsis Caroliniana,
Delphinium,
Dracocephalum virginicumalbum,
Hilianthus rigidus,
Spiraea venusta,
Inula macrocephala,
Tradescantia virginica,
Doronicum davuricum,
Vinca minor var,
Spiraea,
Phlox l'Aiglon,
" Daniel Lesueur,
" Gen. Grovaninilli,
Acorus spurius,
Rudbeckia (Golden Glow),

AGRICULTURAL MEETINGS.

During the year a number of addresses were given at Farmers' Institute meetings, whenever these could be arranged so as not to interfere with farm work.

EXHIBITIONS AND SEED FAIRS.

I have attended the following exhibitions: The Dominion Exhibition at St. John, N.B., September 3 to 12; the Provincial Exhibition held at Charlottetown, P.E.I., September 19 to 23, and the Maritime Winter Fair and Live Stock Show at Amherst, Nova Scotia, December 5 to 9. At the Prince County Exhibition held at Summerside, P.E.I., September 15 to 17, and at the Institute Exhibition at Tracadie, Prince Edward Island, November 3, I gave addresses and acted as judge of small seeds and vegetables.

SEED FAIRS.

I attended the Seed Fair held at Georgetown, P.E.I., March 3, the Provincial Seed Fair at Summerside, March 8 to 10, and the Central Seed Fair at Charlottetown, March 14 to 17, giving addresses on 'Field Crops' and acting as one of the judges. I also attended the Canadian Seed Growers' Association held in Ottawa, February 16 and 17.

TRURO SHORT COURSE.

I gave assistance and instruction during the short course at the Truro Agricultural College from January 3 to 13.

CORRESPONDENCE.

During the year 532 letters were received and 500 sent out, not including circulars.

VISITORS.

While a great many visitors and a number of school classes visited the Farm during the summer months, the farmers of the province have not yet come in large numbers. It is hoped that excursions may be arranged for during the coming summer.

METEOROLOGICAL RECORDS.

Months.	Temperature—F.					Rainfall.		Snowfall.		Total Precipitation.	Bright Sunshine.
	Maximum.		Minimum.		Monthly Mean.						
1910.	Date.	°	Date.	°	°	Days.	In.	Days.	In.	In.	Hrs.
April	25	64	29	23	42·5	10	2 63	7	6·5	3·28	163
May	27	71	5–7	33	49·5	13	2·38	.....	.....	2·38	193
June	22	76	6	34	56	15	4 69	.....	.....	4·69	211
July	10	84·5	3	50	66·6	15	3·14	.....	.....	3·14	288
August	14	80	31	41·5	64·3	10	1·09	.....	.....	1·09	257
September	13	72	30	40	57·5	11	2·84	.....	.....	2·84	192·6
October	6–7	69	14	29	46·7	17	6·78	.....	.....	6·78	80·7
November	5	56·5	22	22	37·88	17	4·44	4	4·5	4·89	59·3
December	2–30	46	19	–0·5	23·92	6	1·38	10	25·2	3·9	59
1911.											
January	4	49·5	18	–15	18·16	9	2·06	5	17·5	3·81	98·5
February	5–27	40	13	–9	13·07	1	0·42	6	4·5	1·17	135·6
March	23–30	48	5–7	–7	22·99	6	0·65	7	14·2	2·07	158·7
Total Annual	.....	...	.....	.....	.....	130	32·50	39	72·4	40·04	1,896·4

I have the honour to be, sir,
Your obedient servant,

J. A. CLARK,
Superintendent.

EXPERIMENTAL FARM FOR NOVA SCOTIA.

REPORT OF R. ROBERTSON, SUPERINTENDENT.

NAPPAN, N.S., March 31, 1911.

To Dr. WM, SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the operations on the Experimental Farm for Nova Scotia at Nappan, N.S., for the year ending March 31, 1911.

The summer season of 1910 was the most favourable for the growing of hay and grass crops that the province has experienced for some years, as the growing period opened earlier than is customary with an unusual amount of rain until well into May, fair weather following this for some time.

Seeding operations began somewhat earlier than the previous year, May 10, but from May 24, practically all through June, the weather was so broken and wet that the sowing progressed quite slowly, with the result that it was finished quite as late as usual, *i.e.*, about the end of June, some turnips being sown as late as July 3.

All crops made very good growth until about the middle of July. From this out. all through the month of August, the weather was colder than usual, with little rain.

Grain and root crops, particularly root crops, that seemed to offer exceptionally well in July and early August, did not come up to expectations on account of the unusually dry weather for this season, which continued well into October.

Corn was below the usual crop, doing very poorly the first part of the season, but improving considerably through August and September.

While the apple crop was not quite as low relatively as in other apple-growing sections of the province, it was by no means up to former years, particularly the late varieties, possibly due to frost on June 5 and 6, while the trees were in full bloom. The same would apply to strawberries, which realized not more than half the crop that had been gotten in some past years.

I have again much pleasure in taking this opportunity to acknowledge the services of Mr. Thomas Coates, farm foreman, and Mr. Robert Donaldson, herdsman, who have so ably assisted me in their respective divisions.

EXPERIMENTS WITH SPRING WHEAT.

Ten varieties of spring wheat were sown in uniform test plots of one-fortieth acre each. The land was a clay loam on which roots had been grown the previous year (1909), for which crop, barnyard manure at the rate of twenty tons per acre had been applied. No manure or other fertilizer was used for this crop.

The land was ploughed in the fall of 1909, well worked up in the spring (1910), and sown May 11, with seed selected from picked heads of the previous year's crop, sown at the rate of one and three-quarter bushels per acre, together with common red clover, seven lbs.; alsike clover, three lbs., and timothy seed, twelve lbs. per acre.

From the time sown, for the first six weeks, the weather was very suitable for growth, being moderately warm, with plenty of rain. The crop gave excellent promise up to this time. Unusually dry weather setting in about July 15, interfered with the full measure of growth which might have been expected. Nevertheless the crops were above the average.

There was neither rust nor smut.

The following were the yields obtained:

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	White Fife	Sept. 6	118	49	10	3	3,160	52	40	61·5
2	Marquis	" 3	115	42	10	2¾	3,120	52	..	64·2
3	Red Fife	" 5	117	44	10	2¾	2,960	49	20	63·2
4	Huron	" 3	115	43½	10	2¾	2,920	48	40	64·0
5	Stanley	" 6	118	48	10	2¾	2,720	45	20	62·0
6	Pringle's Champlain	" 3	115	44	10	2¾	2,640	44	..	63·0
7	Chelsea	" 1	113	38	10	2¾	2,600	43	20	63·6
8	Preston	" 3	115	43	10	2¾	2,560	42	40	62·6
9	Bishop	" 1	113	42	10	2¾	2,200	36	40	61·0
10	Bobs	" 3	115	40	10	2¾	2,160	36	..	62·6

FIELD CROP OF WHEAT.

One acre of Early Riga wheat was sown.

This was grown on a clover sod, the soil being a clay loam in a fairly good state of fertility, having grown clover hay at the rate of two and one-half tons per acre the previous year, no manure having been applied since 1905. The land was ploughed in the fall of 1909, and seeded at the rate of one and three-quarters bushels per acre. It was sown May 14, harvested September 6, and yielded thirty-six bushels per acre.

EXPERIMENTS WITH DURUM OR MACARONI WHEAT.

Four varieties of Durum or Macaroni wheat were also grown in uniform test plots of one-fortieth acre each.

The land was similar to that on which the other spring wheats were sown and received the same treatment throughout. The seed was sown May 12.

MACARONI OR DURUM WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.
1	Yellow Gharnovka	Sept. 6	117	48	10	2¼	3,000	50	00
2	Roumanian	" 6	117	46	10	2¼	2,680	44	40
3	Goose	" 1	112	40	10	2¼	2,440	40	40
4	Mahmoudi	" 6	117	43	10	2¼	2,240	37	20

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties each of Emmer and of Spelt were sown on one-fortieth acre plots on May 12.

The land was similar in character to that on which the spring wheats were sown, and received the same treatment throughout.

The yields from these plots are given in pounds, as, with the ordinary threshing machines, the chaff is not separated from the kernels, and the result cannot well be compared with the other sorts of wheat, which are threshed clean.

The following were the yields obtained:—

EMMER AND SPELT—Test of Varieties.

No.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.
				Inches.		Inches.	Lbs.
1	White Spelt	Sept. 7	118	45	10	3½	3,500
2	Red Spelt	" 7	118	46	10	3½	3,120
3	Red Emmer	" 6	117	42	10	2½	2,680
4	Common Emmer	" 1	112	38	10	1¾	2,600

EXPERIMENTS WITH OATS.

Eighteen varieties of oats were sown in uniform test plots of one-fortieth acre each. The ground was a clay loam on which roots (turnips) had been grown the previous year, 1909, for which crop barn-yard manure at the rate of twenty tons per acre was used. The land was ploughed in the fall, well worked up in the spring until a fine tilth was made, and the seed sown at the rate of from two to two and a half bushels per acre, according to the size of the seed. Clover and timothy were also sown, common red clover at the rate of seven lbs. per acre; alsike clover three lbs. per acre; and timothy seed at the rate of twelve lbs. per acre.

The grain used for seed was from selected heads of the previous year's crop, selected and cut at harvest time.

This crop was sown May 12.

No fertilizer of any kind was used in these plots.

The grain started uniformly and well and gave unusually good promise for a time, but owing to very dry weather at the latter part of the season and to a considerable amount of lodging, only a fairly good result was obtained. There was no rust and very little smut.

The following were the yields produced:—

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	White Giant	Aug. 24..	104	50	8	8	3,160	92	32	35·0
2	Golden Beauty	" 25..	105	47	8	8½	3,080	90	20	32·5
3	Swedish Select	" 25..	105	50	4	8½	3,000	88	08	32·6
4	Danish Island	" 25..	105	47	8	8	2,960	87	22	32·0
5	Pioneer	" 22..	102	48	9	8	2,960	87	02	37·3
6	Wide Awake	" 27..	107	47	7	8	2,920	85	30	33·2
7	Improved Ligowo	" 24..	104	50	4	8	2,880	84	24	33·1
8	Siberian	" 29..	109	51	4	8½	2,840	83	18	32·5
9	Lincoln	" 29..	109	47	8	7½	2,800	82	12	33·0
10	Thousand Dollar	" 24..	104	48	4	8	2,720	80	..	33·4
11	Banner	" 23..	103	48	8	8	2,680	78	28	31·0
12	Twentieth Century	" 25..	105	50	8	8	2,640	77	22	34·0
13	Abundance	" 24..	104	48	8	8	2,640	77	22	33 0
14	Virginia White	" 24..	104	48	8	8	2,620	77	02	32·5
15	Irish Victor	" 25..	105	47	8	7	2,600	76	16	32·5
16	Abundance, "Garton's Regenerated."	" 24..	104	48	7	7½	2,400	70	20	30·0
17	Gold Rain	" 23..	103	48	7	7½	2,240	65	30	31·6
18	Improved American	Sept. 5..	116	53	4	9½	2,080	61	06	32·2

FIELD CROP OF OATS.

Three acres of oats were grown in one lot. The field was a light clay loam in a fairly good state of fertility, having grown ensilage corn the previous year, for which crop, barn-yard manure at the rate of twenty tons per acre had been used.

The variety of oats used was Black Tartarian. It was sown May 13, cut August 30, and yielded at the rate of 61 bushels 17 lbs. per acre.

FIELD CROP OF OATS ON MARSH.

Three acres of oats were grown on ordinary marsh or dyke land, on which timothy had been grown for a long term of years. This land was ploughed in the fall of 1909, and the seed sown May 21 (1910) at the rate of two and a half bushels per acre. The variety used was Pioneer.

This crop made very indifferent growth from the first, particularly on lower parts. the weather being unusually cold and wet at this season. The field was on a rather low part of the marsh (possibly the lowest) and owing to the breaking of dykes the past season, and the repeated flooding with salt water, no doubt had an unusual amount of salt in the soil, which, we believe, to some extent accounted for the rather indifferent growth all through the season. This field gave a total yield of 75 bushels.

FIELD CROPS OF OATS AND MIXED GRAIN.

Eight acres of oats and mixed grain were grown in four lots (four acres Black Tartarian oats; one acre Pioneer oats; one acre Waverley oats; and two acres mixed grain) made up of Sensation oats 2 bushels; Odessa barley 1 bushel; and Golden Vine peas ½ bushel, by weight, and sown at the rate of three bushels per acre.

The land was a light clay loam on which roots (turnips) had been grown the previous year, for which crop manure had been applied at the rate of twenty tons per acre. This was ploughed in the spring (having been entirely too wet the previous fall to be ploughed) and was sown May 24.

The following were the yields obtained:—

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
4 Acres Black Tartarian Oats	67	08	34
1 " " Pioneer "	63	18	34
1 " Waverley Oats	60	32	34
2 " Mixed grain	45	10	40

FIELD CROPS OF OATS, BARLEY AND MIXED GRAIN.

Five acres of oats, barley and mixed grain were sown in one field. The soil was a clay loam in a fairly good state of fertility, having grown clover hay at the rate of two and one-half tons per acre the previous year, no manure having been applied since 1905. The land was ploughed in the fall of 1909, and sown May 24, 1910.

The following were the yields obtained:—

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
1 Acre Sensation Oats	65	32	34
1 " Black Tartarian Oats	56	20	34
1 " Banner Oats	65	..	34
1 " Odessa Barley	25	..	48
1 " Mixed grain	54	20	40

EXPERIMENTS WITH BARLEY.

Twenty-one varieties of barley, eleven of six-rowed and ten of two-rowed, were grown in uniform test plots of one-fortieth acre each.

The land was a light clay loam on which root crops had been grown the previous year (1909), for which crop barn-yard manure at the rate of twenty tons per acre had been used. No manure or other fertilizer was used for this crop.

The land was ploughed in the fall of 1909, thoroughly worked up in the spring (1910) and sown May 13, at the rate of two bushels per acre. Timothy and clover seed were also sown with the grain at the rate of seven lbs. common red clover; three lbs. alsike clover and twelve lbs. timothy per acre.

The oats used were from selected heads of the previous season's crop.

There was no rust and practically no smut.

One variety of two-rowed barley (Hannchen), seemed to attract birds (sparrows), to such an extent, that we estimate this variety to have been at least one-half destroyed.

The yields from both two-rowed and six-rowed barleys are as follows:—

SIX-ROWED BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches		Inches	Lbs.	Bush.	Lbs.	Lbs.
1	Stella	Aug. 19	98	42	10	1¾	2,880	60	..	53·4
2	Oderbruch	" 15	94	43	8	2¼	2,720	56	32	52·0
3	Nugent	" 17	96	40	10	2½	2,600	54	08	52·0
4	Mansfield	" 17	96	44	7	2	2,520	52	24	52·0
5	Odessa	" 15	94	42	8	2¼	2,500	52	04	51·1
6	Mensury	" 17	96	38	4	2½	2,400	50	..	49·7
7	O.A.C. No. 21	" 17	96	44	10	2	2,360	49	08	50·0
8	Yale	" 17	96	44	10	2¼	2,340	48	36	51·0
9	Trooper	" 17	96	44	8	2½	2,320	48	16	52·0
10	Claude	" 17	96	42	10	2	2,240	46	32	53·0
11	Albert	" 17	96	40	10	2¼	2,180	43	16	52·7

TWO-ROWED—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches		Inches	Lbs.	Bush.	Lbs.	Lbs.
1	Invincible	Aug. 22	101	49	10	2¾	2,840	59	08	54·0
2	Swedish Chevalier	" 23	102	42	5	3½	2,480	51	32	55·0
3	Jarvis	" 22	101	46	10	2½	2,440	50	40	54·2
4	Clifford	" 22	101	47	10	2½	2,360	47	24	54·0
5	Danish Chevalier	" 23	102	42	5	3¼	2,200	45	40	54·3
6	Standwell	" 22	101	47	10	2½	2,080	43	16	51·1
7	Canadian Thorpe	" 22	101	46	10	2¾	1,920	40	..	51·8
8	French Chevalier	" 23	102	42	5	3¼	1,880	39	08	56·0
9	Beaver	" 22	101	43	5	3¼	1,840	38	16	52·8
10	Hannchen	" 22	101	41	8	2¾	1,200	25	..	53·6

EXPERIMENTS WITH PEAS.

Thirteen varieties of peas were sown on test plots of one-fortieth acre each.

The land was a clay loam in a rather poor state of fertility, no manure having been used on this land for quite a number of years, and on which timothy and clover hay had been grown the previous year. This was ploughed in the fall of 1909, and sown June 3 at the rate of from two to three bushels per acre according to the size of the pea. Timothy and clover seed were also sown at the rate of seven lbs. common red clover; three lbs. alsike clover, and twelve lbs. timothy seed per acre.

The pea crop made very indifferent growth in the early part of the season, but improved materially later.

The following were the yields obtained:—

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening	Number of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
					Lbs.	Bush.	Lbs	Lbs.
1	Picton	Medium	Sept. 14	101	1,960	32	40	63
2	White Marrowfat	Large	" 12	103	1,840	30	40	64
3	Prussian Blue	Medium	" 14	101	1,820	30	20	65
4	Daniel O'Rourke	Small	" 12	101	1,800	30	..	63
5	Mackay	Medium	" 12	101	1,780	29	40	62·5
6	Gregory	Large	" 14	103	1,600	26	40	61·5
7	Arthur	Medium	" 12	101	1,520	25	20	62·4
8	Chancellor	Small	" 12	101	1,480	24	40	63·3
9	English Grey	Medium	" 12	101	1,400	23	20	63
10	Black-Eye Marrowfat	Large	" 12	101	1,360	22	..	62·5
11	Golden Vine	Small	" 12	101	1,240	20	40	64
12	Paragon	Medium	" 12	101	1,120	18	40	62·8
13	Prince	Medium	" 14	103	1,080	18	..	62·8

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were grown in uniform test plots of one-fortieth acre each.

The ground was a clay loam, in only a moderate state of fertility, on which clover and timothy had been grown the previous season. This was ploughed in the fall of 1909, well worked up in the spring of 1910, and sown June 3 at the rate of one bushel per acre.

The following yields were obtained:—

BUCKWHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points	Yield of Grain per Acre.	Yield of Grain per Acre.	
				Inches.		Lbs.	Bush	Lbs.
1	Rye-Buckwheat	Aug. 25	83	38	7	3,000	62	24
2	Silverhull "	" 25	83	38	10	2,720	56	32
3	Grey "	" 25	83	36½	10	2,680	55	40
4	Japanese "	" 25	83	38	8	2,640	55	..
5	Tartarian "	" 25	83	36	7	2,440	50	40

FIELD CROP OF BUCKWHEAT.

Six acres of buckwheat (Silverhull) were grown. The land was a heavy clay loam in a rather poor state of fertility, not having had any manure for quite a number of years. It was uneven in character and surface, and had been in timothy and clover hay the previous season.

The seed was sown June 25 and harvested September 12.

The total yield was 205 bushels, or at the rate of 34 bushels 8 lbs. per acre.

EXPERIMENTS WITH INDIAN CORN.

Nine varieties of Indian corn for ensilage purposes were sown in uniform test plots.

The land was a light sandy loam on which a grain crop had been grown the previous season. This was ploughed in the fall of 1909, cultivated in the spring of 1910, barn-yard manure at the rate of twenty tons per acre spread on the surface and ploughed under lightly. This was again cultivated, and duplicate plots in rows thirty-six inches apart, and in hills thirty-six inches each way, sown. This was gone over with a smoothing harrow at least twice before the plants came through the ground.

Those in the rows were thinned out to from four to six inches apart, and those in the hills to from three to six plants in each hill.

This crop made very indifferent growth in the early part of the season, but improved considerably in the latter part.

The yield was calculated from the weight obtained from two rows, each sixty-six feet long.

The crop was sown June 13 and cut October 3.

This crop was not well matured.

Following were the yields obtained:—

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Average Height.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
		Inch.		Tons.	Lbs.	Tons.	Lbs.
1	Early Mastodon	80	Early milk	16	450	16	1,550
2	Wood's Northern Dent	74	Late milk	15	470	14	1,700
3	Selected Leaning	72	"	15	250	13	1,730
4	Angel of Midnight	66	Glazed	14	1,150	15	360
5	Eureka	80	Watery	14	600	16	1,220
6	Compton's Early	72	Glazed	12	860	15	1,400
7	Longfellow	74	"	12	750	16	670
8	Superior Fodder	80	Watery	12	640	14	1,070
9	Davidson	66	"	12	200	12	1,360

FIELD CROP OF INDIAN CORN.

One acre of Indian corn was grown, the variety Longfellow being used. The land was a light sandy loam, in rather a poor state of fertility, on which grain had been grown the previous year. It was ploughed in the fall of 1909, cultivated in the spring of 1910, and a dressing of barn-yard manure at the rate of twenty tons per acre was spread on the surface and ploughed under lightly. This was well cultivated again and sown in rows thirty-six inches apart. The surface was harrowed twice before the plants came up, and cultivated between the rows at various times during the season. The corn was sown June 13, and cut October 13. The early part of the season was cold and wet, hence the crop made a rather poor growth and was not well matured. The yield was twelve and a half tons.

EXPERIMENTS WITH TURNIPS.

Ten varieties of turnips were sown in uniform test plots, in duplicate sets, two weeks apart.

The land was a clay loam on which had been a grain crop the previous year, 1909, with clover in the year 1908.

The land was ploughed in the fall of 1909, well cultivated in the spring and barn-yard manure spread on the surface at the rate of twenty tons per acre. This was ploughed under and again thoroughly cultivated. Commercial fertilizer (made up in the proportion of superphosphate 1½ lbs.; bone meal 1½ lbs.; nitrate of soda 1 lb.; muriate of potash 1 lb.;) mixed together and sown at the rate of three hundred lbs. per acre was then spread on the surface and harrowed in with the smoothing harrow.

The rows were twenty-four inches apart, and the plants thinned out to about one foot apart in the rows. The first set of plots were sown June 6, and the second set on June 20.

Besides thinning, they were gone over with the hoe once, and cultivated, with a one-horse cultivator, between the rows at least four times.

The yield was calculated from that obtained from two rows, each sixty-six feet long.

The crop was pulled October 17, with the following results:—

TURNIPS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre 1st Sowing.		Yield per Acre 1st Sowing.		Yield per Acre 2nd Sowing.		Yield per Acre 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Hartley's Bronze	30	885	1,014	45	28	100	935	..
2	Halewood's Bronze Top	28	1,770	962	30	24	1,995	833	15
3	Hall's Westbury	28	1,255	954	15	19	775	646	15
4	Magnum Bonum	27	1,770	929	30	19	1,765	662	45
5	Mammoth Clyde	25	1,480	858	..	20	260	671	..
6	Good Luck	25	1,150	852	30	22	1,375	756	15
7	Bangholm Selected	25	820	847	..	24	1,830	830	30
8	Jumbo	23	1,190	786	30	20	1,415	690	15
9	Perfection Swede	22	715	745	15	21	75	701	15
10	Carter's Elephant	21	1,725	728	45	17	650	577	30

FIELD CROP OF TURNIPS I.

Eight acres of turnips were grown in lots of one acre each, in one field, the land varying from sandy loam on one side to a very white sandy loam on the other side. The previous crop was buckwheat. The land was ploughed in the fall of 1909, well worked up in the syprin, and barn-yard manure, at the rate of twenty tons per acre, spread on the surface and ploughed under lightly with the gang plough. It was again thoroughly cultivated and the rows run up twenty-four inches apart, as far as possible from twenty-four to forty-eight hours ahead of seeding time. To one half of each acre was added commercial fertilizer (superphosphate, 1½ lbs.; bone meal, 1½ lbs.; nitrate of soda, 1 lb.; muriate of potash, 1 lb.), at the rate of three hundred lbs. per acre, and to the other half of each acre, barn-yard manure only.

The comparison of varieties in this case is not very reliable, as the weather was extremely broken at the time of sowing, and, beginning at the side of the field where the soil was in the better condition, a certain number of days elapsed between the sowing of the first acre and that of the last acre.

Until about the first of August this crop made very satisfactory growth; from this out the continued extremely dry weather was very unfavourable for this crop, particularly that of the latest sown.

The following table shows the results:—

FIELD CROPS OF TURNIPS I.

Name of Variety, how Fertilized, Size of Plot.	Yield per Acre.		Yield per Acre.	
	Tons.	Lbs.	Bush.	Lbs.
Magnum Bonum—(Sown June 16—Pulled Nov. 8).				
½ acre manure and fertilizer, 300 lbs. per acre	25	..	833	20
½ " only	23	60	767	40
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 65 bush. 40 lbs. at 6 cts ... 3 94				
Loss per acre ... $ 0 86				
Rennie's Prize—(Sown June 16—Pulled Nov. 8).				
½ acre manure and fertilizer, 300 lbs per acre	26	880	881	20
½ " only	23	240	770	40
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 110 bush. 40 lbs. at 6 cts ... 6 64				
Gain per acre ... $ 1 84				
Hartley's Bronze—(Sown June 17—Pulled Nov. 8).				
½ acre manure and fertilizer, 300 lbs. per acre	23	790	779	50
½ " only	22	300	738	20
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 41 bush. 30 lbs. at 6 cts ... 2 49				
Loss per acre ... $ 2 31				
Kangaroo—(Sown June 17—Pulled Nov. 9).				
½ acre manure and fertilizer, 300 lbs per acre	23	1,900	798	20
½ " only	21	680	711	20
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 87 bush. at 6 cts. 5 22				
Gain per acre ... $ 0 42				
Canadian Gem—(Sown June 21—Pulled Nov. 10).				
½ acre manure and fertilizer, 300 lbs. per acre	23	1,310	788	30
½ " only	21	1,770	729	30
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 59 bush. at 6 cts. 3 54				
Loss per acre ... $ 1 26				
Best of All—(Sown June 27—Pulled Nov. 12).				
½ acre manure and fertilizer, 300 lbs. per acre	23	1,620	793	40
½ " only	23	1,380	789	40
Cost per acre of 300 lbs. fertilizer at $32 per ton ... $ 4 80				
Value per acre in crop over manure only, 4 bush. at 6 cts.. 0 24				
Loss per acre ... $ 4 56				

FIELD CROPS OF TURNIPS I—*Concluded.*

Name of Variety, how Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
Elephant—(Sown June 27—Pulled Nov. 14).		Tons.	Lbs.	Bush.	Lbs.
½ acre manure and fertilizer, 300 lbs. per acre		21	1,160	719	20
½ " only		20	1,340	689	..
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 30 bush. 20 lbs. at 6 cts	1 82				
Loss per acre	$ 2 98				
Purple Top—(Sown June 27—Pulled Nov. 15).					
½ acre manure and fertilizer, 300 lbs per acre		20	1,420	690	20
½ " only		20	120	668	40
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 21 bush. 40 lbs. at 6 cts	1 30				
Loss per acre	$ 3 50				

FIELD CROPS OF TURNIPS II.

Two acres of turnips were grown in eight lots of one-fourth of an acre each. The land was a clay loam, the previous crop having been grain. This was ploughed in the fall of 1909, well cultivated in the spring and barn-yard manure spread on the surface at the rate of twenty tons per acre. This was ploughed under and again thoroughly cultivated. To one-half of each quarter acre, commercial fertilizer (made up in the proportion of superphosphate, 1½ lbs.; bone meal, 1½ lbs.; nitrate of soda, 1 lb.; muriate of potash, 1 lb.) at the rate of three hundred lbs. per acre was added, the other half of each quarter acre receiving barn-yard manure only.

Besides thinning, they were gone over with the hoe once, and cultivated with a one-horse cultivator between the rows at least four times during the season.

The following table shows the results obtained:—

FIELD CROPS OF TURNIPS II.

Name of Variety, how Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
Bangholm Selected—(Sown June 11—Pulled Oct. 18).		Tons.	Lbs.	Bush.	Lbs.
½ acre manure and fertilizer, 300 lbs. per acre		25	1,920	865	20
½ " only		23	1,280	788	..
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 77 bush. 20 lbs. at 6c.	4 64				
Loss per acre	0 16				

FIELD CROPS OF TURNIPS II—*Concluded.*

Name of Variety, how Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Mammoth Clyde—(Sown June 11—Pulled Oct. 18).					
½ acre manure and fertilizer, 300 lbs. per acre		25	80	834	40
½ " only		24	1,520	825	20
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 9 bush. 20 lbs. at 6c.	0 56				
Loss per acre	4 24				
Elephant Improved—(Sown June 11—Pulled Oct. 18).					
½ acre manure and fertilizer, 300 lbs. per acre		25	160	836	..
½ " only		24	1,600	826	40
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 9 bush. 40 lbs. at 6c.	0 58				
Loss per acre	4 22				
Jumbo—(Sown June 11—Pulled Oct. 18).					
½ acre manure and fertilizer, 300 lbs. per acre		26	960	882	40
½ " only		26	400	873	20
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 9 bush. 20 lbs. at 6c.	0 56				
Loss per acre	4 24				
Halewood's Bronze Top—(Sown June 11—Pulled Oct. 18).					
½ acre manure and fertilizer, 300 lbs. per acre		27	1,400	923	20
½ " only		27	360	906	..
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 17 bush. 20 lbs. at 6c.	1 04				
Loss per acre	3 76				
Kangaroo—(Sown June 11—Pulled Oct. 25).					
½ acre manure and fertilizer, 300 lbs. per acre		28	720	945	20
½ " only		26	80	868	..
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 77 bush. 20 lbs. at 6c.	4 64				
Loss per acre	0 16				
Good Luck—(Sown June 11—Pulled Oct. 25).					
½ acre manure and fertilizer, 300 lbs. per acre		28	120	935	20
½ " only		26	1,880	898	..
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 37 bush. 20 lbs. at 6c.	2 24				
Loss per acre	2 56				
Sutton's Champion—(Sown June 11—Pulled Oct. 27).					
½ acre manure and fertilizer, 300 lbs. per acre		25	1,760	862	40
½ " only		25	1,520	858	40
Cost per acre of 300 lbs. fertilizer at $32 per ton	$ 4 80				
Value per acre in crop over manure only, 4 bush. at 6c.	0 24				
Loss per acre	4 56				

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were sown in uniform test plots in duplicate sets.

The land was a clay loam in a fairly good condition, on which wheat had been grown the previous year. This was ploughed in the fall of 1909, well cultivated in the spring of 1910 and barn-yard manure at the rate of twenty tons per acre spread on the surface and ploughed under with a gang plough. This was again thoroughly cultivated and commercial fertilizer (made up of superphosphate, 1½ lbs.; bone meal, 1½ lbs.; nitrate of soda, 1 lb.; muriate of potash, 1 lb.), mixed together and sown at the rate of three hundred pounds per acre was spread on the surface and harrowed in with a smoothing harrow.

The seed was sown in rows twenty-four inches apart with a Planet Jr. hand drill in bunches of from three to six seeds in each, and one foot apart. When the plants were from two to four inches high they were thinned out, leaving one plant in each spot. This gives an opportunity for selection of plants, always having the selected one in the proper place. Besides this thinning, they were gone through twice with a hoe, and cultivated from time to time, at intervals of about a week.

The first set of plots were sown June 3, and the duplicate set June 17, and all were pulled October 12.

The yield was calculated from that obtained from two rows, each sixty-six feet long.

The following were the yields obtained:—

MANGELS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.		Yield per Acre, 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Intermediate	32	350	1,072	30	23	200	770	..
2	Giant Yellow Globe	32	20	1,067	..	21	1,395	723	15
3	Gate Post	31	1,195	1,053	15	21	1,725	728	45
4	Perfection Mammoth Long Red	30	1,380	1,023	..	21	900	715	..
5	Yellow Intermediate	30	720	1,012	..	22	715	745	15
6	Half Sugar White	30	555	1,009	15	23	530	775	30
7	Selected Yellow Globe	29	1,070	984	30	21	75	701	15
8	Prize Mammoth Long Red	28	1,255	954	15	22	1,375	756	15

FIELD CROPS OF MANGELS.

One acre of mangels was grown in four lots of one-quarter acre each.

The land was a clay loam in fairly good condition, having grown a crop of oats the previous year (1909), with clover hay in 1908.

The land was ploughed in the fall, cultivated well in the spring, and barn-yard manure at the rate of twenty tons per acre spread on the surface, ploughed under, and again well cultivated.

To one half of each quarter-acre plot was added commercial fertilizer (superphosphate, 1½ lbs.; bone meal, 1½lbs.; nitrate of soda, 1 lb. muriate of potash, 1 lb.), at the rate of three hundred lbs. per acre, the other half of each plot receiving the barn-yard manure only. The seed was sown with the Planet Jr. seed drill in bunches of from three to six seeds in each bunch, and one foot apart. Those were later thinned out. leaving one plant in each spot, and cultivated between the rows with a one-horse cultivator four times during the season, and hoed twice.

FIELD CROPS OF MANGELS.

Name of Variety, how Fertilized, Size of Plot.	Yield per Acre.		Yield per Acre.	
	Tons.	Lbs.	Bush.	Lbs.
Mammoth Long Red—(Sown June 7—Pulled Oct. 13).				
⅛ acre manure and fertilizer, 300 lbs. per acre	18	...	600	..
⅛ " only	14	400	473	20
Cost per acre of 300 lbs. fertilizer at $32 per ton ....$ 4 80				
Value per acre in crop over manure only, 126 bush. 40 lbs. at 6 cts. 7 60				
Gain per acre $ 2 80				
Yellow Half-Long—(Sown June 7—Pulled Oct. 13).				
⅛ acre manure and fertilizer, 300 lbs. per acre	17	640	577	20
⅛ " only	14	480	474	40
Cost per acre of 300 lbs. fertilizer at $32 per ton....$ 4 80				
Value per acre in crop over manure only, 112 bush. 40 lbs. at 6 cts. 6 16				
Gain per acre $ 1 36				
Yellow Globe—(Sown June 7—Pulled Oct. 13).				
⅛ acre manure and fertilizer, 300 lbs. per acre	20	800	680	..
⅛ " only	14	1,400	490	..
Cost per acre of 300 lbs. fertilizer at $32 per ton....$ 4 80				
Value per acre in crop over manure only, 190 bush. at 6 cts. 11 40				
Gain per acre $ 6 60				
Golden Tankard—(Sown June 7—Pulled Oct. 13).				
⅛ acre manure and fertilizer, 300 lbs. per acre	13	1,200	453	..
⅛ " only	10	1,960	366	..
Cost per acre of 300 lbs. fertilizer at $32 per ton....$ 4 80				
Value per acre in crop over manure only, 87 bush. 20 lbs. at 6 cts. 5 24				
Gain per acre $ 0 44				

EXPERIMENTS WITH CARROTS.

Five varieties of carrots were sown in uniform test plots on June 6, and a duplicate set June 20.

The land was a clay loam in fairly good condition, on which grain had been grown the previous year. This was ploughed in the fall of 1909, well cultivated in the spring of 1910, and barn-yard manure at the rate of twenty tons per acre spread on the surface and ploughed under with a gang plough. It was again thoroughly cultivated and commercial fertilizer made up of (superphosphate, 1½ lbs.; bone meal, 1½ lbs.; nitrate of soda, 1 lb.; muriate of potash, 1 lb.) mixed together and sown at the rate of three hundred pounds per acre was spread on the surface, and harrowed in with a smoothing harrow.

The seed was sown in rows twenty-four inches apart, and the plants thinned out by hand to about three inches apart in the rows.

The yield was calculated from that obtained from two rows, each sixty-six feet long.

The following were the crops obtained:—

CARROTS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.		Yield per Acre, 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	18	1,950	632	30	16	1,660	561	..
2	Improved Short White	17	650	577	30	16	1,165	552	45
3	White Belgian	16	1,330	555	30	15	360	506	..
4	Ontario Champion	16	505	541	45	15	1,020	517	..
5	Half-long Chantenay	13	1,390	456	30	12	1,410	423	30

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were sown in uniform test plots in duplicate lots.

The land was a heavy clay loam in a fairly good condition, on which wheat had been grown the previous year. This was ploughed in the fall of 1909, well cultivated in the spring of 1910, and barn-yard manure at the rate of twenty tons per acre spread on the surface and ploughed under with a gang plough. It was again thoroughly cultivated and commercial fertilizer, made up of (superphosphate, 1½ lbs.; bone meal, 1½ lbs.; nitrate of soda, 1 lb.; muriate of potash, 1 lb.), mixed together and sown at the rate of three hundred pounds per acre was spread on the surface and harrowed in with a smoothing harrow. The sugar beet seed was sown in rows twenty-four inches apart with a Planet Jr. hand drill, in bunches of from three to six in each, and one foot apart. When the plants were from two to four inches high, they were thinned out, leaving one plant in each spot. This gives an opportunity for selection of plants, always having the selected one in the proper place.

Besides this thinning, they were gone through twice with a hoe, and cultivated from time to time at intervals of about one week.

The first set of plots were sown June 3 and the duplicate set June 17, and all pulled October 12.

The yield was calculated from that obtained from two rows, each sixty-six feet long.

The following were the yields obtained:—

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.		Yield per Acre, 2nd Sowing.		Sugar in Juice.	Solids in Juice.	Coefficient of Purity.
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	%	%	
1	French Very Rich	16	175	536	15	13	1,225	453	45	14·92	17·40	85·8
2	Vilmorin's Improved	15	1,350	522	30	11	1,760	396	..	18·24	20·49	89·0
3	Klein Wanzleben	15	525	508	45	10	625	343	45	16.13	18·43	87·5

SIX-ROWED BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches		Inches	Lbs.	Bush.	Lbs.	Lbs.
1	Stella	Aug. 19	98	42	10	1¾	2,880	60	..	53·4
2	Oderbruch	" 15	94	43	8	2¼	2,720	56	32	52·0
3	Nugent	" 17	96	40	10	2½	2,600	54	08	52·0
4	Mansfield	" 17	96	44	7	2	2,520	52	24	52·0
5	Odessa	" 15	94	42	8	2¼	2,500	52	04	51·1
6	Mensury	" 17	96	38	4	2½	2,400	50	..	49·7
7	O.A.C. No. 21	" 17	96	44	10	2	2,360	49	08	50·0
8	Yale	" 17	96	44	10	2½	2,310	48	36	51·0
9	Trooper	" 17	96	44	8	2½	2,320	48	16	52·0
10	Claude	" 17	96	42	10	2	2,240	46	32	53·0
11	Albert	" 17	96	40	10	2¼	2,180	43	16	52·7

TWO-ROWED—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches		Inches	Lbs.	Bush.	Lbs.	Lbs.
1	Invincible	Aug. 22	101	49	10	2¾	2,840	59	08	54·0
2	Swedish Chevalier	" 23	102	42	5	3¼	2,480	51	32	55·0
3	Jarvis	" 22	101	46	10	2½	2,440	50	40	54·2
4	Clifford	" 22	101	47	10	2½	2,360	47	24	54·0
5	Danish Chevalier	" 23	102	42	5	3¼	2,200	45	40	54·3
6	Standwell	" 22	101	47	10	2½	2,080	43	16	51·1
7	Canadian Thorpe	" 22	101	46	10	2¾	1,920	40	..	51·8
8	French Chevalier	" 23	102	42	5	3¼	1,880	39	08	56·0
9	Beaver	" 22	101	43	5	3¼	1,840	38	16	52·8
10	Hannchen	" 22	101	41	8	2¾	1,200	25	..	53·6

EXPERIMENTS WITH PEAS.

Thirteen varieties of peas were sown on test plots of one-fortieth acre each.

The land was a clay loam in a rather poor state of fertility, no manure having been used on this land for quite a number of years, and on which timothy and clover hay had been grown the previous year. This was ploughed in the fall of 1909, and sown June 3 at the rate of from two to three bushels per acre according to the size of the pea. Timothy and clover seed were also sown at the rate of seven lbs. common red clover; three lbs. alsike clover, and twelve lbs. timothy seed per acre.

The pea crop made very indifferent growth in the early part of the season, but improved materially later.

The following were the yields obtained:—

CLOVER EXPERIMENTS.

No.	Name of Variety and how Seeded.	Yield per Acre.	
		Bush.	Lbs.
	Banner Oats—(Sown May 14—Cut August 16).		
1	Without clover	50	20
2	With clover	57	22
3	Without clover	51	06
4	With clover	54	24
	French Chevalier Barley—(Sown May 14—Cut August 24).		
1	Without clover	44	08
2	With clover	49	08
3	Without clover	42	04
4	With clover	46	32

EXPERIMENTS WITH ALFALFA.

The alfalfa sown in 1909, while seeming to come through the winter better than usual, made rather indifferent growth, and was more or less patchy.

This was cut June 23, and a light cutting taken off; then left to grow for the remainder of the season, leaving a moderately good crop standing (probably about one ton per acre), in the fall, with some little seed.

EXPERIMENTS WITH RUN-OUT LAND.

The experiment to determine the practicability of restoring run-out land, where a limited amount of manure is available, was continued this season.

This was commenced in the season of 1906 on a field of eight acres of heavy clay with some little loam, badly run out and particularly deficient in humus. This field had grown grain, and had been sown to grass sixteen years previous, since when it had been lying in pasture, producing extremely little after the first three years. The field was made into four plots of two acres each.

With a view to making each plot as nearly equal in fertility as possible, the field was divided into eight parts of one acre each, and numbered 1 to 8, nos. 1 and 8 being designated plot 1 (2 acres); Nos. 2 and 7, plot 2 (2 acres); Nos. 3 and 6, plot 3 (2 acres): and Nos. 4 and 5, plot 4 (2 acres).

On plot 1, no fertilizer was used; on plot 2, three hundred lbs. commercial fertilizer per acre was used. On plot 3, six hundred lbs. commercial fertilizer per acre was used, and on plot 4, ten one-horse cart loads of barnyard manure per acre was used.

In the season of 1906, this field was sown with peas, oats and vetches, mixed together and sown at the rate of three bushels per acre. They were allowed to grow until about August 1, when the entire crop was ploughed under. This was repeated in 1907. In 1908, the land was sown with Waverley oats, Odessa barley, and Prussian Blue peas, mixed together and sown at the rate of three bushels per acre, together with clover and timothy at the rate of 10 lbs. clover and 12 lbs. timothy seed per acre. This was followed with clover hay in 1909 and again with mixed grain in 1910.

The following tables will show the results for each of the three years, 1908, 1909 and 1910:—

YIELD OF MIXED GRAINS, 1908.

No. of Plot.	How Fertilized.	Yield per Plot (2 acres).		Weight per Bushel.
		Bush.	Lbs.	Lbs.
1	No fertilizer used	61	04	40
2	300 lbs. fertilizer per acre	78	08	40
3	600 " "	82	05	40
4	10 one-horse cart-loads manure	95	04	40

YIELD OF HAY, 1909.

No. of Plot.	How Fertilized.	Yield per Plot (2 acres).	
		Tons.	Lbs.
1	No fertilizer used	2	190
2	300 lbs. fertilizer per acre	2	925
3	600 " "	2	1,275
4	10 one-horse cart-loads manure	3	325

YIELD OF MIXED GRAINS, 1910.

No. of Plot.	How Fertilized.	Yield per Plot (2 acres).		Weight per Bushel.
		Bush.	Lbs.	Lbs.
1	No fertilizer used	88	..	40
2	300 lbs. fertilizer per acre	105	..	40
3	600 " "	103	20	40
4	10 one-horse cart-loads manure	116	..	40

SPECIAL EXPERIMENTS WITH FERTILIZERS.

A series of tests with commercial fertilizers, the object being to gain information regarding the effects of the continued application of certain fertilizers and combinations of fertilizers on the more important farm crops, has been carried on.

These experiments were commenced in 1898, and continued for ten consecutive years, and reported in the annual report each year.

In 1909, this land was all sown to grain, with clover added. The original series of experiments were again carried on in the season of 1910.

The following are the results obtained:—

SPECIAL EXPERIMENTS WITH FERTILIZERS.

No.	Fertilizers used each year previous to 1904.	Banner Oats.		White Fife Wheat.		Logan Barley.		Mixed Grain.		Long-fellow Corn.		Purple Top Turnips.		Gold Coin Potato.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Manure, 30 tons.....	67	22	55	00	54	08	57	20	14	500	653	20	356	40
2	Manure, 15 tons ; fertilizer 250 lbs	76	16	50	00	60	20	60	00	13	1,000	727	20	383	20
3	Complete fertilizer, 1000 lbs.....	47	02	46	40	50	00	48	30	12	..	590	00	240	00
4	" " 500 lbs.	52	32	41	40	45	40	47	20	11	..	568	20	306	40
5	Check, no fertilizer used	35	10	23	20	18	36	27	20	10	500	458	20	215	00
6	Bone meal, 1,000 lbs...	50	00	35	00	42	34	40	00	10	1,800	610	00	266	40
7	" 500 lbs...	47	02	31	40	35	20	47	20	11	500	575	00	286	40
8	Ashes, 2,500 lbs.....	58	28	35	00	38	26	45	00	11	1,500	608	20	345	00
9	Manure, rotted, 20 tons	61	26	35	50	56	12	52	10	16	..	768	20	463	20
10	Check, no fertilizer used	33	18	10	00	16	32	25	00	2	1,000	68	20	175	00
11	Land plaster, 500 lbs ..	44	04	17	30	19	38	32	20	5	500	193	20	206	40
12	Salt, 500 lbs	73	18	33	20	33	16	50	00	8	1,000	515	00	243	20
13	Marsh mud, 100 tons..	74	14	56	40	39	28	55	00	12	..	546	40	291	40
14	Manure, green, 20 tons.	83	28	45	00	58	12	62	20	17	500	830	00	530	00

SPECIAL EXPERIMENTS WITH LIME AND COMMERCIAL FERTILIZERS ON MARSH OR DYKE LANDS.

Special experiments were continued this season with lime and commercial fertilizers on marsh or dyke lands as in previous years. This was on a part of the marsh somewhat lower than the average and uneven in surface. The cold and wet in the early part of the season and the breaking of the dykes with repeated flooding with salt water the previous season, produced conditions so unfavourable that no particulars were kept of the results.

HAY CROP.

The hay crop was the heaviest cut for a good many years, both on upland and marsh.

—	Tons	Lbs.
23 acres on upland yielded.....	62	..
45 " marsh "	92	..
Total....	154	..

SUMMARY OF CROPS GROWN, EXCLUSIVE OF UNIFORM TEST PLOTS OF GRAIN AND POTATOES.

Hay.

—	Tons.	Lbs.
Upland hay	61	1,915
Marsh "	92	1,780
	154	1,695

Grain.

—	Bush.	Lbs.	Lbs.
Mixed grain	540	..	22,560
Oats	869	27	29,573
Wheat	40	57	2,457
Barley	48	45	2,349
Buckwheat	205	..	9,840
			66,779

Turnips.

—	Bush.	Lbs.	Tons.	Lbs.
Turnips (field crop)	7,934	05	238	45
" (test plots)	96	52	2	1,812
	8,030	57	240	1,857

Mangels.

—	Bush.	Lbs.	Tons.	Lbs.
Mangels (field crop)	514	10	15	850
" (test plots)	85	09	2	1,109
	599	19	17	1,959

Corn.

—	Tons.	Lbs.
Corn (field crop)	12	1,000
" (test plots)	2	737
	14	1,737

Nappan. Part of Hay Crop 1910.

FRUIT AND VEGETABLE CROPS.

APPLES.

The apple crop was the poorest for some years, this condition being general all over the province. Heavy frosts coming while the trees were in blossom, were to a certain extent responsible for this condition. The fruit was also not well matured.

STRAWBERRIES.

The strawberry crop was not by any means up to its usual standard. Coming through the winter in rather poor shape, the injury being confined more to spots of the field than to varieties, the comparative value of the following table is somewhat lessened.

A severe frost coming when the plants were in blossom also affected this crop very materially, the result being about one-half the usual yield.

The size of the plots of each variety were 16½ x 5 feet, or 1/528 acre.

The following are the yields of twenty of the most productive varieties this season:—

STRAWBERRIES—Test of Varieties.

Variety.	Dates when Picked.					Yield per Plot.	Yield per Acre.
	July 2.	July 6.	July 8.	July 12.	July 19.		
	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.
Nick Ohmer	1	3	4	6	3	17	8,976
Jas. Vick	.....	4	5	3	4½	16½	8,712
St. Antoine de Padua	1¼	5	3	3½	3¼	16	8,448
Capt. Jack	1½	4½	4	3	3	16	8,448
Equinox	3	5	3	2	2	15	7,920
Afton	2½	3	4	2	1½	13	6,864
Barton's Eclipse	1	2	2	3	2	10	5,280
Carrie	1½	1½	2	2	2	9	4,752
Senator Dunlap	3	2	2	1	1	9	4,752
H. W. Beecher	1	1	3	2	1	8	4,224
Woolverton	1	2	2	2	1	8	4,224
John Little	.....	2	2	2	2	8	4,224
Hood River	.....	1	2	2	2	7	3,696
Saunders	.....	1	2	2	1	6	3,168
Pearl	1	1	2	1	1	6	3,168
Swindle	2	1	1	1	1	6	3,168
Beverly	1	1	1	2	1	6	3,168
Pocomoke	1	1	2	1	1	6	3,168
Thompson's Late	.....	1	1	2	1	5	2,640
Lovett	1½	1	1½	1	.....	5	2,640

PEAS.

Six varieties were sown on May 24. The varieties used were Little Marvel, American Wonder, Thomas Laxton, Stratagenm, Telephone and Gradus.

Little Marvel ripened earliest of all, followed by American Wonder, both kinds producing a good crop, with short vines and small pods well filled with large peas. Those varieties did not require staking. Thomas Laxton and Gradus ripened next (both early), the pods of which were long and well filled with large peas. Stratagem and Telephone are both late varieties.

The yields were as follows:—

PEAS—Test of Varieties.

Variety.	Dates of Picking and Yields.						Total Yield from Plots.	
	Aug. 2.		Aug. 5.		Aug. 12.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Little Marvel	8	8	4	8	3	0	16	0
American Wonder	6	8	4	8	2	0	13	0
Thomas Laxton	6	0	4	0	3	0	13	0
Stratagem	5	0	3	0	4	8	12	8
Telephone	5	0	2	8	4	8	12	0
Gradus	6	8	2	0	1	0	9	8

BEANS.

Six varieties of garden beans were planted on May 24, the varieties used being Dwarf Extra Early, Fame of Vitry, Emperor of Russia, Matchless, Dwarf Wax and Golden Skinless.

The seed germinated slowly, the plants made very slow growth, owing to the wet cold weather in June, and only a fair crop of beans was harvested.

Dwarf Extra Early was the first variety ready for use (August 3); Emperor of Russia was the most prolific. All varieties ripened their seed, which was gathered in good condition.

The yields were as follows:—

BEANS—Test of Varieties.

Variety.	Date of Picking and Yield.						Total Yield from Plots.	
	Aug. 2.		Aug. 9.		Aug. 16.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Emperor of Russia	4	4	10	8	6	8	21	4
Fame of Vitry	4	4	11	4	3	8	19	0
Dwarf Extra Early	8	0	8	0	2	8	18	8
Matchless	3	8	6	8	3	8	13	8
Dwarf Wax	3	0	8	0	2	0	13	0
Golden Skinless	4	8	5	4	3	0	12	12

PARSNIPS.

One variety of parsnips (Hollow Crown) was sown on May 25. This produced a fairly good crop of roots of marketable size.

CARROTS.

Two varieties of carrots (Amsterdam Scarlet and Early French Horn) were sown on June 3. The former variety produced the earlier and heavier crop of smooth, marketable roots. Ready for use August 6.

TURNIPS.

Two varieties of early turnips were sown (Early White Milan and Early White Flat Strapleaved) on June 10. The Early White Milan gave the smoother and earlier crop of roots. Ready for use August 6.

LETTUCE.

Four varieties of lettuce were sown on May 25. The varieties were Cos Trianon. Red Edged Victoria, Unrivalled Summer and Wheeler's Tom Thumb. All varieties grew well, but Unrivalled Summer proved superior in texture and flavour, and remained in head longer before going to seed, closely followed by Wheeler's Tom Thumb. Cos Trianon grew taller and more open, with longer leaves, and was coarser in quality.

RADISH.

Three varieties of radish were sown on May 25, Early Scarlet White Tipped, Forcing Turnip Scarlet and Winter Black Spanish. These all made satisfactory growth, the two former varieties being much freer from the ravages of the maggot than the latter, which was rendered unfit for use from that cause.

ONIONS.

Three varieties of onions were sown in the hotbed on April 13, and set out in the open ground on June 4. The varieties grown were Paris Silverskin, Large Red Wethersfield and Danver's Yellow Globe. These all made satisfactory growth and yielded a fair crop. For early use, the Paris Silverskin is most in demand, but does not seem to possess the keeping qualities of the Large Red Weathersfield.

BEETS.

Egyptian Flat Extra Early, Nutting's Dwarf Red, and Early Blood Red Turnip were the three varieties sown on June 3. For early use, the Egyptian Flat Extra Early is first. Ready for use August 9.

CUCUMBERS.

Three varieties were sown in the open ground, in beds, on June 11. White Spine, Long Green and Davis Perfect were the varieties used. For early use, the White Spine is recommended, followed by Long Green and later by Davis Perfect.

The fruit of the Spine and the Davis Perfect was from six to eight inches long, and that of the Long Green from ten to twelve inches long.

SQUASH.

Six varieties of squash, (Mammoth Whale, Hubbard, White Congo, Custard Marrow, Vegetable Marrow Yellow and Long White Bush Marrow) were grown. The seed was sown in beds 3 x 4 feet in the open on June 11. These made a fairly good growth. The White Bush Marrow was the first fit for use; the Hubbard is recommended for its keeping qualities.

CAULIFLOWER, CABBAGE, BRUSSELS SPROUTS AND BROCOLI.

Five varieties of cabbage (Paris Market Very Early, Extra Early Savoy, Large Late Flat Dutch, Early Jersey Wakefield, and Fottler's Improved Brunswick), two varieties of cauliflower (Early Snowball and Earliest Erfurt), one of brocoli (Extra Early White), and one of Brussels sprouts (Dwarf Improved), were sown in the hot-

led on April 13, and set out in the open ground on June 10. When set out, the plants semed to be healthy, but later on all were gradually so badly affected by club-root that the entire crop was useless.

The Early Jersey Wakefield cabbage, and Early Snowball cauliflower developed some small heads, but not enough to keep any data of.

CORN.

Four varieties of garden corn were sown May 23, Malakoff, Golden Bantam, Early Cory and Canada Yellow. The crows proved very troublesome to this crop.

All varieties ripened well, the Malakoff first, Early Cory, Golden Bantam and Canada Yellow, in the order named. The ears of the first three named varieties were short, the Malakoff, although the most prolific, growing very short ones. The Canada Yellow, although last to ripen, gave a good crop of good-sized ears.

CELERY.

Three varieties of celery, Paris Golden Yellow, Rose Ribbed Paris and White Solid Pascal were sown in the hotbed on April 1, transplanted in the hotbed on May 25, and set out in trenches in the open on July 26. The weather was extremely dry after these plants were set out, and it was found necessary to water them, hence the growth for a long time was very slow, causing the size of the plants to be below the standard, although the quality was very good, particularly the Paris Golden Yellow. The Paris Golden Yellow and Rose Ribbed Paris are splendid fall and early winter varieties; the White Solid Pascal is a more vigorous grower than the other two, and is a good winter variety.

The first earthing was done on September 23, the second on October 1, and third on October 19; the plants were dug on October 30.

TOMATOES.

Ten varieties of tomatoes were sown in the hotbed on March 9, and transplanted in strawberry boxes into cold frames on May 31, and set out in the open on June 15.

All made good growth, producing a fairly good crop of well-made fruit.

Golden Queen formed some large smooth fruit, but rotted badly. Blight struck Sparks' Earliana (Burpee) at ripening time and this variety was pulled up. Towards the end of the season blight was noticed on nearly all varieties.

The following table shows the varieties grown and the yields from each:—

TOMATOES—Test of Varieties.

Variety.	Ripe Fruit.	Green Fruit.	Yield Per Plot.
	Lbs.	Lbs.	Lbs.
Spark's Earliana (Ottawa)	128	102	230
June Pink	101	107	208
Coreless	97	84	181
Matchless	76	100	176
Chalk's Early Jewel	85	72	157
Ponderosa	71	80	151
Atlantic Prize	53	93	146
Livingstone's Beauty	45	91	136
Golden Queen	30	53	83
Spark's Earliana (Burpee)	Badly blighted		

HORSES.

Eight horses are at present on the Farm, kept exclusively as work animals, no experiment of any kind being carried on with them. Six of them are for draft purposes, one express horse and one driver. No change has been made in the number, although an exchange was made during the year in the case of the driver, for a younger animal. At least one draft horse will have to be added for the incoming year. All are in good condition.

CATTLE.

With a view to carrying on an experiment with dairy cows to demonstrate the value and practicability of grading up the common cows of the country by the use of a pure-bred bull of some of the established breeds of dairy cattle, twenty grade heifers one and a half years old were bought in December of this year. They are being bred in February and March, the intention being to commence this test about December 1. 1911. An Ayrshire bull was also procured for this experiment. We thus have on hand one Ayrshire bull and twenty grade heifers.

STEER FEEDING EXPERIMENTS.

As in past years, grade steers were put in in the fall for fattening purposes, with the intention of selling out again in the spring. They were bought in October and November, and the feeding experiment commenced December 1, they having been dehorned in the meantime. The number being fed is sixty-two head The weight credited to them, at the beginning of the experiment, was the weight found at 9 a.m. without their having received any food from 7 p.m. the previous evening. Large quantities of roots and clover hay were fed for the first month, without any meal, reaching 60 lbs. of roots per steer per day. From December 31 to date the roots have been decreased 10 lbs. per day per steer each month, with meal, commencing January 1, 1 lb. increasing 1 lb. per steer per day each month.

In past years, after charging all foods consumed at market prices, whether bought or grown on Farm, a substantial profit has been made, particularly on those fed in the winter of 1909-10 (as per subjoined report of steers fed 1909-10), when the price paid was $4.65 per 100 lbs., and the price received at selling time was $6.50 per 100 lbs. This left an increased price of $1.90 per 100 lbs. The price paid this season, November, 1910, being so much in advance of previous years, leaves a serious doubt as to whether the results will give a profit or a loss.

No sale has as yet been made for spring delivery.

	Lbs.
Total live weight of 62 steers, December 1, 1910	70,745
Total live weight of 62 steers, March 15, 1911	81,205
Increase	10,460
Average daily gain per steer	1·60

COMPLETION OF STEER-FEEDING EXPERIMENT, 1910, FINISHED SINCE LAST REPORT.

On making my report March 31, 1910, the 64 steers were still on hand. The following is a continuation and conclusion of said experiment:—

COMPLETION OF STEER-FEEDING EXPERIMENT, 1910, FINISHED SINCE LAST REPORT.

	Lbs.
Total live weight of 64 steers Dec. 1, 1909	64,410
Total live weight of 64 steers March 31, 1910	77,675
Increase to March 31, 1910	13,265
Total live weight of 64 steers May 15, 1910	81,750
Increase to May 15, 1910	17,340

FINANCIAL RESULTS.

Original weight of 64 steers, 64,410 lbs. at 4·65 cts per lb		$2,994 90
Weight at finish of 61 steers, 78,600 lbs. at 6½ cts. per lb	$5,109 00	
Weight at finish of 3 steers, 3,150 lbs. at 6 cts per lb.	189 00	
		$5,298 00
Gross profit		$2,303 10
Cost of feed for lot 165 days		1,689 00
Net profit		$613 50
Daily rate of gain per steer		1·64 lbs.
Cost of 1 lb. gain		9·74 cts.
Cost of feed per day per steer		16 cts.
Profit per steer		$9 58

SHEEP.

Twenty-seven sheep are now in the pens, consisting of Shropshires, Leicesters, and their grades as follows:—

13 Shropshires.

9 Leicesters.

5 Grades.

POULTRY.

Four breeds of poultry are now on the Farm, *i.e.*, Barred Plymouth Rocks, White Wyandottes, Buff Orpingtons and White Leghorns.

The pens are made up as follows:—

	Cock.	Hens.
Barred Plymouth Rocks	1	10
White Leghorns	1	6
White Wyandottes	1	4
Buff Orpingtons	1	4

BEES.

When taken out of their winter quarters April 18, it was found that the bees had all wintered well. During the spring two colonies dwindled, one of them getting so weak that it was thought advisable to unite the two weak ones, which was done. This colony was only able to get built up during the summer. Brood rearing in the other colonies progressed very rapidly, consuming all stores, but a crop of crimson clover in the orchard, on which the bees worked well every fine day, enabled us to get along without having to feed them. The clover flow was heavier than the average, while the fall flow was not as good as usual.

Fourteen colonies were put into the cellar in good shape on December 5. The hives were prepared for the winter in the usual way, *i.e.*, the hives were raised from the bottom boards by having two inch blocks placed under them, the covers and quilts removed and three empty sacks put over each hive. At date of writing, all colonies are clustering and seem to have wintered well.

GRAIN AND POTATO DISTRIBUTION.

As in past years, grain and potatoes were distributed to farmers on application. The following number of 3 lb. sample bags were sent to the various applicants:—

Potatoes	280
Oats	314
Barley	71
Wheat	62
Buckwheat	87
Total number of samples sent out	814

EXHIBITIONS.

An exhibit of farm products was made at the Dominion Exhibition, St. John. N.B., the Yarmouth County Exhibition, Yarmouth, N.S., and the Nova Scotia Provincial Exhibition, Halifax, N.S.

I also attended the Summerside Exhibition, P.E.I., the Charlottetown Exhibition, P.E.I., the Westmorland and County Exhibition, Sackville, N.B., and the Windsor Exhibition, Windsor, N.S.

CORRESPONDENCE.

During the year 2,536 letters were received and 2,212 sent out, exclusive of reports and circulars sent out with samples of grain.

VISITORS.

At least the usual number visited the Farm during the year in many small picnic groups.

Train accommodations are very unsuitable for visitors to the Farm. So far we have not been able to get any improvement in this service.

WEATHER.

April, 1910, opened with a light rain on the first day, followed by fine weather lasting one week, during which we had nearly the maximum amount of sunshine. Rain again fell from the 8th to the 10th, followed by bright weather until the 20th, after which light rains fell nearly every day until the 29th, when the weather became clear and colder.

Rain fell on twelve different dates, the heaviest being on the 8th, when ·79 inches fell.

Frost was registered on the 2nd, 3rd, 4th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 29th and 30th, the lowest temperatures being on the 29th, when 10° of frost was registered.

May opened with three days of dull cloudy weather, followed by rain on the 5th and a light snow squall on the 6th, after which, until the 24th, the weather was bright and warm. Light rains fell nearly every day after the 24th, the heaviest rainfall being on the 5th, when ·59 inches fell.

Seeding commenced on the 10th. Two degrees of frost was registered on the 6th. and three degrees on the 8th, 16th and 17th respectively.

June was a very wet and unseasonably cold month. Rain fell on fourteen different dates, making a total precipitation of 3·72 inches.

The highest temperature was 77° on the 22nd, and on only five dates did the thermometer register above 70°.

On the 5th the mercury dropped to 31°, and to 32° on the 6th.

July did not register as high temperatures as usual; on only six different dates did the mercury go to 80° or higher, the highest being 84° on the 10th. At the same time the minimum temperatures were higher than usual, leaving the mean temperature for the month higher than that of the two preceding seasons.

A heavy rain (1·38 inches) fell on the 4th, the balance of the month being fine.

August was an extremely dry month, light rains falling on five different dates. making the low precipitation of only 1·55 inches, the lowest experienced here for some time. Low maximum temperatures were also recorded, the mean for the month being 62·33. The highest temperature was 79° on the 23rd, and the lowest 33° on the 31st.

September.—The first half of this month was very seasonable, and favourable for harvesting and for the growth of root crops. On the 19th, 20th and 26th, 2·10 inches of rain fell, the balance of the time the weather was fine. The maximum temperature for September was 74° on the 11th and 13th, and the minimum was 32° on the 25th.

October was quite seasonable for the first half of the month, and dull or rainy for the later half. The heaviest rainfall was on the 26th, when ·86 inches fell. From the 25th until the 31st, no sunshine was recorded. The lowest temperature was 25° on the 14th.

November was a dull and rainy month. Sunshine was recorded on only twelve different dates, giving a total of eighty-five hours. Rain fell on ten different dates. the heaviest rainfall being 1·65 inches on the 27th. Frost was registered on the 1st, 2nd, 3rd, 9th, 10th, 13th, 14th, 16th and every night from the 19th to the 25th, the lowest temperature being 17° on the 22nd.

December.—A light snow fell on the 1st, followed by fair but dull weather until the 8th, during which time there was only four hours sunshine.

Three inches of snow fell on the 8th, one inch on the 14th and three inches on the 15th and 25th.

Rain fell on the 19th, 25th and 30th, the heaviest being on the 19th, when ·98 inches fell.

The thermometer registered 6°, 3°, 1°, zero, 2°, 4° and 2° below zero on the 14th, 15th, 16th, 17th, 18th, 19th and 31st respectively.

January was a very fine winter month. The ground was bare until the 27th, when two inches of snow fell, followed by six inches more on the 28th, making sleighing. Rain fell on the 3rd, 9th, and 30th, the heaviest being 1·64 inches on the 3rd.

February was one of the finest winter months ever experienced here. A slight thaw on the 4th of the month brought the mercury from 13° below zero to 43° above, but did not spoil sleighing. No great amount of snow fell (eight inches), but the steady cold weather held what did fall, and sleighing was fairly good all through the month. The thermometer registered below zero on the 1st, 2nd, 4th, 6th, 7th, 12th, 13th, 14th, 15th, 16th, 17th, 20th and 26th, the lowest being 19° below on the 13th. Rain fell on one day only (4th), when ·78 inches was recorded.

March opened with a light snow storm, followed by two fine days, then another light snow. From then until the 15th, the weather was bright and fine with a good amount of sunshine, taking all the snow off and breaking up sleighing. From the 15th on, the weather was broken with rain and snow storms nearly every day. A total of twelve inches of snow fell during this month.

METEOROLOGICAL RECORDS.

