DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

CAP ROUGE, QUE.

INTERIM REPORT OF THE SUPERINTENDENT

DR. G. A. LANGELIER

FOR THE YEAR 1921

A fine French Canadian filly.

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1922.

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OTTAWA
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PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

EXPERIMENTAL STATION, CAP ROUGE, QUE.

G. A. LANGELIER, SUPERINTENDENT

THE SEASON

The six months, May to October inclusive, during which plants grow in central Quebec, were warmer, drier, and brighter than the average of the last ten years for the same period, the figures being respectively 57·52° and 56·81° F. for mean temperature, 21·17 and 25·13 inches for total precipitation, and 1,222·8 and 1,108·1 hours for sunshine. The main feature, from a meteorological point of view, was the prolonged drought of the early part of summer, which cut down the yield of hay by about a half and that of most cereals by over 25 per cent.

Precipitation is undoubtedly one of the main factors in agriculture, and local showers sometimes give a fair crop to a locality distant only a few miles from where there is nearly a failure. This explanation is necessary in giving details about what was grown at Cap Rouge in 1921:—

Very Good.—Corn for silage, field peas, apples, plums, sweet corn, potatoes, tomatoes;

Good.—Barley, flax, oats, wheat, cherries, grapes, raspberries, cabbage, ornamental plants and bushes;

Medium.—Field roots, beans, currants, gooseberries, strawberries, celery;

Bad.—Hay, pastures until late summer.

METEOROLOGICAL RECORDS, 1921

Month	Temperature °F.			Precipitation—Inches			Total Sunshine
	Highest	Lowest	Mean	Rainfall	Snowfall	Total	
							hours
January	39·0	−16·9	17·4	0·50	19·60	2·46	71·0
February	40·0	−13·9	13·43	0·10	7·00	0·80	81·7
March	52·0	− 2·1	28·05	3·78	7·50	4·53	127·5
April	79·0	16·2	40·07	1·74	2·40	1·98	173·9
May	85·0	30·2	55·71	0·80	.....	0·80	274·7
June	88·0	38·2	50·86	1·94	.....	1·94	235·0
July	96·0	46·2	72·2	4·16	.....	4·16	216·4
August	85·0	45·2	63·3	4·60	.....	4·60	210·6
September	87·0	36·2	58·2	5·01	.....	6·01	187·1
October	79·0	25·2	44·83	4·66	.....	4·66	99·0
November	62·0	5·2	27·58	1·18	22·70	3·45	46·6
December	41·0	−18·0	15·65	1·07	14·70	2·54	54·6
Total	.....	.....	.....	29·54	73·90	36·93	1,778·1

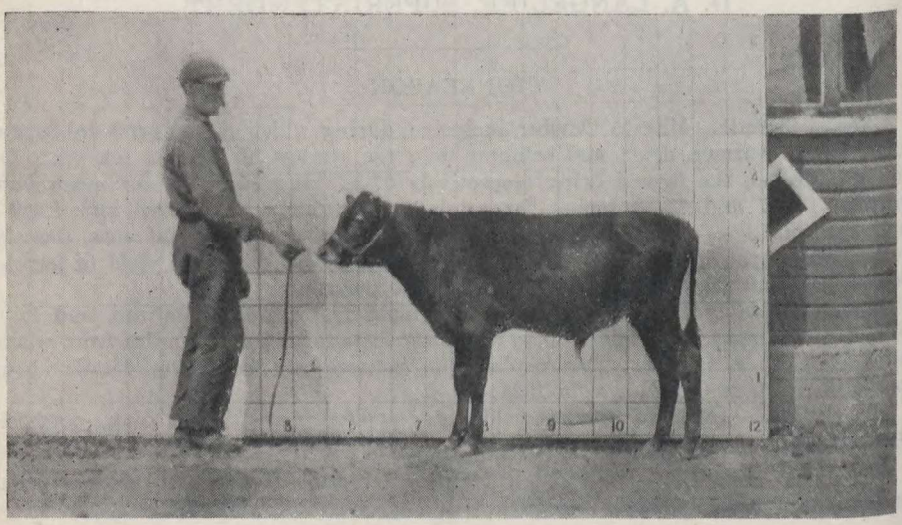
ANIMAL HUSBANDRY

The live stock on the Station consists of French-Canadian cattle, French-Canadian horses, and Leicester sheep, all pure-bred.

DAIRY CATTLE

The herd of French-Canadians numbered 59 head on December 31, 1921, made up as follows: four bulls, twenty-two cows, sixteen heifers, seventeen calves. There are more females qualified for Record of Performance at Cap Rouge, at the end of

1921, than in any other herd in existence. Three champions, two-year-old, three-year-old, and four-year-old, are in the same stable; three of the four bulls were born at Cap Rouge and are out of cows which qualified for Record of Performance in that same stable.



A promising French Canadian calf.

In the following table the figures used were the average for the district. It can thus safely be said that the eighteen cows mentioned on the list gave an actual profit of over $1,000 over the cost of feed. This is neglecting such charges as interest, barn room, labour, bedding, but, on the other hand, no credit is given for the value of the calves and of the manure. A herd of cattle such as is at Cap Rouge now is a good paying proposition:—

Record of Cows Which Finished a Lactation Period During the Year Ending December 31, 1921

Name of cow	Registration No.	Age at beginning of lactation period.	Date of dropping calf	Number of days in lactation period	Total pounds of milk for lactation period	Daily average yield of milk	Average per cent. fat in milk	Pounds of butter produced during lactation period	Value of butter at 40 cts. per pound	Value of skim-milk at 25 cts. per 100 pounds	Total value of products	Pounds of meal eaten at 2 cts. per pound	Pounds of roots and ensilage eaten at $4.00 per ton	Pounds of hay eaten at $15.00 per ton.	Pounds of green feed eaten at $6.00 per ton	Days on pasture at $2.00 per month.	Total cost of feed between calving	Cost to produce 100 pounds of milk	Cost to produce 1 pound of butter, skim-milk neglected	Profit on 1 pound of butter, skim-milk neglected	Profit on cow between calving, labour manure and all neglected
									$ cts.	$ cts.	$ cts.						$ cts.	$ cts.			$ cts.
Aromas 3	2870	8	Mar. 28, 1921	275	3,622·25	13·17	4·4	185 20	74 08	8 65	82 73	891	2,130	2,435	765	218	57 19	1 579	0·423	0·091	25 54
Bruna Reine	3228	6	April 13, 1920	291	5,828·75	20·03	4·1	279·00	111 60	13 98	125 58	1988	4,260	1,918	200	183	75 26	1 290	0·270	0·130	50·32
Brunette de Cap Rouge	4171	3	Mar. 24, 1920	370	8,027·50	21·69	4·5	427·50	171 00	19 24	190 27	3,078	7,305	2,546	1,502	183	111 65	1 390	0·261	0·139	78 42
Denise Alda	3343	6	June 18, 1920	314	5,126·75	16·32	5·1	306·43	122 57	12 61	135 18	2,442	4,340	2,216	1,502	183	90 88	1 772	0·296	0·103	44·30
Dorienne	2022	9	April 27, 1920	364	12,483.00	34·29	4·1	605·41	242·16	29 92	272 08	4,113	8,370	2,590	1,502	183	134 90	1 080	0·223	0·177	137 18
Eglantine de Cap Rouge	4159	3	Sept. 9, 1919	489	5,419·75	11·08	5·9	376·70	150 68	12 75	164 35	2,242	8,907	3,304	110	225	102 76	1 896	0·272	0·128	60·67
Empire	2398	9	May 28, 1920	462	8,338·00	18·05	4·4	433·51	173 40	19 92	193 32	2,928	5,120	3,196	865	282	115 13	1 379	0·265	0·134	78 20
Fanchette F	1685	11	June 19, 1920	343	10,465.00	30·51	4·3	528·40	211 36	25 04	236 40	3,581	6,130	2,500	1,502	188	121 64	1 162	0·230	0·170	114 76
Fortune de Cap Rouge	4161	3	May 22, 1920	317	4,969·50	15·68	4·3	248·95	99 58	11 89	111 47	1,874	4,045	2,214	100	183	72 03	0 845	0·290	0·110	39 44
Gabrielle de Cap Rouge	4731	2	Nov. 15, 1920	367	4,678·50	12·75	4·7	258·59	103 43	11 14	114 57	2,636	6,360	2,304	1,125	153	97 31	2 082	0·376	0·023	17 26
Gaetane de Cap Rouge	4736	2	July 19, 1920	462	6,699·50	14·50	4·8	380·68	152 27	15 94	168 21	3,157	5,910	2,314	2,042	255	116 58	1 740	0·306	0·094	51 63
Gisèle de Cap Rouge	4622	2	July 3, 1920	405	7,125·50	17·59	4·6	385·48	154·19	16 99	171 18	3,425	5,675	2,293	2,092	218	116 79	1 639	0·303	0·097	54 39
Gougou de Cap Rouge	4724	2	July 22, 1920	388	8,171·75	21·06	3·9	379·46	151 78	19 62	171 40	3,452	6,005	2,192	2,292	195	117 45	1 437	0·309	0·090	53 95
La Brune du Sable	2440	15	Sept. 29, 1919	517	7,528·75	14·56	4·2	374·70	149 88	18 03	167 91	3,452	10,269	3,725	200	240	134 12	1 781	0·358	0·042	33 79
Nanette de St. Denis	2413	9	May 14, 1920	363	10,078.75	27·76	4·5	529·22	211 68	24 07	235 75	3,815	6,895	2,625	1,502	183	126·34	1·253	0·238	0·161	109 41
Orange Blossom	886	13	July 2, 1920	297	3,229·25	11·54	5·0	190·71	76·28	7 67	83 95	1,019	3,530	2,551	100	183	58 94	1 825	0·309	0·090	25 01
Pauline 3	2482	9	June 14, 1920	256	4,399·75	17·19	4·1	213·00	85·20	10·55	95·75	1,604	3,674	1,910	258	173	66 02	1·500	0·309	0·091	29 73
Princesse du Sable	2611	9	Sept. 1, 1919	642	10,546.25	16·43	4·2	521·92	208 76	25 25	234·01	4,122	10,817	4,479	462	278	157 58	1 494	0·302	0·098	75 43
Average for 18 head		7		384	7,041·03	18·33	4·4	368·05	147 22	16 68	163 90	2,768	6,097	2,628	1,007	206	104 00	1 477	0·283	0·117	59·90

Project 134.—*Improvement of a dairy herd with a sire of known productive ancestry.*—A French-Canadian heifer, Gougou de Cap Rouge—4724—is now the world's champion milk producer of the breed for her age, as she completed an official Record of Performance twelve months' test, commenced when she was only 2 years and 71 days old, during which she gave 7,992 pounds of milk and 313 pounds of fat. As the requirements were 4,560 pounds of milk and 205 pounds of fat, she gave 71 per cent more milk than asked for and 53 per cent more fat. Her average daily milk production for the whole 365 days was about 22 pounds, and she carried a calf during 226 days when making the record.

This heifer was born at the Experimental Station, Cap Rouge, and is an inbred daughter of Finette 2—218—by the latter's son, Victor de Cap Rouge—3818. This bull was also bred at the Cap Rouge Farm, and four of his daughters, out of different dams, will soon qualify for Record of Performance and enter the sire. Old Finette herself qualified a few years ago in the mature class, with 9,747 pounds of milk and 403 pounds fat, and another one of her daughters, Brunette de Cap Rouge—4171—, qualified as a two-year old with 5,867 pounds of milk and 285 pounds of fat, also as a three-year-old with 8,016 pounds of milk and 358 pounds of fat, coming within 79 pounds of the milk world record for her age. Brunette was bred at Cap Rouge and so was her sire, Delphis de Cap Rouge—3283—the second bull of the breed to qualify for Record of Performance. Gougou, by producing 7,992 pounds of milk at two years, should give about 11,419 when mature, as a two-year-old is expected to produced 70 per cent of the quantity a mature cow does. She would then be about 17 per cent better than her dam.

Many persons after reading this, will say that they wished they owned cows like old Finette, who produced one daughter with a world's record and another very nearly beating a world's record. But if they only owned cows like Finette, without having bulls like Victor or Delphis, they would not be likely to produce world beaters, as will soon be seen.

Exilée de Cap Rouge is out of Finette, but by a bull about whose ancestry nothing is known. During her first period of lactation she gave 4,453 pounds, or 11·08 per day, compared with Gougou's 7,992 pounds, or 22 daily milk yield. But Gougou is by Victor out of Finette, a Record of Performance cow.

Exilée, in her second lactation period, gave 5,178 pounds, or 15·83 per day, compared with Brunette's 8,027 pounds, or 21·69 daily milk yield. But Brunette is by Delphis out of Nanette, a cow which qualified four times for Record of Performance.

Another heifer out of Finette, but also by a bull about whose ancestry nothing is known, is Annette de Cap Rouge. During her first period of lactation she gave 4,253 pounds, or 10·93 per day, which is very near the same as Exilée. During her second period of lactation she gave 3,828 pounds, or 15·16 per day, which is about the same daily production as Exilée.

This seems a very clear case showing the importance of not only using a pure bred or registered bull, but one whose dam is a heavy producer. The same cow produced two poor heifers by registered bulls of unknown ancestry whilst she gave two very good heifers by registered bulls out of heavy producing dams.

Project 3.—*Comparison of whole milk with skim-milk and substitutes for raising calves.*—During three years, an experiment was conducted with thirty-eight calves which were fed differently until they were twenty-four weeks of age. One lot received whole milk; a second, skim-milk and a home mixed calf meal consisting of 6 parts corn, 3 parts oats, 1½ parts flax seed, by weight, all ground together; the last bunch, skim-milk and Royal Purple calf meal, a well-known commercial article. The following table gives details:—

Whole Milk

Year	Number of calves	Feed eaten by calves—Pounds								Weight of calves—Pounds						
		Whole milk	Skim-milk	Home made calf meal	Royal Purple calf meal	Dry meal	Hay	Silage	Roots	Birth	4 weeks	8 weeks	12 weeks	16 weeks	20 weeks	24 weeks
1917	3	2,591	.....	.....	.....	.....	218	80	140	67	104	148	207	255	305	372
1918	3	2,330	.....	.....	.....	.....	302	95	123	55	97	144	183	229	253	307
1919	3	2,174	.....	.....	.....	.....	130	194	.....	55	71	97	116	133	160	184
1920	3	2,475	.....	.....	.....	.....	244	.....	.....	51	88	129	172	218	263	311
Average	3	2,392	.....	.....	.....	.....	223	92	66	57	90	129	169	209	245	293

Skim-Milk and Home Mixed Calf Meal

Year	Number of calves	Feed eaten by calves—Pounds								Weight of calves—Pounds						
		Whole milk	Skim-milk	Home made calf meal	Royal Purple calf meal	Dry meal	Hay	Silage	Roots	Birth	4 weeks	8 weeks	12 weeks	16 weeks	20 weeks	24 weeks
1917	3	89·5	2,323	137	.....	129	220	152	103	66	98	128	170	211	239	290
1918	4	112	2,224	71	.....	72	312	117	362	69	110	144	178	205	242	271
1919	3	151	2,272	108	.....	91	240	.....	.....	66	92	127	159	200	245	270
1920	3	191	2,280	119	.....	98	212	94	.....	65	90	114	133	161	203	235
Average	3·25	136	2,275	109	.....	97	246	91	116	66	97	128	160	194	232	266

Skim-Milk and Royal Purple Calf Meal

Year	Number of calves	Feed eaten by calves—Pounds								Weight of calves—Pounds						
		Whole milk	Skim-milk	Home made calf meal	Royal Purple calf meal	Dry meal	Hay	Silage	Roots	Birth	4 weeks	8 weeks	12 weeks	16 weeks	20 weeks	24 weeks
1917	3	105	2,298	.....	138	127	224	285	243	70	103	154	183	215	252	295
1918	3	123	2,209	.....	74	70	305	151	287	67	102	133	166	213	260	288
1919	4	146	2,308	.....	99	100	307	38	.....	60	86	125	167	194	230	273
1920	3	195	2,223	.....	113	91	251	31	.....	50	90	120	153	185	221	247
Average	3·25	142	2,259	.....	106	97	272	126	132	62	95	133	167	202	241	276

From the above it is seen that the home mixed calf meal gave just as good results as the Royal Purple calf meal, and may reasonably be said to equal it in value. It rests with dairymen to ascertain the respective price of each kind of meal and to buy the one which will cost them the less per hundred pounds, delivered at their farms.

Project 6.—*Keeping cattle in single boarded sheds.*—Interest and depreciation mount to a round sum on costly buildings, and it is thought that only cows in milk and calves until they are about six months old require to be kept in expensive structures. At the Cap Rouge Station all the stock bulls, now numbering four, have been kept under single boarded sheds since 1915, and twenty-nine heifers have been wintered thus since 1918. These sheds front south, and the doors have not been shut half a dozen times during as many years. None of the animals seemed to suffer, and there is no doubt that the exercise and pure air have benefited many of them. A sluggish old bull, on the point of being discarded because he would not serve cows, was, after a winter thus passed outside, as sprightly as a yearling and a sure sire. It is probable that diseases such as tuberculosis would be much rarer and could be stamped out more easily if less tight housing of cattle was done.

HORSES

There are exactly one hundred horses at the Cap Rouge Station and at the St. Joachim Horse Farm. Out of this number there are four which are not pure-bred and ninety-six registered French Canadians. These horses are kept for work and for experimental purposes.

THE ST. JOACHIM HORSE BREEDING STATION

The St. Joachim Horse Breeding Station was started in the spring of 1920 on a property leased for twenty years from the Quebec Seminary by the Dominion Department of Agriculture. The object is to study the breeding, feeding, housing and management of horses. To do this requires a large number of animals, and the intention is to keep about one hundred, young and old. At present, there are ninety-two aged, two three-year-olds, six two-year-olds, six yearling stallions, thirty-five aged mares, one three-year-old, seven two-year-olds, eight yearling fillies, and twenty-three foals, all pure-bred French Canadians. This breed was chosen because experimental work can be done with it as well as with any other one, and also because it is strictly a Canadian one which deserves help. The American Government is doing exactly the same thing, so far as helping a breed goes, with Morgan horses, on the Middlebury, Vermont, Farm.

The French-Canadian horses kept at St. Joachim represent what is probably the best type of general purpose horse in existence to-day. They won more diplomas and prizes at the large exhibitions of the province of Quebec, in 1920 and 1921, than the horses of all other exhibitors combined. No prize money is accepted, of course. That these horses breed on is shown by the fact that five different animals, all the progeny of a single mare, won prizes in 1921 in their respective classes.

It is no doubt much too early yet to come to conclusions in regard to breeding work, though this was started nearly ten years ago at the Cap Rouge Station where a small but very select stud of French-Canadian horses was kept. Besides gathering considerable data, an effort is made to produce horses weighing between 1,200 and 1,300 pounds, tough, hardy, wiry, good walkers, and smooth of conformation. On small, hilly farms, in districts far removed from railways or with very deep snow in winter, there will always be room for this kind of horse. And even on large, level places, a pair of them would be quite serviceable.

All the young stuff is raised outside, having for shelter only single boarded sheds, fronting south, from the time they are turned out of the foaling box until they are broken. Visitors have often remarked how clean of limb the St. Joachim horses are,

and how sprightly and full of vigour the youngsters look. No doubt, exercise and pure air are great helps in the matter, though the breed is very well known to be healthy, hardy and sound in general.

The value of a good stallion was clearly shown at the Horse Farm, in one instance, at least. A mare was bought, in foal, during 1919, and dropped to the service of an outside stallion a colt which was gelded because it was a cull; she was then served by Albert de Cap Rouge—1489—the head stud horse at St. Joachim, and dropped a colt which won first prize in 1921, in very strong competition, at Three Rivers, Que., at Quebec Provincial Exhibition, also at Quebec District Fair.

Stallions by Albert, out of picked mares, will be sent to districts where there are a fair number of good matrons, to bring up the standard of the breed gradually. From these districts French-Canadian horses will be sold to farmers and others desirous of getting good dual purpose animals.

It may be said that certain persons object to the term "dual purpose" being applied to horses, contending that a "dual purpose" horse is nothing but a misfit, a cull produced in breeding drafters. These persons are wrong, as a horse which is true and will pull all day at anything it is hitched to, which is a quick walker and a fairly good driver, is really a general purpose horse. It is not expected that this animal will be as strong as the heavy drafter, nor as fast as the specially bred driver, but he is faster than the drafter and stronger than the driver, so that he has his place, as do the others. The dual-purpose breeds of cattle will not put on fat like the regular beef breeds, nor will they produce milk as well as the specialized dairy breeds, but they are kept on thousands of farms, especially in the Old Country.

A change is not recommended to farmers who have started breeding drafters, but those who wish to go in for general purpose animals should see the St. Joachim horses. The Farm is situated on a trolley line, twenty-five miles east of Quebec city, and visitors are always welcome.

SHEEP

A very good flock of Border Leicesters was kept at Cap Rouge, but there was not enough land, and the sheep were transferred to the Ste. Anne de la Pocatière Station at the end of 1921. The three rams and fifty ewes which were sent form what is probably the best and largest flock of pure-breds in eastern Quebec.

HORTICULTURE

There are seventy-nine different projects with fruits, ornamental plants and vegetables being conducted at this Station, and only those are reported on which have given results from which conclusions can reasonably be drawn. The main divisions are testing of varieties, breeding work, and cultural experiments.

FRUITS

Apples, cherries, plums and pears are the tree fruits which receive attention, though it is doubtful if the last mentioned can be grown with success in this district. Amongst the small fruits, strawberries, raspberries, currants and gooseberries stand in popularity in the order named. Different kinds of grapes are tried, not in the hope of finding anything fit for commercial purposes, but rather a variety or two which may be grown in a small way by farmers for the use of their families.

