DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL SUBSTATION

BEAVERLODGE, ALBERTA

REPORT OF THE SUPERINTENDENT

W. D. ALBRIGHT

FOR THE YEAR 1930

Fertilizer test with cereals on black loam summer-fallow. (Photo by the Superintendent).

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TABLE OF CONTENTS

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INTRODUCTION

Over five and a half inches of well percolated precipitation in September and October of 1929 had provided an extraordinary moisture reserve for the crop of 1930. A large amount of fall ploughing was accomplished, too. Cultivation had continued until early November and intermittently in some cases until nearly the middle of that month.

A moderate winter ensued, with December and January the coldest months, the lowest temperature on the hilltop being 38 below zero on January 16, and the January mean being 1·76° F. The subsequent months were mild.

Thanks to a steady temperature and a good snow blanket, over-wintering vegetation came through well, most trees and shrubs even to the elm leafing out to the tips. Nearly all meadow crops survived nicely although certain plots of clover and of winter wheat were slightly patched.

South of the Peace the land dried up unusually early. A little harrowing and cultivating was done on the experimental grounds on April 5 and a very few plots were seeded two days later although no extensive seeding was done until April 18 to 20. In the vicinity of the Station the bulk of the wheat was sown in April and seeding of coarse grains was virtually completed by the middle of May. Most of the wheat and some of the oats were then showing.

On the Peace-River-Dunvegan plateau little land could be seeded until May and some farmers could not commence until the month was a week or more spent. Crop progress was rapid, however, and by midsummer the crops were little if any, behind those of the more southerly region in stage of development. Two or three weeks of cool, dry, windy weather ensued, but Victoria Day ushered in a general soaking rain, greatly improving the prospect. A little damping off was suspected in a few cases and on some uneven land water stood on parts of the fields but the general situation was most encouraging. Hay and pasture crops were particularly favoured.

Early in June the picture was marred by insect attack. Cutworms in particular were extraordinarily prevalent, clearing off the previous year's seedings of sweet clover and other legumes until patches of the areas were left bare as summer-fallow. In one place the removal of a surface crust revealed thirty cutworms on a space the size of a man's hand. Several species were present but the Red-backed was predominant. (It is worthy of note that the cutworm plague reached points in the Northwest Territories where gardeners have not previously found it necessary to combat this pest). In some places the grain fields were appreciably attacked by the cutworms, while wireworms again took some toll. In gardens leaf beetles, flea beetles, and root maggots were camp followers of the cutworm hosts.

Field crops recovered substantially from the insect attack.

36863—1½

June brought cool, wet weather, with very scant sunshine. From May 24 to the end of June, inclusive, precipitation amounted to 5·86 inches. Clayey soils were puddled by the prolonged saturation and when the weather turned hot and dry in early July considerable baking occurred. Between drowning in June and baking in July the crops on certain white, leached, woodland soils gave a very poor return. Generally speaking, however, the crops came on well, being helped considerably in the latter half of July by showers totalling an inch and a fifth and by nearly another inch during August.

On July 28 a visitation of frost touched potato vines here and there throughout the Peace, but seems to have missed entirely points along the Lower Athabasca, the Slave and the Mackenzie rivers, although the Slave, at least, is usually more subject to frost than the Peace.

No further frost occurred until August 28, when the crops on low lands were again touched, the thermometer at the slough half a mile from the Station buildings reading 25° F., while that on the ridge read 37 degrees.

Much harvesting was done during the last week of August but on the 29th a violent west-by-south-west windstorm raged all day, shattering a seeding or more from most uncut grain and playing havoc with stooks. It brought a light rain, followed by a brief hour of frost on the morning of the 30th. Contrary to the rule, this frost struck quite as hard on the hilltop as in the hollows. It seemed as though a wave of cold air had been suddenly swept in, touching the high points first. Probably if sunrise had not promptly terminated the frost the cold air would have soon commenced concentrating in the dips as usual. Whilst the frost of two nights previous had undoubtedly left its mark on some grain, no general devastating damage occurred. A few fields in certain districts had, however, been blasted in the blossom by the July frost.

Again it is interesting to note that the late-August frost, like that of July, spared the gardens along the Slave and the Mackenzie, although this one reached McMurray on the Athabasca.

By the end of August it was estimated that 75 per cent of the wheat and some of the oats in the Grande Prairie District had been harvested. Some of the wheat had been cut well on the green side.

During the first week of September threshing was under way at Spirit River, good yields and grade being reported. Rain occurred on the sixth, however, and thereafter the September weather sheet was speckled with records of rainfall. Time after time as the grain was about dry enough for threshing another interruption would occur. During the second week calm, cloudy weather brought fear of sprouting in stook but this was averted by a timely Chinook.

On the 22nd the rain was varied by a cold "spell", with four successive nightly readings of 24°, 27°, 27° and 18°, respectively. This nipped a percentage of the undug potatoes.

With eleven rainy days in September aggregating 2·39 inches of precipitation most of the grain threshed in that month was tough, but by October 4 the stooks were getting into excellent condition and grain graded dry. The next day a drizzling rain commenced, changing some days later to snow, of which nearly eleven inches fell by the eighteenth in the southwestern part of the Grande Prairie District. The snow was accompanied by unseasonably low temperatures running down to 9° F. on the sixteenth, followed by four successive readings of ten degrees. At points which missed the snow the ground froze six inches deep. Everywhere ungathered cabbages were injured while potatoes, whether in the ground or in temporary pit-storage, were extensively frosted.

The district north of the Peace largely missed this snow, so that stacking and threshing were resumed before the cold relented.

A week of windy weather at the end of October finally afforded an excellent opportunity for threshing so that fully ninety per cent of the wheat was threshed by the 31st, and the next week all threshing was finished except a few stacks. Perhaps two-thirds the wheat in the Peace this year grades "tough".

The October precipitation totalled 1·72 inches, November 1·32 inches and December 0·36 inch, so that a good moisture supply was stored for 1931.

As if to atone for its misbehaviour in October the weather in November and December was wonderfully fine and mild. The only two zero readings occurred in November, the lowest being -4.

Fall-ploughing was held up by the delay in threshing, by the discouraging price of grain and the disproportionately high cost of fuel and oil. Frost put a stop to it generally about the ninth or tenth of November, though a little tractor ploughing was done as late as November 12.

EXHIBITION WINNINGS

Peace River's proud record of grain-exhibition successes was decidedly enhanced during the year.

Permitted to return to the farm in the summer of 1930, although under doctor's instructions to abstain from actual work, Mr. Herman Trelle, of Wembley, Alberta, generalled a sensational come-back, his farm having been well handled during his absence by Mrs. Trelle and a young neighbour, Erich Anderson, whom they had developed in the seed-grain and exhibition game. Besides actively assisting in the preparation of the Trelle samples Mr. Anderson exhibited in 1930 on his own account, capturing the grand championship at the Royal on a sample of Victory oats and, later on, beating his tutor in wheat at the Provincial seed fair in Edmonton during January. At Toronto he won fourth in wheat and sixth in peas. Mr. Anderson also entered for the International at Chicago but owing to a delay in forwarding of the exhibits from Toronto, his, as well as other exhibits, failed to make connections, else Peace River's honours would have been still greater.

At the Royal Mr. Trelle won first for certified Reward wheat, second for timothy seed, and tenth for six-rowed barley. An outstanding exhibit of wheat entered in the open class was returned to him containing many impurities. These would certainly not have occurred in any sample as despatched by him.

At Chicago the Trelle's captured first in Zone 1 for hard red spring wheat with a sample of Reward which weighed 67·5 pounds per Winchester bushel or 72·8 pounds, as Mr. Trelle tested it, by the slightly larger Canadian standard. It was reported as the heaviest and most uniform sample ever shown at Chicago. It was afterwards awarded the wheat grand championship over a Saskatchewan exhibit of Durum.

An exhibit of Chancellor peas secured Trelle first in the small-yellow class and afterwards grand championship in peas, while a selection of blue peas won second in Class 3.

Had no other Chicago honours come their way Mr. and Mrs. Trelle would have well earned President Beatty's offer of a trip around the world; but for good measure they added second on a beautiful exhibit of timothy seed, third in hard, red winter wheat, prepared from a half-bushel crop of Kanred, and fifth on oats with a peck of Victory.

Engrossed with many public duties, Robert Cochrane, of Grande Prairie, still found time to prepare exhibits of timothy seed good enough to win third at the Royal and first at Chicago, a well-deserved climax to a seven-year series of winnings.

A remarkable win was made by S. B. Allsop, of Wembley, who secured first at the Royal in winter wheat on a half-bushel of Turkey Red. He followed this up by winning fourth at Chicago.

Still another Wembley name is that of P. U. Clubine, who secured fourth at the Royal on his Chancellor peas. The exhibit was entered for Chicago but failed to connect.

From the Fort St. John District, J. W. Abbott, operator of a Dominion Government Illustration Station at Baldonnel, sent to Chicago a sample of Chancellor which in the small yellow class was placed second to Mr. Trelle's Grand championship exhibit. Messrs. Trelle, Clubine and Cochrane all obtained their Chancellor originally from the Beaverlodge Station.

At High Prairie, which is actually in the Athabasca Watershed although on the border of the Peace, lives G. W. Randall, who won twenty-first at Chicago in spring wheat.

Norman Dow, a soldier settler from Pouce Coupe, broke into the lists with thirty-fourth in the same class, being one of the forty-six Canadians among fifty exhibitors placed in hard-red spring wheat.

The Athabasca Watershed was represented by two other successful exhibitors. Jos. H. B. Smith, of Wolf Creek, last year's International Champion, won tenth at Chicago in wheat and seventh in oats. E. J. Shank, of Athabasca, secured third in oats and seventh in spring wheat at Toronto, his exhibit missing connections for Chicago.

The 1930 record, then, for the Athabasca and Peace Watersheds—that one big sweep of country lying north of Edmonton—may be thus summarized:—

At Toronto:

Championship in oats;
First and third in oats;
First in winter wheat;
First in certified Reward spring wheat;
Fourth and seventh in open class for wheat;
Second and third in timothy seed;
Sixth in small field peas;
Tenth in 6-rowed barley.

At Chicago:

Grand Championship in wheat and peas;
First, tenth, twenty-first and thirty-fourth in hard red spring wheat (Zone 1);
Third and fourth in hard red winter wheat;
First and second in small yellow peas;
Second in peas, class 3, any other colour than yellow;
First and second in timothy seed;
Fifth in oats.

A very worthy achievement to the credit of Athabasca was that of Crawford Bros. who won a cup for the best ten acres of standing wheat in the Province. It was part of a seventy-acre field of Garnet and the ten acres in the competition are reported to have threshed 58¾ bushels per acre.

RAILROAD CONSTRUCTION

The year was marked by fifty-six miles of railroad construction. The beginning of December saw the inauguration of a regular passenger service on the sixteen-mile extension from Fairview to Hines Creek, on the north side of the Peace.

On Monday, December 29, a golden spike was driven at Dawson Creek, British Columbia, signalizing the completion of track-laying on a fifty-mile extension northwestward from Hythe, on the Southern fork. The first passenger train went through January 15.

HOMESTEAD ENTRIES

Since 1927 the Substation has been accumulating data regarding homestead entries and soldier grants filed at the five Alberta agencies, also percentage comparisons of Peace River and Alberta aggregates with totals from the three Western provinces. Effort was made to acquire like data for 1930 but several difficulties were encountered. In the first place the entries at the Grande Prairie and Peace River agencies down to 1930 had included filings in the Peace River Block of British Columbia. On August 1 of that year the administration of the resources in the Block was transferred to the British Columbia Government and thereafter the filings within the Block for the last five months of 1930 were grouped with those outside the Block recorded at the Pouce Coupe office for the whole calendar year. The apportionments would be difficult to unscramble. This and other difficulties led to the decision to present for 1930 only the partial data available, without annual comparisons. Entries at the Grande Prairie and Peace River Land agencies covering the whole calendar year for Alberta territory and the first seven months only for the Block numbered 5,606 as against 5,457 for the Edmonton agency and 11,662 for the whole five agencies in Alberta.

TABLE OF HOMESTEAD AND SOLDIER-GRANT ENTRIES OF DOMINION LANDS FOR YEAR 1930

(Figures for period January 1 to September 30, supplied by Deputy Commissioner of Lands, Department of the Interior, Ottawa; figures for period October 1 to December 31, supplied by Secretary, Department of Lands and Mines, Edmonton).

PROVINCE OF ALBERTA—By Land Agencies

	1930
Lethbridge land office	159
Calgary land office	440
Edmonton land office	5,457
*Grand Prairie land office	2,491
*Peace River land office	3,115
	11,662
Total for two Peace River agencies	5,606

* Including entries of Dominion Lands in the Peace River Block of British Columbia from Jan. 1 to July 31, 1930. Last five months' figures for that area not available.

TABLE OF HOMESTEAD AND SOLDIER-GRANT ENTRIES OF CROWN LANDS FOR YEARS 1927, 1928, 1929 AND 1930

(From figures supplied by H. E. Hume, Deputy Commissioner of Dominion Lands, Ottawa, and by the Secretary of the Provincial Department of Lands and Mines, Edmonton, Alta.)

The figures for 1927 and 1928 do not precisely tally with those formerly supplied from Ottawa, but are not essentially different. They represent a careful rechecking at Ottawa.

The figures for 1930 are incomplete by reason of the fact that filings in the Peace River Block of British Columbia after August 1, 1930, were included with the year's filings at Pouce Coupe in points outside the Block and could not be conveniently separated.

PROVINCE OF ALBERTA—By Land Agencies

—	1927	1928	1929	1930
Lethbridge land office	96	294	249	159
Calgary land office	185	510	484	440
Edmonton land office	1,443	3,504	4,666	5,457
*Grande Prairie land office	675	2,457	2,334	2,491
*Peace River land office	647	3,033	3,085	3,115
	3,046	9,798	10,818	11,662
Total for three northern agencies	2,765	8,994	10,085	.....
Total for two Peace River district agencies	1,322	5,490	5,419	.....
*Per cent Alberta total represented by three northern agencies	90·8%	91·8%	93·2%	.....
*Per cent Alberta total represented by two Peace River agencies	43·4%	56·0%	50·1%	.....

THREE PRAIRIE PROVINCES

*Alberta	3,046	9,798	10,818	.....
Saskatchewan	3,050	5,756	6,322	.....
Manitoba	761	649	769	.....
	6,857	16,203	17,909	.....
	%	%	%	
*Per cent of total represented by Alberta	44·4	60·5	60·4	.....
*Per cent of Canadian total represented by three Northern Alberta agencies	40·3	55·5	56·3	.....
*Per cent of Canadian total represented by two Peace River land agencies	19·3	33·9	30·3	.....

*Figures for the Grande Prairie and Peace River agencies include filings in the Peace River Block of British Columbia for 1927, 1928, 1929, down to July 31, 1930.

GRAIN SHIPMENTS AND PRICES

On all the Alberta railways north of Edmonton grain shipments showed a substantial increase in spite of the low prices prevailing. On the Dunvegan lines of the Northern Alberta railways the shipments amounted to 8,921,471 bushels of wheat and 2,595,518 bushels of coarse grains, totalling 11,516,989. The A. & G. W. lines shipped 1,147,767 bushels and the Athabasca line of the C. N. R. 2,665,674 bushels. The grand total shipments of all lines in Alberta north of Edmonton (including the Peace River Block of British Columbia) amounted to 17,038,409 bushels wheat and 4,072,466 of coarse grains making an aggregate of 21,110,875.

Freight rates bear hard upon remote regions. The cost of laying a bushel of Beaverlodge wheat down in Liverpool is placed by elevator men at 41 cents a bushel. It remained unchanged during the crash in prices. Thus while the price of No. 3 wheat in Liverpool at the end of April was a little over 60·5 per cent of what it was a year earlier the Beaverlodge price of the same grade at the end of April was only about 38 per cent of what it had been twelve months previous.

GRAIN SHIPMENTS ON RAILROADS IN ALBERTA (INCLUDING PEACE RIVER BLOCK, B.C.), NORTH OF THE LATITUDE OF EDMONTON, BETWEEN AUGUST 1, 1930, AND JULY 31, 1931, REPRESENTING THE CROP OF 1930

Railway	Wheat	Coarse grains	Total
	bush.	bush.	bush.
Dunvegan Lines, N.A.R.	8,921,471	2,595,518	11,516,989
Alberta and Great Waterways, N.A.R.	990,819	156,948	1,147,767
Canadian National Lines:—			
St. Albert Subdivision	338,481	211,200	549,681
St. Paul Subdivision	3,227,796	569,600	3,797,396
Athabasca Subdivision	2,190,474	475,200	2,665,674
Whitecourt Subdivision	653,796	30,400	684,196
Bonnyville Subdivision	715,572	33,600	749,172
Total Canadian National Lines	7,126,119	1,320,000	8,446,119
Grand total all lines north of Edmonton	17,038,409	4,072,466	21,110,875

The Canadian National Railway figures were given in carloads.
The following table was used to convert carloads into bushels:—

Wheat	1,287 bushels
Oats	1,600 "

SHIPMENT OF GRAIN BY DISTRICTS ON THE DUNVEGAN LINES, NORTHERN ALBERTA RAILWAYS, FROM AUGUST 1, 1930 TO JULY 31, 1931

Commodity	Edmonton to Athabasca River	Pembina Valley Branch	Smoky River to Spirit River	Athabasca to Smoky River	Royeroft to Dawson Creek	McLennan to Hines Creek	Grand total
	bush.	bush.	bush.	bush.	bush.	bush.	bush.
Wheat.....	1,693,573	566,681	704,471	376,106	2,941,311	2,639,329	8,921,471
Other grains...	417,060	9,577	82,371	709,664	1,229,256	147,590	2,595,518
Total all grains	2,110,633	576,258	786,842	1,085,770	4,170,567	2,786,919	11,516,989

LIVE STOCK SHIPMENTS

From every sector of the Dunvegan lines, also from the Waterways line as well as from the Canadian National lines operating in Alberta north of the latitude of Edmonton live stock shipments were the lowest they have been in any year since 1924, when complete tabulations were commenced in the annual reports of the Beaverlodge Substation.

SUMMARY PRESENTING STATISTICS OF LIVE STOCK SHIPMENTS, FROM ALL THE RAILWAYS IN ALBERTA NORTH OF EDMONTON IN 1930

Items	Number of head of each class					
	Cattle	Hogs	Sheep	Horses	Total	Number of cars
Dunvegan line of N.A.R. tapping chiefly Peace River District.....	3,725	23,280	1,445	400	28,850	477
A. & G. W. Railway of N.A.R. running northeastwardly from Edmonton.....	575	2,240	340	140	3,295	62
Coronado Branch (St. Paul line), Canadian National Railways.....	4,293	21,953	1,788	120	28,154	.....
Bonnyville Branch, Canadian National Railways.....	1,197	3,264	518	85	5,064	.....
Athabasca Branch, Canadian National Railways.....	129	450	83	250	912	.....
Whitecourt Branch, Canadian National Railways.....	783	3,865	635	90	5,373	.....
St. Albert to Magnolia, Canadian National Railways.....	392	1,176	93	20	1,681	.....
Total all lines north of Edmonton.....	11,094	56,228	4,902	1,105	73,329	.....