Month.	Degrees of Temperature—F.					Sunshine.
1910.	Highest.	Date.	Lowest.	Date.	Mean.	Hours.
April	71·0	7	22·0	29	44·81	170
May	70·0	26	29·0	8	49·25	193
June	77·0	22	31·0	5	55·76	228
July	84·0	10	49·0	6	65·01	323
August	79·0	23	33·0	31	62·33	324
September	74·0	11	32·0	25	54·03	222
October	66·0	6	24·0	22	46·04	118
November	61·0	5	17·0	22	37·09	85
December	50·0	25	— 6·0	14	21·59	65
1911.						
January	54·0	3	—15·0	17	18·12	113½
February	43·0	4	—19·0	13	12·49	170
March	52·0	28	—10·0	7	24·81	201¼
Total No. of hours sunshine	.....	.....	.....	.....	.....	2,212¾

PRECIPITATION.

Month.	Rain-fall.	Snow-fall.	Total Precipitation.
1910.	Inches.	Inches.	Inches.
April	2·92	.....	2·92
May	2·90	.....	2·90
June	3·72	.....	3·72
July	3·13	.....	3·13
August	1·55	.....	1·55
September	3·14	.....	3·14
October	4·14	.....	4·14
November	4·18	.....	4·18
December	1·85	10	2·85
1911.			
January	1·93	9	2·83
February	0·78	8	1·68
March	1·07	12	2·27

Ten inches of snow-fall is reckoned as equivalent to one inch of rain-fall.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON,

Superintendent.

Experimental Station, Cap Rouge, Que. Showing Piggery, Men's Houses, Horse Barn (far away), Paddocks for Colts, Cabins for Swine, etc.
16—p. 346.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC.

REPORT OF G. A. LANGELIER, SUPERINTENDENT.

CAP ROUGE, QUEBEC, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my first report of the operations on the Experimental Station for Central Quebec.

DESCRIPTION OF NEW STATION.

Situation.—The property, formerly known as Stadacona Farm, which was taken over on January 1, 1911, by the Dominion Department of Agriculture, comprises lots 23, 26, 27, 30, 31, of the first concession of Demaure Seigniory, in the parish of St. Félix du Cap Rouge, County of Quebec, and is about nine miles from Quebec City, on the north shore of the St. Lawrence River.

Facilities of access.—The Transcontinental Railway touches the northeastern corner of the property. The Canadian Northern has its station a short distance from the southeastern part of the farm. The Quebec Electric Tramway is being built to Cap Rouge, about one-third of the road having been put into working order last autumn. The market boats come here now and then, and, with very little repairs to one of the many wharves, could bring excursions from the many large parishes situated along the St. Lawrence, both above and below Cap Rouge.

Area.—The farm, which is in a solid block, has an area of about 380 arpents*, of which 185 are in cultivation, 35 used for paddocks and buildings, 25 a steep side hill, 75 in brush, and 60 in forest. All the land is tillable, with the exception of 30 arpents.

Soil.—This is not very fertile and is underlaid at various depths with shale. It varies from a sandy to a heavy clayey loam and is fairly representative of that of a large number of farms in Central Quebec.

Drainage.—About 125 arpents have been drained, though in some places with tiles of too small a diameter. The other 60 arpents in cultivation, which are nearly level, need drainage.

Fences.—All the paddocks, and a few of the fields, are fenced with Page wire. The posts, all good cedar, are fifteen feet apart, and set in concrete where necessary. Four of the fields will have to be fenced this spring.

* The arpent is used both as a measurement of length and of surface. It is equivalent to 191 English linear feet and as a measurement of surface to .8375 of an acre, nearly.

Buildings—They comprise—

(*a*) The Superintendent's house, a brick structure. 52 x 35, with greenhouse, 20 x 14.

(*b*) The foreman's house, 28 x 37.

(*c*) The herdsman's house, 41 x 18.

(*d*) The boarding house, for the men, 30 x 30.

(*e*) The horse stable, 98 x 30, containing 14 box stalls, harness room, feed room.

(*f*) The cattle barn, 151 x 38, equipped with swinging stanchions, individual watering basins, litter carrier, silo.

(*g*) The piggery, 122 x 47, with stone boiler room, feed room, large shed for wintering brood sows.

(*h*) The poultry house, 25 x 33.

(*i*) The implement shed, 80 x 25.

(*j*) The store for tools, etc., 22 x 12.

(*k*) The blacksmith shop, 17 x 8.

(*l*) The ice house, 32 x 16.

(*m*) The Chatham 10,000 lbs. scales, 15 x 16.

Besides these, there is a building 15 x 15, over the well which furnishes water, by gravitation, to the piggery; a shed 12 x 12, in one of the paddocks, for calves; 2 shelters 15 x 15, for mares and colts; 6 cabins 8 x 8, for hogs.

All these buildings, except the Superintendent's house, are red with white trimmings, and present a very pleasing appearance. A few of those which were painted four or five years ago, as the horse barn, the piggery, the foreman's, also the herdsman's, house, would be better for at least one, or perhaps even two, coats of paint.

The floors of the horse stable, cattle barn, piggery, hen house and ice house are of concrete, also the troughs in the piggery as well as the mangers and partitions of bull pens in the cattle barn.

Implements.—There is quite a complete set of these, including grain and turnip drills, potato and corn planters, single, two-furrow sulky, mould board and ditching ploughs, four horse cut away, four horse riding spring tooth, also two horse disc, spring tooth and levelling harrows, twelve-foot riding weeder, one row walking and two row riding cultivators, two mowers (one 7 feet), ordinary and side delivery rakes, hay loader, hay forks (2), grain and corn binders, potato digger, 30 bush. and 50 bush. manure spreaders, Vessot grinder, Smaller cutter with blower, Legaré wood saw, 12 horse-power portable Waterous steam engine, etc.

Accessories.—There is a heavy lorry, a two-horse Chatham wagon, a one-horse Bain wagon, three Scotch carts, a Surrey, express wagon, five sleighs, two carioles, three sets double harness, five sets single harness, U.S. cream separator, besides shovels, picks, axes, and a rather good set of wood and iron working tools.

WORK PLANNED AND IN PROGRESS.

AGRICULTURAL AND LIVE STOCK DIVISION.

Farm work.—Since January 1, the men have been busy cutting, hauling (2½ miles), and storing over two hundred large pieces of ice, keeping the roofs of the different buildings clear of snow, also about one mile of road in good shape. As there are no cattle on the Station this winter, we are getting about twenty-five single loads of manure from Quebec City every week and this has taken quite a lot of work.

Clearing land.—The wood was cut off from four to five acres of land, for fuel, and the place chosen was the nearest to the Transcontinental Railway, a part of the farm which should be cleared next summer.

Horses.—There are three teams of from 2,600 to 3,200 lbs. and a driver of about 1,000 lbs. One of the heavy mares being in foal, we shall require at least five more horses. If French Canadians are to be bred here, it would no doubt be an advantage to buy three or four registered mares this spring so as to begin operations immediately, this being a work which requires considerable time before much information can be gathered. If a couple of the mares were in foal, a good start could be made right away, and as there are two pure-bred stallions in the vicinity of Cap Rouge, the registered mares could be bred this spring, if desired.

Cattle.—There are no cattle on the place at present. As it has been decided to breed French Canadians here, I examined a few herds, under instructions from Ottawa, to pick out some good cows for foundation stock. The breeders will not sell their best at any price, but I hope to be able to gather about a dozen, and trust that you can send to this Station ten or twelve more from the Central Farm.

Swine.—There are six brood sows and a boar, all pure-bred Yorkshires. Four of the sows and the boar are extra good, the latter having won a championship at Toronto. It is expected that eight to ten choice gilts can be picked from this spring's litters, thus forming the nucleus of a select herd.

Sheep.—There are no sheep on the Station at present. However, it is expected that Shropshires will be bred and if a small flock be acquired this spring, we may commence work with this useful but neglected animal. The erection of a sheep barn can be delayed for a couple of years, as a part of the large shed, in the piggery, can be used for the present.

Poultry.—There are two pens of White Wyandottes. This is a very suitable variety, as it takes a strong fowl, with a rather small comb, to withstand the rigour of our climate, in the cold houses now advocated. Two small incubators and two brooders have been ordered, hence useful work can be started immediately in this division.

Bees.—It is important that apiculture be taken up here, as there are quite a number of persons interested in this branch, around Quebec City and in the adjacent counties. It might be well to have this part of the work started here in the coming spring, even if only on a small scale.

HORTICULTURAL DIVISION.

Flower and vegetable seeds were received a couple of weeks ago. The first have been started in flats and pots, in the greenhouse, while the other things will be sown later.

CEREAL DIVISION.

Most of the varieties of oats, barley, wheat, peas, Indian corn, carrots, turnips, mangels, and sugar beets for the trial plots have been received. This work is of special importance here, as our climate precludes the growing of certain kinds of cereals which do very well in other provinces.

MISCELLANEOUS.

Meetings attended.—I attended the Seed Fair, in Quebec City, on January 19th and 20th last, and also the Poultry Show, at the same place, on February 1. Farmers were very much interested at both meetings, and there cannot be the least doubt that increased interest is now being taken in connection with the general advancement of agriculture in this province.

Visitors.—Though at a season when there is not much to be seen, there were quite a number of visitors during the three winter months. I noticed that the persons who came were eager to talk in an unbiassed way about the questions which interested them. Visits from such inquirers are always welcome. I promised some of these men that I would go to their places, next spring or summer, to discuss with them, right on the spot, the problems which they are trying to solve. This appears to be one of the best methods for our district; to bring right to the farmer's home the information he desires. Besides, one is able to give better help, when the exact circumstances and conditions are known and seen.

Correspondence.—From January 1 to March 31, there were received at this Station 390 letters, and 510 were sent.

Temperature.—It rained on January 1st and 2nd; on the 3rd, there was snow; on the 4th, a snow storm; on the 5th, mild in the morning and turning cold in the afternoon; on the 6th, cold and clear; 7th, a terrible north-eastern storm; 8th, milder with snow; 9th, another storm through the night but milder during the day; 10th, another storm, with cold weather; 11th, 12th, 13th, cold and clear; 14th, milder, snow during afternoon; 15th, 16th, 17th, 18th, clear and very cold, down to 23 below zero; 19th, milder, with snow at noon; 20th, cold and clear; 21st, mild, snow; 22nd, 23rd, 24th, 25th, very mild; 26th, mild, and snow; 27th, rain; 28th, snow storm; 29th, clear and cold; 30th, snow storm; 31st, clear and very cold.

February 1st, clear and very cold; 2nd, snow storm, cold; 3rd, clear, milder; 4th, storm from the north-east, mild; 5th, 6th, 7th, very cold; 8th, snow storm during afternoon; 9th, and 10th, mild; 11th, very cold; 12th, 13th, 14th, 15th, 16th, spring weather; 17th, heavy fall of snow; 18th, 19th, 20th, 21st, 22nd, clear and cold; 23rd, light fall of snow; 24th, mild; 25th, mild, snow in the morning; 26th, mild, rain at night; 27th, mild; 28th, clear and very cold.

March 1st, mild and cloudy; 2nd, mild and clear; 3rd, 4th, 5th, clear and very cold; 6th, mild; 7th, very cold; 8th, getting milder; 9th, 10th, 11th, very mild; 12th, snow in morning, light rain in afternoon; 13th, clear and cold; 14th, mild; 15th, mild, snow; 16th, snow storm; 17th, snow storm and very cold; 18th, clear and cold; 19th, milder; 20th, snow storm; 21st, very cold; 22nd, very heavy wind from north-west, milder; 23rd, regular mid-winter day; 24th, gale, accompanied by snow; 25th, clear, getting milder; 26th, very mild; 27th, rain; 28th, snow and gale as in January; 29th, very cold in the morning, milder in the afternoon; 30th, a regular mid-winter storm; 31st, fine in the morning, but turning cold in the afternoon, with a gale from the south-west.

This was a very hard winter; gales, snow storms, and cold being the rule nearly all through. The spring will no doubt be one of the latest in years, as, at the date of writing, the weather is still rigorous, and there is no sign of it getting milder. I do not remember seeing the latter part of March so cold as it was this year.

I have the honour to be, sir,

Your obedient servant,

GUS. LANGELIER,

Superintendent.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF JAS. MURRAY, B.S.A., SUPERINTENDENT.

BRANDON, MAN., March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to present herewith the twenty-third annual report of the Experimental Farm for Manitoba at Brandon, giving the results of experiments undertaken during the past year.

The spring of 1910 in Manitoba opened up unusually early. The snow was all gone in March and work on the land had commenced in a few districts before the first of April. Seeding was quite general by April 2, and the weather up to that date was warm and bright. On the 13th, 14th and 15th, rain interrupted the work and on the 16th nineteen degrees of frost was recorded. This was the commencement of a series of vicissitudes which continued throughout the season and made a record for unfavourable conditions in many parts of Manitoba.

Sharp frosts which occurred at intervals during April and May did considerable damage to early-sown grain and garden crops. The injury was accentuated by persistent high winds which drifted the soil and left the tender plants exposed. An unusually light rainfall in May made the winds the more destructive. Considerable areas of wheat had to be resown as a result of the blowing and freezing.

The last frost of the spring was recorded on June 6, and after that date a period of extreme heat set in and continued with slight interruptions until the middle of August. During June, subsequent to the 10th of the month, the temperature was over 80 on eighteen days, over 90 on nine days and over 100 on four days. On June 20, 102.2 was recorded. To accentuate the effect of the extreme heat, practically no rain fell before the 30th, and a strong wind from the southwest prevailed. Crops of all kinds were practically ruined by these conditions in some districts, and in all parts they were very seriously injured.

July brought little change. The highest temperature of the season, 104.5 was recorded on the 14th. The daily maximum temperature for the month exceeded 70 every day and was over 80 on eighteen days. The rainfall during this period was only two inches and as most of this fell in light showers, its effect was scarcely noticeable.

Harvest was earlier than usual and the crop was quickly and cheaply secured. Good weather prevailed during the threshing season, the only interruption being showery weather in the first week of September.

The northern part of Manitoba had a considerably heavier precipitation than the southern portion and the temperatures, while higher than usual, were not so extreme as farther south. The crops of all kinds in the north were therefore a fairly good average, and in many instances were unusually good. In the extreme south on the other hand there were thousands of acres of crop not worth harvesting that were pastured off or cut with the mower for hay. Where the crops were harvested the yields were very light. This was true even on farms cultivated according to the most approved methods. In the central part of the province, crops varied greatly, but the

yield generally was considerably below the average. Those on stubble were almost invariably light, but on fallowed land they were usually much better, but not invariably so.

Altogether the season has not been a very auspicious one. Many farmers have had little return for their season's labours, and very few have had a full harvest.

The dry weather experienced in the summer continued during the fall, and the soil therefore contains very little moisture for next year's crop. The snowfall however has been unusually heavy, and this will help to furnish moisture for germination and early spring growth.

The first snow fell on November 13, but there was not sufficient for sleighing until the 27th, when there was a fall of fifteen inches. From that date until the end of December ideal winter weather prevailed. January was a month of heavy snowfall, extremely low temperatures and high winds.

CROPS ON THE EXPERIMENTAL FARM.

Work on the land started the first week in April, and wheat seeding was completed before the end of the month. The high winds and the frost during May retarded growth considerably, but did no serious damage to grain crops. The extreme heat of June and July was much more serious in its effects, the crops on stubble and on light land suffering most. The crops on summer-fallowed land withstood the drought best, but even these ripened too quickly, and did not yield as well as was expected from their appearance. Oats and peas suffered more from the heat than did the other grain crops.

Hay crops of all kinds were light, and old meadows on light land were scarcely worth cutting. Alfalfa produced about two tons per acre, which was more than twice as much as was cut from any other hay land.

Corn grew splendidly until about the middle of July, when the continued dry weather began to affect it. The crop was, however, far from a failure as it averaged nine tons per acre. The best yield was secured from four acres planted in hills forty inches apart each way. Turnips and mangels were greatly benefited by the rain early in September and yielded over twenty tons per acre.

The fruit crop was almost a complete failure as the trees and bushes were in full bloom when the May frosts were experienced. A light crop of currants and of strawberries was produced, but even these were injured by the drought and heat.

Garden vegetables were a good crop in spite of the untoward conditions. Thorough cultivation throughout the season was the secret of their success. Potatoes were a fair crop, and were secured in good condition.

The first frost was recorded on August 31. Grain crops were all secured before that date, but corn and tender vegetables were slightly injured.

EXPERIMENTS WITH WHEAT.

Spring Wheat—Test of Varieties.

Fourteen varieties were sown this year in uniform plots of one-twentieth of an acre. The soil was a heavy clay loam that had been fallow in 1909, and was in excellent condition at the time of sowing—April 26. Germination was uniformly good and the early growth satisfactory. The frequent frosts during May did no serious damage, as the grain recovered quickly. The growth of straw was not so rank as usual, and there was practically no lodging or rust.

Seed was used in the proportion of one and one-half bushels per acre.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Ins.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	White Fife	Aug. 17	113	40	10	3½	2,740	45	40	63·4
2	Bishop	" 8	104	40	10	3	2,690	44	50	62
3	"Registered" Red Fife	" 17	113	43	9	3¼	2,680	44	40	63
4	"Regenerated" Red Fife	" 17	113	40	9	3¼	2,640	44	00	62
5	Marquis	" 10	106	38	10	3	2,560	42	40	63
6	Red Fife "H"	" 14	110	39	9	3¼	2,500	40	40	62
7	Preston	" 12	108	40	10	3¼	2,180	39	40	62·3
8	Riga	" 9	105	40	10	3	2,360	39	20	61
9	Chelsea	" 10	106	35	9	3½	2,300	38	20	62
10	Early Red Fife	" 12	108	38	10	3	2,300	38	20	60
11	Pringle's Champlain	" 12	108	37	10	3¾	2,250	37	30	62
12	Stanley	" 12	108	39	9	3½	2,180	36	20	60
13	Smith's Early Red Fife	" 10	106	38	10	3	2,160	36	10	61
14	Huron	" 13	109	39	10	3½	2,390	29	50	62

Five strains of Red Fife wheat are included in this table. The 'Registered' Red Fife was secured three years ago from a member of the Canadian Seed Growers' Association and has been grown here since then with very good results. The average yield for three years was 39 bushels 48 lbs. per acre, while the average of Red Fife 'H' for the same period was 40 bushels 46 lbs.

Early Red Fife is a strain of Red Fife selected for earliness by the Dominion Cerealist. It was grown on this Farm for the first time in 1909, when it yielded 34 bushels 17 lbs. per acre and ripened two days earlier than Red Fife 'H,' and yielded 2 bushels 10 lbs. less per acre. The only objection to this strain is that it is subject to rust. It has been much worse affected with rust both years it has been grown here than any other variety.

Smith's Early Red Fife is a selection of Red Fife made by Geo. A. Smith, Saskatoon. It ripened four days earlier than Red Fife 'H' but yielded 4 bushels 30 lbs. less per acre.

'Regenerated' Red Fife was secured from the Garton Pedigree Seed Co., Winnipeg.

SPRING WHEAT—Test of Varieties.

AVERAGE OF FIVE YEARS.

The following table gives the average yield and the average number of days maturing of six of the leading varieties of wheat.

Variety.	Average days Maturing.	Average Yield.	
		Bush.	Lbs.
Preston	111	42	58
White Fife	117	41	28
Red Fife	115	41	16
Huron	112	38	4
Stanley	112	37	58
Marquis (for three years)	107	45	3

Marquis has been tested for three years only and has given an average of 45 bushels 3 lbs. per acre for that period, as compared with 44 bushels 46 lbs. for Preston, 42 bushels 46 lbs. for White Fife, and 40 bushels 45 lbs. for Red Fife, for the same period.

FIELD CROPS OF SPRING WHEAT.

Five varieties of spring wheat were sown in field lots last year. The yields are not comparable as neither the soil nor the cultivation was uniform for the different lots. The dry weather and extreme heat affected all the yields but the summer-fallowed land had a considerable advantage. Some of the corn stubble also gave excellent results.

The earlier-ripening varieties were mostly seriously affected by the heat as they were heading during the hottest weather, and were not greatly benefited by several showers which came late in July. The yield of Marquis wheat last year was disappointing as compared with the splendid results from this variety in 1909. The low yield last year was not due to any inherent peculiarity of the variety but to the exigencies of the season. Nine acres of Marquis were sown on land which had been broken out of brome grass in the spring of 1909, and backset in August. The soil was dry when it was backset and it was never properly moistened afterwards. The consequence was that the crop of wheat made a poor start, and as it had to combat a considerable growth of brome grass the returns were very poor. The Marquis on corn stubble yielded much less than Red Fife on land in similar condition but this was due to the Marquis being more advanced during the hottest weather.

The straw of all varieties was comparatively short and there was no lodged grain except in the White Fife. Early Red Fife was considerably rusted.

Spring Wheat—Field Lots.

AVERAGE AND TOTAL YIELDS.

Variety.	Soil preparation.	No. of Acres.	Yield per Acre.	Total Yield.	Weight per measured bushel after cleaning.
			Bush.	Bush.	Lbs.
White Fife	Summerfallow	7	34	238	61·7
Preston	"	4	32	128	58·5
Early Red Fife	"	4	27	108	60·5
Red Fife "H"	Corn stubble	6	34	204	62
"	Second crop after corn	6	20	120	62
"	Fall ploughed stubble	14	12	168	62
Marquis	Corn stubble	7	15	105	
"	Backsetting	9	10½	94½	
Total				1,165½	

A considerable quantity of this wheat was sent to the Central Experimental Farm, to be distributed in small samples throughout the country. The balance, except that required for seed, was sold in lots of from two to five bushels to farmers in Manitoba.

STANDARD AND COMMERCIAL GRADES OF WHEAT.

An experiment has now been under way for three years to determine the comparative value for seed of the various standard and commercial grades of wheat.

Samples of each of the grades were secured from the Chief Inspector of Grain at Winnipeg, and these were sown under uniform conditions of soil on plots of one twentieth of an acre, and the yields determined.

The results for the three years have been reduced to an average and are presented in the following table.

Grade.	Average Yield per Acre for Three Years.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
No. 1 Hard	40	7	61
No. 1 Northern	40	..	61
No. 2 Northern	40	7	60¾
No. 3 Northern	38	40	60½
No. 4	38	17	6 ½
No. 5	37	31	60½
No. 6	33	54	60
Feed	30	21	60

It will be noted that there is an almost steady decrease in yield from No. 1 Hard to Feed. No. 2 Northern is the only exception to this rule. This grade is always sound and fairly plump and it may be graded down merely on account of colour.

The difference in yield per acre between No. 1 Hard and Feed is 9 bushels 46 lbs. and the difference in weight per bushel one pound. If there is so great a difference

in yield where the land is in excellent tilth it is only reasonable to assume that there would have been a greater difference with soil in poor condition.

WINTER WHEAT.

Winter wheat has been grown repeatedly on this Farm, but a successful crop was harvested for the first time last year.

Seed of Kharkov wheat was secured from the Experimental Farm at Lethbridge, Alberta, in 1909, and two sowings were made,—the first on August 26, and the second on October 4. The first came up soon after sowing and covered the ground well in the fall. There was no rain after the second sowing and practically none of it came up in the fall.

The plots were all covered with snow until the middle of March. As soon as the snow disappeared the late-sown plots came up and all of them made excellent growth. The plot sown with 90 lbs. of seed per acre on August 26, suffered considerably from winter-killing on account of a very heavy bank of snow.

The plots were one-fortieth of an acre.

WINTER WHEAT.

Rate of Seeding.	Sown Aug. 26th.		Sown Oct. 4th.		Weight per measured bushel after cleaning.
	Yield per Acre.		Yield per Acre.		
Lbs.	Bush.	Lbs.	Bush.	Lbs.	Lbs.
90	17	12	47	32	62
60	42	17	47	15	62
30	53	22	44	20	62

A number of plots of Kharkov and one plot of Azima winter wheat were sown last fall and a good stand secured before winter set in. The plots are in the middle of a large field but have been well covered with snow throughout the winter.

SMUT PREVENTATIVES.

The stinking smut of wheat and the loose smut of oats and barley are more or less prevalent throughout Manitoba every year, but in 1910, there was very little loss from this cause. In view of the fact that these diseases can be controlled by any farmer by properly treating his grain before sowing, and as many continue to neglect this treatment each year or perform it in an inefficient manner, it has been considered advisable to repeat what was said in last year's report on this subject.

'During the past twenty years various chemicals have been tested to secure one for the prevention of smut in grain crops. Little difficulty has been experienced in controlling this disease in wheat or in oats, but no practicable method has yet been introduced that will entirely prevent it in barley. The formalin treatment has been found, after numerous trials, to be highly satisfactory. Formalin can now be secured almost anywhere; it is inexpensive, the solution is easily prepared, and its efficiency when properly applied is beyond doubt. One pound of formalin is sufficient to make thirty-two gallons of solution, and this quantity will easily cover forty bushels of

wheat, or about twenty-eight of oats. Dipping and sprinkling have given equally good results, but carelessness in either method of treatment is sure to bring disappointment.

'Bluestone has been found effective as a reagent for destroying smut, but its use has not been attended with quite as satisfactory results as formalin. A bluestone solution of the proper strength is prepared by dissolving one pound of bluestone in six gallons of soft water. As with the formalin solution, it makes no difference how this solution is applied so long as every kernel of grain is thoroughly moistened.

'Other treatments that have been on trial, as preventatives of smut, include those with sulphide of potassium, sulphate of iron, agricultural bluestone, massel powder, anti-fungi, salt, and hot water. None of these has proven to be nearly as effectual as either formalin or bluestone. The hot water treatment and the sulphide of potassium both effectively prevented the disease, but the methods of application are too tedious to permit of either treatment coming into general use. Agricultural bluestone and anti-fungi are both mixtures of copper sulphate and iron sulphate, and their effectiveness is dependent upon the proportion of sulphate of copper that they contain, sulphate of iron being of little value as a fungicide.'

The loose smut of wheat is a distinct disease from the stinking smut and cannot be controlled by formalin or bluestone. The only sure method for it yet discovered is what is known as the 'hot water treatment.' For this treatment the grain is placed in a bag and immersed in water at about 115° F. After it is well warmed through it is placed in water which is kept at a temperature between 130 degrees and 135 degrees F. The grain should be stirred occasionally and allowed to remain in the water for fifteen minutes. Afterwards it should be spread on a clean floor to dry.

While this treatment is effective in killing the smut spores it is not adapted to being used in general farm practice as it is very slow and requires to be very carefully performed.

TREATMENT OF SMUT, 1910.

Five methods of treatment of stinking smut of wheat were tried during the past season. The bluestone and formalin solutions were prepared as outlined above, and Cooper's dressing, which is put up by Wm. Cooper & Nephews, was prepared according to directions on the package. A fairly smutty sample of Huron wheat was used. Before the grain was harvested a careful count was made of the number of good heads and of smutted heads in nine feet of row, three feet in each of three different parts of the plot.

The plots were of one-twentieth of an acre.

Treatment.	No. of Heads in Nine Feet of Row.		Yield per Acre.	
	Good.	Smutted.		
			Bush.	Lbs.
Formalin (sprinkled)	182	0	42	30
Bluestone (Copper Sulphate), sprinkled	185	0	42	..
" " " dipped	187	0	41	40
Formalin (dipped)	169	0	40	50
Cooper's Dressing	186	3	40	10
Not treated	170	41	39	..

EXPERIMENTS WITH OATS.

The dry, hot season was very unfavourable for the oat crop and the yields were quite disappointing. Land which would have yielded eighty bushels per acre in an ordinary year, produced only thirty-five, and the best crops yielded only sixty-five bushels per acre. All the crops made good progress until the middle of June, but after that date they suffered for want of rain.

OATS—TEST OF VARIETIES.

Twenty-three varieties of oats were grown in uniform plots of one-twentieth of an acre. The land was a heavy clay loam that had been summer-fallowed in 1909.

The seed was sown May 14, at the rate of two bushels per acre. The crop grew splendidly in spite of the heat and drought until the middle of July, but ripened too quickly to give a high yield.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.			Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Banner	Aug. 17	95	40	10	8	3,030	90	20	37·6
2	Registered Banner	" 18	96	41	10	8	3,050	89	24	37
3	Irish Victor	" 17	95	38	10	8½	3,030	89	4	37
4	Golden Beauty	" 21	99	38	9	7½	3,030	89	4	38
5	Improved American	" 18	96	40	10	8	2,980	87	22	39
6	Abundance	" 18	96	38	10	8	2,940	86	16	37·3
7	Siberian	" 17	95	39	10	8	2,870	84	14	38
8	Danish Island	" 18	96	40	10	8	2,860	84	4	38
9	White Giant	" 21	99	40	10	8	2,840	83	18	37·5
10	Swedish Select	" 17	95	38	10	7	2,790	82	2	39
11	Thousand Dollar	" 17	95	38	10	7½	2,780	81	26	39·2
12	Pioneer	" 22	100	42	10	8	2,770	81	16	37·5
13	Virginia White	" 17	95	35	10	7	2,770	81	16	37·6
14	Gold Rain	" 16	94	39	10	7½	2,750	80	30	42·5
15	'Regenerated' Abundance	" 17	95	37	10	7½	2,740	80	20	40
16	Twentieth Century	" 17	95	38	10	8	2,710	79	24	39·2
17	Victory	" 18	96	39	10	7	2,700	79	14	42
18	Lincoln	" 19	97	39	10	8	2,650	77	32	39
19	Wide Awake	" 19	97	40	10	8	2,590	76	6	39·5
20	Improved Ligowo	" 14	92	35	10	6½	2,510	73	28	39·5
21	Alsasman	" 16	94	36	10	7½	2,430	71	16	40·5
22	Daubeney	" 10	88	31	10	6	2,360	69	14	34·6
23	Orloff	" 9	87	29	10	6	2,160	63	18	34

Pioneer is the only black variety in the above table.

Golden Beauty, Gold Rain, and Orloff are yellow, while Daubeney is mixed yellow and white.

Gold Rain and Victory, which were grown here for the first time, are Swedish varieties produced by Dr. Neilson, Svälof, Sweden.

Daubeney and Orloff are very early varieties suited only to special conditions.

OATS—Test of Varieties.

AVERAGE YIELD FOR FIVE YEARS.

The following table gives the average yield of a number of the leading varieties of oats for the past five years.

Variety.	Average Days Maturing.	Average Yield per Acre.	
		Bush.	Lbs.
Banner	100	111	16
Improved American	100	111	13
Danish Island	101	110	29
White Giant	101	107	9
Golden Beauty	103	103	26
Siberian	100	102	11
Abundance	101	99	29
Thousand Dollar	99	98	11

FIELD CROPS OF OATS.

The yield of oats varied greatly on different fields according to the moisture that was available for the crop. Summer-fallowed land gave the best returns, but this was much below a normal yield on such land.

Variety.	Soil Preparation.	No. of Acres.	Yield per Acre.	Total Yield.	Weight per Measured bushel after cleaning.
			Bush.	Bush.	Lbs.
Banner	Summer-fallow	6	48	288	39
Banner	Fall ploughed stubble	6	32	192	39
Banner	Fall ploughed stubble	36	30	1,080	39
Banner	Spring ploughed stubble	4	35	140	39
Thousand Dollar	Summer-fallow	6	66	396	40·3
Daubeney	Summer-fallow	2	44	88	38·5
Total				2,184	

EXPERIMENTS WITH BARLEY.

Ten varieties of six-row and ten varieties of two-row barley were sown on May 26 on uniform plots of one-twentieth of an acre. The land was heavy clay loam that had been summer-fallowed in 1909. Two bushels of seed was sown per acre.

BARLEY, SIX-ROW.—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Yale	Aug. 16	82	32	10	2½	2,620	54	28	49·5
2	Odessa	" 17	83	30	8	2½	2,410	50	10	49
3	O.A.C. No. 21	" 14	80	32	10	2½	2,410	50	10	47
4	Mansfield	" 15	81	30	10	2¼	2,250	46	42	48
5	Mensury	" 16	82	32	10	2½	2,140	44	28	47
6	Oderbruch	" 15	81	30	10	2½	2,050	42	34	52·2
7	Nugent	" 18	84	30	10	2¾	2,010	41	42	51
8	Trooper	" 18	84	29	10	2½	2,010	41	42	50·8
9	Albert	" 16	82	28	10	2¾	1,890	39	18	52
10	Claude	" 17	83	29	10	2½	1,880	39	8	50

BARLEY, TWO-ROW.—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Hannchen	Aug. 19	85	29	9	3	3,108	64	36	52
2	Danish Chevalier	" 21	87	30	5	3	2,950	61	22	51·2
3	Canadian Thorpe	" 18	84	36	9	2¾	2,940	61	12	52·5
4	Swedish Chevalier	" 19	85	33	7	3½	2,890	60	10	52
5	Standwell	" 18	84	33	7	2½	2,530	52	34	52
6	Invincible	" 21	87	34	9	3	2,430	50	30	51
7	Jarvis	" 17	83	37	9	3¼	2,516	50	20	51·7
8	Clifford	" 18	84	31	9	3	2,350	48	46	51
9	Beaver	" 17	83	32	10	3¼	2,070	43	6	52
10	French Chevalier	" 19	85	31	10	3	1,990	41	22	51·6

O.A.C. No. 21 is a selection of Mandscheuri made at the Ontario Agricultural College, Guelph, Ont. It has been grown here for three years and seems to be a good yielder and to have a particularly stiff straw.

Hannchen was grown here for the first time in 1910. This was obtained from Dr. Neilson, Svälof, Sweden.

BARLEY—Test of Varieties.

AVERAGE YIELD FOR FIVE YEARS.

The following table gives the average yield and the average number of days maturing for several of the leading varieties of barley for the past five years.

SIX-ROW BARLEY.

Variety.	Average Days Maturing.	Average Yield per Acre.	
		Bus.	Lbs.
Odessa	85	61	30
Yale	85	60	28
Mensury	85	59	46
Mansfield	85	58	4
O.A.C. No. 21 (three years)	84	60	..

TWO-ROW BARLEY.

Variety.	Average Days Maturing.	Average Yield per Acre.	
		Bus.	Lbs.
Swedish Chevalier	90	59	10
Canadian Thorpe	88	58	14
Jarvis	88	57	30
Standwell	84	57	26

FIELD CROPS OF BARLEY, 1910.

Variety.	Soil Preparation.	No. of Acres.	Average Yield.	Total Yield.	Weight per Measured Bushel after Cleaning.
			Bus.	Bus.	Lbs.
Mensury	Wheat stubble, spring ploughed	8	35	280	47
"	Pea land, surface cultivated	8	35	280	47
"	Oat stubble, fall ploughed	8	11	88	47
"	Summerfallow	5	41	205	47
"	Barley stubble, spring ploughed	2	31	62	47
Odessa	Barley stubble, fall ploughed	9	34	306	47
O.A.C. No. 21	Root land, fall ploughed	1	34	34	50
	Total	.....	.....	1,255	

EXPERIMENTS WITH PEAS.

The pea crop is not grown as extensively in Manitoba as its value warrants. It is probably the most valuable annual leguminous crop that we can grow. Like the other legumes, it is able to utilize the nitrogen of the air in its growth and stores considerable of it in its roots. This goes to enrich the land when the crop is removed. It is a rank-growing crop and might be used to advantage in this province as a green crop to plough down to increase the humus of the soil, as clover does not attain sufficient size in one season here to make it valuable for that purpose. Peas will produce an

immense growth in from eight to ten weeks and analyses prove that the growth contains about 130 lbs. of nitrogen per acre. A considerable proportion of this is undoubtedly from the atmosphere.

The pea crop is also valuable when ripened. The grain is very rich in protein and when mixed with other grains, is a very valuable feed for milch cows and hogs. The straw, if cut before thoroughly ripe, is excellent for sheep feed.

When grown for feed, peas are best sown mixed with oats at the rate of three bushels per acre, equal parts by weight. They may then be cut with the binder. This mixture also makes an excellent soiling crop for milch cows for the early part of the summer.

When grown alone, they are best harvested with the pea harvester attachment to the mower.

PEAS—TEST OF VARIETIES.

Thirteen varieties of peas were grown on uniform plots of one-twentieth of an acre. The land was a clay loam that had been summer-fallowed in 1909. The seed was sown April 27, at the rate of from 2 to 3 bushels per acre according to the size of the pea. Germination was uniformly good but when the peas were a few inches high a succession of strong winds did considerable damage to them, particularly at the ends of the plots. This checked the growth for some time and no doubt affected the yield.

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.	Inches.	Lbs.	Bus.	Lbs.	Lbs.
1	Mackay	Medium	Aug. 27	118	36	2	2,390	39	50	63
2	Paragon	"	" 30	120	34	2¼	2,370	39	30	63
3	Prince	"	" 30	121	32	2¼	2,190	36	30	62
4	Picton	"	" 30	120	38	2	2,080	34	40	64
5	Gregory	"	" 29	119	34	2	1,980	33	00	63
6	English Grey	"	Sept. 2	123	53	2¼	1,870	31	10	61
7	Golden Vine	Small	" 2	123	34	2	1,720	28	40	64
8	Black-Eye Marrowfat	Large	" 8	129	50	2½	1,590	26	30	62.5
9	Prussian Blue	Medium	Aug. 28	118	34	2½	1,560	26	00	63.5
10	Daniel O'Rourke	Small	Sept. 1	112	32	2	1,500	25	00	63.5
11	Arthur	Medium	Aug. 26	121	33	2¼	1,500	25	00	64
12	Chancellor	Small	" 27	117	30	2¼	1,350	22	30	64.5
13	White Marrowfat	Large	Sept. 7	118	60	2½	1,020	17	00	63.5

MIXTURES OF GRAIN FOR GRAIN PRODUCTION.

In growing grain for feed, the object should be to produce as much as possible per acre. An experiment was started in 1909 to secure some information on the relative values of various mixtures of the coarse grains for the production of feed as compared with oats, barley and peas sown alone.

The varieties used were Daubeney oats and Mensury barley for the oat and barley mixtures; Banner oats and Arthur peas and Mensury barley for the other mixtures.

The following table gives the average yield per acre for 1909 and 1910:—

Mixtures of Grain.	Yield per Acre.
	Lbs.
Oats, 2 bush., Peas, ½ bush	3,030
Oats 1½ bush., Peas, ½ bush	2,900
Oats, 1 bush., Barley, 1 bush	2,720
Oats, 1½ bush., Barley, ½ bush	2,710
Oats, 1 bush., Barley, 1 bush., Peas, 1 bush	2,655
Oats, ½ bush., Barley 1½ bush	2,645
Oats, 1 bush., Barley, 1½ bush	2,595
Oats, 1½ bush., Barley, 1½ bush.	2,530
Banner oats, 2 bush	3,420
Mensury barley, 2 bush	2,251
Daubeney oats, 2 bush	2,360
Arthur peas, 3 bush	1,872
For one year—	
Oats, 1½ bush., Peas, ½ bush	2,780
Oats, ½ bush., Barley, 1 bush	2,400
Oats, ½ bush., Peas, 1 bush	2,220
Oats, ½ bush., Peas, 2 bush	2,130
Oats, ½ bush., Barley, 2 bush	2,120

EXPERIMENTS WITH FIELD ROOTS.

Field roots are not grown extensively in Manitoba, but the acreage is gradually increasing from year to year. The long winter makes the use of such feed as roots almost essential, if stock are to be kept in thrifty growing condition. For pigs, young cattle and milch cows, they are particularly desirable.

Such large crops of roots cannot be expected in Manitoba as in districts of greater rainfall, but when suitable soil conditions are provided and thorough cultivation given, a good crop is assured every year. Turnips will probably continue to be grown most largely as they are less easily injured by frost in spring or fall than mangels or sugar beets. When saved without frost, mangels and sugar beets will keep better than turnips and are more relished by cattle and hogs.

As roots thrive best in cool moist seasons, a heavy yield could not be expected after such a hot, dry summer as prevailed here last year. Turnips were a fairly good crop as they were materially benefited by rain in the first week of September.

Two sowings were made in 1910, the first sowing giving the best results as usual. Sowing on the flat was practised on account of the ground retaining the moisture better than when drilled.

EXPERIMENTS WITH TURNIPS.

Nine varieties of turnips were sown on clay loam that had been in potatoes the previous year. The first sowing was made May 10, and the second sowing May 21, and both were pulled October 17. The rows were thirty inches apart and the young plants were thinned out to about nine inches apart in the row. The yield per acre in each case was estimated from the product of two rows, each 66 feet long.

TURNIPS—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Magnum Bonum	May 10	May 21	Oct. 17	Oct. 17	17	1,904	598	24	13	400	440	..
2	Perfection Swede	" 10	" 21	" 17	" 17	17	1,614	594	00	12	288	404	48
3	Hartley's Bronze	" 10	" 21	" 17	" 17	17	1,376	589	36	17	848	580	48
4	Jumbo	" 10	" 21	" 17	" 17	17	1,112	585	12	12	1,872	431	12
5	Good Luck	" 10	" 21	" 17	" 17	17	320	572	..	22	88	734	48
6	Carter's Elephant	" 10	" 21	" 17	" 17	16	1,528	570	23	13	136	435	36
7	Hall's Westbury	" 10	" 21	" 17	" 17	15	1,944	532	24	19	280	638	00
8	Halewood's Bronze Top	" 10	" 21	" 17	" 17	13	928	448	48	16	528	558	48
9	Mammoth Clyde	" 10	" 21	" 17	" 17	9	480	308	..	13	1,984	466	24

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were sown under uniform conditions. The land was a clay loam that had grown potatoes in 1909.

The first sowing was made May 21, and the second June 3. Both lots were pulled October 10. The rows were thirty inches apart and the young plants were thinned out to about nine inches apart in the row. The yield per acre in each case was estimated from the product of two rows each 66 feet long.

MANGELS—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Selected Yellow Globe	May 21	June 3	Oct. 10	Oct. 17	21	240	704	..	15	624	510	24
2	Prize Mammoth Long Red	" 21	" 3	" 10	" 17	19	1,6..	660	..	15	360	506	..
3	Perfection Mammoth Long Red	" 21	" 3	" 10	" 17	18	1,488	624	48	13	1,984	466	24
4	Half Sugar White	" 21	" 3	" 10	" 17	17	1,904	598	24	16	472	541	12
5	Gate Post	" 21	" 3	" 10	" 17	14	1,832	497	12	15	888	514	48
6	Giant Yellow Globe	" 21	" 3	" 10	" 17	14	1,040	484	..	10	1,912	365	12
7	Yellow Intermediate	" 21	" 3	" 10	" 17	13	1,192	453	12	13	960	616	..
8	Giant Yellow Intermediate	" 21	" 3	" 10	" 17	9	480	308	..	10	1,912	365	12

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were grown under uniform conditions, on land which had produced potatoes in 1909. The rows were thirty inches apart and the plants were thinned out to about 6 inches apart in the row. The first sowing was made May 21 and the second June 3. Both lots were pulled October 10.

Samples of each variety were forwarded to Mr. Frank Shutt, Dominion Chemist. for analysis, and the results are given in the table.

The yield per acre in each case was estimated from the product of two rows each 66 feet long.

SUGAR BEETS—Test of Varieties.

Number.	Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Sugar in Juice.	Solids in Juice.	Co-efficient of Purity.
		Tons.	Lbs.	Tons.	Lbs.	p.c.	p.c.	
1	Klein Wanzleben.	13	1,192	10	328	18·87	22·09	85·4
2	Vilmorin's Improved.....	12	552	9	1,536	19·23	21·89	87·8
3	French Very Rich.....	8	1,424	6	1,290	17·11	22·17	77·1

EXPERIMENTS WITH CARROTS.

Five varieties of carrots were sown under uniform conditions on land which had produced potatoes in 1909. The carrots were sown in rows 18 inches apart, and the young plants were thinned out to about four inches apart in the row.

The first sowing was made May 10 and the second May 21. Both lots were pulled October 25. The yield per acre in each case was estimated from the product of two rows each 66 feet long. The dry season very seriously affected the yield.

CARROTS—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.		2nd Plot Sown.		1st Plot Pulled.		2nd Plot Pulled.		Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot		Yield per Acre. 2nd Plot	
										Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White.....	May	10	May	21	Oct.	25	Oct.	25	5	1,000	183	20	5	1,440	190	40
2	Mammoth White Intermediate	"	10	"	21	"	25	"	25	5	120	168	40	5	1,880	198	..
3	Ontario Champion.....	"	10	"	21	"	25	"	25	4	1,680	161	20	2	1,280	88	..
4	White Belgian	"	10	"	21	"	25	"	25	4	800	146	40	3	1,480	124	40
5	Half Long Chantenay	"	10	"	21	"	25	"	25	4	800	146	40	3	1,920	132	..

HOME GROWN ROOT SEED.

In the fall of 1908 a number of roots of several good varieties of turnips and mangels were saved and planted out the following spring. Most of the roots produced seed. which ripened and was harvested before severe frost in the fall.

Last spring a row of each variety of seed was sown under the same conditions as the varieties grown from commercial seed; the balance of the seed was used for sowing field lots.

The following table gives the yield per acre from the home grown seed and from commercial seed of the same variety.

HOME GROWN AND COMMERCIAL ROOT SEED.

Variety.	Commercial Seed.		Home Grown Seed.	
	Tons.	Lbs.	Tons.	Lbs.
Good Luck Turnip	17	320	16	1,000
Hall's Westbury Turnip	15	928	15	96
Yellow Intermediate Mangel	13	1,192	14	512
Half Sugar White Mangel	17	1,904	27	1,176

The difference in yield is very little, except with one variety.

A notable feature of the home grown mangel seed was that it germinated quicker and more uniformly than the commercial, the young plants appearing three or four days earlier. The commercial seed was sown thickly enough to give a good stand, so that the high vitality of the home-grown seed is not indicated in the yield per acre.

In the seed year, two varieties of mangels were planted side by side and therefore cross-fertilized. This was evident when the roots were produced this year, the distinctive colours of the two varieties being considerably mixed in each lot. A selection of roots of Half Sugar White was made in the fall of 1910 from the product of the home-grown seed. Roots uniform in shape and of good size were chosen, and these will be planted out next spring. In a favourable season mangels produce seed very abundantly and a dozen roots will easily produce sufficient seed to sow an acre.

EXPERIMENTS WITH POTATOES.

Potatoes were rather a light crop last year but they were of good quality and there was no loss from rot or other causes.

The variety tests were conducted on land which had produced a crop of turnips in 1909, and had been manured and ploughed in the fall after the roots were harvested. They were given thorough cultivation throughout the summer and were hilled up slightly about the first of August.

The potato beetles were particularly numerous but were controlled by spraying with Paris green.

Twenty-three varieties were grown. They were planted May 23, in rows three feet apart, the sets being placed about a foot apart in a row. They were dug October 5.

The yield per acre in each case was estimated from the product of one row 66 feet long.

POTATOES—Test of Varieties.

Number.	Name of Variety.	Average Size.	Total yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Manitoba Wonder	Medium	436	20	381	20	55	..	Pink.
2	Morgan Seedling	"	418	..	381	20	36	40	Light pink.
3	Empire State	Large	410	50	385	10	25	40	White.
4	Carman No. 1	"	407	40	377	40	29	20	White.
5	Money Maker	"	405	10	374	..	31	10	Long, white.
6	Late Puritan	"	377	40	352	..	25	40	Long, white.
7	American Wonder	Medium	370	20	348	20	22	..	Long, white.
8	Gold Coin	Large	353	50	339	10	14	40	White.
9	Reeves' Rose	Medium	348	20	330	..	18	20	Pink.
10	Everett	Small	341	..	304	20	36	40	Light pink.
11	Early White Prize	"	341	..	304	20	36	40	White.
12	Ashleaf Kidney	Large	339	10	326	20	12	50	Round, white.
13	Early Ohio	"	337	20	315	20	22	..	Pink.
14	Peacock's Surprise	Medium	289	40	271	20	18	20	Long, russet.
15	Irish Cobbler	Small	289	40	264	..	25	40	Round, white.
16	Hamilton's Early	"	278	40	249	20	29	20	Round, white.
17	Rochester Rose	"	275	..	245	40	29	20	Round, pink.
18	Dreer's Standard	Medium	264	40	245	40	18	20	Round, white.
19	Vick's Extra Early	Small	212	40	179	40	33	..	Round, white.
20	Woodbury's White Rose	"	205	20	190	40	14	40	Long, white.
21	Factor	"	183	20	157	40	25	40	Round, white.
22	Hard to Beat	"	157	40	124	40	33	..	Flat, white.
23	Dalmeney Beauty	"	135	40	113	14	22	..	Yellowish-white

CROP ROTATIONS IN MANITOBA.

Since the settlement of Manitoba thirty years ago it has been known as a grain producing province. The virgin condition of the prairie permitted the land to be brought under cultivation at little expense, and the acreage in cereals increased rapidly. A soil more than usually rich in plant food and a climate particularly suitable enabled more grain growing to be continued for many years at a profit.

An abundance of hay in sloughs and on unoccupied land rendered unnecessary the cultivation of hay crops, and, as little stock was kept, pasture was easily secured. The bulk of the land held by every farmer was therefore available for grain growing.

When the soil was new, manure was not required. Later, when it should have had a good effect, a too liberal application often had a deleterious instead of a beneficial result on account of the soil being dried out. The use of manure was, therefore, in many cases abandoned.

The control of weeds was, from the first, one of the problems which annually pressed for solution. The summer-fallow was most generally used for this purpose, and in the case of most weeds with good results. Good crops, comparatively free from weeds, usually succeeded the fallow for a few years. When weeds again became numerous the same remedy was applied.

This system of farming has in large measure been continued up to the present, although of late years there has been a tendency on the part of some farmers to adopt other systems. For this change there are several causes. The continual removal of grain crops from the land with nothing added to counteract the effect, has resulted in the soil being gradually impoverished and less able to produce abundant crops. The continued cultivation and the exposure of the soil to the sun and air by summer-fallowing has had the effect of working the fibre out of the soil and depleting the humus, thus making it much more liable to blow, more difficult to work, and less con-

genial to growing plants. The incursions of weeds of various kinds not easily destroyed by summer-fallowing have also had the effect of directing attention to a more diversified system of farming.

The effect of continuous grain growing with little or nothing being returned to the soil must become more marked from year to year. The length of time that it can be continued profitably depends on various factors, chief among which are the nature of the soil, its virgin store of plant food and the thoroughness of cultivation from year to year.

A rich clay soil is capable of producing, when handled to best advantage, many more crops than a light soil, but the most productive must ultimately fail to be profitable when no return is made to it to counterbalance the constant drain of fertility through the removal of grain crops.

A solution of the problem lies in the adoption of a system of crop rotation, that will gradually year by year make the land more productive and at the same time enable the margin of profit to be increased.

A crop rotation is simply an arrangement of the various farm crops which repeats itself each time the course is run. A rotation may be of any duration, two, three, four, five, up to ten years or more. Most rotations however are of less than ten years.

The kind of rotation that should be adopted on any given farm will depend on the class of farming followed, and the nature of the soil. In arranging a rotation a knowledge of the food requirements of the various kinds of crops is essential in order that they may succeed one another to the best advantage. For example such crops as corn, roots and hay require an abundance of nitrates for building stem and leaf and can therefore make excellent use of manure, whereas cereal crops can do with less nitrates and may follow a corn or root crop. The planning of the rotation resolves itself into arranging the three classes of crops, cereals, grass and hay crops, and cultivated crops to the best advantage for the system of farming followed, and to suit the particular farm.

Since cereal farming is bound to be the chief branch of farming in Manitoba for many years yet, it follows that rotations suitable for adoption here must provide for a considerable acreage in grains. The proportion of pasture, hay and cultivated crops will depend upon the amount of stock to be provided for. On some farms there is sufficient rough land for pasture, and on such a farm no provision requires to be made in the regular rotation for a pasture crop.

Just what rotations are suitable for conditions in this province is as yet an unsettled question, but one which is deserving of close study. In order to get some definite information a start was made some years ago in putting a number of rotations into practice on parts of this Farm and now most of the cultivated land has been put under one or other of a number of test rotations. An outline follows of each of the rotations on trial—

ROTATION A.

Six years, wheat, oats, hay, pasture, corn and roots. An area of 38 acres divided into six fields is devoted to this rotation.

1st year.—*Wheat* sown on corn stubble that has been harrowed thoroughly, land fall ploughed after harvest.

2nd year.—*Wheat,* land ploughed in the fall if in good condition or left until spring.

3rd year.—*Oats,* sown with 8 lbs. Red clover and 4 lbs. Timothy per acre.

4th year.—*Clover hay.*

5th year.—*Pasture,* manured in summer and ploughed as soon after July 1 as possible, worked at intervals during the summer and fall to destroy weeds and conserve moisture.

6th year.—*Corn and Roots* cultivated at intervals throughout the summer to stimulate growth and destroy weeds.

On a half-section farm, 300 acres cultivated, this rotation would give: 100 acres wheat, 50 acres oats, 50 acres hay, 50 acres pasture, 50 acres corn and roots.

ROTATION B.

Six years, wheat, wheat, oats, hay, pasture, peas. An area of 27 acres is devoted to this rotation.

1st year.—*Wheat,* sown on land that was in peas the year previous, prepared by thorough surface cultivation, land fall ploughed after harvest.

2nd year.—*Wheat,* manure applied in the spring after the crop is sown. Land fall ploughed or spring ploughed.

3rd year.—*Oats,* sown with Rye grass 8 lbs. and Red clover 6 lbs. per acre.

5th year.—*Pasture,* ploughed during the summer and cultivated at intervals.

6th year.—*Peas.*

This rotation would give the same acreage of wheat, oats, hay and pasture as Rotation A, but 50 acres of peas instead of that area of corn and roots.

ROTATION F.

Six years.—Flax, wheat, oats, hay, pasture, peas. An area of 27 acres is devoted to this rotation.

This rotation is the same as Rotation B, except that flax is grown the first year instead of wheat.

ROTATION C.

Five years.—Wheat, wheat, corn, oats, clover. An area of 40 acres is devoted to this rotation.

1st year.—*Wheat,* sown on land that was in clover the previous year, land ploughed in the fall after harvest.

2nd year.—*Wheat,* land manured after harvest and ploughed.

3rd year.—*Corn and Roots,* sown after the land has been well cultivated a number of times, cultivated at intervals through the summer to stimulate growth and destroy weeds.

4th year.—*Oats,* sown on corn stubble after it has been well harrowed. Red clover 8 lbs. and Timothy 3 lbs. and Rye grass 4 lbs. sown with the oats.

5th year.—*Hay,* ploughed as soon as possible after haying and worked at intervals during summer and fall in preparation for wheat.

In a half section farm, 300 acres of which was cultivated, this rotation would give 120 acres of wheat, 60 acres oats, 60 acres hay, 60 acres corn and roots.

This rotation would only be suitable for a farm which had other land available for pasture. If thought advisable part of the land the third year could be in peas.

ROTATION L.

Five years.—Oats, oats, barley, hay, hay. An area of 15 acres is devoted to this rotation.

This rotation is arranged for land that on account of water lying on it in the spring cannot be sown in wheat. It might also be suited to districts where wheat cannot be grown satisfactorily. The mixture for the hay in this rotation is Timothy 4 lbs., Alsike 3 lbs., Red clover 3 lbs. per acre.

ROTATION N.

Four years.—Wheat, wheat, oats, fallow.

ROTATION M.

Four years.—(With manure), wheat, wheat, oats, fallow. An area of 8 acres is devoted to these two rotations.

Rotations N and M differ from one another only in that in M manure is used on the second crop of wheat and in N no manure is used.

The system of cropping indicated in N, is similar to that followed by many farmers in Manitoba, and this is to be tested with the others to compare the financial returns and the effect on the condition and fertility of the soil.

Rotation M is to determine the advantage of using manure when the crops grown are as indicated.

ROTATION S.

Forty acres for sheep land.

Eight years.—Roots and peas, wheat or oats, hay, hay, pasture, pasture, pasture, green crop, rape, etc.

In this rotation, manure is to be applied twice in eight years, as a top dressing after hay in the third year, and for the green crop in the eighth year.

The land to be under this rotation is forty acres of light land that is to be used for sheep. A fence designed to be coyote-proof, encloses the area, and portable fences will be used for subdividing where necessary.

RELATIVE VALUE OF ROTATIONS.

The value of a rotation can be determined definitely only after it has been in actual operation for a number of years. It is only then that its effect on the fertility, the condition of the soil, and the cost of production of the various crops can be accurately ascertained. It is essential to know the cost of production under each system of rotation as it is only in this way that the value of the products can be compared.

In addition to the value of the products harvested under a definite rotation and the cost of producing them in labour, rent and manure, there is to be considered the effect of the rotation on the soil fertility and condition as influenced by the amount of humus and plant food consumed and left for subsequent crops. This cannot accurately be determined on large areas as even the most uniform soils vary greatly in composition over an area of several acres. It has therefore been considered advisable to confine that part of the rotation work which pertains to their effect on the composition of the soil to a small area of uniform virgin soil. This was broken and backset in 1910. Half an acre is to be devoted to each rotation. This will be cropped and worked the same as the regular rotation except that only one crop of the rotation will appear each year instead of all the crops as in the regular field work. For example Plot A representing Rotation A and consisting of half an acre will be cropped as follows: 1911, wheat, 1912, wheat, 1913, oats, 1914, hay, 1915, pasture, 1916, corn and roots.

In addition to there being a plot for each of the rotations above outlined Plot E is added. This is to be cropped with grain continuously.

Samples of soil for analysis were secured in October, 1910, from each of the plots by Mr. Frank T. Shutt, Dominion Chemist. Two samples were taken from each plot, one representing the top six inches of soil and one representing the soil from six inches to twelve inches below the surface. Samples from the same places will be taken at intervals of a few years for comparison with the original samples to determine the effect of the various systems of cropping.

EXPERIMENTS WITH ALFALFA.

I am pleased to be able to report another year's success with alfalfa. There was no winter or spring killing experienced and in spite of an unusually hot, dry summer two fairly good cuttings of hay were secured. The yield of hay was much lighter than usual on account of the drought but was more than twice as heavy as that of any other hay crop on the Farm. This is another evidence of the value of alfalfa for Manitoba conditions, as grass hay crops are quite frequently short on account of little rain.

In view of the increasing interest in the growth of alfalfa in Manitoba and of the number of farmers who are anxious to grow the crop, I make no apology for repeating some of what was said in last year's report regarding the growing of alfalfa under our conditions.

Alfalfa has been on trial at the Experimental Farm for upwards of fifteen years and has been grown to a limited extent in other parts of Manitoba. During these trials, failures have been met with and difficulties encountered, but of late years very good success has been had. There has not been sufficient experimental work done throughout the province to warrant us in recommending every farmer to grow alfalfa extensively, but such excellent crops have been secured here and at a number of other points in Manitoba that we are warranted in suggesting that every farmer give it a trial. If the excellent qualities of the plant as a forage crop were known, with the conditions necessary to its successful cultivation, it would undoubtedly be grown much more extensively.

Alfalfa requires a well drained soil and will not thrive on land where water lies at any time of the year. Sandy loam with a porous subsoil is usually considered ideal but the nature of the surface soil is of comparatively little importance. The most essential requisite in soil is that the water level be not closer than three feet to the surface.

The preparation of the soil is also important. Land in good condition that has been cropped for several years is preferable to new land. One of the best preparations is a crop of potatoes or roots, or summer-fallow is quite suitable. The important features are, that the land be fairly clean and quite free from grass, and in at least a fair state of fertility. Good catches have been secured on suitable land ploughed either in the spring or fall and well top-worked, but potato land or summer-fallow is to be preferred.

Alfalfa, like all other legumes, is able to utilize the nitrogen of the air in its growth and to this is largely due its value as a soil renovator and a fodder. This important function is performed through the medium of bacteria which find lodgment in the roots of the plants. Their presence is indicated by the formation of small nodules or excrescences on the roots about the size of a pin head. These frequently appear in bunches and are usually found on the younger parts of the roots. The absence of these nodules is an indication that the soil does not contain the bacteria. The alfalfa will grow the first season without these bacteria being present, but it lacks stamina and vigour and is apt to succumb during the first winter.

Our prairie soils sometimes have these bacteria present naturally, but otherwise it is necessary to inoculate. This can most readily be done by securing soil from a field where alfalfa has been being growing successfully and scattering it over the land at the rate of from 100 to 200 pounds per acre. This may be done to advantage immediately before sowing the seed, but it may, if necessary, be distributed after the alfalfa is growing as it will gradually be washed in with the rain.

It is not always necessary to inoculate the land, but it is always advisable, as the chances of success are thereby increased. The Experimental Farm will furnish 100 pounds of inoculated soil free to farmers in Manitoba who apply for it. The applicant will have to pay the freight from Brandon.

Several strains of seed have been under trial, but up to the present there has been very little difference in hardiness shown. Turkestan alfalfa is generally considered somewhat hardier than the common alfalfa but it is not always so. Grimm's alfalfa, a strain grown in Minnesota for some years, has been found somewhat hardier than any other strain tested at the Experimental Farm, Indian Head, Sask. A plot of Grimm's alfalfa sown at Brandon in the spring of 1908, has given good returns and has not winter killed, but neither has any of the other strains sown the same year.

The seed may be sown any time after the middle of May until July 1. A nurse crop of grain should never be used in this climate, as alfalfa sown with a nurse crop has always been a failure. Fifteen or twenty pounds of seed per acre is sufficient.

For several years we have sown our alfalfa with the ordinary grain drill. The seed is mixed with about twice the quantity of coarsely chopped barley or wheat to regulate the feed. The seed can be sown at a uniform depth by this method and is much better covered than when sown broadcast.

The plants should be clipped once or twice with a mower during the first season. This keeps weeds from seeding and makes the young plants root better. The cuttings may be allowed to lie on the ground as a mulch unless they are very heavy. The last clipping should not be later than August 15, as the alfalfa should go into the winter with a good top. The alfalfa should not on any account be pastured the first season and should never be pastured close.

Much of the value of alfalfa hay depends upon the curing. After it starts to bloom the stalks rapidly become hard and woody and lose their feeding value. It should, therefore, be cut as soon as it commences to bloom, or, as it is sometimes stated, when it is one-tenth in bloom. The most nutritious part of the plant is the leaves, and, to save the leaves, the curing must be done in the cock. It should be raked into windrows soon after cutting and at once put into small cocks to cure. In this way, the leaves are all retained on the stalks and the hay has not lost any of its nourishing qualities. It is usually an advantage to upset the cocks an hour or two before stacking or drawing to the barn, to air the part that has been next the ground. Two cuttings are usually all that can be secured in Manitoba in a season. The last cutting should not be made later than the middle of August to enable the plants to make some growth before winter.

To those who contemplate growing alfalfa, I would suggest that it be tried first on a small scale, not more than one or two acres. When a small area becomes established, it will furnish soil to inoculate as much land as it is desired to sow.

Several different strains of alfalfa are growing at present on the Experimental Farm. These were sown in 1907 and 1908. There has been practically no winter killing up to the present. The mixtures of alfalfa with Rye grass and Timothy yield a crop of mixed hay at the first cutting and a crop of pure alfalfa at the second cutting.

ALFALFA PLOTS SOWN IN 1907 AND 1908.

YIELD OF HAY IN 1910.

Name.	Year Sown.	Yield per Acre.				Total Yield per Acre.	
		1st Cutting, June 27.		2nd Cutting, July 29.			
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
Alfalfa (Indian Head seed)	1907	1	1,000	..	1,900	2	900
Alfalfa (Common)	1907	1	625	..	1,200	1	1,825
Grimm's alfalfa	1908	1	1,200	..	1,000	2	200
Turkestan alfalfa	1908	1	500	..	475	1	975
Alfalfa and Timothy	1908	..	1,550	..	275	..	1,825
Alfalfa and Rye grass	1908	..	1,100	..	350	..	1,450

The most notable point in this table of yields is the position of the mixtures of alfalfa with Western Rye grass and with Timothy. The yield from these mixtures in 1909, the first year they were cropped, compared favourably with the alfalfa sown alone, but the falling off this year is most marked. The second crop was practically nil. The reason may be that the grass prevented the alfalfa from becoming properly established; in consequence the root system did not extend so deeply and the effect of the drought was greater on this account.

The grass and alfalfa seed was sown the same year in these plots. It appears that it would be advisable when grasses mixed with alfalfa are to be grown that a year should be given the alfalfa to become properly established, and that the following year the grass seed should be sown and harrowed in.

ALFALFA PLOTS SOWN IN 1909.

In the spring of 1909 several samples of alfalfa seed were received from Chas. J. Brand, of the Department of Agriculture, Washington, D.C. In June, 1909, the seed was sown in plots of one-twentieth of an acre and a fairly good stand secured. The plants were clipped once during the summer and went into the winter with about ten inches of top.

The yield of hay from each plot is given in the following table:—

Name and Number.	Yield per Acre of Cured Hay.				Total Yield.	
	1st Cutting, June 27.		2nd Cutting, July 29.			
	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
Grimm's, 25102	..	1,500	..	1,200	1	700
Canadian Variegated Flowered, 24837	..	1,900	..	1,500	1	1,400
Sand Lucerne, 23394	..	1,800	..	1,500	1	1,300
Northern Turkestan, 23203	1	.....	..	1,600	1	1,600
Canadian Purple Flowered, 24836	..	1,800	..	1,400	1	1,200
Provence, France, 22636	1	100	..	1,700	1	1,800
Grimm's, 21735	1	800	..	1,700	2	500
Sand Lucerne, 23481	1	300	1	100	2	400
Montana, 23454	1	300	..	1,800	2	100
Frankish, 25022	1	400	..	1,900	2	300

These varieties were sown primarily to test their relative hardiness in this climate, their yield being a secondary consideration. As stated above they had a good top in the fall and were well covered with snow all winter.

Early in the spring as soon as growth started a careful examination was made of all the plots, but not a single dead plant was found. This is no evidence that these strains are equally hardy, but merely goes to show that the winter of 1909-10 was not a severe one on alfalfa under the conditions that prevailed here. The real test of hardiness can be determined only in a severe winter when the tender strains would be more or less killed.

In addition to the strains referred to above, twenty-seven others were received at the same time. As there was no land in suitable condition for sowing in 1909, these were not put in till last spring. In June one row of each variety was sown and in the fall one hundred plants were counted in each row and stakes driven to mark off this number. Next spring the number of living plants in the hundred of each variety will be ascertained.

The stand obtained was only fairly good on account of the extremely dry summer. There were more than one hundred plants of all varieties except *Medicago falcata*. This is an interesting new variety recently introduced from Siberia. It is considered very hardy, but is prostrate in habit of growth and would not therefore be valuable except for crossing with other varieties.

A list of the varieties sown follows—

Number.