APPLES

Project 87.—*Variety test with apples.*—There are now in the orchards 796 apple trees of ninety varieties. The commercial ones which can be recommended for the district are: Yellow Transparent, Lowland Raspberry for summer; Duchess,

Okabena, Montreal, Peach for autumn; Wealthy, Fameuse, Wolf River, Milwaukee for winter. Amongst those originated at the Central Experimental Farm, Ottawa, Rupert is very good for summer, Petrel for autumn, and Walton for winter.

The following table gives details about the above-named varieties:—

VARIETY TEST OF APPLES SUITABLE FOR CENTRAL QUEBEC

Variety	Season	Source	Number of trees in test	Year planted	Year when first fruit was picked	Total production in 9 years gallons	
						Average per tree	Best tree
Rupert	Early summer	C.E.F. Seedling	2	1911	1916	19·12	20·0
Yellow Transparent	Summer	Commercial	5	1911	1914	19·55	24·0
Lowland Raspberry	"	"	7	1911	1917	0·93	5·0
Duchess	Early autumn	"	9	1911	1914	11·61	18·0
Okabena	Autumn	"	2	1911	1914	31·75	47·25
Montreal Peach	"	"	12	1911	1916	6·04	22·50
Petrel	"	C.E.F. Seedling	1	1911	1915	19·75	19·75
Wealthy	Early winter	Commercial	7	1911	1916	14·57	20·50
Fameuse	Winter	"	6	1911	1916	4·67	14·75
Wolf River	"	"	7	1911	1919	3·79	14·00
Milwaukee	"	"	8	1911	1914	8·06	20·00
Walton	"	C.E.F. Seedling	2	1911	1914	25·25	30·75

In this table it is seen that a summer variety, Yellow Transparent, an early autumn variety, Duchess, an autumn variety, Okabena, and a winter variety, Milwaukee, all came into bearing the third year after they were planted. The four which yielded the most, on an average, during the first nine years, are composed of a summer variety, Yellow Transparent, two autumn varieties, Okabena and Petrel, and one winter variety, Walton. The three individual trees which gave the best crops are a Yellow Transparent (summer), an Okabena (autumn), and a Walton (winter).

From the above, it may be said that, first, there are varieties of different seasons which produce fruit at an early age and which are heavy yielders and, second, amongst the varieties mentioned in the table each grower will have to make his choice according to what is demanded by his market.

CHERRIES

Project 86.—*Variety test of cherries.*—Fifteen varieties have been tested, and details are given in the following table for twelve of them:—

VARIETY TEST OF CHERRIES

Variety	Year planted	Number of trees planted	Number of trees living 1920	Average yield per tree quarts	Yield of best producing tree quarts	Date fruit ready to pick, 1920	Size of fruit	Quality of fruit
Cerise de France	1916	3	3	1·92	2·25	July 22	Medium	Good
Cerise d'Ostheim	1916	2	2	2·0	2·0	" 24	"	Medium
Fouche Morello	1916	4	4	6·12	8·0	" 27	Small to medium	"
Griotte d'Ostheim	1916	2	2	.....	.....	.....	.....	.....
Griotte Morello	1916	3	3	1·25	2·75	July 22	Large	Good
Herzformige Weichsel	1916	1	1	1·0	1·0	" 24	Medium	Medium
Minnesota Ostheim	1916	2	2	2·0	2·0	" 20	"	"
Montmorency Large	1916	6	6	1·58	4·0	" 20	Large	Good
Montmorency Ordinaire	1916	1	1	1·0	1·0	" 24	Medium	"
Susse Fruche Weichsel	1916	1	1	0·25	0·25	" 24	"	"
Vladimir	1916	2	2	4·62	5·0	" 27	Above average	Very Good

PEARS

Project 93.—*Variety test of pears.*—It is doubtful whether pears can be grown in this region. unless it be the dwarfs. As may be seen by the following table, out of twenty-five trees of the most likely varieties, planted from 1913 to 1919, only seven, or 28 per cent, were living in 1921, and not a marketable fruit has yet been produced.

VARIETY TESTS WITH PEARS

Variety	Year when planted	Number planted	Number living, 1921	Remarks
Bessemianka	1919	3	1	Has not produced one marketable fruit.
Clapp Favorite	1913	2	.....	" " "
" "	1915	6	1	" " "
Duchesse d'Angoulême	1914	1	.....	" " "
Flemish Beauty	1913	4	1	" " "
" "	1914	2	1	" " "
" "	1915	5	2	" " "
Seckel	1914	2	1	" " "

In 1920, ten dwarf trees were planted, five Doucet and five Duchess. As two of the latter bloomed in 1921, results will be watched with interest during the next two or three years.

PLUMS

Project 76.—*Variety test of plums.*—There are in the orchards 126 plum trees of twenty-seven varieties. It was expected at first that a larger percentage of Americans would live than of Europeans, but the reverse happened. The following table gives information about the varieties which have done best at Cap Rouge:—

VARIETIES OF PLUMS WHICH HAVE DONE BEST AT CAP ROUGE

Variety	Origin	Colour of fruit	Year planted	Number of trees planted	Number of trees living, 1920	Average yield per tree Gallons	Yield of best producing tree Gallons	Date full bloom, 1920	Date fruit ready to pick, 1920	Remarks
Bixby	Amer.	Red	1911	2	1	14·0	14·0	May 31	Sept. 13	One of the best for canning.
Bonne Ste. Anne	Eur.	Blue	1911	2	2	18·87	21·25	" 31	" 13	The best of all tried here.
Gueii	"	"	1911	2	2	4·25	5·25	" 31	" 13	A good eating plum.
Montmorency	"	Yellow	1911	12	12	9·27	15·62	" 31	" 16	One of the best for canning.
Quackenboss	"	Blue	1911	2	2	14·50	14·50	" 31	Oct. 2	The largest of those tried here.
Raynes	"	"	1911	2	2	11·00	11·50	" 31	" 4	Fruit splits when maturing.
Shipper Pride	"	"	1911	2	1	13·50	13·50	" 31	Sept. 11	One of the best eating plums.

The trouble with the American varieties is that the wood breaks too easily. Possibly Bonne Ste. Anne, Shipper Pride, and Bixby make as good a combination as any, for this district.

BLACK CURRANTS

Project 68.—*Variety test of black currants.*—Sixteen varieties of black currants have been tested since 1912, and the best for this district are Climax, Saunders and Topsy, in the order named. The following table gives interesting details:—

VARIETY TEST WITH BLACK CURRANTS

Variety	Source	Year planted	Number of bushes	Average yield for nine years		Size of fruit
				Per bush	Per acre	
				lb.	lb.	
Climax	C.E.F. Seedling	1911	6	5·59	8,117	Medium to large
Saunders	" "	1911	6	5·30	7,694	Large
Topsy	" "	1911	6	5·21	7,559	Large
Eagle	" "	1911	6	5·18	7,524	Medium to large
Black Champion	Commercial	1911	6	4·59	6,670	Medium to large
Buddenburg	"	1911	6	4·53	6,578	Large
Lee Prolific	"	1911	6	4·35	6,321	Medium to large
Kerry	C.E.F. Seedling	1911	6	4·33	6,282	Medium to large
Boskoop Giant	Commercial	1911	6	4·32	6,270	Large
Ontario	C.E.F. Seedling	1911	6	4·25	6,171	Medium to large
Eclipse	"	1911	6	4·13	6,002	Medium to large
Victoria	Commercial	1911	6	4·06	5,902	Large
Collin Prolific	"	1911	6	3·58	5,203	Medium to large

Cuttings have been made from six bushes of Climax, and seedlings have been grown from the same varieties. A number of both will be placed in the new 1922 plantation to see if the largest producing bushes will be from the heaviest yielding parents.

RED CURRANTS

Project No. 69.—*Variety test of red currants.*—Eleven varieties of red currants have been on test for the past ten years, and the best, for Central Quebec, are Fay Prolific and Perfection. Red Grape is a heavy yielder, but the clusters are not well filled and the fruit is hard to pick. The largest and nicest looking fruit is from Cherry, but it is a low producer. Red Cross is a good one, but as it was planted after the others, it is not included in the following table:—

VARIETY TEST WITH RED CURRANTS

Variety	Source	Year planted	Number of bushes	Average yield for nine years		Size of fruit
				Per bush. lb.	Per acre lb.	
Fay Prolific	Commercial	1911	6	6·94	10,081	Large.
Red Grape	"	1911	6	6·65	9,654	Medium to large
Perfection	"	1911	6	5·94	8,625	Large.
Wilder	"	1911	6	5·78	8,386	Large.
Red Dutch	"	1911	6	5·75	8,360	Medium.
Greenfield	"	1911	6	4·67	6,785	Medium.
Cumberland	"	1911	6	4·13	6,001	Medium to large.
Pomona	"	1911	6	4·01	5,827	Medium to large.
Cherry	"	1911	6	2·18	3,160	Large.

Red currants do not find as good a market as they should, and farmers are advised not to go in too strongly for them unless they can get a long time contract at a stated price from a well known firm.

GOOSEBERRIES

Project No. 71.—*Variety test of gooseberries.*—Twelve varieties of gooseberries have been tested, some for nine and others for eight years. The following table gives details about those for which records were kept during the longest time:—

VARIETY TEST WITH GOOSEBERRIES

Variety	Source	Year planted	Number of bushes	Average yield for nine years		Size of fruit	Colour of fruit
				Per bush. lb.	Per acre lb.		
Red Jacket	Commercial	1911	6	10·86	15,767	Large...	Red.
Queen Anne	"	1911	6	10·47	15,201	Medium	Yellow.
Silvia	C.E.F. Seedling	1911	6	10·42	15,125	Large...	Red.
Downing	Commercial	1911	6	10·20	14,811	Medium	Green.
Industry	"	1911	6	9·91	14,395	Large...	Red.
Mabel	C.E.F. Seedling	1911	6	9·47	13,733	Medium	Green.
Gibb	C.E.F. Seedling	1911	6	9·35	15,572	Large...	Red.
Joselyn	Commercial	1911	6	8·05	11,683	"	"
Rideau	C.E.F. Seedling	1911	6	7·91	11,492	Medium	Green.

Besides the above, Houghton was tried for eight years, and during that period was the heaviest yielder of all. Its fruit is too small for table, but canners seem to like it better than any other. Amongst the varieties mentioned in the table, Silvia has the most qualities. Queen Anne can remain the longest on the bush after the fruit is ready to pick, and is very firm for shipping.

RASPBERRIES

Project No. 72.—*Variety test of raspberries.*—Since 1912, inclusive, twelve varieties of red raspberries have been tested. The following table gives interesting details. The low figures for 1919 are accounted for by the fact that the plantation had to be removed from its first location, and represent yields of young canes.

COMPARATIVE YIELD OF FOUR VARIETIES OF RASPBERRIES FOR TEN YEARS

Variety	Pounds of fruit, per acre										
	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	Average
Herbert	649	1,142	1,592	2,518	4,147	3,069	1,676	353	681	2,042	1,787
Eaton	724	706	2,096	1,525	3,239	2,672	2,193	538	1,952	2,145	1,779
King	529	472	1,720	2,046	3,582	3,176	2,269	592	1,437	1,613	1,744
Marlboro	50	746	1,380	2,382	2,779	2,155	1,562	435	655	1,790	1,393

In central Quebec, the main trouble with raspberries is anthracnose, and results from trial plots often show the power of different varieties to resist this disease rather than their inherent yielding capacity. This is why great care was taken in choosing canes for the new plantation made in 1918, so that only disease-free stock might be compared. If a variety is found which yields quite a bit more than others but falls an easy prey to disease, it may be possible to get a few resistant canes from it, propagate them, and obtain a really worthwhile strain.

The work with raspberries at Cap Rouge shows that: 1st, to give satisfaction, disease-free canes of standard varieties must be planted; 2nd, Herbert is recommended for central Quebec, while King is a very good early sort.

STRAWBERRIES

Project 73.—*Variety test of strawberries.*—Forty-one varieties and strains of strawberries have been tested since 1914, inclusive, and half a dozen of these would suit any and all conditions existing in central Quebec.

The following table gives details for the varieties which have been tried for at least seven years:—

VARIETY TEST OF STRAWBERRIES

Variety	Perf. or Imp.	Season	Source	Pounds of fruit per acre							
				1915	1916	1917	1918	1919	1920	1921	Average
Valeria	Perf.	Midseason	C.E.F. Sdlg.	6,062	13,431	6,026	9,220	10,644	5,138	4,174	7,816
Cassandra	Imp.	"	"	5,785	9,604	11,525	10,418	7,473	5,774	3,333	7,702
Dunlap	Perf.	Early	Commercial	6,417	7,441	8,004	10,127	8,580	5,302	5,203	7,296
Greenville	Imp.	Midseason	"	6,225	8,666	9,982	7,732	6,036	7,389	4,037	7,152
Portia	Imp.	Late	C.E.F. Sdlg.	4,616	13,888	9,510	7,405	5,709	5,191	3,411	7,104
Sample	Imp.	"	Commercial	3,192	7,786	10,305	5,554	1,627	7,381	3,850	7,099
Bisel	Imp.	Midseason	"	4,266	8,667	10,019	10,491	6,584	6,722	2,741	7,070
Glen Mary	Perf.	Late	"	5,853	6,576	11,288	4,755	7,638	6,144	5,481	6,819
Cordelia	Perf.	Midseason	C.E.F. Sdlg.	5,029	8,318	8,203	8,095	9,218	4,178	3,376	6,631
Uncle Jim	Perf.	Late	Commercial	6,443	9,720	5,953	5,826	4,438	3,042	4,828	5,750
Pocomoke	Perf.	Midseason	"	3,847	8,521	10,236	3,388	5,828	4,631	3,593	5,721
Excelsior	Perf.	Early	"	5,354	6,477	7,405	6,969	3,214	3,619	2,432	5,067

The two at the head of the list are seedlings from the Central Experimental Farm, Ottawa. Valeria is too small and not coloured enough, but Cassandra is good in every respect, and it is unfortunate that it is not on the general market. Of all the commercial varieties tried at Cap Rouge, Dunlap is the heaviest yielder, and it is strongly recommended for the district. Persons who can market berries directly to the consumer might, with advantage, put in a small patch of Excelsiors, which are the earliest kind tested and which always bring a good price during the first week.

There are now a great many perfect varieties, so that the planting of imperfect ones should be discouraged. A few total failures and many poor results are due no doubt to having only an imperfect variety which needs another one for pollenization.

The results at Cap Rouge with strawberries show that: 1st, Dunlap is the variety which will give surest results for main crop, while Excelsior may be planted in a small way by persons desiring very early fruit; 2nd, when plants can be had, Cassandra will yield very heavily and is strongly recommended.

GRAPES

Project 122.—*Variety test with grapes.*—Twenty-nine varieties of grapes have been tested and, as expected, a great number are too late for this district. The following table gives details:—

VARIETY TEST WITH GRAPES

Variety	Year planted	Number of vines planted	Total yield for four years	Size	Date picked 1920	Colour	Remarks
			lb.				
Beta	1916	4	13·0	Medium	Oct. 11	Black	Medium quality.
Brant	1916	4	10·75	"	" 19	"	Poor quality.
Brighton	1916	3	7·25	Large	.....	Red	Too late.
Campbell Early	1916	4	31·50	"	Oct. 11	Black	A little late: good quality.
Canada	1916	4	4·25	Medium	" 19	"	Poor quality.
Champion	1916	5	81·25	Large	" 1	"	One of the earliest: poor quality.
Colerain	1916	3	6·25	"	" 13	Green	A little late: good quality.
Cottage	1916	5	9·25	"	" 13	Black	Good quality: somewhat late: fruit shatters.
Delaware	1916	4	3·75	Medium	" 11	Red	A little late: good quality.
Early Daisy	1916	5	32·0	"	" 1	Black	One of the earliest: very good quality.
Early Ohio	1916	2	1·0	Large	.....	"	A little late: medium quality.
Early Victor	1916	3	.....	.....	.....	.....	Never fruited.
Florence X Potter	1916	2	1·0	Large	Oct. 11	Black	A little late: good quality
Hartford	1916	3	3·50	"	" 14	"	Too late.
Jamesville	1916	2	8·50	"	" 14	"	Too late.
Lindley	1916	2	9·50	"	" 19	Red	Too late.
Manito	1912	1	0·50	Medium	" 1	Black	One of the earliest: medium quality.
Merrimac	1916	2	.....	.....	.....	.....	Never fruited.
McTavish	1912	2	3·50	Large	.....	Black	Too late.
Moore Early	1916	4	8·25	"	Oct. 13	"	A little late: good quality.
Moyer	1916	5	1·75	Medium	" 11	Red	Good quality: clusters small and not filled.
Wyoming Red	1916	5	18·25	"	" 2	"	The earliest of the reds: good quality.
Pattison	1914	2	17·75	Large	.....	Black	A little late: medium quality.
Peabody	1916	3	26·75	"	Oct. 19	"	Too late.
Starr Early	1915	2	2·75	Medium	" 11	Green	A little late: good quality.
Telegraph	1916	2	5·25	Large	" 11	Black	Too late.
Wilkins	1916	3	8·50	"	" 11	"	Too late.
Winchell	1916	4	2·50	Medium	" 11	Green	The earliest of the greens: very good quality.
Worden	1916	3	0·75	Large	.....	Black	Too late.

The varieties which can be recommended for central Quebec are Champion and Early Daisy amongst the blacks, Wyoming amongst the reds, and Winchell, sometimes called Green Mountain, amongst the greens. Champion is the heaviest bearer but is of poor quality and should be replaced by Early Daisy.

It is not expected that farmers of the district will grow grapes for market, but it would be quite easy for them to have some for home use.

ORNAMENTAL PLANTS

ANNUALS

Project 163.—*Variety test of annual ornamental plants.*—Amongst the most beautiful annuals which are suitable for this district may be mentioned China Asters, Clarkias, Coreopsis, Cosmos, Gladioli, Salpiglossis, Snapdragons, Stocks, Sweet Peas, Zinnias. The following table gives interesting details about those tested in 1920:—

TEST OF ANNUAL ORNAMENTAL PLANTS

Name	Date sown	Date planted	Height inches	Principal colours	In bloom From	To
Acroclinium roseum (everlasting)	April 18	June 21	18	Rose	June 26 —	Sept. 29
Ageratum Dwarf Blue	" 5	" 8	9	Blue	July 18 —	" 29
Alyssum Little Gem	" 10	" 21	6	White	" 14 —	" 30
Amaranthus Tricolor	" 8	" 14	30	.....	For its foliage.	
Antirrhinum Dwarf, mixed	March 30	" 12	10	Crimson and rose	July 25 —	Sept. 16

TEST OF ANNUAL ORNAMENTAL PLANTS—*Concluded*

Name	Date sown	Date planted	Height inches	Principal colors	In bloom From	In bloom To
Antirrhinum Intermediate, mixed	" 30	" 12	18	Rose and yellow	" 15	" 16
Antirrhinum Tall, mixed	" 30	" 12	24	Crimson and rose	" 20	" 16
Artemisia Summer Fir	" 26	" 14	30		For its foliage.	
Aster Early less Branching, mixed	" 28	" 12	24	Rose and white	July 23	Sept. 7
Aster Late Branching, mixed	" 28	" 12	24	Violet and white	Aug. 4	" 16
Aster Ostrich Plume	" 28	" 12	18	White	July 25	" 14
Aster Purity or Daybreak	" 28	" 12	24		" 28	" 15
Aster Queen of the Market	" 28	" 12	18	Violet and white	" 19	" 2
Balsam Camellia, mixed	April 16	" 15	24	Rose and white	" 16	" 29
Bartonia aurea	May 28		24	Yellow	" 24	" 27
Brachycome Iberidifolia	" 21		12	Blue	" 20	" 30
Calendula Officinalis	" 18		15	Yellow	" 20	" 30
Candytuft White	" 29		12	White	" 2	" 9
Carnation Marguerite, mixed	April 11	June 15	15	Rose and white	Aug. 7	Oct. 10
Castor Oil Plant	March 20	" 15	60		For its foliage.	
Celosia Dward Crimson	April 16	" 27	8	Crimson	July 30	Sept. 27
Centaurea, mixed	May 26		24		Aug. 4	Sept. 2
Chinese Woolflower	March 28	June 27	12	Crimson	" 24	" 27
Chrysanthemum, mixed	May 18		20	White and yellow	" 25	" 12
Cineraria Maritina	April 16	June 27	8		For its foliage.	
Clarkia Elegans, mixed	May 26		24	Rose and white	July 20	Sept. 9
Coreopsis, mixed	April 8	June 10	30	Red and yellow	" 2	" 15
Cosmos, mixed	" 14	" 16	36	Red and white	June 28	" 27
Dahlia Collarette, mixed	" 6	" 14	36	Red and white	July 24	" 15
Dianthus Heddewigii, mixed	" 8	" 13	12	Red and white	" 14	" 15
Dimorphotheca hybrids	May 26		12	Yellow	Aug. 4	" 29
Eschscholtzia, mixed	" 26		15		July 15	" 29
Gaillardia, mixed	April 8	June 14	18	Red and yellow	" 10	" 28
Godetia, mixed	May 18		18	Pink and red	" 29	" 5
Gypsophila Elegans alba	" 27		15	White	" 15	Aug. 29
Helichrysum, everlasting	April 8	June 10	36	Red and white	" 10	Sept.
Kochia Summer Cypress	" 15	" 5	30		For its foliage.	
Larkspur Stock, flowered mixed	March 27	" 10	24	Blue and white	July 28	Sept. 29
Lathyrus odoratus, Sweet Peas	May 5		54	Blue, Lavender red, rose, white	" 23	Oct. 20
Lavatera Rosea	" 26		36	Rose	Aug. 15	" 21
Lobelia Ramosa, blue	March 29	June 15	6	Blue	July 2	" 2
Lupinus, mixed	May 26		30	Rose and white	" 25	Sept. 15
Malope, mixed	May 26		24	Rose and red	Aug. 4	Oct. 2
Marigold, mixed	April 16	June 16	24	Yellow	June 28	Sept. 20
Mignonette Sweet Scented	May 28		12	Red Red	July 24	" 27
Mimulus Moschatus	March 30	June 10	8	Yellow	June 18	" 2
Nasturtium Dwarf, mixed	May 5		12	Red and yellow	July 12	" 27
Nasturtium Tall, mixed	" 5		72		" 14	" 27
Nemesia, mixed	April 6	June 14	12	Cream and yellow	June 21	" 2
Nicotiana, mixed	March 30	" 12	30	Red and white	" 30	" 15
Nigella Miss Jekyll	May 28		12	Blue, rose-pink	Aug. 10	Oct. 12
Pansy Danish Exhibition	March 15	June 21	6	Crimson-purple rose-pink	June 30	" 18
Petunia Single, mixed	" 26	" 11	15	Crimson-white	July 10	Sept. 22
Phlox Drummondii, mixed	" 27	" 19	10	Crimson, rose, carmine, white	June 30	Oct. 12
Poppy Carnation Double, mixed	May 28		24	Red and rose	Aug. 10	Sept. 22
Poppy Shirley Single, mixed	" 28		18	Red and rose	July 24	" 22
Portulaca Single, mixed	April 9	June 19	6	Pink and red	Aug. 19	" 30
Salpiglossis, mixed	March 26	" 19	30	Crimson and gold, golden yellow	" 9	Oct. 9
Salvia Fireball	" 26	" 19	15	Red	July 2	" 2
Scabiosa, mixed	April 5	" 21	24	Light blue, Tiery scarlet	Aug. 10	Sept. 18
Schizanthus, mixed	May 28		20	Pink and white	July 17	" 22
Stock Ten Week	March 29	June 11	18	Blue and white	" 12	Oct. 13
Tagete Signata Pumila	April 9	June 19	15	Yellow	June 26	Sept.
Verbena Large, flowering, mixed	March 27	" 19	10	White, pink, scarlet, purple	Aug. 7	Oct. 13
Zinnia Fireball	April 9	" 11	15	Red	July 8	" 9