On A. & G.W. and Dunvegan lines the following estimates were used to arrive at number of animals per carload:—

Cattle and calves.....	25 head per car
Hogs.....	80 "
Sheep.....	85 "
Horses.....	20 "

The generality of the decline is striking and the falling-off from 1929 is particularly marked. The Dunvegan lines shipped 28,850 head as against 35,735 head during the previous year, a decrease of 19·3 per cent; the Waterways line 3,295 as against 6,020, a decrease of 45·3 per cent; and the Canadian National lines in Alberta territory north of Edmonton 41,184 head compared with 57,552 in 1929, a decrease of 28·4 per cent. The 1930 aggregate for all lines was 73,329 head as compared with 99,307 for 1929, a decrease of 26·2 per cent.

There was a decrease in every class of stock. The 11,094 cattle represented a decline of 30 per cent; the 56,228 hogs a decline of 26·6 per cent; the 4,902 sheep a decline of 5·1 per cent; and the 1,105 horses a decline of 34·9 per cent.

PRODUCTION IN CREAMERIES NORTH OF EDMONTON

Creameries	1926		1927		1928*		1929†		1930	
	Make	Value	Make	Value	Make	Value	Make	Value	Make	Value
	lb.	$	lb.	$	lb.	$	lb.	$	lb.	$
Alberta creameries shipping over Dunvegan lines	601,268	194,888 82	427,506	150,779 00	306,533	111,495 86	362,552	126,305 76	399,415	104,672 63
Alberta creameries shipping over C.N.R., and A. & G.W. lines from points north of Edmonton	818,222	257,854 61	770,260	266,217 63	715,188	252,075 17	840,326	292,629 08	746,541	192,688 62
Total Alberta creameries	1,419,490	452,743 43	1,197,766	416,996 63	1,021,721	363,571 03	1,202,878	418,934 84	1,145,956	297,361 25
Average price per pound cts.		31·9		34·8		35·6		34·8		25·9
Decrease from previous year.. %			15·62	7·9	14·7	12·8			4·7	29·0
Increase from previous year... %							17·7	15·2		
Pouce Coupe creamery	31,589		22,696	7,951 40	15,504	6,239 55	9,475	3,922 65	‡12,165	4,440 23
Average price per pound at Pouce Coupe creamery cts.						40·24		41·4		36·5
Total all creameries	1,451,079		1,220,462	424,948 03	1,037,225	369,810 58	1,212,353	422,857 49	1,158,121	301,801 48

*In 1928 there were two new creameries in operation, viz., High Prairie and Elk Point, while the creamery at Berwyn was closed.
†In 1929 two new creameries were opened, viz., Vilna and Barrhead, while two were closed, viz., Grande Prairie and Sangudo.
‡Imported from Edmonton and sold 19,634 pounds in addition.

When the price of grain crashed many a settler realized the unwisdom of his course for live stock prices did not fall so soon as grain prices and the farmer with several strings to his bow was in a position to turn something to account.

During the era of good grain crops and high prices for them it was much like stemming the ocean tide to argue against the insecurity of a great region depending upon grain alone for its revenue. Economic fact has impressed the lesson which economic theory might have presented in vain.

CREAMERY PRODUCTION

The production of creamery butter declined slightly in volume and heavily in value. Alberta creameries shipping over the Dunvegan lines made 399,415 pounds worth $104,672.63. The total production of Alberta creameries north of Edmonton was 1,145,956 pounds, worth $297,361.25. As compared with 1929 these figures represent a shrinkage of 4·7 per cent in make and 29 per cent in value. Including the Pouce Coupe creamery, the figures are 1,158,121 pounds,, worth $301,801.48, representing an aggregate decline of 4·5 per cent in manufacture and 28·6 per cent in value.

Towards the end of the season a revival of interest in dairying was manifest. When all else fails, the cow!

POULTRY

Poultry production reached a low ebb. In December the Poultry Pool shipped two carloads of dressed turkeys aggregating 53,789 pounds.

No other poultry was handled as there was insufficient to make carload lots and the low price would not warrant smaller lots, which would have had to be shipped by express. Some odd shipments were made by individuals.

36863—2½

METEOROLOGICAL RECORDS AT BEAVERLODGE, 1930

Month	Temperature, degrees Fah.						Precipitation					Evaporation		Sunshine		Sleighing	
	Maximum		Minimum		Mean		Rain	Snow		Total precipitation		1930	Average 9 years	1930	Average 8 years	1930	Average 15 years
	Highest	Mean maximum	Lowest	Mean minimum	1930	Average 15 years	1930	1930	Average 15 years	1930	Average 15 years						
	°	°	°	°	°	°	in.	in.	in.	in.	in.	in.	in.	hours	hours	days	days
January	25	9·32	−38	−5·81	1·76	7·48	.....	6·5	13·80	0·65	1·40	.....	.....	84·5	82·05	31	31·00
February	43	30·46	−22	9·89	20·18	14·15	.....	4·0	7·23	0·40	0·76	.....	.....	121·9	113·76	28	28·10
March	69	37·03	−10	14·84	25·94	22·29	0·09	4·0	11·85	0·49	1·22	.....	.....	212·0	155·10	27	26·60
April	67	52·57	17	30·60	41·59	36·93	0·31	2·5	4·41	0·56	0·70	1·23	0·42	239·2	213·98	.....	8·53
May	72	58·26	21	35·39	46·83	48·13	2·71	.....	1·75	2·71	1·58	4·30	3·96	198·9	267·91	.....	0·40
June	77	64·20	38	44·07	54·14	55·25	3·20	.....	1·51	3·20	1·99	1·93	3·84	117·5	245·58	.....	.....
July	88	74·06	36	45·81	59·94	59·73	1·20	.....	.....	1·20	2·26	4·07	4·75	351·8	299·95	.....	.....
August	87	75·48	32	46·10	60·79	57·51	0·95	.....	.....	0·95	1·69	5·50	3·81	265·0	242·55	.....	.....
September	83	61·67	18	38·50	50·09	48·95	2·39	.....	3·16	2·39	1·69	1·47	2·02	165·2	184·61	.....	.....
October	78	43·87	9	27·45	35·66	38·58	0·64	10·8	4·81	1·72	1·13	1·11	0·93	126·5	148·08	7	1·80
November	60	36·57	−4	20·17	28·37	24·86	0·26	10·6	8·15	1·32	0·99	.....	.....	88·3	95·25	5	7·13
December	62	50·39	2	25·13	37·76	12·61	0·30	0·6	12·25	0·36	1·30	.....	.....	71·5	74·19	18	24·20
Average, 1930	.....	49·49	.....	27·68	38·59	35·54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total, 1930	.....	.....	.....	.....	.....	.....	12·05	39·0	.....	15·95	.....	19·61	.....	2,042·3	.....	116	.....
Average yearly total	.....	.....	.....	.....	.....	.....	.....	.....	68·92	.....	16·71	.....	19·73	.....	2,123·01	.....	127·76

MEAN TEMPERATURES AT SOME REPRESENTATIVE POINTS IN THE PEACE RIVER AND ATHABASCA DISTRICTS, 1930

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
Beaverlodge	1·76	20·18	25·94	41·59	46·83	54·14	59·94	60·79	50·09	35·66	28·37	37·76	38·59
Baldonnel (Fort St. John District)	1·23	15·14	26·50	41·10	47·20	53·70	61·78	61·21	48·57	37·26	26·22	32·49	37·70
Elmworth	2·58	20·84	28·32	42·45	46·47	53·64	58·54	57·89	47·69	33·62	27·44	30·41	37·49
Goodfare	0·66	17·97	27·18	39·37	44·03	52·50	57·68	57·99	47·84	33·70	27·70	31·68	36·53
Pouce Coupe	−1·86	16·52	24·20	39·95	46·83	52·88	59·49	57·34	47·22	35·31	29·80	32·45	36·69
Fort McMurray	−9·85	3·48	29·43	38·40	47·96	57·90	61·22	60·35	47·29	34·11	19·10	14·27	33·64

Observers:—Dominion Experimental Substation, Beaverlodge, Alta.; G. S. Moyer, Elmworth, Alta.; J. W. Abbott, Baldonnel, B.C.; V. Young, Goodfare, Alta.; A. C. Chalmers, Pouce Coupe, B.C.; C. Potts, Fort McMurray, Alta.

PRECIPITATION AT SOME REPRESENTATIVE POINTS IN PEACE RIVER AND ATHABASCA DISTRICTS, 1930

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in
Beaverlodge	0·65	0·40	0·49	0·56	2·71	3·20	1·20	0·95	2·39	1·72	1·32	0·36	15·95
Baldonnel (Fort St. John District)	0·90	0·25	0·10	0·99	2·54	5·16	0·78	1·79	2·64	0·37	0·40	0·08	16·00
Elmworth	1·05	0·25	0·45	0·36	2·06	2·64	0·88	0·67	2·29	1·68	0·90	0·56	13·79
Goodfare	1·70	0·50	0·02	1·38	1·85	3·27	1·19	0·99	1·90	2·11	1·24	0·50	16·65
Pouce Coupe	1·97	0·25	0·35	0·90	3·51	3·89	0·85	0·68	1·85	0·81	1·07	0·01	16·14
Fort McMurray	1·25	1·85	0·12	0·74	0·81	1·70	2·43	3·83	2·20	0·58	0·60	0·35	16·46

Observers:—Dominion Experimental Substation, Beaverlodge, Alta.; G. S. Moyer, Elmworth, Alta.; J. W. Abbott, Baldonnel, B.C.; V. Young, Goodfare, Alta.; A. C. Chalmers, Pouce Coupe, B.C.; C. Potts, Fort McMurray, Alta.

PRECIPITATION AT BEAVERLODGE, 1916–1930

Month	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Average 15 years
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January	0·70	2·50	1·12	0·65	3·85	1·40	1·75	0·70	1·20	1·27	0·50	1·65	0·42	2·60	0·65	1·40
February	0·30	1·00	1·20	0·70	0·20	0·97	1·75	0·00	0·44	1·79	0·45	1·40	0·20	0·60	0·40	0·76
March	1·45	0·95	1·36	1·95	2·12	1·20	1·20	1·60	1·40	1·70	0·28	1·00	1·12	0·50	0·49	1·22
April	0·09	0·37	0·60	0·82	1·82	0·03	0·10	0·23	0·15	0·13	0·66	0·79	3·05	1·17	0·56	0·70
May	0·21	6·62	0·22	1·04	1·15	1·65	2·11	0·23	0·45	0·93	1·06	2·38	0·95	2·05	2·71	1·58
June	0·45	1·02	2·29	2·48	3·17	2·04	0·38	1·26	0·60	1·23	4·45	2·78	2·26	2·17	3·20	1·99
July	3·98	0·41	3·59	2·22	2·52	1·89	0·44	3·65	1·91	1·38	2·06	2·98	2·16	3·54	1·20	2·26
August	0·47	0·88	1·71	2·14	2·66	2·51	0·54	0·92	4·60	3·50	0·69	1·03	1·48	1·20	0·95	1·69
September	0·52	0·21	0·42	1·78	1·80	2·69	1·44	0·37	1·43	2·45	1·84	2·27	0·84	4·89	2·39	1·69
October	0·56	1·82	0·97	2·18	1·65	0·67	0·61	0·18	1·99	1·61	0·68	0·85	0·83	0·70	1·72	1·13
November	0·10	0·39	0·55	2·34	0·43	0·91	0·78	0·12	1·43	2·05	1·49	1·55	0·10	1·34	1·32	0·99
December	1·50	2·60	1·10	1·78	0·75	0·60	0·80	0·50	1·57	2·51	1·17	2·00	1·40	0·85	0·36	1·30
Totals	10·33	18·77	15·13	20·08	22·12	16·56	11·90	9·76	17·17	20·55	15·33	20·68	14·81	21·61	15·95	16·72

RECORD OF SUNSHINE AT BEAVERLODGE, 1922–30

Month	Year									Total (8 years)	Average (8 years)
	1922	1923	1924	1925	1926	1927	1928	1929	1930		
	hours	hours	hours	hours	hours	hours	hours	hours	hours	hours	hours
January	.....	71·7	81·4	73·3	77·5	81·5	114·4	72·1	84·5	656·4	82·05
February	.....	102·9	112·4	101·2	73·7	128·2	173·3	96·5	121·9	910·1	113·76
March	.....	78·7	150·3	163·1	162·9	137·2	163·7	172·9	212·0	1,240·8	155·10
April	.....	245·4	205·0	236·3	226·5	183·4	174·5	201·5	239·2	1,711·8	213·98
May	.....	251·6	279·8	358·2	276·3	269·2	324·5	184·8	198·9	2,143·3	267·91
June	.....	269·9	268·7	299·9	264·7	254·5	241·9	247·5	117·5	1,964·6	245·58
July	.....	250·7	253·9	302·3	321·1	318·7	319·9	281·2	351·8	2,399·6	299·95
*August	255·9	240·0	213·8	193·0	242·2	328·2	241·6	216·6	265·0	1,940·4	242·55
September	136·6	205·2	158·1	176·7	144·2	173·0	253·2	201·3	165·2	1,476·9	184·61
October	139·9	204·7	104·6	131·4	124·8	123·2	168·4	201·0	126·5	1,184·6	148·08
November	68·3	97·8	80·2	111·8	65·8	102 6	125·0	90·5	88·3	762·0	95·25
December	44·9	57·8	91·4	39·1	77·3	83·7	99·9	72·8	71·5	593·5	74·19
Totals	645·6	2,076·4	1,999·6	2,186·3	2,057·0	2,183·4	2,·00·3	2,038·7	2,042·3	16,984·0	2,123·00

*Sunshine recorder installed August 1, 1922.

ACKNOWLEDGMENTS

During the Superintendent's repeated and prolonged absences on various assignments the direction of the Experimental work devolved largely upon his Assistant, Mr. E. C. Stacey, who also had much to do with preparing the present report. He had several excellent helpers, notably Mr. V. Ignatieff, a Russian agricultural graduate of Wye, England, who had charge of the work with fertilizers and soil bacteriology, and R. M. Odlum, who succeeded Mr. Flint in charge of the horticultural work. Both substantially drafted those sections of this report relating to the work of which they had charge. A commendable esprit de corps existed.

AN INSECT PARASITE OF STINKWEED

C. P. McEachern, of Hinton Trail, Alberta, reported finding a maggot destroying pennycress by working on its roots. Specimens were sent to Prof. E. H. Strickland, who identified it as either the cabbage root maggot or a species closely related. He considered this a new and possibly important observation and proposed to follow it up.

FIELD HUSBANDRY

TOPOGRAPHY AS AFFECTING THE OCCURRENCE OF SUMMER FROSTS AND WINTER LOW TEMPERATURES

Since July, 1926, readings have been taken of six thermometers systematically placed on the eastern slope of a ridge with a fall of 134 feet in 214 rods.

During the latter part of January, 1930, all the instruments were placed in recognized standard meteorological cages. This tended to reduce the ability of a strong wind to shake the thermometers and also lessened depredations, though not preventing them altogether, for the lowest thermometer disappeared on April 3. Another was pressed into service three days later. Apart from shaking-down by wind and the above incident, temperature readings have been uniformly consistent. The thermometers were checked at various times when suspicion was aroused but all proved to be registering accurately.

From the records can be gathered the spreads of temperature between the thermometer situated at the top of the hill and the one at the bottom, which is on the edge of a slough. In 349 accepted readings there were, in 1930, 127 nights when the slough thermometer read 10 degrees or more below the hill thermometer, 37 when it read 15 degrees or more lower and 13 nights when there was a difference of 20 or more in favour of the instrument on the hill. Expressed in percentages the figures would be, respectively, 36·4 per cent, 10·6 per cent, and 3·7 per cent. The most extreme divergence occurred on March 2, when the hill thermometer registered 1° F., and the slough thermometer registered -24° F., a difference of 25 degrees. March also exhibited the greatest monthly average spread, with a difference of 11·10° F. A few reversals were attributed to wind or accident.

Since July, 1926, to December, 1930, inclusive, we find that in 1,541 nights of supposedly trustworthy readings there have been 587 nightly readings showing spreads of 10 degrees or more in favour of the instrument on the higher ground; 195 of fifteen degrees or more and 52 of twenty or more. Expressed in percentage the relationships are 38·1 per cent, 12·7 per cent and 3·4 per cent respectively.

A spread of 20 degrees or more occurred on four occasions in each of January, February and March and once in November, the greatest spreads coming after cold weather or a storm.

The spreads between each pair of thermometers on the slope lessened at each elevation, commencing at the slough, till No. 4 was reached but Nos. 4

and 5 showed a lesser spread than 5 and 6. The fourth and fifth instruments are in the approximate vicinity of the farm buildings and the question arises whether this may account for the spread between them being slightly out of line with the ruling trend. Tables show the average differences for the last eleven months of the year.

The lowest thermometer and the second exhibited a difference of 2·80 degrees.

From the second to the third post there was a difference of 1·67 degrees.

From the third to the fourth post there was a difference of 1·13 degrees.

From the fourth to the fifth post there was a difference of 0·31 degree.

From the fifth to the sixth post there was a difference of 0·61 degree.

The difference between highest and lowest elevations was 6·52 degrees.

During the year 1929 only two thermometers were in use but in 1928 six were recording from May 1 to December 31. Records for that period parallel the spreads obtained in 1930, for in 1928 the difference between the first and second post was 2·29 degrees; between the second and third post 1·27 degrees, and, allowing for one erratic instrument, the spreads diminished to 0·84 degree between the fifth and sixth.

Results for 1930 support the data of previous years. In days of muggy weather the whole line of thermometers gave practically the same readings. It emphasizes the desirability of location because when frost temperatures were recorded by the slough thermometer, June 4, June 15, July 2, 4, 6, 7, 9, 18, 26; August 19, 21, 22, and 28, no frost temperatures were denoted by the thermometer on the hill. Not until September 19 did the hill thermometer register 32 degrees F. or lower. On that occasion it read 30 degrees. Judging from the above it is clear that the slough basin is at present a risky situation for the growing of commercial wheat.

TEMPERATURE SPREAD, 1930

The number of nights during each of twelve months in which the thermometer at the apex of a hog's back ridge with a fall of 134 feet in 214 rods read higher than the thermometer at the foot of the slope by the number of degrees specified.