25167. Erfurt, Germany. Hardy Thuringian alfalfa.
25167. Erfurt, Germany. Hardy Thuringian alfalfa.
25115. Bromberg, Prussia.
25269. Frasinet, Roumania.
25257. Bavarian Palatinate. Pfalzer lucerne.
21232. Mongolia.
25270. Vasluiu, Roumania.
25271. Belfontaine, Ohio, U.S.A.
23396. Germany. Commercial Sand Lucerne.
24376. Arabia.
21217. Lecoq's Commercial Sand Lucerne.
20896. Vilmorin's Commercial Sand Lucerne.
22636. Provence, France.
21945. Sextorp, Neb., U.S.A. (Dryland).
22946. Baltic, S. Dak. Wheeler's selections.
24451. Siberia. *Medicago ruthenica.*
23454. Chinook, Montana, U.S.A.
25179. Vienna. Hungarian Lucerne.
22834. Wessel. Duval Peruvian.
23203. Werny. Northern Turkestan.
25176. Berlin, Germany. Commercial Bohemian Sand Lucerne.
24452. Siberia. *Medicago falcata.*
18629. Canadian.
21867. Nephi Utah, U.S.A. (Dryland).
22467. Alt-Deutsche Frankische.
23481. Leifman's Bohemian Sand Lucerne.
21247. Canadian.

NEW SEEDINGS OF ALFALFA.

For Seed.

About two acres were sown with Grimm alfalfa in June for seed purposes. The seed was sown thinly in rows thirty inches apart to give the plants ample room as the seed is produced mainly on the branches.

A fairly good stand was obtained. The plants went into the winter with a top of 8 to 12 inches.

For Hay.

Twenty acres of land that had been summer-fallowed in 1909 was sown to alfalfa in June and an excellent catch secured. The seed was sown at the rate of eighteen pounds per acre with the ordinary grain drill. The mower was run over the field late in August to cut weeds and induce the plants to root deeply. When winter set in the

plants were about ten inches high. Half of the area was sown with Montana seed and half with seed from Idaho.

CLOVERS AND GRASSES.

The clover came through the winter without any loss, but as the weather was very dry, good yields were impossible. About twenty acres were seeded down with oats in 1909, but only a fair catch was secured on account of the dry weather, particularly after harvest. Two acres of light dry land was a particularly poor stand in the spring, so was ploughed up and sown to peas and oats. The remainder yielded about one ton of hay per acre, which, considering the season, was all that could be expected.

Last spring the following seedings were made:—

Area.	Nurse Crop.	Pounds of Seed per Acre.	Remarks.
18 acres.....	Banner oats.....	Western rye grass, 4 lbs.; timothy, 3 lbs.; red clover, 6 lbs.....	Fairly good stand.
6 acres.....	Banner oats.....	Timothy, 4 lbs.; red clover, 8 lbs...	Thin stand.
6 acres.....	Mensury barley.	Timothy, 5 lbs.; alsike, 4 lbs.; red clover, 3 lbs.....	Good stand; part of land liable to be flooded in spring.
8 acres.....	Mensury barley.	Western rye grass, 6 lbs.; red clover, 6 lbs.; timothy, 3 lbs.....	Good stand.
8½ acres....	Mensury barley.	Western rye grass, 6 lbs.; red clover, 6 lbs.; timothy, 3 lbs.....	On hill side with southern slope; light crop of barley; thin stand.

It will be noted that in each of these mixtures Red Clover is included, and that in several it comprises the principal part of the seed. This use of Red Clover is warranted by the excellent results we have had from its use here for a number of years. When grown with Western Rye grass and Timothy the yield of hay is heavier than when the grasses are grown alone and the aftermath is much heavier for pasture purposes. The quality of the hay is also better and is much easier handled. This is particularly true of the Western Rye grass which is inclined to be stiff and slippery.

When Red Clover is sown with a nurse crop the stubble should be left long to hold the snow, and cattle should not be allowed on the field after harvest unless for a few days. If the clover is well rooted in the fall and is not pastured off it is almost sure to come through the winter safely, but if it is eaten down close to the crown after harvest the chances for success are greatly reduced.

The following table gives the yield of cured hay per acre on a number of plots of clover, grasses and mixtures sown in 1907, 1908 and 1909:—

CLOVERS AND GRASSES.

Name.	Size of Plot.	Year Sown.	Yield per Acre.
			Lbs.
Red Clover (Tritolium pratense).....	$\frac{1}{5}$ acre	1907.....	1,275
Alsike Clover (Trifolium hybridum)..	$\frac{1}{5}$ "	1907.....	775
Timothy (Phleum pratense)....	$\frac{1}{5}$ "	1907.....	1,225
Western Rye Grass (Agropyrum tenerum).....	$\frac{1}{5}$ "	1907.....	1,600
Western Rye Grass and Red Clover.....	$\frac{1}{5}$ "	1907.....	1,700
Timothy and Red Clover....	$\frac{1}{5}$ "	1907.....	1,075
Timothy and Alsike.....	$\frac{1}{5}$ "	1907.....	1,000
Orchard Grass (Dactylis glomerata).....	$\frac{1}{5}$ "	1908.....	500
English Blue Grass or Meadow Fescue (Festuca elatior).....	$\frac{1}{20}$ "	1909.....	1,900
Red Clover.....	$\frac{1}{20}$ "	1909.....	2,200
Orel Red Clover.....	$\frac{1}{20}$ "	1909.....	1,700

The yield from the plot of Red Clover sown in 1907 is naturally lower than from the one sown in 1909, as the former was more than half killed out. Red Clover is not expected to last longer than two years.

Orel Red Clover was obtained from the Department of Agriculture, Washington, D.C. It is a clover of Russian origin and is supposed to be considerably hardier than the ordinary Red Clover, which it resembles closely in habit of growth. The chief difference is in its having stalks which are smooth, whereas the stems of the ordinary clover are covered with hairs. This smoothness should be an advantage as the hay produced would be comparatively free from dust. So far there has been no difference in hardiness apparent.

Orchard Grass and Meadow Fescue are both pre-eminently pasture grasses, as they are early to start in the spring and produce an abundant aftermath soon after the hay is cut. The Orchard Grass is adapted to rich soils while the Meadow Fescue will thrive on lighter soils.

SUMMARY OF CROPS, 1910.

	Bushels.
Wheat—	
5 varieties, 57 acres	1,165½
Oats—	
3 varieties, 60 acres	2,184
Barley—	
3 varieties, 41 acres	1,255
Potatoes—	
¾ acre	140
Roots	2,360

	Tons.
Fodder corn	144
Hay—	
Alfalfa, 7 acres	18
Timothy, Western Rye grass and Red Clover	7
Timothy and Red Clover	19
Brome, Western Rye grass, Timothy	3
Brome	12
Wild hay cut in coulees and sloughs	19
Rye grass	2
	80

CORN GROWING IN MANITOBA.

In view of the fact that a greater interest is being taken in the growing of Indian Corn (*Zea Mays*) from year to year, and as many letters of inquiry are received concerning the cultivation and handling of the crop, it has been considered advisable to describe briefly the methods that we have found most suitable in its production.

Corn has been successfully grown in this province long enough to be considered past the experimental stage, and if its merits were better known, it would be grown much more extensively than it is to-day. While it cannot usually be matured in this

climate, all who have given it a fair trial agree that it grows luxuriantly under our climatic and soil conditions and produces more fodder per acre than any other crop we can grow. It responds liberally to manure and cultivation and can be utilized as a means of clearing the land of troublesome weeds.

Corn will thrive on any fertile soil that is well drained. Some growers prefer a warm soil with a southern exposure, and while this may be an advantage it is not a necessity. A late cold soil is not suitable and should always be drained before being planted to corn.

It is a gross feeder and will thrive on any soil no matter how rich. No crop will make better use of manure than corn and a good application should always be made for this crop. Ideal conditions for its growth may be secured by ploughing sod land in the summer after applying about fifteen tons of manure per acre, working it at intervals during the late summer and fall and the following spring. Such a soil is rich in decaying vegetable matter and while it might produce too rank a growth of straw if sown to a grain crop, it will produce corn abundantly. A sod is not necessary, however, for good results. Stubble land ploughed either in fall or spring and well manured will give satisfactory returns. No other crop on the farm will make better use of the manure.

It is not advisable in this climate to sow the larger late varieties as they are so far from maturity when the time for cutting arrives that they are deficient in quality The earlier varieties do not produce as great a bulk of feed per acre, but if sown in good time they are well cobbed by September 10, and hence have much greater feeding value. We have found Northwestern Dent a very satisfactory variety in every respect. It is a red corn that grows from seven to ten feet high and is well advanced toward maturity in our short season. Other good varieties in order of earliness are Golden Dent, Mercer, Compton's Early and Longfellow.

It is not safe to sow much before May 20, but there should be no delay after this date. The corn planter is the most satisfactory implement for sowing, but unless a considerable acreage is to be sown it would not pay to invest in one. The ordinary grain drill can be made to answer the purpose. A sufficient number of spouts should be plugged up so that the rows will be three or three and a half feet apart. The latter distance allows the cultivator to be used to better advantage, but for small varieties three feet between the rows is quite satisfactory. Twenty pounds of seed is sufficient for an acre, and if it all grows it will require thinning. Before starting to sow, the drill should be tried on a hard road or the barn floor to see that the kernels are being dropped evenly every four or five inches.

The success of the corn crop depends very largely upon the cultivation that it receives during its growth. It is a good crop as a land cleaner only if full advantage is taken of the opportunity to cultivate the land that the method of sowing affords. Cultivation should start a few days after the corn is sown and should continue at intervals until it is about six feet high. The cultivation serves not only to kill weeds and to conserve moisture, but also to stimulate the growth.

The first two or three cultivations should be given with the drag harrow. It should be harrowed once before it is up and once or twice after until it is six inches high, the harrows being used lengthwise of the rows to prevent injury from tramping by the horses. A few stalks of corn will be rooted up, but so also will myriads of weeds that have not yet showed above ground. The harrow is the cheapest weed killer we have if used at the proper time. The cultivator should be started as soon as the corn is too high to permit the harrow to be used, and it should be used as frequently as other work will permit; sufficiently often at least to keep weeds in check. Cultivation after each rain is advisable to keep the soil stirred and thus prevent evaporation. For use until the corn is three or three and a half feet high, the two-horse riding cultivator that straddles a row is much to be preferred to the one-horse cultivator, as it will cultivate the soil more thoroughly, particularly if it is hard. After the corn is too

high for the two-horse machine the one-horse cultivator will be required to complete the season's work. Cultivation should not be deep at any time and should get shallower as the season advances.

To make the cultivation complete some hand work with hoes is usually necessary. This can best be done when the corn is about a foot high. If the corn is too thick in the row it should be thinned with the hoes to leave the stalks not closer than eight inches apart.

The hand work can be greatly simplified by sowing the corn in check rows or hills. This permits the cultivator being used both ways and enables the soil to be more thoroughly stirred. This reduces the hand work to a minimum, and it can almost be dispensed with, although this is not advisable.

The most satisfactory method of harvesting is by means of the corn harvester which cuts a row at a time and binds it in sheaves. Where several farmers in a district are growing corn it is well worth while getting one of these machines on a partnership basis. If only a few acres are to be harvested the sickle may be used, as the ordinary grain binder is far from satisfactory, except in a very light crop.

Corn may be used for feed, either as a soiling crop, as dry fodder, or as ensilage. As a soiling crop it is of little use before the middle of August, as it is too immature. After this date it may to advantage be cut and fed twice a day to milking cows to supplement pastures that are usually bare at that season. Cows relish it fed in this way, and it may be depended on to augment the milk flow at a time when pasture is scarce.

At present it is as dry fodder for winter feed that corn is most generally used, and this will continue to be the case for some years. When grown for this purpose the corn should be stooked at cutting time. From ten to twenty sheaves should be put in a stook which should be tied securely near the top with binder twine to prevent its blowing over. After the corn is thoroughly cured it may be drawn to the barn if room is available, and stored. It heats readily if too great a bulk is put together so that it should be stood in rows not deeper than two feet. Occasionally it is built into a mow or stack in alternate layers with straw. The layers of straw should be about two feet thick to absorb moisture and prevent the corn moulding. When stored in this way the corn imparts some of its flavour to the straw and renders it more palatable to stock.

It is quite a common practice to draw the corn from the field as it is required during the winter. The principal objection to this method is that deep snow sometimes interferes and there is a considerable loss of fodder in handling.

The dry corn fodder may be fed whole to cattle or horses, but there is usually considerable loss of the coarse stalks when it is fed in this way. A better way is to run it through a cutting box and feed it mixed with cut straw. The mixing may be in fact done to advantage by cutting straw and corn alternately. The mixture will heat less readily than the pure corn, and the cutting may be done once a week or less frequently as required.

SILOS.

The ideal way to handle corn is by means of the silo. There are few of these in use in Manitoba at present, but as corn is grown more extensively, and a greater interest taken in keeping stock supplied with succulent nourishing food through the winter, they will rapidly come into general use.

When cut for the silo the corn should be in the firm dough stage—usually in Manitoba it should be as nearly ripe as it can be secured. If very succulent when cut, it should be allowed to wilt for two or three days in the field before cutting into the silo, but if fairly well matured it can go without delay. For filling silos there are two types of machines, the chain elevator cutting box and the blower, either of which can be used to cut and elevate the corn thirty feet high or more. When there is a powerful engine

available, plenty of men and teams and a lot of corn to handle, the blower is much to be preferred. Where, however, there is a small force and only a sweep or tread horse power, or a small engine, the chain elevator box will be found most satisfactory.

As the corn is cut into the silo the leaves and stalks should be well mixed in the silo to insure even settling. If the corn is very dry a few pails of water may be poured around the edge as it is being filled. This may be repeated two or three times to advantage. After filling is completed, no further treatment is required except to tramp the ensilage once a day for several days around the edge of the silo. A layer of partially decayed matter soon forms over the surface which effectually excludes the air

If the ensilage is required for feeding as soon as the silo is filled, there will be no loss from decayed matter, but if, as is more usually the case, it is not required for several months, from four to six inches will require to be removed as waste. The ensilage may be fed by itself or it may before being fed be mixed to advantage with cut straw or hay. The method followed here in feeding ensilage is to build up in alternate layers cut straw, ensilage and roots sufficient to feed the entire stock for two or sometimes three days. The straw absorbs some of the juices and flavour from the ensilage and roots and, when fed, the whole makes a highly palatable mixture that is eaten with very little waste. The allowance of meal is scattered on this mixture after it is in the manger. This method of preparing the feed enables considerable coarse and comparatively rough feed to be utilized to good advantage, and is particularly adapted to utilizin any frozen ensilage. Freezing does not injure the quality of the ensilage, and when it is incorporated with the other feeds and allowed to undergo slight fermentation no injurious results can possibly follow.

Two silos each nine feet square and twenty-four feet high were in use on this Farm for fifteen years, and gave good satisfaction. The chief objection to them was the loss entailed through improper settling in the corners and consequent moulding and decay. These silos were located inside the barn and hence there was little freezing.

In the summer of 1908 a new silo was built to take the place of the old ones as the lumber had decayed to such an extent as to impair their usefulness.

The new silo was built outside the north side of the barn, located so that the ensilage was in the middle of the cattle stable. The bottom is on a level with the stable floor and the cement work extends two feet above the surface of the ground. On the cement foundation a superstructure of staves was erected, the lumber used being 6-inch by 2-inch by 20 feet. This made the silo 33 feet high to the roof.

The silo has now been in use three seasons. The only objection to it is the amount of freezing which takes place in very severe weather. As already mentioned freezing does not actually impair the feeding quality. When much freezing occurs there is considerable difficulty in detaching the ensilage from the walls and in incorporating a large quantity of it with the other feed. There is a notable difference in the amount of freezing on the staves and that on the cement work which extends above the ground surface. As the cement is a better conductor than the wood the freezing has always been much worse on the cement. Except in continued very severe weather there has being little freezing on the staves when care has been taken to keep the edges lower than the body of the ensilage.

Cement undoubtedly has the advantage in durability but a well built stave silo should last fifteen years and the initial expense of building is less. The advantage that it has over cement as regards frost is well worth considering.

A silo built of hollow cement blocks would have advantages over the solid cement wall as the air space would considerably reduce the liability of freezing. Hollow tile as a construction material for silos is also worthy of consideration in this climate for the same reason.

Those contemplating the construction of a stave silo should secure a copy of Bulletin 35 of the Experimental Farms on 'Stave Silos.' This may be had free on application.

INDIAN CORN—TEST OF VARIETIES.

Fifteen varieties of fodder corn were grown under uniform conditions last year. The land was a clay loam which had been fallowed in 1909. The corn was sown June 4, in rows 40 inches apart. It made excellent progress until the middle of July but about that date drought began to have its effects and the subsequent growth was slow.

A frost on August 31, withered the leaves considerably and this reduced the weight. The crop was cut for ensilage on September 3. The yield per acre in each case is estimated from the product of two rows each 66 feet long.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No.	Name of Variety.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.	
		Inches.		Tons.	Lbs.
1	Longfellow	82	Silk	21	966
2	Compton's Early	96	"	20	194
3	Mercer	83	Early milk	19	610
4	Golden Dent	74	Soft dough	14	1893
5	Selected Leaming	96	Silk	14	1700
6	Northwestern Dent	84	Late milk	13	1720
7	Jehu	61	Firm dough	13	1126
8	Square Deal	87	Early milk	12	1146
9	Superior Fodder	92	Tassel	11	770
10	White Cap Yellow Dent	97	Silk	11	374
11	Quebec Yellow	64	Firm dough	11	176
12	Paterson	53	"	8	1622
13	Eureka	56	Not in tassel	8	236
14	Champion White Pearl	64	Tassel	7	256
15	Angel of Midnight	48	"	4	1702

Angel of Midnight, Eureka, and Champion White Pearl were planted too close to a row of maples and their growth was seriously affected. The nearest row was twenty-four feet from the maples, but the influence of the trees extended over thirty feet. The average yield of these three varieties for the five years 1905 to 1909, was respectively, Angel of Midnight, 18 tons, 1,908 lbs.; Eureka 17 tons, 24 lbs.; Champion White Pearl, 16 tons, 1,256 lbs.

INDIAN CORN IN FIELD LOTS.

Three varieties of corn were grown in field lots last year as follows: Northwestern Dent 7 acres, Mercer 8 acres, Golden Dent 3 acres.

The best crop was four acres of Northwestern Dent sown on fall-ploughed oat stubble, well manured. This piece was planted in check rows 40 inches apart and horse cultivation was given in both directions. The average yield for the whole crop was 8 tons per acre.

CATTLE.

There are representatives of two breeds of cattle on the Experimental Farm—Shorthorns and Ayrshires—and a number of grade cattle and steers.

The cattle on hand at present are:—

Shorthorns.—1 bull, 11 cows, and 3 calves.
Ayrshires.—1 bull, 1 cow, and 1 calf.
Grades.—2 cows and 21 steers, three years old, for experimental feeding.

MILK RECORD FOR 1910-11.

Name.	Breed.	No. of Days Milking.	No. Lbs. Milk.
Buttercup	Grade	365	6,176
Margaret	"	304	5,601
Daisy	Shorthorn	305	5,109
Rose	"	315	4,831
Snowball	Ayrshire	303	4,488
Jane	Shorthorn	259	3,836
Poppy	"	352	3,878
Hazel	"	284	3,648
Blanche	Grade	241	3,047

BEEF PRODUCTION.

Fed Outside versus Inside.

The system of outside feeding which was inaugurated here three years ago was given another trial, but the results were not altogether satisfactory. The conditions under which the two lots of cattle were fed were described in last year's report, and need not further be detailed here, but a few modifications were made which will be mentioned since they undoubtedly had some effect on the results.

The first two years this experiment was in progress the cattle secured water from a small stream in the feed lot. The winter of 1907-8 was mild so there was little difficulty encountered in keeping the water open and the cattle had access to it at all times. No other provision was made for a supply the following year, but as the winter was a severe one, the water supply was a constant source of trouble and required much attention, and even then was not satisfactory. The cattle frequently did not want water when it was open, and then when they required it, the stream was frozen over.

It was therefore decided to make other provision for a supply for another year, and accordingly a well was sunk and a trough with a tank heater provided. The tank heater is a round cast iron stove that sits in the trough and is bolted to the bottom with wood screws. The air passes down a flue at one side, under the grate on which the fire is placed and out a short chimney. Either coal or wood may be used for fuel. The heater gave excellent satisfaction; a very small fire was sufficient to keep the water from freezing and no effort was made to do more than this. Soft coal was used as fuel.

Several changes were also made in the method of feeding. In previous years oat straw was the principal roughage used. This was fed until March or April, after which time hay was substituted. The grain ration during the first two seasons was limited throughout the feeding period. About four pounds per head per day was fed at the start. This quantity was gradually increased, about twelve pounds per day being fed toward the close of the period.

Last year the hay that was available was fed from the start when the grain ration was light, and when the grain ration approached full feed oat straw was substituted. The grain ration was also heavier than in previous years. Four pounds per day was the ration December 1, and this was increased slightly every week so that by the end of January it was 15 pounds per day. After this date the steers were given practically all the grain they would clean up—this averaged about 17 pounds per day and occasionally was as much as 20 lbs.

Those inside were given the same feed and care as in previous years.

The following prices were charged for feed—

	Per ton.
Grain	$20 00
Bran	18 00
Linseed meal	30 00
Slough hay	4 00
Straw	1 00
Ensilage	2 00
Roots	2 00

Complete details of the experiment follow.

LOT 1. OUTSIDE STEERS. 1909-10.

No. of steers in lot		20
First weight, gross	lbs.	20,960
" average	"	1,048
Finished weight, gross	"	24,150
" average	"	1,207
Total gain in 155 days	"	3,190
Average gain per steer	"	159·5
Daily " "	"	1·0
" " lot	"	20
Gross cost of feed		$ 591 29
Cost of 100 lbs. gain		18 53
" of steers		707 40
Total cost to produce beef		1,298 69
Sold 24,150 lbs. at 5½ cents less 5 per cent		1,261 85
Profit on lot none—loss		36 84
Net profit per steer none—loss		1 84
Average buying price		35 37
" selling "		63 07
" increase in value		27 72
" cost of feed per steer		29 57
Amount of grain eaten by lot	lbs.	43,906
" linseed meal	"	930
" bran	"	920
" hay	tons	29
" straw	"	14

LOT 2. INSIDE STEERS 1909-10.

No. of steers in lot		16
First weight, gross	lbs.	16,755
" average	"	1,047
Finished weight, gross	"	20,630
" average	"	1,289
Total gain in 155 days	"	3,875
Average gain per steer	"	242
Daily gain per steer	"	1·56
Daily gain per lot	"	24·9
Gross cost of feed		$ 292 05
Cost of 100 lbs. gain		7 73
Cost of steers		565 48

Total cost of produce beef	$ 857 53
Sold 24,150 lbs at 5½ cts. less 5 per cent.	1,077 87
Profit on lot	220 34
Net profit per steer	13 77
Average buying price	35 33
" selling price	67 36
" increase in value	32 03
" cost of feed per steer	18 25
Amount of grain eaten by lot ... lbs.	15,994
" linseed meal ... "	744
" bran ... "	736
" hay ... "	7,312
" straw ... "	14,315
" ensilage ... "	84,880
" roots ... "	9,216

The great difference in the cost of 100 pounds gain in the two lots is notable as in the case of these fed outside it is much greater than in the previous experiments conducted. It is clearly evident that the outside lot made poor use of the grain consumed. The average daily ration amounted to slightly over 14 pounds per head per day during the whole period and the average gain in weight was only one pound per day.

The poor gains are due mainly to the method of feeding outlined above. It was evident to any one watching the progress of the cattle throughout the period that they were not making such gains as would naturally have been expected from the feed consumed but since the object of the experiment was to gain information it was not thought advisable to change the method during the feeding period.

Good gains were made until the middle of January. Hay had been fed as roughage up to that time and the grain ration had been gradually increased from 4 pounds per day to 10 pounds per day and was then increased steadily to full feed. The cattle did not take kindly to the straw, in fact they ate very little of it and subsisted almost entirely on the grain. The consequence was that many of them scoured for a time and of course lost in weight. It took them several weeks to regain what they had lost.

The gains made from time to time are shown clearly by the following average weights:—

Date of weighing.	Average weight of 20 steers.
December 1	1,047 lbs.
January 4	1,115 "
February 2	1,090 "
March 2	1,115 "
March 16	1,150 "
April 1	1,179 "
May 5	1,207 "

It will be noted that the weight March 2, is the same as January 4, so that the feed consumed during this period of two months, 19,825 lbs., was a straight loss. Had it not been for this set back it is easy to compute a good profit instead of a slight loss.

In figuring the gain or loss per head it should be remembered that the grain fed is valued at $1 per hundred. The *actual* price realized on the grain fed the cattle outside was 91·1 cents per hundred, a reasonably good price to say the least.

The results require little further comment. It is quite evident that straw cannot profitably be used as a substitute for hay as a complete roughage when a heavy grain ration is fed. With a lighter grain ration the effect would probably not be so marked; certainly the steers would not have scoured so much and the actual loss in grain fed would have been reduced. Had some of the straw been cut and mixed with the grain, the cattle would have been compelled to eat some of it, and this would probably have prevented the scouring. When hay is being fed throughout the whole feeding period it has been found advantageous by some feeders to use the best hay when the grain ration is light and the hay of poorer quality with the heavy grain ration. Where it is a case of feeding hay part of the time and straw during the rest of the period the straw should be fed first before a taste has been acquired for the hay.

SWINE.

The herd of swine on hand at present consists of the following animals—

Yorkshires.—2 boars and 3 sows.
Berkshires.—2 sows.
Grades.—13 feeders.

These are kept for experimental feeding purposes and for breeding. During the past year 52 pigs have been sold.

EXPERIMENT IN FATTENING HOGS.

To determine the feeding value of digester tankage, a lot of 28 young pigs was divided into five lots and fed different rations.

The pigs were all in thrifty condition when the experiment started, and continued so throughout the course of the feeding period. Satisfactory gains were made by all the lots. The experiment was in progress during February, March and part of April.

In thrift and general appearance there was no noticeable difference in the lots under the test. This is possibly accounted for through all the pigs being fed liberally on roots at noon every day throughout the period.

The digester tankage was supplied by the J. Y. Griffin Co., Ltd., Winnipeg, now The Swift Canadian Co., Ltd.

The following prices were charged for feed:—

Grain.—$1 per hundred lbs.
Roots.—5c. per bushel of 60 lbs.
Digester tankage—$1.50 per hundred pounds.

Full particulars of the experiment follow.

LOT 1. CHOPPED BARLEY.

Number of pigs in lot		5
Gross weight at start	lbs	440
Average weight at start	"	88
Gross weight at end of 86 day period	"	852
Average " " 86 "	"	170·4
Gross gain in 86 days	"	412
Average gain in 86 days	"	82·4
Average gain per pig in one day	"	·9
Total amount of meal consumed	"	1,300
" roots consumed	"	175

Amount of meal for one pound gain live weight	lbs.	3·1
" roots for one pound gain live weight	"	·42
Total cost of ration		$ 13 14
Cost of one lb. gain live weight	cts.	3·19

LOT 2. BARLEY AND TANKAGE.

Number of pigs in lot		5
Gross weight at start	lbs.	311
Average weight at start	"	60·2
Gross weight at end of 86 day period	"	759
Average weight at end of 86 day period	"	151·8
Gross gain in 86 days	"	448
Average gain in 86 days	"	89·6
" per pig per day	"	1·04
Total amount of meal consumed	"	1,300
" roots consumed	"	175
" tankage consumed	"	178
Amount of meal for 1 lb. gain live weight	"	2·9
" roots for 1 lb. gain live weight	"	·39
" tankage for 1 lb. gain live weight	"	·39
Total cost of ration		$ 16 71
Cost for 1 lb. gain live weight	cts.	3·72

LOT 3. MIXED CHOP. PEAS 1, OATS 1, BARLEY 1.

Number of pigs in lot		7
Gross weight at start	lbs.	498
Average weight at start	"	71
Gross weight at end of 86 days	"	1,010
Average weight at end of 86 days	"	144·3
Gross gain in 86 days	"	512
Average gain in 86 days	"	73
Average gain per pig in one day	"	·85
Total amount of meal consumed	"	1,675
" roots consumed	"	343
Amount of meal for one pound gain live weight	"	3·2
" roots for one pound gain live weight	"	·67
Total cost of ration		$ 17 03
Cost of 1 lb. gain live weight	cts.	3·32

LOT 4. MIXED GRAIN AND TANKAGE.

Number of pigs in lot		6
Gross weight at start	lbs.	405
Average weight at start	"	67·5
Gross weight at end of 86 day period	"	852
Average weight at end of 86 day period	"	142
Gross gain in 86 days	"	447
Average gain in 86 days	"	74·5
Average gain per pig in one day	"	·86
Total amount of meal consumed	"	1,500
" roots consumed	"	294
" tankage consumed	"	215

Amount of meal for 1 lb. gain live weight	lbs.	3·35
" roots for 1 lb. gain live weight	"	·65
" tankage for 1 lb. gain live weight	"	·48
Total cost of ration	$	18 46
Cost of 1 lb. gain live weight	cts.	4·1

LOT 5. MIXED CHOP AND TANKAGE.

Number of pigs in lot		5
Gross weight at start	lbs.	553
Average weight at start	"	110·3
Gross weight at end of 86 day period	"	1,086
Average " " "	"	217·2
Gross gain in 86 days	"	533
Average gain in 86 days	"	106·6
Average gain per pig in one day	"	1·23
Total amount of meal consumed	"	1,635
" " roots consumed	"	280
" " tankage consumed	"	178½
Amount of meal for 1 lb. gain, live weight	"	3·12
" roots " "	"	·52
" tankage " "	"	·33
Total cost of ration	$	23 65
Cost for 1 lb. gain, live weight	cts.	4·4

HORSES.

Horses are kept for work only. Those at present on the Farm consist of nine heavy farm horses and two light horses for driving and occasional light farm work. One old driving horse was sold during the year and has not yet been replaced. The horses have continued in good health during the year.

POULTRY.

Three breeds of poultry are kept: Barred Plymouth Rocks, Buff Orpingtons and Silver Grey Dorkings. Sixty chickens were hatched during the year and a number of cockerels have been sold for breeding purposes. The flock at present consists of:—

Barred Plymouth Rocks.—1 Cockerel and 16 hens.
Buff Orpingtons.—11 hens.
Silver Grey Dorkings.—12 hens.

SHEEP.

A small flock of sheep have been added to the stock since the last report. This is the first time since the establishment of the Farm that any sheep have been kept. The object in adding them now is mainly to determine their usefulness for improving poor light land that is of little use for grain production, and to carry on some experimental feeding.

A part of the Farm consisting of forty acres of light land on the hill top has been set aside as a sheep farm and is to be cropped as Rotation S. (See Rotations for particulars). Instead of buying a flock of pure breeds it was decided to buy such sheep

as an ordinary farmer would secure if he were starting to raise sheep. Accordingly twenty-five head of young grade range ewes were bought in October at an average cost of $7.35 per head. To these were added a good pure-bred Oxford ram and two Oxford ewes of pure breeding and excellent conformation. Other pure bred ewes will probably be added from time to time and an effort made to breed a flock of good commercial value without a high initial expenditure.

FENCING.

The rotation work has entailed the erection of a considerable quantity of new fence to enable the land to be pastured when the rotations call for it. The fencing was necessary with rotations A, B, F, and S. In rotation A and B permanent division fences were erected but in S the outside fence only was made permanent, as portable fences are to be used for divisions when pasturing.

For the outside and division fences in A and B an eight strand No. 9 wire fence 48 inches high with 13 uprights to the rod was used. Six inches above the woven wire one strand of barb wire was stretched to prevent stock reaching over and sagging the fence. The outside fence for the sheep pasture (Rotation S) was a nine strand fence 46 inches high, all No. 9 wire with uprights 10 inches apart. The horizontal wires were spaced as follows: 3, 3½, 4, 5, 6, 7, 8, 9 inches. One strand of barbed wire was stretched six inches above the top strand of the woven fence.

This fence was selected as one which would be coyote proof and in erecting it, particular care was taken to have it close to the ground at all points to prevent coyotes crawling under it. There is a great diversity of opinion among experienced men as to the requisites of a coyote proof fence but every one agrees that it is difficult to keep coyotes out of a pasture once they have gained access to it. This should be borne in mind in erecting the fence and every precaution taken to make a close structure free from loop holes.

The distance apart of the uprights is also important, as a fence with uprights 10 inches apart will turn dogs that can easily go through one where the uprights are 16 inches apart. A barbed wire at the top is insurance against coyotes jumping even although it may not be a sure preventative. It is important also to see that all gates are of close mesh, that they are hung close to the ground, and that very little space is left between the gate and the posts, at either end.

The posts used for the fence were seven foot, green cut cedar, with six-inch tops, except the corner and gate posts which were eight feet long. They were placed twenty feet apart and all corner and gate posts were securely braced. The amount of fencing done was 2,100 rods.

We have not yet had an opportunity to see how effective the fence is against coyotes but this will be reported on from time to time.

YAKS.

In last year's report, reference was made to a herd of yaks which had been added to the stock of the Farm. Those on hand at present consist of one bull two years old, two cows two years old and one aged cow. These animals have continued in good health since the last report but have not produced any young.

They have the run of about thirty acres of rough land which provides sufficient pasturage for summer. In the winter they have no stabling other than an open shed, and are fed hay with a light grain ration.

BEES.

In the fall of 1909, fifteen hives of bees were put in winter quarters in the Superintendent's cellar, but as they had insufficient stores only one strong hive came through the winter. During the summer this hive swarmed twice and one of the new hives also threw a swarm. There was practically no honey taken and each of the swarms gathered a good supply of honey for the winter. The average weight of the hives on November 14, when they went into winter quarters, was seventy-two pounds.

THE VEGETABLE GARDEN.

Last year was too dry and hot to expect particularly good results from vegetables, but in spite of the unfavourable conditions during the spring and early summer an excellent crop was harvested.

When spring weather first opened up late in March, some seed of such crops as carrots, parsnips and onions was sown, but as the weather turned very cold in April, little or nothing was gained by the early seeding. The sharp frosts which occurred repeatedly during April, May and the early part of June cut off the young plants, but they recovered sufficiently well to render resowing unnecessary. The frosts were less injurious than the high winds which occurred at intervals during May and June. Peas, lettuce, turnips and onions which had made considerable growth by that time were badly blackened and materially thinned out. At one time the conditions were so adverse that it seemed as though the whole garden would be a total failure, but a few light showers and thorough cultivation had a wonderfully reviving effect, with the result that practically everything was saved.

The extreme heat of June and July was accompanied by so little rain that the growth was somewhat stunted. Constant cultivation was the salvation of the garden crops during those months. The most successful crops in the garden this year were squash, pumpkins, citrons, cauliflowers and cabbage. Tomatoes were a fairly good crop, but would have been greatly benefited by more rain. The same is true of carrots, parsnips, beets and celery.

The first fall frost on August 31 injured many of the tender vegetables, but not seriously. The tomatoes and squash continued to grow until a more severe frost on September 7 stopped all growth for the season.

Where practicable, the vegetables are grown in long rows so that inter-tillage can be practised to advantage. The rows in our garden were only 18 inches apart, as the cultivation was done by the Planet Junior, but where plenty of land is available the rows may to advantage be two and a half or even three feet apart, and a one-horse cultivator used for the bulk of the work.

ASPARAGUS.

An asparagus bed was planted in the spring of 1908 with two-year old roots. A small quantity was produced in 1909, but very little was cut until 1910. The asparagus was ready for use May 10, and continued in use until July 8. An application of well-rotted manure was worked into the bed late in the fall.

CARROTS.

Three varieties of carrots were grown, but the crop was light and the roots very irregular in form and of small size. Amsterdam Scarlet produced the best crop, while Half Long Chantenay and Early French Horn yielded considerably less.

PARSNIPS.

Four varieties of parsnips were sown March 17, but little was gained by such early sowing, as the weather was so unfavourable afterwards. The roots were of fair size and of excellent quality.

Following are the estimated yields per acre, calculated from 66 feet of one row:—

Variety.	Yield per Acre.	
	Bush.	Lbs.
Manitoba Prize Intermediate	337	20
Manitoba Prize Guernsey	278	40
Elcombe's Giant	242	..
Hollow Crown	198	..

ONIONS.

Ten varieties of onions for general use and two for pickling purposes were grown.

The onion maggot has been very troublesome here for several years, but it did very little damage last year. The young plants were watered several times with a solution of nitrate of soda, and as this stimulated the growth it probably helped in reducing the injury. An excellent crop of well-shaped onions was harvested.

Variety.	Yield per Acre.		Description.
	Bush.	Lbs.	
Large Red Wethersfield	297	..	Flat, red.
Improved Red Globe	256	40	Red, globe.
Giant Prizetaker	223	40	White, globular.
Sutton's Ailsa Craig	216	20	White, globular.
Large Red Wethersfield (Commercial)	212	40	Red, flat.
Selected Yellow Globe	207	10	Yellow, globular.
Danver's Yellow Globe	201	40	Yellow, some flattish.
Superior Golden Globe	168	40	Yellow, globe.
Perfection Globe	154	..	White, globe.
Australian Brown	110	..	Round, brown.

Earliest White Barletta and Paris Silverskin were grown for pickling purposes, and the former proved the better variety.

BEETS.

Seven varieties of beets were grown and produced an excellent crop.

Variety.	Yield per Acre.		Description.
	Bush.	Lbs.	
Egyptian Flat Extra Early	733	20	Very coarse and not true to type.
Nutting's Dwarf Seed	616	00	Not uniform, fair quality.
Early Blood Red Turnip	542	40	Uniform and good quality and size.
Egyptian Extra Early	498	40	Fair size and quality.
Early Flat Egyptian	447	20	Some turnip shaped and rather coarse quality.
New Danish Blood	366	40	Very badly mixed and poor quality.
Sutton's Pineapple	278	40	Medium size and good quality.

KOHL-RABI.

Sutton's Earliest White was grown and produced a good crop of fair size and medium quality.

CABBAGE.

An excellent crop of cabbage was grown. Of the three varieties of early cabbage, the Extra Early Paris Market was ready for use ten days before either of the others and was of quite as good quality. The Extra Early Savoy produced larger heads, but they were late and of poorer quality.

The seed of all the varieties was started in the hotbed early in April and the young plants were transplanted to the open about the first of June. A sowing of several varieties was also made outside at the time of transplanting but the heads produced were comparatively small and of poorer quality.

Variety.	Weight of Specimen Head.	
	Started in Hot-bed.	Seed Sown in Open.
	Lbs.	Lbs.
Late varieties:—		
Large Late Flat Dutch	14½	9
Fottler's Improved Brunswick	14	6½
Mammoth Marblehead	12½	....
Kildonan	10¾	5
Winningstadt	7½	6
Pickling:—		
Blood Red Pickling	8¾	3¼
Early varieties:—		
Extra Early Paris Market	8½	Extra Early, fine quality.
Early Jersey Wakefield	7¼	
Extra Early Savoy	9¾	

CAULIFLOWER.

Cauliflower was an unusually fine crop on this Farm although there were many failures reported on account of the drought and heat. Four varieties were planted out from the hotbeds early in June. The latest-maturing specimens were of very superior quality, particularly Sutton's White Queen.

Variety.	Weight of Specimen Head.	Remarks.
	Lbs.	
Sutton's White Queen	8½	Second early. Excellent quality and texture.
Earliest Erfurt	7¼	1st early. Fine quality.
Early Snowball	7	1st early. " "
Earliest Snowball	6¼	1st early. " "

SQUASH, PUMPKINS, MARROWS.

The crop of squash, pumpkins and marrows has seldom been surpassed on this Farm. Nearly all varieties produced specimens of large size and excellent quality. The seeds were planted about June 1, in hills eight feet apart each way, with the exception of the Bush Marrows, where the hills were not so far apart. The Golden Hubbard is worthy of special mention, as also is the Long White Bush Marrow, the latter for its earliness.

Seed of several varieties saved in 1909 were planted for comparison. Without exception they produced good crops. Several varieties were grown in close proximity in 1909 and they had cross fertilized to a considerable extent, as the specimens grown this year were not true to type.

Variety.	Weight of Specimen.	Remarks.
	Lbs.	
Large Etampes Pumpkin	35½	Fine quality and fairly productive.
Mammoth Whale	29½	Good quality, fairly early and very productive.
Large Yellow Globe	26	Fine quality and fairly productive.
Mammoth Tours	22	Fair quality, not true to type.
Green English Vegetable Marrow	15¾	Good quality, early and productive.
White English Vegetable Marrow	14¾	Good quality, fairly early.
Hubbard Green (Selected seed from Lethbridge)	11¼	Good quality and fairly early.
Long White Bush Marrow	11	Earliest of all and very productive.
Hubbard Green (Own seed)	10½	Good quality and fairly early.
Golden Hubbard	10	Extra quality, very early and productive.
Green Hubbard (Seed from Central Ex. Farm	8½	Good quality, later than Golden Hubbard.

CITRON.

Three varieties of citron produced an excellent crop. The seed was planted in hills about June 1.

Variety.	Weight of Specimen.		Remarks.
	Lbs.	Oz.	
Colorado Preserving	12	8	Fine quality and fairly productive.
Green Seeded	10	..	Fine quality and fairly productive.
Red Seeded	7	8	Fine quality and very productive.

MELONS.

Several varieties of both watermelons and musk melons were grown outside and ripened fruit of fair size and excellent quality.

TOMATOES.

The past season proved quite favourable to the tomato crop and a large proportion of the fruit ripened. The plants were somewhat injured in June by the extremely high winds and this undoubtedly made the crop somewhat later than it would otherwise have been.

Three strains of Earliana were grown; one to commercial seed, another a selected strain from the Central Experimental Farm and a third was from seed produced here of the Central Experimental Farm's strain. The difference in these strains was very marked. The strain of home grown seed ripened fruit a full week ahead of the commercial strain and five days earlier than the C. E. F strain. In saving tomato seed the aim should be to get it from early maturing specimens of good conformation.

Such excellent results have followed the practice of growing and staking the tomato plants that this method of growing was again followed. The plants are pruned from one main stalk, very few of the laterals being allowed to grow. Stakes two inches square and four feet long are required for staking.

Last year several plants of each strain and variety were left unpruned and the yield of ripe and green fruit from three plants ascertained, to compare with the product of pruned specimens. From the results given below it will be noted that while a considerably greater total weight of fruit was obtained from the unpruned plants, the actual weight of ripe fruit was much greater where staking and pruning was practised.

TOMATOES—Yield from 3 plants.

Variety.	Pruned and Staked.						Unpruned.					
	Ripe.		Green.		Total.		Ripe.		Green.		Total.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Spark's Earliana (C.E.F. strain) Own seed	10	6½	7	12	18	2½	2	2	37	..	39	2
Spark's Earliana, C.E.F. seed	6	7	11	6	17	13	..	14½	39	..	39	14½
Spark's Earliana, Commercial seed	6	2	13	7	19	9	1	7	48	..	49	7
Chalk's Early Jewel	3	5	12	15	16	4	..	5½	33	..	33	5½

WONDERBERRY.

This fruit was tried again last year and with very good success. The seed should be sown in a hotbed like tomatoes or cabbage, and the young plants transplanted to the open when danger of frost is over. The plants are of spreading habit of growth and should be planted four feet apart in a row. They are considerably hardier than tomato plants and will continue to grow and ripen fruit after the tomatoes are frozen in the fall. The fruit is not edible in a raw state, but is quite palatable when preserved.

FRUITS.

The fruit crop was almost a complete failure last year on account of the frequent spring frosts which occurred while the trees were in full bloom. Very few varieties of plums, cross-bred apples or currants escaped, and when any fruit was produced, it was an extremely light crop.

The apple orchards which have suffered so severely from blight for several years were practically free from it last year. In all probability there will be little trouble from that cause for some time at least.

While there was little blight, the loss from winter injury was much greater than usual. The very warm weather in March started the growth and hard frosts followed for six weeks afterwards. These conditions not only killed all the blossoms, but in many cases so seriously injured the trees that they did not recover. These severe conditions appeared to be particularly fatal to trees which had fruited the previous year. A tree of Repka Kislaga, which has wintered without injury for six years and fruited in 1909, was killed completely. Several hundred other trees of different varieties also succumbed. The vacancies thus created in the orchards were filled with a number of cross-bred varieties secured from E. D. Smith, nurseryman, Winona, Ontario.

STRAWBERRIES.

Ten varieties of strawberries were planted in the spring of 1909, and most of them grew well during the summer, but were not allowed to set any fruit. In the late fall a covering of strawy manure was applied and with this protection they wintered with very little loss.

Brandon, 1908. Stocks.

The summer was much too dry to produce a good crop, but a small quantity of fruit was gathered. Fifty plants of each variety were planted. The amount of fruit gathered from each variety follows—

Variety.	Total Yield.	
	Lbs.	Oz.
Crescent	1	3½
Pocomoke	4	12
Enhance	2	10
Tenessee Prolific	2	9
Clyde	2	0½
Lovett	1	11½
Senator Dunlap	1	4½
Splendid	1	4½
Bederwood	.	15½
Uncle Jim	.	3½

FLOWERS.

In the early part of the summer the flowers had to contend with occasional frosts and many very high winds, and later with extreme heat and drought. Under these conditions it is not surprising that the amount of bloom and the luxuriousness of the plants fell short of what has usually been secured here. Notwithstanding the unfavourable conditions many varieties both of annuals and perennials did remarkably well and furnished a succession of bloom from early June till September.

The length of the blooming season was considerably shorter than usual, particularly with the perennials, which were very seriously injured by the wind.

The hotbeds were used for starting most of the annuals and the plants were transferred to the open about June 10. The following sorts were started under glass: Antirrhinum, Ageratum, Pansies, Nemesis, Verbena, Asters, Gaillardia, Stocks, Dianthus, Marigold, Abronia, Celosia and Tagetes patula. Others, including Poppies of various kinds, Mignonette, Bartonia and Portulaca, were sown in the open. Those sown outside germinated very poorly on account of lack of moisture and were, on that account, later than usual in making a good showing.

A row of sweet peas about 150 feet long was sown in October, 1909, just before the freeze-up. The very warm weather during the latter part of March induced early germination and by the first of April the peas were showing above ground. When the severe frost of April 16 occurred, they were from two to three inches high and many of the plants did not recover after the frost. However, there were sufficient that still persisted to make it worth while leaving them and these were in bloom fully a week earlier than those planted in the spring. The plants had rather a stunted appearance all through the season, and did not produce as much bloom as those sown in the spring. The spring-sown sweet peas made an excellent showing, particularly in the latter part of the season.

ROSES.

A consignment of roses consisting of fifty plants and comprising twenty-one varieties was received from the Central Experimental Farm in May, 1910. These were immediately planted and many of them bloomed luxuriantly during the summer. In the late fall they were protected by completely covering with earth.

Following is a list of those planted—

2 Fisher Holmes (both dead).
2 Caroline Testout.
2 Captain Hayward (1 dead)
2 Paul Neyron.
2 Magna Charta.
2 Earl of Dufferin.
2 Merveille de Lyon.
2 La France.
2 Jno. Hopper (1 dead).
4 Frau Karl Druschki.
2 Mrs. R. G. Sharman Crawford.
2 Ulrich Brunner.
2 Baroness Rothschild (1 dead).
4 Mrs. Jno. Laing (3 dead).
4 Madame Gabriel Luizet (1 dead).
2 Persian Yellow.
4 Margaret Dickson (1 dead).
2 Dorothy Perkins.
2 Crimson Rambler.

EXHIBITIONS.

An exhibit of the Farm products was made in the government building at the Brandon Summer Fair in July. Samples of the best varieties of grains, fodder crops, clovers and grasses were shown as well as vegetables and flowers that were in season. In addition a number of charts were displayed giving the results of the experiments with cereals, alfalfa, Indian corn and vegetables. An attendant was on hand during the fair to give information.

An exhibition of garden products was made at the Horticultural Show in August. A splendid display was made of squash, pumpkins, onions, potatoes, tomatoes, and various other vegetables and of flowers. It was greatly admired and favourably commented upon.

DISTRIBUTION OF SAMPLES.

The distribution of samples of potatoes, trees and shrubs, etc., has been continued and during the past year the following material has been sent out:—

Seedling trees and shrubs, packages	102
Potatoes in 3-lb. bags	114

CORRESPONDENCE.

Since the last report 3,545 letters were received and 3,394 despatched, irrespective of circulars.

METEOROLOGICAL RECORD FOR BRANDON.

Months.	Highest Temperature.		Lowest Temperature.		Total. Rainfall.	Total Snowfall.	Hours Bright Sunshine.
1910.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	
April	25	81·	23	8	·49	½	199·9
May	27	84.5	1	11	1·66	.....	251·7
June	20	102·2	1	25·5	2·09	.....	235·1
July	14	104·5	12	39·8	2·00	.....	289·3
August	20	92	31	31	1·04	.....	225·7
September	16	90	26	20	1·91	.....	197·9
October	9	85·4	28	8	·03	.....	189·4
November	8	51·9	29	—14	.....	21	77·1
December	14	34	30	—32·5	.....	11	81·2
1911.							
January	28	16	3, 11	—44	.....	19	90·7
February	25	33	5	—29·5	.....	7	139·3
March	24	48.2	4	—13	.....	1	185·1
					8 62	*59½	2,162 4

* Reckoning 10 inches of snowfall as equivalent to 1 inch of rainfall, the total precipitation for the year ending March 31, 1911 was 14·57 inches.

I have the honour to be, sir,
Your obedient servant,
JAMES MURRAY,
Superintendent.

EXPERIMENTAL FARM FOR SOUTHERN SASKATCHEWAN

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

INDIAN HEAD, SASK., March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit to you my twenty-third annual report of the work done, and the results obtained, on the Experimental Farm for Southern Saskatchewan, at Indian Head, for the year ending March 31, 1911.

The crops in all districts in the southern portion of the province varied in yield and quality in 1910. Dry weather extended over the greater portion of the country during the growing season, and only where cultivation had been properly done, were good crops found.

From the 1st of April to the last of August, only 7·12 inches of rain fell; this included a snow storm in June which was of great benefit. Yet, notwithstanding this small amount of moisture, on the Experimental Farm, and district of Indian Head, only once in the past twenty-three years has a more bountiful or a more satisfactory grain crop been grown.

The clover and grass hay crops were rather below the average, on account of the drought.

Field roots, corn and potatoes obtained benefit from the heavy rains in August, and were all good.

Vegetables were not equal in quantity to the crop of 1909, but were superior in quality.

Fruits were a complete failure, from spring frosts killing the blossoms as they successively came out.

Spring opened from the 10th to the 15th of March, with a good many, in some districts, sowing wheat from the 15th to the 18th. The soil never was in better condition for seeding, but fear of late spring frosts kept many from starting until April.

Seeding commenced on the Experimental Farm on the 6th of April, and was general over the whole province at that date.

Harvest started on the 6th of August, and was completed on the 20th of the same month.

Threshing commenced on the 25th of August, and finished on the 22nd of September, with several delays due to rain, and to the securing of the corn crop.

EXPERIMENTS WITH SPRING WHEAT.

Wheat experiments, both in field and plot lots were very satisfactory; none of the grain lodged, it ripened evenly, and was easily harvested and threshed.

The land was prepared by ploughing six or eight inches deep before the 1st of July of the previous year. It was harrowed and cultivated as each crop of weeds appeared, then the seed was sown and harrowed afterwards.

SPRING WHEAT—TEST OF VARIETIES.

Thirteen varieties were sown on the 8th of April, in plots of one-twentieth acre each, at the rate of one and one-half bushels of seed per acre. Repeated frosts put the grain back, and the winds bared many of the roots. The yields and quality were satisfactory.

Marquis and Red Fife were the worst injured by the winds. Kubanka, in the list, is a Durum Wheat.

SPRING WHEAT—Test of Varieties.

Number of Plot.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre	Yield of Grain per Acre		Weight per measured bushel after cleaning
							Lbs.	Bush.	Lbs.	Lbs.
1	Huron	Aug. 20	134	35	10	3¼	3,280	54	40	62
2	Stanley	" 13	127	38½	9	3½	3,120	52	..	63
3	Bishop	" 20	134	37	10	3	3,080	51	20	64
4	Preston	" 20	134	41	9	3½	3,080	51	20	64·5
5	Pringle's Champlain	" 20	134	39	8	3¾	2,980	49	40	63·8
6	White Fife	" 20	134	38	6	4¼	2,980	49	40	61·5
7	Chelsea	" 10	124	38	10	3	2,940	49	..	64·9
8	Early Red Fife	" 13	127	39	10	3¾	2,900	48	20	64·3
9	Marquis	" 11	125	38	10	3½	2,880	48	..	65·3
10	Red Fife	" 13	127	39	8	3½	2,580	43	..	63·5
11	Red Fife (Smith's)	" 13	127	40	10	3½	2,560	42	40	62·9
12	Red Fife (Garton's 'Regenerated')	" 20	134	38	10	3¼	2,140	35	40	62
13	Kubanka	" 20	134	52	5	3¾	2,900	48	20	64·2

SPRING WHEAT—Test of Varieties in Field Lots.

Number of Plot.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
							In.	Lbs.	Bush.	Lbs.	Lbs.
1	Marquis	April, 6	Aug. 8	124	38	10	3½	3,186	53	06	64·5
2	Marquis	" 7	" 8	123	38	10	3½	2,676	44	36	64·5
3	Early Red Fife	" 6	" 11	127	43	10	3	2,562	42	42	63
4	Red Fife (Smith's)	" 6	" 9	125	40	10	3	2,500	41	40	62·9
5	Preston	" 8	" 8	122	42	10	3¼	2,460	41	11	61·3
6	Stanley	" 7	" 11	126	42	10	3	2,382	39	42	61·3
7	Red Fife	" 6	" 14	130	40	10	2¾	2,228	37	08	62·7
8	Bobs	" 7	" 11	126	39	10	3	2,169	36	09	63·2
9	Huron	" 8	" 8	122	41	10	3	1,991	33	11	63
10	Red Fife (On Stubble)	" 11	" 15	126	37	10	2½	1,725	28	45	64

SPRING WHEAT—Average and Total Yields.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Marquis	Fallow	5⅓	53	6	283	20
Marquis	"	6½	44	36	289	52
Early Red Fife	"	3⅓	42	42	142	10
Preston	"	5½	41	11	226	..
Stanley	"	5⅛	39	42	204	37
Red Fife	"	18	37	8	668	36
Bobs	"	2	36	9	72	18
Huron	"	5½	33	11	182	..
Red Fife	Stubble	5	28	45	143	48
		56⅓			2,212	41

An average of 39 bushels, 15 lbs. per acre.

SPRING WHEAT—Four Years' Comparison of Field Lots.

The average yield per acre and time taken to mature of five varieties of wheat, grown in field lots under similar conditions for the past four years, are given below.

Variety.	Average Days to Mature.	Days earlier than Red Fife.	Average Yield per Acre.	
			Bush.	Lbs.
Preston	127	7	33	52
Huron	125	9	32	51
Stanley	128	6	31	48
Red Fife	134	.....	31	22
Marquis	125	9	39	25

FALL WHEAT.

Fall wheat was sown on the 7th of September, 1909, and came up six to eight inches high before winter set in. It was alive at the roots, but quite dead above ground when the frost left the soil in the spring.

Night frosts and thaws during the day killed all by the 1st of May, except one low spot where the frost remained in the ground later than the rest of the land. The variety used was Alberta Red, formerly called Turkey Red.

EXPERIMENTS WITH OATS.

On account of sowing the oats, both in field and in uniform plots, too early, all suffered from frost and winds.

The uniform plots were entirely killed after coming up, by winds exposing the roots, and frost then killing the grain. All the varieties were resown, but too late to give reliable results.

In the field lots, winds and frost thinned the grain about one-third, causing the crop to ripen unevenly. All however did ripen, but the yield, though good, was less than if the seed had been sown the last of April, or early in May, and escaped the repeated winds and frosts that overtook the earlier-sown grain.

OATS—Test of Varieties.

Nineteen varieties were sown on the 11th of April, on fallowed land. Two bushels of seed was sown per acre. All were entirely killed by winds and frost, and were resown on the 16th of May, on other land, in plots of one-twentieth acre each.

Number of Plot.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	White Giant	Aug. 24	102	40	10	8	3,460	101	26	36·0
2	Twentieth Century	" 23	101	39	10	8	3,080	90	20	40·2
3	Wide Awake	" 24	102	39	10	7½	3,000	88	08	38·2
4	Virginia White	" 22	100	41	10	7	2,960	87	02	40·1
5	Victory	" 24	102	41	10	8	2,800	82	12	42·0
6	Thousand Dollar	" 23	101	38	10	7½	2,780	81	26	40·8
7	Irish Victor	" 23	101	39	10	7½	2,720	80	..	37·5
8	Abundance	" 20	98	38	10	8	2,700	79	14	36·0
9	Danish Island	" 22	100	39	10	8½	2,660	78	08	35·5
10	Banner	" 21	99	40	10	8	2,640	77	22	35·6
11	Golden Beauty	" 22	100	37	10	7	2,550	75	10	35·5
12	Lincoln	" 23	101	40	10	8	2,550	75	10	39·0
13	Improved American	" 24	102	39	10	8	2,520	74	04	35·0
14	Improved Ligowo	" 20	98	40	10	7½	2,520	74	04	39·0
15	Gold Rain	" 21	99	39	10	7½	2,360	69	14	39·4
16	Swedish Select	" 22	100	41	10	8	2,280	67	02	41·0
17	Siberian	" 23	101	41	10	8	2,140	62	32	40·0
18	'Regenerated' Abundance	" 20	98	39	10	8	1,900	55	30	36·0
19	Pioneer (black)	" 24	102	36	10	8	1,300	38	08	38·4

OATS—FIELD LOTS.

Six varieties were sown in field lots, from the 13th to the 26th of April. Regenerated Abundance was sown at the rate of four bushels per acre, the other varieties at the rate of two bushels per acre.

Improved Ligowo, Danish Island, and White Giant were injured by wind and frost severely, the others more or less. The land was fallowed in 1909.

OATS—Test of Varieties in Field Lots.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	'Regenerated' Abundance..	Aug. 5	107	42	10	8	3,107	91	13	42·8
2	Banner	" 18	114	39	10	8	3,065	90	05	41·1
3	Wide Awake	" 15	111	46	10	8	2,999	88	07	40·4
4	White Giant	" 16	125	45	10	8½	2,825	83	03	37·6
5	Improved Ligowo	" 15	116	41	10	7½	2,373	69	27	41·8
6	Danish Island	" 8	119	45	10	7½	2,357	69	11	37·4
7	Banner (Stubble)	" 15	118	45	10	8	1,962	57	24	

OATS—Average and Total Yields.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
'Regenerated' Abundance	Fallow	4	91	13	365	20
Banner	"	6½	90	05	586	26
Wide Awake	"	8	88	07	711	..
White Giant	"	7⅔	83	03	617	..
Improved Ligowo	"	5½	69	27	383	32
Banner	"	5½	69	26	383	28
Danish Island	"	5⅔	69	11	374	17
Banner	Stubble	2	57	12	114	24
		44⅓			3,537	11

An average of 86 bushels 13 lbs. per acre.

The average yield per acre and time taken to mature, of four varieties of oats grown in field lots under similar conditions for the past five years are shown below.

OATS—Five Years' Comparison of Field Lots.

Variety.	Average Days to Mature.	Average Yield per Acre.	
		Bush.	Lbs.
Wide Awake	115·6	88	02
White Giant	116·6	87	27
Banner	116·6	84	03
Danish Island	116	83	17

EXPERIMENTS WITH BARLEY.

The barley tests in uniform plots and in field lots were quite satisfactory.

The yield in nearly all varieties was good, and the quality better than for a good many years. The straw was not extra heavy, and gave no trouble in cutting. The land was summer-fallowed the previous year.

BARLEY—TEST OF VARIETIES.

Twelve varieties of six-row and ten varieties of two-row barley were sown on April 27, at the rate of two bushels seed per acre on plots of one-twentieth acre each.

All came up evenly and escaped the frost and wind to a large extent, or at least were not injured.

SIX-ROW BARLEY—Test of Varieties

No. of Plot.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	O. A. C., No. 21	Aug. 5	100	38	10	2¾	3,340	69	28	46·5
2	Odessa	" 9	104	34	10	2½	3,340	69	28	49
3	Stella	" 8	103	35	10	2½	3,280	68	16	46·8
4	Manchurian	" 8	103	33	10	3	3,280	68	16	45
5	Trooper	" 8	103	33	10	2½	3,220	67	04	47·6
6	Mensury	" 3	98	34	10	2½	3,180	66	12	46·7
7	Yale	" 8	103	32	10	2½	3,140	65	20	49·2
8	Nugent	5 5	100	36	10	3	3,020	62	44	46·6
9	Claude	July 30	94	33	10	2½	3,000	62	24	49
10	Mansfield	Aug. 3	98	34	10	2½	3,000	62	24	47·8
11	Oderbruch	" 5	100	32	10	3	2,900	60	20	51
12	Albert	" 3	98	30	10	3¼	2,660	55	20	47·7

TWO-ROW BARLEY—Test of Varieties.

No. of Plot.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Hannchen	Aug. 9	104	26	10	2¾	3,694	77	04	54·8
2	Danish Chevalier	" 11	106	27	10	3½	3,380	70	20	54·2
3	Invincible	" 11	106	24	10	2½	3,160	65	40	52
4	French Chevalier	" 19	114	30	10	3½	3,000	62	24	51·5
5	Swedish Chevalier	" 17	112	31	10	3¾	3,000	62	24	51
6	Standwell	" 11	106	28	10	2½	2,840	59	08	52·1
7	Clifford	" 9	104	32	10	3	2,820	58	36	50·8
8	Jarvis	" 9	104	32	10	3½	2,600	54	08	50·5
9	Canadian Thorpe	" 11	106	28	10	2½	2,480	51	32	48·1
10	Beaver	" 10	105	28	10	3½	2,340	48	36	50·8

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Eight varieties were sown in field lots, on fallowed land on April 26 and 27. Two bushels of seed was sown per acre.

BARLEY—Test of Varieties in Field Lots.

No. of Plot.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Mansfield	Aug. 7	102	38	10	2½	3,444	71	36	52·7
2	Mensury	" 6	102	44	10	2¼	3,238	67	22	52
3	O. A. C., No. 1	" 8	104	41	10	2¾	2,840	59	08	46
4	Manchurian	" 7	102	41	10	3	2,614	54	22	51
5	Invincible	" 14	109	37	10	3½	2,472	51	24	50·2
6	Standwell	" 15	110	38	10	2½	2,405	50	05	53
7	Canadian Thorpe	" 15	109	36	10	2½	2,160	45	..	52·2
8	Hannchen	" 9	104	32	10	3	1,700	35	20	49·5

BARLEY—Average and Total Yields.

Variety.	Cultivation.	Acres in Field.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Mansfield	Fallow	2¾	71	36	197	15
Mensury	"	9	67	22	607	06
O.A.C. No. 21	"	1	59	08	59	08
Manchurian	"	2	54	22	108	44
Invincible	"	2	51	24	103	..
Standwell	"	2	50	05	100	10
Canadian Thorpe	"	2	45	..	90	..
Hannchen	"	1	35	20	35	20
		21¾			1,301	07

An average of 59 bushels and 32 lbs. per acre.

BARLEY—FIVE YEARS' COMPARISON OF FIELD LOTS.

The average yield per acre and time taken to mature, of five varieties of barley grown in field lots under similar conditions for the past five years will be found below.

Variety.	Days to Mature.	Average Yield per Acre.	
		Bush.	Lbs.
Mensury	99·4	56	18
Mansfield	93·6	51	06
Invincible	106·6	42	31
Standwell	117·4	41	02
Canadian Thorpe	105·0	40	21

EXPERIMENTS WITH FIELD PEAS.

TEST OF VARIETIES.

Peas were sown on root land, on which twelve loads of well-rotted manure was applied the fall before roots were sown. When the roots were taken off, the land was ploughed five inches deep and harrowed, and before the peas were sown in the spring it was ploughed shallow.

The peas were sown at the rate of two bushels for small, and three bushels for large sorts, per acre. All varieties were sown on April 11 and 12, the earliest date that peas have ever been put in here. Of all the crops grown, they suffered the least from wind and frost, as far as could be seen. The yield was below former years, but all ripened and were a good sample. Fourteen varieties were sown on 1/20 acre plots on April 11.

PEAS—Test of Varieties.

Number of Plot.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Mackay	Large	Aug. 6	117	60	2¾	2,420	40	20	64·5
2	Prussian Blue	Medium	" 5	116	54	3	2,300	38	20	64
3	Paragon	"	" 6	117	57	2½	2,300	38	20	63·2
4	Wisconsin Blue	Small	" 6	117	63	2½	2,200	36	40	65
5	Golden Vine	"	July 31	111	47	2	2,180	36	20	63·5
6	Picton	Medium	Aug. 5	116	59	2¼	2,120	35	20	65
7	Prince	Small	" 5	116	64	2¾	2,100	35	..	64·8
8	Gregory	Medium	" 3	114	54	2¼	1,960	32	40	64
9	White Marrowfat	Large	" 6	117	60	3¼	1,880	31	20	62·5
10	Daniel O'Rourke	Small	July 31	111	52	2¼	1,820	30	20	63·8
11	Chancellor	"	" 29	109	58	2½	1,720	28	40	63
12	Arthur	Large	Aug. 1	112	55	2¼	1,640	27	20	64·5
13	Black-eye Marrowfat	"	" 3	114	66	3¼	1,600	26	40	62·5
14	English Grey	"	July 28	108	64	2¼	1,560	26	..	61·5

PEAS—TEST OF FIELD LOTS.

Four varieties of peas were sown in this test on April 12. Golden Vine was also sown on fallowed land, resulting in very little difference in yield.

Number of Plot.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Archer	Medium	Aug. 7	117	57	2¼	2,500	41	40	64·6
2	Gregory	"	" 5	115	53	2¼	2,266	37	46	63·8
3	Golden Vine	Small	" 2	112	45	2	2,200	36	40	64·5
4	Golden Vine (Fallow)	"	" 2	112	46	2	2,168	36	08	64 5
5	Arthur	Large	" 2	112	57	2¼	1,466	24	26	64

SUMMARY OF CROPS, 1910.