PERENNIALS

Project 165.—*Variety test of perennial ornamental plants.*—The perennials which are most liked in central Quebec, where they do very well, are Aquilegias, Bleeding Hearts, Gaillardias, Hesperis, Irises, Lupines, Pæonies, Phloxes, Rudbeckias (Golden Glow), Sweet Williams. The following table gives details about the principal ones tested at Cap Rouge:—

TEST OF PERENNIAL FLOWERING PLANTS, 1920

Name	Height inches	Principal colours	In bloom From	In bloom To	Remarks
Aquilegeia, mixed	24	Violet-blue and white	June 2	June 18	One of the hardiest.
Arabis albida	6	White	May 11	" 22	
Campanula carpatica	12	Blue	July 2	Aug. 4	
Chrysanthemum maximum	30	Red-yellow	" 20	Sept. 18	
Coreopsis grandiflora	24	Yellow	" 2	" 8	
Delphinium, mixed	36	Blue and Lavender	" 2	Aug. 16	One of the best for market.
Dicentra spectabilis	30	Pink	May 26	July 10	
Dictamnus	30	Rosy-Pink	June 25	" 23	
Digitalis, mixed	32	Lilac-Rose-Purple	" 28	Aug. 18	Not quite hardy enough.
Gaillardia grandiflora	24	Red-Brown Crimson	July 2	Sept. 27	Very pretty bloom.
Gypsophila paniculata	30	White	" 14	Aug. 28	Very pretty bloom.
Helianthus hybridus	30	Yellow	June 23	July 28	
Hemerocallis	24	Lemon-yellow	Aug. 8	Sept. 20	
Hesperis matronalis	24	White	June 2	June 28	Very pretty bloom.
Hollyhock single, mixed	48	Rose, white-yellow	July 10	Sept. 20	
Iris anglica, mixed	24	Blue and white	" 2	July 18	
Iris, german, 18 varieties	28	Blue-white, yellow	June 5	June 28	Very pretty bloom.
Incarvillea Delavayi	26	Rose	" 10	July 12	
Lilium tigrinum	30	Orange, spotted black	July 4	Sept. 4	
Lupinus, mixed	30	Blue and white	June 6	June 30	Very pretty bloom.
Lychnis chalcedonica	18	Orange-scarlet	" 19	July 20	Very hardy.
Narcissus, 19 varieties	14	White and yellow	May 5	May 28	
Pæonia, 47 varieties	30	Red, white, rose, fiery scarlet	June 11	July 16	Very pretty bloom.
Papaver orientale, mixed	30	Salmon rose	" 15	" 5	
Platycodon grandiflorum album	24	White	July 22	Aug. 30	
Polemonium Richardsonii album	28	White	June 5	July 3	
Phlox, hardy	24	Carmine-rose and white, red	July 12	Sept. 6	Very pretty bloom.
Pyrethrum, mixed	18	Rose, red and white	June 22	July 12	

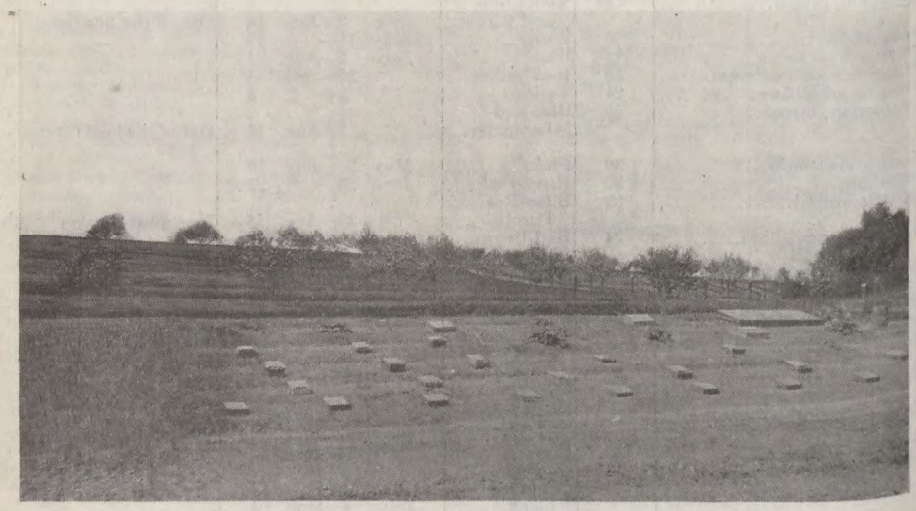
VEGETABLES

The proximity to cities like Quebec, Three Rivers, Lévis, and to lively centres such as Donnaconna, Ste. Anne de Beaupré, St. Grégoire de Montmorency, St. Raymond makes vegetable growing an important industry in the territory covered by this Station. In fact, there are more inquiries about olericulture than about any single branch of agriculture or horticulture. A lot of careful experimental work has been done with vegetables at Cap Rouge, and many projects still receive attention.

GARDEN BEANS

Project 95—*Variety and strain test of garden beans.*—This project was started in 1911 with the object of finding out profitable varieties or strains for the farmer and the market gardener of central Quebec. Since that time sixty-two have been left aside because they were either low yielders, too late, subject to disease, not attractive enough for market, of poor quality, too costly to grow. All the "limes," for instance, are too late, whilst the stakes necessary for the "poles" make the crop too costly. This left only the "bush" kinds to be tested.

At first, a strain of Challenge black Wax, which had been specially selected at Ottawa, took the lead, both for yield and earliness, and, for a while, it was certainly the best variety or strain of garden bean grown at Cap Rouge. But little by little,



Cold frames for vegetables.

it fell back and is now completely out of the running. The trouble was—as is the case, unfortunately, for many other garden beans—that it was an easy prey to disease, which cut down the yield. In finding this out, a valuable lesson was learned: disease resistance is one of the main considerations in garden beans, as far as yield and looks are concerned.

Four well-known varieties have been tested at least five years, two wax-podded and two green-podded. The following table gives interesting figures, as these four are the pick of the sixty-six which have been tested during eleven years:—

COMPARISON OF FOUR VARIETIES OF GARDEN BEANS FOR YIELD AND EARLINESS

YEAR	Greenpodded				Waxpodded			
	Refugee		Stringless		Hodson Long Pod		Pencil Pod	
	Quarts of green pods per acre	Number of days before ready to use	Quarts of green pods per acre	Number of days before ready to use	Quarts of green pods per acre	Number of days before ready to use	Quarts of green pods per acre	Number of days before ready to use
1916	9,196	80	7,744	70	10,890	80	4,840	68
1917	10,890	78	8,107	69	8,349	78	12,705	70
1918	9,922	79	4,598	67	20,812	79	10,648	72
1919	7,502	82	9,196	65	6,534	80	10,043	64
1921	11,011	66	11,737	59	17,545	80	9,680	61
Average	9,704	77	8,276	66	12,826	79	9,583	67

The data show that, for central Quebec, in green-podded sorts, Stringless for early and Refugee for late are good ones, whilst in wax-podded kinds, Pencil Pod for early and Hodson Wax for late are all right.

Pencil Pod is the favourite with retailers, and is recommended for the district until a better one is found.

Project 51.—*Comparison of an early variety of garden beans with four of different seasons.*—Garden beans are gaining in popularity from year to year, and are becoming an important cash crop near cities. Besides making a profit on them, the grower has the advantage that they store in the soil nitrogen gathered in the air. The rather long season during which they are in demand soon prompted farmers to make successive sowings at about a week's interval, as garden beans, to be palatable, must be eaten when the pods are fairly well grown and still green, and this period generally lasts less than ten days of the plant's life. Very busy truckers did not like these successive sowings, and it was thought advisable to see if a certain number of varieties of different seasons, sown the same day, would not fill the bill equally well.

In 1915, an experiment was started which was kept up for five years, so that figures can now be given. An early variety, Round Pod Kidney Wax, was sown each year, at four intervals of about a week each, whilst Round Pod Kidney Wax, Stringless Green Pod, Early Red Valentine, Refugee, four varieties which are ready to use at different seasons, were sown the same day. The following table gives details:—

ONE EARLY VARIETY OF GARDEN BEANS VERSUS FOUR VARIETIES OF DIFFERENT SEASONS

Year	Round Pod Kidney Wax sown at four intervals of about one week each		Round Pod Kidney Wax, Stringless Green Pod, Early Red Valentine, Refugee sown the same day	
	Gallons of green pods per acre	Number of days during which crop was marketable	Gallons of green pods per acre	Number of days during which crop was marketable
1915	1,858	57	1,858	57
1916	2,984	66	3,695	66
1917	5,617	25	4,945	33
1918	2,987	45	2,892	45
1919	2,250	31	3,103	46
Average	3,139	45	3,298	49

From the above figures it is seen that the difference between the two methods was only about five per cent, which is practically negligible. Persons who wish to make one sowing and be done with it, will, of course, sow the same day four varieties of different seasons, whilst others who would rather use only one kind, will have to sow at intervals of a week or ten days. In the latter case, an early variety such as Pencil Pod should be used.

There is practically no difference, for the yield of green pods, between four varieties of garden beans of different seasons sown the same day and one early kind put in at intervals of from a week to ten days.

GARDEN BEETS

Project 97.—*Variety and strain test of garden beets.*—Since 1911 inclusively, twenty-seven varieties and strains of garden beets have been tested and quite a number dropped because they did not yield enough or did not meet market requirements. The following table gives results for varieties which have been tried the same seasons during six years:—

VARIETY TEST OF GARDEN BEETS AT CAP ROUGE

Variety	Shape	Pounds of roots per acre							Days ready to use from sowing
		1915	1916	1917	1918	1919	1920	Average for 6 years	
Eclipse	Globular	21,136	51,691	33,977	49,658	90,169	51,836	50,578	75
Crosby Egyptian	Flat	32,380	35,429	28,750	64,614	65,195	39,204	44,262	78
Edmund	Top-like	21,199	36,010	31,218	35,429	46,754	36,010	34,437	79
Black Red Ball	Globular	21,780	18,876	21,344	25,846	45,593	27,878	26,886	80

There is no doubt that Black Red Ball is the finest table variety, and where discriminating customers can be had who are willing to pay good prices, it may be the best kind to grow. It is small, deep red, and of a fine shape. If, however, yield counts, and the roots are sold to keep over winter, Eclipse would suit well and is the one which is generally recommended.

CABBAGE

Project 99.—*Variety and strain test of cabbage.*—Since 1911, inclusive, forty-eight varieties and strains of cabbage were tested. Leaving aside the Savoy and Red kinds, which have little importance, at least in this district, from a commercial point of view, we can divide all the others into three categories which are hardly comparable: the early, mid-season, and late varieties. A very early one, Jersey Wakefield, for instance, may bring more money to a gardener living near a large city, because, though yielding a smaller number of pounds per acre, it will sell at a much higher price per pound. The mid-season varieties, as Succession, are valuable for truckers who wish to have cabbage for sale every week, as they come between the early and the late sorts. The latter form the bulk of the crop grown in the country and fill in more months, from October to June, than the others combined. The following table gives details concerning four well known varieties:—

VARIETY TEST WITH CABBAGE

Variety	Pounds of Cabbage per acre											Days ready for sale
	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	Average	
Jersey Wakefield	42,108	38,768	27,152	34,340	20,836	26,935	11,035	51,546	50,675	72,310	37,570	122
Copenhagen Market	39,494	63,598	8,712	57,064	29,476	26,862	8,567	36,155	64,614	108,174	44,272	126·5
Succession	.....	.....	48,787	63,388	27,298	35,066	13,141	95,106	39,204	92,057	51,818 (8)	136
Danish Roundhead	43,270	36,010	49,949	82,837	23,740	36,590	24,829	81,457	36,590	116,741	53,201	154

From the tests at Cap Rouge, it seems reasonably clear that: 1st, Jersey Wakefield is the earliest variety, but is not nearly so good a yielder as Copenhagen Market, which is ready for use five or six days later; 2nd, amongst the winter varieties, nothing has been found to beat Danish Roundhead, as it produces heavy crops and keeps well until late the next spring.

GARDEN CARROTS

Project 100.—*Variety and strain test of garden carrots.*—Since 1911, inclusive, twenty-five varieties and strains of garden carrots were tested, and Chantenay proved the highest yielder for five years, as may be seen by the following table:—

VARIETY TEST OF GARDEN CARROTS AT CAP ROUGE—1915-1919

Variety	Shape	Pounds of roots per acre						Number of days ready to use after sowing
		1915	1916	1917	1918	1919	Average	
Chantenay	Half Long	4,066	56,483	34,558	41,527	51,256	37,578	76
Hutchinson	Long	8,567	46,464	35,719	52,417	38,914	36,416	77
Early Scarlet Horn	Short	8,276	33,686	29,476	32,670	30,346	26,891	80
Nantes	Half Long	10,164	34,122	23,813	26,717	30,056	24,974	80

Hutchinson is a very promising variety which has outyielded Chantenay during the last two years, but it must continue to show decided superiority over Chantenay for a few seasons yet, before it can be recommended as superior to the latter.

For forcing or a very early crop, Oxheart, sometimes called Guérande, is to be recommended.

ONIONS

Project 107.—*Variety and strain test of onions.*—The onion is one of the most important vegetables, as practically everybody uses it. There are different shapes, flat, oval, globular, and quite a few colours ranging from dull white to dark red; some of them are small, as Barletta, which is used mainly for pickling, while others are large, as Prizetaker; a few are very poor keepers, and others, as Red Wethersfield, will last until the next summer.

Since 1911, inclusive, twenty-three varieties and strains were tested at Cap Rouge. During five years, six of the well known ones were tried alongside each other, with the following results:—

FIVE-YEAR VARIETY TEST OF ONIONS

Variety	Pounds of merchantable bulbs per acre						Days ready for use
	1914	1915	1916	1917	1918	1919	
Red Globe	31,363	8,712	44,431	38,914	48,206	34,325	97
Yellow Globe	11,616	2,904	38,623	45,598	56,628	31,073	97
Red Wethersfield	37,171	11,906	31,944	33,686	38,623	30,666	99
White Globe	12,778	8,422	30,782	29,040	58,950	27,994	97
Yellow Danvers	10,454	8,131	37,171	31,363	29,621	23,348	99
Early Red	2,323	4,937	27,007	19,747	39,785	18,760	97

The above years are given because it is thought best to compare only varieties which have been tried long enough and, especially, the same seasons.

The Globes have done especially well, but this may be due to the fact that seed came from a grower who has taken special pains to improve these strains.

Tests have shown that Red Wethersfield keeps better through the winter than the others with which it was compared, so that it is recommended for this district until something else shows decided superiority over it as an all around onion.

Work with onions at Cap Rouge for eleven years has shown that: 1st, for an all around good variety, Red Wethersfield is hard to beat; 2nd, for a very good looking onion, Prizetaker (yellow) is unexcelled, while for pickling, Barletta (white) is just the article.

Project 149.—*Sowing, transplanting, and sets compared for onion production.*—Which will give the largest crop of onions, sowing the seed directly in the field, sowing the seed in hot-beds and transplanting, or putting in sets? It was to help answer this question that the above project was started, and details are given in the following table:—

SOWING, TRANSPLANTING, AND SETS COMPARED FOR ONION PRODUCTION

Year	Variety	Pounds of marketable bulbs per acre		
		Sown	Trans-planted	Sets
1916	Red Wethersfield	28,607	56,430	9,797
1916	Yellow Danvers	29,521	55,254	13,062
1917	Red Wethersfield	28,572	43,562	10,946
1917	Yellow Danvers	27,419	48,431	12,445
1918	Red Wethersfield	21,497	34,125	17,575
1918	Prizetaker	13,363	77,715	23,240
1919	Yellow Danvers	32,245	28,098	13,072
1920	Red Wethersfield	18,592	13,363	9,586
	Average	24,977	44,622	13,715

That sets would produce the smallest crop was expected, but it was never thought that transplanting would yield nearly twice as much as sowing. Only one test out of eight shows a smaller yield for transplanting compared with sowing, and it now remains to see if the extra work required pays or not. With hot beds and cheap labour, it would seem to pay, but every grower must decide this according to his own special conditions.

Project 148.—*Comparison of different sizes of onion sets.*—Generally, onion sets which are over half an inch in diameter produce too much top at the expense of the bulb, and an experiment was undertaken to throw some light on the subject. The following table gives rather interesting details, as expectations were reversed:—

COMPARISON OF DIFFERENT SIZES OF ONION SETS

Year	Variety	Pounds of marketable bulbs per acre		
		Sets ½ inch in diameter	Sets ¾ inch in diameter	Sets 1 inch in diameter
1916	Red Wethersfield	2,939	9,666	9,797
1916	Yellow Danvers	5,356	11,495	13,062
1916	Early Red	1,959	4,833	10,319
1917	Red Wethersfield	10,783	12,909	10,946
1917	Yellow Danvers	14,292	15,628	12,445
1917	Early Red	8,993	9,760	9,807
1918	Red Wethersfield	12,782	14,234	17,575
1918	Yellow Danvers	12,201	15,106	16,123
1918	Prizetaker	13,508	29,631	23,240
1919	Yellow Danvers	9,296	13,072	12,782
1920	Unknown	10,458	15,106	20,916
	Average	9,324	13,767	14,274

Contrary to expectations, the crop increased with the size of the sets, but tops were cut before they developed too much as, otherwise, things might have been reversed, the larger sets producing seed and leaving the bulbs at a standstill.

GARDEN PEAS

Project 109.—*Variety and strain tests of garden peas.*—Since 1911, inclusive, sixty-three varieties and strains of garden peas where tried and fifty-six were discarded because they were low yielders or of poor quality. The two main divisions seem to be round and wrinkled. The first cannot, on the general market and throughout the season, command as good a price as the second, on account of the poorer quality and the lower content of sugar. These two classes each contain varieties with plants climbing, semi-dwarf and dwarf, but most of the best ones are amongst the two latter. Another subdivision refers to the colour of the peas, and the greenish ones, in general, are to be preferred to the lighter coloured ones. Of course, when everything is said and done, it is possible that certain persons may have a special trade which demands something else, but the wrinkled, semi-dwarf or dwarf green kinds will generally fill the bill better than others.

Three varieties have been tested for ten years and the following table gives details about them:—

COMPARISON OF THREE VARIETIES OF GARDEN PEAS FOR TEN YEARS

Variety	Pounds of Shelled Green Peas per acre											Number of days ready to use after sowing
	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	Average	
Juno	1,089	847	2,178	847	1,331	2,662	2,178	2,420	1,815	1,815	1,718	73
Stratagem	1,452	605	1,815	726	1,331	2,662	2,904	2,178	1,815	1,452	1,694	73
Gregory Surprise	726	605	1,210	242	847	1,815	1,331	1,452	1,210	1,573	1,101	58

There is no doubt that Gregory Surprise is the earliest variety amongst the whole lot, being ready to use even before some of the round-podded, lower quality kinds. But it is with vegetables as with cereals, precocity does not go hand in

hand with yield, and Gregory Surprise does not produce nearly as much as the later varieties. It is a question, however, if it will not bring as much money, for the season, as the heavier yielding later ones, because the crop brings a much higher price at the beginning of the season.

For a heavy cropper, Juno has shown that it is hard to beat, being always near the top, every year, for yield of green shelled peas.