Month	Ten or more degrees spread in favour of No. 6	Fifteen or more degrees spread in favour of No. 6	Twenty or more degrees spread in favour of No. 6
January	15	12	4
February	15	7	4
March	19	11	4
April	2	0	0
May	8	0	0
June	2	0	0
July	16	0	0
August	15	0	0
September	8	0	0
October	7	1	0
November	7	2	1
December	13	4	0
Total	127	37	13

SUPPLEMENT A

The number of nights in each of two months in which (owing presumably to wind or accident) the thermometer on the hill registered lower than the instrument at the slough.

Month	Ten or more degrees spread in favour of No. 1	Fifteen or more degrees spread in favour of No. 1	Twenty or more degrees spread in favour of No. 1
February	2	2	2
June	1	0	0

SUMMARY OF TEMPERATURE SPREADS, 1930

Summary of most extreme spreads per month for twelve months between self-registering minimum thermometers situated respectively at the foot and at the apex of a hog's back ridge with an eastern slope 214 rods long and with an ascent of 134 feet.

Month	Date	Temperature No. 1	Temperature No. 6	Extreme spread
		°F.	°F.	°F.
January	20	−30	− 8	22
February	14	−35	−12	23
March	2	−24	1	25
April	6	20	30	10
	26	21	31	10
May	5	21	34	13
	10	21	34	13
June	12	47	35	−12
July	11	34	48	14
	12	39	53	14
	20	35	49	14
August	29	33	47	14
September	4	32	46	14
October	3	27	42	15
November	19	−1	17	18
December	19	11	27	16
	20	5	21	16

EXTREME MINIMUM TEMPERATURES, 1930

Extreme temperatures in each month recorded by fully exposed self-registering minimum thermometers situated respectively at the foot and the apex of a hog's back ridge, with an eastern slope 214 rods long and with an ascent of 134 feet. Records January 1 to December 31, 1930.

Month	No. 1 (slough). Temperature	No. 6 (hill). Temperature	Total spread between highest and lowest thermometers Nos. 1 and 6
	°F.	°F.	°F.
January	−52	−39	13
February	−41	−22	19
March	−32	−23	9
April	11	18	7
May	17	28	11
June	32	39	7
July	30	36	6
August	25	37	12
September	10	19	9
October	− 2	9	11
November	−13	− 4	9
December	2	2	0
Average	−1·08	8·33	9·42

MONTHLY MEANS OF MINIMUM TEMPERATURES, 1930

Monthly means of minimum temperatures recorded by fully exposed self-registering thermometers placed at equal successive rises on a gradual 214-rod slope with a total ascent of 134 feet. Records January 1 to December 31, 1930 (inclusive), Beaverlodge.

Month	No. 1 (slough). Temperature	No. 6 (hill). Temperature	Total spread between highest and lowest thermometers Nos. 1 and 6
	°F.	°F.	°F.
January	−15·83	−6·67	9·16
February	0·46	8·61	8·15
March	3·87	14·97	11·10
*April	27·08	31·23	4·15
†May	31·24	35·90	4·66
‡June	41·44	43·96	2·52
††July	38·70	47·10	8·40
†August	38·79	47·03	8·24
**September	33·04	39·04	6·00
October	23·16	27·81	4·65
‡November	13·33	19·07	5·74
December	17·74	25·87	8·13
Average	21·09	27·83	6·74

*Average of 26 days.
† " 29 "
‡ " 27 "
††Average of 30 days.
** " 25 "

SOIL TEMPERATURES

A Friez soil and water thermograph is used to record soil temperatures at Beaverlodge. The instrument was checked when installed and once or twice later though not for some time prior to April 24, 1930. Though appearing to be accurate it was then found reading five degrees too low. The error was accordingly adjusted. Whether the error developed suddenly or gradually there has been no means of ascertaining. It was again checked on October 27 and found to be reading two degrees too low. It was decided at the time that it was undesirable to attempt to regulate the instrument too often and the irregularity was to be adjusted the next spring.

The fault of the thermograph registering at first five degrees and later two degrees too low has tended to strengthen rather than weaken the deductions drawn from previous data. For example, soil temperatures have been observed to become warmer year by year, the inference being that in some way effects of cultivation of the ground surrounding the bulb or influences prevailing generally throughout the district have proved a factor in producing this apparent trend towards higher soil temperatures.

The 1930 records show 144 days of 32° F. or lower; 221 days above 32° F.; 126 days over 50° F.; 63 days over 60° F., and 18 days over 70° F., with one day over 75° F.

The effect of a snow blanket on soil temperatures was noticeable during the latter part of the year. During periods when a snow covering lay on the ground the temperature was not prone to vary but remained fairly constant. Whenever the snow disappeared there was a tendency to greater spreads.

SOIL THERMOGRAPH DATA, 1930.

TABLE showing number of days in each month of 1930 that the soil temperature, as registered by a Friez thermograph with bulb three inches beneath the surface of summer-fallowed ground, rose at any time above the respective degrees specified.

Month	Days above 32 degrees Fah.	Days above 40 degrees Fah.	Days above 45 degrees Fah.	Days above 50 degrees Fah.	Days above 55 degrees Fah.	Days above 60 degrees Fah.	Days above 65 degrees Fah.	Days above 70 degrees Fah.	Days above 75 degrees Fah.
January	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0
March	1	0	0	0	0	0	0	0	0
April	29	10	8	4	1	0	0	0	0
May	31	31	27	13	2	0	0	0	0
June	30	30	30	27	15	5	1	0	0
July	31	31	31	31	31	24	19	11	1
August	31	31	31	31	30	27	20	7	0
September	30	28	22	19	11	7	2	0	0
October	29	7	4	1	0	0	0	0	0
November	9	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0
Total	221	168	153	126	90	63	42	18	1

Thermograph found reading 5 degrees too low April 24, 1930. Error was adjusted.
Thermograph found reading 2 degrees too low Oct. 27, 1930. Error was not adjusted.

SUMMARY OF SOIL THERMOGRAPH DATA, 1922-1930 INCLUSIVE

TABLE showing the number of days in each year that the soil temperature as registered by a Friez thermograph, with bulb three inches beneath the surface of cultivated ground, rose at any time in twenty-four hours above the respective degrees specified.

Calendar year	Days above 32 degrees Fah.	Days above 40 degrees Fah.	Days above 45 degrees Fah.	Days above 50 degrees Fah.	Days above 55 degrees Fah.	Days above 60 degrees Fah.	Days above 65 degrees Fah.	Days above 70 degrees Fah.	Days above 75 degrees Fah.
*1922	—	—	—	116	90	40	0	0	0
†1923	—	177	158	120	79	26	2	0	0
‡1924	—	138	131	112	70	30	14	1	0
1925	—	166	140	116	86	65'	38	11	0
1926	216	168	144	122	97	70	48	16	6
1927	185	161	140	120	95	69	53	30	15
1928	178	150	137	118	96	71	36	15	1
1929	188	162	128	115	82	45	14	2	0
1930	221	168	153	126	90	63	42	18	1

*Installed May, 1922.
†Instrument despatched for repairs towards end of summer.
‡From May 13 to December 31.
NOTE.—Thermograph was reading 5 degrees too low on April 24, 1930; the error was adjusted. Again checked Oct. 27, 1930, was found reading 2 degrees too low, but not adjusted.

METHODS OF SEEDING MEADOW CROPS

An important project commenced in 1925 is directed towards finding the best way of applying and covering meadow-crop seed on Western farms; comparing nurse-crop with non-nurse-crop seeding; and six-inch with twelve-inch spacing of the nurse crop, the quantity of grain per acre in the latter case being half that employed in the former.

Six successive seedings have been made and in 1926 the experiment was amplified by introducing into each method three different depths of covering.

The mixture of grass and legume seeds used is a 4-4-4-4 combination, consisting of four pounds each per acre of alfalfa, sweet clover, Western rye grass and brome.

The nurse crop is Banner oats at two bushels per acre in the six-inch spacing and one bushel in the twelve-inch, the index lever being unchanged for the latter but every alternate grain run being stopped up.

The 1930 yields were very good. The fourth crop taken from the 1927 seeding averaged more than two tons per acre from all except those plots on which the meadow-mixture was seeded with oats in the drill box. The plots of the 1928 seeding sown with nurse crop averaged from 4,772·3 pounds to 4,917 pounds of cured hay per acre, while the plots seeded alone averaged 5,185·3 pounds per acre. These yields are considerably more than those from nearby plots of grass, indicating the advantage of combining legumes with the grasses. Yields from the 1929 seeding were lower. The plots sown with oats at two bushels per acre produced better than a ton; the one-bushel seeding nearly a ton and a half, and the non-nurse crop an average of 4,962·3 pounds per acre. Similar results have been obtained from the first hay crop of previous seedings.

METHODS-OF-SEEDING TEST, 1930

(Average duplicate plots)

Presenting results in pounds of cured hay per acre of the 1928, 1929 and 1930 crops of the 1927 seeding, along with the 1927 yield of oats used as a nurse crop.

Meadow mixture seeded:	Depth of drill lever	Pounds of cured hay per acre 1927 crop	Pounds of meadow hay per acre in 1928 (aftermath not taken)	Pounds of meadow hay per acre in 1929 (aftermath not taken)	Pounds of meadow hay per acre in 1930 (aftermath not taken)	Total hay crop three years	Total crop four years
		lb.	lb.	lb.	lb.	lb.	lb.
With oats in drill box (oats in 6-inch drills)	6th	4,999·0	1,225·0	1,936·0	3,795·0	6,956·0	11,955·0
" " "	4th	5,100·0	1,241·0	1,927·0	3,694·0	6,862·0	11,962·0
" " "	2nd	4,792·0	1,362·0	1,879·0	3,917·0	7,158·0	11,950·0
" " "	Average	4,963·7	1,276·0	1,914·0	3,802·0	6,992·0	11,955·7
Ahead of drill (oats in 6-inch drills)	6th	5,072·0	1,261·0	1,645·0	4,064·0	6,970·0	12,042·0
" " "	4th	4,534·0	1,262·0	1,708·0	4,041·0	7,011·0	11,545·0
" " "	2nd	5,099·0	1,282·0	2,250·0	4,095·0	7,627·0	12,726·0
" " "	Average	4,901·7	1,268·3	1,867·7	4,066·7	7,202·7	12,104·4
Ahead of drill (oats in 12-inch drills)	6th	5,157·0	1,944·0	2,760·0	4,086·0	8,790·0	13,947·0
" " "	4th	5,116·0	1,870·0	3,133·0	4,457·0	9,460·0	14,576·0
" " "	2nd	5,307·0	1,830·0	3,589·0	4,336·0	9,755·0	15,062·0
" " "	Average	5,193·3	1,881·3	3,160·7	4,293·0	9,335·0	14,528·3
Alone, covered with drill disks	6th	.....	4,227·0	3,101·0	4,208·0	11,536·0	11,536·0
" "	4th	.....	4,316·0	2,758·0	4,573·0	11,647·0	11,647·0
" "	2nd	.....	3,996·0	2,242·0	4,360·0	10,598·0	10,598·0
" "	Average	.....	4,179·7	2,700·3	4,380·3	11,260·3	11,260·3

NOTES

1. The 1926 plan of seeding was repeated in 1927 but preparation was different. The land was pea stubble after a fifty-to-sixty-bushel crop in 1926. The ground was spring-toothed and later scuffled but not ploughed.
2. Seeded June 6. Plots afterwards hand-weeded once or twice.
3. A period of dry weather in midsummer seemed to tell rather severely on the meadow plantlets among the nurse-crop, but the mortality was probably not high.
4. The oat nurse crop was cut with the binder on September 10, after border drills had been scythed off and rejected as usual. The oats in 12-inch drills yielded 5·9 per cent more dry matter per acre than the oats in 6-inch drills, while, as usual, the meadow plants made stronger growth in the wider spaces.
5. In 1928 the plots were cut July 6 and 7, but yields after the nurse crops were light, especially in the case of those where the oats had been drilled in the usual way. It was nearly fifty per cent better after the oats sown in 12-inch drills and this hay yield of 1881 pounds per acre was more than doubled by the plots where no nurse crop had been used.
6. In 1929 the plots were cut July 8, yielding less than a ton of cured hay per acre from the plots sown with nurse crop of two bushels oats per acre and over a ton and a half from the nurse-crop plots sown at 1 bushel oats per acre, where the meadow plants became better established than in the former. The heavy yields of hay in 1928 from the non-nurse-crop plots probably drew heavily on soil-moisture supplies, thereby causing a reduction in the 1929 yield.
7. Plots cut July 18 in 1930. Yields averaged a little more than two tons from the fourth crop of the plots originally sown with nurse crop. The plots seeded without nurse crop averaged 4,380·3 pounds of cured hay per acre.

CUTTING ALFALFA ONCE VERSUS TWICE PER ANNUM

In 1928 a block of Grimm alfalfa was sown on land which had been producing alfalfa since 1918, the last stand having been ploughed up in 1927 on account of some patches of winter-killing, this being attributed to the lack of aftermath during the trying winter of 1926-27. It was decided to reseed the whole area and conduct a demonstration upon the cumulative effect of cutting alfalfa once versus twice per annum.

The total crop obtained in the two years is slightly in favour of the once-cut plots. In this instance, stands have not been appreciably impaired by either cropping method. The twice-cut plots have gone into the dormant period with but little aftermath.

An interesting supplement to this test is conducted in the lee of a windbreak which holds deep snowbanks. These not only afford excellent winter protection but also supply a great deal of extra moisture from the melting snow. Incidentally, it is more than likely that considerable advantage results from wind protection during the summer.

In 1930 the test plots averaged 3,773 and the aftermath 2,821 pounds per acre. Here in the shelter the once-cut plots have yielded in two years a total of 8,078 pounds and the twice-cut plots 14,309 pounds per acre.

In the similar test with Macsel and Grimm the once-cut plots yielded a total of 8,056 pounds in two years and the twice-cut plots 12,633 pounds.

The effect of a severe winter upon these plots remains to be demonstrated.

PHOSPHATIC AND OTHER FERTILIZER TESTS

Continuing the work begun in 1929 with triple phosphate supplied by the Trail Smelter, elaborate tests with wheat on podsolized soil and wheat, potatoes and barley on black-brown summer-fallowed land were conducted in 1930, using triple phosphate, ammonium phosphate and nitrate of soda. Lime, rock phosphate, muriate of potash, basic slag and two complete fertilizers were included in some of the tests.

REWARD WHEAT ON PODSOLIZED SOIL

EXPERIMENT A (TO TEST EFFECT OF A REPEAT APPLICATION.)—An extremely variable podsolized type of soil in which the black loam ranged from two or three inches down to six or more in depth was seeded to a second crop of Reward wheat on land broken in 1928. Beneath the surface soil was a whitish-grey or light-brown subsurface with a tight, clay soil below it.

On part of this area phosphatic and nitrogenous fertilizers had been applied in 1929 without impressive results. Carefully taken notes showed no consistent differences in height and colour between treated and untreated plots. Nor were there any decided differences in date of heading and ripening, in appearance at harvest nor in yields.

As it was possible that the effect of the fertilizers applied in 1929 would appear in 1930, the test was reseeded on the same area except that half of each plot treated in 1929 was not fertilized in 1930.

While the results are inconclusive the 1930 applications seemed to promote germination, early growth and heading as compared with the checks. This advantage, however, did not appear to carry through to maturity.

All the fertilized plots except super at 110 pounds averaged slightly longer straw than the checks.

Owing primarily no doubt to the character of the soil, most of the plot crops graded 2, with a large percentage of starchy kernels. The bulked samples from the check and superphosphate at 58 pounds graded 1 although the average of the replicates is predominantly a 2.

There was no regular conformance of yield of total crop with length of straw nor with period of maturity.

The greatest yield of total crop and likewise of threshed grain was obtained from the plot dressed with super plus nitrate and the second-greatest from the ammonium-phosphate plot. The plots dressed with superphosphate at various rates produced a somewhat greater average grain yield than the checks but their performance was not consistent.

The areas fertilized in 1929 but not again in 1930 all produced less total crop per acre than the checks. Several of them, however, yielded more threshed grain, but there was one conspicuous exception. In both total crop and threshed grain the areas fertilized with ammonium phosphate in 1929 only fell in 1930 decidedly below the plots which had not been fertilized in either year. This would seem to suggest a possibly adverse residual effect of ammonium phosphate but such a deduction would be unwarranted without further support.

FERTILIZER TEST WITH REWARD WHEAT, 1930

Experiment A; one versus two years' fertilizing; 1930 crop.

Average of triplicate plots on podsolized soil.

Fertilizer	Days to		Length of straw	Length of head	Strength of straw scale 10 points	Total crop per acre	Weight clean grain per acre		Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
	Heading	Maturity					As threshed	As dried							
			in.	mm.		lb.	lb.	lb.	%	bush. lb.	lb.	grams	%		
Superphosphate at 150 pounds—															
Fertilized 1929 and 1930	83·7	130·3	33·0	60·0	9·5	3,810·3	1,680·0	1,591·0	41·76	26 31	66·9	32·1	96·7	2 starchy	TN
" 1929 only	83·7	130·7	33·0	60·0	9·5	3,595·0	1,653·3	1,592·3	44·29	26 32·3	66·5	32·3	96·3	2 "	TN
Superphosphate at 110 pounds—															
Fertilized 1929 and 1930	83·3	131·0	31·7	60·0	9·5	3,792·7	1,573·3	1,512·3	39·87	25 12·3	66·4	32·1	96·7	2 "	TN
" 1929 only	83·3	131·0	31·3	60·0	9·5	3,361·0	1,546·7	1,493·3	44·43	24 53·3	66·7	31·3	98·0	2 (58% red)	TN
Superphosphate at 58 pounds—															
Fertilized 1929 and 1930	83·3	131·0	32·7	60·0	9·5	3,486·0	1,493·3	1,435·3	41·17	23 55·3	66·7	32·3	97·0	2	TN
" 1929 only	83·3	131·0	30·8	60·0	9·5	3,230·7	1,413·3	1,359·0	42·07	22 39	66·6	31·9	97·7	1	TN
Ammonium phosphate at 110 pounds—															
Fertilized 1929 and 1930	81·3	131·0	32·7	60·0	9·5	4,139·7	1,733·3	1,671·3	40·37	27 51·3	66·6	32·2	96·3	2 (58% red)	TN-N
" 1929 only	83·3	131·0	31·7	60·0	9·5	3,255·0	1,306·7	1,255·7	38·58	20 55·7	66·0	31·9	96·7	2 starchy	TN-N
Sodium nitrate at 60 pounds—															
Super at 110 pounds—															
Fertilized 1929 and 1930	83·0	130·3	35·8	61·7	9·3	4,383·3	1,866·7	1,783·7	40·69	29 43·7	66·4	31·8	97·3	2 starchy	TN-N
" 1929 only	83·3	130·7	32·2	60·8	9·5	3,779·7	1,626·7	1,568·3	41·49	26 8·3	66·8	31·6	95·7	2 "	TN-N
Check	84·3	130·7	31·7	60·0	9·5	3,902·7	1,520·0	1,464·0	37·51	24 24	66·5	31·9	95·7	1	TN

FERTILZIER EXPERIMENT WITH REWARD WHEAT, 1930

Experiment A: One versus two years' fertilizing; 1929 and 1930 crops. Average triplicate plots on podsolized soil.