	Bushels.
Wheat—	
8 varieties, 45⅓ acres	1,813
Two 5½ acres, rotation test	408
13 uniform test plots	34
	2,255
Oats—	
6 varieties, 33⅓ acres	2,769
Two 5½ acres, rotation test	767
21 uniform test plots	80
	3,616
Barley—	
8 varieties, 21¾ acres	1,301
22 uniform test plots	68
	1,369
Peas—	
5 varieties, 6 acres	211
One 2⅛ acres, rotation test	77
14 uniform test plots	23
	311
Fall rye	20
Flax	18
Potatoes	125
Roots	2,000
	Tons.
Corn ensilage	108
Hay—	
Western Rye grass	20
Western Rye grass and Red clover	8
Alfalfa	17
Cut in coulées	10

FALL RYE.

Fall rye was sown on September 6, 1909, and as in all other years, gave a satisfactory yield. Farmers requiring early spring pasture, will find this the earliest crop that can be grown.

Size of Plot. Acres	Date Sown.	Date Ripe.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre. Bush.	Weight per Bushel. Lbs.
¾	Sept. 6	July 21	70 ins.	8	4 ins.	50	57·7

FLAX EXPERIMENTS.

Six varieties of flax were sown in 1/20 acre plots on May 13. Just as they came above ground, a severe frost killed nine-tenths of all the plants, and all were ploughed up after it was certain that no recovery could be made. The varieties sown were: Common, White Flowering, Yellow Seeded, Riga, Improved Russian, Dutch.

Two acres of Dutch flax was sown on May 14. Like the smaller plots, this was badly frozen, and was ploughed up.

One acre was sown on May 23, and one-half acre on June 6. A large part of both plots was pulled for exhibition purposes, and no record was kept of the yield of the remainder.

SMUT TESTS.

Two plots (1/20 acre each) of smutty Huron wheat were sown, one plot being treated with formalin, which clearly shows the necessity of treating for smut.

Remarks.	Yield per Acre. Bush.	Lbs.
Treated, 1 lb. Formalin in 30 gals. water. Free from smut	54	40
Untreated. Unsaleable	47	..

Two plots of Mensury barley were sown,, one plot being treated the same as wheat, and the other plot not treated. No smut was found in either plot.

SOIL PACKING TESTS WITH BARLEY.

Three plots of Mensury barley were used, one plot was packed once, another twice, and the third was not packed. The land had been fallowed and no cultivation done in the spring, before or after seeding. A subsurface packer was used.

—	Sown.	Ripe.	Yield. Bush.	Lbs.
1st plot, packed once	April 27	Aug. 3	69	28
2nd plot, packed twice	27	July 30	68	16
3rd plot, not packed	27	Aug. 4	64	28

SOIL PACKING TEST WITH OATS.

Two plots of Banner oats were used, one plot was packed once, and the other plot was not packed. The land had been fallowed, and no cultivation done in the spring, before or after seeding.

—	Sown.	Ripe.	Yield.	
			Bush.	Lbs.
1st plot, packed	April 19	15	88	17
2nd plot, not packed	" 19	17	81	21

SOIL PACKING TEST WITH PEAS.

One acre of Golden Vine peas was packed with the subsurface packer once, as the crop was coming up. The acre was also harrowed with the ordinary iron harrow before the packing was done.

One acre was not packed, but was harrowed as the peas came above ground, resulting in the unpacked acre giving 1 bushel 32 lbs. more than the one that was packed.

CROP ROTATIONS.

Last spring a field of 49½ acres was laid out in nine fields of 5½ acres each, and the following rotations started:—

FIRST SERIES.

Field No. 1, summer-fallow. No. 2, hoed crop and legume, manure 15 tons per acre. No. 3, wheat. No. 4, oats. No. 5, fallow. No. 6, wheat. No. 7, oats, seeded with Rye grass and alfalfa. No. 8, hay. No. 9, pasture.

SECOND SERIES.

This spring the second series of rotation tests will be commenced in a field of 48 acres laid out in eight fields of 6 acres each.

The field was in pasture when broken up last year.

Order of Rotation.

Field No. 1, summer-fallow. No. 2, wheat. No. 3, wheat. No. 4, fallow. No. 5, roots or legume, 15 tons of manure to the acre. No. 6, barley seeded to Rye grass, Red clover and alfalfa. No. 7, hay. No. 8, pasture.

THIRD SERIES.

A field of 42 acres will be prepared, laid out in six equal divisions, and prepared for the following rotations:—

Field No. 1, summer-fallow. No. 2, wheat. No. 3, wheat,. No. 4, oats, seeded with Rye grass, Red clover and alfalfa. No. 5, hay. No. 6, pasture.

ROTATION TESTS, 1910.

Number.	Variety.	Character of Soil.	Date Sown.	Date Ripe.	Days Maturing.	Length of Straw including Head.	Strength of Straw on a scale of ten points.	Length of Head.	Yield per Acre.	
						Inches.			Bush.	Lbs.
1	Fallow	Fallow								
2	Hoed crop	"								
3	Preston Wheat	"	April 8	Aug. 8	122	42	10	3¼	41	11
4	Imp. Ligowo Oats	"	" 21	" 15	116	41	10	7½	69	27
5	Fallow	"								
6	Huron Wheat	"	April 8	Aug. 8	122	41	10	3	33	11
7	Banner Oats	"	" 21	" 17	118	41	10	7½	69	26
8	Grass seeds	"								
9	Grass seeds	"								

ALFALFA.

Three strains of alfalfa were sown in 1904, nine strains in 1905, six strains in 1908, and thirty-nine strains in 1909. Those living last spring and producing crops are given, with yields. The first cutting in all cases was fairly good. A few varieties of the 1909 seeding gave extra large yields, chiefly from being in low places where the soil was more moist than in the other cases. The second cutting in all varieties was light, on account of the protracted dry hot weather after the first cutting was made.

I repeat what was said in my 1910 report respecting alfalfa growing, and add a few pointers as to the most suitable land, cultivation, seeding, cutting, curing, etc.

It is found from previous tests that a great deal depends on the first season's growth, whether alfalfa prove hardy or not. If it enters the winter with small roots, and the top has been eaten bare, it is sure to succumb. On the other hand, if the roots have taken a good hold, and a good growth has been left to protect the crown, the crop is reasonably safe. If added to this, the precaution is taken not to pasture too closely or too late in the fall, there is no reason to doubt of its entire success. The course pursued on this Farm which has given the best result is, to plough stubble land late in May, four or five inches deep; then harrow once. After harrowing, ten to twelve lbs. seed per acre is sown with a wheelbarrow grass seeder. When sown, the land is harrowed, rolled and again harrowed. The rolling firms the soil, and leaves the surface in good condition for the mower, and the last harrowing prevents evaporation.

The seed is sown without a nurse crop, and when the plants are sufficiently high, the mower is run close to the ground, to kill weeds and cause the roots to take a better hold. This is repeated up to the end of July, and after that all growth is left for winter protection.

It has been found, when a nurse crop has been grown, that the plants are weakly, even if not badly killed out by the grain using up all the moisture in August. If they survive after the grain is harvested, as a rule the weather is too dry for them to make satisfactory root or top growth, and they are not in a condition to stand the thaws and frosts of April and early May.

CULTIVATION, SEEDING AND HARVESTING OF ALFALFA.

Alfalfa can be sown on fallowed land or on stubble land.

Fallow.—If fallow lands drift with the winds, plough four inches deep before seeding to overcome the danger.

Indian Head, 1908.—Two-row Barley.

Stubble.—If stubble is heavy, burn in the spring, plough five inches deep and harrow. If land was ploughed the preceding fall, cultivate before sowing.

Seeding.—Sow 12 lbs. of seed per acre, from May 25 to 31. After seeding, cross-harrow twice then roll or pack soil; do not roll fallowed land, use packer instead.

Nurse crop.—On fallowed land, grain can be sown; oats or barley is better than wheat, as these can be delayed in seeding. Alfalfa seed should not be sown too early. On stubble land, no nurse crop should be sown, as usually the moisture is not sufficient for both and the tender clover plants die.

When clover is up about five inches, mow close to the ground, and repeat the first week in August.

Leave the last growth uncut for winter protection. The mowing kills weeds and strengthens the roots, which is important the first winter.

Harvesting.—Alfalfa is usually ready for the first cutting early in July, and for the second cutting, the same time in August of the second year. Cut when in blossom. Cut early in the forenoon, and if the day is fine, rake into windrows in the afternoon, and put into small cocks the next day.

Allow the hay to cure in the cocks; turning and exposing to the air will hasten drying.

Have the hay well dried before stacking, for fear of spoiling.

ALFALFA, Sown 1904.

Variety.	Remarks.	Date Cut.	Yield per Acre.	
			Tons.	Lbs.
Turkestan	Strong	July 8	1	600
Common Alfalfa	"	" 8	1	1,080

ALFALFA, Sown 1905.

Variety.	Remarks.	Date Cut.	Yield per Acre.	
			Tons.	Lbs.
Grimm	Strong	July 8	2	400
New York	"	" 8	2	100
Samarkand (Turkestan)	"	" 8	1	1,575
Nebraska	"	" 8	1	880

ALFALFA, Sown in 1908.

Variety.	Remarks.	Date Cut.	Yield per Acre.	
			Tons.	Lbs.
Grimm (Lyman Co)	Strong	July 8	1	1,420
Idaho	"	" 8	1	1,330
Montana, (Lyman Co.)	"	" 8	1	1,600
Dryland, (Lyman Co.)	"	" 8	1	1,600
French Alfalfa	"	" 8	1	1,600
Turkestan, (Lyman Co.)	"	" 8	1	1,390

ALFALFA—Sown in 1909.

Variety.	Remarks.	Date Cut.	Yield per Acre.	
			Tons.	Lbs.
Canadian	Strong	July 11	2	1,790
Vilmorin's Sand Lucerne	"	" 11	2	825
Lecoq's " "	"	" 11	2	825
Mongolian	"	" 11	3	1,740
Nephi, Utah (dry land)	12 p.c. killed	" 11	2	1,805
Sextorp, Neb	Strong	" 11	2	837
Alt-Deutsche Fränkische	"	" 11	2	1,872
Provence-Aubignan	8 p. c. dead	" 11	1	903
Wessel, Duval Peruvian	Winter killed.			
Baltic	Strong	" 11	1	1,870
Werney or Tschilik (Turkestan)	"	" 9	3	1,740
Sand Lucerne, (Darmstadt)	"	" 9	3	1,740
Chinook, Montana	"	" 9	3	1,740
Liefman's Sand Lucerne	"	" 9	2	1,805
Arabian	Killed by spring frosts.			
Medicago ruthenica	10 p. c. killed	" 9	1	1,870
Medicago falcata	Strong	" 9	2	1,805
Sand Lucerne, Bromberg	"	" 9	6	577
Thuringian, Erfurt (Germany)	"	" 9	5	642
Sand Lucerne, (Wissinger)	"	" 9	5	1,610
Hungarian, Boschan (Vienna)	"	" 9	5	1,610
Pfalzer (Bavarian)	"	" 9	5	1,610
Frasinet (Roumania)	4 p. c. killed	" 9	3	1,740
Vasluiu, (Roumania)	5 p. c. killed	" 9	2	1,805
Belfontaine (Ohio)	Strong	" 9	5	755
Mixed Seed	"	" 9	5	642
Old Frankish Lucerne	"	" 9	3	1,740
W. A. Wheeler, No. 162	"	" 9	2	1,500
No. 240	"	" 9	2	1,500
No. 164	"	" 9	2	450
No. 167	"	" 9	2	1,625
Grimm (A. B. Lyman Co.)	"	" 9	2	375
Montana (23454)	5 p. c. dead	" 9	1	1,600
Grimm (25102)	Strong	" 9	2	80
Sand Lucerne (23394)	"	" 9	1	1,360
Canadian, variegated (24837)	"	" 9	1	1,800
Canadian, purple flowered (24837)	"	" 9	2	125
Turkestan	"	" 9	1	1,750
Sainfoin (Spanish)	Entirely winter killed.			
Grimm	Strong	" 9	2	.....
Turkestan	"	" 9	1	1,720
Mixed varieties	"	" 9	2	40

TEST OF SOWING ALFALFA ON DIFFERENT DATES

Three two-acre lots of alfalfa were sown in the spring of 1909, the first lot in the last of May, the second lot on July 10, and the third lot on August 18. The variety was Montana, and each lot was sown without a nurse crop.

The first plot, sown the last week in May, was mown twice by August 1, and the last growth left for winter protection.

The second plot was mown once early in August and the last growth left. The third plot was mown, but as the alfalfa growth was short, the mowing was more for the purpose of killing weeds.

In the spring of 1910, the third plot was entirely dead, the second plot was also dead in low places. Both plots were ploughed up and resown early in May. The first plot came through in good condition, giving 2 tons 400 lbs. per acre.

GRASSES AND RED CLOVER.

The hay crop was light, but the weather being favourable when cut, was secured in good condition.

Variety.	Year Sown.	Date Cut.	Yield per Acre.	
			Tons.	Lbs.
Western Rye Grass	1906	July 8...	1	...
Western Rye Grass and Red Clover	1906	" 13...	1	100
Western Rye Grass, Red Clover and Timothy	1907	" 13...	1	500
Brome Grass	1899	" 13...	..	1,970

EXPERIMENTS WITH INDIAN CORN.

Ten varieties of Indian corn were sown in drills thirty-five inches apart, and planted in hills three feet apart each way. The land had been fallowed the previous year. No manure was applied.

Up to August 15, the promise was not good for a satisfactory return, but heavy rains after that date, with warm weather, made a great improvement, and when cut on September 7, a good yield in all cases was obtained. No frost injured the crop from sowing to cutting.

The corn was sown with the grain drill, by closing up enough cups to make the rows as nearly thirty-six inches apart as possible. The farm drill is a seven-inch, causing the rows to be thirty-five inches apart. The corn was sown two inches deep. The yield was computed from the weight of two rows, each sixty-six feet long.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No. of Plot.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
				Inches.		Tons.	Lbs.	Tons.	Lbs.
1	Eureka	May 25.	Sept. 7.	86	Tasselled	29	1,400	26	1,400
2	Champion White Pearl	" 25.	" 7.	90	"	27	1,044	22	880
3	Salzer's All Gold	" 25.	" 7.	80	"	24	1,104	24	180
4	Selected Leaming	" 25.	" 7.	88	"	21	184	20	920
5	Wood's Northern Dent	" 25.	" 7.	88	"	24	180	23	200
6	Angel of Midnight	" 25.	" 7.	78	"	23	1,520	19	1,600
7	Compton's Early	" 25.	" 7.	84	Not tasselled	23	200	19	1,600
8	Northwestern Dent	" 25.	" 7.	80	In cob	22	1,540	19	1,600
9	Longfellow	" 25.	" 7.	78	Not tasselled	22	220	19	1,600
10	Superior Fodder	" 25.	" 7.	88	"	20	656	20	920

FIELD ROOTS.

Turnips, mangles, sugar beets and carrots were sown on fallowed land. The land was ploughed in June, seven inches deep, cultivated three times during the growing season, and ploughed five inches deep in October, and twelve loads of well-rotted manure applied per acre.

In the spring before the frost was out of the soil, the land was harrowed, which helped to scatter the manure. A few days before sowing the root seed, the land was gang-ploughed shallow and harrowed.

The seed was sown on the flat, turnips, mangels and sugar beets on two separate dates, and carrots once. When up sufficiently high, the plants were thinned to twelve inches apart in the rows, rows twenty-seven inches apart. Heavy raing in August insured a large crop of turnips and mangels.

TURNIPS—Test of Varieties.

No. of Plot.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth Clyde	33	1,188	1,119	48	27	1,308	921	48
2	Hall's Westbury	31	1,624	1,060	24	28	1,024	950	24
3	Hartley's Bronze	29	1,532	992	12	26	536	875	36
4	Jumbo	29	608	976	48	22	1,936	765	36
5	Perfection Swede	29	80	968	..	23	200	770	..
6	Magnum Bonum	28	760	946	..	24	1,500	825	..
7	Halewood's Bronze Top	25	1,216	853	36	23	728	875	36
8	Good Luck	25	556	842	36	28	1,420	957	..
9	Carter's Elephant	21	1,164	719	24	24	1,104	818	24
10	Bangholm Selected	19	544	642	24	22	1,804	763	24

MANGELS—Test of Varieties.

Number of Plot.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Intermediate	31	1,624	1,060	21	23	1,388	789	43
2	Half Sugar White	29	1,796	996	36	24	576	809	36
3	Giant Yellow Globe	28	1,156	952	36	26	140	869	..
4	Gate Post	26	1,196	886	36	19	1,732	662	12
5	Selected Yellow Globe	26	1,196	886	36	27	252	904	12
6	Prize Mammoth Long Red	26	536	875	36	24	1,368	822	48
7	Perfection Mammoth Long Red	23	464	774	24	21	768	712	48
8	Yellow Intermediate	22	1,276	754	36	17	1,036	583	56

CARROTS—Test of Varieties.

Number of Plot.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	12	420	407	1
2	White Belgian	11	440	374	2
3	Half Long Chantenay	9	1,668	327	48
4	Ontario Champion	9	1,536	325	36
5	Improved Short White	8	104	268	24

SUGAR BEETS—Test of Varieties.

Number of Plot.	Name of Variety.	Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.		Yield per Acre. — 2nd Sowing.		Yield per Acre. — 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	French Very Rich	15	228	503	48	13	1,192	453	12
2	Klein Wanzleben	14	1,700	495	..	13	928	432	8
3	Vilmorin's Improved	14	116	468	36	13	928	432	8

POTATOES.

The potato crop was very satisfactory both in quantity and quality. Rather more small tubers were produced than in ordinary years.

The potato bug made its first appearance on the Farm and in the district last year. They however came too late to do much injury, but will no doubt give more trouble after this.

The yield per acre in each case was computed from two rows, each sixty-six feet long. The land was a clay loam fallowed the same as root land, but no manure was applied.

The rows were thirty inches apart, with the sets planted fourteen inches apart. Before the sets were cut, the potatoes were soaked in a solution of 1½ lbs. formalin in 35 gallons of water, for two hours, for the prevention of scab. While not entirely effectual, it was fairly so.

All varieties were planted on May 11, and dug September 26.

POTATOES—Test of Varieties.

Number.	Variety.	Growth.	Size.	Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.		Form and Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Reeves' Rose	Strong	Medium	622	36	576	24	46	12	Oval, red.
2	Everett	"	Large	607	12	567	36	39	36	Long, pink.
3	Morgan Seedling	"	"	580	48	545	36	35	12	" "
4	Late Puritan	"	"	558	48	508	12	50	36	Oval, white.
5	Money Maker	"	"	554	24	510	24	44	..	Long, white.
6	Carman No. 1	"	Medium	545	36	499	24	46	12	Round, white.
7	Gold Coin	"	Large	545	36	503	48	41	48	Oval, white.
8	Empire State	"	Medium	543	44	492	48	50	36	Round, white.
9	Rochester Rose	"	"	543	24	499	24	44	..	Oval, red.
10	Irish Cobbler	"	"	484	..	442	12	41	48	Round, white.
11	Vick's Extra Early	"	Large	479	36	442	12	37	24	Oval, pink.
12	Ashleaf Kidney	"	"	464	12	413	36	50	36	Round, white.
13	Dreer's Standard	"	"	455	24	409	12	46	12	Oval, white.
14	Dalmeny Beauty	"	"	437	48	389	24	48	24	" "
15	Hard-to-Beat	Medium	Medium	427	54	381	42	46	12	Oval, pink.
16	Factor	"	"	421	25	369	36	51	49	" "
17	American Wonder	Strong	"	371	48	321	12	50	36	Long, white.

THE VEGETABLE GARDEN.

Vegetables were all good but were not a large crop. Frosts in May destroyed any tender sorts that were planted too early. Tomatoes were cut down. The dry, hot weather in July was much against a rapid growth. Heavy rains in the latter part of August made a decided improvement in most of the varieties.

ASPARAGUS.

A good crop was obtained from the old beds of Barr's Mammoth, Barr's Elmira, and Conover's Colossal. In use from May 7 to July 4.

BEANS—Sown in Garden May 23.

Variety.	Seed from.	In Use.	Pulled.	Remarks
Dwarf Kidney	Indian Head.	July 23	Sept. 12	Good crop
Dwarf Extra Early	" ..	" 22	" 1	Medium crop.
White Field	" ..	Aug. 4	" 17	Good crop.
Haricot Matchless	" ..	July 28	" 10	"
Emperor of Russia	" ..	" 26	" 12	"
Fame of Vitry	" ..	" 28	" 24	Extra good.
Bush, Green Pod	" ..	" 25	" 19	Good crop.
Dwarf Matchless	" ..	" 30	" 10	"
French Extra Early	" ..	" 23	" 2	Medium wax.
Challenge Black Wax	" ..	" 21	" 2	Large pod.
French Unrivalled	" ..	" 22	" 10	Good crop.
Black Speckled	" ..	Aug. 2	" 17	Long green.
Bush Butter, xxx	" ..	July 26	" 16	Extra good.
Dwarf Extra Early	" ..	" 22	" 2	Medium crop.
Early Six Weeks	" ..	" 20	" 10	Long green.
Extra Early	" ..	" 22	" 10	Green.
Honey Pod	" ..	" 25	" 17	Good crop.
Haricot Extra Early	..	" 25	" 2	Long wax.
King of the Skinless	" ..	Aug. 8		Did not ripen.

BEETS—Sown April 29, Pulled October 10.

Variety.	In Use.	Yield per Acre.	
		Bush.	Lbs.
Eclipse	July 21	1,033	20
Crosby's Egyptian	" 21	1,000	..
Early Flat Egyptian	" 21	1,016	40
Crimson Globe	" 21	1,066	40
Brigg's Extra Early	" 21	1,283	20
Egyptian Extra Early	" 21	1,016	40
Nutting's Dwarf Red	" 21	1,066	40
Blood Red Turnip	" 21	1,082	40
Egyptian Extra Early	" 21	800	..

CABBAGE—Sown in hothouse March 18; set out May 23; taken up October 11.

Variety.	In Use.	Average Weight.	Remarks.
		Lbs.	
Autumn King	Aug. 25	16	Large and solid.
Chester King	" 14	17	"
Surehead	" 9	14	"
Early Jersey Wakefield	" 1	12	"
Mammoth Red Rock	Sept. 4	10	Solid heads.
World Beater	Aug. 14	17	Large and solid.
Early Paris Market	July 22	10	Medium, solid.

CABBAGE—Sown in hothouse April 5; set out May 30; taken up October 11.

Variety.	In Use.	Average Weight.	Remarks.
		Lbs.	
All Seasons	Aug. 9	17	Large, solid.
All Head	" 5	17	"
Large Flat Dutch	" 18	16	"
Early Savory	July 22	9	Medium, solid.

CITRONS.

Colorado Mammoth, and a variety received from the Central Experimental Farm, were sown in the hothouse on March 19; set out in the garden on May 26; a good crop, average weight, 12 lbs.

MELONS—Sown in the hothouse, March 19; set out, May 26.

Variety.	Weight.	Remarks.
	Lbs.	
Cole's Early	5	Did not ripen.
Table Melon	5	"

RHUBARB.

Old beds in use from May 20 up to August 25; made a good growth during the season. The following varieties were grown:—

Myatt Linnaeus.
Fottler's Improved.
Scarlet Nonpareil.
Victoria.
Royal Linnaeus.
Strawberry.
Prince Albert.

CELERY.

Planted June 9, in trenches 18 inches deep, with 6 inches of manure in the bottom, and 4 inches of soil on top of manure. The celery was given three good waterings during the season.

Variety.	Sown in Hot-house.	Set Out.	In Use.	Weight per Dozen Heads.
				Lbs.
White Plume	Mar. 18	Apr. 25	Aug. 25	18
Dwarf White Salad	" 18	" 25	Sept. 4	17
Rennie's Self Blanching	" 18	May 4	Aug. 25	12
Giant Pascal, C.E.F.	Apr. 5	" 4	Sept. 18	19
Rose-ribbed	" 5	" 4	" 14	14
Paris Golden Yellow	" 5	" 4	" 14	10
Solid Pascal	" 5	" 4	" 18	17
Giant Pascal	" 5	" 4	" 18	19

CAULIFLOWER—Sown in hothouse, March 18; set out, May 30.

Some heads of Autumn Giant were pulled before heading and put in the cellar in three inches of soil, and gave cauliflower at and after the New Year.

Variety.	In Use.	Average Weight.	Remarks
		Lbs.	
Early Snowball	July 19	6	Good.
Extra Early Erfurt	" 23	6	"
Earliest Snowball	" 19	5	Medium.
Lend's Short Stem	" 29	4	"
Early Snowball	" 29	5	Good.
Autumn Giant	Sept. 4	10	Very fine heads.

CARROTS—Sown April 2; pulled September 29.

Variety.	In Use.	Yield per Acre.		Remarks.
		Bush.	Lbs.	
Stensball	July 11	400	..	Very good.
Half-Long Nantes	" 5	383	20	"
Half-Long Danvers	" 8	350	..	"
Half-Long Chantenay	" 12	350	..	"

CUCUMBERS—Sown in hothouse, March 19; set out, May 26.

Variety.	In Use.	Ripe.	Length.	Remarks.
			Inches.	
New Davis	Aug. 4	Aug. 30	8	Good crop.
Prize Pickling	July 29	" 22	8	"
Giant Pera	" 22	" 20	10	Fair crop.
Short Green	" 18	" 17	7	Good crop.

CORN—Sown, May 25.

Variety.	In Use.	Date Ripe.	Remarks.
Rennie's XXX			Did not mature.
Early Cory, White Cob			"
White Squaw	Aug. 9	Sept. 1	Good crop.
Red Squaw	" 8	" 1	"
Early Adams	Sept. 5		Did not ripen.
Malakoff	" 1		"

GARDEN PEAS.

Variety.	Date Sown.	In Use.	Date Ripe.	Remarks.
Stratagem	April 13	July 25	August 25	Splendid crop.
Admiral	" 13	" 13	" 25	"
Yorkshire	" 13	" 14	" 8	"
Nott's Excelsior	" 13	" 12	" 15	"
Leviathan, Extra Early	" 13	" 8	" 13	"
Burpee's Profusion	" 13	" 18	" 5	"
Surprise	" 13	" 11	" 19	"
Anticipation	" 13	" 18	" 10	"
Gradus	" 13	" 6	" 19	"
Shropshire Hero	" 13	" 17	" 16	"
Perfection	" 13	" 21	" 19	"
Dwarf Telephone	" 13	" 20	" 20	"
Western Beauty	" 13	" 14	" 13	"
Rennie's Queen	" 13	" 21	" 15	"
Horsford's Market Garden	" 13	" 16	" 9	"
Laxton's Charmer	" 13	" 16	" 10	"
Queen	" 13	" 23	" 17	"
American Wonder	" 13	" 17	" 9	"
Alaska	" 13	" 9	" 5	"

ONIONS—Sown in hothouse, March 26; transplanted in garden, May 17; taken up, September 5.

Variety.	Bushels per Acre.	Remarks.
Red Wethersfield	132·20	Medium crop.
Prize Taker	130	Good "
Australian Brown	102	" "
Southport Red Globe	133	Medium "
Silverskin	66	" "

ONION SETS—Planted in garden, April 16; taken up, September 5.

Variety.	Bushels per Acre.	Remarks.
White Multiplier	83	Fair crop, medium quality.
French Shallot	75	" " " "
Potato Onion	86·40	" " " "

ONIONS—Sown in garden, April 2; taken up September 5.

Variety.	Bushels per Acre.	Remarks.
Red Wethersfield	100	Fair crop, good quality.
Prize Taker, Red Globe	105	" " " "
Australian Brown	83·20	" " " "
Southport Red Globe	100·40	" " " "
Silverskin	40	" " " "

PARSLEY.—Sown in garden, April 18; in use, July 8; pulled, September 30. Variety—Extra Curled, good crop.

SPINACH.—Sown in garden, May 9; in use, July 3. Good crop. Varieties—Broomsdale and Victoria.

PUMPKINS—Sown in hothouse, March 19; transplanted in garden, May 26.

Variety.	Date Ripe.	Remarks.
Jumbo Mammoth	Sept. 12	Medium crop, good size.
Connecticut Field	" 12	Good crop, fair size.
Etampes	" 12	" " " "

SQUASH—Sown in hothouse, March 19; transplanted in garden, May 25.

Variety.	In Use.	Weight.	Remarks.
Hubbard Squash	Aug. 16	18 Lbs.	Medium crop, good size.
Mammoth Yellow	" 12	15 "	" " fair "
Custard	" 8	6 "	" " " "
Early Orange	" 4	40 "	Small crop, very large.
Bush Marrow	" 10	9 "	Medium crop, good size.
Yellow Fleshed	" 2	35 "	Fair crop, good size.
Mammoth Whale	" 14	17 "	" " " "

RADISH—Sown in garden, April 2.

Variety.	In Use.	Remarks.
White Icicle	June 17	Large, white.
Olive Scarlet	" "	Large, fine.
White Tipped	" "	Very good.
Winter Black	" "	Large, good crop.

TOMATOES.

Sown in boxes in hothouse, March 1 and April 18. Frost caught the March 1 plants when set out, and the ones sown on April 18 were set out in the garden on May 25. The yield is the number of pounds of fruit, both green and ripe, taken on September 15, from two plants of each variety set three feet apart.

Variety.	First Ripe.	Yield of Two Plants.
		Lbs.
Early Jewel	August 17	18
Livingston's Globe	" 22	20
New Earliana	" 14	28
Early Ruby	" 17	23
Earliana, C.E.F	" 14	25

LETTUCE.

First seeding, April 2; second seeding, May 9; third seeding, May 24. First seeding in use, June 4. Second seeding in use, July 11. Third seeding in use, July 21.

Variety.	Remarks.
First seeding—	
May King	Good heads.
Grand Rapids	Fair heads.
Cos Trianon	Fair heads.
Second seeding—	
Red-Edged Victoria	Good heads.
Unrivalled Sommer	Good heads.
Grand Rapids	Fair heads.
Cos Trianon	Large heads.
Third seeding—	
Red-Edged Victoria	Fair heads.
May King	Good heads.
Grand Rapids	Medium heads.
Cos Trianon	Medium heads.

PARSNIP—Sown April 22.

Variety.	In Use.	Yield per Acre.
		Bush.
Hollow Crown	August 10	303
Guernsey	" 10	300

SAGE—Sown April 18; ready for use, July 1. Fair crop.

SAVORY—Sown May 9; ready for use, July 1. Good crop.

PEPPERS—Sown in hothouse, March 21; transplanted, June 8. Cut down by frost before ripening. Variety—Chinese Giant.

CRESS—Sown, May 9. In use, June 4. Variety—Extra Curled.

THE FLOWER GARDEN.

Annual flowers had a longer period of bloom than usual, asters alone doing poorly, which was generally the case with them wherever grown.

The ground was deeply dug over in the fall, and well-rotted manure dug in and before planting, it was loosened on top. The perennial flower beds were dug over in the spring, as deeply as the roots would permit, a good coating of manure being applied.

Each fall, all tops are removed and a covering of coarse manure put on for winter protection.

ANNUALS—Sown in hothouse, March 18, 26, and 31. Set out June 6, 7, 8.

Variety.	In Bloom.	
	From	To
Asters, 11 varieties	July 25	Oct. 11.
Balsam	June 18	Sept. 12.
Clarkia	" 20.	" 12.
Coreopsis	" 20.	" 12.
Celosia	July 25	" 12.
Candytuft	June 4.	Oct. 11.
Carnation	Aug. 25.	" 11.
Dianthus	July 2	" 11.
Centaurea	Did not bloom.	
Canterbury Bell	" "	
Castor Bean	" "	
Columbine	" "	
Chrysanthemum	June 19	Oct. 11.
Datura	Sept. 12	" 11.
Gaillardia	July 3	Sept. 24.
Godetia	" 8	" 24.
Linum	June 24	" 20.
Mignonette	" 16	" 28.
Nasturtium	" 28	" 15.
Monkey Flower	" 28	" 10.
Nicotiana affinis	" 29	Oct. 12.
Petunias, C. E. F., (3 varieties)	" 20	Sept. 15.
Papaver	" 23	" 15.
Phlox	" 28	July 28.
Poppy	" 28	" 28.
Sweet Peas (27 colours)	July 20	Oct. 15.
Sweet Marguerite	" 20	Sept. 22.
Scabiosa	Did not bloom.	
Salpiglossis	July 24	Sept. 15.
Sunflower	" 24	Aug. 20.
Tagetes	June 23	Oct. 12.
Verbena	" 29	" 12.
Alyssum	" 10	" 11.
Antirrhinum	" 28	Sept. 25.
Ageratum	" 20	Aug. 25.

ANNUALS—Sown in the open, April 30.

Variety.	In Bloom.	
	From	To
Abronia	July 14	Sept. 30.
Barton a	" 14	"
Brachycome	" 4	"
Clarkia	" 6	"
Coreopsis	" 8	"
Calendula	" 14	"
Eschscholtzia	" 28	"
Helichrysum	" 15	"
Godetia	" 17	"
Lobelia	" 10	"
Mignonette	" 8	"
Pansies	" 6	"
Scabiosa	Aug. 15	"
Salpiglossis	July 19	"
Chrysanthemum	" 19	"
Nasturtium	" 12	"
Scabiosa major	" 12	"
Nasturtium, (Tom Thumb)	" 12	"
Nemesia strumosa	Aug. 3	"

PERENNIALS—PLANTED IN SPRING OF 1910.

The following bulbs were received from the Central Experimental Farm, Ottawa, and set out early in April.

H. Wendland,
Florence Vaughan,
Comte Horace de Choiseul,
J. D. Eisele,
King Humbert,
Louisiana,
Indiana,
Venus,
Yellow Crozy,
Fair Hope,
Miss Berthine Brunner,
America,
New York,
Mrs. Kate Grey,
The Express,
Duke of Marlboro,
Captain Druyon,
Inglewood,
Rubin,
Mrs. Geo. A. Strohlein,
Allemania,
Leonard Vaughan,
Secretaire Chabanne,
Queen Charlotte,
Jupiter,
Pennsylvania,
William Saunders,
Wyoming.

Dahlias.

Prince Imperial,
Mrs. Leopold Seymouss,
Gabriel,
Matchless,
Austin Connell,
Earl of Pembroke,
Empress of India,
Cycle,
Ernest Glasse,
Flossie,
Connell's Gem,
Lady H. Grosvenor,
Capstan,
Standard Bearer,
Miss Annie Jones,
Mrs. Chas. Turner,

Louis Hariot,
Kingfisher,
Gloriosa,
Eureka,
Pendant,
Bon Ton,
Winsome,
Sylvia,
Kynerith,
Miss Fuich,
A. D. Levone,
Rosenhagen,
Evadne,
Island Queen,
Blue Oban,
Mrs. E. Gladstone,
Catharine Duen.

PERENNIALS.

Variety.	In Bloom.		Remarks.
	From	To	
Tulips	April 25	May 25	Poor.
Snowdrops	Did not bloom		
Crocus	" "		
Iris	May 25	July 1	Fair.
Pæonies	June 24	" 20	Good.
Everlasting Pea	" 20	Aug. 20	"
Bleeding Heart	" 14	July 28	"
Yarrow	" 24	" 10	"
Hemerocallis	July 8	" 30	"
Sidalcea	June 28	Aug. 1	"
Achillea	" 28	" 25	Fair.
Helianthus	July 20	Sept. 12	"
Columbine	June 11	July 21	Good.
Lychnis	" 25	Aug. 4	"
Sweet William	" 20	" 9	"
Clematis Recta	" 25	" 1	"
Delphinum	" 28	" 30	"
Oriental Poppy	" 26	July 10	"
Phlox	Aug. 11	Sept. 17	"
Golden Glow	" 6	" 14	"
Blue Squill	April 7	April 21	"
Shasta Daisy	June 29	Aug. 12	"
Veronica spicata	July 6	Sept. 2	"
Lupinus polyphyllus	" 8	Aug. 5	"
Canterbury Bell	" 1	" 25	"

BULBS PLANTED IN FALL OF 1910.

Twenty-four varieties of Tulips and Narcissus, were received from the Central Experimental Farm, Ottawa, and planted on September 28.

ROSES.

The following list of roses were received from the Experimental Farm, Ottawa, and planted in the garden on April 28. Of these La France, Magna Charta, Mrs. R. C. Sharman Crawford, Frau Karl Druschke, Capt. Hayward, Mrs. John Laing, and Margaret Dickson, came to bloom; the last two named were exceptionally fine, and bloomed until the heavy frosts came in October. All were deeply covered with manure when frost set in.

Baroness Rothschild,
Captain Hayward,
Charles Lefebvre,
Killarney,
Earl of Dufferin,
Fisher Holmes,
Frau Carl Druschki,
General Jacqueminot,
John Hopper,
La France,
Mme. Gabriel Luizet,
Magna Charta,
Margaret Dickson,
Merveille de Lyon,
Mrs. John Laing,
Mrs. R. G. Sharman Crawford,
Paul Neyron,
Ulrich Brunner,
Persian Yellow,
Crimson Rambler,
Dorothy Perkins.

SMALL FRUITS.

The following varieties of Small Fruits are grown on the Farm at present.

RED CURRANTS.

Victoria Red,
New Dutch,
Long Bunch Holland,
La Conde,
Red Jacket,
Moore's Early,
Benwell,
Greenfield,
Red Grape,
Large Red Cherry,
Raby Castle,
Cumberland Red,
Rankin's Red,
Red English,
Fertile D'Angers.

WHITE CURRANTS.

Wentworth Leviathan,
White Cherry,
White Kaiser,
Climax,
Verrier's White,
Large White,
Large White Brandenburg,
White Dutch,
White Grape,
White Pearl,
White Imperial.

BLACK CURRANTS.

Black Grape,
Magnus,
Topsy,
Eagle,
Climax,
Merveille de la Gironde,
Kerry,
Winona,
Saunders,
Beauty,
Ontario,
Black English,
Dominion,
Ogden,
Eclipse,
Bang-Up,
Ethel,
Lee's Prolific,
Stewart,
Success,
Perry,
Clipper,
Star,
Ogden,
Standard,
Perth.

RASPBERRIES.

Marlboro,
Turner,
Dr. Reider,
Sunbeam,
Schaeffer's Colossal,
Columbia,
Herbert.

GOOSEBERRIES.

Troy,	Rideau,
Cluster,	Merton,
Ruth,	Red Jacket.
Governess,	Sylvia,
Smith's Improved,	Ramsay,
Edna,	Vesta,
Mabel,	Richland,
Gibb,	Pale Red,
Saunders,	Downing,
York,	Houghton,
Griffin,	Lady Houghton,
Sussex,	Carman.

STRAWBERRIES.

Senator Dunlap.

ORNAMENTAL AND FOREST TREES.

These, like the fruit trees, commenced to grow very early, and three times were the greater part of the leaves frozen back, it being well on in July before they were in full leaf. All made good progress for the rest of the season. Frost killed the entire crop of maple, elm, and ash seed.

SHRUBS.

Lilacs, hich the year before gave such a profusion of bloom, were last year entirely without flowers. Caragana, Honeysuckle, High Bush Cranberry and all late blossoming varieties, partially escaped injury.

EXCURSIONS TO THE EXPERIMENTAL FARM.

On July 14 a large excursion from Moosejaw Sunday school visited the Farm, between four and five hundred being present.

On July 26, 27 and 28, excursions were run each day by the Department of Agriculture at Regina. The main line of the Canadian Pacific Railway, from the eastern boundary to Mortlatch on the west, brought very large crowds. All the branch lines to the south of the main line contributed largely also. On account of an accident on the Canadian Northern railway, the excursion train from Saskatoon and all points along that line, was cancelled. Numerous speakers were provided, including Dr. Saunders, C.M.G., and the Hon. Mr. Motherwell.

The weather was warm and very favourable for enjoyment in the shade of the trees and avenues on the Farm. The crops were well advanced and looked their best at the time.

Lunch was provided by the lady directors of the Indian Head hospital, and music was furnished by the Indian Head band.

IMPROVEMENTS.

SILO.

During the summer a silo was erected outside the barn, to take the place of the two put up shortly after the Farm started. The silo is 15 feet in diameter inside measure, and 27 feet high, the lower 7 feet being cement, and the upper 20 feet staves held in place by ¾-inch iron hoops.

ENGINE HOUSE.

A building 16 x 26 feet was put up to hold the gasoline engine for winter use.

SHEEP HOUSE.

Having purchased some sheep, a house became necessary, and one 20 feet by 40 feet with three divisions, and a loft for hay, was built late in the fall.

FENCING.

Nearly five miles of fencing was erected during the season, four miles of inside cross-fences and one mile on the southern boundary; 1,400 rods of woven wire and 1,470 lbs. of barbed wire was used.

FRUIT CROP.

As already stated, all fruit was destroyed by spring frosts, something that never before happened on the Farm.

The spring opened early in March, and all fruit trees and bushes came in blossom long before they should. Commencing with strawberries, everything was killed in succession, and, excepting two trees of late wild-plums, all blossom was totally destroyed.

CROSS-BRED APPLE TREES.

The following cross-bred apple trees were received from E. D. Smith, Winona, Ont., and used to fill the blanks in the different orchards:—

10 Alberta,	15 Jewel,	10 Prince,
10 Golden,	10 Pioneer,	10 Magnus,
10 Silvia,	10 Tony,	15 Robin.

PREPARING LAND FOR GRAIN CROPS IN SASKATCHEWAN.

During the growing season of 1908 almost the entire western portion of the province suffered from dry weather, and the majority of the new settlers, either from unfamiliarity with the methods of cultivation for the conservation of moisture, or through a desire to bring the greatest possible area under cultivation, naturally suffered a severe disappointment.

In some districts, where in former years moisture had been abundant and proper cultivation had in consequence been neglected in the effort to 'get rich quick,' the partial failure of the crop proved an expensive lesson.

For many years, commencing in 1888, the methods of conserving moisture by "Breaking and Backsetting' and by 'Summer-fallowing,' now called 'Dry-farming' for a change, have been recommended and universally adopted by the older settlers, but to very many of the new settlers they are unknown. The latter, I trust, may be benefited by the following explanation of the methods which, for a great many years, have proved uniformly successful at the Experimental Farm here, and may with confidence be recommended for every district in the province of Saskatchewan.

BREAKING PRAIRIE SOD.

The success or failure of a new settler often depends on the method employed in the preparation of the land for his first crop, and it is therefore of the utmost importance that the question of 'Breaking' or 'Breaking and Backsetting' be given the consideration it deserves.

For some years past the general practice throughout the country has been to continue breaking three or more inches deep so long as the teams can turn over the sod, then in the fall to disc the top-soil and grow grain in the spring following. From the breaking so done before the end of June, a good crop of wheat, oats or barley is usually obtained, but no amount of cultivation will ensure even a fair crop on this land in the next succeeding year. After the first crop has been cut the soil is usually in a perfectly dry state and remains so, in spite of any known method of cultivation, until the rains come in the spring following. If they are insufficient or late, as is frequently the case, failure of the crop must be the result.

BREAKING AND BACKSETTING.

Breaking and backsetting is the true way of laying the foundation for future success in the greater number of districts throughout the province, and while this method does not permit of as large an acreage being brought under cultivation in the year, it does permit of more thorough work, and ensures better results in the long run. The anxiety of nearly all settlers to sow every acre possible, regardless of how or when the work on the land has been accomplished, may be given as the reason for breaking and discing, to a large extent, superseding the older, better and safer plan.

Breaking and backsetting means the ploughing of the prairie sod as shallow as possible before the June or early July rains are over, and in August or September, when the sod will have become thoroughly rotted by the rains and hot sun, ploughing two or three inches deeper in the same direction and then harrowing to make a fine and firm seedbed. From land prepared in this way two good crops of wheat may be expected. The first crop will be heavy and the stubble, if cut high, at harvest time, will retain sufficient snow to produce the moisture required, even in the driest spring, to germinate the seed for the next crop. The stubble-land can readily be burned on a day in the spring with a warm, steady wind and the seed may be sown with or without further cultivation. In a case where the grass roots have not been entirely killed by the backsetting, a shallow cultivation before seeding will be found advantageous, but as a rule the harrowing of the land with a drag-harrow after seeding will be sufficient.

The principal objection to 'breaking and backsetting' is urged with regard to the backsetting which, no doubt, is heavy work for the teams, but if the discing required to reduce deep-breaking and then the ploughing or other cultivation that must be done in the effort to obtain a second crop, be taken into consideration it must be conceded that in the end 'breaking and backsetting' is the cheaper and better method.

When two crops have been taken from new land it should be summer-fallowed.

SUMMER-FALLOWS AND SUMMER-FALLOWING.

Among the many advantages to the credit of the practice of summer-fallowing may be mentioned:—The conservation of moisture, the eradication of weeds, the preparation of the land for grain-crops at a time when no other work is pressing, the availability of summer-fallowed land for seeding at the earliest possible date in the spring and the minor advantages of having suitable land for the growing of pure seed, potatoes, roots and vegetables at the least cost and with the greatest chance for success, and that of being able to secure two crops of grain with little or no further cultivation.

Summer-fallowing undoubtedly has some disadvantages, but so long as the growing of grain, and more particularly wheat, remains the principal industry of the province, it will be necessary to store up moisture against a possible dry season, to restrain the weeds from over-running the land and on account of the short seasons, to prepare at least a portion of the land to be cropped in the year previous to seeding and a well-made summer-fallow is the best means to this end. Among the disadvantages are:—The liability of the soil to drift, the over-production of straw in a wet season, causing late maturity and consequent danger of damage by frost, and, it is claimed, the partial exhaustion of the soil. The two former may, to a great extent, be overcome by different methods of cultivation, and if the soil can be prevented from drifting, I am satisfied that one of the reasons for the latter contention will disappear.

Various methods are practised in the preparation of fallow, and where the aim has been to take advantage of the June and July rains and to prevent the growth of weeds, success is almost assured. Where the object has been to spend as little time as possible on the work, failure is equally certain.

In my annual report for the year 1889, the following was submitted for the consideration of the settlers. Since then many experiments have been conducted on the Experimental Farm with different systems and again I submit what, on the whole, have been found to be the most successful methods for the cultivation of the soil in Saskatchewan:—

FROM REPORT OF 1889.

'The year just past has been one of extremes. Last winter was one of the mildest on record and March was so very fine that thousands of acres of grain were seeded from the 15th to the 31st, and at no time in the history of the country has the ground been in better condition for the reception of the seed. Immediately after seeding, however, exceptionally high winds set in, followed by extreme drought during the entire growing season. In many places the crops were injured by the winds and finally almost ruined by the succeeding dry weather. In some localities, however, where the farming has been done in accordance with the requirements of the country, the crops did fairly, and considering the excessively dry weather, remarkably well.

'The Experimental Farm suffered in company with every other farm in the country. Perhaps very few suffered as much from winds, but the dry weather, though reducing the yields, did not prove so disastrous as to many others. In this portion of the Territories at least, every settler knows the importance of properly preparing his land. For several years after the country became open for settlement every one imagined that grain would grow, no matter how put in, but now the man is devoid of reason who thinks he is sure of a crop without any exertion on his part. It is true that since 1882 we have had one year in which the land required little or no preparation for the production of an abundant crop but only too many realize the loss in the remaining years from poor cultivation.

'Our seasons point to only one method of cultivation by which we may in all years expect to reap something.

'It is quite within the bounds of possibilities that some other and perhaps more successful method may be found, but at present I submit that 'fallowing' the land is the best preparation to ensure a crop. Fallowing land in this country is not required for the purpose of renovating it, as is the case with worn-out lands in the East; and it is a question as yet unsettled how much or how little the fallows should be worked, but as we have only one wet season during the year, it has been proved beyond doubt that the land must be ploughed the first time before this wet season is over, if we expect to reap a crop in the following year. The wet season comes during June and July, at a time when every farmer has little or nothing else to do, and it

is then that this work should be done. Usually seeding is over by the 1st of May and to secure the best results the land for fallow should be ploughed from 5 to 7 inches deep as soon after this date as possible. Land ploughed after July is of no use whatever unless the rains in August are much in excess of the average. A good harrowing should succeed the ploughing and all weeds or volunteer grain be kept down by successive cultivation. A good deal of uncertainty is felt with regard to a second ploughing, some holding that it is useless; others maintaining that it is an injury; while others again have found it to give from five to ten bushels per acre more than one ploughing. So far the experiments on the Experimental Farm have shown that by far the best returns have been received from two ploughings; and more noticeably was this the case when the first ploughing had been completed in May or June. Without doubt, two ploughings cause a greater growth of straw and consequently in a wet year the grain is several days later in maturing, causing greater danger from frost; but taking the seasons so far passed, 1884 excepted, two ploughings with as much surface cultivation as possible in between, may be safely recommended.

'Above all it is of the greatest importance that the first ploughing be as deep as possible, and that it be done in time to receive the June and July rains.'

After seventeen years' further experience and observation, the following was written on this subject in the Annual Report of the Experimental Farm for 1906.

FROM REPORT OF 1906.

METHODS OF PREPARING SOIL FOR GRAIN CROPS.

METHODS OF PREPARING NEW GROUND.

'In view of the fact that every year brings to the Northwest many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this important work may not be amiss.

'In all sections where the sod is thick and tough, breaking and backsetting should be done; while in the districts where bluffs abound and the sod is thin, deep breaking is all that is necessary.

'The former is generally applicable to the southern and western portions, and the latter to the northeastern part of Saskatchewan, where the land is more or less covered with bluffs.

BREAKING AND BACKSETTING.

'The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit backsetting to commence early in August.

'Backsetting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough but three to four inches will give better results.

'After backsetting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.'

DEEP BREAKING.

'Deep breaking, which in some sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and backsetting would give much more satisfactory results, consists in the

turning over the sod as deeply as possible, usually from four to five inches. When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow or disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

'Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come in June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.'

SUMMER-FALLOWS.

'The true worth of properly prepared fallows has been clearly demonstrated in past years in every district of Saskatchewan.

'The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the country, that perhaps a few words on some of the methods employed may be of use to at least some of the new settlers.

'It has been observed in some parts of Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

'By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

'The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or in fall or spring cultivation.

'As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

'*First Method.*—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

'Result—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

'*Second Method.*—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

'Result—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

'*Third Method.*—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

'Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

'*Fourth Method.*—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

'Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods

is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

'Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

'In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

'Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.'

During the past two years the term 'dry farming' has been applied to what was formerly known in the west as 'summer-fallowing.'

With the exception of the addition of the use of a soil-packer there is no change in the methods formerly employed, when the spring rains and frequent cultivation were depended upon for the packing of the soil.

Packers are, without doubt, most useful instruments on the farm and where from any cause the soil is loose, they should be used. They are, however, expensive implements and within the means of comparatively few of the new settlers. Fortunately, early ploughing and frequent shallow cultivation may be depended upon to produce almost equally satisfactory results in the majority of cases.

CULTIVATION OF STUBBLE.

When farmers summer-fallow one-third of their cultivated land each year, as they should, one-half of each year's crop will be on stubble. For wheat, the best preparation of this land is to burn the stubble on the first warm, windy day in the spring, and either cultivate shallow before seeding or give one or two strokes of the harrow after seeding, the object being to form a mulch to conserve whatever moisture may be in the soil, until the commencement of the June rains.

The portion intended for oats or barley, should be ploughed four or five inches deep and harrowed immediately; then seeded and harrowed as fine as possible. In case time will not permit of ploughing, good returns may be expected from sowing the seed oats or barley on the burnt ground, and discing it in; then harrowing well.

FALL PLOUGHING.

With regard to fall ploughing it may be said that, as a rule, on account of short seasons and dry soil, very little work can possibly be done in the fall, but if the stubble-land is in a condition to plough and the stubble is not too long, that portion intended for oats and barley may then be ploughed, if time permits.

It is, however, a mistake to turn over soil in a lumpy or dry condition, as nine times out of ten it will remain in the same state until May or June, with insufficient moisture to properly germinate the seed, and the crop will very likely be overtaken by frost.

As to the quantity of seed to sow and the depth of sowing, long experience has shown that the best results are had in Saskatchewan by the sowing of one and a half bushels of wheat per acre or two bushels of barley or oats. Sowing about two inches deep has given the most satisfactory returns, and the seed should be got in as early as is practicable.

CATTLE.

The herd of cattle at present on the Farm consists of thirty-eight pure-bred Shorthorns and twenty grade animals, thirteen of the latter being two and three-year old steers bought for a feeding test.

On November 13 and 14, 1910, the entire herd was tested for tuberculosis and was found to be free from the disease.

FEEDING TEST.

Last fall fourteen steers were obtained in this district for feeding; seven were three years and over, and seven were two years and over. These were divided into two lots and fed the same ration, consisting of one pound of ground linseed meal throughout the test, and six pounds of meal for the first four weeks, increased to eight pounds for the second four weeks, and ten pounds for the third four weeks. In addition, both were fed all the cut oat straw and ensilage that they would eat. The weight of straw consumed by each animal daily was about twenty pounds, and of ensilage twenty-seven pounds. The meal used consisted of oats and barley, equal parts.

On account of not being able to obtain the steers early enough, the test of sixteen weeks could only be started on December 18, after three weeks' preliminary feeding, and cannot be completed until early in April.

For the three months' feeding, the gain was 1,370 pounds. The price paid for the steers was 3¼c. per pound live weight. One steer was ruptured by falling on the cement floor, and had to be withdrawn from the test.

HORSES.

Ten draft horses, with two light animals for driving and scuffling, constitute the working force on the Farm.

SHEEP.

Four pure-bred Shropshire sheep, and twelve grade animals were purchased late in the fall. The former were obtained from John A. Turner, Calgary, and the latter from a farmer in this district.

SWINE.

Two breeds are kept on the Farm, Yorkshire Whites and Berkshires. Following is the number of each at present; one Berkshire sow with litter of ten; three Berkshire sows eight months old; six Yorkshire boars, and six sows. During the year ending March 31, 1911, seventeen pigs were sold to farmers for breeding purposes, of Yorkshires twelve and of Berkshires five.

POULTRY.

Poor success was obtained last year with poultry. At present the breeding pens consist of one Black Minorca cockerel, and twenty pullets, two Barred Plymouth Rock cockerels and thirty-three pullets.

BEES.

I regret to report the loss of the entire colony of bees last spring.

Five hives were put into the cellar in the fall, weak in numbers but with plenty of honey. The spring opened so early that they became restless and were taken out on March 20. Three hives were dead and the others quickly followed with dwindling.

DISTRIBUTION OF SAMPLES.

A distribution of samples of the products of the Farm, was made in the spring to residents of Saskatchewan. The following is a list of the samples sent out:—

Wheat, 3-lb. bags	309
Oats, 3-lb. bags	163
Barley, 3-lb. bags	39
Peas, 4-lb. bags	84
Sundries (Flax, Rye, Rye Grass)	19
Potatoes, 3-lb. bags	440
Total	1,054
Garden peas, 1-lb. bags	125
Garden corn, ½-lb. bags	15

Small seeds, 342 packages containing 4,788 packets of Flower, Garden and Shrub seeds.

Tree Seeds, Maple, 400 packages of 1-lb. each.

Tree Seeds, Ash, 24 packages of 1-lb. each.

Tree Seeds, Shrubs, 60 packages of 1-lb. each.

Tree and Shrub seedlings, 655 packages containing 75 trees each.

Express parcels, trees and shrubs, 35 packages containing 50 trees each.

Crab-apple and plum seedlings, 143 packages containing 12 trees each.

Rhubarb roots, 114 packages containing 6 roots each.

CORRESPONDENCE.

During the twelve months ending March 31, 1911, 10,191 letters were received and 9,974 mailed from this office.

In letters received, reports on samples are not included, and in letters mailed, circulars of instructions sent out with samples are not counted.

METEOROLOGICAL RECORDS.

Month.	Temperature.					Rainfall.		Snowfall.	Sunshine.
	Maximum.		Minimum.		Mean.				
	Date.	°	Date.	°	°	Days.	Inches.	Inches.	Hours.
1910									
April	20	92	22	13	44·3	6	·76	1·75	205·7
May	27	79	2	14	47·66	6	2·92	1·18	251·6
June	20	97	1	27	62·90	6	2·03	5·50	263·2
July	14	94	11	43	66·43	6	·86	.....	296·6
August	10	88	31	36	58·7	7	4·03	.....	223·2
September	16	82	26	23	50·6	4	·59	.....	167·9
October	9	82	28	13	43·46	2	·15	.....	173·6
November	6	42	29	13–	16·28	.....	.....	13·00	46·4
December	21	36	5	24–	6·5	.....	.....	17·00	69·5
1911									
January	23	23	13	14–	—11·70	.....	.....	29·75	73·6
February	14	28	4	41–	1·2	.....	.....	9·50	129·5
March	24	45	4	31–	21·64	.....	.....	2·75	178·7
						37	11·34	* 80·43	2,079·5

* Reckoning ten inches of snowfall as equivalent to one inch of rainfall, the total precipitation for the year ending March 31, 1910, was 19·383 inches.

I have the honour to be, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

EXPERIMENTAL STATION FOR CENTRAL SASKATCHEWAN

REPORT OF WM. A. MUNRO, B.A., B.S.A., SUPERINTENDENT.

ROSTHERN, March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the second annual report of the Experimental Station for Central Saskatchewan at Rosthern.

The spring of 1911 opened the earliest of any in the experience of the oldest settler, and seeding began in some instances as early as the last week in March, and became quite general by the middle of April. Severe frosts occurred on May 1, 16 and 21, which cut back the barley to the ground, and did much damage to the peas, oats and wheat. Almost no moisture fell between the melting of the snow in March and June 3, and high winds prevailed almost constantly. Three-quarters of the Farm had been thoroughly summer-fallowed the year previous, and there was plenty of moisture for the germination of grain crops, but the dry dust mulch drifted so much that it was impossible to get small seeds to germinate and grow, and the drifting soil did much damage to the grain. On June 3 moisture appeared in the form of a snow storm which germinated many weeds, and the weeds attained such a vigorous start over the weakened grain that the uniform trial plots of peas, oats and barley were ploughed under and the wheat plots were not what they otherwise might have been.

During August and September, there was an abundance of rainfall which did much to bring on such crops as had made a fair start. The Indian corn, however, was too late in starting and never came to tassel, and was therefore not harvested. The seed of the root crops germinated slowly and unevenly, and the development of the young plants was slow. In August, a second growth started on the carrots, evidently due to the abundance of moisture in the latter part of the season.

SPRING WHEAT.

Sixteen varieties of spring wheat were sown on one-twentieth acre plots.

The plot of Marquis wheat gave a poor stand but better success was obtained with a half-acre plot which yielded at the rate of nearly 28 bushels per acre.

Four plots of Red Fife were sown on successive dates one week apart, and were cut on the same day, no difference appearing in their time of ripening. The difference of yield is no doubt as much influenced by the difference of the effect of the drifting soil as by the difference in the time of seeding. A correct conclusion can only be arrived at in such a case by averaging a number of years of experiments.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Lbs.	Bush. Lbs.	Lbs.
1	Stanley	Apr. 1	Aug. 29	150	2,000	33 20	61·0
2	White Fife	" 1	" 22	143	1,920	32 ..	60·8
3	Pringle's Champlain	" 4	Sept. 3	152	1,800	30 ..	61·7
4	Huron	" 1	" 3	155	1,780	29 40	63·0
5	Red Fife	" 1	Aug. 24	145	1,740	29 ..	61·0
6	Riga	" 1	" 24	145	1,660	27 40	61·7
7	Bishop	" 1	" 22	143	1,560	26 ..	61·7
8	Preston	" 4	" 22	140	1,520	25 20	63·0
9	Marquis	" 1	" 19	140	1,380	23 ..	61 5
10	Chelsea	" 1	" 19	140	1,200	20 ..	60·5
11	Preston (Mansel)	" 7	Sept. 3	149	1,660	27 40	61·7
12	Stanley (Mansel)	" 7	Aug. 22	137	2,220	37 ..	61·5
13	Red Fife (Geo. L. Smith)	" 4	" 29	147	1,920	32 ..	63·0
14	Bobs	" 16	" 24	130	1,380	23 ..	60·7
15	Red Fife "Regenerated"	" 16	Sept. 3	140	1,800	30 ..	61·0
16	*Kubanka (Durum)	" 16	Sept. 3	140	700	11 40	55·6

* Immature and frozen at time of cutting.

FIELD LOTS OF SPRING WHEAT.

Marquis, Red Fife, Chelsea and Preston were sown in plots larger than the uniform trial plots. The land was all summer-fallow, but varied somewhat in exposure and influence of drifting soil.

FIELD LOTS OF SPRING WHEAT.

Number.	Name of Variety.	Acreage.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
						Bu. Lbs.	Lbs.
1	Red Fife } Time of Seeding	1/20	March 31	Aug. 24	147	34 40	62·5
2	" } Time of Seeding	1/20	April 7	"	140	28 40	61·7
3	" } Time of Seeding	1/20	" 14	"	133	34 39	61·7
4	" } Time of Seeding	1/20	" 21	"	126	32	61·5
5	Red Fife (Field)	·5	" 20	Aug. 22	124	27 12	60
6	" (Rotation)	·8	" 9	" 20	135	26 43	63
7	Chelsea	1·75	" 8	" 19	135	27 33	63
8	Preston	1·4	" 20	" 22	124	25 38	63
9	Marquis	·45	" 23	" 19	124	27 15	65

OATS.

FIELD LOTS OF OATS.

Field plots of Thousand Dollar, Banner and Ligowo Oats were sown with the following results.

The yield of Banner oats was very uneven, due to the effect which the drift of soil had upon it in different parts. Most of the yield came from about two-thirds of the field.

FIELD LOTS OF OATS.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Bu. Lbs.	Lbs.
1	Thousand Dollar	April 20	Aug. 18	120	49 12	37
2	Ligowo	" 21	" 18	119	52 2	36·6
3	Ligowo	" 25	" 30	127	56 ..	36·6
4	Banner	" 20	" 31	133	46 ..	[illegible]

BARLEY.

FIELD LOTS OF BARLEY.

Mensury barley was sown on three field plots with the following results:—

Number.	Name of Variety.	Acreage.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
						Bu. Lbs.	Lbs.
1	Mensury (on fallow)	5·1	April 28	Aug. 18	112	38 14	46
2	Mensury (on fallow)	1·8	" 25	" 20	120	38 7	46
3	Mensury (on breaking)	1·5	June 9	Sept. 9	92	48 28	46

BUCKWHEAT.

A plot of buckwheat was sown on breaking on June 9, and grew splendidly and gave promise of a large yield, but was caught with the frost on August 31.

FLAX.

A plot of flax of one-fifteenth of an acre was sown on June 9, and cut on September 24, yielding forty-five pounds. It had been sown at the rate of sixty pounds per acre and yielded at the rate of 18·75 bushels per acre.

Much difficulty is experienced in obtaining clean flax seed. We secured four pounds of good seed and handpicked it, pulled any weeds that appeared in the growing crop and at harvest had forty-five pounds of absolutely pure seed. The same method might be very profitably applied to a sufficient area to produce seed for the next year's field crop.

TURNIPS (SWEDES).

Ten varieties of Swede turnips were grown and their yield computed from the weight of three rows 66 feet long, sown 24 inches apart. The seed was sown on May 16 and the roots were pulled on October 17.

Number.	Variety.	Yield in 1910.		Number.	Variety.	Yield in 1910.	
		Tons.	Lbs.			Tons.	Lbs.
1	Hall's Westbury	26	1,790	6	Hartley's Bronze	20	40
2	Bangholm Selected	23	200	7	Magnum Bonum	19	1,160
3	Jumbo	22	400	8	Carter's Elephant	11	1,650
4	Perfection Swede	21	240	9	Halewood's Bronze Top	10	1,010
5	Good Luck	20	1,360	10	Mammoth Clyde	9	700

The average yield of the ten varieties of Swede turnips was 18 tons 1,055 lbs. per acre.

MANGELS.

Eight varieties of mangels were grown and their yield computed from the weight of three rows 66 feet long and two feet apart. The seed was sown on May 11 and the roots were pulled on October 15.

Number.	Variety.	Yield in 1910.		Number.	Variety.	Yield in 1910.	
		Tons.	Lbs.			Tons.	Lbs.
1	Half Sugar White	9	260	5	Gate Post	4	1,020
2	Yellow Intermediate	7	1,180	6	Giant Yellow Globe	3	1,150
3	Giant Yellow Intermediate	7	300	7	Prize Mammoth Long Red	3	820
4	Perfection Mammoth Long Red	5	1,330	8	Selected Yellow Globe	3	820

The average yield of the eight varieties of mangels was 5 tons 1,110 lbs. per acre.

CARROTS.

Five varieties of carrots were tested and the yield computed from the weight of three rows 66 feet long and two feet apart. The seed was sown on May 20 and the roots were pulled on October 14.

Number.	Variety.	Yield in 1910.		Number.	Variety.	Yield in 1910.	
		Tons.	Lbs.			Tons.	Lbs.
1	Improved Short White	3	1480	4	Half Long Chantenay	3	50
2	White Belgian	3	1480	5	Mammoth White Intermediate	2	1170
3	Ontario Champion	3	380				

The average yield of the five varieties of carrots was 3 tons 512 lbs. per acre.

SUGAR BEETS.

Three varieties of sugar beets were tested and their yield computed from the weight of three rows 66 feet long and two feet apart. The seed was sown on May 10 and the roots were pulled on October 15.

Number.	Variety.	Yield in 1910.		Number.	Variety.	Yield in 1910.	
		Tons.	Lbs.			Tons.	Lbs.
1	Vilmorin's Improved	5	1,770	3	French Very Rich	2	1,390
2	Klein Wanzleben	5	890				

The average yield of the three varieties of sugar beets was 4 tons 1,350 lbs. per acre.

POTATOES.

Five plots of standard varieties of potatoes were grown. They were planted in rows thirty inches apart and eight inches apart in the row, and were covered with the plough to a depth of about four inches. The seed was cut to two eyes each. The rows were cultivated as often as weeds made an appearance and were hilled in June.

The planting was done on May 13, and the digging on October 8.

Number.	Variety.	Yield in 1910.	
		Bush.	Lbs.
1	Everett	363	3
2	Irish Cobbler	357	45
3	Gold Coin	344	30
4	Dreer's Standard	297	41
5	Ashleaf Kidney	296	13

The average yield of the five varieties of potatoes was 19,910 lbs. (331 bushels 50 lbs.) per acre.