The experiments with varieties and strains of garden peas have shown that: 1st, in general, wrinkled, semidwarf or dwarf, green seeded kinds are the most profitable to grow; 2nd, Gregory Surprise for early and Juno for main crop have done best at Cap Rouge, where a selection of each is made each year, and are recommended for central Quebec.

Project 59.—*Comparison of an early variety of garden peas with four of different seasons.*—Green peas have become an important source of income to a large number of truckers and gardeners. The man who grows for the cannery chooses as heavy a yielder as he can, provided it is accepted by the factory, but the one who sells to nearby customers wishes to prolong as much as possible the season during which green peas are at their best. To do this, there are two ways: sowing the same varieties at different intervals or sowing varieties of different seasons at the same time.

The following table gives details about an experiment which was conducted during four seasons at Cap Rouge:—

ONE EARLY VARIETY OF GARDEN PEAS VERSUS FOUR VARIETIES OF DIFFERENT SEASONS

Year	Thomas Laxton, sown at four intervals of about one week each		Thomas Laxton, Gradus, Advancer, Stratagem, sown the same day	
	Gallons of green peas per acre	Number of days during which crop was marketable	Gallons of green peas per acre	Number of days during which crop was marketable
1916	599	31	597	32
1917	190	23	275	32
1918	220	24	229	24
1919	357	28	433	44
Average	341	26·5	383	33

From the above figures, it is seen that the four varieties somewhat lengthened the season during which green peas could be sold, also that they yielded about 12 per cent more. An advantage of one variety is that a person may easily grow the seed each year, though this may be done with four, with more trouble, as peas do not cross. On the other hand, in sowing four varieties the same day, a gardener is done with the job and need not bother himself about the weather being good at the right time for successive sowings.

One or two more tests will be made before this project is closed.

Project 111.—*Variety and strain test of potatoes.*—Sixty-seven varieties and strains of potatoes were tested since 1911, and the following table gives details about six which were in the trial plots alongside each other during five consecutive seasons:—

VARIETY AND STRAIN TEST OF POTATOES—1917 TO 1921 INCLUSIVE

Variety	Size	Form	Colour	Season	Average yield per acre—Pounds		
					Marketable	Unmarketable	Total
Green Mountain	Large	Oblong	White	Late	17,860	3,775	21,635
Dreer Standard	"	Oval	"	"	14,903	1,577	16,480
Irish Cobbler	Medium	Round	"	Early	14,322	1,082	15,404
Table Talk	"	Oval	"	Late	11,048	2,561	13,609
Morgan Seedling	Large	"	"	Medium	10,890	1,365	12,255
Warrior	Medium	"	"	Late	9,768	2,179	11,947

Green Mountain, for general crop, and Irish Cobbler, for early use, are a very good combination which should rapidly be gaining popularity in central Quebec. They are standard commercial sorts and may readily be sold at any time if the home supply is too large. Dealers will always buy these, even through correspondence, while with other kinds not so well known, a grower may have difficulty in getting rid of the surplus.

Project 112.—*Comparison of different kinds of potato seed pieces.*—A few years ago, when potatoes were very high in price, it was often asked if less seed could be used per acre and this project was started to help the inquirers. The following table gives details about the results of five years:—

COMPARISON OF DIFFERENT KINDS OF POTATO SEED PIECES

Year	Variety	Pounds of marketable tubers per acre			
		Round potatoes less than 2 inches in diameter	Seed cut to 1 eye	Seed cut to 2 eyes	Seed cut to 3 eyes
1915	Irish Cobbler	9,504	2,904	8,184	12,144
1917	"	8,091	12,093	9,483	3,393
1918	Green Mountain	6,438	6,264	9,048	12,354
1919	"	22,794	26,970	25,926	30,450
1920	"	16,368	11,748	13,925	15,576
Average		12,639	11,996	13,313	14,783

The average for five years showed that the larger the weight of seed used the greater the crop was, as the small round potatoes weighed more than the pieces cut to one eye. Probably the most economical kind of seed piece to use, year in and year out, is one of generous size, on which are two good eyes.

Project 113.—*Effect of land plaster on potato seed pieces.*—The use of land plaster on potato seed pieces is a well known and time-honoured agricultural practice. Is it a paying proposition? This was the question asked during an excursion at the Station, and it gave rise to the project, details about which are given below:—

EFFECT OF LAND PLASTER ON POTATO SEED PIECES

Year	Variety	Pounds of marketable tubers per acre	
		With land plaster	Without land plaster
1915	Warrior	9,768	7,260
1917	Green Mountain	5,807	4,440
1918	"	10,440	9,222
1919	"	19,488	29,928
1920	"	14,850	11,616
Average		12,071	12,493

From the above, it is seen that the use of land plaster on potato seed pieces decreased the crop a little more than 3 per cent for an average of five years, but this is less than may reasonably be expected from ordinary experimental error. The conclusion is that it does not pay thus to treat potato seed pieces when they are put in the ground soon after being prepared.

TOMATOES

Project 120.—*Variety and strain tests of tomatoes.*—Since 1911, inclusive, seventy-eight varieties and strains of tomatoes have been tried and seventy-one discarded because they did not produce enough ripe fruit before frost. Most of the strains which gave satisfaction are from Earliana, and there is certainly no variety which will give more satisfaction than this one in central Quebec. The main trouble with it is that it is subject to crack around the stem and that it is highly acid, but breeding should improve these defects. Whatever is said against the Earliana, it is still the "Queen of Tomatoes" wherever absolute earliness is the principal consideration.

Two varieties, during the last seven years, have shown superiority over Earliana, one for earliness, Danish Export, and the other for yield, Prosperity. However, Danish Export gave an average of 30 per cent less ripe fruit than Earliana and will be discarded in 1922 after what should be regarded as a fair test. For anybody, however, who wishes a very smooth fruit of rather small size, Danish Export just fills the bill. Prosperity has outyielded Earliana by 14 per cent during the 9 years, from 1913 to 1921, but the point to be decided by future tests is whether it produced the bulk of the crop towards the end of the season when prices were down. It is intended, in future, to get, from the earliest ripe fruit to the last gathered, the weekly value of tomatoes on the Quebec market, so as to arrive at the production of each variety and strain in actual dollars and cents instead of only in pounds.

The following table shows the yield per acre of ripe fruit and the number of days to come to maturity, for the four leaders, during seven years:—

YIELD OF RIPE FRUIT AND TIME TO MATURE—FOUR LEADING VARIETIES OF TOMATOES

Year	Prosperity		Earliana, C.R.		Alacrity		Danish Export	
	Lb. of ripe fruit per acre	Days to come to maturity	Lb. of ripe fruit per acre	Days to come to maturity	Lb. of ripe fruit per acre	Days to come to maturity	Lb. of ripe fruit per acre	Days to come to maturity
1915	22,461	146	21,372	142	25,728	142	16,777	135
1916	42,063	165	41,518	160	28,858	139	40,769	148
1917	9,120	157	5,445	171	5,173	165	8,372	152
1918	8,508	150	5,649	150	9,529	150	6,466	147
1919	58,874	136	39,817	145	35,392	133	12,932	139
1920	24,298	146	22,256	146	18,989	146	10,482	146
1921	48,188	149	49,549	146	30,084	149	26,272	146
Average	30,502	150	26,515	151	21,965	146	17,439	145

Summary.—From the above, the following deductions may be made: 1st, for Central Quebec, earliness is the prime consideration in tomatoes, 2nd, before other varieties have shown decided superiority, it is safer to grow a good strain of Earliana.

Project 119.—*The improvement by selection of the Earliana tomato.*—Theoretically, a person should select tomatoes for extreme earliness, great productiveness, bright red colour, large size, and high quality. But, as there is no such thing as an all around perfect strain, it is better, in practice, to breed for one thing at a time. It is also no use to work for contradictory attributes; for instance, when the size of fruits is large there is generally a smaller number of them in a cluster, though the total yield may be greater.

It should also be remembered that attention must be directed towards the whole plant and not only a part of it. Thus, it is a mistake, when selecting for earliness, to save seed from a plant which bore one very early fruit while the others were rather late in maturing. What should be done is to save seed from a plant having the highest number of fruits maturing early enough for the locality where grown.

In 1911, seed of Earliana was procured from Burpee and hundreds of selections from individual plants were made since, to find out a strain giving a large quantity of ripe fruit, especially during the early part of the season, when prices usually rule high and when a pound is worth as much as two or even three later on. In 1919, the number of strains had been cut down to forty-five, in 1920 to ten, and in 1921 to two. In 1922 the best one will be multiplied and in 1923 seed will be offered to the trade or to growers.

The weather has a great deal to do with the ripening of tomatoes early in the season, but the following figures, for the last three years, if they cannot be taken as an absolutely certain sign of constant improvement, at least show the great difference between plants, also the importance of selection:—

PRODUCTION OF RIPE TOMATOES FROM DIFFERENT STRAINS

Year	Pounds of ripe tomatoes in August	
	From the best plant	From the worst plant
1919	2·0	0·0
1920	3·20	0·60
1921	3·42	3·26
Average	2·87	1·29

Project 117.—*Comparison of different methods of starting tomato plants.*—Should tomato plants be pricked out, and how many times? Is this extra work beneficial to the man who grows the crop for canning, to the average market gardener, or to both? These are questions which come up every year, and an experiment was started at Cap Rouge in 1916 to help throw some light on them.

Seed was sown in flats, and plants grown in the greenhouse until the weather permitted to transfer the flats to hot-beds where plants were hardened before being set out in the field. One lot was not pricked out, another was pricked out once, another twice, and still another three times. All plants were given about the same space, the ones which were not pricked out being thinned to the same distance at which the ones which were pricked out were placed. Naturally, seed of a very uniform strain was used each year, either Alacrity or a Cap Rouge selection of Earliana.

The following table gives details which are interesting:—

COMPARISON OF DIFFERENT METHODS OF STARTING TOMATO PLANTS

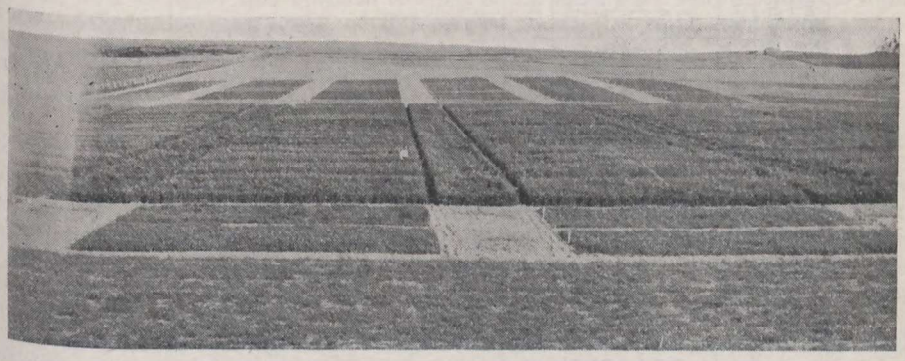
Year	Date of sowing in flats	Date of transplanting in field	Not pricked out			Pricked out once			Pricked out twice			Pricked out three times		
			Pounds of fruit per acre			Pounds of fruit per acre			Pounds of fruit per acre			Pounds of fruit per acre		
			Ripe	Green	Total	Ripe	Green	Total	Ripe	Green	Total	Ripe	Green	Total
1916	Mar. 7	May 29	43,805	22,406	66,211	53,061	13,721	66,782	45,221	15,682	60,903	50,067	13,720	63,787
1917	" 22	June 9	9,665	40,157	49,822	6,670	39,612	46,282	16,879	39,476	56,355	10,209	43,832	54,041
1918	April 2	" 8	5,153	28,197	33,350	8,070	28,100	36,170	5,348	24,308	29,656	4,959	26,253	31,212
1919	" 2	" 12	54,722	17,968	72,690	32,806	42,607	75,413	39,476	35,392	74,868	41,926	44,649	86,575
1920	Mar. 19	" 9	24,502	7,759	32,261	21,031	8,440	29,471	31,173	13,612	44,785	29,131	11,434	40,565
1921	" 15	" 6	49,102	22,947	72,049	61,451	19,058	80,509	55,520	18,280	73,800	60,284	13,029	73,313
Average	.....	.....	31,158	23,239	54,397	30,515	25,256	55,771	32,270	24,458	56,728	32,763	25,486	58,249

From the above it is seen that, for an average of six years, the lots pricked out three times have more ripe fruit and also a larger total of fruit than any of the three other lots. The main consideration, from a profit point of view, is the quantity of ripe fruit, and it is interesting to note that pricking out three times gave less than 5 per cent more ripe fruit than not pricking out at all, which is not more than the probable experimental error. It is generally admitted that plants which have been pricked out have a better root system than those which have not, but this may possibly be due to the fact that plants which are not pricked out are generally left too thick in flats or in hot-beds. In the experiment, as noted above, the plants which were not pricked out were given ample room and care was taken to harden them gradually and grow them stocky instead of spindly.

At Cap Rouge, tomato plants not pricked out gave practically as much ripe fruit as others pricked out from one to three times. Where no pricking out is done, great care must be taken to grow strong, stocky plants, and a great help to this end is to give plenty of space in flats or in hot-beds.

Project 116.—*Comparison of different methods of pruning tomatoes.*—Pruning has long been recommended to hasten the maturity of tomatoes and to obtain a larger total crop of ripe fruit. It seemed to be losing time to undertake an experiment about this matter, but it also looked reasonable to expect that this treatment would not have the same effect on varieties with different intensity of foliage. As the Earliana and its very numerous strains gives better satisfaction in Central Quebec than other varieties, it was decided to use it, when work was started with this project in 1916.

Every plant was tied to a stake, and four feet was left in all directions. One lot was left unpruned, a second one pruned to two stems with all foliage intact, a third lot pruned to two stems with part of the foliage removed, a fourth lot pruned to one stem



Trial Plots at Experimental Station, Cap Rouge, Que.

with all foliage intact, and a fifth lot pruned to one stem with part of the foliage removed. The seed used was from well selected strains, and all plants were treated exactly alike from the time they came through the soil, in flats, until all ripe fruit was picked at the first hard frost.

The following table gives details:—

COMPARISON OF DIFFERENT METHODS OF PRUNING TOMATOES

Year	Date of sowing in flats	Date of transplanting in field	Not pruned			Pruned to two stems						Pruned to one stem					
			Foliage intact			Foliage intact			Part foliage removed			Foliage intact			Part foliage removed		
			Pounds fruit per acre			Pounds fruit per acre			Pounds fruit per acre			Pounds fruit per acre			Pounds fruit per acre		
			Ripe	Green	Total	Ripe	Green	Total	Ripe	Green	Total	Ripe	Green	Total	Ripe	Green	Total
1915	Mar. 17	June 8	8,304	38,768	47,072	8,508	4,383	12,891	7,922	3,076	10,998	7,582	3,403	10,985	5,282	1,579	6,861
1916	" 7	May 29	45,220	15,682	60,902	20,623	4,560	25,183	14,960	4,438	19,398	14,429	5,704	20,133	11,434	4,179	15,613
1917	" 22	June 9	16,879	39,476	56,355	6,182	13,329	19,511	6,352	9,756	16,108	4,367	6,636	11,003	2,666	4,652	7,318
1918	April 2	" 8	5,348	24,308	29,656	2,188	10,307	12,495	2,820	8,556	11,376	2,820	5,445	8,265	3,695	5,396	9,091
1919	" 2	" 12	39,476	35,392	74,868	20,249	9,699	29,948	15,229	4,821	20,050	16,845	6,012	22,857	9,756	4,420	14,176
1920	Mar. 19	" 9	11,707	11,979	23,686	6,398	11,843	18,241	6,670	7,487	14,157	6,636	6,806	13,442	5,445	5,445	10,890
1921	" 15	" 6	64,173	21,877	86,050	28,100	8,168	36,268	21,294	8,459	29,753	23,725	7,001	30,726	16,918	5,251	22,169
Average	.....	.....	27,301	26,783	54,084	13,178	8,899	22,077	10,750	6,656	17,406	10,915	5,858	16,773	7,885	4,417	12,303

CEREALS

The work done for this Division consists of varieties tests, selection by the head-to-row method, also comparison of different mixtures for grain production and of cereals for hay. Barley, beans, flax, oats, peas, and wheat receive special attention at this Farm. Only projects which have been in existence long enough to warrant definite statements are reported upon.

BARLEY

Project 23.—*Variety and strain tests of barley.*—From 1911 to 1921, inclusive, eighteen varieties and strains of barley were tried. The results of fifty-seven tests show that the six-rowed kinds yielded at the rate of 1,323 pounds per acre and matured in eighty-four days, whilst the figures for the two-rowed ones are respectively 1,254 pounds and ninety-three days, for twenty-eight tests. This shows that, in general, the six-rowed varieties have not only given more grain, but have been earlier.

Seven varieties (the figures in brackets indicate whether the variety is two-rowed or six-rowed) were discarded because they were found inferior to the others for conditions here: Beaver (2), Black Japan (6), Duckbill (2), Gold (2), Hanchenn (2), Swan's Neck (2), Swedish Chevalier (2).

Work is continued with Albert-Ottawa 54 (6), Chinese-Ottawa 60 (6), Early Chevalier-Ottawa 51 (2), Escourgeon C (6), Himalayan-Ottawa 59 (6), Manchurian-Cap Rouge 14 (6), Manchurian-Ottawa 50 (6), O.A.C. 21 (6), Odessa (6), Stella-Ottawa 58 (6), Success (6), and any of the above which do not give satisfactory yields after a test of five years will be left aside, leaving room to take on promising varieties or strains.

The following are the only ones which were in the trial plots at the same time during nine years:—

Year	Early Chevalier (2)		Manchurian (6)		O.A.C. No. 21 (6)		Success (6)		Average	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1911										
1912	1,920	74	1,290	79	660	80	1,305	68	1,294	75
1915	1,380	100	1,020	100	900	97	1,080	91	1,095	97
1916	1,905	80	1,942	81	1,717	83	1,743	77	1,827	80
1917	900	84	780	89	1,260	85	1,020	79	990	84
1918	1,770	88	1,440	87	1,440	90	1,050	85	1,425	87
1919	1,740	83	1,890	89	1,710	86	1,200	77	1,635	84
1920	1,290	88	810	90	990	88	960	78	1,012	86
1921	2,010	77	2,130	84	2,160	79	1,320	76	1,905	79
Average	1,650	78	1,375	79	2,000	78	1,625	72	1,662	77
	1,618	84	1,409	86	1,426	85	1,256	78	1,427	83

Of the above four, Success is decidedly the lowest producer and is kept because it is a so-called hooded variety and is very early, having invariably been the first grain of any kind to mature each season.

In 1914, a selection of Manchurian was started at the Station, and in 1918 it was included in the variety tests. The following table shows that it is a higher yielder than the three leading varieties which have been tried for a number of years:—

Year	Manchurian, Cap Rouge 14		O.A.C. No. 21		Early Chevalier, Ottawa 51		Manchurian, Ottawa 50		Average	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1918	1,890	84	1,710	86	1,740	83	1,890	89	1,807	85
1919	1,860	86	990	88	1,290	88	810	90	1,237	88
1920	2,370	84	2,160	79	2,010	77	2,130	84	2,167	81
1921	1,550	79	2,000	78	1,650	78	1,375	79	1,644	78
Average	1,918	83	1,715	83	1,672	81	1,551	85	1,714	83

The results to date with variety and strain tests of barley show that the six-rowed varieties, generally, are better adapted to central Quebec than the two-rowed ones; the exception to the rule being Early Chevalier which has been the heaviest yielder of all those tried during a number of years. The Cap Rouge selection of Manchurian has shown such decided superiority over the others that it will be multiplied as rapidly as possible and offered either to the trade or to farmers.

Project 19.—*Improvement of Manchurian barley by selection.*—This project was started in 1913, when ninety average heads each from a separate plant were chosen in a field of Manchurian barley, taking care not to pick up anything which might have had some advantage of environment.