Fertilizer	Yield of grain per acre				
	Fertilized 1929	Fertilized 1930	Not fertilized 1930	Total 1 and 2	Total 1 and 3
	lb.	lb.	lb.	lb.	lb.
Superphosphate at 150 or 155 pounds	1,961·0	1,591·0	1,592·3	3,552·0	3,553·3
Superphosphate at 110 pounds	1,918·3	1,512·3	1,493·3	3,430·6	3,411·6
Superphosphate at 58 or 60 pounds	1,936·3	1,435·3	1,359·0	3,371·6	3,295·3
Ammonium phosphate at 110 pounds	1,922·7	1,671·3	1,255·7	3,594·0	3,178·4
Superphosphate at 110 pounds Nitrate of soda at 60 pounds	1,927·3	1,783·7	1,568·3	3,711·0	3,495·6
Check	1,898·7	.....	1,464·0	.....	3,362·7

EXPERIMENT B (TO TEST EFFECT OF AN APPLICATION ON SECOND CROP AFTER BREAKING).—An adjacent area representing much the same type of soil although somewhat superior to it was used to investigate the effect of the application of phosphate and nitrate to the second crop of wheat after breaking, the first having in this case been unfertilized.

Throughout the test the treated plots outyielded both the half-plot checks beside them and the triplicate check plots in total crop and threshed grain. With few exceptions the grain graded 1.

The three dressings of superphosphate outyielded the triplicate check plots by an average of nearly four bushels but there was no regular response to the rate of application. Ammonium phosphate at 110 pounds yielded 2,082·7 pounds per acre, or more than six bushels better than the check plots. Superphosphate at 110 pounds plus nitrate at 60 yielded about the same as the plots fertilized with super only.

FERTILIZER TEST WITH REWARD WHEAT, 1930

Experiment B; one application only made to second crop after breaking, 1930 crop.

Average of triplicate plots on podsolized soil.

Fertilizer	Days to		Length of straw	Length of head	Strength of straw, scale 10 points	Total crop per acre	Weight clean grain per acre		Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
	Heading	Maturity					As threshed	As dried							
			in.	mm.		lb.	lb.	lb.		bush. lb.	lb.	grams	%		
Superphosphate at 150 pounds—															
Fertilized 1930	82·7	130·0	34·5	63·3	9·5	4,878·0	2,053·3	1,998·0	40·96	33 18·0	66·6	31·3	96·7	1	N
Not fertilized 1930	82·7	130·0	33·8	62·5	9·5	4,654·3	1,973·3	1,913·3	41·11	31 53·3	66·3	30·4	95·3	1	TN–N
Superphosphate at 110 pounds—															
Fertilized 1930	83·0	130·3	34·5	63·3	9·5	4,823·7	1,946·7	1,893·0	39·24	31 33·0	66·0	31·1	96·3	1	TN–N
Not fertilized 1930	83·0	130·3	34·0	60·8	9·5	4,719·3	1,813·3	1,763·3	37·36	29 23·3	66·3	31·3	96·0	1	TN–N
Superphosphate at 58 pounds—															
Fertilized 1930	83·3	130·7	34·3	62·5	9·5	4,646·7	1,973·3	1,932·0	41·58	32 12·0	66·6	31·8	97·7	1	TN–N
Not fertilized 1930	83·3	131·0	34·0	62·5	9·5	4,891·3	1,920·0	1,873·3	38·30	31 13·3	66·4	31·3	93·3	1	TN–N
Ammonium phosphate at 110 pounds—															
Fertilized 1930	83·0	131·0	34·8	63·3	9·5	5,258·0	2,133·3	2,082·7	39·61	34 42·7	66·7	31·9	97·3	1 Hard	TN–N
Not fertilized 1930	83·3	131·3	34·3	61·7	9·5	4,273·3	1,786·7	1,735·0	40·60	28 55·0	66·3	31·5	96·3	1	TN–N
Sodium nitrate at 60 pounds—															
Super at 110 pounds—															
Fertilized 1930	82·7	131·0	34·5	64·2	9·5	4,711·3	1,973·3	1,926·3	40·89	32 6·3	66·7	31·5	96·0	1	TN–N
Not fertilized 1930	83·3	131·3	33·3	62·5	9·5	4,029·7	1,680·0	1,627·3	40·38	27 7·3	66·7	30·4	96·3	1	TN–N
Check	83·7	131·3	33·0	61·7	9·5	4,455·3	1,760·0	1,720·0	38·61	28 40·0	66·6	31·0	97·0	1	TN–N

EXPERIMENT I (AMMONIUM AND SUPERPHOSPHATE AT VARIOUS RATES).—Four plots were sown with each of the following treatments:—

Check for superphosphate plots.
Superphosphate at 50 pounds.
Superphosphate at 100 pounds.
Check for ammonium phosphate plots.
Ammonium phosphate at 50 pounds.
Ammonium phosphate at 100 pounds.

The superphosphate plots headed and ripened half a day or more earlier than their checks. The ammonium phosphate plots headed and ripened two days or more ahead of the checks. In both cases the heavier rate had slightly the advantage.

Both super and ammonium applications slightly lengthened the straw.

That corresponding differences were not found in yields may possibly be attributed to the wind of August 29, which in the stage-of-cutting test elsewhere on the Station was found to have shattered ripe Reward wheat to the extent of 4·5 bushels per acre, affecting the ripest plots most, of course. The ammonium-phosphate plots were the ripest and were ready to cut the day before the storm but paths were too narrow to permit the harvesting of one plot before its neighbour. According to photographs and observations the ammonium-phosphate plots were decidedly the rankest as well as the ripest, with the superphosphate plots second and the checks third, an appreciable difference in each case being remarked in favour of the heavier application.

Reward wheat in a test of phosphates applied to wheat on black-brown summer-fallow. The plot on the left was treated with ammonium phosphate at 100 pounds per acre—plot on right, check, no fertilizer. The ammonium phosphate plot was decidedly ranker than the check and had heavier heads, yet perhaps not quite so much heavier as the picture would make it appear.

36863—4

FERTILIZER TEST WITH REWARD WHEAT, 1930

Phosphates on black-brown summer-fallow.

Average of quadruplicate plots.

Fertilizer	Days to		Length of straw	Length of head	Strength of straw, scale 10 points	Total crop per acre	Weight clean grain per acre		Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
	Heading	Maturity					As threshed	As dried							
			in.	mm.	%	lb.	lb.	lb.	%	bush. lb.	lb.	grams	%		
Check	85·0	133·5	40·0	75·0	9·0	5,885·8	2,604·3	2,529·0	42·97	42 9	66·0	30·7	93·0	1	N
Superphosphate at 50 pounds	84·5	133·0	41·5	73·8	9·0	6,344·0	2,754·3	2,673·8	42·15	44 33·8	65·7	30·2	93·5	1	N-TK
Superphosphate at 100 pounds	84·3	132·5	41·0	75·0	9·0	6,233·3	2,745·8	2,662·8	42·72	44 22·8	65·5	30·3	90·0	1 Poor	N-TK
Check (ammonium phosphate)	85·0	133·5	39·5	72·5	9·0	5,620·5	2,533·3	2,460·0	43·77	41 0	65·4	30·6	88·8	1	N
Ammonium phosphate at 50 pounds	83·0	131·5	41·5	75·0	8·5	6,212·3	2,733·3	2,656·0	42·75	44 16	65·4	30·1	94·0	1	TK
Ammonium phosphate at 100 pounds	82·8	131·3	41·0	75·0	8·3	6,565·3	2,858·5	2,774·3	42·26	46 14·3	65·4	30·7	93·8	1	TK

FERTILIZER TEST WITH REWARD WHEAT, 1930

Three-course rotation with ammonium phosphate

Average quadruplicate plots.

Fertilizer	Days to		Length of straw	Length of head	Strength of straw, scale 10 points	Total crop per acre	Weight clean grain per acre		Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
	Heading	Maturity					As threshed	As dried							
			in.	mm.		lb.	lb.	lb.		bush. lb.	lb.	grams	%		
No fertilizer, 1930	84·5	133·3	40·8	73·8	9·3	5,675·8	2,479·0	2,410·5	42·47	40 10·5	65·4	30·5	95·5	1	N-TK
Ammonium phosphate at 100 pounds	82·0	131·5	41·5	74·3	9·0	6,382·3	2,754·0	2,685·3	42·07	44 45·3	65·1	30·3	96·3	1	N-TK
Check	84·8	133·3	40·5	73·8	9·0	5,662·8	2,471·0	2,393·5	42·27	39 53·5	65·8	31·0	96·0	1	N

Though the two tests adjoined one another, the check plots in the super test outyielded the checks in the ammonium-phosphate test by 265 pounds total crop and a little over a bushel of grain per acre, indicating a possible slight advantage in soil. Nothwithstanding, the ammonium-phosphate plots averaged a hundred pounds more total crop than the superphosphate plots and 47 pounds more grain. In both total crop and yield of grain the fertilized plots substantially outyielded their respective checks. Thus the two rates of superphosphate averaged 139 pounds more grain than their checks while the two rates of ammonium phosphate yielded 255 pounds more grain than did their checks.

EXPERIMENT II.—A THREE-COURSE ROTATION WITH AMMONIUM PHOSPHATE.—A three-course rotation may be presumed to have commenced in 1929 with summer-fallow. Two successive crops of wheat were to be grown in 1930 and 1931. Four plots were to be fertilized with a hundredweight per acre of ammonuim phosphate in 1930, repeated in 1931; four plots were to be left unfertilized in 1930 but fertilized in 1931 and four plots were to be unfertilized in either season.

Here again ammonium phosphate hastened heading by two and a half days or more and maturity by nearly two days. It lengthened the straw by from three-qurters of an inch to an inch, augmented the weight of total crop by 720 pounds per acre or 12·7 per cent and the weight of threshed grain by 12·2 per cent, or nearly five bushels per acre in spite of excessive shattering from the riper plots.

EXPERIMENT III. SUPERPHOSPHATE AT EACH OF TWO RATES DRILLED VS. BROADCAST.—Superphosphate was both drilled and broadcast at each of two rates per acre, viz. 50 and 100 pounds.

At each of the two rates drilling promoted heading by nearly three-quarters of a day, on the average of the quadruplicate plots, while broadcasting promoted it by only half a day. By harvest the lead of the fertilized plots had been reduced to a third of a day except that the heavier drilled application ripened its crop half a day ahead of the check.

The broadcast-fertilizer plots had rather longer straw than the checks and the drilled-fertilizer plots three-quarters to an inch longer straw than the broadcast-fertilizer plots.

In weight of total crop produced the broadcast plots exceeded the checks by 335 pounds per acre or 5·6 per cent. The drilled plots exceeded the broadcast by 188 pounds per acre or 3 per cent.

In weight of threshed grain the broadcast averaged 178 pounds per acre more than the checks or 6·9 per cent, while the drilled plots exceeded the broadcast by 36 pounds or 1·3 per cent. The first noteworthy inconsistency occurred in the comparison of the grain yields drilled vs. broadcast at the 100-pound rate, the broadcast plots in this case exceeding the drilled in weight of threshed grain. Experimental error due to harvesting conditions is likely and the season was probably more than usually favourable to broadcast applications of fertilizers.

36863—4½

FERTILIZER TEST WITH REWARD WHEAT, 1930

Superphosphate broadcast versus drilled, each at 2 rates per acre on black-brown summer-fallow.

Average of quadruplicate plots.

Fertilizer	Days to		Length of straw	Length of head	Strength of straw, scale 10 points	Total crop per acre	Weight clean grain per acre		Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
	Heading	Maturity					As threshed	As dried							
			in.	mm.		lb.	lb.	lb.		bush. lb.	lb.	grams	%		
Check	84·5	133·8	39·8	71·3	9·0	5,963·3	2,599·8	2,568·8	43·08	42 48·8	65·4	30·1	93·0	1	N
Superphosphate at 50 pounds, broadcast	84·0	133·5	40·0	72·5	9·0	6,228·8	2,733·3	2,711·5	43·53	45 11·5	65·2	29·7	93·3	1	N-TK
Superphosphate at 50 pounds, drilled	83·3	133·5	41·0	72·5	9·0	6,559·0	2,850·0	2,831·0	43·16	47 11·0	65·5	30·1	89·3	1	N-TK
Superphosphate at 100 pounds, broadcast	84·0	133·5	40·8	75·0	9·0	6,368·3	2,808·3	2,781·5	43·68	46 21·5	65·2	30·0	90·3	1	N-TK
Superphosphate at 100 pounds, drilled	83·3	133·3	41·5	73·8	9·0	6,413·3	2,783·3	2,735·3	42·65	45 35·3	65·0	29·9	87·8	1	N-TK

MILLING AND BAKING TESTS

It was thought that perhaps fertilizing of the land might result in a superior grading and in superior milling and baking qualities, but no positively significant data were obtained in respect to grades, kernel weight, germination or milling and baking tests. Of course, the season was one favouring high-quality in any wheat threshed before the bad weather of September, but it is disappointing that the fertilizer failed to improve noticeably the colour, grade and baking quality of the wheat grown on the poorer woodland-type soil. Following is the report of A. G. O. Whiteside, Assistant in Charge of Milling and Baking Tests, Cereal Division, Ottawa:—

"On samples of Reward wheat grown in Fertilizer Test Plots, Dominion Experimental Substation, Beaverlodge, Alberta, Crop 1930.

"The data on the milling and baking tests of the Reward samples from the fertilizer test plots may be summed up as follows:—

"1. All samples in Series I (Experiments A and B, both in grey, woodland-type soil) exhibited closely similar characteristics to each other as judged by test weight per bushel, weight per thousand kernels, crude protein in wheat, ash in wheat and by milling and baking characteristics.

"2. The samples of Series I, Experiment B, differed principally from those of Series I, Experiment A, in that they were a little higher in protein content and contained higher percentages of vitreous kernels.

"3. In neither Experiment A nor Experiment B of Series I was there any indication that samples from the fertilized plots were different from samples from the check plots in kernel development or milling and baking characteristics.

"4. Similarly, in Series II (black-brown loam, summer-fallow preparation) all samples exhibited closely similar characteristics to each other.

"5. Again as in Series I there does not seem to be any marked indication that the samples from the fertilizer plots differed from the samples from the check plots in kernel development or milling and baking characteristics.

"6. The samples in Series I were grown on breaking and the samples in Series II on summer-fallow. The soil in the case of the former was a type of woodland soil and that of the latter a much deeper black loam. The samples of Series I differ chiefly from the samples of Series II in that they are lower in crude protein content of wheat and in baking strength of the flour milled from the wheat. In addition they are as a group higher in ash content of the wheat, higher in straight grade flour, and lower in percentage of vitreous kernels than those of Series II. It is evident in these tests that considerable differences were shown between the samples of Reward wheat grown in Series I and those grown in Series II. The samples in the former series were inferior to those in the latter in those characteristics which mark a strong wheat for bread-making purposes.

"7. The addition of phosphatic or nitrogeoous fertilizers did not appear to affect the quality of the wheat."

BARLEY ON SUMMER-FALLOW

A fertilizer experiment with two varieties of barley was undertaken on sod after a mixed stand of brome, Western rye grass and alfalfa.

The fertilizers were:—

Superphosphate at 150 pounds per acre.
Ammonium phosphate at 150 pounds per acre.
Nitrate of soda at 108 pounds per acre.
Lime at 1,450 pounds per acre.
Basic slag at 300 pounds per acre.
Lime at 1,450 plus super at 150 pounds per acre.

It was particularly sought to ascertain the effect of lime on barley.

Ammonium phosphate hastened maturity by 2·5 days on the average of both varieties and produced yields of 14 per cent more total crop and 16·9 per cent more grain than the checks. The difference was 9 bushels 3 pounds per acre. It seemed also to increase slightly the weight per measured bushel and weight per 1,000 kernels. The proportion of grain to total crop was rather higher, too.

Nitrate of soda gave very little response. Star yielded approximately four bushels more after the nitrate, but one plot of Trebi yielded decidedly less, thereby lowering the average. There is no apparent reason for this one low yield.

Yields of grain after superphosphate were 9 per cent greater than those of the checks. Heading occurred nearly two days earlier and maturity almost three days earlier than the checks. As with ammonium phosphate there was some increase in weight per bushel and kernel.

Lime and superphosphate produced much the same results as super applied alone. This crop matured in nearly two days' less time than the untreated.

Basic slag in this case appeared to produce much the same results as superphosphate.

The limited data available show encouraging results from the use of ammonium phosphate and superphosphate on barley. Both produced significant increase in yield, weight per bushel and kernel. The benefit derived from applications of lime is not so certain. Plots treated with lime and superphosphate responded much the same as to superphosphate applied alone. By itself lime may have benefited the crop somewhat but irregular results render this uncertain.

Fertilizer Test with Barley, 1930

On black-brown summer-fallow.

Average duplicate plots each variety.