Besides the standard varieties, a sample was obtained from a farmer of the neighbourhood and from it six distinct varieties were tested under conditions identical with those of the five standard varieties with the following results.

Number.	Variety.	Yield in 1910.	
		Bush.	Lbs.
1	R. E. F. No. 6	348	8
2	R. E. F. No. 3	297	44
3	R. E. F. No. 5	284	22
4	R. E. F. No. 4	287	40
5	R. E. F. No. 1	268	24
6	R. E. F. No. 2	247	20

The average yield of these six unnamed varieties is 287 bushels, 26 pounds.

From a comparison of the two tables it will be seen that only two of the unnamed varieties yielded as high as the lowest standard variety. Then it will be noticed that if this farmer had taken the pains to first learn the comparative values of his own varieties and then had selected that variety which yielded the best, he would have had an average yield of 348 bushels instead of an average of 287 bushels, thus giving to him a distinct gain of at least 61 bushels per acre.

Opinion is divided as to whether potatoes should be hilled or left unhilled in this part of the country. To gain experience in this, a large plot of potatoes was divided into two parts, which were treated exactly alike except that one part was hilled in June and the other was left level. At digging time, two typical rows were selected from each part and a calculation was made therefrom with the following results:—

Unhilled—279 bushels per acre.

Hilled—225 bushels per acre.

TREES AND SHRUBS.

Upwards of five hundred apple trees were received in the spring of 1909, and heeled in in nursery rows. These came through the winter in good condition. They were planted in rows fifteen feet apart both ways in the spring of 1910, and withstood the dry summer well. So also did the plums. The bush fruits including raspberry, gooseberry and currant, suffered much from the late spring frosts and the drying winds.

THE GARDEN.

An attempt was made to grow annual flowers and vegetables from seed, but there being as yet no protective windbreaks on the Farm, the young plants were cut off and killed by the blowing sand.

HOUSE PLANTS.

We have had the windows of the Superintendent's house full of plants and flowers all winter, such plants as begonias, geraniums and coleus coming through without injury from cold.

What was most pleasing of all was a collection of bulbs of narcissi, hyacinths and tulips forwarded from the Central Farm. These were potted in October in about equal parts of sand and black prairie mould, watered thoroughly and placed in a cool, dark, dry cellar. In about three weeks, they were found to be very dry and were thoroughly soaked again and this was repeated at intervals of from two to four weeks. We began taking them from the cellar about Christmas time and did not take the last up till the first week in March and had a continuous bloom from the Christmas holidays till nearly Easter. Only one variety of tulip was tried in the house, the Duchesse de Parma, and it was particularly beautiful. It is intended to try a number of varieties of tulips another year.

Thirteen hundred tulips of several varieties were planted in a bed in October, the results of which will appear in next year's report.

BUILDINGS.

The Superintendent's house, which was begun in August, 1909, was completed in May, 1910, except the painting, which was deferred, on account of the dust storms, till July.

I should like to draw attention to one feature of the construction of the house which means more for its warmth than perhaps anything else. I refer to the back plastering of all the outside walls. The house is a frame structure and all studding on outside walls have strips nailed to them reaching half the width of the stud. To these strips lath are nailed and the lath covered with plaster. When the inside of the walls is lathed and plastered after this method there are then two dead-air spaces.

An addition was made to the implement building. The former building was 60 feet by 20 feet and was found to be inadequate. An additional twenty feet gives us ample room for the present.

WATER SUPPLY AND SEWAGE DISPOSAL.

The water supply comes from two sources, namely: Soft water from two forty barrel storage tanks in the basement and hard water from a well sixteen feet distant from the house. In the attic are two tanks, each 3 feet by 5 feet by 2½ feet, into one of which is pumped soft water from the basement and into the other, hard water from the well. From the soft water tank, water is piped to the bath tub and wash basin in the bath room, to the sink and heater in the kitchen and from the hard water tank water is piped to the commode and bath tub in the bath room and to the sink in the kitchen. The pumping of the water from the basement is not a difficult task, a man being able to fill the tank in ten minutes, but the pumping of the water from the well requires a man working for thirty minutes. We have recently tried a 1½ h.p. gasoline engine for this and find it works very satisfactorily.

The well is twenty-three feet deep, is 4½ feet across, and is lined from the bottom to six inches above the level of the ground with a six-inch solid concrete wall. This prevents the possibility of any water entering the well except through the bottom.

We believe that the well would be much more satisfactory if it were five feet in diameter inside the curb instead of three, because the water enters too slowly, coming as it must only from the bottom. The water is conducted from the well to the house through a 2-inch pipe seven feet below the surface of the ground.

For sewage disposal, there is a septic tank immediately outside the wall of the outer kitchen with its top level with the top of the ground. The tank is three feet deep, three feet wide and ten feet long, is made of concrete six inches thick, and has three compartments. The wall between the first and second compartments is 33 inches high, the second wall 32 inches and the overflow from the third compartment 31 inches above the bottom of the tank. The tank is covered with lumber and about two inches of earth and about two feet above this a roof. For winter, the intervening space between the cover and the roof is filled with chaff and the whole thing covered to a depth of about three feet with straw. The tank has been in use for more than a year and has given no trouble from disagreeable odours nor from frost in winter. The outlet from the septic tank connects with the drain from the cellar seven feet below the surface and leads to a cesspool four hundred feet distant.

In the autumn, the tank was opened to be cleaned of any solid matter that might have accumulated, but none was found.

A float with a light wood indicator in the third compartment registers the depth and when this compartment is full, a rod connected with a plug in the outlet at the bottom is pulled and the compartment emptied with a rush which prevents any possibility of the sewer pipe clogging.

There are automatic valves for this purpose on the market, but we find the simple cedar plug inexpensive and absolutely proof against disarrangement. As we have occasion to pass the tank several times daily, it is no inconvenience to pull the plug, when the indicator shows the tank to be full.

LIVE STOCK.

There are six horses on the Farm, four heavy draft, one general purpose, and one driver, all sound and in good condition. The heavy draft horses are especially fine animals. This number was found to be insufficient to do the work of the Farm, and on several occasions an extra horse was hired.

There are two pure-bred Ayrshire cows, one nine years old and one three.

CORRESPONDENCE.

During the year there were 396 letters received and 342 sent out, irrespective of circulars.

MEETINGS ATTENDED.

It was my good fortune to attend a series of eight Institute meetings in June in company with Prof. Bracken of the University of Saskatchewan. We started out with a team at Prince Albert on June 13, and followed a westerly and southwesterly course on the west side of the North Saskatchewan River, taking the train again at Borden on June 22, the distance covered being upwards of one hundred and twenty-five miles. The country passed through was exceedingly beautiful, being rolling and somewhat broken with woods and lakes. It was rather sparsely settled, but was filling up very rapidly. The crops were doing splendidly, not apparently affected by the drought which was so severely felt in the open plains in certain other parts of the province.

I acted as judge at two exhibitions and attended the meetings of Farmers' Institute workers and the Saskatchewan Poultry and Pet Stock Show in Saskatoon and the Agricultural Societies' Convention and Winter Fair in Regina.

METEOROLOGICAL RECORDS.

A set of meteorological instruments consisting of maximum and minimum thermometers, rain guage and sunshine recorder were received in November and records kept from December 1.

Month.	Temperatures.			Date.	Mean.	Snowfall.	Hours of Sunshine.
	Max.	Date.	Min.				
	°		°		°	Inches.	
December	34·5	17	-28	31	5·8	17	92·1
January	22·9	4	-43·2	2	-17·2	22	99·5
February	35·5	25	-31	5	-3·6	8	169·2

I have the honour to be, sir,
Your obedient servant,

WM. A. MUNRO,
Superintendent.

EXPERIMENTAL STATION FOR SOUTHERN ALBERTA.

REPORT OF W. H. FAIRFIELD, M.S., SUPERINTENDENT.

LETHBRIDGE, ALTA., March 31, 1911.

Dr. WILLIAM SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit the fourth annual report of the operations on the Experimental Station for Southern Alberta, at Lethbridge, for the year ending March 31, 1911. Three seasons' crops have been grown, the first spring and summer after the Station was established being devoted to the breaking and preparation of the sod.

The results obtained during the season of 1910 on the Farm here are of more than usual interest, due to the fact of the season being so extremely dry. The necessity of a farmer summer-fallowing at least a portion of his land every year, to insure against a dry season, is clearly emphasized, for in reality the so-called 'new science of dry farming' is merely intelligent summer-fallowing either once in two or once in three years. By ploughing the land in the spring and not allowing any vegetation whatsoever to grow all summer, the larger part of the moisture that falls at this time is carried over in the soil for the use of the crop the next year. The past season has the undesirable distinction of being the driest in southern Alberta since reliable meteorological observations have been made, and, according to the statements of the older residents, there has been no summer so dry since 1886. During the autumn of 1909 there were no rains worth mentioning. The autumn was followed by a winter of practically no snow. The amount of the total precipitation during the following months in 1910 speaks for itself, and no further explanation of the light yields is required:—

	Inches
March	0·17
April	0·28
May	0·79
June	0·53
July	0·09
Total	1·86

Although it may scarcely be necessary to offer any further suggestions as to the reason for the small yields reported in the following pages, still the fact that we obtained the crops that we did is certainly extraordinary, considering the fact that less than one and two-thirds inches of moisture fell on the grain from the time it was sown in April till it was harvested in July. Not once during this whole four months did we get a good rain; what little moisture there was came in small showers that did not wet the surface of the soil deeper than two inches at any time. Crops sown on land that had not been summer-fallowed in 1909 failed to produce a yield of any kind.

The winter of 1909-10, on the whole, was not particularly severe. The coldest weather occurred in December, and again in February. The lowest temperature recorded was —35·5° on February 22. The most noteworthy point about the winter was the practical absence of snow, combined with the fact that during the periods when the temperature was relatively high, more than the usual amount of windy weather prevailed. This dried out still more the fields that were already drier than they should be.

The season opened up very early. The first work done on the land in the spring of 1910 was discing in the afternoon of March 4. For a few days it was possible to work only in the afternoons, as there was too much frost in the forenoons, but by the 11th, the land had softened sufficiently to make it possible to plough. The last frost in the spring was on June 4, when 31·0° was recorded. The first frost in the autumn was on August 23 when 31·5° was recorded, and on the following night the thermometer dropped to 30·0°. On account of the drought, the grain ripened very early. The first winter wheat was cut on July 14 and the first spring wheat was ripe July 23. Red Fife was ripe August 1.

Winter wheat on the Farm came out in the spring very well, much better than after the previous winter. On account of the very dry autumn of 1909, the winter wheat throughout a large portion of the southern part of the province did not come up well, and the major portion of the land so planted had to be resown with spring wheat. At the present time, more winter wheat is sown on breaking than on summer-fallow, and this is the principal reason why it is so difficult to get the grain up in a dry autumn. Although there may be moisture in the subsoil, the sods themselves have dried out and it is impossible to drill through to the moisture below, which is not the case with summer-fallowed land.

TWO FARMS.

Of the 400 acres on the Farm, one-fourth can be irrigated; the balance is devoted to 'dry' or non-irrigated farming. Two experimental farms are really being operated at Lethbridge. Their object is, not to compare the relative merits of the two systems, but to study their individual problems. To aid in doing this and to prevent confusion, the report is divided into two parts. Part I deals with the results from the non-irrigated or 'dry' farm, and Part II with the results from the irrigated farm. In this connection, it might be well to point out that the yields of even the same variety of crop grown on the two farms in any one season are not necessarily comparable, and that an increased yield on the irrigated portion may not be entirely due to irrigation, owing to the fact that the preparation of the land in the two fields may not have been identical.

Although many of the tests carried out are the same on both the dry and the irrigated farms, still it would be well for the reader, if he wishes to get a comprehensive grasp of the work, to read both parts. For example, any suggestions offered regarding the preparation of the land, particularly the raw prairie, in Part I, is equally applicable to the preparation of the land that is intended to be irrigated.

PART I.—THE NON-IRRIGATED OR 'DRY' FARM.

EXPERIMENTS WITH WINTER WHEAT.

As stated above, there was very little winter-killing in any of the plots or fields of winter wheat on the farm, with one notable exception of those plots sown early, *i.e.*, in July and the first part of August. The land on which all the winter wheat was sown was summer-fallowed in 1909. None was sown on breaking. It was ploughed once and during the summer given enough surface cultivation to kill the weeds and volunteer grain.

WINTER WHEAT—TEST OF VARIETIES.

Ten varieties of winter wheat were sown August 25 at the rate of about one bushel per acre, on plots of one-sixtieth of an acre each.

WINTER WHEAT (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of grain per acre.		Weight per measured bushel after cleaning
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Kharkov	Sept. 10	July 14	24	9	3	1,200	20		62·8
2	Ghirka	" 10	" 16	22	9	3	990	16	30	58·9
3	Turkey Red (No. 380)	Aug. 25	" 14	22	9	2½	840	14	..	62·8
4	Reliable	" 25	" 20	26	10	4	840	14	..	59·8
5	Prosperity	" 25	" 15	24	9	3½	660	11	....	59·5
6	Dawson's Golden Chaff	" 25	" 19	25	10	3	600	10	..	59·9
7	Red Velvet Chaff	" 25	" 16	23	9	3½	540	9	..	60·1
8	Abundance	" 25	" 20	22	10	3½	480	8	..	59·5
9	Early Windsor	" 25	" 20	25	10	3½	480	8	..	59·1
10	Red Chief	" 25	" 19	23	9	3½	330	5	30	57·1

An interesting variety in the above list is the Ghirka, which is a beardless variety of the Turkey Red type. It was obtained from the Kansas Agricultural College and they state that it will yield nearly as well as the Kharkov, under their conditions. We have only tested it one season, but it will be a welcome addition to our list of winter wheats if it shows itself to be as good in yield and quality as the bearded varieties.

HARROWING WINTER WHEAT IN SPRING.

A field of 5·8 acres of Kharkov was sown on summer-fallow on August 24. On April 9, 1910, one end of this field was harrowed. Both pieces were ripe and cut July 16; the yields obtained were:

——	Area.	Yield per Acre.	
		Bush.	Lbs.
Part harrowed April 9	0·9	18	48
Part not harrowed	4·9	16	15

In connection with this experiment, it should be explained that the part harrowed was at one end of the field on somewhat lower ground and the increased yield may not be altogether due to the harrowing. As the advisability of this treatment for winter grain seems to be somewhat in doubt it will be of interest to learn the results of a similar experiment to be carried on in 1911.

FIELD LOTS OF WINTER WHEAT.

Sown on summer-fallow the latter part of August and all ripe July 15.

Variety.	Area.	Yield per acre.	
	Acres.	Bush.	Lbs.
Turkey Red, No. 380	4·22	16	55
Turkey Red, from commercial sample	0·81	12	21
Kharkov	20·10	13	54

TIME TO SOW WINTER WHEAT.

In studying the conditions that might influence winter-killing, the experiment in which the winter wheat is sown at different dates is interesting. Average results are given for three years, except where indicated by footnote.

The land is all prepared in exactly the same manner and the only difference in treatment is that the seed is sown at different times. It was all sown with the same drill and at the same rate per acre. In 1908 and 1909 it was grown on breaking, in 1910 on summer-fallow. The area of each plot in 1910 was one-tenth of an acre and the seed was sown at the rate of one bushel per acre.

WINTER WHEAT (non-irrigated)—Dates of Sowing.

Date of Sowing.	Date Ripe in 1910.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
July 15	winter-killed			1	30*
August 1	July 14	0	30	12	10*
" 15	" 14	8	20	27	41
September 1	" 14	15	20	31	53
" 15	" 14	15	10	23	29
October 1	" 20	13	10	20	11
" 15	" 26	9	10	16	21
November 1	August 1	9	..	10	49
" 15	Not sown				
December 1	August 8	6	40	..	..

* Average for two years only.

In studying the yields given in the tables for 1910, it will be noted that the wheat sown on July 15, winter-killed entirely and that sown on August 1, for all practical purposes, did the same. It should be mentioned that these plots came up well and made a vigorous growth, forming a good mat on the ground before the winter set in. That sown August 15 made more growth than the seeding made September 1.

After watching these tests for the past three seasons, the writer has been led to believe that it is not wise to sow winter wheat early enough in the season to allow much growth to take place in the fall. It would seem that if the grain comes up well and from three to five blades are developed on each plant, the crop has a better chance of going through the winter without injury than if more growth takes place in the fall. I believe one would be safe in making the statement that, under our conditions, in average years, the best time to sow winter wheat on well-prepared land is between August 20 and September 1.

AMOUNT OF WINTER WHEAT TO SOW PER ACRE.

The proper amount of winter wheat to sow per acre is a question that has been the cause of a great deal of discussion among the farmers of southern Alberta for the past few years. Quite a general practice has been to seed lightly, that is, from two to three pecks per acre, but some of the most successful growers are beginning to sow larger amounts of seed. In the following table it will be noted that the average results, for the three years that the test has been carried on, would indicate that heavier seedings pay. Even in the extraordinarily dry season of 1910, the very light seedings did not give as much increase in yield over the heavier ones as one would be inclined to expect. Judging from the average results given in the table, it certainly appears that it would pay to sow at least one bushel of winter wheat seed per acre.

The size of the plots used in this test in 1910 was one-tenth of an acre. They were all sown with Kharkov on August 23, on summer-fallowed land.

WINTER WHEAT—Rates of Seed per Acre (non-irrigated).

Rate of seed per acre.	Date Ripe in 1910.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs	July 16	16	40	27	47
30 "	" 16	15		33	20
45 "	" 16	15	30	35	36
60 "	" 16	13		41	17
75 "	" 16	13	30	43	1
90 "	" 14	14		42	19
105 "	" 14	11	20	38	3
120 "	" 14	12	20	38	47

EXPERIMENTS WITH SPRING WHEAT.

Although winter wheat yields more, under normal conditions, than does spring wheat, still, owing to a certain element of uncertainty that will always be connected with the wintering of wheat sown in the fall, together with the fact that it is possible to obtain a crop of spring grain the same season that it is sown, it is probable that the importance of spring wheat will never be second to winter wheat in southern Alberta.

SPRING WHEAT—TEST OF VARIETIES.

Twelve varieties of spring wheat were grown on summer-fallowed land in 1910 in plots of one-sixtieth of an acre each. The varieties were all sown on March 30, except Red Fife, which was sown on April 1. The seed was sown at the rate of about one bushel and one peck per acre.

SPRING WHEAT (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre	Yield of Grain per Acre	Weight per measured bushel after cleaning.	Average Yield for three years.
				Inches.		Inches.	Lbs.	Bus. Lbs	Lbs.	
1	Red Fife..	Aug. 1..	125	25	10	3	900	15 ..	58	25 56
2	Preston...	July 27..	119	23	8	3	660	11 ..	59	24 46
3	White Fife	" 27..	120	25	9	3	780	13 ..	57·2	23 56
4	Marquis...	" 26..	119	22	9	3	660	11 ..	60·2	23 43
5	Chelsea ...	" 26..	119	20	8	3	480	8 ..	60·1	23 7
6	Pringle's Champlain	" 25..	118	22	9	3½	600	10 ..	59·3	22 46
7	Kubanka (Durum).	Aug. 1..	125	26	8	3	1020	17 ..	61·1	22 46
8	Stanley....	July 26..	120	24	9	3½	630	10 30	56·5	22 43
9	Huron.....	" 26 .	120	24	9	3½	720	12 ..	57·9	22 43
10	Bishop....	" 26..	117	21	9	3	570	9 30	58·2	21 36
11	Gatineau...	Aug. 1..	124	24	8	3½	600	10 ..	58	18 26
12	Riga	July 23..	114	24	9	2¾	300	5 ..	60	15 30

FIELD LOTS OF SPRING WHEAT.

Wheat sown on stubble land, although it came up, did not grow more than ten inches or a foot high, and failed to produce any crop at all. There was apparently no difference in the amount of growth on the stubble land where spring ploughed and on that double-disced in the spring and not ploughed. The crop also failed on a three-acre field of June breaking. The straw was somewhat higher and heavier on this than on the stubble land, but there was not enough grain produced to pay for cutting.

The following fields were sown on summer-fallowing at the rate of about one bushel and one peck per acre.

FIELD LOTS OF SPRING WHEAT.

Variety.	Area.	Date Sown.	Date Ripe.	Yield per acre.
	Acres.			Bush. Lbs.
Red Fife.....	4·82	Mar. 24 ...	Aug. 3	11 6
Red Fife II.....	0·12	Apr. 1....	" 3....	10 33
Marquis....	1·60	" 1....	July 27.....	9 47

SPRING WHEAT—RATES OF SEED PER ACRE.

In the following experiment, the size of the plots used was one-twentieth acre. They were all sown April 4. The preparation of the land for 1910 was summer-fallow, for the two previous seasons, June breaking. The variety used for the three seasons was Red Fife.

SPRING WHEAT—Rates of Seed per Acre (non-irrigated).

Rate of Seed per Acre.	Date Ripe 1910.	Yield in 1910.		Average yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Aug. 8.	8	..	10	20
30 "	" 8.	8	40	15	7
45 "	" 3.	11	..	20	..
60 "	" 1.	10	40	20	53
75 "	" 1.	9	40	21	7
90 "	" 1.	9	20	21	20
105 "	" 1.	10	40	23	20
120 "	July 24.	10	20	22	47

The most interesting point shown by the table is the fact that, notwithstanding the very dry season, the light seedings did not yield better than the heavier ones, indicating that the results expressed in the average yield for the three years are probably reliable.

SOWING WINTER WHEAT IN THE SPRING.

A great many letters are received asking what the result would be if winter wheat were sown in the spring. Some farmers even maintain that it is safe to reseed winter wheat fields that have been killed out more or less during the winter, with winter wheat in the spring.

When winter wheat is sown in the spring, its inclination is to stool cut very freely and to be slow about shooting for head, so that, even when a good crop is produced, it is much later than spring wheat and is almost certain to be frosted. However, on account of the idea that appears to be more or less prevalent among certain farmers that such a practice is feasible, the following experiment was carried out. On March 24, two plots of one-sixtieth acre each were sown on summer-fallowed land. with the following results:—

WINTER WHEAT—Sown in Spring.

Variety.	Date Ripe.	Yield per Acre.	
		Bush.	Lbs.
Kharkov (winter wheat)	Aug. 18.	15	..
Red Fife (spring wheat)	" 2.	17	..
Difference in time of maturing	16 days.		

In a normal year, when the maturing of the grain is not hastened by drought, it can readily be seen that the great difference in the time it takes the winter wheat, as compared to a spring variety, to ripen would make it very unsafe to sow the former as spring wheat.

CULTURE OF WINTER AND OF SPRING WHEAT.

So many letters of inquiry concerning the growing of winter wheat and also of spring wheat are received at the Station, that it may be excusable to repeat what was said in last year's report and give a very brief outline of the general practice followed in the growing of these crops in southern Alberta. Anything in the way of preparation of the soil that will apply to spring wheat is of course applicable in general to oats or to barley.

PREPARATION OF SOD LAND.

The sod should be broken in May or June, while the soil is moist and before the rainy season is over. May breaking usually gives better results than June breaking, the reason for this being that less of the rains is used up by the growing grass and, consequently, more is stored in the subsoil; also, the moist weather of June is conducive to the rotting of the grass roots. The sods should be rolled or flattened down in some manner as fast as broken. This connects the furrow slice with the subsoil and facilitates the rotting process. The rolling should be done at noon and at night before the teams leave the field. If a tractor is used, a weighted roller should be attached behind the ploughs. The common practice is to break 3½ to 4½ or even 5 inches deep; after this, the surface cultivation should be shallow. No attempt should be made to cut through the sods with the discs, but merely to go deep enough to form a mulch on the top to prevent rapid evaporation. If one is prepared to do this surface cultivation after rain, while the sods are moist, it will be found that the land is worked more economically and to much better advantage. Enough work should be done to get sufficient loose material to fill in the cracks between the sods which will then rot sufficiently during the summer to be loose and in good condition for growing a crop the following spring. It is generally found necessary, if a thorough job is desired, to double-disc the land twice, using a drag harrow and possibly a float after each double-discing. The latter is a contrivance made of four or five two-inch planks a foot wide, twelve to sixteen feet long, laid flatways and lapped so as to resemble somewhat a washboard. This implement, when weighted with stone or sod added to the weight of the driver, crushes quite effectively small pieces of sod which, when dry, could not be broken up well with a drag harrow. *The float should be followed immediately with a harrow,* for evaporation takes place very rapidly from the land when the surface is left too smooth. If the floating is done just before seeding, the seed drill will, of course, roughen the surface. A light harrowing immediately after seeding is advisable.

For the best results with spring grain, this work should be done on the sod during the previous summer (say before the rush of harvest). In this way, all the land requires in the early spring of the next year is a harrowing just as the frost draws out, to prepare it for the seed drill.

SOWING ON FRESH BREAKING.

Considerable land during the past few years has been broken in April and immediately sown to grain. Although fair results are often obtained in this way, it is not a practice that can be recommended, for, if the season is dry, the resulting crop may be disappointing, and, on account of the sods not having had a chance to rot properly, the second crop is not nearly as good as the second crop after breaking the land in May or June and allowing it to lie fallow that summer as described above.

BACKSETTING.

Although it is not customary to backset in this district, it is a practice that cannot be too highly recommended. When backsetting is to be done, the sod should be broken as shallow as practicable and immediately rolled, or, if a roller is not available.

it may be flattened down by a weighted float. The earlier the breaking after the grass has started growth, the better will be the results. In the latter part of July or early in August, if winter wheat is to be sown, the land is again ploughed (with stubble bottom ploughs) about two or three inches deeper than it was broken. The depth of this second ploughing should be governed by the depth of rotting that has taken place in the subsoil. In ordinary years, where the land has been broken in May or early in June, the grass roots for about two inches down in the subsoil have become rotted. If spring grain is to be sown, this second ploughing or 'backsetting' may be done any time in August or, if desired, in September when the sods and grass roots are better rotted, but, on the other hand, the land is apt to be a little drier at that time and consequently the soil is inclined to be too loose, which tends to make it dry out. This condition can be largely overcome by the use of a subsurface packer used at noon and at night before leaving the field. The packer should be immediately followed by a harrow. After backsetting, a seed bed can often be prepared by the use of a harrow only, but a disc should be used if the conditions of the ground require it. Special attention should be called to the importance of harrowing each day's ploughing at night before leaving the field. If an engine is used, the harrow should be attached to the plough, or, if horses are used on a sulky or a gang plough, one section of a harrow should be attached so that the land is harrowed as fast as it is turned. This practice of harrowing land immediately after it is ploughed should always be followed; too much stress cannot be laid on this point.

It might be well to state here that backsetting is the only feasible way of preparing land that is to be used for a garden or for trees and shrubs the second season after a settler goes on raw land.

SUMMER-FALLOWING.

In speaking of this subject, Mr. Angus Mackay, Superintendent, Experimental Farm, Indian Head, puts in a concise way some of the advantages of summer-fallow, with special reference to its application to conditions in southern Saskatchewan, which are in so many ways similar to those found in southern Alberta, the one notable exception being that, so far, winter wheat has not been very successful there. He says:—

> 'Among the many advantages to the credit of the practice of summer-fallowing may be mentioned: The conservation of moisture, the eradication of weeds, the preparation of the land for grain crops at a time when no other work is pressing, the availability of summer-fallowed land for seeding at the earliest possible date in the spring and the minor advantages of having suitable land for the growing of pure seed, potatoes, roots and vegetables at the least cost and with the greatest chance for success, and that of being able to secure two good crops of grain with little or no further cultivation.

Mr. Mackay adds, however:—

> 'Summer-fallowing undoubtedly has some disadvantages, but, so long as the growing of grain, and more particularly wheat, remains the principal industry of the province, it will be necessary to store up moisture against a possible dry season, to restrain the weeds from over-running the land and, on account of the short season, to prepare at least a portion of the land to be cropped in the year previous to seeding and a well-made summer-fallow is the best means to this end. Among the disadvantages are: The liability of the soil to drift, the over-production of straw in a wet season, causing late maturity and consequent danger of damage by frost, and it is claimed, the partial exhaustion of the soil. The two former may, to a great extent, be overcome by different methods of cultivation, and if the soil can be prevented from drifting, I am satisfied that one of the reasons for the latter contention will disappear.'

The growing of winter wheat in southern Alberta gives an added reason why, in this province, farmers should give summer-fallowing even more careful consideration, if possible, than where spring wheat alone is raised. In this connection, summer-fallowing certainly has a distinct advantage that is not mentioned in the quotation above, for it must be admitted that there is a somewhat greater risk in getting a stand of winter wheat on sod than on well-prepared summer fallow. In seasons like that of 1909, in which there was little or no precipitation during the months of August, September and October, it is very difficult to get the grain sown on fresh breaking to come up. Although there is ample moisture in the subsoil, the sods themselves have become very dry and have not rotted sufficiently by August to allow the discs or shoes of the seed drill to cut through them so that the seed may be deposited on the moist subsoil. Under these conditions, opportune rains must be depended upon to bring the seed up. On well prepared summer-fallow, conditions are quite different, for if the land is ploughed in May or June, while it is moist, before the rainy season is over and while the weeds are not more than a few inches high, little trouble is experienced in getting the lower part of the furrow slice firm and and keeping it moist. The depth of the ploughing should not be less than five or six inches and eight is recommended. The harrow should immediately follow. Too much stress cannot be laid on the importance of doing this ploughing early, *i.e.*, before the weeds have had a chance to grow large enough to pump out the moisture that should be stored in the subsoil for the crop that is to follow. If, for example, the weeds and volunteer grain are allowed to grow a foot or more high and it is necessary to use a chain on the plough to get them turned under, the work on the summer-fallow is practically thrown away, for the land is certain to turn up lumpy and loose and the supply of moisture that should be in the subsoil has already been heavily drawn upon.

If, after the land is ploughed, hard rains form a crust, it should be broken up with a drag harrow before the land had a chanceto dry out to any extent. Sufficient surface cultivation should be given during the summer to prevent all weeds from growing, *i.e.*, the land should be kept perfectly bare. Two of the best tools to do this with are an ordinary harrow and a duck-foot cultivator. The latter implement is too rarely seen on the grain farms of southern Alberta. A serious mistake is made when a disc is substituted, for the reason that it cuts down too much and so forms too deep a mulch. It also pulverizes the land excessively, causing it to drift too readily with the wind. The duck-foot cultivator can be set very shallow, just deep enough to cut off the small weeds and it merely loosens the surface without making it fine, leaving it in a granular rather than in a powdery condition. Another great advantage of the cultivator over the disc, that will appeal strongly to farmers, is that a summer-fallow may be cleaned much more economically with it. Whereas it is necessary to double-disc a piece of ground if a satisfactory job is to be accomplished, with this cultivator the same four horses will cover at least twice as much ground in a day and do the work better.

TIME TO SOW.

Winter Wheat.—Our results for the past three seasons certainly indicate that from the middle of August to the first of September is the best time to sow. On well prepared, summer-fallowed land, where it is possible to maintain the moisture zone relatively near the surface, we have reason to believe that the August or early September sowing will give more satisfactory results as a rule than will July sowing.

Spring Wheat.—Early sowing is of prime importance. Every effort should be made to conclude the seeding of this grain by May 1.

QUANTITY OF SEED TO SOW.

This, as well as the proper time to sow, is a point about which we have not yet sufficient data at hand to draw very satisfactory conclusions, consequently, any state-

ments that are made in this connection must be considered as tentative. Sixty pounds of winter wheat and seventy to seventy-five pounds of spring wheat is probably a safe quantity to sow per acre.

SMUT.

Both winter and spring wheat seed should always be treated for bunt or stinking smut. Either the formalin or the bluestone method is satisfactory providing the work is done carefully. Very smutty grain should never be used for seed, for, even when treated thoroughly, some smut is apt to appear in the resulting crop. If seed wheat is treated every year whether any smut can be found in it or not the trouble will be kept in subjection. With either method, it is important that each kernel be thoroughly wet. As to the strength of the solution, it should be strong enough to kill smut spores, but not so strong as to injure the vitality of the grain. The strength of solution most often recommended is one pound of formalin to thirty-two gallons of water, and in the case of bluestone, one pound dissolved in six gallons of soft water. The sacks into which the grain is to be put after it is treated should have been dipped in the solution also. In the case of formalin, it is the fumes that kill the spores, so, after the grain has been treated, it is a good plan to throw it into a heap and cover it with a canvas or with empty sacks, but see that the covering used is free from smut spores.

EXPERIMENTS WITH OATS.

OATS—TEST OF VARIETIES.

Twenty-one varieties were sown on April 14, at the rate of about two bushels and one peck per acre on summer-fallow. The area of each plot was one-sixtieth acre.

OATS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
1	Improved American	Aug. 1	108	23	9	5	750	22	2	37	63	16
2	Lincoln	" 1	109	20	9	5	600	17	22	36·3	58	18
3	Abundance	July 25	102	25	9	5½	840	24	24	35	53	8
4	Banner	" 27	104	22	9	5½	720	21	6	35·8	52	22
5	Irish Victor	" 27	104	24	9	4½	780	22	32	33	51	26
6	Danish Island	" 26	103	23	9	5	840	24	24	34·5	51	23
7	Golden Beauty	" 26	103	26	9	5	720	21	6	35·5	51	24
8	Improved Ligowo	Aug. 1	109	24	9	5	660	19	14	36·5	50	16
9	White Giant	July 27	104	24	9	5½	840	24	24	33·7	49	7
10	Wide Awake	Aug. 2	110	24	9	5½	810	23	18	38	48	18
11	Twentieth Century	July 27	104	24	9	5	780	22	32	36·6	47	15
12	Pioneer	Aug. 1	109	23	10	4½	720	21	6	33·5	43	30
13	Siberian	" 1	109	22	9	5	570	16	26	33·6	43	24
14	Virginia White	July 25	102	24	9	5	720	21	6	37·5	43	1
15	Swedish Select	" 25	102	22	9	5½	750	22	2	36·5	41	26
16	Thousand Dollar	Aug. 1	109	21	9	4½	540	15	30	39	39	4
17	Dodd's White	July 27	104	26	9	5½	780	22	32	39	.....	
18	Victory	July 27	104	24	9	5	750	22	2	39	.....	
19	Gold Rain	" 25	102	25	10	5	720	21	6	38	.....	
20	Garton's 'Regenerated' Abundance	" 25	103	24	9	5	570	17	22	35·8	.....	.....
21	Sixty Day	" 14	91	20	9	4½	420	12	12	33	.....	

RATES OF SEED PER ACRE.

The size of the plots used was one-twentieth acre each and they were all sown April 16. The land was summer-fallowed in 1909. The variety used was Banner in 1910 and 1909. In 1908, Tartar King was used.

OATS (non-irrigated)—Rates of Seed per Acre.

Rate of Seed per Acre.	Date Ripe.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Aug. 7	17	2	32	12
30 "	" 2	22	12	43	31
45 "	July 26	22	32	46	29
60 "	" 25	25	10	50	13
75 "	" 25	27	2	48	21
90 "	" 25	25	10	50	..
105 "	" 23	21	26	48	21
120 "	" 23	20	20	42	19

Notwithstanding the apparent irregularity in the averages, due no doubt to the factor of experimental error, it would appear that about seventy-five pounds would not be far from the right amount of seed to sow per acre under our conditions.

FIELD LOTS OF OATS.

The following field lots of oats were sown on summer-fallow at the rate of about two bushels and one peck per acre.

Variety.	Area.	Date Sown.	Date Ripe.	Yield per Acre.	
	Acres.			Bush.	Lbs.
Abundance	0·28	May 7	Aug. 5	24	23
Improved American	0·30	" 7	" 5	24	..
Irish Victor	0·30	" 7	" 5	20	8
Banner	2·65	" 9	" 5	20	6
Banner	11·72	" 6	" 5	18	6

EXPERIMENTS WITH BARLEY.

Eleven varieties of six-row and ten varieties of two-row barley were grown on summer-fallowed land. They were all sown April 19 at the rate of a little less than one bushel and three pecks per acre.

SIX-ROW BARLEY (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bu.	Lbs.	Lbs.	Bush.	Lbs.
1	Claude	Aug. 12.	105	19	9	2¾	570	11	42	44·8	36	8
2	Mansfield	" 13.	106	19	9	2¾	480	10	..	48·1	33	32
3	Odessa	" 8.	101	18	9	3½	600	12	24	45·5	30	26
4	Mensury	" 12.	105	17	10	4	510	10	30	45	26	38
5	Stella	" 12.	105	17	9	3½	390	8	6	48·5	26	37
6	Albert	" 18.	111	15	9	4	360	7	24	45·4	26	32
7	Nugent	" 18.	111	18	9	4	300	6	12	38·6	25	15
8	Yale	" 12.	105	19	8	3½	420	8	36	48	24	31
9	Trooper	" 12.	105	18	8	3½	450	9	18	39·9	24	4
10	Oderbruch	" 12.	105	18	8	3½	360	7	24	40·5	23	46
11	O.A.C. No. 21	" 8.	111	18	8	3½	570	11	42	40	...	.....

TWO-ROW BARLEY (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bu.	Lbs.	Lbs.	Bush.	Lbs.
1	Swedish Chevalier	Aug. 15.	108	18	10	4	570	11	42	50·7	37	..
2	Invincible	" 31.	124	16	8	3½	510	10	30	48·3	34	41
3	Canadian Thorpe	" 24.	117	16	9	4	510	10	30	49	32	27
4	Standwell	" 15.	108	15	8	3½	450	9	18	50·5	31	15
5	Clifford	" 13.	106	18	9	4	750	15	30	49·5	29	23
6	Danish Chevalier	" 31.	124	16	9	4½	480	10	..	45·5	27	27
7	French Chevalier	" 24.	117	17	9	4	300	6	12	50	26	12
8	Jarvis	" 15.	108	20	10	4½	420	8	36	49·5	24	8
9	Beaver	" 12.	105	19	9	4½	450	9	18	44	21	31
10	Hannchen	" 1.	94	18	10	4	780	16	12	48·5	.....	

RATES OF SEED PER ACRE—(NON-IRRIGATED).

The size of the plots used was one-twentieth acre each and they were all sown May 2 on summer-fallowed land. The variety used was Mensury.

BARLEY (non-irrigated)—Rates of Seed per Acre.

Rate of Seed.	Date Ripe.	Yield in 1910.		Average Yield for two years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs	Aug. 15	7	44	4	28
30 "	" 15	7	44	5	20
45 "	" 13	10	..	15	..
60 "	" 13	10	20	17	44
75 "	" 12	11	12	22	04
90 "	" 12	11	22	22	39
105 "	" 8	10	30	23	11
120 "	" 8	8	16	21	42

WINTER BARLEY.

A small plot of winter barley was sown on August 25, 1909. A good stand was obtained in the fall but, with the exception of an occasional plant, it all winter-killed.

EXPERIMENTS WITH PEAS.

Thirteen varieties of peas were sown. Nine of these were mixed in the field after cutting, by a severe wind storm, in spite of the fact that they had been carefully staked to prevent any shifting. The remaining four plots are here reported on. The plots were sown April 2, at the rate of about two or two and a half bushels per acre, depending on the size of the pea. The land was summer-fallowed in 1909. The plots were one-sixtieth of an acre each.

PEAS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	
					Inches.	Inches.	Lbs.	Bush.	Lbs.
1	Mackay	Medium	Aug. 23	112	18	2¾	810	13	30
2	Gregory	"	" 26	115	20	2½	720	12	..
3	Paragon	"	" 23	112	19	2½	660	11	..
4	Black-eye Marrowfat	Large	" 24	113	17	2½	600	10	..

WINTER RYE.

A small plot of one-sixtieth of an acre of winter rye was sown September 10, 1909, on summer-fallow. It was ripe July 14. The length of straw including head was 37 inches. It yielded at the rate of 19 bushels and 16 pounds per acre.

INDIAN CORN AND ROOTS.

On account of the drought, seeds planted in May in almost every case failed to germinate. None of the corn came up and only a very scattering stand of roots was obtained. In the case of potatoes it was possible to plant them a little deeper, so that the sets were in contact with the moist soil below and consequently they all came up, but owing to the prolonged drought, only a very light crop was produced. The yield of roots, in each case, was estimated from the product of two rows, each sixty-six feet long.

EXPERIMENTS WITH TURNIPS (NON-IRRIGATED).

Ten varieties were sown on May 12, and a second sowing was made two weeks later. The latter sowing did not germinate and the seed of only two varieties germinated from the first seeding. The seed was sown in drills thirty inches apart and there was such a poor stand obtained that practically no thinning was necessary. The roots were pulled October 5. Halewood's Bronze Top yielded at the rate of 1,995 pounds per acre and Hall's Westbury 665 pounds per acre.

EXPERIMENTS WITH MANGELS.

Eight varieties were sown May 3, and a second sowing was made two weeks later. Practically none of the seed in the second sowing germinated. The stand obtained from the first sowing, the results of which are given, was poor. The seed was sown in drills thirty inches apart and the young plants were thinned out to ten or twelve inches apart in the row, although little thinning was required owing to the poor stand. The roots were pulled October 5.

MANGELS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Half Sugar White	11	610	376	50
2	Perfection Mammoth Long Red	11	610	376	50
3	Selected Yellow Globe	10	1,280	354	40
4	Gate Post	8	1,290	288	10
5	Prize Mammoth Long Red	8	1,290	288	10
6	Giant Yellow Globe	7	1,960	266	..
7	Giant Yellow Intermediate	5	1,970	199	30
8	Yellow Intermediate	5	1,305	188	25

EXPERIMENTS WITH CARROTS.

Five varieties of carrots were sown May 3, and a second seeding was made two weeks later. The seed of only three varieties germinated in the first seeding and none in the second. The seed was sown in drills twenty inches apart. The stand was so poor that thinning was practically unnecessary. The roots were pulled October 5.

CARROTS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Ontario Champion	1	970	49	30
2	White Belgian	1	970	49	30
3	Mammoth White Intermediate	0	1,980	33	..

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were planted on summer-fallowed land on May 3, and a second seeding was made two weeks later, but the later seeding did not germinate. Seed of one variety was supplied from the Knight Sugar Company of Raymond, and was planted May 12, but it failed to come up. This failure was, no doubt, due to drought and not from lack of vitality on the part of the seed. The seed was sown in drills twenty inches apart but a very poor stand was obtained from all three varieties. The roots were pulled October 5.

SUGAR BEETS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Vilmorin's Improved	7	850	247	30
2	Klein Wanzleben	5	1,880	193	..
3	French Very Rich	5	890	181	30

EXPERIMENTS WITH POTATOES.

Fifteen varieties were planted on summer-fallowed land, in rows thirty inches apart on May 13. The potatoes for planting were cut into pieces with two or three eyes in each, although medium rather than large-sized potatoes were selected so as to avoid cutting as much as possible. They were dug October 6, and the yield was computed from two rows each sixty-six feet long in each instance. The potatoes were all sound, being affected with neither rot nor scab, but they were rather small, and those classed as marketable were not of a size to sell to the best advantage. They were dug October 6.

POTATOES (non-irrigated)—Test of Varieties.

Number	Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Reeves' Rose	147	24	134	12	13	12	Oval, pink.
2	Everett	128	42	110	..	18	42	"
3	Vick's Extra Early	125	24	112	12	13	12	Irregular, pink.
4	Gold Coin	119	54	104	30	15	24	Round and oval, white.
5	Carman No. 1	113	18	101	12	12	6	Oval, white.
6	Empire State	108	54	96	48	12	6	"
7	Dreer's Standard	107	48	96	48	11	..	Round, white.
8	Late Puritan	106	42	93	30	13	12	Oval, white.
9	Irish Cobbler	103	24	86	54	16	30	Round, white.
10	Money Maker	101	12	85	48	15	24	Flat, oval.
11	Rochester Rose	99	..	82	30	16	30	Oval, pink.
12	Morgan Seedling	89	6	71	30	17	36	Irregular, pink.
13	American Wonder	86	54	66	..	20	54	Oval, white.
14	Ashleaf Kidney	77	..	63	48	13	12	"
15	Dalmeny Beauty	55	..	37	24	17	36	Round, white.

POTATOES PLANTED AT DIFFERENT DISTANCES APART.

This experiment will be carried on for a number of years with the object in view of ascertaining the best distance apart to plant potatoes on non-irrigated land. The land was summer-fallowed the previous season. The yield was computed from three rows, each 73.5 feet long. The variety used was Gold Coin. The potatoes were cut as nearly uniform in size as possible, with at least two to three eyes to the piece, and the pieces averaged rather large so that the amount of seed used per acre may be somewhat greater than would have been the case had they been cut smaller. The total yield only is given; in future, the yield of marketable potatoes will be reported in addition.

POTATOES—Planted at different Distances Apart.

Distance apart of Rows.	Amount of Seed per Acre.		Total Yield per Acre.			
	Sets put 2ft. apart.	Sets put 1ft. apart.	Sets put 2ft. apart.		Sets put 1ft. apart.	
Feet.	Lbs.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
2½	1,185	2,370	113	23	111	23
3	987	1,974	113	48	106	37
3½	846	1,692	104	8	90	25
4	740	1,481	94	54	91	50

FORAGE CROPS.

On account of the extreme drought, none of the alfalfa, brome grass, Western rye grass, timothy or clovers made enough growth to be cut for hay. We were able to get a few pounds of alfalfa seed by cutting over four of five acres of alfalfa that had been planted in rows in 1908 and 1909, but the yield was of no particular value from a commercial standpoint, as less than thirty-five pounds of clean seed was obtained in all.

APPLE ORCHARD AND SMALL FRUITS.

There was more or less winter-killing in most of the apple trees, but some of the varieties came through with little injury. This was practically the case with all the cross-bred varieties. The currants and raspberries came through the winter in fair condition, but made only small growth during the summer on account of the dry weather, and no small fruit was produced.

SUMMARY OF CROPS GROWN EXCLUSIVE OF UNIFORM TEST PLOTS.

	Bushels.
Winter wheat	448
Spring wheat	69
Oats	287
Total	804

PART II.—THE IRRIGATED FARM.

The yields of grain on the irrigated farm were all relatively low, the principal cause for this being the high mean temperature during the months of April, May and June and the windy weather that prevailed during a good part of this time. The way the season turned out, to have obtained the best results it would have been necessary to irrigate the grain the latter part of May or early in June. This was a course we hardly cared to risk, for two reasons: First, because it injures grain to flood irrigate it in the spring before it is through stooling, and second, because, if the land had been flooded at this time and the usual rains had occurred, which almost invariably come at this season of the year, the grain would have been seriously injured by too much wet. In such a season it would be almost impossible to have obtained particularly large crops, no matter when the irrigation was done. Land that had been irrigated the previous fall was, of course, in much better condition to withstand the unusually dry conditions of the spring. But very little of our land was so treated.

WINTER WHEAT.

Two small fields of Kharkov wheat were sown on summer-fallow on August 23, 1909. One was irrigated in the fall after the grain was up and the other was irrigated in the spring on June 13.

—	Area Acres.	Date Ripe.	Yield per Acre.	
			Bush.	Lbs.
Field fall irrigated	0·9	July 16	21	40
Field spring irrigated	1·0	" 21	18	5

It is very difficult to offer any explanation for the low yields of these two fields.

EXPERIMENTS WITH SPRING WHEAT.

Five varieties of spring wheat were grown on summer-fallowed land in plots of one-sixtieth acre each. They were sown on March 30 at the rate of about one bushel and one peck per acre. They received two irrigations, one on June 22 and the other July 13.

SPRING WHEAT (irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
1	Preston....	Aug. 11	132	28	9	4	1,500	25	..	62·3	36	12
2	Huron	" 18	139	27	9	4	1,590	26	30	63·6	35	20
3	Red Fife ..	" 8	129	31	10	3¾	1,740	29	..	62·5	33	28
4	Stanley....	" 13	134	31	9	4	1,380	23	..	60	26	35
5	Marquis. ..	" 8	129	28	9	3½	1,410	23	30	62·7		

SPRING WHEAT—RATES OF SEED PER ACRE.

In the following experiment, the size of the plots used was one-twentieth acre; they were sown April 4, on land on which hoed crops had been grown the previous season. The land was not spring-ploughed, but was double-disced and levelled before the wheat was sown. The variety used was Red Fife. Two irrigations were given, one on June 15, and the other July 14.

SPRING WHEAT (irrigated)—Rates of Seed per Acre.

Rate of Seed per Acre.	Date Ripe.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.....	August 13.....	21	..	28	40
30 "	" 11.....	23	15	29	25
45 "	" 13.....	26	..	31	17
60 "	" 8.....	28	..	32	27
75 "	" 8.....	32	..	36	..
90 "	" 18.....	34	..	36	57
105 "	" 8.....	35	..	37	10
120 "	" 18.....	36	..	34	57

From the results for the past three years as given in the above table, it would appear that one bushel of spring wheat is not enough seed to sow on irrigated land to produce the best results under our conditions.

EXPERIMENTS WITH OATS.

Seven varieties of oats were grown on summer-fallowed land in plots of one-sixtieth acre each. They were sown on April 15, at the rate of about two bushels and one peck per acre. Two irrigations were given, one on June 22, and the other July 13.

OATS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre	Yield of Grain per Acre		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
1	Improved American	Aug. 11..	118	30	10	6	2,580	75	30	37	84	27
2	Banner....	" 11..	118	29	10	6	2,340	68	28	39	78	11
3	Irish Victor	" 18..	125	29	10	5½	2,340	68	28	38	78	1
4	Abundance	" 18..	125	29	9	5½	2,400	70	20	37·5	77	4
5	Danish Island.....	" 13..	120	27	9	5½	2,460	72	12	39	75	..
6	Dodd's White...	" 13..	120	28	10	6	2,040	60	..	40	..	..
7	Sixty Day..	" 6..	113	22	9	4½	1,282	37	24	35·6	..	..

FIELD LOTS OF OATS.

Variety.	Area.	Preparation of Land.	Date Sown.	Date Ripe.	Yield per Acre.	
	Acres.				Bush.	Lbs.
Banner.....	1·0	In hoed crops previous season..	April 16...	.....	82	31
Banner	5·0	June breaking.....	" 18...	Sept. 15...	45	20
Banner.....	7·1	Stubble, spring ploughed.....	" 18...	" 18...	28	04

The one acre field was irrigated on June 15 and on July 14. The other two fields were irrigated June 17-18 and July 19-20. The very light yield of the field sown on stubble was largely due to the fact that the grain was suffering in a very severe manner before the first irrigation was given on June 17 and 18.

OATS—RATES OF SEED PER ACRE.

In the following experiment, the size of the plots used was one-twentieth acre; they were sown April 15 on land on which hoed crops had been grown the previous season. The land was not spring-ploughed but was double-disced and levelled before the oats were sown. The variety used was Banner. Two irrigations were given, one on June 15, and the other July 14.

OATS—Rates of Seed per Acre (irrigated).

Rate of Seed per Acre.	Date Ripe.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Aug. 13	55	20	68	45
30 "	" 13	61	..	67	13
45 "	" 8	56	16	67	31
60 "	" 8	67	32	74	43
75 "	" 8	70	20	77	37
90 "	" 8	86	16	81	03
105 "	" 8	86	16	82	49
120 "	" 8	88	08	78	52

EXPERIMENTS WITH BARLEY.

Four varieties of six-row and four varieties of two-row barley were grown on summer-fallowed land, in plots of one-sixtieth acre each. They were all sown April 29, at the rate of a little less than one bushel and three pecks per acre. Two irrigations were given, one on June 22 and the other on July 13.

SIX-ROW BARLEY (irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
1	Claude	Aug. 18	111	25	9	2¾	2,040	42	24	48·0	55	16
2	Mansfield	" 13	106	25	9	2¾	1,800	37	24	50·0	48	29
3	Odessa	" 12	105	23	9	2¾	1,440	30	..	50·5	45	12
4	Mensury	" 18	111	27	9	4	1,200	25	..	48·5	38	31

TWO-ROW BARLEY (irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.	Average Yield for three years.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
1	Swedish Cheval'r	Aug. 23	116	28	9	4	2,580	53	36	52	61	12
2	Standwell	" 22	115	26	9	2¾	2,080	43	16	50·5	59	11
3	Invincible	" 23	116	25	9	2½	2,080	43	16	51·3	..	..
4	Clifford	" 18	111	30	10	3½	1,320	27	24	51·5	..	..

FIELD LOTS OF BARLEY (irrigated)

Variety.	Area.	Preparation of Land.	Date Sown.	Date Ripe.	Yield per Acre.	
	Acres.				Bush.	Lbs.
Standwell	0·22	In hoe crops previous season.	May 7	Sept. 9	48	37
Mensury	1·4	Summer-fallow	June 4	" 13	32	44

The Standwell barley was irrigated June 15 and July 14. The Mensury was irrigated June 22 and July 13.

BARLEY—RATES OF SEED PER ACRE.

In the following experiments, the size of the plots used was one-twentieth acre; they were sown May 2 on land on which hoed crops had been grown the previous season. The land was not spring-ploughed, but was double-disced and levelled before the barley was sown. The variety used was Mensury. Two irrigations were given, one on June 15 and the other on July 14.

BARLEY—Rates of Seed per Acre (irrigated).

Rate of Seed per Acre.	Date Ripe.	Yield in 1910.		Average Yield for three years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs	Aug. 13	32	24	34	48
30 "	" 11	32	24	37	24
45 "	" 11	42	24	41	39
60 "	" 11	45	..	43	36
75 "	" 11	30	..	39	18
90 "	" 13	30	..	38	27
105 "	" 8	23	36	33	29
120 "	" 12	28	16	36	49

The irregularities that are shown this year, both in regard to the date of ripening and the yields, are rather confusing, but may in part be due to the fact that the plots germinated somewhat unevenly on account of the drought. A good stand was obtained in each case, but the grain did not all come up at the same time.

EXPERIMENTS WITH PEAS.

Thirteen varieties of peas were grown on summer-fallowed land in plots of one-sixtieth of an acre each. They were sown April 2, at the rate of about two and one-half bushels per acre, depending on the size of the pea. The crop received two irrigations, one on June 2 and one on July 13.

PEAS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	
					Inches.	Inches.	Lbs.	Bush.	Lbs.
1	Paragon	Medium	Aug. 11	131	32	3	3,000	50	..
2	Mackay	"	" 8	128	30	3	2,460	41	..
3	Gregory	"	" 13	133	34	2¾	1,950	32	30
4	English Grey	"	" 13	133	28	3	1,860	31	..
5	Arthur	"	July 26	115	24	3	1,860	31	..
6	Daniel O'Rourke	Small	Aug. 6	126	28	2½	1,620	27	..
7	Black-eye Marrowfat	Large	" 11	131	32	3½	2,070	34	30
8	White Marrowfat	"	" 6	126	34	3¼	1,920	32	..
9	Prince	"	" 6	126	27	3	2,040	34	..
10	Chancellor	Small	July 26	115	24	2½	1,950	32	30
11	Golden Vine	"	" 26	115	28	2¾	1,500	25	..
12	Picton	Large	Aug. 6	126	26	2¾	2,100	35	..
13	Prussian Blue	Medium	July 26	115	25	3	1,680	28	..

INDIAN CORN.

On account of the drought, none of the corn that was planted germinated, except that put in the garden, which was duly irrigated and came up promptly.

EXPERIMENTS WITH FIELD ROOTS.

The stand obtained was very poor in the case of all the roots, on account of the severe drought. The yields reported should not be taken as a criterion of what may be expected from irrigated land in ordinary seasons when the land and crop are given reasonable care. It is very rare indeed in southern Alberta that any difficulty is experienced in getting seeds of any kind to germinate readily when planted during the month of May. The writer has been farming for the last ten years in the Lethbridge district and during that length of time he has never before failed to get a good stand of all seeds sown during the month of May; even small seeds, such as grass or alfalfa, sown on the surface and harrowed in have always come up well. In fact, during normal years, May and June are our wettest months.

PREPARATION OF THE LAND.

The land on which all the roots were planted received, in the spring of 1909, an application of fresh manure at the rate of about twelve tons per acre. The manure was disced in at once and the land was ploughed and summer-fallowed.

EXPERIMENTS WITH TURNIPS.

Ten varieties of Swede turnips were grown. The seed was sown in drills thirty inches apart, and as such a poor stand was obtained, owing to the drought, it was not necessary to do any thinning. The first sowing was made May 12, and the second May 26. From the great irregularity in yields, it can be seen that uneven germination has probably had more to do with the difference in yields than any peculiar qualities possessed by the varieties themselves. The roots were pulled October 5, and the yield per acre estimated from the product of two rows—each sixty-six feet long. The crop received four irrigations, July 12, 21, 30 and August 11.

TURNIPS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Hartley's Bronze	17	580	576	20	1	1,325	55	25
2	Good Luck	9	1,950	332	30	..	1,330	22	10
3	Halewood's Bronze Top	7	1,960	266	..	2	1,985	99	45
4	Bangholm Selected	7	630	243	50	1	1,325	55	25
5	Jumbo	6	1,300	221	40	7	630	243	50
6	Perfection Swede	3	650	110	50	1	660	44	20
7	Carter's Elephant	2	1,985	99	45	1	1,325	55	25
8	Magnum Bonum	2	1,985	99	45	1	660	44	20
9	Mammoth Clyde	1	1,990	66	30	2	655	77	35
10	Hall's Westbury	.....	.....	.....	.....	5	1,305	188	25

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were grown. The seed was sown in drills thirty inches apart but such an extremely poor stand was obtained that practically no thinning was necessary. The first sowing was made May 4, and the second sowing two weeks later. The crop received four irrigations, July 12, 21, 30 and August 11. The roots were pulled October 5. The yield per acre is estimated from the product of two rows, each sixty-six feet long.

MANGELS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prize Mammoth Long Red	24	1,875	831	15	3	1,049	117	29
2	Giant Yellow Intermediate	24	1,210	820	10	..	..	..	..
3	Half Sugar White	23	683	778	3	5	906	181	46
4	Perfection Mammoth Long Red	22	1,220	753	40	1	1,990	66	30
5	Gate Post	20	1,895	698	15	1	1,990	66	30
6	Yellow Intermediate	20	1,230	687	10	1	260	37	40
7	Giant Yellow Globe	18	1,240	620	40	..	..	..	..
8	Selected Yellow Globe	17	580	576	20	1	1,325	55	25

EXPERIMENTS WTH CARROTS.

Five varieties of carrots were grown. The seed was sown in drills twenty inches apart. The stand obtained was so poor that practically no thinning was necessary. The first sowing was made May 4, and the second sowing two weeks later. The crop received four irrigations, July 12, 21, 30, and August 11. The roots were pulled October 5. The yield per acre was estimated from the product of two rows, each sixty-six feet long.

CARROTS (irrigated)—Test of Varieties.

Number	Name of Variety.	Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.		Yield per Acre. — 2nd Sowing.		Yield per Acre. — 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	White Belgian	6	1,860	231	..	2	1,148	85	48
2	Mammoth White Intermediate	3	930	115	30	..	....	..	..
3	Half Long Chantenay	3	930	115	30	..	....	..	..
4	Improved Short White	1	970	49	30	..	1,980	33	..
5	Ontario Champion	1	970	49	30	..	....	..	..

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were grown. The seed was sown in drills twenty inches apart but such a poor stand was obtained that practically no thinning was necessary. The first seeding was made May 4, and the second sowing two weeks later. The roots were pulled October 5. The yield per acre was estimated from the product of two rows, each sixty-six feet long. The crop was irrigated four times, on July 12, 21, 30, and August 11.

SUGAR BEETS (irrigated)—Test of Varieties.

Number	Name of Variety.	Yield per Acre. — 1st Sowing.		Yield per Acre. — 1st Sowing.		Yield per Acre. — 2nd Sowing.		Yield per Acre. — 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Klein Wanzleben	16	1,660	561	..	.	..	..	..
2	Vilmorin's Improved	14	710	478	30	2	950	82	30
3	French Very Rich	12	750	412	30	..	..	..	..

EXPERIMENTS WITH POTATOES.

One of the most satisfactory crops grown the past season on the irrigated farm was the potato crop. On the summer-fallowed land on which they were planted there was plenty of moisture in the soil below the first two or three inches, so, as they were planted in moist ground, no difficulty was experienced in getting a good stand.

There is an impression more or less general in the district that potatoes grown with irrigation are apt to lack in quality; that when cooked they are inclined to be soggy or watery and less mealy and dry than are potatoes raised without the aid of irrigation. That there are grounds for this belief cannot be denied, for, if the crop is irrigated in a careless manner and too much water is applied, the resulting crop is almost sure to be poor in quality, as just pointed out. However, by using reasonable care and intelligence, this trouble may be easily avoided. To begin with, the land should be in good tilth. There is probably no better preparation than to summer-fallow the land the season previous to when the potatoes are to be planted. If an application of manure could be given before the land is ploughed for the summer-fallow, so that it would have a chance to rot during the summer, the yield of the following crop would be materially increased. Another quite satisfactory method is to manure the land in the spring and then raise a grain crop to be cut for green feed. This will leave the land relatively clean for the potatoes. As soon as a farmer on an

irrigated farm has enough alfalfa seeded down so that he can afford to break up a four or five year old field to plant his potatoes on, he will have a field that will be certain to give large returns.

As indicated above, to avoid the possibility of producing potatoes of poor quality, care must be exercised as to when and how the crop is irrigated. It probably requires more skill and experience to raise potatoes successfully under irrigation than any other crop commonly grown here at the present time. The secret appears to lie in being able to keep the plants growing vigorously from the beginning with no setbacks, and on the other hand in being able to apply the water so that too sudden growth will not be stimulated at any time. If possible, the first irrigation should not only be very light, but it should not be given until the small potatoes are set and are perhaps the size of peas. This stage is usually about the time the first blooms appear. If the crop is wet before this time there is danger of the plants setting more potatoes than they will be able to develop to a marketable size. To be sure that the potatoes are not wet too much when the first irrigation is given, it is well to run the water between every alternate row only and turn it off just as soon as it gets through so as not to let the ground soak up any more than is necessary. As soon as the ground dries sufficiently, the land should be given a shallow cultivation. About ten days after the first irrigation, the second should be given. This time, the water may be run down between all the rows and should be allowed to remain running until the land is well wet. After irrigation has once begun, the land should never be allowed to dry out completely. Unless heavy showers intervene, it will be found necessary in order to maintain this condition to irrigate about every ten days. After each irrigation, as soon as the surface of the soil dries sufficiently, it should be given a shallow cultivation. If, for any reason, after irrigation has once begun, the land is allowed to become relatively dry, the potatoes should not again be irrigated, for, if they are, a second growth is almost certain to be induced, and this will injure the quality, for the main cause of soggy potatoes being produced when grown under irrigation is from allowing the land to become somewhat dry so that the growth is checked and then applying and inducing a fresh growth of roots and tops.

POTATOES (IRRIGATED)—TEST OF VARIETIES.

Fifteen varieties of potatoes were planted May 13 in rows thirty inches apart, the sets being placed about one foot apart in the rows. The land was prepared the same as for the turnips and mangels, etc. The potatoes for planting were cut in pieces with two or three eyes to each, although medium rather than large-sized potatoes were selected, so as to avoid cutting as much as possible. The crop was irrigated five times, July 12, 21, 30, and August 11 and 20. They were dug October 5. Anything smaller than a good-sized hen's egg was classed as unmarketable. There was no rot or scab among the potatoes dug. The yield was calculated from the product of two rows, each sixty-six feet long.

POTATOES (irrigated)—Test of Varieties.

Number.	Variety.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vick's Extra Early	583	..	528	..	55	..	Flat, white.
2	Gold Coin	578	36	545	36	33	..	Round, white.
3	Reeves' Rose	563	12	545	36	17	36	Long, pink.
4	Carman No. 1	554	24	528	..	26	24	Flat, white.
5	Morgan Seedling	552	12	509	18	42	54	Long, pink.
6	American Wonder	528	..	492	48	35	12	" white.
7	Rochester Rose	526	54	486	12	40	42	" pink.
8	Irish Cobbler	521	24	508	12	13	12	Flat, white.
9	Dreer's Standard	501	36	462	..	39	36	Oval, "
10	Empire State	479	36	457	36	22	..	Long, "
11	Ashleaf Kidney	455	24	433	24	22	..	Oval, "
12	Money Maker	446	36	433	24	13	12	Round, "
13	Dalmeny Beauty	442	12	374	..	68	12	Oval, "
14	Everett	436	42	385	..	51	42	Long, pink.
15	Late Puritan	435	36	407	..	28	36	" "

OTHER PLANTINGS OF POTATOES—(IRRIGATED).

The preparation of the land was the same as for the variety test. The sets were put a foot to sixteen inches apart in the rows which were thirty inches apart. The treatment in the way of irrigation, etc., was about the same as for the variety test. The area of each plot planted varied from one-tenth to one one-hundredth of an acre.

Variety.	Date Planted.	Yield per Acre.	
		Bush.	Lbs.
Gold Coin	May 19	546	..
Rochester Rose	" 21	463	40
Irish Cobbler	" 21	455	.
Early Ohio	" 19	384	..
Butter	" 13	235	37
Hard to Beat	" 13	266	57

FORAGE CROPS.

ALFALFA—(IRRIGATED).

There is no crop that we know of that can be grown on irrigated land in Southern Alberta with more profit than can alfalfa. If cut promptly, as soon as the very first blooms appear, three cuttings can be obtained in each season. After a field is once seeded down, it continues to produce year after year with no deterioration. In fact, the crop improves each year for about three seasons. Besides producing large returns annually as long as desired, it has the happy faculty of improving the soil by adding nitrogen and humus so that any time the field is ploughed it is in excellent condition for any crop that may be planted upon it. It has a most important place in a locality where sugar beets are grown, for there is no treatment that prepares the land in such a way as to increase the tonnage of beets as will the growing of this forage crop for a

few years. During the time it is thus preparing the land for an increased yield of beets, it is producing a crop that ranks in cash returns very close to the sugar beet. For dairying and stock feeding, there is no other hay that quite equals alfalfa.