In 1914, thirty-one kernels were sown from each head, two inches apart, in rows five feet long and a foot apart, with checks, and in such a way that no row would have the advantage over the others. The soil, to all outward appearances, looked very uniform. The following table gives details of the yield from each of the ninety mother plants:—

YIELD OF NINETY STRAINS OF MANCHURIAN BARLEY IN FIVE FOOT ROWS, 1914

Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces
1	3·25	19	3·75	37	4·50	55	2·50	73	2·0
2	2·75	20	3·75	38	4·0	56	2·50	74	1·75
3	3·0	21	3·50	39	2·75	57	1·75	75	1·25
4	1·25	22	1·75	40	2·75	58	2·75	76	3·50
5	5·25	23	2·50	41	1·50	59	2·0	77	3·75
6	1·75	24	2·75	42	2·25	60	1·25	78	1·25
7	4·25	25	3·25	43	2·25	61	1·75	79	2·25
8	4·0	26	3·25	44	2·75	62	1·50	80	2·0
9	5·0	27	1·75	45	2·25	63	3·75	81	3·50
10	2·75	28	3·25	46	3·25	64	4·25	82	2·0
11	3·25	29	2·0	47	2·0	65	4·75	83	3·75
12	3·75	30	2·0	48	3·75	66	2·0	84	1·75
13	5·50	31	2·25	49	4·75	67	2·75	85	3·0
14	4·25	32	4·0	50	4·0	68	3·50	86	2·25
15	3·75	33	1·25	51	2·75	69	3·25	87	2·0
16	4·25	34	3·75	52	4·50	70	2·75	88	3·25
17	4·0	35	2·75	53	2·0	71	1·50	89	1·25
18	3·75	36	4·0	54	1·25	72	3·25	90	1·50

In 1915, ninety-one kernels of each of the thirty best strains of the preceding year were sown, two inches apart, in rows fifteen feet long and two feet apart, with checks, without giving any advantage to any row. The following table gives details about the production of these thirty strains both in 1914 and in 1915:—

YIELD OF THIRTY STRAINS OF MANCHURIAN BARLEY IN FIFTEEN FOOT ROWS—1914 and 1915

Strain No.	1914		1915		Strain No.	1914		1915	
	Yield for 5-ft. row	Position	Yield for 15-ft. row	Position		Yield for 5-ft. row	Position	Yield for 15-ft. row	Position
	Ounces		Ounces			Ounces		Ounces	
5	5·25	2	24·75	2	36	4·0	7	20·25	6
7	4·25	6	17·25	9	37	4·50	5	18·75	7
8	4·0	7	18·75	7	38	4·0	7	25·50	1
9	5·0	3	15·75	10	49	4·75	4	21·75	4
12	3·75	8	14·25	12	50	4·0	7	18·75	7
13	5·50	1	11·25	14	52	4·50	5	15·0	11
14	4·25	6	21·75	4	63	3·75	8	20·25	6
15	3·75	8	18·0	8	64	4·25	6	12·0	13
16	4·25	6	18·75	7	65	4·75	4	17·25	9
17	4·0	7	21·0	5	76	3·50	9	18·75	7
18	3·75	8	17·25	9	77	3·75	8	21·0	5
19	3·75	8	24·0	3	81	3·50	9	15·0	11
20	3·75	8	18·75	7	83	3·75	8	12·0	13
32	4·0	7	18·0	8	85	3·0	11	20·25	6
34	3·75	8	18·75	7	88	3·25	10	18·75	7

In 1916, 271 kernels were sown of each of the ten highest yielding strains of 1915, two inches apart in rows forty-five feet long and two feet apart, with checks, so that no row would have any advantage over the others. In the following table are found the yields of these ten strains for 1914, 1915, and 1916:—

YIELD OF TEN STRAINS OF MANCHURIAN BARLEY IN FORTY-FIVE FOOT ROWS—1914-1915-1916

Strain No.	1914		1915		1916	
	Yield for 5-ft. row	Position	Yield for 15-ft. row	Position	Yield for 45-ft. row	Position
	Ounces		Ounces		Ounces	
5	5·25	.....	24·75	2	54·0	7
14	4·25	.....	21·75	4	67·0	1
17	4·0	.....	21·0	5	61·0	4
19	3·75	.....	24·0	3	62·0	3
36	4·0	.....	26·25	6	61·0	4
38	4·0	.....	25·50	1	51·0	9
49	4·75	.....	21·75	4	53·0	8
63	3·75	.....	20·25	6	60·0	5
77	3·75	.....	21·0	5	66·0	2
85	3·0	.....	20·25	6	58·0	6

In 1917, half of the grain of strain 14, the heaviest yielder of 1916, was sown with a garden drill in rows one foot apart to multiply it; the rest of the grain was kept, in order not to lose the work of years in case what was in the ground would be destroyed.

In 1918, 1919, 1920, 1921 the selection was sown in the trial plots, alongside of other varieties and strains, and gave the following results:—

VARIETY AND STRAIN TESTS OF BARLEY—1918-19-20-21

Variety or Strain	Yield of grain, in pounds, per acre					Average number of days to mature
	1918	1919	1920	1921	Average	
Manchurian, Cap Rouge 14	1,890	1,860	2,370	1,550	1,917	83
O.A.C. 21	1,710	990	2,160	2,000	1,715	83
Early Chevalier, Ottawa 51	1,740	1,290	2,010	1,650	1,672	81
Manchurian, Ottawa 50	1,890	810	2,130	1,375	1,551	85
Stella, Ottawa 58	1,530	1,080	1,710	1,525	1,461	85
Success	1,200	960	1,320	1,625	1,276	76

The above method of selection, which can be practised by anybody having time to do so, singled out from the general population of Manchurian a strain which yielded, for an average of four years, about 23 per cent more than the mother variety.

Manchurian Cap Rouge 14 will be multiplied as fast as possible and offered to farmers at a reasonable price.

OATS

Project 26.—*Variety and strain tests of oats.*—From 1911 to 1921, inclusive, sixteen varieties and strains of oats were tried. The results of eighty-five tests show that the average time to come to maturity was 98 days and the average yield 1,952 pounds per acre of the varieties tried for six years or more. The earliest was Eighty Day, which matured in 85 days and produced 1,819 pounds of grain per acre, while the heaviest yielders were Gold Rain which matured in ninety-six days and produced 2,261 pounds of grain per acre, followed by Banner which matured in ninety-nine days and produced 2,175 pounds of grain per acre.

Eight varieties were discarded because they were found inferior to the others for central Quebec conditions: Abundance, Clydesdale, Daubeney, Eighty Day, Ligowo, Siberian, Thousand Dollar, Twentieth Century.

Work is continued with Banner Cap Rouge 31, Banner Ottawa 49, Gold Rain, Leader, Liberty, Ottawa 480, O.A.C. 72 and Victory.

The following varieties are the only ones which were in the trial plots during ten years, and are certainly the best which have been tested:—

COMPARISON OF THREE BEST VARIETIES OF OATS GROWN AT CAP ROUGE DURING TEN YEARS

Year	Gold Rain		Banner		Victory	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1911	2,850	87	2,820	87	2,460	87
1913	2,580	112	2,340	112	2,760	112
1914	2,200	85	1,960	94	1,580	89
1915	2,244	91	2,404	92	1,997	92
1916	2,338	95	2,398	98	2,458	100
1917	2,430	104	2,040	111	2,490	104
1918	2,400	104	1,401	104	1,950	104
1919	1,800	95	2,580	97	1,740	97
1920	2,340	92	2,340	100	2,160	100
1921	1,429	91	1,465	94	1,658	93
Average	2,261	96	2,175	99	2,125	98

Of the above three, Banner is recommended because the yellow colour of Gold Rain is quite a disadvantage, as buyers discriminate against it thinking it has changed colour through weathering.

The following table gives details for the 1921 test:—

VARIETY AND STRAIN TESTS OF OATS AT CAP ROUGE IN 1921

Name	Average length of plant	Average length of head	Strength of straw on a scale of 10 points	Yield per acre	Days to mature
	Inches	Inches		Lbs.	
Banner—Cap Rouge 31	43	9	10	2,425	94
O.A.C. 72	47	9	10	1,760	93
Victory	40	8	10	1,658	93
Leader	41	9	10	1,598	92
Banner—Ottawa 49	40	8	10	1,465	94
Gold Rain	37	7	10	1,429	91
Liberty—Ottawa 480	34	7	10	1,053	89

The last named is a hulless variety which would no doubt stand higher in the list if the number of pounds of meat per acre was calculated.

The results to date with variety and strain tests of oats show that: (1) The well known Banner should be grown practically everywhere in central Quebec, as it would be a decided advantage to have only one variety to offer for sale. (2) The Cap Rouge selection of Banner will be tested for three or four more years and then offered to the trade or to farmers if it shows decided superiority over the others.

Project 21.—*Improvement of Banner oats by selection.*—This project was started in 1913, but everything was lost through a storm during the summer of 1916. The same autumn, however, ninety average heads from different mother plants were chosen in a large field, leaving aside any extra good ones which had advantages of environment. In 1917, thirty-one kernels were sown from each head, two inches apart, in rows five feet long and a foot apart, with checks, so that none of the rows would have an advantage over the others. The soil was very uniform, according to all outward appearances at least, but the following figures show that the yields between the lowest and highest strains were quite different:—

YIELD OF NINETY STRAINS OF BANNER OATS IN FIVE FOOT ROWS—1917

Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces
1	4·25	19	3·75	37	5·0	55	5·0	73	5·25
2	5·0	20	5·0	38	6·75	56	4·25	74	5·50
3	5·75	21	3·50	39	5·25	57	5·50	75	5·0
4	5·0	22	5·0	40	7·75	58	3·75	76	4·50
5	4·50	23	4·50	41	4·50	59	6·25	77	5·50
6	3·25	24	4·25	42	5·25	60	5·25	78	4·0
7	3·25	25	4·50	43	5·50	61	4·25	79	6·0
8	5·50	26	6·0	44	3·50	62	6·75	80	6·0
9	6·25	27	5·25	45	5·25	63	8·25	81	2·50
10	5·75	28	5·75	46	5·75	64	7·0	82	3·75
11	3·0	29	5·0	47	6·25	65	5·50	83	5·0
12	3·0	30	4·75	48	5·25	66	6·50	84	3·50
13	3·25	31	6·25	49	5·0	67	5·25	85	4·50
14	3·25	32	7·25	50	7·50	68	4·50	86	3·0
15	2·75	33	6·50	51	5·75	69	5·50	87	3·50
16	4·50	34	5·75	52	5·50	70	5·25	88	2·0
17	3·0	35	6·25	53	5·25	71	4·0	89	3·75
18	3·0	36	7·0	54	3·50	72	4·25	90	5·75

In 1918, ninety-one kernels were sown of each of the thirty highest yielding strains of the preceding year, two inches apart, in rows fifteen feet long and two feet

apart, with checks, to prevent any row having an advantage over the others. The following table gives the number of the strain, its position and yield in 1917 and also in 1918.

YIELD OF THIRTY STRAINS OF BANNER OATS IN HEAD TO ROW PLOTS 1917 AND 1918

Strain Number	1917		1918		Strain Number	1917		1918	
	Yield for 5 ft. row	Position	Yield for 15 ft. row	Position		Yield for 5 ft. row	Position	Yield for 15 ft. row	Position
	oz.		oz.			oz.		oz.	
3	5·75	10	26·50	3	46	5·75	10	20·50	10
8	5·50	11	22·0	9	47	6·25	8	20·50	10
9	6·25	8	22·0	9	50	7·50	3	19·0	13
10	5·75	10	22·0	9	51	5·75	10	18·0	14
26	6·0	9	23·0	8	52	5·50	11	19·50	12
28	5·75	10	20·50	10	57	5·50	11	17·50	15
31	6·25	8	26·50	3	59	6·25	8	18·0	14
32	7·25	4	26·0	4	62	6·75	6	24·50	6
33	6·50	7	25·0	5	63	8·25	1	18·0	14
34	5·75	10	16·50	16	64	7·00	5	23·0	8
35	6·25	8	23·0	8	65	5·50	11	20·0	11
36	7·00	5	20·0	11	66	6·50	7	24·50	6
38	6·75	6	27·0	2	79	6·00	9	23·0	8
40	7·75	2	22·0	9	80	6·00	9	27·0	2
43	5·50	11	24·0	7	90	5·75	10	27·50	1

In 1919, 271 kernels were sown of each of the ten highest yielding strains of 1918, two inches apart, in rows of forty-five feet long and two feet apart, with checks put in such a way that no row would have any undue advantage over the others. Figures are given showing the number of each strain, with its yield and position in 1917, 1918 and 1919:—

YIELD OF TEN STRAINS OF BANNER OATS IN HEAD TO ROW PLOTS, 1917-8-9

Strain number	1917		1918		1919	
	Yield for 5 ft. row	Position	Yelid for 15 ft. row	Position	Yield for 45 ft. row	Position
	oz.		oz.		oz.	
3	5·75	10	26·50	3	60·0	3
31	6·25	8	26·50	3	76·00	1
32	7·25	4	26·0	4	52·0	6
33	6·50	7	25·0	5	58·0	4
38	6·75	6	27·0	2	54·0	5
43	5·50	11	24·0	7	20·0	9
62	6·75	6	24·50	6	40·0	7
66	6·50	7	24·50	6	68·0	2
80	6·00	9	27·0	2	28·0	8
90	5·75	10	27·50	1	20·0	9

In 1920, half of the grain of strain 31, the highest yielder of the preceding year, was sown with a garden drill in rows one foot apart, so as to multiply it; the other half of the grain was kept, in case something should happen to the crop, so that the work of years would not be lost.

In 1921, the selection was sown in the trial plots, alongside of other varieties and strains of oats, with the following results:—

Variety	Days to mature	Yield of grain per acre
		lbs.
Banner, Cap Rouge 31	94	2,425
O. A. C. 72	93	1,760
Victory	93	1,658
Leader	92	1,598
Banner Ottawa 49	94	1,465
Gold Rain	91	1,429
Liberty, Ottawa 480	89	1,053

If this selection shows up above standard varieties, after three or four more years in the trial plots, it will be offered for sale to the trade or to farmers.

Results of this selection work show that, to be worth while, a high yielding selection must produce grain which, in turn, will be a heavy yielder. For instance, line 32 was fourth in 1917 and line 31 eighth, whilst the respective positions were sixth and first in 1919.

PEAS

Project 24.—*Variety and strain tests of field peas.*—Since 1911, sixteen varieties and strains of field peas were tried. The results of fifty-six tests show that the average time to come to maturity was ninety-eight days and the average yield 1,821 pounds per acre.

The following varieties were kept aside because they were found inferior to the others for our conditions here: Black-Eye Marrowfat, English Grey, Golden Vine, Paragon, Prussian Blue, White Marrowfat, Wisconsin Blue.

Work is continued with Arthur Ottawa 18, Chancellor Ottawa 26, Mackay Ottawa 25, Solo, and some of the best strains of standard varieties from the Central Experimental Farm, Ottawa, and also from American Experiment Stations.

The following varieties are the only ones which were tested for nine years and it will be seen that Arthur has shown decided superiority:—

COMPARISON OF THREE WELL-KNOWN VARIETIES OF FIELD PEAS AT CAP ROUGE DURING NINE YEARS

Year	Arthur		Golden Vine		Prussian Blue	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1911	2,280	87	1,935	87	1,245	87
1913	2,820	126	2,220	126	2,040	126
1914	1,200	91	1,180	89	1,160	98
1915	1,564	92	1,779	91	1,410	98
1916	1,950	93	1,890	93	2,010	95
1917	2,040	96	2,100	101	1,950	101
1918	2,160	99	1,110	110	1,230	110
1919	1,230	91	1,200	90	1,230	92
1920	2,280	106	1,860	103	2,190	106
Average	1,947	98	1,697	99	1,607	100

During the last seven years, a variety from Sweden, Solo, has outyielded Arthur by exactly three bushels per acre, on an average. Until, however, field peas are used more extensively for live stock feed, which they should be, the question of productivity is not the only one to be taken into consideration. At present, in central Quebec, field peas are sold mostly for human consumption. To find out the preference of merchants, samples were sent in 1921 to three well known firms of Quebec city.

Arthur was placed first by two of them and second by one, whilst Solo was placed sixth or last by two and fifth by one. The price paid for Solo would be very low indeed and two of the three firms would not buy it at all.

The two best yielding varieties of field peas at Cap Rouge have been Arthur, for an average of nine years, and Solo for an average of seven years.

As Arthur is a much better seller in central Quebec, it is recommended.

WHEAT

Project 27.—*Variety and strain tests of spring wheat.*—From 1911 to 1921, inclusive, twenty varieties and strains of spring wheat were tried and twelve were left aside mainly because they were found inferior to others for conditions here.

Amongst those which were discarded were Alpha, Bobs, Early Red Fife, Early Russian, Pioneer, Preston, Prospect, Red Fife, White Fife, Yellow Cross.

Work is continued with Bishop Ottawa 18, Chelsea Ottawa 10, Huron Cap Rouge 7, Huron Ottawa 3, Marquis Ottawa 15, Prelude Ottawa 135, Ruby Ottawa 623, besides an Ottawa selection which is not yet named.

The following are the only ones which were in the trial plots at the same time during nine years:—

Year	Huron		Bishop		Marquis		Early Red Fife		Average	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1911	2,340	87	1,830	87	1,725	87	765	85	1,665	86
1912	540	112	600	106	660	112	360	112	540	110
1915	1,488	93	1,305	94	1,332	100	1,485	97	1,402	95
1916	1,129	95	1,009	93	649	98	1,219	96	1,001	95
1917	1,500	105	1,320	99	1,350	106	1,320	103	1,372	103
1918	1,170	101	1,260	98	1,260	101	1,020	104	1,177	101
1919	690	98	1,530	94	960	97	690	98	967	97
1920	1,770	100	1,560	95	1,560	100	1,530	98	1,605	98
1921	1,525	93	1,625	91	1,600	92	1,350	94	1,525	92
Average	1,350	98	1,338	95	1,233	99	1,082	99	1,251	98

Huron has been recommended to farmers of this district and has consistently been a high yielder.

In 1914, a selection of Huron was started at the Cap Rouge Station and in 1918 it was included in the variety tests. The following table shows that it is a higher yielder than the three leading varieties which have been tried for a long number of years:—

VARIETY TESTS WITH WHEAT

Year	Huron, Cap Rouge 7		Huron Ottawa 3		Bishop Ottawa 8		Marquis, Ottawa 15		Average	
	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature	Pounds per acre	Days to mature
1918	1,590	104	1,170	101	1,260	98	1,260	101	1,320	101
1919	900	95	690	98	1,530	94	960	97	1,020	95
1920	1,830	100	1,770	100	1,560	95	1,560	100	1,680	99
1921	1,775	92	1,525	93	1,625	91	1,600	92	1,632	92
Average	1,524	98	1,289	98	1,494	94	1,345	97	1,413	97

From the above, it is seen that the best yielding variety of spring wheat, during a number of years, has been Huron, a Cap Rouge selection of which is proving superior to all others since 1918 inclusively. Varieties which do very well in other

parts of Canada, in the West for instance, such as Marquis and Early Red Fife, do not seem to be able to compete with Huron in central Quebec.

Project 22.—*Improvement of Huron wheat by selection.*—During the autumn of 1913, ninety average heads from different mother plants were chosen in a field of Huron wheat, taking care to leave aside everything which seemed to have had advantages of environment.

In 1914, thirty-one kernels were sown from each head, two inches apart, in rows five feet long and a foot apart, with checks, and in a manner that no row would have an advantage over some or all of the others. To all outward appearances, the soil was very uniform. The following figures show that the yield from different plants, in some instances, differed very much even with a neighbouring row.

YIELD OF NINETY STRAINS OF HURON WHEAT IN FIVE FOOT ROWS, 1914

Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces	Strain No.	Ounces
1	5·0	19	3·50	37	3·50	55	3·25	73	4·25
2	3·25	20	7·25	38	3·0	56	4·50	74	3·75
3	3·50	21	3·50	39	4·0	57	8·0	75	3·75
4	5·75	22	3·25	40	3·75	58	3·50	76	4·00
5	3·0	23	3·75	41	2·25	59	3·25	77	3·50
6	4·50	24	3·50	42	3·00	60	3·50	78	6·75
7	7·75	25	3·50	43	3·0	61	4·0	79	3·50
8	3·75	26	3·75	44	3·50	62	3·0	80	3·25
9	4·75	27	3·0	45	3·75	63	3·25	81	4·0
10	3·0	28	4·50	46	3·25	64	3·50	82	4·50
11	3·25	29	3·25	47	3·0	65	3·25	83	3·50
12	3·0	30	4·75	48	2·75	66	3·50	84	4·75
13	3·25	31	3·25	49	6·0	67	3·75	85	3·25
14	7·0	32	3·25	50	4·0	68	3·25	86	3·0
15	3·0	33	3·25	51	3·25	69	3·0	87	4·0
16	7·50	34	6·50	52	3·50	70	4·25	88	4·75
17	4·50	35	3·75	53	3·25	71	4·50	89	3·0
18	4·0	36	3·25	54	4·25	72	3·50	90	3·75

In 1915, ninety-one kernels were sown of each of the thirty highest yielding strains of the preceding year, two inches apart, in rows fifteen feet long and two feet apart, with checks, and giving no undue advantage to any row. The following table gives details about the production of these thirty strains both in 1914 and in 1915:—

YIELD OF THIRTY STRAINS OF HURON WHEAT IN FIFTEEN FOOT ROWS, 1914 AND 1915

Strain No.	1914		1915		Strain No.	1914		1915	
	Yield for 5-ft. row	Position	Yield for 15-ft. row	Position		Yield for 5-ft. row	Position	Yield for 15-ft. row	Position
	Ounces		Ounces			Ounces		Ounces	
1	5·0	10	24·0	8	50	4·0	14	20·50	11
4	5·75	9	24·50	7	54	4·25	13	19·0	14
6	4·50	12	17·0	18	56	4·50	12	18·50	15
7	7·75	2	30·50	1	57	8·0	1	28·0	2
9	4·75	11	19·50	13	61	4·0	14	20·50	11
14	7·0	5	25·0	6	70	4·25	13	17·0	18
16	7·50	3	22·50	9	71	4·50	12	17·0	18
17	4·50	12	18·0	16	73	4·25	13	18·50	15
18	4·0	14	20·50	11	76	4·0	14	20·50	11
20	7·25	4	27·0	4	78	6·75	6	26·50	5
28	4·50	12	20·0	12	81	4·0	14	20·0	12
30	4·75	11	17·50	17	82	4·50	12	18·0	16
34	6·50	7	27·50	3	84	4·75	11	20·50	11
39	4·0	14	19·0	14	87	4·0	14	17·50	17
49	6·0	8	21·0	10	88	4·75	11	19·0	14

In 1916, 271 kernels were sown of each of the ten highest yielding strains of 1915, two inches apart, in rows forty-five feet long and two feet apart, with checks, so that no row would have any undue advantage over any of the others. Figures are herewith given showing the respective yield and position of each of these ten strains in 1914, 1915, and 1916:—

YIELD OF TEN STRAINS OF HURON WHEAT IN FORTY-FIVE FOOT ROWS, 1914-1915-1916

Strain No.	1914		1915		1916	
	Yield for 5-ft. row	Position	Yield for 15-ft. row	Position	Yield for 45-ft. row	Position
	Ounces		Ounces		Ounces	
1	5·0	10	24·0	8	30·0	10
4	5·75	9	24·50	7	36·0	7
7	7·75	2	30·50	1	74·0	1
14	7·0	5	25·0	6	69·0	3
16	7·50	3	22·50	9	32·0	8
20	7·25	4	27·0	4	42·0	5
34	6·50	7	27·50	3	40·0	6
49	6·0	8	21·0	10	31·0	9
57	8·0	1	28·0	2	61·0	4
78	6·75	6	26·50	5	70·0	2

In 1917, half of the grain of strain 7, the highest yielder of the preceding year, was sown with a garden drill in rows one foot apart so as to multiply it; the other half of the grain was kept in case something should have happened to the crop, so that the selection would not be lost.