Fertilizer	Days to Heading	Days to Maturity	Length of straw	Length of head	Strength of straw, scale 10 points	Total crop per acre	Weight clean grain per acre: As threshed	Weight clean grain per acre: As dried	Per cent grain to total crop	Yield of grain per acre	Weight per measured bushel	Weight per 1,000 kernels	Germination	Commercial grading	Condition of stand
			in.	mm.		lb.	lb.	lb.	%	bush. lb.	lb.	grams	%		
Check—															
Star	65·5	101·5	30·0	47·5	8·0	4,767·5	2,775·0	2,646·0	55·50	55 6·0	51·3	33·4	94·5	2 C.W. 6-row	N
Trebi	67·0	107·0	28·5	70·0	7·5	4,867·0	2,825·0	2,499·5	51·36	52 3·5	46·1	48·2	80·0	3 C.W. (stained)	VTN
Average	66·3	104·3	29·3	58·8	7·8	4,817·3	2,800·0	2,572·8	53·41	53 28·8	48·7	40·8	87·3	2-3 C.W.	TN
Sodium nitrate at 108 pounds—															
Star	66·0	101·5	30·5	47·5	8·0	5,173·0	2,975·0	2,849·5	55·08	59 17·5	51·6	33·4	96·0	2 C.W. 6-row	N
Trebi	66·0	108·0	27·5	67·5	7·5	3,981·0	2,325·0	2,057·0	51·67	42 41·0	47·2	46·8	79·0	3 Extra C.W. Trebi	VTN
Average	66·0	104·8	29·0	57·5	7·8	4,577·0	2,650·0	2,453·3	53·60	51 5·3	49·4	40·1	87·5	2-3 C.W.	TN-N
Ammonium phosphate at 150 pounds—															
Star	62·0	99·0	30·0	45·0	8·0	5,751·5	3,300·0	3,190·5	55·47	66 22·5	51·9	33·8	96·0	2 C.W. 6-row	N
Trebi	65·0	104·5	27·5	67·5	7·5	5,231·0	3,037·5	2,824·5	54·00	58 40·5	47·6	50·4	79·5	2 C.W. Trebi	TN
Average	63·5	101·8	28·8	56·3	7·8	5,491·3	3,168·8	3,007·5	54·77	62 31·5	49·8	42·1	87·8	2 C.W.	TN-N
Lime at 1,450 pounds—															
Star	64·0	101·0	29·0	45·0	8·0	4,989·5	2,825·0	2,737·0	54·86	57 1·0	52·0	33·4	95·0	2 C.W. 6-row	N
Trebi	66·5	107·0	27·0	67·5	7·5	4,595·0	2,675·0	2,434·0	52·97	50 34·0	46·3	49·9	91·5	3 Extra C.W. Trebi (stained)	TN
Average	65·3	104·0	28·0	56·3	7·8	4,792·3	2,750·0	2,585·5	53·95	53 41·5	49·2	41·7	93·3	2-3 C.W.	TN-N
Super at 150 pounds—															
Star	63·0	98·0	28·5	47·5	8·0	4,895·5	2,900·0	2,784·5	56·88	58 0·5	51·8	33·8	95·0	2 C.W. 6-row	N
Trebi	66·0	105·0	29·0	70·0	7·5	5,272·0	3,025·0	2,822·0	53·53	58 38·0	47·6	50·6	79·5	2 C.W. Trebi	N
Average	64·5	101·5	28·8	58·8	7·8	5,083·8	2,962·5	2,803·3	55·14	58 19·3	49·7	42·2	87·3	2 C.W.	N
Lime at 1,450 pounds— Super at 150 pounds—															
Star	62·5	99·0	27·5	45·0	8·0	4,671·0	2,825·0	2,721·0	58·25	56 33·0	52·4	34·8	96·0	2 C.W. 6-row	TN-N
Trebi	65·0	106·0	27·0	70·0	7·5	5,421·5	3,075·0	2,874·0	53·01	59 42·0	48·3	48·5	88·0	2 C.W. Trebi	TN-N
Average	63·8	102·5	27·3	57·5	7·8	5,046·3	2,950·0	2,797·5	55·44	58 13·5	50·4	41·7	92·0	2 C.W.	TN-N
Basic slag at 300 pounds—															
Star	62·5	98·0	27·5	45·0	8·0	5,163·0	2,950·0	2,847·0	55·14	59 15·0	51·5	34·0	94·5	2 C.W. 6-row	N
Trebi	66·0	104·5	28·0	70·0	7·5	5,047·0	2,925·0	2,684·5	53·19	55 44·5	47·3	50·1	89·5	2 C.W. Trebi	TN
Average	64·3	101·3	27·8	57·5	7·8	5,105·0	2,937·5	2,765·8	54·18	57 29·8	49·4	42·1	92·0	2 C.W.	TN-N

EPITOME

In the dry season of 1929 results from chemical fertilizers applied to wheat on a grey woodland-type soil were almost entirely negative. In 1930 when moisture was more plentiful fertilizers on the same type of soil but with the second crop after breaking produced definite although not very large increases in yield. The difference is attributed to the moisture for in most tests on the prairies summer-fallow crop has responded to fertilizers more favourably than second crop.

Ammonium phosphate (carrying nitrogen as well as phosphorus) has given noticeably greater increases in yield than superphosphate (carrying phosphorus without nitrogen). It increased the vigour of growth and hastened maturity.

Nitrate of soda was top-dressed on certain plots that had been drilled with superphosphate. These stood second in yield to the ammonium-phosphate plots.

In certain instances where ammonium phosphate had been applied in 1929 but not repeated in 1930 there was a disappointing reduction in the 1930 yield, raising the question whether there may be an adverse residual effect from this fertilizer.

In 1930 much the better returns from fertilizer applications came from the better rather than the poorer types of soil. This fact, together with the apparent influence of ample moisture, would seem to indicate that the native quality of the soil, together with physical and bacterial conditions, are likely to have an important influence upon the effect of fertilizers upon the wheat crop. This deduction seems to square with deductions from tests conducted elsewhere.

The most economical rate of application has not been ascertained.

Even in the season of 1930, characterized by super-abundant precipitation during late May and June, drilling of the superphosphate with the seed produced an appreciably greater effect than broadcasting of the fertilizer.

While the wheat from the poorer type of grey soil was inferior to the wheat from the deeper black loam in those characteristics which mark a strong wheat for bread-making purposes, the application of fertilizer to the land did not appreciably improve the quality in either case, nor did it improve the grade to any observable extent.

Ammonium phosphate promoted the maturity of barley by two and a half days and increased the yield of grain 16·9 per cent or over 9 bushels per acre.

Nitrate of soda applied to the barley gave scant and irregular response in this test.

Superphosphate promoted maturity of barley almost three days and increased the grain yield 9 per cent as compared with the checks.

Lime gave no very positive results on barley.

Neither with wheat nor barley at Beaverlodge, has any of the fertilizers produced sufficient increase in yield or abbreviation in period of maturity to establish its profitable use under present conditions, when both the cost of the fertilizer and the inconvenience of application are considered.

The effect of fertilizer applications in conjunction with green manuring remains to be ascertained.

FERTILIZERS FOR POTATOES

The fertilizer work with potatoes was enlarged in 1930. It consisted of a main test and a supplementary one. The main test was conducted on a black, clay loam on which millets and roots had been grown in 1929 and vegetables and roots the two previous years. The supplementary test was planted on a rather shallow, black, clay loam with podsolized subsoil on which the previous crops had been cereals in 1926, fallow, sweet clover seeded down and sweet clover.

The fertilizers, which were the same for both tests, together with the rates of application, were as follows:—

	Pounds per acre
Triple superphosphate	300
Ammonium phosphate	300
Basic slag	400
Rock phosphate	400
Muriate of potash	150
Mixture B—	
Ammonium phosphate	300
Muriate of potash	150
Mixture A—	
Triple superphosphate	300
Nitrate of soda	217
Muriate of potash	150

In contrast with the results of 1929, all the fertilizers appeared to retard development of the plants. The check or non-fertilized plots were in bloom 1·7 days before the super and basic-slag plots, the two next earliest, and 4·2 days before the ammonium-phosphate plots, the latest ones.

(Photo by the Superintendent)

Gold Coin potatoes in the fertilizer test, August 26, 1930. The rates of fertilizers which were sown in the furrows immediately previous to the planting of the potatoes were as follows:—

Superphosphate	300	pounds per acre
Ammonium phosphate	300	" " "
Rock phosphate	400	" " "
Basic slag	400	" " "
Muriate of potash (Kcl)	150	" " "
Mixture A—		
Superphosphate	300	" " "
Muriate of potash	150	" " "
Nitrate of soda	217	" " "
Mixture B—		
Ammonium phosphate	300	" " "
Muriate of potash	150	" " "

Check—no fertilizer.

By harvest time the maturity seemed to have been evened up for the tops of all are recorded as having died down the same day. This effect on maturity does not agree with that observed in 1929. It is evident that further work is necessary in order to get conclusive results.

Between the average yields, both total and marketable, of Mixture-B, the highest, with 13,728 pounds per acre, and basic-slag, the lowest, with 9,880 pounds per acre, there is a difference of more than 3,800 pounds per acre, actually 38·9 per cent. The second-highest average yield was produced by Mixture-A plots which produced 13,039 pounds per acre. Between the Mixture-A and the ammonium-phosphate yields there is no significant difference. The remainder of the plots come in the order: check, superphosphate, muriate of potash and rock phosphate.

The influence of the fertilizers on the potatoes as manifested by the top growth differed somewhat from that shown in the yield of tubers. Notes on the heights of the plants, as taken toward the end of July, indicate that Mixture B plots were the tallest, at 17·3 inches. Mixture A, ammonium phosphate and superphosphate plots were next tallest, averaging 16·5 inches, while the check plot was 16·3 inches. Basic slag and rock phosphate were next with 14·8 inches, while the lowest of all were the muriate of potash plots, which averaged only 14·3 inches. Notes on the tendency to vigorous, bushy growth, taken at the same time show a similar tendency, the relative order of the plots being Mixture B, ammonium phosphate, Mixture A and superphosphate (tied), check, rock phosphate, and basic slag and muriate of potash (tied).

Thus, there appears to be a definite trend toward larger yields of tubers and especially of top growth with the use of the more readily available and particularly the nitrogenous fertilizers. Moreover, it appears significant that the higher-yielding treatments, those containing nitrogen, all of which averaged over 13,000 pounds per acre, are relatively high in yield of green haulms, dry weight of haulms, total tubers, marketable tubers, percentage of marketable tubers anad also in height and bushiness of the plants. Conversely, the three lowest-yielding treatments, which averaged over 1,800 pounds per acre less total yield than the unfertilized plots, are relatively low in these respects.

A quite unexpected result is the poor showing of tuber yield and top growth made by muriate of potash. The average yield of these plots is only 10,545 pounds per acre, or over 1,800 pounds less than the check plots and only slightly more than the average of the rock-phosphate plots. In top growth the muriate-of-potash plots are recorded as being the lowest of all plots in height and one of the two lowest in bushiness and vigour. Possibly this can be partially explained by the leaching of the readily soluble potash. Such leaching almost certainly resulted from the heavy rains May 24 and 25 and on through to the end of June. However, why a washed-out dressing of potash should cause an actual reduction in yield is rather difficult to understand.

A possibility that offers itself as an explanation of the erraticism of some of the yields and especially of the lack of response to some of the fertilizers, notably potash and nitrate, is that a toxic effect may have been produced by the direct contact of the potato sets with the fertilizers. Moreover, this toxic effect probably varied in severity according to the fertilizer used. Nitrate of soda and muriate of potash, being readily available, might quite conceivably have produced the greatest toxic effect.

Supplementary Fertilizer Test with Early and Late Potatoes.—With a few minor exceptions the Irish Cobblers gave a response to the fertilizers similar to that of the Early Rose. One exception is that ammonium phosphate, instead of giving an average yield that is insignificantly different from that of mixture A, produced 770 pounds per acre or over six and a half per cent more than

mixture A. Also superphosphate, instead of averaging 1,000 pounds more per acre than muriate of potash, yielded less, in fact only as much as rock phosphate. In top growth there was the same general tendency for a greater response from the more available and more nitrogenous fertilizers as was observed in the test with Early Rose. The only variations of any importance were found in the basic-slag and muriate-of-potash plots. The basic-slag plots made almost as tall, bushy and vigorous a growth as did the mixture-A plots, while the tops of the muriate-of-potash plots were slightly larger than those of the check and rock-phosphate plots. However, as these figures for Irish Cobbler are from only two sets the variations may easily be due, in large part, to the erraticism in yield.

(Photo by the Superintendent)

Early Rose potatoes in fertilizer test, September 20, 1930—Set 1, partly sacked. The rates of fertilizers, which were sown in the furrows immediately previous to the planting of the potatoes were as follows:—

Superphosphate	300	pounds	per	acre
Ammonium phosphate	300	"	"	"
Rock phosphate	400	"	"	"
Basic slag	400	"	"	"
Muriate of potash (KcL)	150	"	"	"
Mixture A—				
Superphosphate	300	"	"	"
Muriate of potash	150	"	"	"
Nitrate of soda	217	"	"	"
Mixture B—				
Ammonium phosphate	300	"	"	"
Muriate of potash	150	"	"	"
Check—No fertilizer.				

In the case of the set containing Gold Coin the order established by the Early Rose and Irish Cobblers was rather badly upset. The greatest yield was from the plot treated with muriate of potash, which gave over 16,000 pounds per acre. The second-highest yield was from the superphosphate plot, with over 3,000 pounds less. Next in yield was rock phosphate with almost 1,000 pounds less, followed by check, mixture A, basic slag and mixture B, in that

order but with very slight difference in yield. The lowest-yielding plot of this series was ammonium phosphate with just over 8,300 pounds per acre, almost 2,000 pounds less than mixture B, the next lowest yielder, and just over one-half the yield of muriate-of-potash, the highest yielder. With this variety though the relative tuber yields differ quite radically from those of the Early Rose and Irish Cobbler plots, the response to the fertilizers as interpreted in top growth, shows a remarkable conformity to the tendency indicated by the two earlier varieties. In this variety some of the poorest bottoms were found under the rankest tops. The Gold Coin were frosted before mature. Whether the discrepancy noted might have been overcome if the plants had remained green longer can only be conjectured.

In growth of tops or haulms the fertilizers which carried nitrogen produced the greatest increases, followed by the phosphate-carrying fertilizers.

Potash produced the least increase in vine growth. In the case of the tubers the effect from the various fertilizers was irregular.

SUMMARY OF RESULTS WITH POTATOES.—Briefly summarizing the results of fertilizer work for the past two years, we find that while with cereals there has been comparatively little definite response to the application of fertilizers, with potatoes, there have been fairly pronounced differences in time of maturity, in yield of tubers and more especially in luxuriance of vine growth. That the first and second differences have been somewhat irregular seems unfortunate, and indicates the necessity for further work along these lines.

With potatoes as with grain ammonium phosphate had a greater effect than superphosphate. Applied at the same rate as the superphosphate, ammonium phosphate gave greater yields by 6·2 per cent based on the weighted average for the four varieties. This difference was presumably due to the ammonium phosphate carrying nitrogen as well as phosphorus.

Ammonium phosphate appeared superior to nitrate of soda in supplying nitrogen for potatoes. Comparing two complete fertilizers containing nitrogen, phosphorus and potash in equal amounts, we find that, on an average of all the plots of each, the mixture containing ammonium phosphate outyielded the mixture containing nitrate of soda and superphosphate by 10 per cent. Also ammonium phosphate alone gave practically as great a yield as did a mixture of nitrate, superphosphate and muriate of potash.

In 1929 the maturity of the potatoes was somewhat hastened, to the extent of about seven days at the time of bloom, by the addition of fertilizers. Also, in the case of later varieties, the yields of tubers and the quality (the latter probably due to the greater maturity) were increased by the use of fertilizers.

In 1930 the bloom on the fertilized plots of Early Rose was delayed from 1·7 days to 4·2 days as compared with the check plots, though the tops of each variety all died down or were frozen down on the same days.

SUMMARY OF YIELDS OF MARKETABLE TUBERS FROM FERTILIZER TESTS WITH POTATOES IN 1930

Variety	Mixture B, per acre	Mixture A, per acre	Ammonium phosphate per acre	Superphosphate, per acre	Check, per acre	Muriate of potash per acre	Rock phosphate, per acre	Basic slag, per acre
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Early Rose—Average of 4 sets	13,728	13,039	13,015	11,590	12,374	10,545	10,426	9,880
Gold Coin—One set	10,220	10,020	8,330	12,880	11,620	16,030	11,900	10,360
Irish Cobbler—Average of 2 sets	15,050	11,550	12,320	9,975	10,220	10,045	9,975	9,065
Small whites—One set	13,720	12,460	11,970	12,180	9,240	9,450	9,940	9,870
Weighted average of four varieties	13,619	12,329	12,125	11,421	11,350	10,969	10,437	9,735
*Weighted average of three varieties	13,605	12,311	12,147	11,313	11,651	11,186	10,508	9,716
Serial average of four varieties	13,180	11,992	11,469	11,656	10,864	11,518	10,560	9,794
Serial average of three varieties	12,999	11,836	11,222	11,482	11,405	12,207	10,767	9,768

* The set consisting of small whites has been omitted in calculating this average.

SOIL FERTILITY, 1930

NITRATE TEST WITH RAPE

Dwarf Essex rape was seeded in rows and broadcast June 3 on land cropped to hemp and fibre flax in 1929 and spring-ploughed in 1930. Germination was prompt but subsequent growth was slow. The rape beetle and the red turnip beetle ravaged the stand until two sprayings of arsenate of lead terminated their activities.

Nitrate of soda applied on June 30 at the rate of 160 pounds per acre to quadruplicate plots resulted in very little extra growth. Broadcast stands to which the nitrate had been applied yielded 17,570 pounds of green weight per acre or only 1·8 per cent more than the checks. Taking the dry-matter yields, however, the increase was 15·4 per cent. The fertilized rows yielded 13,825 pounds green weight or 3·4 per cent more than the checks. The increase in dry matter was only 1·1 per cent.

The crop did not appear healthy throughout the growing season. The cold and windy weather after seeding tended to retard growth. Little rain fell in July so the nitrate fertilizer could not produce the results obtained in other years.

NITRATE APPLICATIONS TO OLD MEADOW

From time to time nitrate of soda has been applied in narrow strips across a meadow sown to Western rye grass and alfalfa in 1918. Each application is made at right angles to the previous one so as to avoid possible complications by residual effects. Except in one or two extremely dry seasons the grass has always shown a prompt increase in growth and darkening of colour, whereas no benefit in either respect has ever been evident in the alfalfa.

The nitrate dressing was repeated on May 20, 1930, on two strips. Shortly after this a response to the nitrate was observed. By the middle of June the extra growth on the treated plots was quite pronounced. When the plots were cut on July 17 the spread had disappeared and one nitrate plot which happened to carry a higher grass content than the average was considered the poorest of the series. Yield data based on the cured hay per acre substantiated these observations. The light yield from the one treated plot reduced the average of the nitrate plots to a little less than that of the checks.

CEREALS

SCOPE AND TECHNIQUE

Since the introduction in 1924 of the rod-row method of testing cereals the number of fortieth-acre drilled plots then in use has been reduced fairly steadily until in 1930 the list comprised merely duplicate seedings of a few standard varieties designed to obtain data for certain long-term averages.

The smaller plots, each amounting to seven rod-rows, and seeded in octuplicate, are considered to produce quite accurate comparisons since all operations can be handled with painstaking care with economy of time and space. It has been observed that the yields tend to surpass those current in the district. It should be kept in mind, however, that to secure accurate results the preparation must needs be summer-fallow or hoe-crop land and the plots hand-weeded if necessary. All varieties are thereby given optimum conditions and the data recorded represent their reaction to such. Cultural tests are designed to investigate other points than yielding capacity.