Although alfalfa, after it is once well established, is a strong, vigorous grower, it is quite tender when young and considerable care should be exercised in preparing the land so that a good stand may be obtained to start with. One or two grain or other crops should have been taken off the land. The sods should be all rotted and the native grasses should be all worked out of the ground. Although it is not wise to sow it on non-irrigated land except on summer-fallow or where hoed crops have been grown the previous season, it is quite feasible to sow on fall or spring-ploughed stubble where the land is to be irrigated. After the ground is ploughed a good fine seed bed should be prepared. Before seeding, the land should be inoculated by taking some soil from an old alfalfa field and scattering over the field, and then harrowing it in. One hundred pounds of soil is sufficient for one acre but one hundred and fifty to two hundred pounds can be spread over easier. On the payment of one dollar, a sack of this soil will be shipped to any farmer in Southern Alberta from the Station and the freight on the same will be prepaid to the applicant's nearest railway station. Soil from an inoculated alfalfa field that has been growing in a thrifty manner for two seasons may be used to inoculate other fields.

The seed should always be sown alone, never with a nurse crop, and during the latter part of May. On irrigated land about twenty pounds of seed per acre, on non-irrigated land, from ten to twelve pounds of seed per acre, should be sown. Further space will not be taken up here in giving details in regard to the growing of this plant, but a circular dealing with the matter quite fully will be mailed free to any one applying for the same.

ALFALFA—RATES OF SEED PER ACRE—(IRRIGATED).

The following fields were sown in June, 1908, and the average results for the last two seasons are here given. They were irrigated twice, on June 8, and on August 4. In the fall, after growth had about ceased, the fields were again irrigated so that they might go into the winter wet and so insure rapid growth the first thing in the following spring. The first cutting was made June 20, the second July 26, and the third September 19.

ALFALFA—Rates of Seed per Acre (irrigated).

Rate of Seed.	First Cutting.				Second Cutting.				Third Cutting.				Total for Season.			
	Yield in 1910.		Average for two years.		Yield in 1910.		Average for two years.		Yield in 1910.		Average for two years.		Yield in 1910.		Average for two years.	
Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
5 lbs.	1	1,720	1	1,780	2	320	2	660	1	1,080	1	650	5	1,120	5	1,090
10 " ...	2	680	2	440	2	840	2	1,060	1	1,360	1	1,200	6	880	6	700
15 "	2	600	2	640	2	440	2	950	1	1,400	1	1,290	6	440	6	890
20 "	2	720	2	460	2	360	2	1,020	1	840	1	1,030	5	1,920	6	510
25 "	2	360	2	180	2	480	2	940	1	880	1	1,080	5	1,720	6	200
30 "	2	520	2	400	2	320	2	920	1	1,400	1	1,300	6	240	6	620

In connection with the results given in the above table, it should be mentioned that an excellent stand was obtained on all the fields when the seed was sown in 1908. The seed bed was in prime condition, and timely rains came immediately after the

seeding was done, so that practically every seed sown came up. As a rule, such conditions cannot be relied upon, so five or ten pounds of seed do not always give as good a stand as was here obtained. Observation and experience in this district would indicate that it pays to sow about twenty pounds of seed per acre on irrigated land.

A field of 2.8 acres of alfalfa sown in 1908 was irrigated June 8, August 4 and October 5 and yielded as follows:—

—	Date Cut.	Yield per Acre.	
		Tons.	Lbs.
First cutting	June 21	1	1,630
Second cutting	July 26	1	1,705
Third cutting	September 19	1	500
Total for season		4	1,835

A field of 3⅓ acres was seeded in 1909. It was irrigated June 10, July 2 and not again till after the third cutting. The fact of it not being irrigated after the second cutting accounts for the very light third crop.

—	Date Cut.	Yield per Acre.	
		Tons.	Lbs.
First cutting	June 22	1	1,490
Second cutting	August 3	2	480
Third cutting	September 19		920
Total for season		4	890

Another small field of .89 acres was seeded in 1909. It was irrigated June 13 and August 2.

—	Date Cut.	Yield per Acre.	
		Tons.	Lbs
First cutting	June 22	1	1,925
Second cutting	July 25	1	1,860
Third cutting	September 14	1	1,320
Total for season		5	1,105

MIXTURE OF GRASSES AND ALFALFA.

Where alfalfa is sown with a mixture of grasses such as timothy, rye grass, etc., the hay can be cut only twice during the season instead of three times, owing to the fact that the grasses are not ready to cut until some time in July, which allows time for only one more cutting to come on, while alfalfa when grown alone must be cut the first time about June 25 if three cuttings are desired. After the grasses have been cut in July, they make little growth, so that the second cutting is practically pure alfalfa. The following table gives the results of three plots of one-quarter acre each, sown in 1908. They were irrigated twice in 1910, on June 10 and August 5, and again in the fall, on October 3. The first cutting was made on July 13 and the second cutting August 24.

MIXTURES OF GRASSES AND ALFALFA.

	First Cutting.		Second Cutting.		Total for Season.	
	Yield in 1910.	Average for two years.	Yield in 1910.	Average for two years.	Yield in 1910.	Average for two years.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
Alfalfa and Brome grass*	3 680	.. ..	2 1,840	.. ..	6 520	.. ..
Alfalfa and Timothy	3 880	2 1,250	2 1,400	2 160	6 280	4 1,410
Alfalfa and Rye grass	3 1,800	2 1,800	2 1,720	2 780	6 1,520	5 580
Alfalfa, Timothy and Rye grass	3 1,880	2 1,910	2 1,880	2 1,160	6 1,760	5 1,070

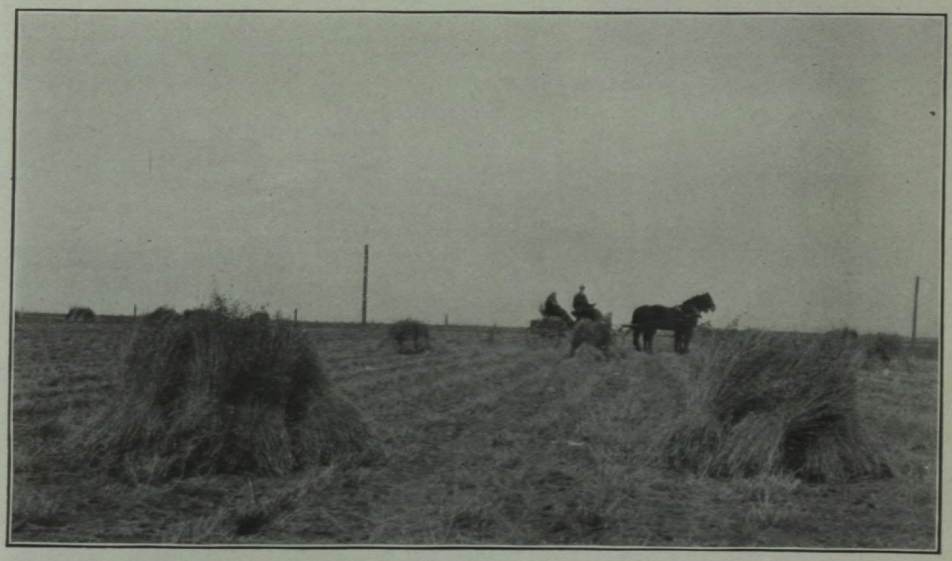
* The record of yield in 1909 was lost owing to an error in harvesting.

VARIETIES OF ALFALFA.

In the spring of 1909, seed of fourteen varieties or strains of alfalfa were planted that were received from the United States Department of Agriculture, Washington, D.C. These were supplied by the courtesy of Mr. J. M. Westgate, Agronomist, Division of Forage Crop Investigations. The following table gives the results for the past season. They were irrigated June 13 and August 12; but, unfortunately, the second irrigation was not very thorough, which probably accounts for the low yields in the second crop in some of the plots. The first cutting was made June 21, the second cutting July 25, and the third September 14.

Size of Plot.	Name and Number.	First Cutting.		Second Cutting.		Third Cutting.		Total for Season.	
		Yield per Acre.		Yield per cre.		Yield per Acre.		Yield per Acre.	
Acre.		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1-10	24859 Kansas Hardy	2	600	1	900	1	1,200	5	700
1-10	23454 Montana	2	600	1	250	1	1,400	5	250
1-10	24837 Canadian (Variegated)	2	300	1	550	1	1,400	5	250
1-40	23203 from Werny, Turkestan (very severe winters)	2	800	1	600	1	400	4	1,800
1-10	Turkestan from Ottawa	2	600	1	300	1	600	4	1,500
1-10	23394 Sand Lucerne	2		1	300	1	1,000	4	1,300
1-40	22788 from Aulieata, Turkestan (severe winters)	2	400	1	..	1	800	4	1,200
1-40	22790 from Kiva, Turkestan (mild winters	2	400	1	600	1	..	4	1,000
1-10	24836 Canadian (Purple Flowers)	1	1,900	1	150	1	900	4	950
1-10	23396 Sand Lucerne	1	1,900	..	1,850	1	600	4	350
1-10	21032 Turkestan	1	1,700	..	1,950	1	550	4	200
1-40	22789 from Tschimkent, Turkestan (average winters)	2	200	..	1,600	1	400	4	200
1-10	25102 Grimm	1	1,650	..	1,850	1	650	4	150
1-40	25022 Old Frankish Lucerne	1	1,600	..	1,600	1	400	3	1,000

Third cutting of Alfalfa on irrigated land, September 10th, 1910.



Seed Alfalfa cut with binder. Non-irrigated land, October 1909.

RED CLOVER (IRRIGATED).

A plot of 1-41 acre of Red Clover was sown in 1908. It was irrigated twice on June 8 and August 4.

Date Cut.	Tons.	Lbs.
First cutting July 20. Yield per acre	2	100
Second cutting October 5. Yield per acre	2	100
Total	4	200

INOCULATION TEST WITH CLOVER (IRRIGATED).

That it is necessary to inoculate the land to get the best results with alfalfa in southern Alberta has been quite conclusively demonstrated, so it is not surprising to find that Red Clover requires the same treatment. It might be well to mention, however, that the bacteria that work on the roots of clover are quite distinct from those that live on the roots of alfalfa, so that the soil from an alfalfa field would not be suitable to use to inoculate land on which Red Clover was to be sown.

To test the effect of inoculation with Red Clover, three plots of about two square rods each were seeded down without a nurse crop in 1909. The following table gives the results of the first cutting in 1910 expressed in yield per acre. By the time the second cutting was ready to be made, no difference in the appearance of the plots could be noticed. The germs had no doubt been distributed by the irrigation water, as the plots were quite small and were adjacent to each other. By the time the second crop was ready, all three plots appeared to be equally good so they were all cut together and yielded at the rate of 2 tons and 750 pounds per acre.

INOCULATION TESTS WITH CLOVER.

No. of Plot.	—	First Cutting — Yield per acre.	
		Tons.	Lbs.
1	Inoculated with clover soil from Cardston	2	144
2	Inoculated with nitro-culture	1	592
3	Check, not inoculated	..	1,988

TIMOTHY (IRRIGATED).

As yet we have only one plot of one-fourth acre of straight timothy. This was sown in 1908. It was irrigated at the same time as were the mixtures of grasses and alfalfa. It was cut July 13. The yield was at the rate of 2 tons and 140 pounds per acre.

BROME GRASS (*Bromus inermis*).

One-fourth acre of Brome grass was sown in 1908. It was irrigated at the same time that the mixture of grasses and alfalfa were, and was cut July 13. It yielded at the rate of 2 tons and 160 pounds per acre. The second growth would have made excellent pasture, but it was not heavy enough to warrant cutting for hay.

WESTERN RYE GRASS (*Agropyrum tenerum*).

One-fourth acre of Western Rye grass was sown in 1908. It was irrigated at the same time as the Brome grass and was also cut on the same day. It yielded at the rate of 2 tons and 1,780 pounds per acre. No second growth came on, as was the case with the Brome grass.

Summary of crops grown exclusive of uniform test plots (irrigated)—

	Bush.
Wheat (winter)	38
Oats	430
Barley	75
	543
	Tons.
Hay, alfalfa	41
Hay, mixed	8½
	49½

ORCHARDS AND SMALL FRUITS (IRRIGATED).

There were a few varieties of apples that wintered with no apparent injury although most of them were more or less killed back, some, in fact, clear to the roots. On the whole, however, the results with the young trees are rather encouraging.

The currants and raspberries came through the winter in very fair condition but no fruit was produced except in the case of the latter where some of the raspberry canes had a few berries. In the growing of raspberries, it has been found that the canes should be bent down and covered with earth to protect them during winter but more particularly to keep them from drying out. For in our dry, open winters, the canes are very apt to become quite dry and, if they do, they are almost sure to die down to the ground. Bending down and covering with earth prevents this. Manure does not make a satisfactory substitute for the earth.

STRAWBERRIES.

Every farmer should have a small patch of strawberries, for they can be easily grown in southern Alberta, especially where they can be irrigated. It is two or three years after a plantation of raspberries or currants are put out before they come into bearing but, in the case of strawberries, they can be set out in the spring and the following year a good crop may be obtained. Probably the most satisfactory way for a farmer to set a bed is to put the rows about three and one-half feet apart and set the plants eighteen to twenty-four inches apart in the rows. Let the runners form a matted row about a foot to a foot and one-half wide. The land on which they are put should be very rich. Give them thorough cultivation and irrigate often enough to keep the plants growing vigorously. In the fall, about the time the ground is starting to freeze up, the bed should be mulched with straw or with old hay if it is free from grass or weed seeds. Never use manure to mulch them with. They should be allowed to bear only two years. After the second crop has been picked, the bed should be ploughed up, and replaced by a new one which should have been set out in the spring of the same season.

The strawberry plantation on this Station was set out in 1908, so this was the second bearing season, which is not as a rule as good as the first. As stated in last year's report, a rather uneven stand was obtained with most of the varieties, so that the report of the yield from the different varieties would not be of much value. We

find that the Senator Dunlap is one of the most vigorous and thrifty growers. The yield of fruit, as a whole, was not as good as last year, for, owing to the dry, windy weather that prevailed during the bearing season, it was difficult to get the berries to grow to their usual size.

TREES AND SHRUBS.

Several hundred of the ornamental shrubs were moved from the nursery to their permanent locations on the border plantation surrounding the Station, but many of them died on account of the very unfavourable conditions.

VEGETABLE GARDEN.

On the ordinary grain farm, the vegetable garden is too often neglected. In the hope of being able to offer a few suggestions that will be of help in reducing the hand work connected with a garden, and to encourage those farmers who would like to attempt more in this line than they have in the past, I will repeat what I said in my last year's report in connection with the laying out of the vegetable garden.

The different kinds of vegetables should be planted in rows far enough apart to allow a horse cultivator to be worked between them. The amount of land used is generally of little moment to the farmer, for at most it is a small area, so the rows for lettuce, onions, etc., may be put two feet apart. The larger-growing plants, such as peas and potatoes, etc., may be put three and one-half or even four feet apart. On land that cannot be irrigated, there is an added advantage in this, for it gives more space in which the roots may forage for moisture. The rows should be made somewhat long so that there need not be too much time lost in turning. It is not necessary that a full length row of any one kind be planted. For example, if the garden is six hundred feet long, any desired part of this length of row may be sown with lettuce; then, on the same row, as many feet of radish as required, and so on down the list of vegetables that one wishes to put two feet apart. By planting the garden in this way, it is possible, if a horse cultivator is used occasionally, to raise a lot of vegetables with very little hoeing and other hand work. Always give level cultivation and hill or bank the plants as little as possible, to avoid drying the land out.

IRRIGATING VEGETABLES.

What has been said about planting the garden in long rows is particularly important where irrigation is to be practised. The rows should always run up and down the fall of the ground so that the water will readily run down between the rows. When it is desired to give an irrigation, make a small trench between the rows, without throwing earth against the plants if possible, and then allow only a small stream of water to trickle down. Let it run until the ground is thoroughly saturated between the trenches, but do not allow the land to be flooded where the plants stand, for this causes the soil to bake and crust close around the plants, injuring them unnecessarily and quite often requiring an extra hoeing. Thorough irrigations are recommended rather than more frequent light ones. As soon as the land dries off sufficiently after each irrigation, a light cultivation should be given.

The usual assortment of vegetables were planted, but it was necessary to irrigate them all to induce germination. This is not only difficult to do, but is often quite unsatisfactory. For this reason, the material planted was slow in coming up, but still, on the whole, the results of the vegetable garden were quite satisfactory. On account of the gardener leaving in the middle of the season, the notes are in such an unsatisfactory condition that it will be impossible to attempt a report of the results that would be of much value. All the hardier vegetables such as lettuce, radish, spinach, cabbage,

cauliflower, turnips, beets, carrots, parsnips, peas, etc., did well. The various varieties of beans tested produced well and some of the earlier varieties ripened seed. None of the corn ripened seed, except the Squaw. The earlier sorts of sweet corn produced roasting ears. Only one variety of tomatoes was tested, Sparks' Earliana. The plants were well loaded with green tomatoes and a few were just beginning to ripen at the time of the frost. Some of the vines were pulled and hung in the cellar and quite a number of the green tomatoes ripened later on.

ASPARAGUS AND RHUBARB.

Every farm garden should contain some rhubarb and an asparagus bed, for they require very little care after they are once established, and the green stuff that they produce early in the spring is usually much appreciated by all.

The asparagus bed started in 1908 produced a little and another year will doubtless yield a very satisfactory quantity. The rhubarb did well.

FLOWERS.

The annuals did not do as well as usual. It was almost impossible to get the seed up that was planted in the open on account of the lack of the usual showers. Even those started in the hot beds and set out did not thrive as they usually do. The tulips put in the previous fall came through the winter quite satisfactorily, but the blooms were small. Among the perennials, the pæony, perhaps, gave the most satisfactory results.

HORSES.

Eight work horses and two drivers are kept on the Station. In addition to this, there is a four-year old colt and a three-year old filly, not yet broken.

CATTLE.

Two grade cows are kept to supply milk to the families on the Station.

MEETINGS AND CONVENTIONS ATTENDED.

I attended the National Irrigation Congress at Pueblo, Colorado, September 26 to 30, and the Dry Farming Congress at Spokane, Washington, October 3 to 6. I attended and addressed a number of seed fairs and institutes; among them might be mentioned Pincher Creek, Taber, Cleverville, Carmangay, Barons, Noble, Monarch, Warner and Stavely. I assisted at the short course schools held at Strathmore and Macleod, and acted as one of the judges and delivered an address at the Provincial Seed Fair at Lacombe. In January I gave an address on Alfalfa at the Saskatchewan Fairs' Association in Regina.

DISTRIBUTION OF SAMPLES.

A distribution of samples of winter wheat, potatoes and small packets of seedling trees was made from the Station, and the following material has been sent out or promised, up to March 31, 1911.

Three-pound bags of potatoes	833
Five-pound bags of winter wheat	13
Total number distributed	846

A considerable number of young forest and ornamental trees and shrubs were also sent out, amounting to 172 packages in all.

INOCULATED SOIL.

The number of applications for hundred-pound sacks of inoculated alfalfa soil that have been supplied or promised during the past year amounts to 130.

CORRESPONDENCE.

For the twelve months ending March 31, 1911, there were 2,600 letters received and 2,380 sent out, not including circulars and reports.

CULTURAL AND ROTATION PROBLEMS.

In conluding, it might not be out of place to point out very briefly the enlarged scope that is to be given this work on the Station with the object of obtaining more exhaustive data regarding cultural as well as rotation problems.

In connection with the cultural investigations, the following outline will give some idea of the lines of work that are being taken up.

1. *Prairie Breaking.*—Ploughing in the spring and sowing immediately with both grain and flax. Breaking different depths and at different times of the year, back-setting, etc.

2. *Depth of Ploughing.*—Ploughing different depths from three to eight inches. It will also include subsoiling.

3. *Summer-fallowing Treatment.*—Ploughing at different depths and at different dates, ploughing twice in the same season, etc.

4. *Stubble Treatment.*—Ploughing in autumn, in the spring and no ploughing, discing at cutting time and discing in the spring, etc.

5. *Seeding to Grass and Clover.*—Seeding with and without a nurse crop, on stubble, on summer-fallow, after hoed crops, etc.

6. *Breaking sod of Cultivated Grasses.*—Similar to the tests with prairie sod.

7. *Applying Barnyard Manure.*—Applying on stubble, on winter wheat, spring wheat, etc.

8. *Green Manuring.*—Ploughing under various green crops.

9. *Seed Bed Preparation.*

10. *Soil Packers.*—Comparing different styles.

11. *Depth of Seeding.*—From one to four inches.

12. *Commercial Fertilizers.*

13. *Underdraining.*

These experiments will require between four hundred and five hundred plots. Each plot will be one-fortieth of an acre in size.

In addition to these cultural experiments, the following rotation fields will be established. Each field will contain from one to two acres.

Rotation A.—Wheat continuously, year after year.

Rotation B.—1. Summer-fallow.
2. Grain.

Rotation C.—1. Summer-fallow.
2. Grain.
3. Grain.

Rotation T.—1. Summer-fallow.
2. Wheat.
3. Oats or Barley.
4. Summer-fallow to May, seeded to Alfalfa in rows.
5. Alfalfa hay.
6. Alfalfa Hay.
7. Alfalfa hay or pasture.
8. Summer-fallow.
9. Hoed Crop.
10. Wheat (manure).

Rotation M.—1. Summer-fallow.
2. Wheat.
3. Coarse grain (manure).
4. Summer-fallow.
5. Peas and Oats for hay.
6. Barley or Oats.

Rotation S.—1. Summer-fallow.
2. Hoed crop.
3. Wheat.
4. Summer-fallow.
5. Wheat.
6. Coarse grain.
7. Summer-fallow (manure).
8. Peas and Oats for hay.
9. Rye pasture.

IRRIGATED LAND ROTATIONS.

Rotation U.—1. Seeding Alfalfa.
2. Alfalfa hay.
3. "
4. "
5. "
6. "
7. Hoed crops.
8. Wheat.
9. Wheat or coarse grain.
10. Coarse grain.

Rotation V.—1. Alfalfa continuously.

METEOROLOGICAL REPORT.

Months.	Highest Temperature.		Lowest Temperature.		Total Precipitation.	Bright Sunshine.
1910.	Date.	Degrees.	Date.	Degrees.	Inches.	Hours.
April	25	87·9	15	17·0	0·28	247·8
May	7	91·5	1	18·8	0·79	278·7
June	26	93·7	1	31·0	0·53	339·0
July	17	98·9	12	33·5	0·09	360·6
August	1	91·5	24	30·0	1·07	242·6
September	15	84·0	25	22·0	2·014	197·5
October	9	76·5	27	12·0	0·595	172·6
November	2	65·0	27	-31·0	0·41	119·7
December	20	60·8	31	-15·0	0·94	82·4
1911.						
January	6	44·5	12	-45·2	0·70	101·9
February	27	49·0	23	-20·5	0·52	135·9
March	19	70·5	1	10·5	0·315	160·4
Totals					8·254	2,439·1

In the above ten inches of snow is computed as one inch of precipitation.

I have the honour to be, sir,
Your obedient servant,

W. H. FAIRFIELD,
Superintendent.

EXPERIMENTAL STATION FOR CENTRAL ALBERTA

LACOMBE, ALTA., March 31, 1911.

Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit to you the fourth annual report of the work of the Experimental Station for Central Alberta at Lacombe, Alta., for the past year.

The spring of 1910 opened early; seedings of wheat in the dates of sowing test and test of varieties and trial seedings of oats and barley were made on March 31. There was little growth during the first half of April, while night frosts made unfavourable conditions for alfalfa and winter wheat.

As the season advanced, growth was good, particularly on well-worked breaking of 1909 or summer-fallow of that year, well-worked. The rainfall for the season was less than usual and dry weather made it hard for those who, being newcomers, had not been long enough in the province to get their land in condition to meet a dry season by storing moisture through cultivation. From April 1 to August 15, 8·34 inches of rain fell at Lacombe.

All grain crops on the Station matured well and, as there was no frost to injure Indian corn till September 9, a fair crop of fodder corn was harvested. Notwithstanding the limited rainfall, yields of grain and roots have been good and in one or two instances almost phenomenal records have been established.

Fall work was retarded by rather early freezing, no work on the land being possible after November 1.

EXPERIMENTS WITH WINTER WHEAT.

As in 1909, winter wheat on breaking or on sod was able to withstand the continual thawing and freezing of the early spring better than the winter wheat sown on summer-fallow. All the varieties of winter wheat were sown on summer-fallow and were so badly spring-killed that it was not thought worth while leaving them. Turkey Red and Dawson's Golden Chaff varieties were sown on land ploughed out of timothy sod after the hay was cut in 1909. These varieties were used both in the tests as to dates of sowing and seeding at different quantities of seed per acre.

WINTER WHEAT—Quantities of Seed per Acre.

Variety.	Quantity of Seed.	Date Sown 1909.	Date Cut 1910.	Yield per Acre.		
	Bush.			Bush.	Lbs.	Oz.
Turkey Red	½	Aug. 30	Sept. 8	15	5	10
"	¾	" 16	Aug. 31	27	33	12
"	¾	" 16	Sept. 3	29	26	4
"	1	" 16	Aug. 29	45	41	4
"	1¼	" 16	" 29	49	18	12
"	1½	" 16	" 18	50	48	12
"	1¾	" 16	" 18	52	30	..
"	2	" 16	" 29	53	11	4
Dawson's Golden Chaff	½	" 16	Sept. 3	8	5	10
" "	¾	" 16	" 1	24	..	..
" "	1	" 16	Aug. 29	31	30	..
" "	1¼	" 16	" 31	49	35	10
" "	1½	" 16	" 18	43	43	2
" "	1¾	" 16	" 22	28	43	2
" "	2	" 16	" 29	25	15	..

WINTER WHEAT—DATES OF SOWING.

Seedings of winter wheat of the Dawson's Golden Chaff and Turkey Red varieties were made on August 2 and at intervals of one week up to September 12. The work in this connection this year, as previously, would go to show that, under conditions of soil and moisture similar to those on this Station, the best time to sow winter wheat is about the middle of August.

WINTER WHEAT—Dates of Sowing.

Variety.	Date Sown 1909.	Date Cut 1910.	Yield per Acre.		
			Bush.	Lbs.	Oz.
Turkey Red	Aug. 2	Sept. 5	45	..	..
"	" 9	Aug. 30	44	9	6
"	" 16	" 29	45	41	4
"	" 23	Sept. 5	28	45	..
Dawson's Golden Chaff	" 2	" 2	10	41	4
" "	" 9	Aug. 31	31	30	..
" "	" 16	" 29	31	30	..
" "	" 23	" 31	11	11	4
" "	" 30	Sept. 1	15	33	12

SUGGESTIONS WITH REGARD TO CULTIVATION FOR WINTER WHEAT.

We believe that winter wheat is a crop which will receive more attention in the central and eastern sections of the province, as time passes. It is a desirable crop in that it distributes the year's labour, and does particularly well on breaking. The breaker should be followed by the packer and the packer by the disc. We find the disc to do more effective work immediately after the plough than if the discing be done a month or six weeks after the breaking. If breaking is handled in this way, the work can continue until about August 1, or just to give time to finish the preparation of the seed bed and get the seeding done about the middle of that month. While the amount of moisture present and the condition of the seed bed will have a bearing upon the quantity of seed that should be sown, yet possibly in average seasons from one bushel to a bushel and a peck will give satisfactory results.

EXPERIMENTS WITH SPRING WHEAT.

Twelve varieties of spring wheat were tested, ten of which were sown on March 31, and two on April 21, at the rate of about one and three-quarters bushels per acre. The land was top-dressed with barn-yard manure after the hay was cut in 1908. The hay crop in 1909 was cut and the land immediately packed, ploughed and disced thoroughly. Owing to the slow growth during the early part of the season, the length of time required to mature is longer than if the wheat had been sown on a later date. Of the varieties under test, Red Fife is probably the best where it can be counted on to mature. Next following is Marquis, combining the quality of the Red Fife with the early maturing characteristics of Huron and Preston. It is possible that Marquis will yet prove itself to be superior to Red Fife even for districts where Red Fife can be counted on to mature. For soils such as we have on this Station, Red Fife is not suitable and Marquis, Huron and Preston should be given the preference.

Each plot was one-sixtieth of an acre in size, and the soil was a black, clay loam. No rust occurred on any of these plots.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw, on a scale of 10 points.	Average Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre		Weight per measured bushel after cleaning.
					Inches.		Inches.		Lbs.	Bu.	Lbs.	Lbs.
1	Huron....	Mar. 31.	Sept. 3.	156	48	10	4¼	Bearded	5,964	69	35	63·5
2	Pringle's Champlain	" 31.	" 3.	156	50	9	4¼	"	7,985	65	54	61·5
3	Preston...	" 31.	" 3.	156	47	10	4	"	8,109	65	50	61·0
4	Riga.....	" 31	Aug. 29.	151	44	10	3	Bald....	5,921	65	18	63·0
5	Red Fife..	" 31.	Sept. 7.	160	46	10	3¾	"	8,100	64	..	62·0
6	White Fife	" 31.	" 12.	165	51	10	3½	"	8,643	63	56	58·0
7	Stanley....	" 31.	" 3.	156	53	10	4	"	7,426	63	13	61·0
8	Bishop....	" 31.	" 4.	157	50	10	3½	"	6,429	60	50	62·3
9	Marquis..	" 31.	" 3.	156	45	10	4	"	5,911	59	28	63·0
10	Chelsea....	" 31.	" 3.	156	46	10	4	"	5,334	53	5	61·3
11	Century...	Apr. 21.	" 9.	141	59	10	3	Bearded	7,515	47	45	
12	'Regenerated' Red Fife.....	" 21.	" 7.	139	46	10	3½	Bald...	5,910	47	30	

SPRING WHEAT—DATES OF SOWING.

The season was favourable for maturing late-sown grain, and the rains coming later than usual helped the late-sown plots to fill out. The Chelsea variety of spring wheat was used in this test, five sowings being made at intervals of one week, the first being March 31.

Variety.	Date Sown.	Date of Ripening.	Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.	
			In.		In.	Lbs.	Bus.	Lbs.
Chelsea.....	Mar. 31..	Sept. 9..	46	10	4	5,334	53	5
"	Apr. 7..	" 5..	47	10	3½	4,263	53	56
"	" 14..	" 3..	47	10	3½	5,096	60	3
"	" 21..	" 9..	49	10	3¾	5,898	55	41
"	" 28..	" 9..	49	10	3¼	7,278	63	41

SPRING WHEAT—QUANTITIES OF SEED.

The crops obtained in the experiments with different quantities of seed per acre have resulted in this instance in favour of the heavier seeding, not only with wheat but with oats and barley as well. The results of the past season support those of previous years and are in opposition to the theories advanced by a number of dry-farming experts of the western states. This work has now been conducted for more than one season, and the results are so uniformly in favour of what might be considered heavy sowing that we are forced to the conclusion that conditions in the province are so different as to warrant our farmers in following the advice of the light seeding advocates with extreme caution. It would be safer to use fairly liberal quantities of seed until proof has been given by a limited experiment on individual farms that lighter seeding will give better results. The uniformity of the results in favour of the heavier seeding indicates that, for this soil, it will pay to be generous in the use of seed.

Variety.	Bushels Seed per Acre.	No. of Days Maturing.	Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Weight of Straw.	Yield per Acre.	
	Bush.		Inches.		Lbs.	Bush.	Lbs.
Marquis	¾	156	47	10	5,670	45	30
"	1¼	148	47	10	5,645	49	54
"	1¾	149	49	10	5,769	58	50
"	2¼	145	50	10	5,872	62	7
"	2¾	144	47	10	6,018	63	41

SPRING WHEAT—TEST OF COMMERCIAL FERTILIZERS.

The results tabled below, while indicating that commercial fertilizer on spring wheat will increase the yields, particularly when the land has been cropped for a long time, are not conclusive, in that they do not demonstrate the most desirable combination of fertilizers. Another point to be noted is that the increase in yield was not sufficient to pay the cost of the fertilizer. It is possible, however, that benefits will accrue to succeeding crops from the application of fertilizer made this year.

Combinations.	Amount applied per Acre.	Cost of Fertilizer.	Yield per Acre.		Value of crop minus cost of fertilizer, when valued at 85c. per bush.
	Lbs.	$ cts.	Bush.	Lbs.	$ cts.
Check plot			49	5	41 72
Acid phosphate Muriate of potash Nitrate of soda	300 120 120	6 18 4 33 4 63	61	41	37 29
Nitrate of soda Acid phosphate	120 300	4 63 6 18	61	46	41 69
Acid phosphate Muriate of potash	300 120	6 18 4 33	61	16	41 36
Muriate of potash Nitrate of soda	120 120	4 33 4 63	60	22	42 35

TEST OF SPRING WHEAT IN FIELD LOTS.

Four varieties were sown in field lots on fallowed land on April 5 and 9. The straw grew very heavy and all varieties, except the Huron, lodged badly. The yields were not as large as expected, judging from the growth of the straw.

Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Kind of Head.	Yield per Acre.	
	Acre.					Bush.	Lbs.
Huron	1·622	April 5	Sept. 5	153	Bearded	36	26
Preston	1·795	" 9	" 8	152	"	34	40
Chelsea	2·792	" 9	" 8	152	Beardless	33	19
Red Fife	3·045	" 5	" 9	157	"	23	51

EXPERIMENTS WITH RYE.

One plot of fall rye was sown on August 30, 1909, and one plot of spring rye on April 9, 1910. The soil and cultivation was similar to that for spring wheat. Seed was sown at the rate of one bushel per acre for the fall rye and about one and a half for spring rye. Fall rye has always proven hardy.

Variety.	Date Ripened.	No. of Days Maturing.	Length of Straw.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.	
			Inches.		Inches.	Lbs.	Bus.	Lbs.
Fall rye	Aug. 9	344	54	9½	4	4,380	38	32
Spring rye	" 29	142	62	10	4	5,820	55	40

EXPERIMENTS WITH EMMER AND SPELT.

Plots of one-sixtieth of an acre each of Common Emmer and Red Spelt were sown April 22 at the rate of about one hundred and twenty pounds per acre. Until this year the yield of these grains here has not been satisfactory.

Variety.	Date Ripened.	No. of Days Maturing.	Length of Straw.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
			In.		In.		Lbs.	Lbs.
Common Emmer	Sept. 3	134	41	8½	2	Bearded	5,760	2,700
Red Spelt	" 5	136	44	10	4	Beardless	5,400	4,020

EXPERIMENTS WITH OATS.

All experiments with oats were conducted on land top-dressed in 1908 after the hay was cut and ploughed out of sod after the hay crop of 1909 was harvested. As soon as the land was ploughed it was packed and thoroughly disced. The land on which the variety test was conducted was ploughed somewhat later than the land on which the dates of sowing and quantities of seed tests were carried on. The early ploughed land had greater opportunity for storing moisture, hence the larger yields in the dates of sowing and quantites of seed test as compared with the variety test. The seed was sown at the rate of about two and three-quarter bushels per acre, with the exception of 'Regenerated' Abundance which was sown at the rate of seven bushels per acre. Twenty-six varieties were tested and were sown on one-sixtieth acre plots on April 11. The soil was a black clay loam.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Strength of Straw on a scale of 10 points.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	White Giant	Aug. 29	140	37	10	10	Branching	3,180	88	8	39 0
2	Tartar King	" 22	133	41	10	8½	Sided	2,850	82	2	40·0
3	Swedish Select	" 22	133	41	10	8½	Branching	3,510	80	10	43·0
4	Abundance	" 29	140	39	10	8½	"	3,360	79	14	40·0
5	Banner	" 29	140	38	10	8½	"	3,750	78	18	40·2
6	Danish Island	" 29	140	30	10	7	"	3,480	77	22	41·0
7	Lincoln	" 29	140	37	10	8	"	3,300	77	22	42·0
8	Thousand Dollar	" 22	133	41	10	8½	"	2,940	75	30	41·0
9	'Regenerated' Banner	" 29	140	38	10	9	"	3,600	75	30	40·5
10	Improved American	" 22	133	39	10	9	"	3,210	73	8	43·4
11	Garton's 'Regenerated' Abundance (7 bush.)	" 21	132	33	10	6	"	3,330	73	8	40·0
12	Improved Ligowo	" 22	133	40	10	8½	"	3,180	72	12	44·0
13	Irish Victor	" 22	133	36	10	8½	"	3,060	72	12	40·8
14	Twentieth Century	" 29	140	39	10	9	"	3,120	70	20	38·5
15	Pioneer	" 22	133	34	10	9	"	2,820	70	20	40·5
16	Virginia White	" 22	133	37	10	8	"	2,630	70	20	42·2
17	Golden Beauty	" 29	140	32	10	8½	"	2,880	68	28	42·5
18	Siberian	" 29	140	37	10	8	"	3,330	67	32	40·0
19	Montgomery	" 23	134	37	10	8½	"	2,745	67	17	40·5
20	Bedrock	" 22	133	34	10	7¾	"	3,150	64	14	39·0
21	Alsasman	" 22	133	35	10	7¾	"	2,790	64	14	40·7
22	Wide Awake	" 23	134	35	10	8	"	2,445	63	33	40·5
23	Gold Rain	" 23	134	36	10	8½	"	2,760	56	16	44·5
24	Poland	" 9	120	36	10	9	"	2,385	55	5	43·0
25	Dawson	" 11	122	38	10	9	"	2,280	44	4	42.7
26	Orloff	" 9	120	27	10	6	"	1,890	30	30	

OATS—DATES OF SOWING.

Banner oats were sown one week apart, the first seeding being made on March 31, continuing to May 12. The heaviest yield was secured from the plot sown April 28, which made 157 bushels 2 lbs. per acre. As has been noted previously, spring opened early but there was little growth until after the middle of April, which explains, to some extent, the reason the first-sown plot required thirty-three days longer to mature than the last sown.

OATS—Dates of Sowing.

Variety.	Date Sown.	Date Ripened.	No. of Days Maturing.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Banner	Mar. 31	Aug. 29	151	5,280	125	10
"	Apr. 7	" 29	144	4,740	116	16
"	" 14	" 24	132	4,545	122	7
"	" 21	" 22	123	4,860	135	..
"	" 28	" 29	123	6,420	157	2
"	May 5	" 31	118	7,065	145	5
"	" 12	Sept. 7	118	9,240	141	6

OATS—QUANTITIES OF SEED.

Banner oats were sown at varying quantities of seed per acre. Each plot was increased one-half bushel and the range was from one to four and a half bushels per acre. Increasing the seed from one bushel to four and one-half decreased the number of days required to mature by ten and increased the yield by twenty-nine bushels per acre. The table shows a variation, but, taken in conjunction with results of previous years, from two and one-half to three and one-half bushels of seed per acre would appear to be about the right quantity for this kind of soil.

OATS—Quantities of Seed.

Variety.	Bushels Seed per Acre.	No. of Days Maturing.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.	
	Bush.			In.	Lbs.	Bush.	Lbs.
Banner	1	142	10	11	4,680	91	26
"	1½	141	10	10	5,595	100	5
"	2	140	10	10½	5,550	99	24
"	2½	139	10	10	6,135	137	7
"	3	134	10	9¾	4,410	110	10
"	3½	132	10	8½	5,010	129	24
"	4	132	10	8½	4,860	134	4
"	4½	132	10	8½	4,980	128	28

OATS—CLEAN SEED.

Two plots of Banner Oats were sown side by side at the same rate of seed per acre and under the same conditions as to cultivation. One plot was seeded with grain as it came from the threshing machine well cleaned by the separator as far as broken straw or weed seeds was concerned. The seed for the other plot was put through the fanning mill twice.

OATS—Clean Seed.

Variety.	Date Sown.	Date Ripened.	Length of Head.	Strength of Straw on a Scale of 10 Points.	Weight of Straw.	Yield per Acre.
			In.		Lbs.	Bush. Lbs.
Banner (twice cleaned)	Apr. 22..	Aug. 29..	9	10	6,210	135 ..
" (uncleaned)	" 22..	" 29..	8½	10	5,880	128 28

OATS—TESTS OF VARIETIES IN FIELD LOTS.

Four varieties of oats were grown in field lots on land ploughed out of sod in 1909 after the hay was cut and given thorough fall working.

OATS—Tests of Varieties in Field Lots.

Variety.	Size of Lot.	Date of Sowing.	Date of Ripening.	Kind of Head.	Yield per Acre.	No. of Days Maturing.
	Acres.				Bush. Lbs.	
Banner	1·194	Apr. 19..	Aug. 20..	Branching	71 5	123
Danish Island	1·11	" 19..	" 20..	"	67 18	123
Ligowo	1·00	" 19..	" 18..	"	64 10	121
Thousand Dollar	1·22	" 19..	" 18..	"	52 19	121

Steers, Lacombe.

EXPERIMENTS WITH BARLEY.

Both the test plots and fields of barley were sown on timothy sod ploughed after the hay was cut in 1909. The yields on the plots as well as from the fields were satisfactory. Seed was sown at the rate of about two and one-quarter bushels of six-row and two and one-half bushels per acre of the two-row varieties. The soil was a black clay loam with a clay sub-soil similar to that on which the other tests were conducted. All varieties were sown on April 12, and the field lots on April 20.

BARLEY (SIX-ROW)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Strength of Straw on a scale of 10 points.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Stella	Aug. 13	123	41	8½	3½	Bearded	3,780	80	..	52·1
2	Guymalaye	" 4	114	31	9	2¾	"	4,200	80	..	61·6
3	Claude	" 18	128	40	9½	3	"	2,925	79	3	48·6
4	O.A.C. No. 21	" 9	119	43	9	3¼	"	4,185	77	39	45·0
5	Odessa	" 9	119	37	7½	2¾	"	4,920	77	24	51·5
6	Yale	" 14	124	44	9	3	"	4,620	77	24	52·0
7	Albert	" 18	128	45	9	4½	"	4,410	73	6	48·0
8	Trooper	6 13	123	45	9	3½	"	4,320	71	12	49·0
9	Hulless	" 18	128	34	6½	2¼	Beardless	3,540	67	24	64·5
10	Mensury	" 9	119	42	10	3½	Bearded	4,800	63	36	48·5
11	Mansfield	" 9	119	42	10	3	"	3,210	63	6	51·8
12	Oderbruch	" 9	119	41	10	3¼	"	3,870	58	6	50·0
13	Nugent	" 9	119	42	10	3¼	"	4,080	53	36	48·3

BARLEY (TWO-ROW)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Strength of Straw on a scale of 10 points.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Swedish Chevalier	Aug. 18	128	38	7	4¼	Bearded	5,100	85	..	53·0
2	Hannchen	" 1[illegible]	120	38	9	3¾	"	3,900	83	36	54·0
3	Standwell	" 18	128	42	8	3	"	4,755	80	45	54·0
4	Invincible	" 19	129	39	9	3½	"	4,800	75	..	
5	Canadian Thorpe	" 18	128	40	9	4½	"	4,200	68	36	53·1
6	Danish Chevalier	" 14	124	47	9½	4½	"	4,590	49	18	53·0
7	Clifford	" 13	123	46	10	4¼	"	4,380	47	24	53·1
8	French Chevalier	" 18	128	47	10	3¾	"	5,235	47	9	54·1
9	Jarvis	" 18	128	50	9½	5	"	5,325	45	15	51·5
10	Beaver	" 13	123	52	9	5½	"	7,050	44	18	48·6

BARLEY—DATES OF SOWING.

Mensury and Invincible barleys were sown at intervals of one week commencing March 31 and continuing to May 12. Because of the late rains and the fact that frost did not interfere with the maturing of the late-sown seed, the latest sown plots gave

this year the largest yields. This is not to be taken to mean that barley may safely be sown late. Too many farmers, working on the idea that barley may be sown at leisure after every thing else has been put in, have not only harvested a smaller crop in average years on account of the late sowing, but have exposed the crop to frost from which earlier-sown barley would have been harvested and out of danger. The average of our results would indicate that the order in which the different grains should be sown for largest yields is wheat, barley and oats.

Variety.	Date Sown.	Date Ripened.	No. of Days Maturing.	Length of Straw.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.	
				Inches.		Inches.	Lbs.	Bush.	Lbs.
Mensury	Mar. 31	Aug. 18	140	44	10	3½	4,020	66	42
"	April 7	" 14	129	43	10	3½	4,110	63	6
"	" 14	" 13	121	42	10	3½	4,680	73	36
"	" 21	" 13	114	41	9½	3½	5,130	81	42
"	" 28	" 13	107	41	8½	3½	5,550	91	42
"	May 5	" 29	116	42	8	3½	6,330	101	42
"	" 12	" 31	111	43	7½	3	7,140	103	36
Invincible	Mar. 31	" 31	153	44	10	4	6,360	60	..
"	April 7	" 22	137	41	10	3¾	4,890	63	6
"	" 14	" 18	126	41	10	3¾	5,580	61	12
"	" 21	" 22	123	44	9½	4	5,745	79	3
"	" 28	" 24	118	43	10	3¾	5,985	81	27
"	May 12	Sept. 2	113	44	8½	4	7,520	85	..

BARLEY—QUANTITIES OF SEED PER ACRE.

Mensury and Invincible barleys were sown on the same day and under the same conditions at rates of seed per acre varying from one bushel up to three bushels per acre, each plot being increased one-half bushel. Attention is called to the effect of heavy seeding upon the length of time required to mature—a most important factor.

Variety.	Quantity of Seed.	Date Ripened.	No. of Days Maturing.	Length of Straw.	Strength of Straw on a Scale of 10 Points.	Length of Head.	Weight of Straw.	Yield per Acre.	
	Bush.			Inches.		Inches.	Lbs.	Bush.	Lbs.
Mensury	1	Aug. 18	128	47	9	5	4,260	77	24
"	1½	" 18	128	46	8½	4½	5,625	81	27
"	2	" 14	124	45	8	4	5,610	83	6
"	2½	" 13	123	46	8	4	5,535	83	21
"	3	" 9	119	44	8	3¾	5,520	88	36
Invincible	1	" 31	141	43	10	4½	5.415	48	21
"	1½	" 29	139	40	10	4¼	6,285	61	27
"	2	" 22	132	44	10	4	5,985	64	3
"	2½	" 22	132	45	9	3¾	7,140	81	12
"	3	" 18	128	50	7½	3½	6,450	80	30

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Three varieties of barley were sown in field lots on April 20 on land ploughed out of timothy sod in the summer of 1909.

Variety.	No. of Acres.	Date Sown.	No. of Days Maturing.	Yield per Acre.	
				Bush.	Lbs.
Mensury	2·33	April 20	129	54	44
Invincible (two-row)	1·33	" 20	129	52	31
Mansfield	2·03	" 20	111	51	26

TEST OF THE SOIL PACKER.

The surface soil packer was tried this year with wheat, oats and barley, the packer following the drill. This land was ploughed out of sod in 1909, all packed, disced and thoroughly worked. The cultivation given the plots was exactly the same, except for the once going over with the packer after the grain was sown. This is the fourth season during which the soil packer has been tested, and each year the results have been strongly in favour of its use. An average of the results would show an increased yield sufficient, on 100 acres of crop, to pay for the packer in one season with grain at average market prices. The large proportion of the land in Central Alberta is rich in humus and, when freshly turned by the plough, lies loosely with numerous relatively large spaces. The packer closes the majority of these air spaces by compressing the soil, thus preventing the too free circulation of air which would carry away with it large quantities of moisture. The advantage of using the packer immediately after the breaker or the plough (whether in fall or spring) is thus made apparent. The advantage of the use of the packer after the grain drill lies in the fact that the seed and soil are brought into close contact, that moisture promptly rises to the seed, that germination is more uniform and rapid, and that the young rootlets readily establish themselves in the firm soil. According to the 'Census and Statistics Monthly' for December, 1910, we had in the province of Alberta 1,722,000 acres under wheat, oats, barley, rye and flax. It is probably safe to say that not more than one-third of the area sown to these different crops was packed. If the use of the soil packer will increase the yields on this area by five bushels per acre (which, judging by results here, is a moderate estimate) the increased money return to the farmers of the province who do not pack their land, valuing wheat at 80 cents per bushel, barley at 40 cents and oats at 25 cents per bushel would be $2,492,867.

Variety.	Soil.	Date of Ripening.	No. of Days Maturing.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Chelsea	Unpacked	Sept. 3	135	4,785	50	15
"	Packed	" 9	141	5,898	55	41¼
Banner	Unpacked	Aug. 22	123	4,110	131	16
"	Packed	" 22	123	4,890	135	..
Mensury	Unpacked	" 18	119	3,690	74	18
"	Packed	" 13	114	5,130	81	42

EXPERIMENTS WITH FIELD PEAS.

Fourteen varieties of field peas were tested at Lacombe in 1910. The seed was sown at the rate of from two and one-half to three bushels per acre, according to the size of the pea. The land was black clay loam ploughed out of timothy sod in 1909. In 1909, the pea plots were inoculated with soil from land on which had been successfully grown at Brandon, Man. As a result of that inoculation, the yield, though small on all plots, was doubled. Soil from the inoculated plots of 1909 was applied to all the pea plots this year which were one-sixtieth of an acre in size.

PEAS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Average Length of Straw.	Weight of Straw.	Average Length of Pod.	Yield per Acre.	Yield per Acre.		Weight per measured bus. after cleaning.
						Inch.	Lbs.	Inch.	Lbs.	Bush.	Lbs	Lbs.
1	Prussian Blue.....	Apr. 15.	Sept. 3.	141	Strong..	40	5,640	2½	2,580	43	..	63
2	Mackay.....	" 15.	" 3.	141	Medium	37	4,440	2¾	2,280	38	..	61
3	Early Harvest.....	" 28.	Aug. 29.	123	Fairly strong.	43	5,508	2¼	2,231¼	37	11¼	63
4	Chancellor.....	" 15.	" 29.	136	Medium	43	4,080	2	2,220	37	..	64·5
5	Prince.....	" 15.	Sept. 3.	141	" .	36	4,110	2¼	2,190	36	30	.. .
6	Picton.....	" 15.	" 3.	141	" .	40	4,500	3	2,100	35	..	62·5
7	Arthur.....	" 15.	Aug. 30.	137	" .	49	3,517	2½	2,002½	33	22½	63·0
8	Black-eye Marrowfat	" 15.	Sept. 3.	141	Fairly strong.	37	4,845	3	1,995	33	15	62·0
9	White Marrowfat.....	" 15.	" 4.	142	" .	46	4,785	2¾	1,995	33	15	62·5
10	English Grey.	" 15.	Aug. 29.	136	Medium	28	3,390	2¼	1,890	31	30	60·0
11	Daniel O'Rourke.....	" 15.	" 30.	137	" .	37	4,305	2¼	1,755	29	15	63·0
12	Golden Vine.....	" 15.	" 30.	137	Fairly strong.	39	3,990	2	1,590	26	30	63·6
13	Paragon....	" 15.	Sept. 3.	141	" .	46	5,310	2½	1,530	25	30	63·0
14	Gregory.	" 15.	" 10.	148	Strong..	60	5,220	3	1,500	25	..	....

ROTATIONS.

Of the following rotations, 'B,' 'C,' 'E,' and the check plots have been got under way this year, while 'A' and 'D' have been laid out and will be started in 1911.

ROTATION 'K.' SIX YEAR.

About 25 acres.

This rotation is to be located in an irregular area between the Canadian Pacific Railway and the Edmonton trail. The field is to be divided into six equal blocks by paralleling the north and south road allowance.

First year—Hoe crop, peas and mixed grains.

Second year.—Wheat.

Third year.—Oats and barley seeded down.

Part (*a*) Alsike clover 6 lbs., Rye grass 10 lbs.

Part (*b*) Alsike clover 6 lbs., Alfalfa 6 lbs. and Timothy 3 lbs.

Part (*c*) Red clover 6 lbs., Alsike 2 lbs., Timothy 2 lbs., and Western Rye grass 2 lbs.

Part (*d*)

Fourth year.—Hay, manure in autumn, 12 tons per acre.

Fifth year.—Pasture.

Sixth year.—Pasture, plough in July after haying or earlier in preparation for root crops.

ROTATION 'L.' SIX YEAR.

About 11 acres.

This rotation is to be located next to the north line and west of the north and south drive. The fields are to be about 1½ acres each.

First year.—Hay.
Second year.—Pasture, manure in autumn.
Third year.—Pasture, break in July for winter wheat or. . . . . .
Fourth year.—Wheat or. . . . . .
Fifth year.—Oats.
Sixth year.—Barley seeded down, Timothy 4 lbs., Alsike, 4 lbs., Red clover, 4 lbs.

ROTATION 'N.' SEVEN YEARS.

Ten acres.

This rotation is to be located west of the north and south drive and south of rotation 'L.' The fields are to be one acre each in extent.

First year.—Alfalfa seeded without a nurse crop.
Second year.—Alfalfa hay, manure six tons in autumn.
Third year.—Alfalfa hay.
Fourth year.—Alfalfa hay, manure six tons in autumn.
Fifth year.—Alfalfa, ploughed after first cutting.
Sixth year.—Winter wheat, or in case of failure, spring wheat.
Seventh year.—Grain (oats and barley). (Three acres of alfalfa to be left down permanently).

ROTATION 'O.' SEVEN YEARS.

About 29 acres.

This rotation is to be located south of the east and west drive and occupying the total block of 29 acres less rotation 'E.'

First year.—Roots, peas and oats, cut green and worked during fall.
Second year.—Wheat.
Third year.—Oats.
Fourth year.—Summer-fallow.
Fifth year.—Barley seeded down, alsike 2 lbs., alfalfa 6 lbs., and timothy 3 lbs.
Sixth year.—Hay, manure in autumn.
Seventh year.—Pasture, plough part intended for roots in July.

ROTATION 'C.' THREE YEAR.

Three Acres.

This rotation is to be located next to the south line and west of north and south drive. The fields are to be one acre each in extent.

First year.—Grain, wheat.
Second year.—Grain, wheat or coarse grains.
Third year.—Summer-fallow.

ROTATION 'V.'

1. Alfalfa, continuously. Located south of rotation 'N' and in same block.

ROTATION 'A.'

1. Grain, continuously. Oats will be grown on this plot without rest or manure, and the plot will be located in the triangle east of the railway and will be numbered 'A' in the check plots as below.

CHECK PLOTS.

Numbering A, K, L, N, O, C, from southeast corner of Station in triangle east of Canadian Pacific Railway from which Mr. Frank T. Shutt, Dominion Chemist, will make chemical determinations. All these plots will be in wheat in 1911.

COST OF PRODUCTION OF GRAIN CROPS.

The average yield per acre of all grain crops in Alberta is far below what should be produced on comparatively new land. A large amount of breaking is being done each year. In 1910 there was an increased area of 310,500 acres under crop. This area of new land bearing its first crop constituted almost one-fifth of the total acreage sown. The average yield of the three leading grain crops in Alberta in 1910 is given in the 'Census and Statistics Monthly' for December as follows:—

	Per Acre.
Wheat (winter and spring)	12·4 bushels.
Oats	24·27 "
Barley	26·32 "

Though the season of 1910 was unusually dry, much larger yields would have been secured if a good system of cultivation had been followed on every farm. The figures give no indication of the possibilities of the soil, but reveal the fact that many farmers give little thought to how they do their work or the cost of poor work.

As a means of increasing yield and at the same time reducing the cost of production, it is suggested that more attention should be given by farmers to determining that cost. The work necessary to determine the cost of producing crops would reveal the weak spots in the system being practised and make it possible to curtail losses and extend the business along the lines proving most profitable. To illustrate:—

As a result of our experimental work with the soil packer, we have found that by packing the land after the seed drill, at an additional expense per acre of twenty-five cents, we have been able to reduce the cost of producing oats by as much as two cents per bushel; in other words to fail to spend twenty-five cents per acre on certain cultivation, would mean a loss of three dollars and ninety-seven cents per acre. The very fact that a farmer sets about to know what it cost him to produce a bushel of grain would have a strong influence in preventing him from being an *average* farmer. It does not pay to be an *average* farmer. As is pointed out above, the average yield of oats in Alberta in 1910 was 24.27 bushels per acre. Our cost of producing oats on stubble land, figuring a man and a four-horse outfit at $6 per day, which is considered sufficiently liberal to cover depreciation in machinery, is as follows:—

Land rental	$1 60
Ploughing	1 20
Packing	0 25
Dragging twice	0 25
Seed, 3 bushels	1 05
Seeding	0 30
Packing	0 25
Harrowing after grain is up	0 12½
Cutting	0 50
Twine	0 25
Shocking	0 25
Threshing, 5 cents per bushel, yield 70 bushels	3 50
Delivery	1 40
	$10 92½

Cost to grow and sell yield of 70 bushels per acre is (per bushel) 15.6 cents.

Cost to grow and sell yield of 24·27 bushels per acre, threshing cost being $1.21 and delivery cost being 48 cents is (per bushel) 31.8 cents.

PEAS AND OATS AS A MIXTURE FOR GREEN FEED OR FOR CURING FOR HAY.

A plot of peas and oats was sown on April 21 at the rate of two bushels each of seed per acre. This was sown on land ploughed out of brome sod in 1909 after the hay crop was harvested. The growth of the crop was remarkable and illustrates what may be done in the way of supplying soiling crops throughout the summer for dairy cattle or other farm stock. The crop was cut on July 30 while still quite green, though far enough advanced to cure into hay of the best quality. The yield was at the rate of 25,440 pounds green which cured into hay of good quality at the rate of 12,360 pounds per acre.

EXPERIMENTS WITH ALFALFA.

In the spring of 1909, the following varieties of alfalfa were received from the Central Experimental Farm and sown on small plots side by side. After the ground had frozen in the fall of that year one hundred plants in each plot were counted out and surrounded by a cord so that the exact location of the plants counted could readily be determined the following spring. After growth commenced in the spring of 1910, the plants still living were again counted and a comparison of hardiness thus arrived at.

HARDINESS OF DIFFERENT STRAINS OF ALFALFA.

Name.	Number.	Per Cent. Living.
Medicago falcata	24,452	100
Grimm Alfalfa, from A. B. Lyman, Excelsior, Minn		95
Turkestan		92
Old Frankish Lucerne	25,022	69
Grimm Alfalfa	25,102	52
Canadian Alfalfa	24,836	36
Montana Alfalfa	23,454	24
Sand Lucerne	23,394	20

Unfortunately, the weights of the first cutting of these varieties are not available since the varieties were confused when hauling. The standing of the several varieties judged from the second cutting only is as follows: Grimm alfalfa (from A. B. Lyman, Excelsior, Minn.); Old Frankish Lucerne No. 25022; *Medicago falcata*, No. 24452; Montana alfalfa, No. 23454; Turkestan; Sand Lucerne, No. 23394; Canadian alfalfa, No. 24836 and Grimm alfalfa, tie.

COMPARING INOCULATED SOIL WITH CULTURE AS A MEANS OF INOCULATING FOR ALFALFA.

In the spring of 1909, two methods of inoculation were used with the Russian variety of alfalfa. A sample of Nitragin, manufactured by the Dr. Reiche Nitragin Co., Milwaukee, Wis., U.S.A., was carefully used according to instructions, while side by side was a block of alfalfa inoculated with soil taken from a field on which alfalfa had been successfully grown. This is the only culture which we have tried that has given any evidence of inoculating the land for alfalfa.

COMPARISON OF NITRO-CULTURE AND SOIL INOCULATION.

Variety.	Method of Inoculation.	First Cutting		Second Cutting.		Total.	
		Green.	Dry.	Green.	Dry.	Green.	Dry.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Russian	Soil	6,080	2,624	3,136	1,632	9,216	4,256
Russian	Culture	5,696	2,688	1,856	1,248	7,552	3,936

A block of alfalfa was sown in 1909, on which it was intended to run rotation 'C.' Five varieties were sown on this area from which two cuttings were taken in 1910. Cuttings were made July 18 and September 21. Owing to the dry weather, growth was slow to start after the first cutting. There was little growth after the second cutting and it is possible that all growth after the first cutting might better have been left. A narrow strip for comparison has been left and beside it another narrow strip which has been given no protection for the winter. All the rest of the alfalfa which was cut late has been top-dressed with barnyard manure applied with the manure spreader. It is believed that alfalfa can be successfully grown in this part of the province. In 1909 inoculated soil was sent to over 150 farmers living in all parts of the province north of Calgary. This spring after the crop had time to show by the character of its growth whether the inoculation was effective, letters of inquiry in regard to the appearance of the crop were sent to all those who had received soil. The majority of these men replied and of all those replying only one reported his alfalfa as being pale in colour and weak in growth as indicating the failure of the soil to effect inoculation. Judging from these results, farmers are recommended to undertake the growing of alfalfa, securing a hardy strain such as Turkestan and inoculating by means of soil from an old alfalfa field. Following are the yields in 1910 of the five different varieties grown under field conditions. When the high nutritive value of this crop is considered and the character of the past season remembered, the yields will be considered satisfactory.

Variety.	Method of Inoculation.	First Cutting.		Second Cutting.		Total.	
		Green.	Dry.	Green.	Dry.	Green.	Dry.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Russian	Soil	6,080	2,624	3,136	1,632	9,216	4,256
Turkestan	"	5,440	2,560	2,368	1,440	7,808	4,000
Sand Lucerne	"	3,648	1,920	2,816	1,472	6,464	3,392
Grimm	"	4,352	1,664	2,304	1,504	6,656	3,168
Canadian	"	3,904	1,664	2,816	1,504	6,720	3,163

GRASSES AND CLOVERS.

Hay was cut from the following varieties of grasses and clovers for the second time at this Station. The results are not altogether reliable as representing the merits of different varieties because the seed was variable and we did not get an even stand. Timothy and alsike appear to make a good mixture. Western Rye grass has also yielded well. Brome grass is not recommended except for land intended for permanent pasture. Once established, it is hard to eradicate. Timothy seed was sown too thickly on this block and even at the end of two years time it had become sod-bound. From four to five pounds of timothy seed per acre is thought to be sufficient.

Number.	Variety.	Yield of Dry Hay per Acre in lbs.
1	Timothy and Alsike	4,042
2	Western Rye grass	2,631
3	Red Clover	2,547
4	Brome grass	2,522
5	Red Top	2,118
6	Kentucky Blue grass	1,823
7	Meadow Fescue	1,595
8	Orchard grass	1,548
9	Canadian Blue grass	1,374
10	Timothy	1,340

EXPERIMENTS WITH INDIAN CORN.

Eleven varieties of Indian corn were planted on May 19, on land top-dressed in 1908, and ploughed out of brome sod after the hay was cut in 1909. The seed was planted in hills two and one-half feet apart each way. Dry weather affected the growth of ears but a fair crop of fodder corn was harvested. The crop was cut on September 9.

INDIAN CORN—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Height.	Condition when Cut.	Weight per Acre grown in Hills.	
			Inches.		Tons.	Lbs.
1	Longfellow	May 19	71	Well tasseled	21	1,327
2	White Cap Yellow Dent	" 19	67	Not tasseled	18	938
3	Golden Dent	" 19	62	"	17	1,196
4	Selected Leaming	" 19	73	Just tasseling	17	848
5	Angel of Midnight	" 19	66	Well tasseled	17	267
6	Northwestern Dent	" 19	70	"	16	1,686
7	Eureka	" 19	68	Not tasseled	16	176
8	Compton's Early	" 19	61	Commencing to tassel	15	201
9	Superior Fodder	" 19	72	Not tasseled	13	949
10	North Dakota No. 100 Dent	" 19	61	Well tasseled	10	1,954
11	Davidson	June 14	56	Commencing to tassel	9	934

EXPERIMENTS WITH FIELD ROOTS.

All the root crops of 1910 were grown on clay loam ploughed in 1909, after brome hay was harvested and given thorough fall work. The dry spring interfered with the germination of mangels and carrots while the late rains were favourable to a good growth of turnips. The yields are computed from the weight of roots on two rows each 66 feet long and 30 inches apart.

TURNIPS.

Twelve varieties of field turnips were tested this year. Seed was sown in drills two and one-half feet apart and the plants were thinned out to ten or twelve inches apart in the row. The first sowing was made on May 26, and the second on June 9, and the roots were harvested on November 2.

TURNIPS—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Hall's Westbury	May 26	June 9	Nov. 2	Nov. 2	31	1,096	1,051	36	19	676	644	36
2	Rennie's Prize (Rutabaga)	" 26	" 9	" 2	" 2	24	1,896	831	36	20	128	668	48
3	Mammoth Clyde	" 26	" 9	" 2	" 2	22	1,408	756	48	19	1,072	651	12
4	Jumbo	" 26	" 9	" 2	" 2	23	1,256	787	36	17	848	580	48
5	Hartley's Bronze	" 26	" 9	" 2	" 2	22	1,804	763	24	16	1,396	556	36
6	Derby Bronze Top	" 26	" 9	" 2	" 2	23	992	783	12	13	1,456	457	36
7	Halewood's Bronze Top	" 26	" 9	" 2	" 2	19	808	646	48	16	1,924	565	24
8	Good Luck	" 26	" 9	" 2	" 2	23	1,520	792	..	12	420	407	..
9	Magnum Bonum	" 26	" 9	" 2	" 2	21	1,824	730	24	13	1,984	466	24
10	Bangholm Selected	" 26	" 9	" 2	" 2	19	1,996	666	36	15	1,416	523	36
11	Perfection Swede	" 26	" 9	" 2	" 2	20	1,316	688	36	14	1,964	499	24
12	Carter's Elephant	" 26	" 9	" 2	" 2	21	900	715	..	11	1,100	385	..

CARROTS.

Five varieties of carrots were tested during the past season. Seed was sown in drills two and one-half feet apart and the young plants were thinned out to from five to seven inches apart in the row. The first sowing was made May 12, and the second May 26, and the roots were harvested October 11.

CARROTS—Test of Varieties.

Number.	Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	May 12	May 26	Oct. 11	Oct. 12	6	804	213	24	5	1,880	198	..
2	Mammoth White.....	" 12	" 26	" 11	" 12	5	1,880	198	..	3	1,920	132	..
3	White Belgian.. ...	" 12	" 26	" 11	" 12	3	1,920	132	.	4	712	145	12
4	Ontario Champion....	" 12	" 26	" 11	" 12	4	184	136	24	2	1,676	94	36
5	Half-Long Chantenay.	" 12	" 26	" 11	" 12	3	336	105	36	3	72	101	12

MANGELS.

Eight varieties of mangels were tested at Lacombe in 1910. The seed was sown in drills two and one-half feet apart and the young plants were thinned to from eight to ten inches apart in the row. The roots were pulled on October 11.

MANGELS—Test of Varieties.