In 1918, 1919, 1920, 1921, the selection was sown in the trial plots, alongside other varieties and strains, with the following results:—

VARIETY AND STRAIN TESTS OF SPRING WHEAT, 1918-19-20-21

Variety or Strain	Yield of Grain in pounds per acre					Average number of days to mature
	1918	1919	1920	1921	Average	
Huron, Cap Rouge 7	1,590	900	1,830	1,775	1,524	98
Bishop, Ottawa 8	1,260	1,530	1,560	1,625	1,494	94
Marquis, Ottawa 15	1,260	960	1,560	1,600	1,345	97
Chelsea, Ottawa 10	1,170	930	1,320	1,750	1,292	96
Huron, Ottawa 3	1,170	690	1,770	1,525	1,289	98
Ruby, Ottawa 623	1,110	900	1,650	1,350	1,252	90
Prelude, Ottawa 135	1,110	1,020	1,410	1,100	1,160	84
Early Russian	1,380	870	1,410	975	1,159	95
Early Red Fife, Ottawa 16	1,020	690	1,530	1,350	1,147	98

The above described selection found out a strain, in the general crop of Huron, which outyielded its parent by nearly 15 per cent in carefully conducted variety and strain tests during four years; Huron Cap Rouge 7 wheat should be multiplied and disseminated as soon as possible in central Quebec.

MISCELLANEOUS

Project 18.—*Mixture for grain production.*—A great many people believe that a mixture of two or more kinds of grains yield more than one alone. At Cap Rouge, however, these mixtures have generally produced less per acre than one of the components did the same seasons. Two other disadvantages are that farmers are inclined to feed the threshed grain as it comes from the machine, when the

proportion of each kind is not what it should be, and also that the mixture cannot always be used for seed, unless it is first separated and then the right quantity of each put in.

Since 1912, twelve different mixtures were tried at Cap Rouge and the following were discarded because they did not yield enough, compared with others: Gold Rain oats and Swan's Neck barley, Thousand Dollar oats and Swedish Chevalier barley, Daubeney oats and Manchurian barley, Daubeney oats and Early Chevalier barley, Eighty Day oats and Manchurian barley, Eighty Day oats and Success barley, Daubeney oats and Prelude wheat. It was easy to see, right along, that the mixtures into which Banner oats entered yielded more than the others, and the following table gives details about five combinations:—

MIXTURES FOR GRAIN PRODUCTION

Varieties	Pounds of Grain per acre			
	1918	1919	1920	Average
Banner oats and Duckbill barley	1,890	1,590	2,190	1,890
Banner oats, Duckbill barley and Huron wheat	1,950	1,200	2,220	1,790
Banner oats and Arthur peas	1,680	1,500	2,040	1,740
Banner oats and Huron wheat	2,100	1,500	1,620	1,740
Banner oats and Novelty flax	1,830	1,050	2,220	1,700
Banner oats	1,410	2,580	2,340	2,110

From the above, it is quite clear that Banner oats alone outyielded all mixtures, and it is easy to understand that this cereal, which produces more than the others in Central Quebec would be at a disadvantage when having to compete for growing room with others of a less productive nature.

The figures in the table might be misleading to a certain extent, as 1,740 pounds of a mixture of oats and peas are more valuable for live stock feeding than 1,890 pounds of a mixture of oats and barley.

The deductions which can reasonably be made are that Banner oats alone will give more pounds of grain per acre in central Quebec than mixtures which have a reasonable chance of maturing at the same time; and that if a mixture is desired, for certain special reasons, Banner oats and Arthur peas will give the best results. A good quantity to sow per acre is about 50 pounds of each.

Project 17.—*Cereals for hay production.*—It sometimes happens that clover and grass seed fail to catch or are winter killed, which means a shortage of hay. One of the best things to do then is to sow grain and cut it for hay. The question is, what kind of grain to sow, or even what mixtures to use.

From 1915 to 1920 inclusive, a few varieties of oats and some grain mixtures were sown on one-sixtieth-acre plots and a careful record kept of the yields. The following table gives interesting details:—

YIELD OF PROTEIN AND DIGESTIBLE NUTRIENTS OF CERTAIN CEREALS, ALSO MIXTURES OF SAME, CUT FOR HAY

Year	Clover and Timothy Hay			Banner Oats and Vetches			Banner Oats and Arthur Peas			Victory Oats			Gold Rain Oats			Banner Oats		
	Yield per acre	Protein per acre	Total digestible nutrients per acre	Yield per acre	Protein per acre	Total digestible nutrients per acre	Yield per acre	Protein per acre	Total digestible nutrients per acre	Yield per acre	Protein per acre	Total digestible nutrients per acre	Yield per acre	Protein per acre	Total digestible nutrients per acre	Yield per acre	Protein per acre	Total digestible nutrients per acre
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1915	3,006	120·2	1,388·8	6,060	418·1	2,854·3	3,360	278·9	1,639·7	6,120	275·4	2,839·7	7,200	324·0	3,340·8	4,440	199·8	2,060·2
1916	5,728	229·1	2,646·3	5,820	401·6	2,741·2	6,270	557·8	3,279·4	7,920	356·4	3,674·9	7,440	334·8	3,452·2	5,940	267·3	2,756·2
1917	5,397	215·9	2,492·4	4,200	289·8	1,978·2	6·240	517·9	3,0.5·1	7,560	340·2	3,507·8	6,840	307·8	3,173·8	5,760	259·2	2,672·6
1918	5,055	202·2	2,335·4	10,740	741·1	5,058·5	7,140	592·6	3,484·3	8,820	396·9	4,092·5	7,860	353·7	3,647·0	7,500	337·5	3,480·0
1920	4,212	168·5	1,945·9	8,400	579·6	3,956·4	7,080	587.6	3,455·0	7,620	342·9	3,535·7	7,620	342·9	3,535·7	7,500	337·5	3,480·0
Average	4,680	187·2	2,162·2	7,044	486·0	3,317·7	6,108	507·0	2,980·7	7,608	342·4	3,530·1	7,392	332·6	3,429·9	6,228	280·3	2,889·8

The yield of roughage per acre is no doubt important, but the main things are the total digestible nutrients and the protein per acre. The whole experiment is thus condensed to show how the different crops compared for these two points:

Crop	Protein per acre	Digestible nutrients per acre
	lbs.	lbs.
Banner oats and Arthur peas	507·0	2,980·7
Banner oats and vetches	486·0	3,317·0
Victory oats	342·4	3,530·1
Gold Rain oats	332·6	3,429·9
Banner oats	280·3	2,889·8
Clover and Timothy hay	187·2	2,162·2

From the above it can readily be seen that a tall, heavy stooling variety of oats, such as Victory, will yield the highest quantity of digestible nutrients per acre; and that oats and peas give the greatest yield of protein per acre, which is one of the main considerations in live stock feeding. Possibly sixty pounds of each would be a good mixture to use.

FORAGE CROPS

The work done at Cap Rouge for the Division of Forage Crops consists of variety tests and improvement by selection of clovers and grasses for hay and pasture, corn for grain and for silage, also roots. This report includes only projects about which sufficient data have been gathered to be of use to farmers or of interest to experimentalists. In looking over figures for 1921, one should not forget that the season was a bad one for hay, very good for corn and somewhat below the average for roots. The main reason for any decrease in crops was the long drought of early summer.

Project 56.—*Variety and strain test of red clover.*—Though red clover is generally sold only as red clover, there are many distinct types, as can readily be seen if careful attention is paid when going through a field. There seems to be no doubt that some are earlier or later than others, are higher or lower yielders than the average and are more or less adapted to certain conditions.

In the spring of 1920, three varieties, one from a well known seed firm, one which had been isolated at the Central Experimental Farm, Ottawa, and another from Sweden were sown with a garden drill, four rows of 375 feet in length and one foot apart being given to each.

The plants were counted during the autumn of 1920 and again in the spring of 1921 to determine the relative degree of hardiness of each, as the piece of land used is in a very exposed location.

The following table gives interesting details:—

VARIETY AND STRAIN TEST OF RED CLOVER, 1921

——	Commercial	Ottawa Perennial	Late Swedish
Number of plants living—autumn, 1920	2,193	1,541	2,225
" " spring, 1921	1,738	1,118	1,880
Percentage of plants, living—spring, 1921	79	73	84
Date of first cutting of hay, 1921	July 2	July 2	July 13
Pounds of hay from first crop, 1921	37	38	50
Date of second cutting of hay, 1921	Aug. 9	Aug. 9	Oct. 8
Pounds of hay from second crop, 1921	13	13·5	3
" " two cuttings, 1921	50	51·5	53
Weight of hay per plant—in fraction of ounces	·46	·74	·45
Pounds of hay per acre—actual yield	1,450	1,493·5	1,537
" " same number of plants for each variety	1,568	2,511	1,537

It will be noted that the variety from Sweden suffered the least from winter, and that it gave the best actual yield of hay. However, it had a great deal more plants growing than the "Ottawa Perennial," which brings the corrected yield much higher

A good hay crop.

for the latter. Where the "Late Swedish" might be very useful, though, would be for use with timothy as clover is generally ready to cut before timothy is. This means a loss of tonnage if hay is made when clover is at its best or a loss of digestible nutrients if hay is made when timothy is just right.

This project will be continued, as it is yet much too early to draw definite conclusions.

Project 62.—*Improvement of corn for grain production.*—This project really is incidental to another one, "Growing Longfellow corn for seed in Quebec," but as the principles involved are the same for the Longfellow variety as they would be for one more suitable for grain production, details are given about results obtained.

According to careful records kept, it was found that the cost of seed required to produce an acre of silage corn represents only 3 per cent of the total costs. If poor seed is used, a certain proportion of the 97 per cent of all other costs is lost,

and as resowing is out of the question in a northern locality, it is clear that good seed must be procured. Merchants often have good seed corn for sale, but the man who requires corn silage for his cattle every year must *always* get good seed, and the most logical way to do this is for him to grow it.

At first sight, to do this looks an impossibility, as varieties of corn which mature grain every year, in the northern parts of Canada, do not produce enough tonnage to be recommended for silage production, whilst those which produce enough tonnage will mature grain only in exceptional seasons. But it was found, at Cap Rouge, that when three kernels were sown in four-inch pots and these placed in a hot bed, with medium temperature, at the end of April, the plants could be put out in the field, about the beginning of June, with a loss of less than 12 per cent, calculating the number of kernels sown and the number of plants which lived.

This was kept up for five years and it is very interesting to note how the production of shelled corn, or dry seed, went up each season. Of course, the strains which produced the most grain were kept each year, commencing with six in 1918, until two were kept in 1921, the best of these to be sown in 1922. The following table gives a few details:—

IMPROVEMENT OF CORN FOR GRAIN PRODUCTION

Year	Source of seed	Date of sowing in pots	Date of trans-planting in field	Number of 4-inch pots used	Number of hills with each three plants	Number of plants put in field	Number of plants which lived	Number of ripe ears produced	Number of pounds of seed produced	Pounds of shelled corn per acre
1917	John A. Bruce, Toronto.....	April 25	June 7	56	50	150	131	92	15	1,458
1918	Experimental Station, Cap Rouge.....	" 25	" 7	109	100	300	272	189	32	1,548
1919	" "	" 28	" 6	367	350	1,050	958	1,126	233	3,222
1920	" "	" 27	" 2	462	450	1,350	1,317	1,517	325	3,496
1921	" "	" 26	" 7	317	300	900	818	1,173	248	4,001
	Average.....	April 26	June 5	262	250	750	705	819	171	2,745

Admitting that 1921 was an extraordinarily good year for corn production, it must be acknowledged that the yield has crept up every year and that a production of over 71 bushels of shelled corn per acre is a result which was not even dreamt of for Central Quebec. Though there must have been lots of crossing, it is seen that isolating the best strains has had a very good effect.

From the above it is seen that corn can be improved in Central Quebec for the yield of grain or seed; and that it is possible for a farmer to produce, in a small area, good ensilage corn seed, even in the north where the variety used does not naturally ripen.

Project 44.—*Variety and strain test of corn for silage.*—Since 1913, inclusive, twenty-seven varieties and strains of corn were tested for silage production. The following were dropped because they did not give enough tonnage: Canada Yellow, Ninety Day, Free Press, Gehu, Quebec Yellow, Twitchell's Pride, Early Malcolm and Yellow Flint.

Out of the others, seven were tested for at least five years, and the following table gives details about them:—

VARIETY TESTS OF CORN FOR SILAGE AT CAP ROUGE—AVERAGE OF FIVE YEARS

Variety	Pounds of corn per acre, just before ensiling					
	1915	1917	1919	1920	1921	Average
Bailey	18,300	37,521	26,625	33,382	52,301	33,626
Leaming	15,250	30,688	21,975	26,130	70,553	32,919
Wisconsin No. 7	18,750	33,896	24,900	26,721	55,452	31,944
White Cap Yellow Dent	15,300	26,035	21,750	24,436	62,277	29,960
Longfellow	14,150	20,654	23,325	28,813	50,205	27,429
North Dakota	15,750	21,860	25,875	22,322	49,944	27,150
Compton Early	14,750	22,297	18,075	20,605	50,070	25,159

The above five years were chosen because they were the only ones during which all the varieties were tested.

All the above were in the dough stage when cut in 1921, but it was an exceedingly good season for corn. In poor seasons, there is no doubt that some of the high yielding varieties may not produce as much dry matter per acre as some of the others, so that, beginning with 1922, a certain number of representative plants will be taken from every variety, cut up in small pieces and a sample of each analysed. This will give the yield of dry matter per acre, which is one of the main points to consider.

The results to date would tend to show that varieties of corn which will mature grain nearly every year, in central Quebec do not give enough tonnage to be profitably used for silage production, and that of the varieties producing enough tonnage, it is safer to keep on using Longfellow until others, through yield and analysis combined, show that they produce more dry matter per acre.

Project 45.—*Variety and strain tests of field carrots.*—Since 1911, inclusive, nineteen varieties and strains of field carrots have been tested on eighty-seven plots and have yielded at an average rate of 19,640 pounds per acre. Some years, land was not exactly suitable, others, germination was very poor, and others again the weather was very dry, but a farmer growing field carrots for his live stock would no doubt be subject to these drawbacks at different times. The fact, though, that the average yield for four varieties, in 1921, was 46,757, with the highest variety giving 57,584 pounds per acre, shows the possibilities of the crop. As it yielded much less digestible nutrients per acre than swede turnips during the whole period of the test, this kind of root should only be grown when required to be fed to horses.

The following table gives details about the varieties grown in 1921:—

VARIETY AND STRAIN TEST OF FIELD CARROTS. *Sown on May 6*

Size of Plots, 1-236 acre. Project No. 45. Pulled on October 7.

Variety or Strain	Source of Seed	Type	First Plot			Second Plot			Average for two plots			
			Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plots	Actual yield per acre	Corrected yield per acre
				Lb.	Lb.		Lb.	Lb.		Lb.	Lb.	Lb.
Mammoth Short White	William Rennie, Limited, Montreal	Short; white	237	255	60,180	173	233	54,988	205	244	57,584	76,085
Large White Belgian	" "	Long; white	180	177	41,772	159	168	39,648	169·5	172·5	40,710	60,885
Mammoth White Intermediate.	" "	Intermediate; white	246	203	47,908	225	180	42,480	235·5	191·5	45,194	48,648
Danish Champion	Central Experimental Farm, Ottawa.	Intermediate; yellow	243	182	42,952	264	187	44,132	253·5	184·5	43,542	43,542
	Average		226·5	204·25	48,203	205·25	192	45,312	215·875	198·125	46,757·5	54,907

Carrots of different colours were tested: white, yellow, orange, red; but the whites have shown decided superiority over the others for yield of roots per acre. Of the whites, the three types were tried, long, intermediate and short, and there is not much difference between them, as the average yield per acre for eleven years is as follows: Improved Short White, 23,128 pounds; White Belgian (Long), 21,224 pounds; Mammoth White Intermediate, 20,793 pounds. The most careful test was made in 1921, and the variety which seems to be the best to recommend is Improved Short White, followed by Mammoth White Intermediate.

Results to date would show that: 1st, field carrots cannot be profitably grown except to be fed to horses; 2nd, the variety which gives the highest tonnage is Improved Short White, closely followed by Mammoth White Intermediate.

Project 46.—*Variety and strain tests of mangels.*—Since 1911, inclusive, twenty varieties and strains of mangels and sugar mangels have been tested on 99 plots and have yielded at an average rate of 16,970 pounds per acre. At the same time and on the same land, a clayey loam of naturally poor fertility but well tilled and manured, swede turnips have produced more than twice the quantity of dry matter per acre, so that mangels cannot be recommended as a profitable crop under conditions such as existed at Cap Rouge. In 1921, the five varieties tested averaged 40,828 pounds per acre, and the highest went to 48,144, which is quite above the average for ten years, as stated above; but in 1921 the five best varieties of swede turnips averaged 44,533 pounds per acre, and the highest went up to 57,702 pounds, which shows that when conditions are nearly ideal, swedes as well as mangels take advantage of them.

The following table gives details about the varieties tested in 1921:—

VARIETY AND STRAIN TEST OF MANGELS

Sown on May 6

Size of Plots, 1-236 acre. Project No. 46. Pulled on October 6.

Variety or Strain	Source of Seed	Type	First Plot			Second Plot			Average for two plots			
			Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plots	Actual yield per acre	Corrected yield per acre
				Lb.	Lb.		Lb.	Lb.		Lb.	Lb.	Lb.
Giant White Sugar	Wm. Ewing Co., Montreal	Half-long, white, green top	187	182	42,952	175	175	41,300	181	178·5	42,126	44,221
Giant Yellow Globe	" "	Round; yellow	192	193	45,548	188	164	38,704	190	178·5	42,126	42,126
Giant Yellow Intermediate	" "	Half-long; yellow	178	157	37,052	173	145	34,220	175·5	151	35,636	38,580
Golden Tankard	" "	Tankard, orange	194	172	40,592	174	159	37,524	184	165·5	39,058	40,332
Long Red Mammoth	" "	Long; red	175	160	37,760	181	161	37,996	178	160·5	37,878	40,432
Yellow Intermediate	Central Experimental Farm, Ottawa.	Half-long; yellow	167	195	46,020	157	213	50,268	162	204	48,144	56,465
Average			182·166	176·5	41,654	174·666	169·5	40,002	178·416	173	40,828	43,479

* This places all varieties on the same footing as the one which had the best stand.

Mangels of different types were tested: long, intermediate, tankard, globe, besides the sugar-mangels. The best yielder, for a number (10) of years has been Yellow Intermediate, rather closely followed by Half Sugar White, and as the latter contains a larger percentage of dry matter, it is probably the best to grow, wherever conditions would warrant growing mangels. The former averaged 19,868 pounds and the latter 18,739 pounds per acre.

Results to date would show that: 1st, mangels are not as profitable to grow as swede turnips under conditions such as exist at Cap Rouge; 2nd, the variety which has given the highest tonnage is Yellow Intermediate, while Half Sugar White has produced the largest quantity of dry matter per acre.

Project 55.—*Comparison of some methods of helping the germination of mangel seed.*—As is well known, what is generally called mangel seed is really a hard envelope containing one or more seeds. Before germination takes place, this hard envelope must break, and this is the reason why so much trouble is experienced, especially on ridges, when the weather is dry. In central Quebec, it is not uncommon to see farmers preparing for swede turnips land on which mangels were sown early but did not germinate.

In 1916, an experiment was undertaken, during the early part of the winter season, in the greenhouse, where nine different methods were compared with a check. This experiment was conducted in flats, such as are ordinarily used by gardeners to start plants in the spring. Three tests were made that winter and three more each of the following four winters so that figures are offered for fifteen different tests.

The methods used were as follow:—

1. Check.
2. Seed envelopes soaked for fifteen hours just before sowing in water kept at 60° F.
3. Seed envelopes soaked for fifteen hours just before sowing in a mixture of half water and half liquid manure from cattle, kept at 60° F.
4. Soil packed, just after sowing, about as would be done with a roller in ordinary farm practice.
5. Soil packed as in 4, and about one-tenth inch water at 60° F. applied every day.
6. Soil not packed, but watered as in 5.
7. A 2-10-3 fertilizer applied at an approximate rate of 1,000 pounds per acre and mixed with the soil as harrows would probably mix it.
8. The same quantity of fertilizer as in 7, applied in the drills or depressions, with the seed envelopes.
9. Common salt applied at an approximate rate of 300 pounds per acre and mixed with the soil as harrows would probably mix it.
10. The same quantity of salt as in 9 applied in the drills or depressions, with the seed envelopes.