The use of the Swift Current Nursery thresher facilitated threshing. Previously the crop had been laboriously hand-threshed.

Official germination and grading results were secured for samples from variety and cultural plots.

The cereal work also included:—

A rate-of-seeding test with spring grains.
A date-of-planting test with spring and winter grains.
A stage-of-harvesting test with spring wheat.
A stripe-rust nursery.
Co-operative tests with cereals.
The propagation of Registered Banner and Victory oats.

SEASON AND SEEDING

Some seeding was possible by April 7, but cold, windy weather held up operations until April 19 when the variety-test peas were sown.

Harvest commenced August 12. Filling and ripening conditions were normal. A severe windstorm on August 29 lashed the crop and shattered ripe grain. Fortunately the harvesting was well in hand and unnecessary losses did not result. Yields obtained from the stage-of-cutting test with spring wheat indicate that all varieties standing at that time suffered somewhat as a result of the storm. The frost of August 30 was not prolonged and caused scarcely more than bran wrinkling where it did occur.

RATES OF SEEDING

REVIEW OF TWO COMPLETED EXPERIMENTS 1918-24 AND 1925-29

In 1918 a rate-of-seeding experiment with one variety each of wheat, oats and barley was commenced, being combined with a nurse-crop test in seeding down. Seven successive sowings were made but no pronounced results obtained. It was remarked in the 1924 review that very heavy seeding seemed to fine and shorten the straw and in some cases to reduce the yield although hastening maturity a trifle, especially in the case of oats. Very thin seedings were observed to fill up their stands considerably by tillering and to yield nearly as well as medium ones. Low rates of grain seeding rather favoured meadow crops seeded among them as well as any weeds whose seeds might lie in the ground. Where grain alone was the object medium rates seemed best. It was noticed that Banner oats, used in one or more seasons, appeared to respond to thick seeding less favourably than Abundance.

The latter point suggested an expansion of the experiment to include two varieties of each grain. Such a test was begun in 1925 and repeated each year until 1929, after which another alteration was made in technique and varieties.

During the twelve years' continuation of the two experiments under review seeding was done by an ordinary grain drill and the rate regulated by the index. The aim was to sow according to weight. This method has proven to be less accurate than is desired. Occasional irregularities in seeding have resulted in the application of other than the intended amounts of seed. Plots were cut with the binder and threshed by a small-sized power separator.

The varieties employed were Garnet and Marquis wheat; Ligowo and Banner oats; Eureka and Bearer barley.

The prescribed rates of seeding were five, six, seven and eight pecks of wheat per acre; ten, twelve, fourteen and sixteen pecks of oats; four, six, eight and ten pecks of barley.

Duplicate plots were drilled seven feet wide and ten rods long. Two flanking drills on each side were removed at harvest, making test areas $^{1}\%_{28}$ths acre each.

Preparation of the land has varied year by year, choice of site being governed by the ground available.

WHEAT.—Wireworms marred the test with wheat, affecting Garnet particularly. In 1926 the attack was rather devastating, bringing down its yield 22½ per cent below that of Marquis. The damage was most severe in the thinnest seedings, and would have been even greater had not the weather favoured crop recovery. Even then the five-peck seeding of Garnet yielded but 38 bushels 27 pounds, as against 51 bushels 55 pounds from the thickest. The Marquis that year ranged from 56 bushels 58 pounds for the thinnest to 61 bushels 28 pounds for the thickest.

As already mentioned, irregular seeding has contributed to erratic results. In 1927 both varieties were applied fifty per cent more heavily than intended.

Seasons have had much to do with the effect of varying rates. Thus in 1925 thick seedings were noticeably affected by the dry weather, and in the case of all six varieties of grain that year the thinnest sowings were represented at harvest by the stoutest-looking plots.

Averaging all the data recorded we find as between the thickest and thinnest seedings a fraction of an inch shorter straw and a fraction of a day's hastening of maturity in favour of the heaviest rate.

The average effect upon yield was slight. Marquis turned out practically alike from the six-, seven- and eight-peck sowings, the five peck being 102·9 pounds per acre (3·9 per cent) under the six-peck. Garnet produced rather its heaviest yield of both grain and total crop from the seven-peck seeding, As with Marquis, its five-peck seeding gave the lowest average yield. In the years when wireworms were not particularly troublesome Garnet produced decidedly its largest yields from the thinner seedings. Balancing all the chances, it would appear that a moderate application of about six pecks should be recommended for present conditions in the Peace.

It is of incidental interest that during the five years of the experiment Garnet yielded 37 bushels 16 pounds and Marquis 44 bushels 45 pounds. The inferior relative showing of Garnet in this series as compared with its normal performance is attributed largely to wireworm injury.

OATS.—In the 1918-24 experiment with oats it had seemed that, within the limits of the test the successive addition of each half-bushel of seed had promoted maturity about a day. In the five-year series under present discussion the effect in this regard has been much less marked, the average recorded difference between the extreme rates being only a third of a day in the case of Banner and four-fifths of a day in the case of Ligowo. In some years the plots all seemed to ripen together. At other times the thin seedings were noticeably later although hardly to the degree that might have been expected.

While Ligowo yielded somewhat better from the intermediate sowings than from either extreme Banner exhibited a fairly uniform progressive decrease in yield with each half bushel of seed, the thickest rate falling below the thinnest by over 7 bushels per acre, or 7·5 per cent. Banner is a strong-tillering variety which seems to favour moderately thin seeding and in the drilled plots of the variety test at Beaverlodge has commonly been seeded more sparingly than most other varieties.

Even Ligowo, whilst yielding highest from medium rates, averaged better from the thinnest than from the thickest sowing.

The length of straw decreased as the seedings were increased. With Banner the difference between the extreme rates was 2·3 inches; with Ligowo 2·5 inches.

Banner outyielded Ligowo at every rate of sowing and on the average of all rates exceeded it by 8 bushels 13·1 pounds or 9·8 per cent.

In the interpretation of the data considerable allowance must be made for errors. For instance in 1929 the Ligowo was applied 50 per cent too heavily

and the Banner about 15 per cent too light. Strange to say, the effect on crop growth was not just what might have been expected. However, the test does indicate a significant difference between the characteristics of the two varieties and goes to show that with seed of normal germination a sack of seed oats per

Oats in the rod-row variety test showing one foot cut off each side of the path to exclude marginal effects, leaving the plots each one rod long. (Photo by the Superintendent).

acre is sufficient for average soil conditions. While heavier seedings may slightly promote maturity they are liable to do so at the expense of yield and length of straw.

BARLEY.—The beards of the Bearer barley gave frequent trouble in drillings and upset calculations more or less. Sometimes the drills had to be patched up with the garden seeder. Eureka (beardless and hulless) feeds freely and in 1929 was sown about 46 per cent too heavily while the Bearer that year was sown about 17 per cent too lightly.

According to the estimates Eureka at four pecks ripened about a day and a third later than at ten pecks while with Bearer the difference was nine-tenths of a day. With both varieties the straw was nearly three inches shorter from the ten-peck than from the four-peck seeding. In the case of Eureka the yield decreased progressively, the thickest seeding yielding four bushels less than the thinnest, a decline of 8·8 per cent.

Bearer was more erratic, giving the most favourable average response from the six-peck seeding.

Lodging, when evident, occurred uniformly over all the plots, not being appreciably affected by the rate of seeding. Eureka lodged considerably nearly every year.

Allowing for the factor of hull, which possesses slight feeding value, the yield of Eureka measured up pretty well with that of Bearer, which is recognized to be a very high-yielding variety.

As tabulated, Bearer outyielded Eureka by 9 bushels 27 pounds per acre or 21·8 per cent. Deducting from the Bearer ten per cent of hull we should have the comparison 4 bushels 10 pounds or 9·6 per cent in favour of Bearer.

EPITOME

While lacking decisiveness, owing to an unusual degree of error, twelve years' data indicate that:—

1. Within ordinary limits the rate of seeding is not vitally important in its effect upon crop yields.
2. Varieties differ in their reaction to seeding at various rates.
3. Seasons markedly affect the outcome.
4. Where wireworms are prevalent considerably more seed wheat should be sown.
5. Thick seedings tend on the average to mature a day or so sooner than thin ones, although the difference is sometimes more and sometimes zero.
6. Thin seedings stool more, grow longer straw and larger heads and in seasons of extreme drought sometimes produce stands that look thicker on the ground than those resulting from thick ones.
7. Unless under extreme conditions lodging is not appreciably controlled by increasing or decreasing the rate of seeding. An excessively thin stand produces crooked straw which may not always carry its heads well.

RATES-OF-SEEDING CEREALS (1925–1929 INCLUSIVE), 1930—SUMMARY

Average of duplicate plots

Designation	Height	Estimated days to maturity	Yield per acre		Per cent grain to total crop
			Total crop	Grain	
	in.		lb.	lb.	
Marquis at 5 pecks	42·7	124·0	5,939·0	2,615·2	44·03
Marquis at 6 pecks	43·3	123·8	6,153·8	2,718·1	44·17
Marquis at 7 pecks	42·5	123·6	6,075·7	2,699·8	44·44
Marquis at 8 pecks	42·5	123·6	6,141·2	2,708·6	44·11
Average	42·8	123·8	6,077·4	2,635·4	44·19
Garnet at 5 pecks	38·0	116·7	5,214·6	2,195·2	42·10
Garnet at 6 pecks	37·6	116·3	5,794·1	2,235·0	38·57
Garnet at 7 pecks	36·9	116·1	5,932·1	2,272·7	38·31
Garnet at 8 pecks	37·4	115·8	5,869·9	2,241·2	38·18
Average	37·5	116·2	5,702·7	2,236·0	39·21
Banner at 10 pecks	45·1	117·0	6,484·9	3,320·3	51·20
Banner at 12 pecks	44·6	117·0	6,358·2	3,235·0	50·88
Banner at 14 pecks	42·6	116·8	6,286·0	3,173·9	50·49
Banner at 16 pecks	42·8	116·7	6,146·9	3,071·7	49·97
Average	43·8	116·9	6,319·0	3,200·2	50·64
Ligowo at 10 pecks	44·3	116·6	6,001·4	2,899·5	48·31
Ligowo at 12 pecks	43·6	116·6	5,971·9	2,947·4	49·35
Ligowo at 14 pecks	42·8	116·3	6,032·2	2,983·6	49·46
Ligowo at 16 pecks	41·8	116·2	5,790·7	2,830·0	48·87
Average	43·1	116·4	5,949·1	2,915·1	49·00
Bearer at 4 pecks	40·6	116·7	5,204·4	2,571·8	49·42
Bearer at 6 pecks	39·9	116·6	5,196·2	2,642·1	50·85
Bearer at 8 pecks	39·4	116·3	5,009·8	2,582·1	51·54
Bearer at 10 pecks	37·8	115·8	4,972·2	2,435·7	49·99
Average	39·4	116·4	5,095·7	2,570·4	50·44
Eureka at 4 pecks	34·3	112·8	4,237·9	2,202·0	51·98
Eureka at 6 pecks	33·5	112·4	4,204·8	2,191·2	52·11
Eureka at 8 pecks	31·5	112·2	3,975·4	2,043·0	51·39
Eureka at 10 pecks	31·5	111·5	3,959·5	2,007·8	50·71
Average	32·7	112·2	4,094·4	2,111·0	51·56

DATES OF PLANTING

A change was made in 1930 with the number and varieties used in the date-of-planting test. Reward wheat was substituted for Garnet. Liberty oats were not considered commercially important enough to warrant further testing. Legacy replaced O.A.C. 3. Eureka, a valuable feed barley, gave place to Hannchen and O.A.C. 21.

SPRING GRAINS

Eight successive seedings of spring grains commencing April 7 at intervals of seven days were made for all varieties except flax, which commenced April 28 with six successive seedings.

The land was summer-fallow after cereals and was in good tilth.

WHEAT.—In the test with wheat the greatest yield was obtained from the first seeding of both Marquis and Reward. The second-highest yield was with the third seeding made April 21. Yields were well maintained in three or four dates but fell off rapidly after that.

A noticeable feature of the test was that the first, third, fifth and sixth sowings of Reward outyielded the corresponding seedings of Marquis. The fourth and fifth sowings of Reward were slightly shattered by the windstorm on August 29. The last three sowings of Marquis were cut on the green side to avoid frost injury. Five seedings of Reward were harvested before the first one of Marquis matured.

All the Reward graded No. 1 Hard. First, fourth, sixth and seventh sowings of Marquis graded 1 Hard, the others 1 Northern. Slight traces of frost were found in grain from the seventh and eighth sowings of Reward and the fifth sowing of Marquis. The eighth seeding of Marquis showed green kernels as well as frost.

With both varieties the straw showed a fairly regular decrease in length from the successive plantings although with Reward the second was taller than the first while with Marquis the first was the tallest. Strange to say, the Reward throughout the 1930 test averaged taller than the Marquis. The latter may have been slightly disadvantaged in this respect by its situation on rather higher ground.

Perusal of the records emphasizes anew that while fairly early seeding is safest for wheat a week's delay in sowing seldom entails anything like a week's delay in ripening. In considering the first four seedings of each wheat it may be seen that in the case of Marquis 21 days delay in seeding resulted in only 6·7 days delay in time of maturity, the ratio being 3·1: 1. With Reward the ratio was 4·5: 1·0. Nature apparently tries to keep to schedule, whatever Man's delinquencies may be.

OATS.—Seasonal conditions in 1930 were such that the advantage of very early seeding extended to oats, both the early and the standard variety producing the greatest yield of grain from the first sowing and declining quite regularly save that the third sowing of Banner (April 21) gave a greater yield than the second sowing (April 14). With the fourth sowing of Banner yields fell off sharply. Data obtained from a stage-of-cutting test with wheat indicated that considerable shattering occurred due to a severe windstorm at that time. Yields of Legacy declined uninterruptedly. Its first two sowings outyielded those of Banner.

Greatest length of straw was attained with both varieties from medium dates of sowing, Banner from the fourth and Legacy from the fifth.

All graded 1 C. W. except the fifth and eighth sowings of Legacy and the eighth of Banner, which graded 2 C.W.

Taking the first four sowings of oats as of wheat we find that 21 days' difference in seeding Banner resulted in only 7·6 days' difference in time of ripening, a ratio of 2·8 : 1. With Legacy the ratio was 3·6 : 1.

Barley.—Highest yields with barley were secured from the third sowing made on April 21. Weight per bushel was substantially alike throughout the first four or five seedings. All the Hannchen weighed nearly as heavy as standard wheat.

From the first five seedings O.A.C. 21 outyielded Hannchen. The remaining plots of O.A.C. 21 shattered badly as a result of the windstorm of August 29. The last six seedings of Hannchen likewise suffered, but much less than the O.A.C. 21, the variety being far more wind-resistant.

The relatively inferior 1930 yield of Hannchen in this as well as other cultural experiments is most plausibly explained on the hypothesis that seasonal conditions up to a certain point favoured precocity, whether by early seedings or early varieties. Crops standing through the violent wind at the end of August appeared to be frayed and injured by the gale.

The first five plantings of O.A.C. 21 graded 2 C.W. and the remainder Ex. 3 C.W. All the Hannchen graded 2 C.W. except the crop from the last planting, which was Ex. 3 C.W.

With O.A.C. 21 three weeks' difference in seeding made only 5·8 days' difference in date of ripening, a ratio of 3·6 : 1. With Hannchen the ratio was 2·5 : 1.

Peas.—Four plantings of Chancellor were ripe before the earliest planting of Mackay. Three dates of the former and six of the latter maintained high yields, remaining dates yielding considerably less. Mackay this year gave a somewhat greater yield than Chancellor in each date except the last. The harvest season appeared favourable for the medium-late dates of Mackay, which were not pulled until September 23.

Save only the final planting of Mackay, every lot of peas in both varieties tested from 65 to 65·9 pounds per measured bushel. In every instance the Chancellor tested slightly the heavier.

The twenty-one days' difference between the first and fourth sowings of Mackay accounted for 9·6 days' difference in dates of maturity, a ratio of 2·2 : 1. With Chancellor the corresponding ratio was 3·1 : 1.

Flax.—Cutworms thinned the stands of the first two seedings of flax, which nevertheless threshed nine and ten bushels. It is rather remarkable in view of such insect attack to find an April planting of this crop producing within a pound of nine bushels per acre. The May 12 and May 29 seedings gave the best yields. No difference in grading resulted with the different dates of seeding, all rating 1 C.W.

Cutworm injury to the early seedings probably delayed their maturity. At all events a lapse of twenty-one days between the first and fourth seedings resulted in only 3·4 days' difference in estimated dates of full maturity. Averaging of the spreads gives a ratio of 6·2 : 1.

The length of straw decreased progressively with the date of planting.

Winter Grains

Turkey Red winter wheat and Ottawa rye were planted at eight successive weekly dates, commencing July 26, 1929, except that the first seeding of rye was put in one day late. The land was summer-fallow after cereals.

Wheat.—Winter killing was uneven and caused patchy stands. The late seedings suffered to the greatest extent. The highest yield was obtained from the fourth seeding (August 16) and second-highest from the fifth (August 23). The first six seedings graded 3 R.W. with the last two grading 4.

RYE.—Winter rye gave best results with the seventh and eighth dates of planting. Yields in the test proved very good, the seventh planting producing 70 bushels 9 pounds per acre. All plots lodged badly and the test portions were secured only with considerable difficulty.

STAGE OF HARVESTING WHEAT

An experiment designed to investigate the effect of harvesting at different stages of maturity on the yield and quality of wheat was conducted on a somewhat more elaborate scale in 1930. Reward and Marquis were seeded by hand in rows 18·5 feet in length and 7 inches apart. The preparation was fallow after cereals in 1928. Cutting commenced August 6 when single rows were taken in each of four successive days preliminary to the main test. These serve to indicate the progression of development during the early filling stages.

Following the preliminary test, octuplicate plots, each consisting of three rod-length rows, were harvested by hand daily. The heads plus approximately a foot of straw were placed in gunny sacks, hung on storage racks until threshed. Altogether the test covered 28 dates of Reward and 30 dates of Marquis.

RESULTS WITH REWARD

Reward was estimated to be in the late-milk to early-dough stage when cutting was commenced. Yields increased progressively with each date of cutting until the straw had shown yellow for three days and the kernels were judged to be in the hard-dough to ripe stage. During this time there had been a steady improvement in grades from No. 5 to 1 Hard. The weight per 1,000 kernels and weight per measured bushel increased until the hard-dough stage was reached. From this stage to several days past dead-ripeness these weights remained fairly constant.

When the crop was considered 90 per cent ripe it was subjected to a severe lashing by wind. Plots harvested in the evening when the wind had subsided yielded 271·2 pounds per acre less than those of the previous day's cutting. Presumably the maximum yield had not been attained by this date as there are indications that yields were increased slightly until the crop was dead-ripe and the straw commenced to break down.