Number.	Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Half Sugar White....	May 12	May 26	Oct. 11	Oct. 11	12	948	415	48	12	1,344	422	24
2	Selected Yellow Globe	" 12	" 26	" 11	" 11	10	1,912	365	12	13	1,192	453	12
3	Giant Yellow Globe..	" 12	" 26	" 11	" 11	13	928	448	48	10	1,384	356	24
4	Perfection Mammoth Long Red.....	" 12	" 26	" 11	" 11	9	84	301	24	11	1,100	385	..
5	Yellow Intermediate..	" 12	" 26	" 11	" 11	9	876	314	36	10	1,516	358	36
6	Giant Yellow Intermediate.....	" 12	" 26	" 11	" 11	11	1,100	385	..	7	1,840	264	..
7	Prize Mammoth Long Red.....	" 12	" 26	" 11	" 11	8	500	275	..	11	308	371	48
8	Gate Post.....	" 12	" 26	" 11	" 11	9	876	314	36	6	936	215	36

SUGAR-BEETS.

Three varieties of sugar beets were sown on land similar to that on which the mangels were sown and given similar cultivation. The seed was sown in drills two and one-half feet apart and from four to five inches was allowed each plant in the row. The dates of sowing and harvest were the same as for mangels and carrots. The sugar-content of these roots was not high. Analyses made by Mr. Frank T. Shutt, Dominion Chemist, Central Experimental Farm, showed Vilmorin's Improved to stand first with 13·4 per cent of saccharine matter.

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	French Very Rich. ...	May 12.	May 26.	Oct. 11.	Oct. 11.	6	1,728	228	48	7	1,708	261	48
2	Vilmorin's Improved..	" 12.	" 26.	" 11.	" 11.	6	1,728	228	48	6	1,332	222	12
3	Klein Wanzleben.	" 12.	" 26.	" 11.	" 11.	5	1,220	187	..	5	1,088	184	48

POTATOES.

The season of 1910 was a satisfactory one for the growth of the potato. The yields were good and the quality is the best so far grown here. The land was black clay loam, top-dressed in 1908 after hay harvest, ploughed out of brome sod in 1909, packed and thoroughly cultivated that fall. The potatoes were planted on May 17, and dug September 24, 26 and 27. For planting, the tubers were cut into pieces having from two to three eyes to the piece and were planted about twelve inches apart in the row, the rows being two and one-half feet apart. Frequent cultivation was given but the vines were not hilled. We have not been troubled with rot or the potato beetle, though it has made its appearance in certain parts of the province. Paris green, one teaspoonful to a pail of water applied by means of a sprayer, is a practical means for destroying the potato beetle.

POTATOES—Test of Varieties.

Number.	Name of Variety.	Planted.	Dug.	Average Size.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable		Form and Colour.
					%	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Table Talk.	May 17.	Sept. 26.	Large ..	75	577	30	490	53	86	37	White, oval
2	Holborn Abundance.	" 17.	" 26.	" ..	60	534	36	481	9	53	27	"
3	British Queen	" 17.	" 26.	Medium	80	524	42	446	..	78	42	"
4	Late Puritan.	" 17.	" 26.	Large ..	80	496	6	471	18	24	48	"
5	Pioneer.....	" 17.	" 27.	" ..	75	485	6	436	36	48	30	"
6	Gold Coin.....	" 17.	" 27.	" ..	50	484	..	435	36	48	24	"
7	Empire State. ...	" 17.	" 26.	" ..	95	482	54	458	46	24	8	"
8	American Wonder ..	" 17.	" 26.	" ..	75	481	48	457	43	24	5	"
9	Carman No. 1.	" 17.	" 26	" ..	60	467	30	444	8	23	22	"
10	State of Maine.....	" 17.	" 27.	" ..	45	466	24	443	5	23	19	"
11	Uncle Sam.	" 17.	" 27.	" ..	80	465	18	442	3	23	15	"
12	Morgan Seedling....	" 17.	" 27.	" .	50	462	..	415	48	46	12	Pink, long.
13	Reeves' Rose.	" 17.	" 27.	" ..	65	427	54	385	7	42	47	Red, oval.
14	Country Gentleman.	" 17.	" 24.	" ..	65	426	48	384	8	42	40	White, long.
15	Dooley	" 17.	" 26.	" ..	75	422	24	405	31	16	53	White, oval.
16	Ashleaf Kidney.....	" 17.	" 24.	" ..	55	419	6	377	12	41	54	Pink, oval.
17	Twentieth Century..	" 17.	" 27.	Medium	60	407	..	345	57	61	3	White, oval.
18	Dreer's Standard....	" 17.	" 27.	Large ..	70	391	36	352	27	39	9	"
19	Irish Cobbler.	" 17.	" 27.	Medium	70	348	42	296	24	52	18	White, round
20	Vick's Extra Early..	" 17.	" 27.	Large ..	75	342	6	307	54	34	12	White, oval.
21	Money Maker	" 17.	" 27.	" ..	55	341	..	306	54	34	6	White, long.
22	Everett.....	" 17.	" 27.	Medium	95	324	30	275	50	48	40	Red, oval.
23	Rochester Rose.....	" 17.	" 24.	" .	70	319	..	255	12	63	48	Pink, long.
24	Dalmeny Beauty....	" 17.	" 26.	Large ..	90	315	42	284	8	31	34	White, long.
25	Uncle Gideon's Quick Lunch.....	" 17.	" 27.	Small ..	50	171	36	128	42	42	54	White, round pink eye.
26	Factor.....	" 17.	" 27.	" ..	75	99	..	79	12	19	48	
27	Hard to Beat.	" 17.	" 27.	" ..	75	85	48	64	21	21	27	

APPLICATION OF COMMERCIAL FERTILIZER TO POTATO CROP.

Fertilizers were supplied by the Brackman-Ker Milling Co., Calgary, agents for the Canadian Potash Syndicate, Toronto, and were applied to a crop of the Ashleaf Kidney variety, results of which appear below.

Combination.	Amount applied per Acre.	Cost of Fertilizer.	Yield per Acre.		Value minus cost of Fertilizer when valued at	
					50c. per Bush.	35c. per Bush.
	Lbs.	$ cts.	Bush.	Lbs.	$ cts.	$ cts.
Check plot			330	..	165 00	115 00
Nitrate of soda Acid phosphate Muriate of potash	200 400 250	7 72 8 24 9 02	477	24	213 78	142 11
Acid phosphate Nitrate of soda	400 200	8 24 7 72	501	36	234 74	159 60
Muriate of potash Acid phosphate	250 400	9 02 8 24	484	..	225 74	152 14
Muriate of potash Nitrate of soda	250 200	9 02 7 72	371	48	169 16	113 38
Sulphate of potash Muriate of potash	250 250	9 27 9 02	536 402	48 36	259 13 192 28	178 61 131 88

POTATOES—DEPTH OF PLANTING.

British Queen potatoes were planted two, four and six inches deep with the following results:—

Variety.	Total Yield		Yield per Acre.			
			Marketable.		Un-marketable.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
British Queen, 1 inches deep	440	..	396	..	44	..
" 4 "	418	..	355	18	62	42
" 6 "	523	36	486	57	36	39

POTATOES—TESTING ADVISABILITY OF PLANTING AS SOON AS CUT.

British Queen potatoes were planted the same day the seed was cut, but a part of the seed was held over for two weeks and planted on the rows adjoining those of the same variety planted two weeks previous. The held seed was stored in sacks in a fairly light room.

Variety.	Total Yield		Yield per Acre.			
			Marketable.		Un-marketable.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
British Queen, seed cut, planted at once	477	24	405	48	71	36
" " stood two weeks	376	12	312	12	63	57

POTATOES—Cut vs. Whole Seed—Large and Small.

Variety.	Amt. of Seed required per Acre. (Approximate.)		Yield per Acre.					
			Total Yield		Marketable.		Unmarketable.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Holborn Abundance—								
Small cut	15	2	514	48	489	4	25	44
Small whole	27	48	475	12	451	27	23	45
Large cut	23	23	479	36	455	38	23	58
Large whole	50	49	440	..	418	..	22	..

APPLE ORCHARD.

The spring of 1910 proved trying on all trees and quite a large percentage were destroyed. There are, however, in the orchard a number of crab apple trees and cross-breds which are making good growth. A few blossoms were produced, but none of the fruit set. The orchard was seeded with rape during the last of July, which will be a protection to the trees this spring should the snow go as early as it did in the spring of 1910.

SMALL FRUITS.

Owing to the fact that the small fruit plantations has an exposed location the high winds which prevailed to an unusual extent in the spring of 1910, injured the plantation considerably. The covering being left on the strawberries to hold back the blooming period caught large quantities of dust as it passed which smothered the vines. Only one picking of fruit was secured previous to the date of the annual excursion. The green berries were not given an opportunity to ripen. Judging the yield from the one picking secured, Haverland, Senator Dunlap and Beder Wood are the most promising sorts.

BUSH FRUITS.

The red, white and black currants gave a small crop of fruit, all of which was of good quality and large size. The following varieties were received from the Central Experimental Farm and set out in a permanent plantation:—

RED CURRANTS.

2. Large Red,
1. Benwell,
2. Wentworth Leviathan,
1. Champagne Red,
2. Large Bunch Holland,
1. Rankin's Red,
2. New Red Dutch,
2. Greenfield,
3. Red Grape,
3. Raby Castle,
3. Moore's Seedling,
3. Early Scarlet,
2. Wilder,
3. Red English.

WHITE CURRANTS.

1. White Pearl,
2. Large White,
1. White Cherry,
3. Verrier's White,
2. Eyatt's Nova,
2. Large White Brandenburg.

BLACK CURRANTS.

1. Ogden.

RASPBERRIES.

With the exception of Sunbeam, both raspberries and blackberries were badly winter-killed and we have no crop of fruit to report. The following varieties were received and planted:—

RASPBERRIES AND BLACKBERRIES.

21. Henry,
11. Hilborn,
20. Early King,
15. Muriel,
4. Kansas,
15. Cumberland
11. Gregg,
20. Golden Queen,
10. Kansas Black Cap,
10. Conrath,
10. Palmer,
10. Taylor,
12. Eldorado,
8. Snyder,
10. Ancient Briton.

TREE PLANTING.

Manitoba Maples have been planted on two drives which divide the section of the Station west of the Calgary and Edmonton Trail, north and south and east and west. The boundary planting has been completed with the exception of the row of ornamentals on the south boundary and about one-quarter of a mile on the west line. Taken altogether, about four miles of trees were put out last spring, not including a wide wind-break to shelter the buildings on the north and west.

THE VEGETABLE GARDEN.

The early spring was not favourable for the growth of vegetables. The first planting was destroyed by high winds, and the second, while of good quality, was rather late. The following vegetables are named in the order of merit. The date of sowing and when first ready for use is given.

ASPARAGUS.

Two hundred plants of the Palmetto variety were received from the Steele, Briggs Co., Toronto, and planted in shallow trenches three feet apart, and the plants 18 inches apart in the trench. Good growth was made during the season.

BEANS—Sown May 16.

The variety Dwarf Wax Every Day was the best in quality. They were ready for use August 21. French Dwarf Matchless stood next as to quality and was ready for use July 28. On July 21 Early Edible Podded was in use and takes third rank as to quality.

BEETS—Sown June 22. (First sowing destroyed).

Egyptian. Quality good. In use September 17.
Nutting's Dwarf Red. Quality good. In use September 19.

BROCOLI AND BRUSSELS SPROUTS.

The early sown of these vegetables were destroyed by high winds and sand. The plants were replaced from the hotbed, on June 17, and were taken up October 22. The average weight of Early White Brocoli was 8 lbs., 14 ozs., and of Dwarf Improved Brussels Sprouts, 4 lbs., 10 oz.

CABBAGE—Sown in hotbed, March 28, transplanted June 17. (First transplanting from hotbed destroyed by wind).

Variety.	In Use.	Average Weight per Head.	
		Lbs.	Oz
Early Jersey Wakefield	Sept. 10	7	8
Paris Market Very Early	" 15	5	..
Fottler's Improved Brunswick	" 20	8	1
Large Red Drumhead	Oct. 1	10	..

CARROTS—Sown June 22, pulled October 15. (First sowing destroyed).

Variety.	In Use.	Yield per Acre.	
		Bush.	Lbs.
Early French Horn	Sept. 25	52	48
Amsterdam Scarlet	" 25	110	..

CAULIFLOWER—Sown in hotbed March 28. Set in open May 26. (Destroyed and re-set June 17).

Variety.	In Use.	Average Weight.	
		Lbs.	Oz.
Early Snowball	Sept. 6	4	8

CELERY.

This seed was sown in the hotbed on March 28, and the plants were set in shallow trenches four feet apart and about six inches apart in the row, on May 30. The dry weather appeared to stunt the growth of the plants after transplanting, and in consequence practically all went to seed.

CORN.

The varieties of corn, Golden Bantam and Malakoff, were planted on May 16, and the Pocahontas on May 30, but none of the varieties advanced their corn to a stage fit for table use.

Vegetables, at Lacombe, 1908.

LETTUCE.—Sown May 16.

Wheeler's Tom Thumb. Ready for use, July 6.
Cos Trianon. Ready for use, July 6.
The variety Wheeler's Tom Thumb was slightly superior to Cos Trianon in texture and flavour, though the latter variety was also good.

ONIONS—Seeds sown April 6.

The variety Yellow Danvers was tested, but the high winds checked its early growth and, later, necks rather than bottoms were produced.

RADISH.—Sown May 14.

Only two varieties were tested, Forcing Turnip Scarlet for summer use which was ready for the table on July 1, and Black Spanish winter radish which produced a fair crop of roots of good quality.

TOMATOES.

Seed was sown in the hotbed on March 28, and as the plants were destroyed by sand after having been set out on May 27 the test of tomatoes came to an early termination.

RHUBARB.

We have a large number of varieties of rhubarb under test, and most of them have produced exceptionally heavy yields of good quality. Late this season a fungous disease made its appearance in the crown of a large majority of the hills. Two samples of the affected plants were forwarded to the Dominion Botanist, Mr. H. T. Güssow, Ottawa, for examination. The disease is first noticed by the leaves turning brownish-red, finally wilting, when the connection at the crown will be found in process of decay.

TURNIPS.

The variety Extra Early White Milan was sown on May 14, and was ready for use on July 31. They were very large and when harvested in the fall on October 15, yielded at the rate of 1,108 bushels 48 lbs. per acre.

SUMMARY OF CROPS—1910.

	Bush.	Lbs.
Wheat—		
4 varieties, 9·338 acres	287	
12 uniform test plots	12	
Oats—		
4 varieties, 4·538 acres	289	9
26 uniform test plots	30	
For feed, 16·139 acres	1,041	15
Barley—		
3 varieties, 5·669 acres	332	17
23 uniform test plots	25	25
For feed, 11 acres	279	11
Peas—		
14 uniform test plots	7	44

	Bush.	Lbs.
Potatoes—		
Three-quarters of an acre	345	54
Roots—		
One-half acre	243	
Mixed grain for feed—		
13·869 acres		31,004

	Tons.	Lbs.
Fodder corn—		
Three and one-half acres	50	
Hay—		
Timothy, 9 acres	12	785
Alfalfa, 10·82 acres	16	1,623
Mixed, 5 acres	6	378

THE FLOWER GARDEN.

The high winds of early spring were very hard on the first sown plants which had been transplanted from the hotbed into flats on April 28, and into the open on May 12. All of the first planting were destroyed and were replaced from the hotbed on May 23. Bloom was earlier this year notwithstanding this delay than in previous seasons and continued to October 15, with the exception of the Nasturtium which succumbed to frost on September 9. The seeds of Larkspur, Sweet Peas, Poppy and Mignonette were sown in the open.

ANNUALS.

Variety.	First bloom.
Antirrhinum	Aug. 1
Brachycome	July 15
Candytuft, Empress	" 10
Calendula	Aug. 1
Chrysanthemum	" 12
Dianthus	" 15
Eschscholtzia	July 28
Gaillardia	Aug. 12
Godetia	" 15
* Kochia	
Mignonette	July 15
Nemesia strumosa Suttoni	July 15
Pansies	" 1
Phlox Drummondi	" 20
Stocks	" 25

* Well suited for a background for a flower garden.

PERENNIALS.

Sweet William came into bloom July 10, and Larkspur July 15, and were quite attractive. Iris, of which we have a large number of varieties, produced only a fair amount of bloom, commencing June 15.

CANNAS.

The following varieties of cannas were received and planted. the only one of the lot blooming being the William Saunders, which flowered August 29.

3. Mrs. Kate Gray,
6. Wyoming,
7. Pennsylvania,
5. Louisiana,
3. Miss Berthine Brunner,
4. Rubin,
4. New York,
6. Indiana,
3. Queen Charlotte,
6. America,
4. Captain,
3. King Humbert,
2. William Saunders,
3. Jupiter.

DAHLIAS, TULIPS AND CROCUS.

The tulips and crocus did not amount to anything, very few growing in the spring and only one or two blooms being produced, these being the variety Cottage Maid (Tulip). The following dahlias were received and planted:—

Flossie,
Cannall's Gem,
Lady H. Grosvenor,
Capstan,
Standard Bearer,
Wm. Pearce,
Austan Cannell,
Gloriosa,
Evadne,
Blue Oban,
Kynesith,
Wm. Agnew,
Ernest Glasse,
Grand Duke Alexis,
Earl of Pembroke,
Empress of India,
Cycle,
Mrs. Moore,
Highland Queen.
Cuban Giant,
Sylvia,
Bon Ton.

A large collection of tulips were planted for bloom in 1911.

ROSES.

Twenty-two varieties of roses were received from the Central Experimental Farm in the spring of 1910 and planted in the perennial border. One of the hybrid perpetuals bloomed remarkably well, commencing July 12.

CATTLE.

Two registered Jersey heifer calves were purchased in July from B. H. Bull & Sons, of Brampton, Ont. These animals were winners of the first and second prizes at the Calgary Exhibition and are promising youngsters. The other two grade dairy cattle have done well during the year.

FEEDING FOR BEEF.

Last fall a carload of cattle were purchased with the object of feeding them during the winter, and securing further cost data relative to feeding cattle. In the winter of 1909-10 the first car fed gave good returns, showing an average profit on the eighteen head sold of $16.97 and made frozen wheat worth $1.28½ per bushel when marketed as beef, which, had it been marketed in the fall as grain, would have brought only 35 cents per bushel. The average profit is higher this year, though the cost of 100 lbs. gain is also higher. The increase in cost of producing gain may be because grain fed this year was sound and therefore chargeable against the cattle at full market price, and also due in part to the poor quality of hay which was fed.

The cattle secured for this year's trial were a good uniform lot, mostly rising four with a few rising three years. They did not represent any particular breed, though Shorthorn and Hereford blood predominated.

The last individuals were secured at the close of October and on November 1 the feeding of oat sheaves cured green, and hay was begun. One sheaf of green oats per head was fed daily till December 19, after which date one-half sheaf daily was allowed each animal. They had access to hay, water and salt at all times. Ice was prevented from forming on the water tank by means of a galvanized tank-heater. No shelter was provided other than that afforded by the corral fence and buildings as wind breaks. The cattle had no opportunity of getting under cover. During part of the feeding period they ran to a straw stack. On December 1 the feeding of chop was begun at the rate of two pounds per head per day. Every seven days two pounds per day was added to the ration until twelve pounds was reached. They stood at this rate for about three weeks when the grain was again increased, the increase being continued up to eighteen pounds per head per day. The chop consisted of two-thirds oats and one-third barley. The oats were valued at 32 cents per bushel and barley at 40 cents per bushel, which, after allowing 10 cents per hundred pounds for grinding, brings the cost of chop to practically 1 cent per pound. Hay was valued at $6 per ton which was more than the hay purchased this year was worth as it was cut and put up after the frost and late summer rains.

The only equipment used for these trials consists of feeding racks for hay, water tank and tank heater and grain tables.

The time cost for feeding hay and grain and pumping was 209 hrs. 20 min. The time cost for pumping alone was 117 hrs. 45 min., which could be reduced or even eliminated by use of a windmill or in cases where feeding yards are watered by springs. The cost of feeding hay does not include hauling, which would mean an additional 50 cents per ton for hauling well-cured hay for about a mile. Where racks holding several days' hay are provided, the time for feeding could be cut down as compared with the time cost here where fresh hay was put in racks once or twice daily.

No account is given in the tables of the labour cost or of the interest on the money tied up in cattle for 157 days. In the corral there is a large pile of splendid manure which is estimated to be worth fully twice the cost of labour and interest charges together. If any one should feel disposed to disallow this claim they are free to deduct the cost of labour ($36.62) and interest on money ($33.30) from the profits.

Towards the last of March various buyers were invited to bid for the load, and a number of very satisfactory bids were received.

The bid of 'P. Burns & Co., Ltd.,' submitted through their agent, Mr. W. F. Puffer, proved to be the highest and the cattle were accordingly sold to that firm, delivery being made April 7.

The following statement gives full data in regard to this trial:—

No. steers in lot		20
Gross weight weighed in	lbs.	26,416
Average weight per head weighed in	"	1,320
Number days on feed		157
Gross weight weighed out April 7	lbs.	31,085
Average weight weighed out April 7	"	1,554
Total gain in 157 days	"	4,669
Average gain per head	"	233·9
Average daily gain per head	"	1·48
Average cost per 100 lbs. gain		$11 25

COST.

20 steers average weight 1,320 lbs. at 3·664 cents per lb.	$ 967 94
45,413 lbs. prairie hay at $6 per ton	136 23
28,820 lbs. chop at 1 cent per lb.	288 20

3,000 lbs. wheat screenings chop at ½ cent per lb.			$ 15 00
333 lbs. salt			4 16
20 tons straw at $1 per ton			20 00
2,060 bundles green feed at 3 cents per bundle			61 80
	Hrs.	Min.	
Total time cost pumping water	117	45	
Total time cost feeding	91	35	
Total cost			$1,493 33

RECEIPTS.

Sold 20 steers total weight 31,085 lbs., less 5 per cent, at 7 cents per lb.	$2,067 17
Profit on 8 pigs following steers	4 16
Total receipts	$2,072 03
Total cost	1,493 33
Total profit	$ 578 70
Average profit per head	28 93

HORSES.

The horses have been in good condition throughout the year, though the cost of wintering is less than formerly. One heavy team did what work was necessary during the winter and were blanketed and kept in the stable when not at work. The other horses were allowed to run during the day and kept in the stable at night. All were fed straw and two quarts of oat chop each three times daily and have come through the winter in good flesh and heart for the spring work. Estimating the average farm value of oats in Alberta at about 25 cents per bushel, and considering the fact that one bushel of oats makes 56 quarts of chop, a cost of about 90 cents per head per month for chop, is figured out.

The heavy horses have done 3,287 hours of work during the year.

BUILDINGS.

A building for the accommodation of about twenty-five hens was erected. This building is 10 by 18 feet and is provided with a cotton front. The birds wintering in this building were healthy and laid well.

CORRESPONDENCE.

From April 1, 1910, to March 31, 1911, 3,710 letters were received and 3,591 answered.

MEETINGS ATTENDED.

The Station was represented at the Calgary and Edmonton Exhibitions occupying a tent on the grounds and making an exhibit of an educational nature.

I acted as judge of Dairy Cattle and Swine at the Provincial Exhibition at Calgary and as one of the judges and speakers at the Seed Fairs held at Alix, Hardisty, Provost, Daysland, Vermilion, Lloydminster, Innisfree, Vegreville and the Provincial

Seed Fair held this year at Lacombe. I had the pleasure of addressing the convention of the Association of School Trustees for Alberta held at Wetaskiwin, on the subject of 'Agriculture in the Rural Schools.'

I assisted the provincial Department of Agriculture in the short course schools at Macleod, Vermilion and Innisfail and also in the dairy school held at Innisfail.

EXCURSION.

The date of the second annual excursion was July 20, when possibly a thousand people visited the Station, coming by special trains from Calgary and Edmonton, and from the surrounding country in carriages. Addresses were delivered by Hon. Duncan Marshall, Minister of Agriculture for Alberta, Mr. Michener, M.L.A., for Red Deer, Mr. Fream, Secretary of the United Farmers of Alberta, and Mr. W. F. Stevens and Mr. H. A. Craig of the provincial Department. Senator Talbot acted as chairman. The visitors were shown over the Station and the work explained as carefully as possible in such limited time.

ACKNOWLEDGMENT.

Mr. R. E. Everest, who has been foreman here for two years, received the appointment of Superintendent of the Station at Scott, Sask., in March. Mr. S. Edmunds who has been an employee of the Station from the first, is now foreman and is satisfactorily discharging the duties of that post.

DISTRIBUTION OF SAMPLES.

Owing to a change in the policy in regard to the distribution of seed grain, no samples have been sent out from this Station this year. Preparations have been made to distribute samples of potatoes and seedling trees in April, 1911.

METEOROLOGICAL REPORT.

Months.	Highest Temperature.	Date.	Lowest Temperature.	Date.	Total Precipitation.	Total Hours Sunshine.
1910.					In.	
April	81·8	24th	16·7	4th	0·04	212·1
May	81·5	28th	13·8	7th	1·73	281·7
June	89·7	11th	26·7	3rd	3·87	297·0
July	85·1	13th	32·4	25th	1·35	325·2
August	82·8	9th	31·9	22rd, 25th	2·61	249·3
September	80·3	15th	19·5	25th	1·00	193·7
October	77·0	8th	7·0	27th	0·27	165·3
November	43·4	22nd	−2·6	30th	0·51	51·9
December	47·8	19th	−22·1	31st	0·30	71·4
1911.						
January	40·0	3rd	−47·5	13th	0·55	68·6
February	43·6	10th	−39·2	2nd	0·48	152·1
March	61·7	23rd	−3·7	8th	1·01	166·4
Totals	.....	.....	.....	.....	13·72	2,234·7

I have the honour to be, sir,

Your obedient servant,

G. H. HUTTON,

Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA

REPORT OF THOS. A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., March 31, 1911.

To Dr. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to present herewith my report for the year ending March 31, 1911.

The winter of 1910-11 was mild with no very severe storms, heavy snowfalls or drops in temperature, but the cold winds continued till late in the spring, with less than the usual rainfall for that season. The prevailing winds in April, May, and well on into June were north, north-east and north-west, with occasional light frosts during May and June. This was unfavourable for fruit trees blooming during that time, and, in consequence, the crops of apples, plums and pears were very light on the trees here. In this country, a few miles, sometimes, makes considerable difference in climatic condition and this year we suffered from unfavourable weather in spring to a greater degree than places only a short distance away. The cold spring weather did not appear to affect the hay crop, which has been an average one, and the weather during haying was fairly favourable, the crop being saved in good condition. The grain crops were, as a rule, above the average, but showery weather during harvest delayed the work, and the colour of the oats, which is the principal grain crop in this district, was not as bright as usual.

The dry, cool weather in spring prevented the germination of the mangel, carrot and turnip seed and the stand was not an even one, but good growing weather with sufficient rainfall later in the season, filled the roots out and the result has been a fair yield. Owing to the very low prices for potatoes last spring, many lots remaining unsold, fewer were planted and, although the yield has been a fairly good one, the price has been high since the crop was harvested.

Corn as usual, did not make much growth in spring and early summer and was, in consequence, very late and immature when cut.

November and December were wet and cool with no severe drops in temperature. In January, however, the weather turned colder, with a northeast gale and snowstorm; the temperature on the night of the 13th dropped to four degrees below zero, with a gale from the north and snow which drifted into roads and sheltered spots, forming banks in some places ten feet deep. February was cool and the snow did not go off, although the weather was bright.

EXPERIMENTS WITH SPRING WHEAT.

Nine varieties of spring wheat were sown in the test plots, on April 22, at the rate of one and one-half bushels per acre. The land on which these plots were sown had given a crop of roots in 1909; these in turn had been grown on a clover sod,

which had been manured and was in fairly good condition. The stand of wheat was uniform and the grain plump, bright and clean, but, owing to the dry weather, the heads did not fill out to the tip and the yields were only fair. The seed was treated with formaldehyde and there was no smut or rust on any of the plots.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of head	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.		Lbs.	Bu.	Lbs.	Lbs.
1	Stanley	Aug. 12.	113	48	10	3½	Beardless.	5,120	30	40	63·4
2	Bishop	" 17.	118	43	10	3½	" .	5,140	28	20	63·3
3	Pringle's Champlain	" 16.	117	50	10	3 to 4	Bearded. .	5,200	28	..	63·6
4	Huron	" 15.	116	45	10	3 to 3½	Beardless.	5,520	27	20	63·1
5	Red Fife	" 13.	114	45	10	3 to 3½	" .	4,880	27	.	63·3
6	Chelsea	" 15.	116	45	10	4	" .	4,400	21	40	64·7
7	Preston	" 9.	110	44	10	4	Bearded. .	4,720	23	..	63·8
8	White Fife	" 13.	114	42	10	3½ to 4	Beardless.	4,720	22	40	62·0
9	Marquis	" 11.	112	42	10	3½ to 4	" .	5,350	21	..	63·4

EXPERIMENTS WITH OATS.

Nineteen varieties of oats were sown in the test plots. The previous crop was roots and the land was in very good condition as to fertility and was well prepared, having been ploughed early in the spring and harrowed several times before the seed was sown.

The seed was carefully treated with formaldehyde and was sown April 22, at the rate of two and one-half bushels per acre. The stand was even, the heads were long and the grain was plump. There was no smut in the heads, but some varieties were rather badly rusted. The straw was stiff and stood up well until harvested. The yield was a fairly good one.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing	Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning	Rusted.
				Inches.		Inches.		Lbs.	Bu.	Lbs.	Lbs.	
1	Pioneer.....	Aug. 11.	112	38	10	9	Branch'g	4,840	81	6	39·0	A little.
2	Improved American.	" 13.	113	44	10	10	"	5,200	80	20	36·1	"
3	Golden Beauty...	" 12.	111	38	10	10	"	5,200	80	..	35·9	"
4	White Giant	" 9.	108	38	10	8	"	5,260	77	22	36·0	"
5	Improved Ligowo...	" 8.	107	44	10	10	"	4,800	76	26	40·1	Considerably.
6	Twentieth Century..	" 12.	111	41	10	9	"	4,720	76	16	37·7	Very little.
7	'Reg.' Abundance....	" 9.	108	42	10	9	"	5,360	75	30	40·2	"
8	Lincoln.....	" 10	109	40	10	9	"	5,180	75	20	37·0	Considerably.
9	Banner.....	" 10.	109	42	10	10	"	4,800	74	24	37·0	Slightly.
10	Abundance..	" 9.	108	42	10	9	"	5,100	72	12	37·8	"
11	Wide Awake	" 11.	110	42	10	9	"	5,280	72	12	37·0	"
12	Tartar King	" 9.	108	40	10	9	Sided....	5,040	71	6	38·1	"
13	Irish Victor.	" 10.	109	40	10	10	Branch'g	4,480	70	12	37·8	Considerably.
14	Swedish Select	" 8.	107	42	10	9	"	4,840	70	..	38·0	"
15	Siberian....	" 10.	109	40	10	9	"	4,720	68	28	36·0	Very little.
16	Virginia White....	" 9.	108	40	10	9	"	5,080	63	18	39·0	Considerably.
17	Danish Island ...	" 14.	114	40	10	9	"	4,480	61	26	37·5	None.
18	Gold Rain..	" 9.	108	42	10	10	"	4,720	60	..	41·0	Considerably.
19	Thousand Dollar....	" 12.	111	46	10	11	"	5,120	54	24	40·0	"

EXPERIMENTS WITH BARLEY.

Twenty-one varieties of barley were sown in plots of one-fortieth of an acre each. The previous crop was roots, and, late in the fall, the land was ploughed and harrowed. In March it was ploughed to break up the surface and start the weed seeds. It was harrowed every few days until April 21, when the seed was sown. The seed was treated with formaldehyde and the plot sown at the rate of two and one-half bushels per acre. There was no smut in the grain or rust on the straw, which was bright and fairly stiff.

Eleven varieties of six-row, and ten varieties of two-row were tested in this series.

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Mensury	Aug. 3	104	43	10	4	5,440	45	20	48·1
2	Trooper	" 9	110	39	10	3½	6,040	45	4	50·2
3	Odessa	" 2	103	42	10	3	4,800	45	..	51·0
4	Oderbruch	" 5	106	43	10	3½	4,720	43	36	52·3
5	O.A.C. No. 21	" 5	106	40	6	3½	5,160	41	12	50·0
6	Mansfield	" 6	107	44	6	4½	4,640	39	8	49·8
7	Yale	" 8	109	43	8	3½	4,580	39	8	50·0
8	Albert	" 4	105	41	10	3½	4,600	35	..	51·5
9	Nugent	" 8	109	39	10	3½	4,960	34	28	50·0
10	Stella	" 7	108	38	8	3½	4,840	32	44	50·5
11	Claude	" 4	105	41	8	4	5,040	31	12	51·5

TWO-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Danish Chevalier	Aug. 10	112	40	10	4 to 5	4,960	52	44	53·0
2	Standwell	" 12	114	40	10	3	5,960	47	24	53·5
3	French Chevalier	" 9	111	38	10	4	5,880	44	8	53·3
4	Clifford	" 8	110	46	10	4 to 5	5,240	43	36	53·6
5	Invincible	" 12	114	42	10	3½	5,110	43	16	54·0
6	Swedish Chevalier	" 10	112	44	10	4to 5	5,640	42	24	53·3
7	Beaver	" 8	110	40	10	4 to 4½	5,040	40	20	54·8
8	Canadian Thorpe	" 12	114	40	10	3 to 4	5,440	40	..	52·7
9	Jarvis	" 10	112	48	10	5 to 6	5,040	37	44	51·3
10	Hannchen	" 6	108	40	9	4 to 4½	5,460	37	24	54·1

EXPERIMENTS WITH PEAS.

Thirteen varieties of field peas were sown in the regular test plots of one-fortieth acre each. They were all sown April 21, on a clover sod which had been ploughed the previous fall and was well prepared by repeated harrowings.

The large varieties were sown at the rate of three bushels per acre and the small at the rate of two and one-half bushels per acre. The stand was uniform and the growth vigorous and promising, but the dry summer, and a few very hot days when they were in bloom, brought on a quite severe attack of mildew, which reduced the yield.

PEAS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Weight of Straw.	Average Length of Pod.	Size of Pea.	Yield per Acre.		Weight per measured bushel after cleaning.
				Inches.	Lbs.	Inches.		Bush.	Lbs.	Lbs.
1	Chancellor	Aug. 12.	113	50	5,680	2½	Small..	40	40	65·0
2	Picton	" 15.	116	56	5,560	3	Medium	36	20	62·1
3	Gregory	" 17.	118	53	4,840	3	"	34	..	64·6
4	Black-eye Marrowfat	" 19.	120	62	5,420	3½	Large..	33	20	63·0
5	Prince	" 17.	118	46	4,920	3½	" ..	33	10	65·0
6	White Marrowfat	" 17.	118	56	4,720	3	" ..	33	..	63·0
7	Golden Vine	" 16.	117	52	5,120	2½	Small..	32	40	64·0
8	Prussian Blue	" 14.	115	49	5,160	2½	" ..	32	20	64 0
9	Mackay	" 16.	117	50	5,400	3½	Medium	32	..	63·5
10	English Grey	" 16.	117	56	5,360	3	"	30	40	62·0
11	Paragon	" 15.	116	50	5,120	3	Large..	30	..	65·2
12	Daniel O'Rourke	" 13.	114	51	5,440	2½	Small..	28	40	64·5
13	Arthur	" 14.	115	50	5,320	3	Large..	28	..	64·0

EXPERIMENTS WITH INDIAN CORN.

Eight varieties of Indian corn, grown for ensilage, were planted on May 19, on a clover sod which was ploughed early in April and harrowed repeatedly with disc and spading harrows to cut the sods and start the weed seeds. A dressing with the spike tooth drag left the land in fine condition for the seed. For convenience in cultivation, the corn was planted in hills, three feet apart each way. To protect the sprouting seed from crows, which are very plentiful, the seed received a coating of coal tar before planting, and the stand was very uniform.

The weather in spring was cold with showers and until the first week in July the growth was poor. The season as a whole was a very unfavourable one for corn and, although the gross yield was a fairly heavy one, the corn was very green and immature and very few stalks had ears advanced in growth to the roasting ear stage.

The plots were harvested October 7 and 8, and put into the silo at once.

The yield per acre was estimated from the product of two rows, each sixty-six feet long.

INDIAN CORN—Test of Varieties.

Number.	Name of Variety.	Height.	In Silk.	Condition when Cut.	Weight per Acre Grown in Hills.	
		Inches.			Tons.	Lbs.
1	Superior Fodder	120	Oct. 7	Ears forming	22	660
2	Longfellow	112	Sept. 16	Late milk	21	1,560
3	Wood's Northern Dent	112	Oct. 1	Ears forming	19	1,710
4	Compton's Early	112	Sept. 16	Late milk	19	1,050
5	Angel of Midnight	106	" 16	"	18	1,950
6	Early Mastodon	116	Oct. 1	Ears forming	16	1,880
7	Eureka	107	" 7	In silk	16	1,820
8	Selected Leaming	106	Sept. 24	Early milk	16	560

EXPERIMENTS WITH TURNIPS.

Ten varieties of turnips were sown in drills two feet apart. Two sowings of each variety were made, the first on May 4, and the second on May 18. Four drills of one hundred feet in length were sown of each variety and the yield in each case was computed from the yield of sixty-six feet of the two centre rows in each plot.

The first part of the season was dry and unfavourable, but rains in August started the growth, which, during the last few weeks, was rapid. The yield was a fairly good one and the quality very good. The soil was a light sandy loam, but a heavy growth of clover had been turned under in July of the previous year and a dressing of about ten loads of barn-yard manure per acre was spread and worked into the soil with the disc and drag harrows. Early in the spring, the land was disced and worked over with the spike-toothed drag and was in fine tilth when the seed was sown, and the plots were very free from weeds. The plants were thinned to about eight or nine inches apart in the drills. The roots were pulled on October 22.

TURNIPS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.		1st Plot.		2nd Plot.		2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Jumbo	38	735	1,278	45	32	1,176	1,086	15
2	Halewood's Bronze Top	31	1,030	1,050	30	30	290	1,004	50
3	Perfection Swede	26	1,965	899	25	25	655	844	15
4	Hall's Westbury	25	820	847	..	29	80	968	..
5	Good Luck	25	490	841	30	23	365	772	45
6	Mammoth Clyde	24	15	800	15	28	595	943	15
7	Magnum Bonum	23	1,520	792	..	23	1,190	786	30
8	Hartley's Bronze	22	1,870	764	30	19	610	643	30
9	Carter's Elephant	21	900	715	..	25	1,480	858	..
10	Bangholm Selected	20	1,745	695	45	19	1,270	654	30

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were sown in the comparative test plots this season. The soil was a sandy loam, underlaid with gravel, and suffers if the season is very dry. It was in clover the previous year and one crop was taken off it in June. After the hay was removed, the land was given a light dressing of stable manure, about ten loads per acre, which was scattered thinly and then harrowed with the spike-toothed drag. In July, a fine growth of clover was turned under and immediately rolled and harrowed.

Early this season, the land was gone over repeatedly with the disc and spike-toothed drag and was in fine tilth when the first sowing was made on May 4. Another set of plots were sown on May 18. The ground was rather dry and the seed was very slow in germinating and the stand uneven.

Four drills, each one hundred feet long, of each variety, were sown at both sowings with the drills two feet apart, and, where necessary, the plants were thinned to about eight inches in the drill. The yield per acre was computed from the product of sixty-six feet of the two centre drills in each plot.

The mangels were all pulled on October 21.

MANGELS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.		1st Plot.		2nd Plot.		2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Perfection Mammoth Long Red	28	1,420	957	..	26	965	882	45
2	Yellow Intermediate	27	1,110	918	30	24	1,665	827	45
3	Half-Sugar White	21	900	715	..	18	135	602	15
4	Giant Yellow Globe	20	920	682	..	16	1,990	566	30
5	Gate Post	19	1,930	665	30	20	1,085	684	45
6	Prize Mammoth Long Red	19	1,600	660	..	19	115	635	15
7	Selected Yellow Globe	19	1,435	657	15	17	1,970	599	30
8	Giant Yellow Intermediate	19	1,270	654	30	17	980	583	..

EXPERIMENTS WITH CARROTS.

Five varieties of carrots were sown on a sandy loam which had had a clover stubble turned under in the summer of 1909, and about twelve wagon-loads of barn-yard manure per acre scattered and worked into the soil in the autumn. It was then repeatedly harrowed to destroy the weed seeds. The land was disced and harrowed early in the spring of 1910, and was in good condition when the seed was sown, but the weather just then was dry with a north wind, the surface of the field became dry and the seed was slow in germinating; one variety did not germinate at all and in no case was the stand at all uniform.

Two sowings were made, the first on May 4 and the second on May 18, in drills two feet apart, and the plants were thinned to four or five inches apart in the row, where necessary. The carrots were all pulled on October 21 and the yield was calculated from the product of two rows, each sixty-six feet long.

CARROTS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.		1st Plot.		2nd Plot.		2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	31	40	1,034	..	25	1,315	855	15
2	Ontario Champion	30	1,050	1,017	30	25	1,480	868	..
3	White Belgian	28	430	940	30	30	720	1,012	..
4	Mammoth White Intermediate	26	470	872	50	24	875	814	30

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were sown in drills two feet apart. Two sowings were made of each variety, the first on May 4, and the second on May 18. The soil was a warm loam which had been manured the previous year and fall-ploughed. It was cultivated with the disc and spike-toothed drag in March and at intervals until the seed was sown.

Owing to unfavourable weather in the spring, the seed did not germinate evenly, the stand was uneven, and the yield was light. Four rows of each variety were sown

at each sowing and the yield was computed from the returns from the two centre rows each sixty-six feet long.

The beets were pulled on October 21.

Specimens were sent to the Dominion Chemist, Mr. Frank T. Shutt, for analysis of sugar-content. The results are included in the following table:—

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.								Sugar in Juice.	Solids in Juice.	Co-efficient of Purity.
		1st Plot.		1st Plot.		2nd Plot.		2nd Plot.				
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	%	%	
1	Vilmorin's Improved....	17	1,200	586	40	16	1,660	561	..	19·92	21·37	93·2
2	Klein Wanzleben.....	14	1,960	499	20	12	1,080	418	..	20·08	22·03	91·1
3	French Very Rich.	13	620	443	40	12	640	410	40	17·55	19·11	91·8

EXPERIMENTS WITH POTATOES.

Seventeen varieties of potatoes were planted in the trial plots this season.

The soil was a fairly light, sandy loam and suffered from the drought of summer, which reduced the yield considerably. There was no disease, either in the tops or tubers and the latter were remarkably even in size, clean, smooth and of very good quality. They were planted from May 6 to May 11, in rows thirty inches apart, one foot apart in the drill, the seed being cut to two strong eyes to the set. Hard-to-Beat and Factor are new varieties, the seed did not germinate well and the stand was very uneven. The tubers of these two varieties are smooth and even in size and of the popular white colour. The potatoes were dug on September 24 and 26, and the yield was estimated from the product of two rows, each sixty-six feet long.

POTATOES—Test of Varieties.

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Morgan Seedling.....	400	24	360	..	40	24	Long, pink.
2	Dalmeny Beauty.....	369	36	332	24	37	12	Oblong, white.
3	Empire State.....	334	24	301	24	33	..	"
4	Dreer's Standard.....	321	12	276	..	45	12	"
5	American Wonder.....	310	12	265	12	45	..	Long, white.
6	Money Maker.....	302	36	273	..	30	36	Oblong, white.
7	Carman No. 1.....	288	12	245	..	43	12	Round, white.
8	Irish Cobbler.....	283	48	243	24	40	24	"
9	Gold Coin.....	277	12	249	12	28	..	Long, white.
10	Reeves' Rose.....	259	36	234	..	25	36	Long, rose.
11	Everett.....	251	44	214	..	37	44	"
12	Rochester Rose.....	250	48	225	48	25	..	"
13	Late Puritan.....	246	24	209	..	37	24	Long, white.
14	Ashleaf Kidney	246	12	222	..	24	12	Oblong, white.
15	Vick's Extra Early.....	215	36	172	36	43	..	Oblong, pink.
16	Hard-to-Beat.....	118	48	103	..	15	48	Long, white.
17	Factor.....	94	36	79	36	15	..	"

SUMMARY OF CROPS, 1910.

	Tons.	Lbs.
Hay—		
Mixed Clover, Italian Rye grass and Orchard grass..	107	1,650
Ensilage—		
Corn and Clover..	80	....
	187	1,650

	Tons.	Lbs.
Roots—		
Mangels..	7	1,300
Turnips..	53	650
Carrots..	4	1,200
	65	1,150

	Bushels.
Grain—	
Oats..	512
Spring wheat..	80
Barley..	18
Peas..	200
Peas, oats and barley, mixed..	1,450
	2,260

No fall wheat or rye was grown here in 1910.

GARDEN VEGETABLES.

The cold, drying winds and lack of rain throughout the spring kept the surface of the ground so dry that small seeds failed to germinate or grew very feebly, and the garden vegetables were a comparative failure.

TABLE BEETS—Sown May 3.

Extra Early Egyptian Blood Turnip.—A very poor stand. Only a very few seeds germinated and they grew very slowly. Fit for the table August 10, but not of high quality.

Early Blood Turnip.—Sown May 3. A poor stand. Fit for the table August 15; of fair quality.

Long Blood.—Sweet and pleasant; of very good quality. A good keeper for winter use.

TABLE TURNIPS—Sown May 3.

Extra Early White Milan.—The seed germinated well and the turnips were fit for the table on June 13. Very sweet and pleasant in flavour.

Early Snowball.—An even stand. Turnips, small but crisp, sweet and very good.

Early Stone.—Not first-class in any respect as the flesh was tough, stringy and strong. Large enough for table use July 18.

Golden Ball.—A strong grower, forming a solid, smooth turnip, but not equal in table qualities to the earlier sorts.

RADISH—Sown April 20.

Early Scarlet Turnip.—A quick growing variety; sweet, crisp and pleasant. Fit for table May 24.

Early Scarlet Tipped.—Fit for the table May 26. A smooth, crisp, sweet sort and a rapid grower.

Long Black Spanish.—Sown August 2. A strong grower but not crisp or sweet; stringy, tough and pungent.

LETTUCE—Sown in Hotbed April 1.

Iceberg.—A rapid grower. Heads, solid, crisp and very good. Fit for the table May 24 and continues crisp for a long time. Sown in the open May 2.

Simpson's Early Curled.—A rapid grower and a crisp, sweet, fine-flavoured sort. Fit for the table June 4.

Early Prize Head.—Fit for the table June 8; sweet and crisp, heads solid, and a very heavy cropper.

GARDEN PEAS—Sown April 30.

The peas were sown in drills thirty inches apart.

Rennie's Queen.—Vines, twenty to twenty-four inches long; moderately productive. Pods, three to four inches long, containing from four to seven large peas of very fine flavour and quality. Fit for the table June 20.

Thomas Laxton.—Vines from twenty-four to thirty inches long and moderately productive. Pods of medium length and containing from four to six medium large peas of very fine quality. Fit for the table July 3.

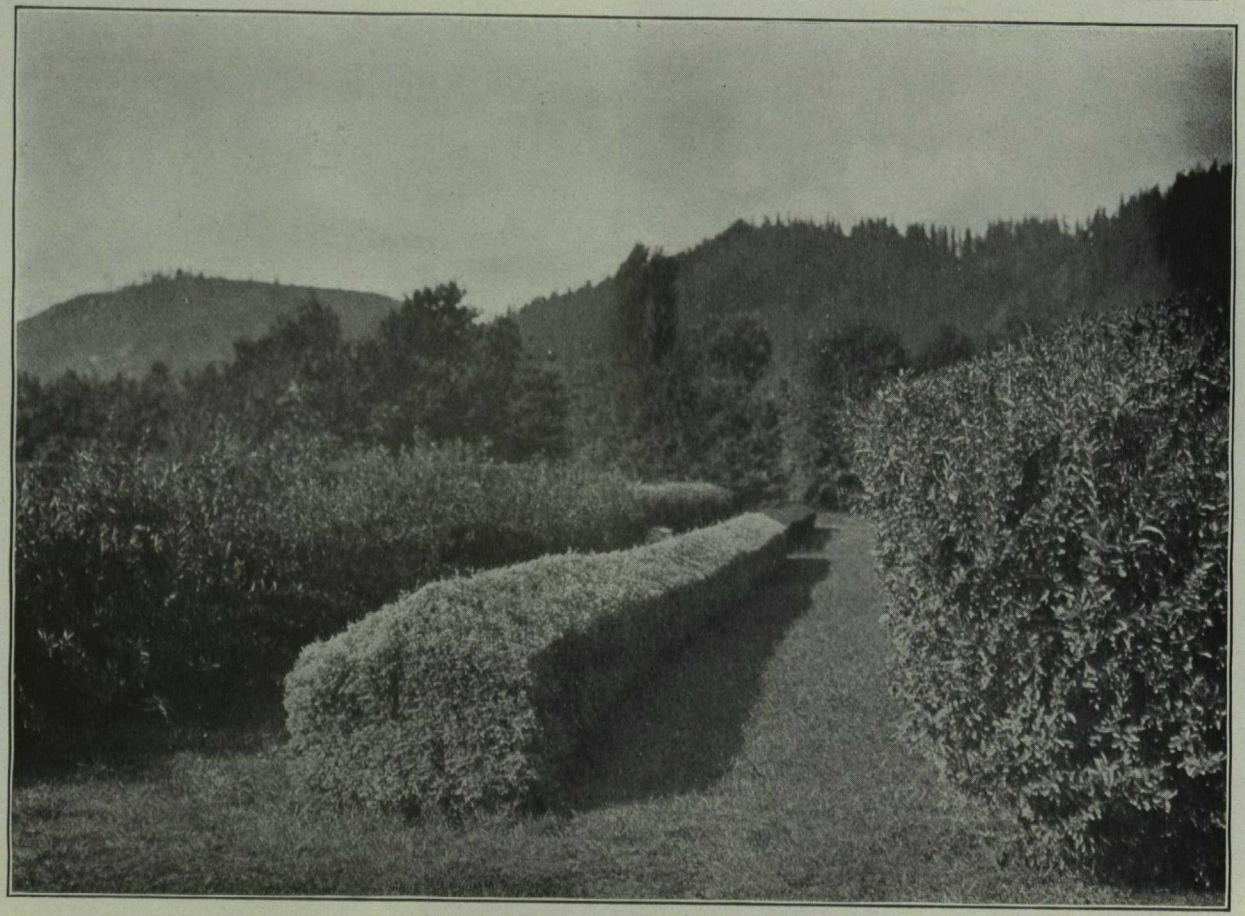
The Pilot.—Vines, twenty-four to thirty-six inches long, and productive. Pods, long and well filled with large peas of very superior quality. Fit for the table July 4.

Sutton's Earliest Marrow.—Vines, fifteen to twenty inches long and of more than average productiveness. Pods of medium length and containing from three to five medium sized peas, of good flavour. Season very short, as the vines were ripe August 1. Fit for the table July 10.

Improved Ringleader.—Vines twenty-four to thirty inches long and very productive. Pods, well filled but quite short, containing from three to five medium-sized peas, of very good quality. Fit for the table July 14 and ripe August 5.

Star of Australia.—Vines of medium length and very productive. Pods, long, containing from five to nine large, sweet peas, of very fine quality. The vines continue producing peas for the table during the whole month of August. First fit for the table July 16.

New Dwarf Telephone.—Vines fifteen to twenty inches long and very productive. Pods, long and well filled with large very sweet peas, of delicious quality. Fit for table July 18, and the season continues well on into August.



Hedges, Agassiz, 1908. Retinospora Squarrosa in centre.

Gradus.—Vines thirty to thirty-six inches long and moderately productive. Pods, long and well filled with peas of large size and of the best quality. Fit for table July 20, and continues in season for several weeks.

BEANS—Planted May 2.

Dwarf Edible Podded.—Vines dwarf and very productive. Pods three and one-half to five inches long, crisp, pleasant and sweet. Fit for table July 2. Very short in season.

Emperor of Russia.—Vines dwarf and not productive. Pods two and one-half to four inches long. Of very mild, pleasant flavour. Fit for table July 6.

Dwarf Wax Every Day.—Vines vigorous and very productive. Pods four to five inches long, curved, plump and crisp, fine-grained and of mild, pleasant flavour. Fit for table July 7, and continues producing pods for several weeks.

Dwarf Matchless.—Vines short, stocky and very productive. Pods three to five inches long, plump, crisp and of fine quality. Fit for table July 10.

Fame of Vitry.—Vines vigorous and tall enough to carry the bean pods clear of the ground. Very productive. Pods four to six inches long, plump, crisp, and of excellent flavour.. Fit for table July 10, and continues producing fresh pods for a long time.

Michigan White Wax.—Vines dwarf, but very productive. Pods short but plump, crisp, with a sweet delicate flavour. A very fine table bean. Fit for table in July, and continues in season for a long time.

PARSNIP.

These were sown in drills two feet apart on May 3. The seed came forward very slowly but the stand was fairly even and a fair crop of long, plump roots of very fine flavour and quality was obtained.

Sutton's Student.—Plants coming up May 13. A fair stand. The roots were short, thick and very irregular, but sweet and of good flavour.

CABBAGE.

Sown in beds in the garden in April and transplanted May 14. The seed did not germinate freely, although the soil was kept moist and the plants did not make a satisfactory growth until transplanted.

First and Best.—Eighteen plants were set out on May 14, and one plant was cut off and replanted. Of the seventeen plants left of the first planting, sixteen made firm solid heads. The first head was cut on July 3, and was solid, crisp and white and very tender.

Early Jersey Wakefield.—First head cut on July 11; crisp, solid, very white, sweet and finely flavoured. Out of eighteen plants set, fifteen made solid, merchantable heads.

Glory of Enkhuizen.—A very regular header, and heads fairly large, solid and of fine flavour. Fit for the table August 9. Eighteen stocky plants were set out and seventeen made medium large, solid heads.

Early Winningstadt.—Eighteen plants were set out on May 14, and fourteen made heads; twelve of these were very fine, handsome and solid; two were smaller. Fit for the table latter part of August.

Danish Ball Head.—Heads of medium size, very hard, solid, white and crisp, of good quality. Eighteen plants were set out on May 14; fifteen very fine heads formed. An excellent winter cabbage.

Fottler's Drumhead.—A strong grower and an even, regular header. Eighteen plants made sixteen fine heads. A very good late fall and winter cabbage.

Red Zenith.—An even, regular header. Heads medium small but solid, crisp and of fine quality. Eighteen plants set out on May 14 made fourteen fine, solid heads, of a very dark-red colour.

Savoy Drumhead.—A regular header; heads large, flat, solid, and crisp; of very fine flavour and a good keeper. Eighteen plants made eleven solid heads of good size and four second-class heads.

Perfection Savoy.—A very regular header; heads very solid, crisp, of delicate and delicious flavour. An excellent keeper. Eighteen plants made fifteen very good heads.

CARROTS.

These were sown in drills eighteen inches apart on May 3. The seed did not germinate well and the stand was uneven.

Early Scarlet Horn.—Stump-rooted and a very rapid grower. Very sweet, crisp and pleasant in flavour. Fit for table June 30.

Chantenay.—A very poor stand, but the plants made rapid growth when the rains came . A very solid, sweet carrot, usually a heavy cropper and easily harvested.

Amsterdam Scarlet.—A medium stand. Carrots crisp, sweet, with a mild, pleasant flavour; a good keeper.

CAULIFLOWER.

These seeds were sown in open beds in April. The seed did not germinate freely, and the plants grew slowly until after they were transplanted.

Earliest Erfurt.—Transplanted on May 14 and, as the ground was rather dry, the plants were carefully watered until they were thoroughly established. Eighteen plants were set out and thirteen developed fine heads; five plants were destroyed by cutworms or failed to make good heads. First fit for table in the middle of July.

Lenormand Short Stem.—Eighteen plants were set out on May 14, and the first head was fit for the table on August 18. The heads were large, solid and of very fine quality. Fourteen plants made good heads.

Autumn Giant.—Only ten plants were set out and seven developed large, solid heads. Fit for the table by the middle of September. Heads, solid, large, crisp and sweet.

BRUSSELS SPROUTS.

These were sown at the same time as the cauliflower and were transplanted May 17. The seed did not germinate well and only ten plants of each variety were set out.

Improved Half Dwarf.—The growth was stocky and well set with solid sprouts of fine flavour. Fit for the table all winter.

Giant.—A tall, stocky grower, with the stalk well set with large, firm, crisp sprouts. Of very fine flavour and an excellent keeper.

BROCOLI.

Sown in beds in the open garden in April and transplanted May 17.

Extra Early White.—A reliable header and a rapid grower. Fit for the table early in August. There were ten fine, crisp heads from twelve plants set out.

Walcheren.—Fit for the table in August. From nine plants set out on May 18, fine heads were produced, large, crisp and solid; of very good quality.

CELERY.

Three varieties of celery were sown in beds in the garden, at the same date as the cabbage. The seed did not germinate and no plants of this vegetable were grown.

SPINACH.

Two varieties of this vegetable were sown in drills eighteen inches apart, on May 17.

Curled-Leaved Savoy.—Leaves thick and crisp. A very rapid grower and of fine, delicate flavour.

Short Season.—A rapid grower and does not run to seed for a long time after being fit for table.

ONIONS.

These were sown in drills eighteen inches apart on May 3. The seed germinated very slowly and did not grow much until copious rains came, too late in the season for them to make good bottoms and ripen.

Danver's Yellow Globe.—An uneven stand. Only a very small percentage made any bottom; a nice, mild onion, when well grown.

Large Red Wethersfield.—An uneven stand, but about one-third of the plants developed medium-sized bottoms, which ripened fairly well. This in one of the best croppers we have tested.

Australian Brown.—Very few seeds germinated and the plants did not make a vigorous growth. There were a few nice onions, of very good quality. A good keeping sort when well ripened and cured in dry weather.

Paris Silverskin.—This variety germinated the best of any. The crop was good and the bulbs ripened up early. A fine onion for pickling.

TABLE CORN.

The following varieties were planted in hills three feet apart each way, on May 7.

Golden Bantam.—Tasseling out on July 24, and in silk August 4. Fit for the table August 14. The cold season was unfavourable to the rapid growth of corn and this variety took eleven days longer to grow to table condition than it did last year. The stalks were 36 to 48 inches long, with frequently three ears to a stalk. The ears were four to six inches long and well filled out with very sweet pleasant-flavoured corn.

Malakoff.—Planted May 7. Stalks stout and from 48 to 60 inches high. Ears, six to eight inches long and thick; well filled with deep, white grains; not so sweet or good as Golden Bantam. Fit for table August 26.

Pocahontas.—Stalks, five to seven feet high, slender, productive. Ears, six to eight inches long, well filled out to the tip with sweet, well-flavoured corn. Fit for the table August 26, and remains tender and good for a long time.

SQUASH.

Six varieties of squash were planted on May 12. The bush varieties were planted in hills six feet apart each way and the running varieties in hills nine feet apart each way.

Golden Custard.—A very strong, bushy grower and productive. Squash, four to eight inches in diameter. Fit for the table July 28.

Long White Bush Marrow.—A strong grower and very productive. Squash, from ten to twelve inches long and four to six inches in diameter; quality, very fine for table use. Fit for use August 2.

Essex Hybrid.—A strong, running variety and productive. Squash, weight from eight to twelve pounds, very thick fleshed; very sweet, pleasant-flavoured. A very good fall and winter variety.

Hubbard.—A strong grower and very productive. Flesh, thick and solid, sweet, fine-grained, and very good for table use; a good keeper.

Fordhook.—A good grower and productive. Flesh, thick, fine-grained and very sweet. A good winter squash.

Mammoth Whale.—A very strong grower. Squash, very large, rather coarse in texture, and not a table variety.

CLEARING.

About two acres of land have been cleared and all small trees and scrub grubbed out and burned off and the land is now ready for the plough.

No ditching has been done this year.

CATTLE.

The herd of Shorthorns numbers twenty cows and heifers, one stud bull and four young bulls. Dairying is so profitable in the western portion of the mainland and on Vancouver Island, that the dairy breeds have supplanted the beef breeds, and the demand for Shorthorn bulls is steadily falling off. It is a question whether it would be better to sell the herd here and replace them with a dairy herd. All of our stock are in good condition and in excellent health.

SHEEP.

The cougars have killed a number of our lambs each year for two or three years, and some other flocks in the municipality have suffered more severely than that on the Farm. As there is so much cover for wild animals on these wooded mountains, it is difficult to make sheep breeding profitable. Our flocks consists of twenty-two females and two buck lambs.

PIGS.

The stock of pigs at present on the Farm consists of twenty-seven White Yorkshires of all ages and ten Berkshires. Our breeding stock of both breeds are very superior animals, and those sold have given satisfaction in every case to the purchaser. As the price for pork products is high, the demand for breeding stock has been good.

HORSES.

The horse stock is the same as in my last year's report, none having died, nor any having been bought. There are three teams of work horses, one of the original stock brought here in 1889, which is a useful beast yet, and a general purpose mare.

BEES.

The cool, dry spring and summer was not very favourable for honey gathering, but all old or early swarms went into winter with sufficient stores, and, at this writing, there are fifteen strong swarms.

FOWLS.

We have had the same breeds of fowls in 1910 as in the three previous years, namely, Black Minorcas, Barred Plymouth Rocks, White Wyandottes, Rhode Island Reds and Buff Orpingtons. As conditions were not materially changed, either as to climate or care, the results this year were similar to those of previous years. A good strain of any of these breeds are good layers and all, except the Black Minorcas, are good table fowls if well fed and cared for.

The fowls are kept confined, each breed in a separate pen, with a yard attached, from January 1 to July 1. During the balance of the year they are at large. While they are confined in their pens, the fowls of one pen, each in their turn, are at large. This gives them their liberty one day in five, when they have the range of the Farm and eat grass and insects of various kinds. This is likely to ensure a better hatch and stronger chickens.

The hens are fed mixed grains, about half wheat, one-quarter oats and one-quarter barley or peas. In winter, they have a cabbage head or turnip to pick, also small potatoes boiled and mashed with any chop there may be on hand; they also get any milk there is to spare. They have grit, broken clam shells and water always before them.

Their pens are cleaned once a week, when fresh chaff or straw three or four inches deep is put on the floor. The whole of the inside of the building is cleaned several times a year with whitewash, to which is added carbolic acid. The roosts are frequently washed with sheep dip. The hen house and fowls are almost free from insects of any kind. It is necessary to keep a hen house very clean in this climate, as we have considerable mild, damp weather. We find dampness much more trying to fowls than bright, frosty weather.

There is a good demand for eggs for setting and for any birds, either male or female, which there are to spare.

NUT PLANTATION.

The nut trees and bushes are receiving a good deal of attention throughout the province and many letters of inquiry are received and replied to..

Filbert.—Our plantation of these nuts, embracing over forty named varieties got from nurseries in England, France and Germany, continues to make a strong, healthy

growth, but does not fruit well, except one variety, known as Pearson's Early Red. This variety fruits freely and regularly and is one of the earliest to ripen. The nut is small, with a thin shell and a plump kernel of very fine flavour and, under more favouring conditions, would prove profitable, as there is a good demand and good prices for filberts. Here, however, the large areas of land clothed with timber make a good breeding ground for blue jays, and these come by dozens and strip the bushes of the crop before it is ripe.

Shellbark Hickory.—The hickory trees are making a fine annual growth and fruit freely, but, as our trees are seedlings, unfortunately, the fruit is too small to be of value. The hickory seedlings vary so much that it is too much of a lottery to plant any but grafted trees of the best varieties. The soil and climate appear to suit the hickory, and it is more than probable that a plantation of selected varieties would, in time, prove profitable.

Pecan.—This variety of the hickory does not make a strong growth and is evidently unsuited to this climate.

Butternut.—The trees grow vigorously and make fine shade trees, but do not fruit freely and are not of value as nut-bearing trees in this part of the province. As the tree is very hardy, it may be of value in parts of British Columbia where tenderer trees would not thrive.

Black Walnut.—This variety of walnut makes a strong, healthy growth and develops into a handsome tree. If planted on hillsides, where cultivation is impossible, it will grow into valuable timber trees. A few planted here in the spring of 1890, have grown to over thirty feet high, are from ten to fourteen inches in diameter at one foot above the surface of the soil, and are producing a small crop of nuts each year.

Chestnut.—The chestnut trees have, for some years, made a strong growth and have developed into handsome trees, but the last two seasons have been rather severe on them, apparently, as two of them have died and several of the others in the nut orchard are dying. They have not been very productive, the trees blooming so very late that the fruit does not develop before the cool weather in October sets in, and we seldom have any perfect nuts.

English Walnut.—The trees of this variety planted in the spring of 1893, have grown well and are now twenty to twenty-five feet high, with a great spread of top and a diameter of ten to twelve inches of trunk at one foot above the surface of the ground. They produce a small crop of nuts each year and, as the trees grow older, may become profitable, as the nuts are large, thin-shelled and of fine flavour.

Japanese Walnut.—(Variety 'Sieboldi'). This is one of the handsomest shade trees in the collection here. The trees are vigorous growers with very luxuriant foliage and are early bearers and very productive. The trees, two years old when planted in the nut orchard at forty feet apart, have grown so that the branches touch and the crop of nuts grown in 1910 was the thirteenth crop in succession. These nuts have been distributed to planters in many parts of British Columbia and, from reports received, they have done very well in many places.

FOREST PLANTATION.

The land for this plantation was cleared and ploughed in 1892, and the trees planted in the spring of 1893, at which time the greater portion of them were two-year old seedlings and consisted mainly of different varieties of oak, elm, ash, maple, chestnut, walnut, white pine, Austrian pine, Scotch pine, beech and larch, with a few trees of rarer sorts.

Almost without exception, the trees have grown well and many of them, such as the larch, elm, and basswood, are over thirty feet high and a foot in diameter a foot from the surface of the ground. They were planted in rows ten feet apart each way. The first year, the land was cultivated and, in the spring of the second year, seeded with red clover, which has been gradually killed out in the shade of the trees until the latter occupy the ground almost entirely, there being only some scattered tufts of native grasses. The white pine appears to be admirably suited to this soil and climate and some of the trees of that timber will, in a few years, be almost large enough to cut for lumber.