Method	Number of plants which grew for each hundred seed envelopes sown																				
	1916-17				1917-18				1918-19				1919-20				1920-21				Average for 5 years or 15 tests
	First test	Second test	Third test	Average for 1916-1917	First test	Second test	Third test	Average for 1917-1918	First test	Second test	Third test	Average for 1918-1919	First test	Second test	Third test	Average for 1919-1920	First test	Second test	Third test	Average for 1920-1921	
Soaking seed envelope in water	146	148	140	145	154	148	210	171	124	150	164	146	192	164	192	183	182	170	200	184	165
Soaking seed envelope in water and liquid manure	162	162	132	152	144	136	202	161	120	144	160	141	180	160	196	179	178	164	194	179	162
Check	152	140	126	139	142	156	210	169	126	112	168	135	174	160	166	167	172	168	194	178	157
Packing soil	156	142	120	139	154	124	188	155	122	154	164	147	176	156	170	167	176	170	174	173	156
Packing soil and watering	168	128	140	145	138	162	208	169	114	120	150	128	182	158	188	176	150	154	160	155	154
Watering unpacked soil	148	140	136	141	120	160	196	159	118	110	150	126	172	160	182	171	174	162	164	167	153
Applying fertilizers broadcast	154	114	110	126	112	120	150	127	112	136	134	127	164	130	146	147	148	120	154	141	133
Applying fertilizers in seed rows	72	42	12	42	54	80	145	93	104	92	92	96	120	118	118	119	124	112	118	118	93
Applying common salt broadcast	124	90	68	94	44	46	54	48	102	60	60	74	88	78	90	85	92	84	98	91	78
Applying common salt in seed rows	30	6	6	14	4	12	30	15	48	6	24	26	40	28	46	38	24	22	42	29	24

There were really three different methods used, but with changes in more or less important details, through the seed, the soil, and foreign substances added to the soil. The only method which gave better results was treatment of the seed envelope to make it rot more quickly and permit it to liberate the true seeds in the shortest possible time.

It was thought that packing the soil, and also watering the soil every day afterwards, would have a tendency to bring the seed envelope in close contact with the moist soil, and soften. This was probably accomplished but it did not do the work as fast as soaking did.

The application of chemical fertilizers and of salt, compared with the check, not only did not help, but were rather detrimental. It is difficult to explain this, but they really seemed to injure the seed just as it germinated, as is shown by the very small percentage of germination above ground when these substances were used in the rows with the seed envelopes.

The results of this experiment would seem to show: 1st. That soil treatment or the addition of substances such as chemical fertilizers or salt have no beneficial effect on the quick germination of mangel seed. 2nd. That the most efficient method, according to the experiment, is to soak the seed envelopes, just before sowing, for about 15 hours, in water kept around 60° F.

Project 53.—*Variety and strain test of swede turnips.*—Since 1911, inclusive, sixty-five varieties and strains of swede turnips have been tested on 247 plots and have yielded at an average rate of 31,109 pounds per acre. They have furnished a great deal more dry matter and digestible nutrients per acre than carrots, mangels, or sugar beets, and they are without doubt the most profitable class of roots to grow under conditions such as exist at Cap Rouge. In 1921, the ten varieties and strains grown averaged 39,069 and the highest yielder went up to 57,702, which is much higher than the eleven-year average and shows the possibilities.

The following table gives details about the test of 1921:—

VARIETY AND STRAIN TEST OF SWEDE TURNIPS *Sown on May 6*

Size of Plots, 1-236 acre. Project No. 53. Pulled on October 4.

Variety or Strain	Source of Seed	Type	First Plots			Second Plot			Average for two plots			
			Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plot	Actual yield per acre	Number of plants	Yield of plot	Actual yield per acre	Corrected yield per acre
				Lb.	Lb.		Lb.	Lb.		Lb.	Lb.	Lb.
Bangholm	Sweden	Purple top, oval	146	229	54,044	157	260	61,360	151·5	244·5	57,702	58,654
Ditmars	Experimental Station, Kentville, N.S.	Bronze top, round	150	200	47,200	158	246	58,056	154·0	223·0	52,628	52,628
Good Luck	Steele, Briggs Seed Co., Toronto	Purple top, oval	135	141	33,276	144	177	41,772	139·5	159·0	37,524	41,424
Sutton Champion	Experimental Station, Fredericton, N.B.	Purple top, round	137	144	33,984	153	175	41,300	145·0	159·5	37,642	39,979
Shepherd Golden Globe	Sweden	Green top, round	133	136	32,096	164	179	42,244	148·5	157·5	37,170	38,546
Magnum Bonum	Wm. Rennie Seed Co., Montreal	Purple top, oval	130	125	29,500	165	184	43,424	147·5	154·5	36,462	38,069
Invicta	Wm. Rennie Seed Co., Montreal	Bronze top, round	134	118	27,848	150	168	39,648	142·0	143·0	33,748	36,600
Perfection	Steele, Briggs Seed Co., Toronto	Purple top, round	128	128	30,208	172	167	39,412	150·0	147·5	34,810	35,738
Mammoth Clyde	Wm. Ewing Seed Co., Montreal	Purple top, round	140	133	31,388	163	154	36,344	151·5	143·5	33,866	34,425
Monarch	Experimental Farm, Nappan, N.S.	Purple top, oval	117	100	23,600	143	147	34,692	130·0	123·5	29,146	34,527
Average			135	145	34,314	157	186	43,825	146	165·5	39,069	41,210

*This places all varieties on the same footing as the one which had the best stand.

Swede turnips of different types were tested: purple top oval, purple top round, bronze top oval, bronze top round, and green top round. All the best yielders were found amongst the purple tops and the majority of the good ones amongst the ovals. The three leading varieties have been tested for nine years, the same seasons, and the average production per acre is as follows: Good Luck, 41,130 pounds; Perfection, 39,661 pounds; Magnum Bonum, 39,056 pounds. The variety which has been recommended by this Station for a number of years is Good Luck, as it has been a consistently high yielder. Rather than try to find a better one, work should be directed to improving this variety.

Results to date show that: 1—Swede turnips are by far the most profitable class of roots to grow, under conditions such as exist at Cap Rouge, and where roots must be grown. 2—The variety which has proved itself the best, as far as tonnage is concerned, is Good Luck.

Project 58.—*Improvement of Good Luck swede turnip by selection.*—Good Luck was chosen for this work in 1915 because it was the one which had produced until then at Cap Rouge the largest number of pounds of roots per acre. The choice was a good one, as this variety, at the end of 1921, is still at the top for tonnage.

The improvement sought is in the percentage of dry matter, as the number of pounds of dry matter per acre is of a great deal more importance than the number of pounds of roots.

To find out the roots with the greatest percentage of dry matter, a number of them are placed in a tub of water and only those which sink are kept. These are afterwards placed in a solution of one pound of common salt per gallon of water and only those which sink are kept. Again the latter are placed in brine, but composed, this time, of two pounds of common salt per gallon of water, and the heaviest, those which sink, are kept for breeding work. Roots might be tried right away in the denser solution, but it would take much more salt as some of the liquid is lost with every root taken out.

This long description of a very simple method of choosing the best roots is given so that any farmer who wishes to plant a dozen roots or so may know what to do. At Cap Rouge, roots which produced seed gave about two ounces each.

Care must be taken to place roots to be used for seed growing in water, after taking them out of the brine, as the exposure of the sun, with the salt on them, seems to have a deleterious effect.

After a couple of years it is proposed to grow individual seed-bearing plants under cotton tents so that there may be no crossing, and to test, by the above-described method, the progeny of each plant, gradually leaving aside the undesirable ones and keeping only the one which not only will be of a high density itself but will produce the largest percentage of roots with a high percentage of dry matter.

Project 158.—*Comparison of Experimental Farms grown with commercial root seed.*—The quality of commercial root seed was very poor during the war and the supply quite small. This led to a comparison of seed grown on the Experimental Farms system with the commercial article, to show the importance of sowing only what was capable of giving good crops.

The following table gives details about the three tests made at Cap Rouge in regard to this matter:—

COMPARISON OF EXPERIMENTAL FARMS GROWN WITH COMMERCIAL ROOT SEED

Year tested	Kind of root	Name of variety	Seed from	Yield per acre
				lbs.
1920	Carrot.....	White intermediate.....	Experimental Station, Summerland, B.C....	25,100
1920	"	"	Wm. Rennie, Montreal, Que.....	20,100
1920	Swede Turnip	Good Luck.....	Steele Briggs, Toronto, Ont.....	37,400
1920	"	"	Experimental Station, Fredericton, N.B.....	31,200
1920	"	"	" Ste. Anne, Que.....	26,700
1921	Mangel.....	Yellow Intermediate....	Experimental Farm, Ottawa, Ont.....	48,144
1921	"	" ...	Wm. Ewing, Montreal, Que.....	35,636

The results, to date, from the somewhat small number of tests, are in favour of the Experimental Farms grown seed. That the seedsmen can, and sometimes do, sell good seed is shown by the test with the Good Luck swede turnips.

It would be so easy for most farmers to grow themselves the root seed which they require that it is a wonder they do not do so. They would then be sure of what is sown, and even if it was only a question of vitality, it might be a great help towards better crops.

POULTRY

The work here with poultry consists of experiments with breeding, feeding, housing, management, also methods of preserving eggs. The laying contest for the province of Quebec is conducted at Cap Rouge and besides the above, eggs and stock from good producing strains are sold at reasonable prices. No report is made on breeding operations, as the pedigree mating system has not been in use long enough to warrant giving details. Not many years ago a heavy layer was supposed invariably to produce heavy laying pullets, but this has been shown to be not always the case; then everybody seemed positive that a male bird out of a heavy laying hen would be sure to produce all heavy laying pullets if mated with heavy laying hens, but this also is influenced by other considerations. The main reasons for this disappointment were that pullets were not hatched at the right time of the year, were not fed so as to lay early in the autumn, and were not constitutionally strong enough to stand the hard work of heavy production. These few notes of warning are sounded for those who without proper care and attention expect to revolutionize egg production simply by the use of male birds out of heavy layers.

The following five experiments, Projects 79, 80, 81, 82 and 83, were reported very briefly last year but are given with greater detail this year.

Project 79—*Commercial grain versus screenings for winter egg production.*—Some poultrymen seem to think that any kind of small shrivelled grain will do for laying hens, while others will not feed anything except the plump article. No doubt, the cause of shrivelling of grain influences its composition but it would be going too deeply into the subject to expect that a farmer will send samples for analysis any time that he has screenings for his flock.

The screenings used for the present experiment were what came out of the fanning mill when grain was cleaned and graded for seed. As only about 50 per cent came out fit to be sown, it is readily seen that the rest was composed of at least a fair percentage of good grain, mostly oats, barley and wheat. Practically all farmers have the same kind of material on hand and this is why it was used. The commercial scratch used was a standard make sold by dealers; the mash and other feed was similar in both lots.

The following table gives details about the experiment, which was run for five seasons, November to February, inclusive, each year:—

Season	Pen No.	No. of Birds in pen	Total weight of birds on November 1st	Total weight of birds on February 28th	Weight gained or lost during experiment at $0.30 per lb.	Number of eggs laid at $0.60 per doz.	Average weight of eggs per dozen in ounces	Value of eggs	Total value of product	Pounds of grain at $2.40 per 100 lbs.	Pounds of screenings at $1.60 per 100 lbs.	Pounds of skim milk at $0.25 per 100 lbs.	Pounds of meal at $2.00 per 100 lbs.	Pounds of beef scraps and green bone at $5.00 per 100 lbs.	Pounds of swedes at $0.20 per 100 lbs.	Pounds of grit and shells at $1.25 per 100 lbs.	Total value of feed consumed	Loss or gain per pen	Loss or gain per head	Cost of one dozen of eggs	Cost of one pound of eggs
COMMERCIAL GRAIN																					
1916–17	3	25 Yearling hens	136	166	+30	169	25·6	$ 8 45	$17 45	472·5	.....	16	261	45	128·0	21	$19 37	−$ 1 92	−$0·077	$1·375	$0·859
1917–18	3	25 Pullets.....	121	148	+27	60	24·1	3 00	11 10	547·0	.....	197	121	.....	31·0	25	16 41	− 5 31	− 0·212	3·282	2·179
1918–19	10	22 Yearling hens	119	174	+55	358	27·6	17 90	34 40	438·0	.....	552	195	48	182·5	37	19 01	+ 15 39	+ 0·700	0·637	0·369
1919–20	4	25 Pullets.....	106	132	+26	135	25·2	6 75	14 55	554·0	.....	122	163	35	114·0	32	19 24	− 4 69	− 0·188	1·710	1·086
1920–21	3	25 Birds.....	146	161	+15	277	26·1	13·85	18 35	676·0	.....	340	71	31	55·0	28	20 50	− 2 15	− 0·860	0·889	0·545
Average	.....	24 Birds.....	126	156	+30	200	25·7	9 99	19 17	537·0	.....	245	162	32	102·0	29	18 91	+ 0 26	+ 0·011	1·135	0·707
SCREENINGS																					
1916–17	4	25 Yearling hens	134	162	+28	163	26·8	8 15	16 55	.....	551	16	259·0	45·5	127·0	24	16 87	− 0 32	− 0·013	1·242	0·741
1917–18	4	25 Pullets.....	119	144	+25	65	24·4	3 25	10 75	.....	348	198	171·5	.....	34·0	25	9 87	+ 0 88	+ 0·035	1·822	1·195
1918–19	12	22 Yearling hens	116	119	+ 3	345	21·8	17 25	18 15	.....	519	552	195·0	48·0	182·5	37	16 80	+ 1 35	+ 0·061	0·583	0·428
1919–20	3	25 Pullets.....	102	124	+22	141	24·9	7 05	13 65	.....	682	127	167·0	34·0	107·0	27	16 82	− 3 17	− 0·127	1·431	0·920
1920–21	4	25 Birds.....	145	160	+15	278	25·8	13 90	18 40	.....	625	340	68·0	55·0	55·0	29	15 43	+ 2 97	+ 0·119	0·666	0·413
Average	.....	24 Birds.....	123	142	+19	198	24·7	9 92	15 50	.....	545	247	172·0	36·0	101·0	28	15 16	+ 0 34	+ 0·014	0·918	0·595

It is seen by the above figures that there was an average of twenty-four birds in each pen and that both lots received practically the same quantities of animal and green food, of meal, grit and shells; the only difference being that one bunch got commercial grain and the other screenings.

The results show two interesting features: 1—Placing a value on commercial grain of 50 per cent above that of the screenings, the birds receiving the latter paid better. 2—Practically the same number of pounds of screenings and of commercial grain were eaten by each pen.

Project 81—*Skim-milk versus beef scrap for winter egg production.*—It is safe to say that the egg yield of the average farm flock would be materially increased by supplying more protein from animal sources. One thing is certain, and has been proved time and again; that protein from vegetable sources cannot completely replace protein from animal sources for the production of eggs. Moreover, the cost of eggs is surely decreased by the addition of animal feeds, as there are much experimental data, both in the United States and in Canada, to prove that grain alone is an expensive ration.

The small number of people who have realized the importance of animal feeds for the production of eggs at a low cost have, however, been in doubt as to the best and most economical sources of these animal feeds. The commercial article has generally been in the form of ground green bone, raw meat, and beef scrap, whilst skim milk is a home product to be had on a very large number of farms. Green bone and raw meat do not keep very well, except in freezing weather, so that beef scrap is generally used.

In 1916, it was decided to compare beef scrap with skim-milk, at the Cap Rouge Station, for the production of winter eggs. This experiment was run for five seasons, November to February inclusive, during five years, so that the data which accumulated, if not completely conclusive, may be regarded as throwing considerable light on the subject. An average of twenty-five birds were in each pen and both received the same quantities of similar food, except that one pen was fed skim-milk and the other beef scrap. The following table gives details:—

Season	Pen No.	No. of Birds in pen	Total weight of birds on November 1st	Total weight of birds on February 28th	Weight gained or lost during experiment at $0.30 per lb.	Number of eggs laid at $0.60 per doz.	Average weight of eggs per dozen in ounces	Value of eggs	Total value of product	Pounds of grain at $2.40 per 100 lbs.	Pounds of skim milk at $0.25 per 100 lbs.	Pounds of meal at $2.00 per 100 lbs.	Pounds of beef scrap at $5.00 per 100 lbs.	Pounds of swedes at $0.20 per 100 lbs.	Pounds of grit and shells at $1.25 per 100 lbs.	Total value of feed consumed	Loss or gain per pen	Loss or gain per head	Cost of one dozen of eggs	Cost of one pound of eggs
SKIM-MILK																				
1916-17...	1	25 Pullets.....	112	145	+33	384	24·4	$19 20	$29 10	467	786	250	.....	129	17	$18 64	+$10 46	+$0·418	$0·582	$0·382
1917-18...	1	25 "	122	158	+36	159	28·2	7 95	18 75	489	438	153	.....	28	25	16 26	+ 2 49	+ 0·100	1·227	0·696
1918-19...	1	25 "	95	159	+64	438	21·2	21 90	41 10	531	858	225	.....	188	51	20 40	+ 20 70	+ 0·828	0·559	0·422
1919-20...	1	25 "	109	135	+26	144	23·2	7 20	15 00	636	763	156	.....	120	23	20 82	− 5 82	− 0·233	1·735	1·197
1920-21...	1	25 Birds.....	140	160	+20	449	22·9	22 45	28 45	660	795	57	.....	55	18	19 30	+ 9 15	+ 0·366	0·516	0·361
Average..	.....	25 Birds.....	116	151	+36	315	24·0	15 74	26 48	557	728	168	.....	104	27	19 08	+ 7 40	+ 0·296	0·727	0·485
BEEF SCRAP																				
1916-17...	2	25 Pullets.....	115	155	+40	247	24·0	12 35	24 35	469	.....	242	104·0	129·0	17	21 76	+ 2 59	+ 0·104	1·057	0·705
1917-18...	2	25 "	116	156	+40	8	24·0	0 40	12 40	496	.....	159	37·0	29·0	25	17 30	− 4 90	− 0·196	25·950	17·300
1918-19...	2	25 "	106	149	+43	232	21·9	11 60	24 50	527	.....	215	23·5	188·5	51	19 13	+ 5 37	+ 0·215	0·989	0·723
1919-20...	2	25 "	117	128	+11	76	24·1	3 80	7 10	636	.....	208	50·0	118·0	15	22 35	− 15 25	− 0·610	3·529	2·343
1920-21...	2	25 Birds.....	141	142	+ 1	499	23·8	24 95	25 25	661	.....	60	47·0	55·0	22	19 79	+ 5 46	+ 0·218	0·476	0·320
Average..	.....	25 Birds.....	119	146	+27	212	23·6	10 62	18 72	558	.....	177	52·0	104·0	26	20 07	− 1 35	− 0·054	1·137	0·771

The preceding table shows that the birds given skim-milk not only laid a greater number of eggs, but gained more weight than those which received beef scrap. According to the experiment, beef scrap is worth about nine times more than skim-milk, weight for weight, for egg production, so that if it sells for $90 per ton, skim-milk is worth $10 per ton or 50 cents per hundred pounds,

Skim-milk can very well replace beef scrap for the production of eggs; but it should be fed either always sweet or always sour.

The best feeding practice shows that it takes about one-third of a pound per hen per day; if this quantity is not drunk by the birds, mash may be made with skim-milk to get the birds to take the required amount.

Project 80—*Roots versus clover for winter egg production.*—Green feed has for a long time been regarded as an essential part of the ration for laying hens but, unfortunately, it is not always on hand. When it was decided to compare roots with dry clover leaves, the object was to find out whether a material always available to farmers cannot be used with advantage when the succulent article is not to be had.

The following table gives details about this project:—

Season	Pen No.	No. of Birds in pen	Total weight of birds on November 1st	Total weight of birds on February 28th	Weight gained or lost during experiment at $0.30 per lb.	Number of eggs laid at $0.60 per doz.	Average weight of eggs per dozen in ounces	Value of eggs	Total value of product	Pounds of grain at $2.40 per 100 lbs.	Pounds of skim milk at $0.25 per 100 lbs.	Pounds of meal at $2.00 per 100 lbs.	Pounds of beef scrap and green bone at $5.00 per 100 lbs.	Pounds of swedes at $0.20 per 100 lbs.	Pounds of clover leaves at $0.75 per 100 lbs.	Pounds of grit and shells at $1.25 per 100 lbs.	Total value of feed consumed	Loss or gain per pen	Loss or gain per head	Cost of one dozen of eggs	Cost of one pound of eggs
ROOTS																					
1916-17	10	20 Pullets.....	91	132	+41	210	24·4	$10 50	$22 80	423	196	179·0	45·0	140·0	.....	23	$17 04	+$ 5 76	+$0·288	$0·974	$0·639
1917-18	10	22 "	97	141	+44	39	24·0	1 95	15 15	418	.....	189·0	.....	38·5	.....	25	14 20	+ 0 95	+ 0·043	4·369	2·913
1918-19	3	25 "	112	153	+41	243	22·0	12 15	24 45	605	.....	220·0	50·5	199·5	.....	53	22 50	+ 1 95	+ 0·078	1·111	0·808
1919-20	12	25 Yearling hens	128	164	+36	271	24·3	13 51	24 35	712	.....	138·5	33·8	79·0	.....	36	22 16	+ 2 19	+ 0·088	0·981	0·646
1920-21	7	25 Birds.....	100	112	+12	69	25·1	3 45	7 05	636	410	26·0	9·0	47·0	.....	14	17 51	− 10 46	− 0·418	3·045	1·941
Average	.....	23 Birds.....	106	140	+35	166	24·0	8 32	18 76	559	121	150·0	28·0	101·0	.....	30	18 68	+ 0 08	+ 0·003	1·350	0·900
CLOVER																					
1916-17	9	20 Pullets.....	88	134	+46	224	24·2	11 20	25 00	415	206	188·0	45	.....	43	23	17 10	+ 7 90	+ 0·395	0·916	0·606
1917-18	9	22 "	117	178	+61	6	24·1	0 30	18 60	393	.....	125·5	.....	.....	24	25	12 43	+ 6 17	+ 0·283	24·86	16·505
1918-19	4	25 "	110	152	+42	351	21·1	17 55	30 15	595	.....	220·0	51	.....	119	53	22 78	+ 7 37	+ 0·295	0·779	0·591
1919-20	10	25 Yearling hens....	130	153	+23	523	24·7	26 15	33 05	712	.....	153·0	33	.....	170	36	23 51	+ 9 54	+ 0·382	0·539	0·349
1920-21	8	25 Birds.....	108	132	+24	156	25·5	7 80	15 00	626	410	17·0	21	.....	95	11	18 28	− 3 28	− 0·131	1·406	0·882
Average	.....	23 Birds.....	111	150	+39	252	23·9	12 60	24 36	548	123	141·0	30	.....	90	30	18 82	+ 5 54	+ 0·241	0·896	0·600

Contrary to expectations, the lot receiving no succulent food gained more weight and produced eggs at a lower cost per dozen. Though each bunch consumed practically the same quantities of grain, meal, animal food, grit and shell, it must be remarked that the quantity of swedes eaten was low compared with the quantity of clover leaves, when the composition of each is taken into consideration. The clover leaves were from well cured hay and were fed dry.