Grain cut from the time it was almost ripe until it had been deap-ripe four days graded 1 Hard uniformly. Precipitation totalling 0·72 inch fell on the fifth day after dead-ripeness was reached. The wet grain was placed in sacks as usual and hung so that there was a free circulation of air. Some sprouting of this lot took place and the grain graded rejected 4^0. Possibly stooked grain might not have sprouted. Grain cut after this date graded 1^0 and was bleached in appearance.

RESULTS WITH MARQUIS

Cutting of Marquis wheat commenced in the early-milk stage. In this stage yield and weight per 1,000 kernels were approximately half that obtained by cutting when ripe. The grain graded Feed. By the fourth date of cutting, Marquis was estimated to have reached the stage corresponding to that of Reward at the commencement of the test. Grain cut in the early-milk stage graded Feed, that at the medium-stage graded 5^0 and that at the early-dough stage graded 3^0. One cutting, taken in the medium-to-late-dough stage, graded 2^0. Late-dough to ripe grain graded 1 Hard.

Yields increased until the medium-to-late-dough stage was reached. From then until the completion of the test, five days after the crop was estimated ripe but two or three days from being dead ripe, yields remained constant. It is estimated that the windstorm shattered approximately two bushels per acre.

36863—6½

The highest weight per bushel was obtained from samples taken when the crop was estimated ripe. Until that time the increase in weight had been regular. The following day due to the heavy rain and sacking of the grain in a wet condition the weight per bushel dropped to 64·2 pounds whereas it was 66·7 pounds on the previous day. Corresponding to this the grain graded 4^0, showing mildew and musty sprouts as compared with 1^0 Hard. The moisture did not influence the weight per 1,000 kernels and yields of the musty grain were lower by a bushel. The grain taken the day after the rain when the straw was still wet yielded a bushel less than that taken on the day of the rain but graded 1, showing a few sprouts. Grain cut two days after the storm graded 1 Hard. Although less ripe than Reward when subjected to the wet weather Marquis kernels did not have the bleached appearance noticeable in the Reward. Possibly the grain of neither variety will retain its natural colour when subjected to a severe soaking a week after maturity.

Yields did not appear to be affected by moisture while the crop was in the early-dough stage but after reaching the medium dough, grain cut while wet or tough following the heavy rain cured out two to five bushels per acre less than grain cut in a reasonably dry condition. Records are not sufficiently complete to indicate positively whether the reduction in yield observed was or was not a direct result of the moisture in the grain and straw as gathered.

CUTTING WHEAT IN MILK STAGE

Results from single rows harvested in the milk stage indicate that filling of the kernel does not take place previous to this but once the early-milk stage is reached the kernels rapidly increase in weight. Only when wheat reached the medium-dough stage did it grade higher than feed.

STAGE-OF-HARVESTING TEST WITH REWARD WHEAT, 1930

Average of octuplicate plots, three rod rows each, grain cut by hand leaving one foot of straw, and sacked.

Sequence	Date of cutting	Maturity at harvest	Yield per acre	Weight per 1,000 kernels	Weight per bushel	Official grading	Precipitation	Remarks
			lb.	grams	lb.		in.	
1st	Aug. 11	Late milk-early dough, straw greenish yellow colour	2,108·0	21·6	62·6	No. 5° (immature)		
2nd	" 12	Late milk-early dough, straw greenish yellow colour	2,272·6	24·2	63·4	5° "		
3rd	" 13	Early dough, straw greenish yellow	2,477·1	25·6	63·7	4° "		
4th	" 14	Early dough, straw yellow to greenish	2,491·9	26·0	63·8	4° "		
5th	" 15	Early dough to medium dough, straw yellow streaked	2,599·8	27·6	65·0	4° "		
6th	" 16	Early dough to medium dough, straw yellow streaked	2,598·9	27·6	65·3	4° "	0·02	
7th	" 18	Medium dough, straw yellow, with greenish-yellow patches	2,736·3	28·6	65·8	4° "	0·23	Rained while cutting. Wet grain put in sacks.
8th	" 19	Medium to late dough, straw yellow with a tinge of green still showing	2,752·0	28·2	66·3	3° "		
9th	" 20	Medium dough to late dough, straw yellow with greenish tinge still showing	2,784·3	28·8	66·7	3° "	0·03	
10th	" 21	Medium dough to late dough, straw yellow with greenish tinge still showing	2,734·1	28·0	65·8	3° "		
11th	" 22	Late dough, straw yellow with green tinge persisting	2,661·9	29·4	66·0	2° "		
12th	" 23	Late dough to hard dough, straw almost completely turned yellow	2,793·8	30·0	65·1	1°		
13th	" 24	Late dough to hard dough, straw completely turned yellow	2,827·4	30·2	66·1	2°		
14th	" 25	Late dough to hard dough, straw yellow	2,897·3	30·4	66·8	1°	0·07	
15th	" 26	Late dough to hard dough, straw yellow	2,792·4	29·0	66·4	1° (poor)		
16th	" 27	Hard dough to ripe, straw yellow	2,828·6	29·8	66·3	1°		
17th	" 28	Hard dough to ripe, straw yellow	2,812·6	30·2	66·1	1 Hard		
18th	" 29	Hard dough to ripe, perhaps 90 per cent ripe	2,541·4	30·6	66·2	1 "	0·12	Strong wind. Reward shattering to a considerable degree.
19th	" 30	Estimated ripe	2,436·5	30·0	66·3	1 "	0·06	Slight frost recorded.
20th	" 31	Estimated ripe	2,564·3	30·4	66·7	1 "		
21st	Sept. 1	Estimated dead ripe	2,541·4	29·8	66·8	1 "		
22nd	" 2	Dead ripe, straw showing signs of breaking down	2,484·6	29·6	66·3	1 "		
23rd	" 3	Dead ripe, heads break over, etc., only to a slight degree	2,502·4	30·0	66·6	1 "		
24th	" 4	Dead ripe, straw breaking down slightly	2,608·0	31·2	67·0	1 "		
25th	" 5	Dead ripe, straw breaking down slightly	2,367·3	30·8	67·0	1 "		
26th	" 6	Dead ripe, straw breaking down slightly	2,197·4	29·0	60·0	Rejected 4° (sprouted)	0·72	Heavy rain, grain very wet when cut.
27th	" 7	Dead ripe, straw breaking down slightly	2,617·4	29·6	65·0	1° (bleached)		
28th	" 11	Dead ripe, not much shattering when cut by hand	2,564·1	30·4	65·1	1° "		

STAGE-OF-HARVESTING TEST WITH MARQUIS WHEAT, 1930

Average of octuplicate plots, three rows each, grain cut by hand leaving one foot of straw, and sacked.

Sequence	Date of cutting	Maturity at harvest	Yield per acre	Weight per 1,000 kernels	Weight per bushel	Official grading	Precipitation	Remarks
			lb.	grams	lb.		in.	
1st	Aug. 11	Early milk stage, straw green	1,470·8	16·0	54·2	Feed (immature)		
2nd	" 12	Early-medium milk stage, straw green	1,760·3	19·4	56·5	6° "		
3rd	" 13	Medium milk stage, straw green	1,991·5	21·0	58·3	5° (poor, immature)		
4th	" 14	Medium to late milk, straw first signs of turning, small patches greenish-yellow	2,343·6	22·2	59·3	5° (immature)		
5th	" 15	Late milk-early dough, straw green to greenish-yellow	2,329·5	23·2	61·2	4° "		
6th	" 16	Late milk-early dough, straw green to greenish-yellow	2,427·0	24·8	62·0	4° "	0·02	
7th	" 18	Early dough, straw green with yellow patches beginning to show up	2,539·2	27·0	63·2	4° "	0·23	Rained while cutting. Wet grain put in sacks.
8th	" 19	Early dough, straw green with yellow patches	2,662·6	26·2	64·0	4° "		
9th	" 20	Early dough, straw greenish-yellow with small green patches	2,760·6	26·8	64·2	3° "	0·03	
10th	" 21	Early dough, straw greenish-yellow with green patches	2,786·5	28·4	64·0	3° "		
11th	" 22	Early-medium dough, straw greenish yellow	2,787·3	28·0	64·2	3° (immature, slightly musty)		
12th	" 23	Medium dough, straw greenish yellow	2,788·5	29·6	65·0	3° (immature)		
13th	" 24	Medium dough, straw greenish yellow	2,949·0	30·2	66·1	4° "		
14th	" 25	Medium dough, straw greenish to yellow	2,964·6	30·2	65·5	3° "	0·07	
15th	" 26	Medium dough, straw greenish to yellow	2,609·3	29·8	65·6	3° (poor)		
16th	" 27	Medium to late dough, straw greenish to yellow	3,019·1	30·2	65·7	3° (dark)		
17th	" 28	Medium to late dough, straw greenish to yellow	3,126·1	30·2	65·8	2° (immature)		
18th	" 29	Late dough, straw yellow with green patches	3,008·9	31·6	66·0	1°	0·12	Strong wind blowing very hard all day. Practically no shattering.
19th	" 30	Late dough, straw mostly yellow with slight tinges of green	3,044·3	31·0	66·0	1°	0·06	Slight frost recorded.
20th	" 31	Late dough, straw mostly yellow with tinge of green	3,156·9	31·4	66·1	1 Hard		
21st	Sept. 1	Late dough, straw mostly yellow with tinge of green	3,002·0	31·2	66·1	1 "		
22nd	" 2	Late dough, straw almost completely turned yellow	3,020·3	31·2	66·0	1 "		

23rd	"	3	Late dough, straw almost completely turned yellow	2,952·0	31·8	66·3	1	"	
24th	"	4	Late dough to ripe, straw almost completely turned	2,945·1	31·4	66·7	1	"	
25th	"	5	Estimated ripe, straw completely turned yellow	2,971·1	31·4	66·7	1	"	
26th	"	6	Estimated ripe	2,923·3	31·6	64·2	4°	(mildew and musty sprouts) 0·72	Heavy rain and grain very wet when cut.
27th	"	7	Estimated ripe	2,867·1	32·0	65·2	1°	(odd sprouts and D.K.)	Straw still wet when cut from heavy rain Sept. 6.
28th	"	8	Estimated ripe	2,969·8	32·4	65·8	1	Hard	Wet damp weather, straw tough.
29th	"	9	Estimated ripe	3,177·9	33·2	65·0	1°	(light frost)	Wet, damp weather, straw tough.
30th	"	11	Estimated ripe (2-3 days from being dead ripe)	2,778·0	31·4	65·0	1°		Weather still wet, and straw tough.

EFFECT OF HARVESTING METHODS ON SUBSEQUENT KERNEL DEVELOPMENT

Commercial and experimental methods of harvesting cereals vary regarding the period required for curing the crop and the length of straw left attached to the head. It is commonly held that the kernels continue to increase in weight following cutting and that much nourishment is derived from the partly ripened straw.

In a quadruplicate test with plots comprising one rod-row each and harvested every fourth day Reward wheat cut at different stages of maturity yielded slightly better when a foot of straw was left attached to the head than when heads only were taken. Shelling the kernels at cutting time so that no benefit could be derived from the straw or chaff resulted in a slightly decreased yield from that obtained from the unshelled heads.

The greatest differences were secured from Reward cut in the medium-dough stage, when there appears to have been some benefit derived from the straw. However, the shelled kernels heated, developed must and graded 6 as compared with grade 3 for heads alone. Possibly the musty condition reduced the yields slightly. Other takings also indicate a disadvantage derived from removing the kernels from the head.

Marquis wheat showed no advantage from leaving a foot of straw on the heads. Kernels alone from four dates graded rejected on account of mustiness, possibly as a result of storage conditions. All lots of Marquis yielded less when the kernels were hulled out immediately after harvest than when left in the head.

The 1930 results as a whole are too irregular to permit confident deductions. They do suggest that a slight advantage may be derived from leaving the kernels in the straw after cutting but the difference appeared significant only in the extreme case where kernels were threshed out before curing had taken place. Such a practice is rarely followed.

EFFECT OF HARVESTING METHODS ON SUBSEQUENT KERNEL DEVELOPMENT WITH REWARD WHEAT, 1930

Average of quadruplicate plots, one row each, grain cut by hand, and sacked.

Designation	Date of cutting	Yield per acre	Weight per bushel	Weight per 1,000 kernels	Official grading
		lb.	lb.	grams	
Kernels shelled out:					
1st cutting	Aug. 18	2,382·8	65·8	28·0	Musty and heated No. 6°
2nd cutting	" 22	2,294·0	66·0	29·6	4°
3rd cutting	" 26	3,082·5	66·0	31·6	5° musty
4th cutting	" 30	2,223·3	66·0	30·2	1° Hard
5th cutting	Sept. 3	2,564·3	66·9	30·8	1° Hard
6th cutting	" 6	2,347·5	64·8	30·2	1° bleached
Average	.....	2,482·4	65·9	30·1	
Heads only:					
1st cutting	Aug. 18	2,595·3	65·9	27·2	3° immature
2nd cutting	" 22	2,604·3	66·3	27·8	2° immature
3rd cutting	" 26	2,759·0	66·3	29·8	1°
4th cutting	" 30	2,276·3	66·4	29·4	1° Hard
5th cutting	Sept. 3	2,781·5	66·7	31·0	1° Hard
6th cutting	" 6	2,365·0	65·7	30·8	1°
Average	.....	2,563·6	66·2	29·3	
One foot of straw:					
1st cutting	Aug. 18	2,714·8	65·0	29·2	4° immature
2nd cutting	" 22	2,533·3	65·3	29·8	2°
3rd cutting	" 26	2,777·0	66·6	30·8	1°
4th cutting	" 30	2,515·5	66·2	29·8	1° Hard
5th cutting	Sept. 3	2,431·5	67·0	30·4	1° Hard
6th cutting	" 6	2,688·5	65·5	30·8	1° bleached
Average	.....	2,610·1	65·9	30·1	
Full length of straw:					
6th cutting	Sept. 6	2,520·3	65·2	29·6	1°

EFFECT OF HARVESTING METHODS ON SUBSEQUENT KERNEL DEVELOPMENT WITH MARQUIS WHEAT, 1930
Average of quadruplicate plots, one row each, grain cut by hand, and sacked.

Designation	Date of cutting	Yield per acre	Weight per bushel	Weight per 1,000 kernels	Official grading
		lb.	lb.	grams	
Kernels shelled out:					
1st cutting	Aug. 18	2,338·3	61·3	25·0	Rejected No. 6° musty
2nd cutting	" 22	2,414·0	63·7	28·2	Rejected No. 6° musty
3rd cutting	" 26	2,710·5	63·6	29·0	Rejected No. 6° musty
4th cutting	" 30	3,060·3	64·3	31·0	Rejected No. 5° musty
5th cutting	Sept. 3	2,663·0	65·8	32·8	1°
6th cutting	" 6	2,892·3	65·0	32·8	1°
7th cutting	" 11	2,701·5	65·0	31·8	1° Hard
Average		2,682·8	64·1	30·1	
Heads only:					
1st cutting	Aug. 18	2,409·3	62·9	26·8	3° pink
2nd cutting	" 22	2,631·0	64·8	27·4	1° immature
3rd cutting	" 26	2,989·5	65·8	30·0	1°
4th cutting	" 30	2,914·3	66·0	31·2	1°
5th cutting	Sept. 3	3,366·0	65·9	31·8	1° Hard
6th cutting	" 6	2,932·0	66·0	31·8	1°
7th cutting	" 11	2,967·3	65·7	31·6	1°
Average		2,887·1	65·3	30·1	
One foot of straw:					
1st cutting	Aug. 18	2,560·0	62·2	25·6	3° immature
2nd cutting	" 22	2,688·5	65·0	27·6	1°
3rd cutting	" 26	2,776·8	65·9	29·8	1°
4th cutting	" 30	2,719 3	66·2	30·8	1°
5th cutting	Sept. 3	2,914·5	67·0	31·4	1° Hard
6th cutting	" 6	2,932·0	66·0	31·8	1° Hard
7th cutting	" 11	3,082·4	65·9	31·2	1° Hard
Average		2,810·5	65·5	29·7	
Full length of straw:					
6th cutting	Sept. 6	2,661·8	65·1	31·6	1°
7th cutting	" 11	2,949·5	65·0	32·0	1° Hard
Full length of straw in sheaf:					
7th cutting	Sept. 11	2,835·0	64·0	32·0	1°

FORAGE CROPS

PASTURING TEST IN SEEDING DOWN MEADOW CROPS

Following a lead indicated by previous trials an experiment was commenced in 1925 to try the plan of pasturing meadow seedings during the initial season in the hope of preventing annual weeds from seeding yet allowing the meadow plants to establish themselves well enough to produce a vigorous growth in the ensuing season. Annual seedings were made until 1929 when the test was discontinued because the stand was found sprinkled with couch grass believed to have been previously introduced in seed of Western rye. Wind soon after seeding that year had also mutilated some of the stands.

In order to study the respective reactions of certain hay crops to this treatment while at the same time comparing them further as producers, both singly and in various suitable combinations, duplicate seedings were made of nine crops and combinations:—

Alfalfa at 12 pounds per acre;
Alfalfa at 8 and Western rye grass at 10 pounds;
Western rye grass at 14 pounds;
Alfalfa at 8 and brome at 12 pounds;
Western rye at 7 and brome at 9;
Brome at 18 pounds;
Sweet clover at 8 and brome at 12 pounds;
Sweet clover at 8 and Western rye grass at 10 pounds;
Sweet clover at 12 pounds.

These meadow strips, sixteen rods long, were sown about the middle of May and the block was then divided into four cross sections as follows:—

(*a*) On the south four rods winter rye was immediately cross-drilled at five pecks per acre.

(*b*) On the next four rods no nurse crop was seeded.

(*c*) On the third four rods Banner oats at two bushels per acre were drilled in to be pastured during the summer of seeding.

(*d*) On the fourth and last four rods oats were cross-drilled, to be cut for grain or sheaf feed.

Cross sections (*a*), (*b*) and (*c*) were surrounded by fences. In the initial seeding (*b*) was further subdivided so as to confine the stock at will upon the sweet-clover plots and thus avoid the danger of their neglecting these and cropping the remaining plots too closely. As it was observed that the cattle did not tend to discriminate thus, the precaution was not taken in the later seedings.

In the layout of the 1926 seeding a fifth block was added, a sprinkling of Dwarf Essex rape, about three pounds of seed per acre being used as nurse crop. This nurse crop was not a great success, producing only a limited amount of pasture, and for fear of bloat this had to be watched very carefully. In subsequent seedings the block was omitted.