In the spring of 1892, 1893 and 1894, a large number of small seedling timber trees were planted in the open spaces on the steep sides of the mountain, from near the base up to an elevation of over one thousand feet. These trees have received no care or attention since they were planted but a great many of them have made a fair growth. Owing to the dense growth of ferns and scrub, the growth of the trees has been slender, and clean of limbs below. They promise to make fine timber trees in time, if the mountain can be protected from fire. A quantity of black walnuts, butternuts, hickory nuts and chestnuts were planted on the mountain and a fair percentage of these grew and are making fair progress. As the initial expense was very small, the land of no value for other purposes, and no further expense was incurred, the timber will, at a future time, be valuable at little cost.

ORNAMENTAL AND FLOWERING TREES AND SHRUBS.

Nearly all of the ornamental trees and shrubs planted have grown well but, of course, some are much more desirable than others. In flowering trees, the Magnolias have grown well and bloom early in spring, as does the pink, scarlet and white Hawthorn, the pink and white flowering Dogwood and the Laburnum. All of the above are growing vigorously and flower freely. In shrubs, the Rhododendrons, Azaleas and Kalmias make a magnificent display early in May, followed by the Lilac, of which we have a very good collection.

All of these shrubs and trees are hardy enough to endure our severest winters and bloom regularly and profusely. Following these, the Weigelias, Deutzias, Wistaria and Snowball furnish bloom until the roses come, almost all of the hardier varieties of which grow and bloom luxuriantly. For later bloom, the Japanese Hydrangeas commence to flower early in July and continue until the frost cuts them off in November. The Chinese Wistaria blooms freely a second time as a rule, commencing late in July and continuing through August. The *Hydrangea grandiflora* makes a magnificent display of bloom in August and September, and the *Clethra alnifolia* makes a fine show of sweet-scented spikes of white flowers from early in August until November. There are a number of flowering shrubs in our collection which are very ornamental, but those mentioned are perhaps the most striking and valuable.

The following trees grow vigorously in this climate and, where they have room to develop properly, make very handsome shade trees, either for lawn or street planting:—white oak, scarlet oak, mossy-cup oak, pin oak, English oak, chestnut oak and red oak; Amercan elm, American, copper and fern-leaved, beech; American and European linden and white basswood; Scarlet, sugar, European cork, sycamore, Norway, Reitenbach's purple, and Schwedler's, maple; the tulip trees and the Eastern white pine. Of all of the above, we have very handsome specimens, some of the oaks being over twenty-five feet high, with splendid heads.

APPLES.

The cold winds and light frosts in the blossoming time of the tree fruits was very unfavourable; the fruit crop was small and not up to the standard in quality Orchard No. 3, which is the only one of the old apple orchards left, was, owing to the excessive rainfall in November of 1909, aided by the run-off from the mountain, under water for several weeks in the winter of 1909-10, and this left the trees in an unhealthy condition. The fruit crop there has been light and of poor quality.

COMMERCIAL APPLE ORCHARD.

The following varieties have been added to this orchard; twelve trees of each variety having been planted in April and all having made a satisfactory growth: Belle de Boskoop, Delicious, Rome Beauty and Wagener.

Of the older trees in this orchard, the following varieties produced as follows:—

Grimes' Golden.—7 boxes No. 1. 2 boxes No. 2.

Ontario.—8 boxes No. 1. 1 box No. 2.

Salome.—3 boxes No. 1. 2 boxes No. 2.

Aiken.—2 boxes No. 1. ½ box No. 2.

Mother.—7 boxes of fine fruit, but almost every apple punctured by crows.

Jonathan.—4 boxes No. 1. 1 box No. 2.

Sutton Beauty.—6 boxes, nearly all No. 1, but almost all damaged by crows.

King.—This variety produced a fair crop of very fine apples, a large percentage of which were injured by crows. Yield, 7 boxes No. 1; 2 boxes No. 2.

Monmouth Pippin.—4 boxes No. 1, 1 box No. 2.

Winter Banana.—This variety began to bear this year and produced 2 boxes of fruit, 1½ of No. 1 and one-half box of No. 2.

Cox's Orange Pippin.—This variety produced a few apples, ten lbs. of No. 1 and 17 lbs. of No. 2.

COMMERCIAL PEAR ORCHARD.

No addition was made to the pear orchard this year. The following varieties fruited and are given in the order of ripening.

Dr. Jules Guyot.—Produced 43 lbs. of fine, even pears, all No. 1.

Bartlett.—Produced 17 lbs. of fine even pears, all No. 1.

Clairgeau.—Produced 15 lbs. fine No. 1 fruit.

Howell.—Produced 23 lbs. of rather irregular, uneven fruit; 18 lbs. No. 1, 5 lbs. small.

The older pear trees in the experimental orchard gave a very poor crop, and the fruit was not first-class.

COMMERCIAL PLUM ORCHARD.

No addition of new varieties was made this year. Nearly every tree has made a vigorous growth, but none of them bore fruit. Several of the trees bore a few blossoms, but no fruit set.

In the experimental orchard, a number of the trees died, owing, I think, to the very wet condition of the land in the previous winter, when the ground froze. The trees that lived blossomed, but nearly all the bloom fell off. Many of the trees that lived were in an enfeebled condition and made but little growth.

PEACHES AND APRICOTS.

The few trees left of these bore no fruit, although a few of the peach trees blossomed.

MEDLARS.

No vicissitude of climate affects the trees of this fruit and they bore a full crop as usual.

ORCHARD No. 4.

No additions have been made to this orchard this year. One tree died and two others had to be cut back on account of the tops dying, but these have recovered and all have made strong growth. Some varieties promise to produce fruit this coming summer.

As nearly all of these varieties were planted in the first orchard in the spring of 1890, when the land had just been cleared, it may be that some of them will do better on old land and may be considered worthy of a trial in the commercial orchard.

CHERRIES.

The sweet cherries bore no fruit this year, and the crop of sour cherries was very small. Several of the trees have died since leafing-out in spring.

MULBERRIES.

The mulberry trees bore a small crop of fruit, which the birds appreciated.

MOUNTAIN ORCHARDS.

Owing to scarcity of labour, very little attention has been given these orchards for a number of years. A forest fire ran over the highest one last spring and a large number of the trees were destroyed. Those left, as well as those in the orchards lower down the mountain, fruited again this year, but as in former years, the fruit was eaten by bears.

The soil on the benches is a very fine loam, suitable for fruit trees, and, owing to free circulation of air, the fruit grown on these hillsides is finer than that of the same varieties in the bottom lands.

SMALL FRUITS.

CURRANTS.

The currant crop was very light and the quality poor, as the berries were small. The frosts in spring, when the bushes were coming out in blossom and leaf, were severe, and the fruit did not set well or grow freely. Many of the bushes lost their foliage in summer.

BLACKBERRIES.

The only blackberry bushes which survived the severe winter of 1908-9, were the Eldorado, Snyder, Stone's Hardy and Maxwell. These bore a fair crop of firm berries and look promising for the coming summer.

RASPBERRIES.

Our new plantation of raspberries was too young to bear a crop this year. The following varieties each bore a few berries:—Cuthbert, Sarah, French Vice-President, and Pauline.

SAMPLES DISTRIBUTED.

Oats	140
Barley	68
Peas	132
Potatoes	454
Scions and cuttings	348
Nuts, tree seeds, etc.	314

CORRESPONDENCE.

Letters received	4,983
Letters despatched	4,869

METEOROLOGICAL RECORDS.

Months.	Highest Temperature.		Lowest Temperature.		Total Precipitation.	Bright Sunshine.	
1910.	Day.	°	Day.	°	Inches.	Hours.	Min.
April	23	85	28	30	3·02	113	36
May	31	84	9	36	4·93	143	12
June	10	91	3	43	5·51	136	18
July	10	94	28	44	2·16	258	06
August	9	82	23	41	3·9	158	48
September	12	84	25	40	3·47	148	48
October	19	69	26	30	7·1	69	36
November	7	62	6 & 13	30	7·61	38	12
December	9	55	9	26	6·7	32	24
1911.							
January	5	48	11	-3	4·98	11	36
February	28	53	2	16	3·56	84	42
March	24	65	8-11-22	29	2·76	142	36
Total precipitation for year ending March 31, 1911					55·70	1,337	54

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.
Superintendent.

INDEX

PAGE.

Agriculturist, report of the.. 55
Beef production. (*See* Cattle).
Cattle—
Remarks on.. 57
Pure-bred breeding.. 57
Grade.. 57
Steers.. 57
Beef production—
Feeding of steers.. 71-76
Dairy Cattle.. 59-71
Feeding of.. 59-61
Herd record for year.. 61-65
Dairy cow record keeping.. 66-67
Products of.. 67-71
Cheese—
Manufacture of cream.. 68-69
Manufacture of Coulommier.. .. .. 68 69
Crops—Comparative statement of, 1899-1910, inclusive.. 83
Dairy Cattle. (*See* Cattle).
Financial statement of 200-acre farm. 81-82
Horses—
Number and breeding.. 57
Used for.. 58
Distribution of labour.. 58
Feeding of work.. 58
Letter of transmittal.. 55-56
Live Stock—
General.. 57-58
Inventories of.. 81
Summary of operations with.. 81-82
Milk—
Disposal of.. 67
Pigs. (*See* Swine).
Rotations.. 84-100
Remarks on.. 84
Experiments with.. 84-86
Comparative values of, on stock farms.. 86-100
Sheep—
Number and breeding.. 57
Remarks on.. 76
Lamb feeding experiment.. 76-80
Swine—
Number and breeding.. 57-58
Summary of piggery operations .. 81

PAGE.

Botanist, Report of the.. 237
Acknowledgments.. 237
Agaricus campestris.. 263
Alfalfa Leaf Spot.. 257
Anthracnose of Apple.. 245
Anthracnose of Raspberries and Blackberries.. 252
Arboretum.. 261
Bacterial Blight of Walnuts.. 252
Bacteria interfering with malting.. .. 241
Bacterium juglandis.. 252
Baldwin Spot of Apple.. 245
Bindweeds.. 272
Bitter Pit of Apples.. 244
Bitter Rot of Apples.. 247
Black Knot of Plum and Cherry.. .. 250
Black Rot of Apple.. 246
Black Spot of Maple.. 259
Bladder Plums.. 251
Botanic Gardens.. 261
Capnodium Sp.. 248
Cedar Apples.. 248
Chloris virgata.. 262
Club Root of Crucifers.. 257
Convolvulus arvensis.. 272
Cylindrosporium pomi.. 245
Dasyscypha Willkomii.. 259
Discoloration of Wheat Grain.. 240
Dothidella ulmea.. 259
Elm, Leaf Spot of.. 259
Entomosporium maculatum.. 250
Entomosporium mespili.. 259
Erysiphe graminis.. 240
Exoascus pruni.. 251
Fairy Ring Fungus.. 264
Frost injury to Pears.. 249
Frost injury to Strawberries and Raspberries.. 253
Frosted Wheat.. 240
Fruit Pit of Apples.. 244
Fusarium oxysporum.. 255
Gloeosporium malicorticis.. 245
Gloeosporium venetum.. 252
Glomerella rufomaculans.. 247
Grain, Rusts of.. 239
Gymnosporangium macropus.. .. .. .. 2 8
Herbarium.. 260
Hollyhock Rust.. 259
Leaf Blight of Pear and Quince.. .. 250
Leaf Spot of Alfalfa.. 257
of Elm.. 259

Botanist, Report of the—*Con.* PAGE.
Leaf Spot of Pear.. 250
of Strawberry.. 253
of Tomato.. 256
Malting, Bacteria interfering with.. 241
Maple, Black Spot of.. 259
Marasmius oreades.. 264
Mildew of Onions.. 256
of Wheat.. 240
Millets, Variety Trials of.. 262
Mulleins.. 272
Mushrooms and Toadstools.. 263
Mycosphaerella fragariae.. 253
New Disease of Peaches.. 251
Onion Mildew.. 256
Peach Leaf Curl.. 251
Pear Diseases.. 249
Peronospora Schleideni.. 256
Phragmidium subcorticum.. 259
Plasmodiophora brassicae.. 257
Plowrightia morbosa.. 250
Plum Pockets.. 251
Poison Ivy.. 269
Poisonous Plants.. 268
Pseudomonas juglandis.. 252
Puccinia malvacearum.. 259
Red Cedars and Apple Rust.. 248
Resin Bordeaux, Formula for.. 257
Rhodes Grass.. 262
Rhus Toxicodendron.. 269
Rhytisma acerinum.. 259
Ripe Rot of Apples.. 247
Rose, Rust of.. 259
Septoria Lycopersici.. 256
Septoria pyricola.. 250
Smuts.. 239
Sooty mould on Apple Twigs.. 248
Sphaeropsis malorum.. 246
Strawberry, Leaf Spot of.. 253
Frost Injury to.. 253
Toadstools and Mushrooms.. 263
Tomato, Leaf Blight of.. 256
Walnut Blight.. 252
Weeds.. 272
Wild Buckwheat.. 272
Wild Rice.. 264
Verbascum blattaria.. 272
Verbascum thapsus.. 272
Zizania aquatica.. 264

Cerealist—Report of the.. 137
Acknowledgments.. 137
Baking tests.. 142
Barley, six-row.. 149
Earliest varieties of.. 151
Hulless.. 151
Most productive varieties of.. 151
Test of varieties of.. 150
Albert.. 150

Cerealist, Report of the—*Con.* PAGE.
Barley, six-row—*Con.*
Black Japan.. 150
Blue Shorthead.. 150
Claude.. 150
Early Indian.. 150
Escourgeon.. 150
Manchurian.. 150
Mandscheuri.. 150
Mansfield.. 150
Mensury.. 150
Nugent.. 150
O. A. C. No. 21.. 150
Oderbruch.. 150
Odessa.. 150
Small Blue Naked.. 150
Success.. 150
Stella.. 150
Taganrog.. 150
Trooper.. 150
Barley, two-row.. 151
Beardless.. 152
Earliest varieties of.. 152
Most productive varieties of.. 152
Test of varieties of.. 152
Archer Chevalier.. 152
Beaver.. 152
Black two-row.. 152
Canadian Thorpe.. 152
Caucasian Hulless.. 152
Clifford.. 152
Danish Chevalier.. 152
Duckbill.. 152
Early Chevalier.. 152
French Chevalier.. 152
Gordon.. 152
Hannchen.. 152
Hofbrau.. 152
Invincible.. 152
Jarvis.. 152
Jewel.. 152
Kutais.. 152
Leader.. 152
Primus.. 152
Standwell.. 152
Swan's Neck.. 152
Swedish Chevalier.. 152
Beans, field.. 154
Test of varieties of.. 155
Beets, sugar.. 157
Branch Farms and Stations, visits to. 138
Carrots.. 157
Test of varieties of.. 157
Cereals—
Crossing and selection of.. 138
Small plots of.. 142
Uniform test plots of.. 142
Corn. (*See* Indian Corn).. 158

Cerealist, Report of the—*Con.* PAGE.
Crossing and Selection of Cereals.. .. 138
Distribution of Seed Grain and Potatoes.. 139
Distribution of Samples from Central Experimental Farm, summary of.. 140
Vitality and weight per bushel of grain distributed.. 140
Emmer and Spelt.. 147
Test of varieties of.. 147
Common Emmer.. 147
Double Emmer.. 147
Red Emmer.. 147
Red Spelt.. 147
Smooth Spelt.. 147
Speltz.. 147
White Spelt.. 147
Field Beans.. 154
Field Roots.. 156
Flax.. 155
Test of varieties of.. 155
Indian Corn.. 158
For ensilage.. 158
Sown at different distances.. 158
Test of varieties of.. 158
Mangels.. 156
Test of varieties of.. 157
Meetings attended.. 138
Milling and baking tests.. 142
Oats.. 147
Earliest varieties of.. 149
Most productive varieties of.. 149
New varieties of.. 147
Test of varieties of.. 148
Abundance.. 148
Alpine.. 148
American Beauty.. 148
Banner B.. 148
Bergs.. 148
Black Mesdag.. 148
Danish Island.. 148
Daubeney Selected.. 148
Early Blonde.. 148
Early Ripe.. 148
Excelsior.. 148
Garton's Abundance.. 148
Gold Rain.. 148
Improved American.. 148
Improved Ligowo.. 148
Irish Victor.. 148
Lincoln.. 148
Pioneer.. 148
Siberian.. 148
Sixty-Day White.. 148
Swedish Black.. 148
Swedish Ligowo.. 148
Swedish Select.. 148

Cerealist, Report of the—*Con.* PAGE.
Oats—*Con.*
Tartar King.. 148
Thousand Dollar.. 148
Twentieth Century.. 148
Victory.. 148
Virginia White.. 148
White Giant.. 148
White Wonder.. 148
Wide Awake.. 148
Peas.. 153
Recommended varieties of.. 153
Test of varieties of.. 153
Potatoes, field plots of.. 158
Roots, field.. 156
Rye.. 154
Spring Rye, test of varieties of.. .. 154
Winter Rye, test of varieties of.. .. 154
Seed Grain and Potatoes, distribution of.. 139
Spelt.. 147
Sugar Beets.. 157
Test of varieties of.. 158
Turnips.. 156
Test of varieties of.. 156
Weather.. 143
Uniform test plots of cereals.. 142
Wheat, Durum or Macaroni.. 144-145
Test of varieties of.. 144
Goose.. 144
Kubanka.. 144
Roumanian.. 144
Wheat, spring.. 143
Early ripening varieties.. 143
Earliest varieties of.. 145
Most productive varieties of.. 145
Test of varieties of.. 143
Alpha Selected.. 144
Aurora.. 145
Bishop.. 145
Bobs.. 144-145
Chelsea.. 145
Colorado.. 143
Downy Riga.. 144
Early Red Fife.. 143-144
Early Russian.. 144
Gatineau.. 144
Hungarian White.. 144
Huron Selected.. 144-145
Marquis.. 143-145
Outlook.. 144
Preston H.. 144-145
Pringle's Champlain C.. 144-145
Prospect.. 144
Red Fern.. 145
Red Fife.. 145
Red Fife H.. 144
Red Fife M.. 145

Cerealist, Report of the—*Con.* PAGE.
Wheat—*Con.*
Stanley A.. 144
White Fife.. 144-145
White Russian.. 143
Yellow Cross.. 144
Yellow Queen.. 144
Wheat, winter.. 146
Recommended varieties of.. 146
Test of varieties of.. 146

Chemist, Report of the.. .. .. 1 1
Acknowledgments.. 164
Alfalfa, Inoculation for the growth of. 174
Arsenate of lead, composition of.. .. 199
Ashes from crematory, composition of. 192
From refuse paper, sweepings, etc., composition of.. 193
From wheat straw, composition of.. 193
Barley, composition of the grain as influenced by soil moisture content.. 165
Burnet (*Poterium Canadense*) composition of.. 182
Carrots, composition of.. 179
Cottonseed meal, composition of.. .. 181
Crematory ashes.. 192
Dogfish scrap, composition of.. 197
Fertilizing materials—
Ashes from crematory, composition of.. 192
Ashes from refuse paper, sweepings, etc., composition of.. 193
Ashes from wheat straw.. 193
Dogfish scrap, composition of.. 197
Gypsum or land plaster, composition of.. 187
Lime, composition of.. 186
Limestone, composition of.. 184
Marl, composition of.. 187
Mucks, composition of.. 189
Mud, composition of.. 188
Mud (Mussel), composition of 189
"Natural Fertilizer," composition of. 183
Peat, composition of.. 191
Sea-weed, composition of.. 194
Flour, wheat—
Influence of environment on the composition of.. 161
Fodders and Feeding Stuffs—
Burnet (*Poterium Canadense*) 182
Cottonseed Meal, composition of.. .. 181
Oil Cake, composition of.. 181
Gypsum or Land Plaster, composition of.. 187
Inoculation for the Growth of Legumes. 174
Insecticides and Fungicides—
Arsenate of Lead, composition of .. 199

Chemist, Report of the—*Con.* PAGE.
Insecticides and Fungicides—*Con.*
Lime Sulphur Washes, composition of.. 198
Legumes, Enrichment of Soils through the Growth of.. 173
Lime, composition of.. 186
Limestone, composition of.. 184
Lime-Sulphur Washes, composition of. 198
Mangels, composition of.. 176
Influence of Heredity on.. 177
Marl, composition of.. 187
Meat Inspection Division, samples from.. 164
Mucks, composition of.. 189
Muds, composition of.. 188
Muds (Mussel), composition of.. 189
"Natural Fertilizer," composition of. 183
Nitrogen Enrichment of Soils through Growth of Legumes.. 173
Oil Cake, composition of.. 181
Peat, composition of.. 191
Poterium Canadense (Burnet), composition of.. 182
Rain, Fertilizing Value of.. 163-200
Roots, Relative Value of.. 176
Carrots, composition of.. 177
Mangels, composition of.. 176
Influence of Heredity on.. 177
Turnips, composition of.. 178
Samples received for Examination and Report.. 163
Sea-Weed, composition of.. 194
Snow, Fertilizing Value of.. 163-200
Soil Moisture as affected by Cultural Methods.. 162
Soils, Nitrogen Enrichment through Growth of Legumes.. 173
Packed and Unpacked, Moisture-Content of.. 172
Sugar Beets for Factory Purposes.. .. 180
Turnips, composition of.. 178
Water Supply of Farm Homesteads, Analyses of.. 201
Wheat and Flour, Influence of Environment on the Composition of.. 161
Influence of Age on.. 168
Wheat, Composition of the Grain as Influenced by Soil Moisture-Content.. 165
Clark, J. A., Superintendent, Experimental Station for Prince Edward Island at Charlottetown, Report of.. 295

PAGE.

Director, Report of the.. 5
Acknowledgments.. 54
Additions to Staff.. 52
Alberta—
Grain Crops in, in 1910.. 6
Vitality Tests of Grain from.. 34
Ash Seed, Tests of Vitality of.. 33
Barley—
Decrease in Vitality through Age. 37, 38, 42, 43, 47, 48, 49
Experiments with, at Fort Vermilion.. 22
Samples distributed in 1910.. 15
Yield in Eastern Provinces.. 6
in Western Provinces 6
on Experimental Farms.. .. 7, 8
in United States.. 9
Beans, Tests of Vitality.. 33
British Columbia—
Vitality Tests of Grain from.. 34
Bulletins issued in 1910—
No. 47. Trees and Shrubs tested in Manitoba and the Northwest Territories. (Reprint).. 18
No. 49. The Potato and its Culture. (Reprint).. 18
No. 66. Crop Bulletin, 1910.. 18
No. 67. Mangels, Sugar Mangels and Sugar Forage Beets.. 19
No. 68. Progress in the Breeding of Hardy Apples for the Canadian Northwest.. 19
No. 6. Second Series. Western Prairie Soils, their Nature and Composition.. 19
Bunting, T. G., appointment of.. 53
Cap Rouge, Que. Station at.. 9
Carruthers, E. B., appointment of.. .. 53
Changes in Staff.. 52
Clovers, Experiments at Fort Vermilion.. 24
Co-operative Experiments by Farmers. 11
Correspondence—
From Branch Farms and Stations.. 18
From Central Farm.. 17
Crops—
In the Dominion.. .. .. 5, 6
In the Eastern Provinces.. 6
New Brunswick.. 6
Nova Scotia.. 6
Ontario.. 6
Prince Edward Island.. .. .. ; 6
Quebec.. 6

Director, Report of the—*Con.* PAGE.
Crops—*Con.*
In the Western Provinces.. 6
Alberta.. 6
Manitoba.. 6
Saskatchewan.. 6
Decrease in Vitality of Grain with Age, Experiments in.. 37
Experiments with Barley.. .. .. .. 37, 38, 42, 43, 47, 48, 49
Flax.. 37
Oats. 37, 38, 41, 46
Peas. 37, 38, 44, 49
Wheat.. ..37, 38, 40, 45
Distribution of Seed Grain.. 14
by Provinces.. 15
from Branch Farms.. .. 16
from Central Farm.. .. 15
Total Samples sent out. 15
Value of.. 16
Everest, R. E., appointment of.. 52
Experimental Stations. *See* Stations.
Flax, Tests of Vitality.. 33
Flowers at Fort Vermilion.. 26
Fort Vermilion, Report of Robt. Jones on—
Experiments at.. 19
Barley at.. 22
Carrots at.. 23
Character of season at.. 19
Flowers at.. 26
Fruits at.. 27
Grasses and Clovers at.. 24
Indian Corn at.. 24
Mangels at.. 23
Meteorological Observations at.. .. 31
Oats at.. 21
Peas at.. 22
Potatoes at.. 24
Shrubs tested at.. 27
Spring Wheat at.. 21
Sugar Beets at.. 23
Sunshine at.. 30
Trees tested at.. 27
Vegetables at.. 25
Weather at, compared with Ottawa. 29
Fruits, experiments with at Fort Vermilion.. 27
Grasses, experiments with at Fort Vermilion.. 24
Grass Seed, tests of vitality of.. 33
Indian Corn, experiments with at Fort Vermilion.. 24
Samples of distributed 1910.. 15
Invermere, B.C., station at.. 10
Kamloops, B.C., experimental work at. 32
Kentville, N.S. Station at.. 10

Director, Report of the—*Con.* PAGE.
Langelier, G. A. Appointment of.. 52
Letter of Transmittal.. 3
Manitoba—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34
Maple Seed, Tests of Vitality.. 33
McKillican, W. C., Appointment of.. 52
Meteorological Records at Fort Vermilion.. 31
At Ottawa.. 35
New Brunswick—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34
Nova Scotia—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34
Oats, Decrease in Vitality of through Age.. .. .. 37, 38, 41, 46
Experiments with at Fort Vermilion.. 21
Samples of distributed in 1910.. .. 15
Tests of Vitality of.. 33
Yield in Eastern Provinces in 1910. 6
in Western Provinces in 1910. 6
on Experimental Farms.. .. 7, 8
in United States.. 9
Ontario—
Grain Crops in, in 1910.. 6
Vitality Tests of Grain from.. 34
Pamphlets issued in 1910—
No. 7. On the Preservation of Fruits for Exhibition Purposes.. 19
Peace River, *see* Fort Vermilion.
Peas—
Decrease in Vitality of through Age.. .. .. 37, 38, 44, 49
Experiments with at Fort Vermilion.. 22
Samples of distributed in 1910.. .. 15
Tests of vitality of.. 33
Plots, Cereal, on Experimental Farms, Yields in 1910.. .. .. 7, 8
Potatoes, Experiments with at Fort Vermilion.. 24
Samples distributed in 1910.. .. ..15, 16
Precipitation—
At Ottawa from 1890 to 1910-11.. .. 36
Prince Edward Island—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34
Quebec—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34

Director, Report of the—*Con.* PAGE.
Robinson, C. H., Appointment of.. .. 53
Rye, Tests of Vitality of.. 33
Saskatchewan—
Grain Crops in 1910.. 6
Vitality Tests of Grain from.. 34
Scott, Sask.—
New Station at.. 9
Report of Duncan Anderson on.. .. 11
Seed Grain, Tests of Vitality of.. 33
Decrease in Vitality of, through Age. 37
Shrubs, Tested at Fort Vermilion.. 27
Sirett, H., Appointment of.. 53
Staff, Additions to and Changes in.. 52
Stations, Experimental, New—
Scott, Sask.. .. .. 9, 11
Cap Rouge, Que.. 9
Ste. Anne de la Pocatière, Que.. .. 10
Kentville, N.S.. 10
Invermere, B.C.. 11
Ste. Anne de la Pocatière—
Station at.. 10
Stuart, A. T., Appointment of.. 53
Sugar Beets, Experiments with at Fort Vermilion.. 23
Summary of General Report.. 3
Sunshine—
Records of at Fort Vermilion.. .. 36
at Ottawa.. 36
Thomson, W. W., Appointment of.. .. 52
Total Samples tested for Vitality.. .. 33
Trees tested at Fort Vermilion.. .. 27
Turnips, Experiments with at Fort Vermilion.. 23
United States—
Yields of Grain Crops in 1910.. 9
Vegetables, Experiments with at Fort Vermilion.. 25
Visits to Branch Farms and Stations. 51
To Charlottetown.. 51
To Nappan.. 51
To Western Farms.. 51
Vitality of Seed Grain, *see* Seed Grain.
Vitality of Seed Grain, Decrease of through age, Experiments in.. .. 37
Weather observations at Fort Vermilion and at Ottawa compared. 29
Wheat—
Decrease in Vitality of through Age.. .. .. 37, 38, 40, 45
Samples Distributed in 1910.. 15
Tests of Vitality of.. 33
Wheat, Spring—
Tests at Fort Vermilion.. 21

Director, Report of the—*Con.* PAGE.
Wheat, spring—*Con.*
Yield in Eastern Provinces.. 6
in Western Provinces.. 6
on Experimental Farms.. .. 7, 8
in United States.. 9
Wheat, Winter—
Yield in Ontario.. 6
in Alberta.. 6
on Experimental Farms.. .. 7
White, O. C., Appointment of.. 53

Entomologist—Report of the.. 207-235
Abbot's Pine sawfly.. 233
Æolothrips fasciatus 226
Anaphothrips striatus.. 226
Anisota rubicunda.. 233
" *virginiensis*.. 233
Apiary.. 235
Apiculture.. 234
Apple Maggot.. 230
Argyresthia thuiella.. 233
Bees, keeping of.. 234
Birch Sawfly.. 233
Black flies.. 223
Blister Beetle, Black.. 230
Grey.. 230
Western.. 230
Brown-tail-Moth.. .. .. 208, 215
distribution in United States and Canada.. 218
Brown-tail-Moth, effect of temperature on.. 219
Brown-tail-Moth, field inspection in Nova Scotia.. 216
Brown-tail-Moth, History in Canada. 216
Inspection of imported nursery stock.. 215
Inspection in New Brunswick.. 217
Cankerworms.. 230
Cantharis nuttalli.. 230
Carpocapsa pomonella.. 230
Chermes abietis.. 233
floccus.. 233
pinicorticis.. 233
similis.. 233
Cherry and Pear Slug.. 230
Cherry Fruit Fly.. 230
Cherry Leaf Beetle.. 230
Codling Moth.. 230
Coelopisthia nematicida.. 233
Conotrachelus nenuphar.. 230
Correspondence of the Division.. 207
Dermacentor albipictus.. 225

Entomologist, Report of the—*Con.* PAGE.
Destructive Insect and Pest Act.. ..207, 211
Regulations under.. 213
Ephestia kuehniella.. 221
Epicauta cinerea.. 230
pennsylvanica.. 230
Eriocampa cerasi.. 230
Euproctis chrysorrhoea.. 215
Eye-spotted Budworm.. 230
Fir Sawfly.. 233
Fumigation with hydrocyanic acid gas. 221
Gad flies.. 223
Galerucella cavicollis.. 230
Gipsy Moth.. 220
distribution in United States.. 213
Grape Vine Leaf Hopper.. 234
Grass thrips.. 226
Green-striped Maple worm.. 233
Haltica ericta.. 230
" *ignita*.. 231
Hemerocampa leucostigma.. 227
Hop Flea Beetle.. 230
Horse flies.. 223
Hylotoma pectoralis.. 233
Hypoderma lineata.. 223
Insects affecting field and root crops. 229
fruit and fruit trees. 230
forest and shade trees.. 231
Insects affecting garden and greenhouse.. 233
Insects affecting live stock.. 233
Larch Sawfly.. 233
distribution in Canada.. 232
Lepidosaphes ulmi.. 230
Leptinotarsa decemlineata.. 230
Limothrips cerealium.. 226
Locust, Lesser migratory.. 230
Packards.. 230
Lophyrus abietis.. 233
abbotii.. 233
Lygaeonematus erichsonii.. 233
Lygus pratensis.. 234
Macrosiphum destructor.. 230
Margaropus annulatus.. 226
Melanoplus atlanis.. 230
packardii.. 230

Entomologist, Report of the—*Con.* PAGE.
Merodon equestris.. 229
Mesoleius aulicus.. 233
Narcissus Fly.. 229
Nasonia tortricis.. 231
Nursery stock, imported, inspection of for Brown-tail Moth.. 215
Nysius ericae.. 230
Oberea bimaculata.. 231
Oyster Shell Scale.. 230
Pea Aphis.. 230
Pentarthrum minutum.. 217
Plum curculio.. 230
Porthetria dispar.. 220
Potato Beetle.. 230
Ptinus fir.. 221
Raspberry Cane Borer.. 231
Red-humped Apple Tree Caterpillar. 230
Rhagoletis cingulata.. 230
intrudens.. 231
pomonella.. 230
Root Maggots.. 229
Schizura concinna.. 230
Sitones hispidulus.. 230
Spruce Budworm.. 231
distribution in Canada.. 232
Spruce G[illegible]se.. 233
Strawberry [illegible]wn Borer.. 231
Strawberry flea beetle.. 231
Tarnished Plant bug.. 233
Tent Caterpillars.. 230
Thrips attacking cereals.. 226
Ticks on horses.. 225
Tmetocera ocellana.. 230
Tortrix fumiferana.. 231
Tyloderma fragariae.. 231
Typhlocyba comes.. 231
Warble fly.. 223
White Cedar Twig Borer.. 233
White grubs.. 229
White Marked Tussock Moth.. 227
Wireworms.. 229
Xenylla humicola.. 233

Experimental Farm, Agassiz—Report of the Superintendent.. 511
Barley, experiments with.. 513
Six-row, test of varieties.. 514
Two-row, test of varieties.. 514

Experimental Farm, Agassiz—*Con.* PAGE.
Bees.. 525
Beets, Sugar, experiments with.. 517
Test of varieties of.. 518
Carrots, experiments with.. 517
Test of varieties of.. 517
Cattle.. 524
Clearing.. 524
Corn, Indian, experiments with.. 515
Test of varieties of.. 515
Crops, summary of.. 519
Correspondence.. 530
Distribution of samples.. 530
Fruits.. 523-530
Apples.. 528
Apricots.. 529
Cherries.. 529
Medlars.. 529
Mulberries.. 529
Peaches.. 529
Pears.. 528
Plums.. 528, 529
Small—
Blackberries.. 529
Currants.. 529
Raspberries.. 530
Horses.. 525
Indian Corn, *see* Corn, Indian.
Mangels, experiments with.. 516
Test of varieties of.. 517
Meteorological records.. 530
Nut trees, *see* under Trees.
Oats, experiments with.. 512
Test of varieties of.. 513
Orchards, commercial.. 528
Mountain.. 529
No. 4.. 529
Peas, experiments with.. 514
Test of varieties of.. 515
Pigs, *see* Swine.
Potatoes, experiments with.. 518
Test of varieties of.. 518
Poultry.. 525
Samples distributed.. 530
Season, character of.. 511
Sheep.. 524
Shrubs.. 527
Spring Wheat, *see* Wheat, Spring.
Sugar Beets, *see* Beets, Sugar.
Swine.. 525
Trees, forest, plantation of.. 526, 527

Experimental Farm, Brandon—*Con.* PAGE.
Trees—*Con.*
Nut.. 525, 526
Ornamental.. 527
Turnips, experiments with.. 516
Test of varieties of.. 516
Vegetables.. 519-524
Beans.. 521
Beets.. 519
Brocoli.. 523
Brussels Sprouts.. 522
Cabbage.. 521
Carrots.. 521
Cauliflower.. 522
Celery.. 523
Corn.. 523
Lettuce.. 520
Onions.. 523
Parsnip.. 521
Peas.. 520
Radish.. 520
Spinach.. 523
Squash.. 524
Turnips.. 519
Wheat, Spring, experiments with.. 511
Test of varieties of.. 512

Experimental Farm, Brandon—
Report of the Superintendent... 351
Alfalfa, experiments with.. 371-375
New Seedings of.. 374
Tests of varieties of.. 372, 373, 374
Barley—
Chopped for fattening swine.. 384, 385, 386
Experiments with.. 360
Field crops of.. 361
Smut of, loose, treatment for.. 356
Six-row, average yield for 5 years.. 361
Test of varieties of.. 360
Two-row, average yield for five years.. 361
Test of varieties of.. 360
Beef production. (*See* Cattle).. 381
Bees.. 338
Beets, sugar, experiments with.. 365
Test of varieties of.. 365
Carrots, experiments with.. 365
Test of varieties of.. 365
Cattle.. 380
Beef production.. 381
Beef, Methods of Feeding.. 381
Fed inside stables.. 381
outside stables.. 381
Steers, feeding experiments in 1909-1910.. 381
Herd on hand.. 380
Milk record.. 381

Experimental Farm, Agassiz—*Con* PAGE.
Corn, Indian—
Field lots of.. 380
Growing of in Manitoba.. 376-379
Test of varieties of.. 380
Correspondence.. 394
Clovers.. 375
Crop rotations, *see* Rotations.
Crops in Manitoba.. 351
On experimental farm.. 352
Summary of.. 376
Exhibitions.. 394
Fencing.. 387
Flowers.. 393
Roses.. 393
Sweet Peas, planted in fall.. 393
Fruits.. 392
Apples.. 392
Strawberries.. 392
Grains, mixed, experiments with.. 362, 363
For fattening swine.. 385
Grasses.. 375
Horses.. 386
Indian Corn, *see* Corn, Indian.
Mangels, experiments with.. 364
Home-grown *vs.* Commercial Seed.. 366
Test of varieties of.. 364
Meteorological records.. 395
Milk records.. 381
Mixed Grains, *see* Grains, Mixed.
Oats, average for five years.. 359
Experiments with.. 358
Field crops of.. 359
Smut of, loose, treatment for.. 356
Test of varieties of.. 358
Peas, experiments with.. 361
Test of varieties of.. 362
Pigs, *see* Swine.
Potatoes, experiments with.. 366
Test of varieties of.. 367
Poultry.. 386
Rotations, in Manitoba.. 367
Kinds of.. 368, 369, 370
Necessity for.. 367, 368
Value of.. 367, 368, 370
Samples distributed.. 394
Season, character of.. 351
Seed, Root—
Test of Home-grown *vs.* Commercial. 366
Sheep.. 386
Silos.. 378, 379

Experimental Farm, Brandon—*Con.*
PAGE.
Smut—
Treatments for.. .. .. 356, 357
Spring Wheat, *see* Wheat, Spring.
Steers, Feeding of, *see* under Cattle.
Sugar Beets, *see* Beets, Sugar.
Summary of crops.. 376
Swine.. 384
Fattening experiment.. 384
Tankage, digester, for fattening swine.. .. .. 384, 385, 386
Turnips, experiments with.. 363
Home-grown *vs.* Commercial Seed.. 366
Test of varieties.. 364
Vegetables.. 388
Asparagus.. 388
Beets.. 389
Cabbage.. 390
Carrots.. 388
Cauliflower.. 390
Citrons.. 391
Kohl-Rabi.. 390
Marrows.. 390
Melons.. 391
Onions.. 389
Parsnips.. 389
Pumpkins.. 390
Squash.. 390
Tomatoes.. 391
Wonderberry.. 392
Weather.. 351
Wheat—
Smut, loose, treatment of.. 357
Smut, stinking, treatment of 356, 357
Standard and Commercial Grades of. 355
Spring, average for five years.. .. 354
Experiments with.. 352
Field crops of.. .. .. 354, 355
Test of varieties of.. 353
Winter, experiments with.. 356
Winter Wheat, *see* Wheat, Winter.
Yaks.. 387

Experimental Station, Cap Rouge—
Report of the Superintendent.. .. 347
Correspondence.. 350
Meeting attended.. 350
Station, description of.. 347
Accessories.. 348
Access, facilities of.. 347
Area.. 347
Buildings.. 348
Drainage.. 347
Fences.. 347
Implements.. 348
Situation.. 347
Soil.. 347

Experimental Station, Cap Rouge—*Con.*
PAGE.
Visitors.. 350
Weather during January, February, March.. 350
Work planned and in progress.. 348
Agricultural and live stock division. 348
Bees.. 349
Cattle.. 349
Clearing land.. 349
Farm Work.. 348
Horses.. 349
Poultry.. 349
Sheep.. 349
Swine.. 349
Cereal Division.. 349
Horticultural Division.. 349

Experimental Station, Charlottetown—Report of the Superintendent.. 295
Alfalfa, experiments with.. 305
Barley, acre plots of.. 300
Experiments with.. 299
Six-row, test of varieties.. 299
Two-row, test of varieties.. 300
Buckwheat, Silverhull, acre plot of.. 301
Buildings.. 306
Carrots, experiments with.. 304
Test of varieties of.. 304
Corn, Indian, experiments with.. .. 301
Test of varieties of.. 302
Correspondence.. 314
Drainage.. 306
System of, on station.. 306
Wells for.. 306
Exhibitions attended.. 314
Farm, addition to.. 306
Fencing.. 306
Flowers.. 310
Annuals.. 311
Cannas.. 312
Dahlias.. 312
Gladioli.. 312
Irises.. 312
Paeonies.. 313
Perennials.. .. .. 311, 313
Roses.. 313
Fruits, Small.. 308
Blackberries.. 308
Currants.. 308
Dewberries.. 309
Gooseberries.. 308
Grapes.. 308
Raspberries.. 308
Strawberries.. 309

Experimental Station, Charlottetown— *Con.* PAGE.

Grains, Mixed, crops of.. 302
Horses.. 307
Indian Corn, *see* Corn, Indian.
Mangels, experiments with.. 303
Test of varieties of.. 303
Meetings, Agricultural, attended.. .. 314
Meteorological records.. 315
Mixed Grains, *see* Grains, Mixed.
Oats—
Black, acre plots of.. 299
Experiments with.. 297
Test of varieties of.. 298
White, acre plots of.. 298
Orchards—
Apple.. 307
Cherry.. 308
Pear.. 308
Plum.. 308
Stock for.. 307
Treatment of.. 307
Peas, experiments with.. 300
Test of varieties of.. 301
Potatoes, experiments with.. 304
Test of varieties of.. 305
Season, Character of the.. .. .. .. 295, 315
Seed Fairs.. 314
Shrubs.. 309
Spring Wheat, *see* Wheat, Spring.
Sugar Beets, experiments with.. 304
Test of varieties of.. 304
Swedes, *see* Turnips.
Timothy, crops of.. 305
Trees, Ornamental.. 309
Truro Short Course.. 314
Turnips, Club-Root of.. 303
Experiments with.. 302
Test of varieties of.. 302
Vegetables.. 309
Asparagus.. 309
Beans.. 309
Beets.. 309
Brocoli.. 309
Brussels Sprouts.. 309
Cabbage.. 310
Carrots.. 310
Cauliflower.. 310
Corn (table).. 310
Cucumbers.. 310
Lettuce.. 310
Onions.. 310
Peas.. 310
Radishes.. 310
Squash.. 310

Experimental Station, Charlottetown— *Con.* PAGE.

Vegetables—*Con.*
Tomatoes.. 310
Turnips.. 310
Visitors.. 314
Wheat, Spring, experiments with.. .. 296
Quarter acre lots of.. 297
Test of varieties of.. 293
Work, General, done during year.. .. 307

Experimental Farm, Indian Head—
Report of the Superintendent.. .. 397
Alfalfa.. 408-410
Culture of.. 408
Harvesting of.. 409
Seedings of.. 409
Sown on different dates.. 410
Varieties tested.. 409-410
Backsetting.. 425
Barley—
Average and total yields of.. 403
Experiments with.. 402
Field lots of.. 403
five years' comparison of.. 403
Soil Packing test with.. 406
Six-rowed, test of varieties.. 402
Two-row, test of varieties.. 402
Bees.. 432
Beets, Sugar, test of varieties of.. .. 413
Breaking.. 425
Carrots, test of varieties of.. 412
Cattle.. 431
Feeding test of.. 431
Clover, Red.. 411
Corn, Indian, experiments with.. .. 411
Test of varieties of.. 411
Correspondence.. 432
Crop rotations, *see* Rotations.
Crops, summary of.. 405
Distribution of samples.. 432
Excursions to Farm.. 424
Fallowing.. 425
Farm, improvements to, *see* Improvements.
Flax.. 406
Flowers.. 420
Annuals.. .. .. 420, 421
Perennials.. .. .. 421, 422
Roses.. .. .. 422, 423
Fruits—
Apples, cross-bred varieties received. 425
Crops of.. 425
Small.. .. .. 423, 443
Currants.. 423

Experimental Farm, Indian Head—*Con.*
Fruits—*Con.* PAGE.
Gooseberries.. 424
Raspberries.. 423, 424
Strawberries.. 424
Grasses.. 411
Horses.. 431
Improvements to farm.. 424, 425
Engine house.. 425
Fencing.. 425
Sheep house.. 425
Silo.. 424
Indian Corn, *see* Corn, Indian.
Mangels, test of varieties of.. 412
Meteorological records.. 433
Oats—
Average and total yields.. 401
Experiments with.. 399
Field lots of.. 401
five years' comparison of.. 401
Soil packing, test of, on.. 407
Test of varieties of.. 400
Peas, experiments with.. 404
Field lots of.. 404
Soil packing, test of, on.. 407
Test of varieties of.. 404
Potatoes—
Test of varieties of.. 413
Poultry.. 431
Preparing land for grain crops in Saskatchewan.. 425
Roots, field, experiments with.. 411-413
Rotations.. 407
Rotation tests.. 408
Rye, Fall.. 406
Samples, distribution of.. 432
Season, character of.. 397
Seed distribution.. 432
Sheep.. 431
Shrubs.. 424
Smut, treatment for.. 406
Soil packing, applied to barley.. 406
Applied to oats.. 407
Applied to peas.. 407
Sugar Beets, *see* Beets, Sugar.
Summary of crops.. 405
Swine.. 431
Trees, ornamental and forest.. 424
Turnips, test of varieties of.. 412
Vegetables.. 414
Asparagus.. 414
Beets.. 414

Experimental Farm, Indian Head—*Con*
Vegetables—*Con.* PAGE
Cabbage.. 415
Carrots.. 416
Cauliflower.. 416
Celery.. 416
Citrons.. 415
Corn.. 417
Cress.. 419
Cucumbers.. 416
Lettuce.. 419
Melons.. 415
Onions.. 417, 418
Parsley.. 418
Parsnips.. 419
Peas.. 417
Peppers.. 419
Pumpkins.. 418
Radish.. 418
Rhubarb.. 415
Sage.. 419
Savory.. 419
Spinach.. 418
Squash.. 418
Tomatoes.. 418
Wheat, Fall.. 399
Wheat, Spring—
Average and total yields of.. 399
Field lots of.. 398
four years' comparison of.. 399
Experiments with.. 397
Test of varieties of.. 398

Experimental Station, Lacombe, Alta.—Report of the Superintendent.. 481
Acknowledgment.. 510
Alfalfa, comparison of inoculated soil with culture.. 496, 497
Different strains, hardiness of.. 495, 496
Experiments with.. 495
Barley, dates of sowing.. 489
Experiments with.. 489
Fields lots of.. 491
Rates of seed per acre.. 490
Test of soil packer on.. 491
Six-row, test of varieties of.. 489
Two-row, test of varieties of.. 489
Beef production, *see* Cattle.
Beets, Sugar, test of varieties of.. 499, 500
Buildings.. 509
Carrots, tests of varieties of.. 499
Cattle.. 507
Number on hand.. 507
Beef, feeding experiment.. 507-509
Clovers.. 497
Corn, Indian, experiments with.. 497

Experimental Station, Lacombe—*Con.*
Corn—*Con.* PAGE.
Test of varieties of.. 498
Correspondence.. 509
Crop Rotations, *see* Rotations.
Crops, summary of.. 505
Culture *versus* Inoculated soil for Alfalfa.. .. .. 496, 497
Distribution of samples.. 510
Emmer, experiments with.. 485
Excursion to station.. 510
Fertilizer, commercial, applied to potatoes.. 501
Fertilizer, commercial, applied to spring wheat.. 485
Flowers—
Annuals.. 506
Perennials.. .. .. 506, 507
Cannas.. 507
Crocus.. 507
Dahlias.. 507
Roses.. 507
Tulips.. 507
Fruits—
Apple.. 502
Small.. 502
Blackberries.. 503
Currants, black.. 503
red.. 502
white.. 503
Raspberries.. 503
Grain crops, cost of production of.. .. 494
Grasses.. 497
Horses.. 509
Indian Corn, *see* Corn, Indian.
Mangels—
Test of varieties of.. 499
Meeting attended.. 509
Meteorological records.. 510
Oats—
Clean seed, test of.. .. .. 487, 488
Cost of production on station.. 494, 495
Dates of sowing.. .. .. 486, 487
Experiments with.. 486
Field lots of.. 488
Rates of seed per acre.. 487
Test of soil packer on.. 491
Test of varieties of.. 486
Grown with peas for green feed or hay.. 495
Peas, experiments with.. 492
Test of varieties of.. 492
Grown with oats for green feed or hay.. 495

Experimental Station, Lacombe—*Con.*
Potatoes— PAGE.
Cut *versus* whole seed.. 502
Experiments with.. 500
Planted as soon as cut *vs.* held.. .. 501
Planted at different depths.. 501
Test of commercial fertilizers on.. 501
Test of varieties of.. 500
Poultry.. 509
Rotations.. 492-494
Rye, experiments with.. 485
Samples, distribution of.. 510
Season, character of.. 481
Soil, inoculated, compared with culture for Alfalfa.. .. .. 496, 497
Soil packer, test of, on barley, wheat, and oats.. 491
Value in reducing cost of production.. 494
Spelt, experiments with.. 485
Spring Wheat, *see* Wheat, Spring.
Sugar Beets, *see* Beets, Sugar.
Trees, plantations of, on station.. .. 503
Turnips, test of varieties of.. 498
Vegetables.. 503-505
Asparagus.. 503
Beans.. 503
Beets.. 504
Brocoli.. 504
Brussels Sprouts.. 504
Cabbage.. 504
Carrots.. 504
Cauliflower.. 504
Celery.. 504
Corn.. 504
Lettuce.. 505
Onions.. 505
Radish.. 505
Rhubarb.. 505
Tomatoes.. 505
Turnips.. 505
Wheat, test of soil packer on.. 491
Spring, dates of sowing.. 483
Experiments with.. 483
Fertilizers, commercial, applied to. 484
Field lots of.. 485
Rates of seed per acre.. 484
Test of varieties of.. 483
Wheat, Winter.. 482
Dates of sowing.. 481
Experiments with.. 481
Rates of seed per acre.. 482
Winter Wheat, *see* Wheat, Winter.

Experimental Station, Lethbridge, Alta.—Report of the Superintendent.. .. .. PAGE. 443
Season, character of.. 443
Effect of, on Winter Wheat.. 444
Two Farms.. 444

PART I.—THE NON-IRRIGATED OR DRY FARM.. 444-460
Backsetting.. 450
Barley, experiments with.. 455
Rates of seed per acre.. 456
Six-row, test of varieties.. 455
Two-row, test of varieties.. 455
Winter.. 456
Beets, Sugar, experiments with.. 458
Test of varieties of.. 458
Breaking.. 450
Carrots, experiments with.. 458
Test of varieties of.. 458
Corn, Indian.. 457
Crops, Forage.. 459
Summary of.. 460
Culture of Winter and of Spring Wheat.. 450-453
Forage crops.. 459
Fruits.. 460
Indian Corn, *see* Corn, Indian.
Mangels, experiments with.. 457
Test of varieties of.. 457
Oats, experiments with.. 453
Field lots of.. 454
Rates of seed per acre.. 454
Test of varieties of.. 453
Peas, experiments with.. 456
Test of varieties of.. 456
Potatoes—
Experiments with.. 458
Planted at different distances.. 459
Test of varieties of.. 459
Rye, Winter—
Test of varieties.. 456
Sod, preparation of, for Wheat.. 450
Sugar beets, *see* Beets, Sugar.
Summary of crops.. 460
Summer Fallowing.. 451
Turnips.. 457
Wheat—
Smut, treatment of.. 453
Spring, experiments with.. 447
Field lots of.. 448
Rates of seed per acre.. .. .. 448, 449
Test of varieties of.. .. .. 447, 448
Time to sow.. 452

Experimental Station, Lethbridge—*Con.*
Wheat, Winter— PAGE.
Culture of.. 450-453
Experiments with.. 445
Field lots of.. 446
Harrowing in Spring.. 445
Rates of seed per acre.. 447
Sown in Spring.. 449
Test of varieties of.. 445
Time to sow.. .. .. 446, 452

PART II. THE IRRIGATED FARM.
Alfalfa.. 469
Mixed with grasses.. .. .. 471, 472
Rates of seed per acre.. 470
Varieties of.. 472
Barley—
Experiments with.. 463
Field lots of.. 464
Rates of seed per acre.. 464
Six-row, test of varieties.. 463
Two-row, test of varieties.. 463
Beets, Sugar, experiments with.. .. 467
Test of varieties of.. 467
Brome Grass.. 473
Carrots.. 466
Test of varieties of.. 467
Cattle.. 476
Clover.. 473
Inoculation test with.. 473
Red, yield of.. 473
Conventions attended.. 476
Corn, Indian.. 465
Correspondence.. 477
Crops, Forage.. 469-474
Summary of.. 474
Cultural problems.. 477
Distribution of samples.. 476
Flowers.. 476
Forage crops, *see* Crops.
Fruits, small.. .. .. 474, 475
Currants.. 474
Raspberries.. 474
Strawberries.. 474
Grasses.. .. .. 473, 474
Mixed with Alfalfa.. .. .. 471, 472
Horses.. 476
Mangels—
Experiments with.. 466
Test of varieties of.. 466
Meetings attended.. 476
Meteorological report.. 479
Oats, experiments with.. 462
Field lots of.. 462

Experimental Station, Lethbridge—*Con.*

Oats—*Con.* PAGE.
Rates of seed per acre.. .. .. .. 462, 463
Test of varieties of.. 462
Orchards, growth of.. 474
Peas, experiments with.. 464
Test of varieties of.. 465
Potatoes, experiments with.. 467
Test of varieties of.. .. .. 468, 469
Roots, Field—
Conditions for, in 1910.. 465
Rotation problems.. 478
Rotations on irrigated land.. 478
Samples, distribution of.. 476
Shrubs.. 475
Soil, inoculated, distribution of.. 477
Sugar Beets, *see* Beets, Sugar.
Summary of crops.. 474
Timothy.. 473
Trees, ornamental 475
Turnips, experiments with.. 465
Test of varieties of.. 466
Vegetables.. 475
Asparagus.. 476
Irrigating.. 475
Method of planting.. 475
Rhubarb.. 476
Western Rye Grass.. 474
Wheat, Spring, experiments with.. .. 461
Rates of Seed per acre.. 461
Test of varieties of.. 461
Winter.. 460

Experimental Farm, Nappan—

Report of the Superintendent.. .. 317
Alfalfa, experiments with.. 333
Barley, experiments with.. 321
Field crops of.. 321
Six-row, test of varieties.. 322
Two-row, test of varieties.. 322
Bees.. 343
Buckwheat, experiments with.. 323
Field crop of.. 323
Test of varieties.. 323
Carrots, experiments with.. 330
Test of varieties.. 331
Cattle.. 341
Steer feeding experiment.. .. .. 341, 342
Clover, experiments with.. .. .. .. 332, 333
Corn, Indian, crops of, in 1910.. 336
Experiments with.. 324
Field crop of.. 324
Test of varieties of.. 324

Experimental Farm, Nappan—*Con.*

PAGE.
Correspondence.. 313
Crops, summary of, 1910.. 336
Distribution of seed.. 343
Durum Wheat.. 318
Emmer.. 319
Exhibitions.. 343
Fertilizers—
Commercial, and lime on marsh land.. 335
Applied to mangels.. 330
run-out land.. .. .. 333, 334
turnips.. .. .. 326, 327
Special experiments with.. .. .. 331, 335
Fruit crops.. 337
Apples.. 337
Strawberries.. 337
Grain, crops of, in 1910.. 336
Mixed, crops of.. .. .. 320, 321
Hay, crops of, in 1910.. .. .. 335, 336
Horses.. 341
Indian Corn, *see* Corn, Indian.
Land, run-out, experiments with.. .. 333
Crops on.. 334
Lime, applied to marsh or dyke lands. 335
Macaroni wheat.. 318
Mangels, crops of, in 1910.. 336
Effects of manure and fertilizers on. 330
Experiments with.. 329
Field crops of.. .. .. 329, 330
Test of varieties of.. 329
Manure, barnyard—
Applied to mangels.. 330
run-out land.. .. .. 333, 334
turnips.. .. .. 326, 327
Special experiments with.. .. .. 331, 335
Meteorological records.. .. .. 345, 346
Mixed Grains, *see* Grains, Mixed.
Oats, Experiments with.. 319
Field crop of.. .. .. 320, 321
on marsh.. 320
Test of varieties of.. 320
Peas, experiments with.. 322
Test of varieties.. 323
Potatoes, experiments with.. 332
Test of varieties.. 332
Poultry.. 312
Precipitation.. 346
Seed distribution.. 343
Sheep.. 342
Spelt.. 319
Spring Wheat, *see* Wheat, Spring.

Experimental Farm, Nappan—*Con.*
Steers, *see* Cattle. PAGE.
Sugar Beets, experiments with.. 331
Test of varieties of.. 331
Turnips, crops of, in 1910.. 336
Effects of manure and fertilizers on.. .. .. 326, 327
Experiments with.. 325
Field crop No. 1.. 325
No. 2.. 325
Field crop, test of varieties in.. 326, 327
Test of varieties of.. 325
Vegetable crops.. 337
Beans.. 338
Beets.. 339
Brocoli.. 339
Brussels Sprouts.. 339
Cabbage.. 339
Carrots.. 338
Cauliflower.. 339
Celery.. 340
Corn.. 340
Cucumbers.. 339
Lettuce.. 339
Onions.. 339
Parsnips.. 338
Peas.. .. .. 337, 338
Radish.. 339
Squash.. 339
Tomatoes.. 340
Turnips.. 339
Visitors.. 343
Weather.. .. .. 344, 345, 346
Wheat, Durum or Macaroni.. 318
Emmer, test of varieties of.. 319
Spelt, test of varieties of.. 319
Spring, experiments with.. 317
Field crop of.. 318
Test of varieties.. 318

Experimental Station, Rosthern, Sask.—Report of the Superintendent.. 435
Barley.. 437
Beets.. 439
Buckwheat.. 437
Building.. 441
Carrots.. 438
Cattle.. 442
Correspondence.. 442
Flax.. 437
Garden, The.. 440
Horses.. 442
Mangels, test of varieties.. 438
Meetings.. 442
Meteorological.. 442
Oats, field lots of.. 437
Plants, house.. 440

Experimental Station, Rosthern—*Con.*
Potatoes— PAGE.
Test of local seed.. .. .. 439, 440
Test of varieties.. 439
Season, character of.. 435
Sewage, disposal of, on station.. 441
Shrubs.. 440
Sugar Beets, *see* Beets, Sugar.
Trees, ornamental.. 440
Turnips, test of varieties.. 438
Water supply on station.. 441
Wheat, Spring, field lots of.. 436
Test of varieties of.. .. .. 435, 436
Fairfield, W. H., Superintendent, Experimental Station, Lethbridge, Alberta—Report of.. 443
Gilbert, A. G., Poultry Manager—Report of.. 275
Grisdale, J. H., Agriculturist—Report of.. 55
Güssow, H. T., Botanist—Report of.. 237
Hutton, G. H., Superintendent Experimental Station, Lacombe, Alberta—Report of.. 481
Hewitt, C. G., Entomologist—Report of.. 207

Horticulturist, Report of.. 101
Acknowledgments.. 104
Apples, Adney, Tappan, Upper Woodstock, N.B., from.. .. .. ..107, 108
American Golden Russet Seedlings, characteristics of 113
Bingo, description of.. 110
Bittersweet, description of.. .. 108
Bowman, Geo., Spring Valley, Ont., from.. 108
Carno, description of.. 110
Cora, description of.. 110
Crab seedling from M. G. Hagerman, Toronto, Ont .. 108
Crab, Raymond Red.. 107
from C. L. Stephens, Orillia, Ont 108
Darcy, Mrs. Denis, Sheenboro, Ont., description of.. 110
Fameuse Seedlings, characteristics of.. 113
Gano Seedlings, characteristics of.. 113
Glenton, description of.. 111
Individuality of trees.. 119
Kildare, description of.. 111
Kim, description of.. 111
Langford Beauty Seedlings, characteristics of.. 113

Horticulturist, Report of—*Con.* PAGE.
Apples—*Con.*
Lawver Seedlings, characteristics of.. 113
Luke, description of.. 111
MacLeod, F. S., Hintonburgh, Ont., from.. 108
McIntosh Seedlings, characteristics of.. 113
Munro Sweet, description of.. 109
Niobe, description of.. 111
Norfolk Beauty (Strawberry King), description of.. 109
Northern Spy Seedlings, characteristics of.. 113
Originated in the Horticultural Division, C.E.F.. 110
Peabody Greening, description of.. 108
Ripon, description of.. 111
Rocket, description of.. 112
Roger, description of.. 112
Rosalie, description of.. 112
Salome Seedlings, characteristics of.. 113
Seedling from W. Judge, Orangeville, Ont., description of.. 109
Seedling from W. J. Kerr, Woodroffe, Ont., description of... 109
Seedling from Geo. L. Moore, Belleville Ont.. 108
Seedling from Alex. McNeill, Ottawa, Ont.. 108
Seedling from T. C. Paddon, Toronto, Ont.. 108
Seedling from George W. White, Woodstock, N.B.. .. 108
Seedling from Mr. Wylie, St. Andrews, N.B., description of.. 109
Seton, description of.. 112
Shiawassee Seedlings, characteristics of.. 113
Sport of Pewaukee from G. D. Morse, Nictaux, N.S.. 108
Stephens, C. L., Orillia, Ont., from.. 108
St. George, C.B., Tramore, Ont., from.. 108
Swazie Seedlings, characteristics of.. 113
Taylor, W. R., Aylmer, Que., from, description of.. 109
Trees, individuality of.. 119
" " yields of from third to twenty second year after planting.. 116

Horticulturist, Report of—*Con.* PAGE.
Apples—*Con.*
Verreault, A. D., Village des Aulnaies, Que., from.. 108
Wealthy Seedlings, characteristics of.. 113
Wiley, description of.. 108
Woodstock Blossom.. 108
Yield of fruit per tree from date of planting.. 117
Arboretum and Botanic Garden 105
Characteristics of the fruit of seedling apples at the C.E.F., tabulated.. .. ..114, 115
Characteristics of apple seedlings originated in the Horticultural Division, C.E.F.. 112
Character of season.. 102
Cherries, crop of.. 118
Colorado Potato Beetle, experiments with insecticides for controlling. 130, 131, 132
Donations.. .. ..104, 105
Forest Belts, Central Experimental Farm.. 133
Forest Belts, Central Experimental Farm, growth of trees in.. .. ..134, 135
Fruit and vegetable crops.. 103
seedlings, received for examination.. 107
Grapes, crop of.. 120
Insecticides, experiments with for controlling the Colorado Potato Beetle.. .. ..130, 131, 132
Letter of transmittal.. 101
Meetings attended, places visited, and addresses given.. 103
Plums, crop of.. 119
Seedling, Dara, description of. 119
from J. Kilpatrick, Ottawa, Ont 108
Potatoes.. 122
Beetle, Colorado, experiments with insecticides for controlling.. .. ..130, 131, 132
Change of seed.. .. ..127, 128
Spraying with Bordeaux mixture for prevention of Late Blight and Rot.. 127
Ten most productive varieties. 124, 125
Twelve most productive varieties.. 123
Twelve most productive varieties, when not sprayed.. ..125, 126
Thirty most productive varieties. 124
Seedling fruits received for examination.. 107

Horticulturist, Report of—*Con.* PAGE.
Small fruits, crops of.. 120
Spraying to control oyster shell scale or bark louse.. 129
Experiments.. 129
with insecticides for controlling the Colorado Potato Beetle.. .. ..130, 131, 132
with lime-sulphur for Gooseberry Mildew.. 130
Potatoes for prevention of Late Blight and Rot.. 127
Tomatoes, results from selection.. .. 129
Selection to develop superior early strains.. 128
Trees, growth of in Forest Belts at the C.E.F.. .. ..134, 135
Vegetable and fruit crops.. 103
Farmers' List of Best. 120, 121, 122
Langelier, G. A., Superintendent, Experimental Station, Cap Rouge, Que., Report of.. 347
Mackay, A., Superintendent, Experimental Farm, Indian Head. Sask., Report of.. 397
Macoun, W. T., Horticulturist, Report of.. 101
Murray, James, Superintendent, Experimental Farm, Brandon, Man., Report of.. 351
Munro, Wm. A., Superintendent, Experimental Station at Rosthern, Sask., Report of.. 435

Poultry Manager—Report of the.. .. 277
Artificial and Natural Incubation.. .. 237
Adoption of the Co-operative Principle.. 281
Association Rulings.. 283
Association Grading of Eggs.. 282
Breeding Pens made up.. 286
Better quality in Poultry in Demand. 278
Co-operative Principle, Adoption of the... 281
Classification of Poultry and Eggs.. .. 281
Commercial grading of Eggs.. 284
Definition of Poultry Terms.. 281

Poultry Manager, Report of—*Con.* PAGE.
Description of Egg Contents.. 284
Experimental Work of the Year.. .. 286
Eggs for Hatching.. 286
Experiments with egg preservatives.. 293
Free Range *vs.* Limited Runs.. 288
Fertilization of Eggs.. 289
Grading of Eggs, Association.. 282
Commercial.. 284
How the Candler selects Eggs.. 284
Hatching Results from different Groups.. 287
Increasing Value of the Home Market. 277
Incubation, Natural and Artificial.. .. 287
Natural and Artificial Incubation.. 287
Number of Eggs laid during the Year. 291
Prices paid by leading Purchasers.. 279
Poultry and how Graded.. 282
Progress of the Chickens.. 287
Preservatives, egg, experiments with. 293
Practices which should be avoided by Shippers.. 285
Rulings, Association.. 283
Rules governing Association Branches or Circles.. 283
Strictly new-laid Eggs only, desirable. 278
Selection of Eggs by Candlers.. 284
Suggestions for formation of Branches or circles.. 283
Stock and Eggs sold during the year. 292
Stock on Hand.. 293
Terms, Poultry, Definition of.. 281
Too many doubtful Eggs brought to Market.. 284
Value of Eggs and Poultry Exported. 278
When the Pullets commenced to lay.. 291
Robertson, R., Superintendent. Experimental Farm, Nappan, N.S., Report of.. 317
Saunders, C. E., Cerealist, Report of. 137
Saunders, Wm., Director, Report of.. 5
Sharpe, Thos. A., Superintendent, Experimental Farm, Agassiz, B.C., Report of.. 511
Shutt, F. T., Chemist, Report of.. .. 161