The deductions which may reasonably be made are that: (1) Succulent food should be given when possible, if it can be procured at a reasonable price; (2) Dry clover leaves from the battery floor of the barn or from the bottoms of mows are a very good substitute for succulent food, even if fed dry.

Project 82.—*Water versus snow for winter egg production.*—With the advent of the modern cold poultry house came trouble with water freezing. There would have been drawbacks, probably, with any kind of a house, so that regular poultrymen did not mind this very much. But as the bulk of the poultry products of the country are produced on farms where, oftentimes, the actual work of caring for the fowls is done by women and children, the question assumed some importance.

This prompted the Cap Rouge Experimental Station to try snow for laying hens. The experiment was conducted during five seasons, from the beginning of November to the end of February each year. An average of twenty-three birds were in each pen and both received practically the same quantities of feed, one lot getting water all the time and the other snow from the moment it was available until the testing period was finished.

The following table gives details about this project:—

Season	Pen No.	No. of Birds in pen	Total weight of birds on November 1st	Total weight of birds on February 28th	Weight gained or lost during experiment at $0.10 per lb.	Number of eggs laid at $0.60 per doz.	Average weight of eggs per dozen in ounces	Value of eggs	Total value of product	Pounds of grain at $2.40 per 100 lbs.	Pounds of skim milk at $0.25 per 100 lbs.	Pounds of meal at $2.00 per 100 lbs.	Pounds of beef scrap and green bone at $5.00 per 100 lbs.	Pounds of swedes at $0.20 per 100 lbs.	Pounds of grit and shells at $1.25 per 100 lbs.	Total value of feed consumed	Loss or gain per pen	Loss or gain per head	Cost of one dozen of eggs	Cost of one pound of eggs
WATER																				
1916-17...	12	20 Hens	109	150	+41	178	26·1	$ 8 90	$21 20	385	6	229·0	22·0	116·0	16	$15 37	+$ 5 83	+$0·291	$1·036	$0·635
1917-18...	13	22 "	117	161	+44	66	23·6	3 30	16 50	318	.....	129·5	.....	26·3	25	10 58	+ 5 92	+ 0·269	1·924	1·304
1918-19...	11	22 Pullets	78	134	+56	185	22·8	9 25	26 05	571	55	191·0	47·5	186	39	20 89	+ 5 16	+ 0·235	1·355	0·951
1919-20...	11	25 "	92	138	+46	101	23·1	5 05	18 85	702	.....	148·5	34·8	120	31	22 18	− 3 33	− 0·133	2·635	1·825
1920-21...	6	25 Birds	105	114	+ 9	159	23·8	7 95	10 65	666	.....	55·0	35·0	47	13	19 08	− 8 43	− 0·337	1·440	0·968
Average..	.....	23 Birds	100	139	+39	138	23·9	6 89	18 65	528	12	151·0	28·0	99·0	25	17 62	+ 1 03	+ 0·045	1·532	1·026
SNOW																				
1916-17...	11	20 Hens	105	133	+28	188	26·0	9 40	17 80	385	6	229·0	22	116·00	19	15 40	+ 2 40	+ 0·120	0·983	0·605
1917-18...	11	22 "	103	130	+27	126	24·5	6 30	14 40	458	.....	158·5		28·75	25	14 53	− 0 13	− 0·006	1·384	0·904
1918-19...	9	22 Pullets	78	128	+50	202	21·4	10 10	25 10	573	55	216·0	50	186·0	38	21 55	+ 3 55	+ 0·161	1·280	0·957
1919-20...	9	25 "	85	127	+42	82	23·4	4 10	16 70	712	.....	143·0	32	118·0	31	22 18	− 5 48	− 0·219	3·246	2·219
1920-21...	5	25 Birds	120	146	+26	287	23·6	14 35	22 15	656	.....	55·0	15	47·0	13	17 84	+ 4 31	+ 0·172	0·746	0·506
Average..	.....	23 Birds	98	133	+35	177	23·8	8 85	19 23	557	12	160·0	24	99·0	25	18 30	+ 0 93	+ 0·040	1·241	0·834

By the above table it is seen that, for the average of all tests, the pens receiving snow gained 11 per cent less than those getting water, but, on the other hand, they laid 28 per cent better. With the valuations placed on meat and eggs, also on feed given, the profit from the birds receiving snow was, for the five seasons, exactly 12½ per cent higher than from the ones getting water.

Whenever water can be given to laying hens in winter, so that they can drink enough before it freezes, it is probably the safest thing to do.

If this cannot be done, snow may be given without any fear either as to the effect on the stock itself or on the production of eggs, but plenty of fresh clean snow must be available.

Project 83.—*Fluctuations of temperature in poultry houses of different widths.*—Farmers who now sell and will probably continue to sell the largest part of the poultry products of the country keep hens for the money there is in them, and not simply for pleasure. Elaborate and costly buildings were never popular, as the interest and depreciation take too much from the sales, before a profit can be made. This is why the small cold poultry houses grew in favour so quickly—they were cheap, and they were more easily ventilated.

Ventilation, in most of these houses, it must be admitted, is often more a question of letting in lots of fresh air through open windows or cotton fronts than getting this air in by inlets and letting it out by outlets, as recommended for other buildings used to house live stock.

To find out the fluctuations in houses of different widths, thermometers registering the highest and the lowest temperatures were put in, during six consecutive winters, in a colony 8 feet wide, in a laying house 12 feet wide, and in another 16 feet wide. All these buildings were of the shed roof pattern, had about twice the area of cotton as of glass, and were placed so as to be about equally sheltered from the wind and to get practically the same amount of sun.

The following table shows the average highest, lowest, and range of temperature for six years in the three above-mentioned houses, also outside, where the meterological instruments were left:—

Season	Outside			House 16 feet wide			House 12 feet wide			House 8 feet wide			Average		
	Average highest temperature	Average lowest temperature	Average range of temperature	Average highest temperature	Average lowest temperature	Average range of temperature	Average highest temperature	Average lowest temperature	Average range of temperature	Average highest temperature	Average lowest temperature	Average range of temperature	Average highest temperature	Average lowest temperature	Average range of temperature
Winter of	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees
1915–16	35·71	—3·75	39·46	32·7	18·1	14·6	32·7	15·9	16·8	33·8	12·1	21·7	33·73	10·59	23·14
1916–17	32·0	—8·0	40·0	29·3	14·2	15·1	28·8	12·1	16·7	31·5	12·3	19·2	30·40	7·65	22·75
1917–18	27·5	—10·1	37·6	35·0	2·8	32·2	37·0	5·8	31·2	38·0	6·3	31·7	34·37	1·20	33·17
1918–19	35·0	2·0	33·0	41·0	7·0	34·0	46·0	9·0	37·0	41·0	7·0	34·0	40·75	6·25	34·25
1919–20	22·9	—14·30	40·50	21·1	8·5	12·6	32·1	9·0	23·1	20·0	10·0	9·8	24·02	3·30	21·50
1920–21	32·0	— 3·0	36·0	43·0	5·0	37·0	38·0	9·0	29·0	31·0	6·0	26·0	36·00	4·25	32·00
Average	30·85	— 6·19	37·76	33·7	9·3	24·2	35·8	10·1	25·6	32·5	8·9	23·7	33·21	5·54	27·80

The above figures show that, during six winters, the difference between the average highest and lowest temperature was 37·8 degrees outside, 25·6 in the narrow house, 24·2 in the wide house, and 23·7 in the colony.

The results of this experiment show that: Even in cold poultry houses, the range of temperature was 13·3 degrees less than outside. There is no difference, as far as fluctuations in temperature go, between houses of the same type varying in width between 8 and 16 feet wide.

Project 84.—*Comparison of early pullets, late pullets, yearling hens, and two-year old hens as winter layers.*—It seems admitted that hens are generally kept until too old for profitable winter egg production also that late hatched pullets commence to lay only the following spring when eggs are low in price. But the best known facts have to be reiterated quite often, which is the main reason for starting at Cap Rouge a project comparing layers of different ages.

The experiment began on the first day of November and ended on the last day of February, during five consecutive years. The number of birds in each pen was about 25; and the whole lot occupied the same house. A careful record was kept of all feed consumed, also of all eggs produced by every pen. At the beginning and at the end of each test, the birds were placed on the scales, so that, in the spring, the gain or loss in weight could be credited or debited to them.

The following table gives details about this project:—

Comparison of Early Pullets, Late Pullets, Yearling Hens, and Two-year-old Hens as Winter Layers

Season	Pen No.	No. of birds in pen	Total weight of birds on November 1st	Total weight of birds on February 28th	Weight gained or lost during experiment at $0.30 per lb.	Number of eggs laid at $0.60 per doz.	Average weight of eggs per doz. in ounces	Value of eggs	Early pullets. Total value of product	Pounds of grain at $2.40 per 100 lbs.	Pounds of skim milk at $0.25 per 100 lbs.	Pounds of meal at $2.00 per 100 lbs.	Pounds of beef scraps and green bone at $5 per 100	Pounds of sweedes at $0.20 per 100 lbs.	Pounds of grit and shells at $1.25 per 100 lbs.	Total value of feed consumed	Loss or gain per pen	Loss or gain per head	Cost of one dozen of eggs	Cost of one lb. of eggs
Early Pullets																				
1915-16...	1	25 early pullets.....	125	161	+36	955	23·7	$47 75	$58 55	468	282	196	42·0	118·0	21·0	$18 45	+$40 10	+$1·60	$0·232	$0·1556
1916-17...	5	25 "	119	160	+41	631	23·7	31 55	43 85	494	302	209	45·0	127·0	23·0	19·58	+ 24 27	+ 0·971	0·372	0·253
1917-18...	6	25 "	136	176	+40	65	23·8	3 25	15 25	371	.....	131	.....	31·0	25·0	11 89	+ 3 36	+ 0·134	2·195	1·477
1918-19...	5	25 "	120	155	+35	552	22·0	27 60	38 10	577	.....	210	50·0	185·5	45·0	21 48	+ 16 62	+ 0·665	0·467	0·340
1919-20...	5	25 "	115	140	+25	166	23·5	8 30	15 80	656	.....	167	24·5	120·0	28·0	20 89	— 5 09	— 0·203	1·510	1·027
Average..	.....	25 "	123	158	+35	474	23·3	23 69	34 31	513	117	183	32·3	116·3	28·4	18 46	+ 15 85	+ 0·634	0·467	0·320
Late Pullets																				
1915-16...	4	25 late pullets.....	93	135	+42	545	21·9	$27 25	$39 85	459	278	193	35·0	118·0	21·0	$17 82	+$22 03	+$0·881	$0·392	$0·286
1916-17...	8	25 "	98	145	+47	171	21·5	8 55	22 65	488	297	207	38·0	127·0	23·0	19·03	+ 3 62	+ 0 145	1·335	1·994
1917-18...	5	25 "	102	150	+48	9	24·0	0 45	14 85	604·5	.....	201	.....	29·0	25·0	18 90	— 4 05	— 0·162	25·200	16·800
1918-19...	8	25 "	85	128	+43	71	22·3	3 55	16 45	514	.....	187·0	47·5	167·5	31·0	19·17	— 2 72	— 0·109	3·240	2·311
1919-20...	8	25 "	67	113	+46	71	22·4	3 55	17 35	646	.....	112·5	22·0	125·0	27·0	19 44	— 2 09	— 0·084	3·285	2·347
Average..	.....	25 "	89	134	+45	173	22·4	8 67	22 23	542·3	115	180·1	28·5	113·3	25·0	18 87	+ 3 36	+ 0·134	1·308	0·934
Yearling Hens																				
1915-16...	2	25 yearling hens.....	136	178	+42	154	25·4	7 70	20 30	452	283	216·0	33·0	119·0	19·0	$18 01	+ $2·29	+$0·916	$1·403	0·883
1916-17...	6	25 "	137	172	+35	137	24·8	6 85	17 35	483	302	231·0	35·0	127·0	19·5	19 21	— 1·86	— 0·744	1·683	1·086
1917-18...	7	25 "	142	180	+38	150	24·6	7 50	18 90	402	.....	121·5	.....	31·0	25·0	12 45	+ 6·45	+ 0·258	0·996	0·641
1918-19...	6	25 "	130	175	+45	179	24·0	8 95	22 45	551	.....	258·0	52·0	185·5	43·0	21 89	+ 0·56	+ 0·022	1·467	0·975
1919-20...	6	25 "	143	150	+ 7	345	25·0	17 25	19 35	656	.....	223·0	24·0	130·0	26·0	21 98	— 2·63	— 0·105	0·764	0·489
Average..	.....	25 "	137	171	+33	193	24·8	9 65	19 67	509	117	209·9	29·0	118·5	26·5	18 74	+ 0·93	+ 0·069	1·165	0·751

TWO-YEAR-OLD HENS

1915-16...	*3*	*25 two-year-old hens..*	*122*	*139*	*+17*	*16*	*27·2*	*0 80*	*5 90*	*452·0*	*278*	*198·0*	*21·0*	*119·0*	*17·0*	*$17 00*	*—$11 10*	*—$0·444*	*$12·75*	*$7·486*
1916-17...	*7*	*25 " ..*	*150*	*165*	*+15*	*25*	*23·2*	*1 25*	*5 75*	*483·0*	*297*	*211·0*	*23·0*	*127·0*	*18·0*	*18 17*	*— 12 42*	*— 0·497*	*8·722*	*6·019*
1917-18...	*8*	*25 " ..*	*131*	*157*	*+26*	*76*	*24·1*	*3 80*	*11 60*	*446·5*	*.....*	*204·5*	*.....*	*35·0*	*25·0*	*15 19*	*— 3 59*	*— 0·144*	*2·398*	*1·592*
1918-19...	*7*	*15 " ..*	*86*	*103*	*+17*	*27*	*22·7*	*1 35*	*6 45*	*482·0*	*.....*	*156·0*	*39·0*	*185·5*	*32·0*	*17 41*	*— 10 96*	*— 0·732*	*7·738*	*5·454*
1919-20...	*7*	*25 " ..*	*138*	*158*	*+20*	*128*	*24·7*	*6 40*	*12 40*	*676·0*	*.....*	*153·9*	*28·6*	*112·0*	*32·0*	*21 33*	*— 8 93*	*— 0·352*	*1·999*	*1·297*
Average..	*.....*	*23 " ..*	*126*	*144*	*+19*	*54*	*24·4*	*2 72*	*8 42*	*507·9*	*115*	*184·5*	*22·3*	*115·7*	*25·0*	*17 82*	*— 9 40*	*— 0·434*	*3·960*	*2·592*

From the above figures it is seen that when early pullets, hatched before May, produced a certain number of eggs at a cost of $1, yearling hens produced the same number at a cost of $2.49, pullets hatched after April at a cost of $2.80, and old hens at a cost of $8.48.

It is sometimes objected that, though early pullets lay more eggs than yearlings or older hens, the size of the eggs is such that they would bring much less if ever eggs were sold by weight. Taking the figures of the above table, we find that when it cost $1 for early pullets to produce a certain weight of eggs, it cost $2.35 for yearlings to produce the same weight, $2.92 for late pullets, and $8.10 for old hens.

The birds used for this experiment were not specially bred for egg production, so that the early pullets put in each year were not from better stock than the yearlings or older hens. Two seasons, the yearling hens used were the same birds, with the exception of a very few which had died, as the ones in the pen of early pullets of the previous year, and in both cases they were, for cost of production, below the new lot of early pullets taken indiscriminately from the farm flock.

Early pullets are the cheapest producers of winter eggs. This has been told and written so often that it is an old story. But another carefully conducted experiment will again remind farmers of a well known fact which they seem liable to forget.

SECOND QUEBEC EGG LAYING CONTEST

On October 31, 1920, the second Quebec Egg Laying Contest started with twenty pens of ten birds each, six of these pens being entered by the Cap Rouge Station, out of competition, simply to give an official record to sixty Barred Rock Pullets bred on the Farm.

The following table gives details about each hen and each pen for the twelve months:—

TABLE SHOWING THE TOTAL PRODUCTION OF EACH HEN AND EACH PEN IN THE SECOND LAYING CONTEST WHICH WAS CONDUCTED BY THE EXPERIMENTAL STATION AT CAP ROUGE, QUE., FROM OCTOBER 31, 1920, TO OCTOBER 30, 1921, INCLUSIVE.

X—Production of more than one bird.
D—Dead, but not substituted.
B.R.—Barred Rocks.
R.I.—Rhode Island Reds.

Pen	Owner and Address	Breed	1	2	3	4	5	6	7	8	9	10	Floor	Total
1	Station Expérimentale, Cap Rouge, Que.	B.R.	121	93	142	134	108	128	115	160	135	140	8	1,284
2	André Bouchard, St. Philippe de Néri, Que.	R.I.	153	X138	X117	X135	102	X106	160	122	93	105	6	1,237
3	George Bouchard, Ste. Anne de la P., Que.	"	86	128	138	99	165	111	166	132	87	127	1	1,240
4	Station Expérimentale, Cap Rouge, Que.	B.R.	117	135	137	112	113	121	119	43	X90	110	4	1,101
5	Ecole d'Agriculture, Ste Anne de la P.Que.	R.I.	D73	73	127	116	106	145	95	91	86	79	4	995
6	M. l'Abbé Galarneau, Charlesbourg, Que.	"	150	85	78	49	84	90	77	24	X92	99	5	833
7	Jos. W. Gauvin, Champigny, Que.	"	80	68	75	99	95	121	51	85	132	64	.....	870
8	Station Expérimentale, Cap Rouge, Que.	B.R.	99	116	88	113	106	X87	89	134	77	102	4	1,015
9	Louis Lessard, St. Joseph de Beauce, Que.	R.I.	91	157	63	79	91	118	29	83	42	124	3	880
10	A. Ouellette, N.-D. de Pierreville, Que.	"	82	133	156	24	109	X96	81	60	134	114	21	1,010
11	Station Avicole, Princeville, Que.	"	53	40	84	X122	78	60	108	63	D83	68	5	764
12	M. l'Abbé L. P. Côté, St. Alexis de Mat., Que.	B.R.	82	90	65	89	21	80	86	85	45	51	1	695
13	Ecole d'Agriculture, Ste. Anne de la P., Que.	"	88	74	130	102	96	53	51	112	84	103	1	894
14	G. F. Fournier, Montmagny, Que.	"	162	206	150	102	85	171	128	138	152	129	6	1,429
15	Melle M. Laferrière, New Carlisle, Que.	"	89	79	26	139	129	6	D10	72	98	41	9	698
16	Station Avicole, Princeville, Que.	"	160	74	48	2	68	83	D13	48	144	84	11	735
17	Station Expérimentale, Cap Rouge, Que.	"	111	146	104	120	140	114	144	83	170	99	.....	1,231
18	A. Gaboury, Cap Rouge, Que.	"	121	91	89	55	36	62	21	139	138	132	.....	884
19	Station Expérimentale, Cap Rouge, Que.	"	103	118	133	173	95	98	137	141	156	170	1	1,325
20	Station Expérimentale, Cap Rouge, Que.	"	117	111	161	132	136	107	119	152	135	112	1	1,283

Project 78.—*Comparison of different methods of preserving eggs.* During six years, eight different ways have been compared of preserving eggs: water glass, lime water, wrapping in paper and leaving alone, wrapping in paper and turning daily, putting away in oats, also in sawdust, and two commercial preservatives. Samples were tested at the Chemistry Division, also at the Poultry Division, Central Experimental Farm, Ottawa, and at the Cap Rouge Station.

Only the first two mentioned methods, waterglass and lime water, have given satisfactory results at every one of the three places where they were tested.

Waterglass can be had at any druggists and is so easy to use that it is recommended as the preparation best meeting all exigencies.

MISCELLANEOUS

BUILDINGS

The office burnt during the night of December 16 and a new one was built with exactly the same floor space as the other. A cattle barn was commenced and will be completed during 1922.

FENCES

Over a mile of wire fencing was put up at the horse farm, part of which is now divided into five large fields instead of a very large number of small ones.

EXHIBITIONS

More than 150 prizes were won in open competition at Three Rivers, at Quebec Provincial Exhibition, and at Quebec District Fair with horses, forage crops, cereals, fruits, vegetables, flowers. No money is taken, but over $1,000 would have come to Cap Rouge and St. Joachim if it had.

PUBLICITY

A large number of bulletins, circulars and leaflets were distributed during the year, and articles were written for "Seasonable Hints," also for the press.