Milch cows were employed to graze the plots as required. However, seasonal conditions and the failure to have the necessary fencing done by the desired time, due in most cases to the pressure of other work, render this data incomplete.

Some data are available from the five seedings. The 1925 seeding was cropped until midsummer in 1927 when it was broken. The remainder were ploughed up in 1930. The 1929 yield data of the 1928 seeding were unfortunately lost and the presence of couch grass in certain areas of the 1929 seeding caused a condition beyond the scope of the experiment. Hence for the most part only the results from the initial and two succeeding years of the 1925 seeding and the initial and three successive years of the 1926 and 1927 seedings may be considered comparable. The tabulated data from these along with observations from all five seedings provide the basis for the deductions herewith presented.

GOOD MEADOWS SECURED BY SEEDING ALONE

With but one exception much the strongest stands of both grasses and legumes were obtained by seeding alone. That exception was in 1929, when lashing winds soon after seeding beat out many of the tender, unprotected meadow plantlets, while those in nurse-crop areas were somewhat shielded. In thirteen years' extensive experimentation with forage crops this is the only instance where areas seeded alone have failed to make decidedly the best showing in hay production. In twelve years out of thirteen the nurse crop has proven rather a strangle crop, justifiable only on the ground that it gives a considerable return in the year of seeding and keeps down weeds during that first year. Unfortunately after nurse-crop seeding the weeds often assert themselves the next year among the thin, weak stands commonly resulting. However, in this experiment weeds did not prove particularly troublesome until the 1929 seedings.

In the non-nurse-crop paddock grazing cattle pretty well prevented the annual weeds from seeding. Only incidental handpulling was necessitated by conditions beyond the scope of the project. In ordinary farm practice clipping with the mower would top any tall species of annuals not eaten down by the live stock.

On the whole, it can be said that seeding without a nurse crop and grazing closely until August of the year of seeding furnished a little choice summer pasture and usually resulted in good crops of fairly clean hay. Whether or not it is the most profitable seeding practice will depend upon conditions.

SEEDING WITH OATS OR ALONE

The average hay crop from eight kinds of crop or mixture of crops when seeded without a nurse crop but pastured during the first summer was 41·4 per cent higher than that obtained by seeding with oats to be cut, practically all this 41·4 per cent being secured in the first meadow year. The total hay crops obtained from an aggregate of eight cuttings off three years' seedings were 20,956·6 pounds and 14,816·7 pounds, respectively. This averages 6,985·5 pounds hay per acre per seeding from non-nurse-crop and 4,938·9 pounds from nurse-crop seeding. The oat bundles produced in the initial year in these three seedings averaged 5,544·7 pounds, bringing the total feed production from the nurse-crop seeding up to 10,483·6 pounds. In total weight of feed produced the nurse-crop seedings out-yielded the non-nurse-crop by 3,498·1 pounds per seeding. In other words, the areas seeded without nurse crop produced 2,046·6 pounds more meadow hay but at the expense of 5,544·7 pounds of oat bundles. The limited amount of pasture afforded by the non-nurse-crop plots during the season of seeding would not nearly equal in dry-matter content the difference of 3,498·1 pounds of forage harvested. Perhaps some allowance might be made for a difference in quality since in a region where cereal roughage is the standard live stock ration a limited quantity of meadow hay might possess a value per ton greater than the value of an equal weight of oat sheaves.

PASTURING STANDS SEEDED WITH OATS

The project was designed to test, among other points, the effect upon the ensuing meadow crop of pasturing a nurse crop of oats as compared with cutting the oat crop. Delays in fencing the areas so as to permit grazing at the proper time necessitated mowing of the heavy oat growth in certain of the pasture paddocks before the stock could be permitted to graze. Hence direct comparisons are denied. The oats-to-pasture areas in most cases were essentially the same as the oats-to-cut except that the competition between the grain and meadow plants was less severe in the former. The eight crops tested averaged 10·8 per cent more hay crop where sown with oats to be pastured than with oats to be cut. The spreads were quite uniform and no one crop or mixture showed conclusive evidence of having benefited or suffered more than the others from this method of seeding.

The practice of seeding in this way did not commend itself unless for special circumstances. If a generous bulk of pasture were desired during the season of seeding, if wind injury to tender meadow seedlings were particularly feared or if it were found inconvenient to sow coarse-seeded grasses without some grain to force the seed, a few oats might be drilled and grazed off as in this test. Otherwise it would usually be more profitable to resort to one of the alternative practices already discussed.

PASTURING STANDS SEEDED WITH WINTER RYE

Throughout the experiment the winter-rye paddock has produced the greatest total amount of pasture in the season of seeding. As a strictly pasture proposition in itself it is worthy of consideration. But it competed so aggressively with the meadow-crop seedings that their stands were weakened and the subsequent hay crops were not so heavy. In the first hay crop of the 1926 and

1927 seedings the areas that had been seeded along with winter rye averaged 6·7 per cent more crop than the areas seeded with oats to be cut, winter rye constituting a considerable part of the crop.

The winter-rye paddock of the 1925 seeding, despite the attention paid it by grasshoppers, yielded some pasture but the insects took their toll, eating grasses and winter rye. On April 28, 1926, when the rye was about six inches tall and quite thick three head of cattle were again turned into it nightly until it was eaten short. It afterwards matured a crop of grain which, with some grass and sweet clover tied up with it, weighed at the rate of 4,404 pounds per acre and threshed 1,604 pounds of grain, including some sweet-clover seed.

The 1926 paddock of winter rye supported the equivalent of one head seventy days on an acre during August. In June, 1927, following considerable winter injury, the rye furnished but 23 grazing nights for one head. The subsequent growth was taken for hay. Among the winter rye the grasses were weak. The former constituted 80 per cent of the first hay crop.

A delay in fencing the 1927 seeding considerably upset the test. Grazing of the winter-rye paddock did not commence until August 8. Approximately twenty-seven full days' grazing was taken.

The winter-rye paddock furnished the earliest and apparently the greatest amount of pasture. If such be desired the crop would be worthy of consideration. But where the salient feature is the establishment of a meadow crop the winter rye offers too much competition.

RAPE AS A NURSE CROP

Rape as a pastured nurse crop was not judged a success by its performance in the 1926 seeding. The rape plants were slow in becoming established. The stand was quite thin and it produced only a limited amount of grazing. The crop from the rape area in the three subsequent years amounted to 164 per cent of that obtained from the oats-to-be-cut area, while the non-nurse-crop area yielded 86 per cent more crop. The limited amount of pasture obtained from the rape seeding did not compensate for the somewhat reduced hay yields, as compared with seeding alone.

SPRING CULTIVATION OF NEW MEADOWS

Spring cultivation of the year-old sod areas was tried once. Results did not seem to warrant the adoption of the practice. Portions of each plot were spring-toothed lightly on April 30, 1926, and afterwards twice harrowed. A limited number of plants were torn out and some others disturbed. The cultivated portions were the cleaner up until haying but any plots where the meadow stands were seriously thinned by cultivation permitted subsequent encroachment of weeds and certain poorer swards had to be handweeded to avoid complications. The cultivated halves yielded about 10 per cent less than the non-cultivated, the effect appearing particularly severe upon Western rye grass and alfalfa. Stands on the non-nurse crop and nurse-crop areas both suffered.

COMPARISON OF NINE MEADOW CROPS AND MIXTURES

In order to introduce a fair comparison of sweet clover, a table has been prepared summarizing the first year's crop from each of the three seedings. It may be observed that sweet-clover heads the list in each column while in combination with each of the two grasses it also shows up well. On the average of three treatments it yielded 3,022·3 pounds per acre compared to 1,954·8 pounds for alfalfa—a difference of nearly 55 per cent. This agrees essentially with an advantage of 43 per cent reported from extensive trials summarized

in 1926. In those earlier trials the sweet-clover had sustained more winter injury than during the years under present discussion.

Alfalfa, of course, is recognized to be a crop that does not reach its best until about the third year and in trials at Beaverlodge has seldom equalled the grasses in the first hay crop after seeding. That it exceeded one of them in this comparison is due to the severe attack of hoppers in 1925, affecting the grasses much more than the legumes.

On Western rye grass grasshoppers have repeatedly been found very destructive. The 1925 seeding of it was fairly riddled and its next year's crop amounted to less than half that of the brome grass. The grasshopper plague terminating in 1926, the second and third seedings of Western rye quite exceeded those of the brome, averaging 2,046 pounds as against 1,643 pounds. The average of the first crop from all three seedings, however, was 1,748·7 pounds of Western rye and 1,882 pounds of brome.

Apart from the biennial, sweet clover, a much more satisfactory comparison is presented in the second table summarizing yields for the total cropping period. Eight crops are here compared, including the two mixtures of sweet clover and grass. There is a striking regularity in the trend throughout all three treatments. At the top of the list stands the blend of alfalfa and Western rye grass, with alfalfa and brome a good second. Both mixtures somewhat outyielded the straight alfalfa. This harmonizes with the Station's recommendation to sow alfalfa mixed with a grass when intended for ordinary hay purposes since the grass then fills the space where for any cause the legume may fail.

The plots seeded with a combination of sweet clover and grass produced considerably less than the alfalfa mixtures or than straight alfalfa but decidedly outyielded the plots seeded with grass only. Reduced to a basis of acre-per-annum yields the eight cuttings of each crop rank:—

	Pounds cured hay per acre per annum
Alfalfa and Western rye	2,737
Alfalfa and brome	2,640
Alfalfa	2,439
Sweet clover and brome	2,103
Sweet clover and Western rye	1,988
Brome and Western rye	1,975
Brome	1,767
Western rye	1,745

From the standpoint of yield, therefore, as well as for the sake of improving the hay and enriching the soil, a strong case is made out for the inclusion of a legume in the seeding.

A mixture of the two grasses yielded over two hundred pounds more than either alone.

The two grasses grown separately practically equalled each other in yield but if we were to exclude the 1925 seeding, in which grasshoppers so badly affected the Western rye, the six cuttings from the two subsequent seedings would place the Western rye over eighteen per cent in the lead over brome. Previous tests have shown these two grasses approximately equal in production from stands left down three years. As a rule, when unmolested, the Western rye established itself more promptly than the brome.

PASTURING TEST IN SEEDING DOWN, 1930

Yields from first hay crop obtained from the 1925, 1926 and 1927 seedings.

(Average of duplicate plots)

Designation	Seeding	Seeded with			
		No nurse crop	Oats to be pastured	Oats to be cut	Average
		lb.	lb.	lb.	lb.
Alfalfa	1925	2,452·5	2,102·0	2,049·5	2,201·3
Alfalfa	1926	3,098·0	2,153·0	978·0	2,076·3
Alfalfa	1927	1,659·0	1,169·0	1,932·0	1,586·7
Average		2,403·2	1,808·0	1,653·2	1,954·8
Alfalfa and Western rye grass	1925	2,713·0	1,794·0	2,308·0	2,271·7
Alfalfa and Western rye grass	1926	3,865·0	2,096·0	1,263·0	2,408·0
Alfalfa and Western rye grass	1927	2,062·0	1,800·0	2,250·0	2,037·3
Average		2,880·0	1,896·7	1,940·3	2,239·0
Western rye grass	1925	2,257·0	379·5	824·5	1,153·7
Western rye grass	1926	4,583·0	1,710·0	1,106·0	2,466·3
Western rye grass	1927	2,125·0	1,355·0	1,398·0	1,626·0
Average		2,988·3	1,148·2	1,109·5	1,748·7
Alfalfa and brome	1925	2,853·0	1,766·0	1,904·5	2,174·5
Alfalfa and brome	1926	3,254·0	1,785·0	1,400·0	2,146·3
Alfalfa and brome	1927	2,062·0	1,658·0	2,115·0	1,945·0
Average		2,723·0	1,736·3	1,806·5	2,088·6
Western rye grass and brome	1925	3,495·0	1,117·0	2,132·5	2,248·2
Western rye grass and brome	1926	4,626·0	1,258·0	1,011·0	2,298·3
Western rye grass and brome	1927	1,980·0	1,376·0	1,107·0	1,487·7
Average		3,367·0	1,250·3	1,416·8	2,011·4
Brome	1925	3,737·0	1,227·0	2,118·0	2,360·7
Brome	1926	4,584·0	1,066·0	999·0	2,216·3
Brome	1927	1,479·0	927·0	801·0	1,069·0
Average		3,266·7	1,073·3	1,306·0	1,882·0
Sweet clover and brome	1925	4,247·0	2,427·0	2,777·0	3,150·3
Sweet clover and brome	1926	4,207·0	1,078·0	889·0	2,058·0
Sweet clover and brome	1927	2,661·0	1,888·0	2,494·0	2,347·7
Average		3,705·0	1,797·7	2,053·3	2,518·7
Sweet clover and Western rye grass	1925	4,247·0	2,835·0	3,041·5	3,374·5
Sweet clover and Western rye grass	1926	4,649·0	1,233·0	1,264·0	2,382·0
Sweet clover and Western rye grass	1927	3,070·0	2,456·0	3,046·0	2,857·3
Average		3,988·7	2,174·7	2,450·5	2,871·3
Sweet clover	1925	3,998 0	2,838·5	3,342·5	3,393·0
Sweet clover	1926	4,540·0	1,729·0	989·0	2,419·3
Sweet clover	1927	3,660·0	2,533·0	3,571·0	3,254·7
Average		4,066·0	2,366·8	2,634·2	3,022·3
Grand average		3,265·3	1,694·7	1,818·9	2,259·6

PASTURING TEST IN SEEDING DOWN, 1930

Yields per acre from two hay crops of the 1925 seeding and three hay crops from the 1926 and 1927 seedings.

(Average of duplicate plots)

Designation	Seeding	Seeded with			Average
		No nurse crop	Oats to be pastured	Oats to be cut	
Alfalfa	1925	6,579·5	5,668·0	5,364·5	5,870·7
Alfalfa	1926	8,648·0	7,505·0	5,370·5	7,174·5
Alfalfa	1927	6,240·0	6,024·0	7,138·0	6,467·3
Grand average 8 cuttings	.....	2,683·4	2,399·6	2,234·1	2,439·0*
Alfalfa and Western rye grass	1925	7,197·0	5,443·0	5,873·0	6,171·0
Alfalfa and Western rye grass	1926	9,666·0	8,071·0	6,882·5	8,206·5
Alfalfa and Western rye grass	1927	7,292·0	7,428·0	7,843·0	7,521·0
Grand average 8 cuttings	.....	3,019·4	2,617·8	2,574·8	2,737·3*
Western rye grass	1925	3,902·0	2,858·5	3,046·5	3,269·0
Western rye grass	1926	9,619·0	5,866·0	4,691·5	6,725·5
Western rye grass	1927	4,739·0	4,134·0	3,034·0	3,969·0
Grand average 8 cuttings	.....	2,282·5	1,607·3	1,346·5	1,745·4*
Alfalfa and brome	1925	6,178·0	6,516·0	4,571·5	5,755·2
Alfalfa and brome	1926	9,063·5	8,649·0	5,032·0	7,581·5
Alfalfa and brome	1927	7,270·0	7,937·0	8,153·0	7,786·7
Grand average 8 cuttings	.....	2,813·9	2,887·8	2,219·6	2,640·4*
Western rye grass and brome	1925	6,981·0	4,906·0	4,820·5	5,569·2
Western rye grass and brome	1926	8,402·5	4,443·5	3,506·5	5,450·8
Western rye grass and brome	1927	5,256·0	5,076·0	4,001·0	4,777·7
Grand average 8 cuttings	.....	2,579·9	1,803·2	1,541·0	1,974·7*
Brome	1925	6,509·0	4,370·0	4,452·0	5,110·3
Brome	1926	7,837·0	3,459·0	3,707·5	5,001·2
Brome	1927	4,669·0	4,201·0	3,205·0	4,025·0
Grand average 8 cuttings	.....	2,376·9	1,503·8	1,420·6	1,767·1*
Sweet clover and brome	1925	7,352·0	6,239·0	5,078·0	6,223·0
Sweet clover and brome	1926	7,393·5	3,667·5	3,506·5	4,855·8
Sweet clover and brome	1927	6,366·0	5,407·0	5,460·0	5,744·3
Grand average 8 cuttings	.....	2,638·9	1,914·2	1,755·6	2,102·9*
Sweet clover and Western rye grass	1925	4,247·0	2,835·0	3,041·5	3,374·5
Sweet clover and Western rye grass	1926	9,547·0	4,584·0	5,031·0	6,387·3
Sweet clover and Western rye grass	1927	6,699·0	6,004·0	5,724·0	6,142·3
Grand average 8 cuttings	.....	2,561·6	1,677·9	1,724·6	1,988·0*
Grand average per acre per annum 8 kinds of crop, three seedings	.....	2,619·6	2,051·5	1,852·1	2,174·4*

*Grand average in this column obtained by averaging average yields in the three treatments.

THE DATE-OF-PLANTING SUPPLEMENT

Supplementary to the Pasturing Test in Seeding Down was a Date-of-Planting experiment in which the same lines of treatment were carried out, except that for this supplement the meadow seeding consisted of a 4-4-4-4 mixture, comprising four pounds each per acre of alfalfa, sweet clover, Western rye grass and brome. In 1925 three seedings were made and the plots were not replicated. In 1926 and 1927, duplicate seedings at four dates were allowed for. The first seeding was always sown about the middle of May, the day when the main pasturing test was seeded. The remaining seedings were made at approximately two-week intervals.

Various accidental factors entered into this supplementary test and few deductions are permissible. However, it may be said that the 4-4-4-4 mixture, devised only for experimental purposes and with no thought whatever of its being recommended for general use, gave a surprisingly good account of itself,

yielding satisfactorily even into the third cropping season. Sweet clover constituted a substantial proportion of the first hay crop, although the other constituents were much in evidence. The decay of the sweet-clover roots may have had a favourable effect upon the soil, thereby contributing to subsequent vigour of the other elements. The alfalfa constituted a considerable percentage of the second and third hay crops.

Not only did this meadow mixture produce well but its residual effect appeared to be favourable. The two-year-old sod of the 1925 seeding carried a particularly vigorous growth of corn in 1928.

Fairly consistent results were obtained from the first three seedings, which yelded substantially alike. Even the fourth seeding, made about the first week of July, succeeded in establishing itself successfully and produced a moderate yield. Where the land is not clean it is probably best to cultivate and let it lie a while to germinate the weed seeds rather than to seed early and force the crop to compete with the weeds.

DATE-OF-PLANTING SUPPLEMENT TO PASTURING TEST IN SEEDING DOWN, 1930

Yields per acre from two years' hay crop from the 1925 seeding and three years' crop from the 1926 and 1927 seedings of the 4-4-4-4 mixture.

(Average of duplicate plots.)

Designation	Seeding	Seeded with			Average
		No nurse crop	Oats to be pastured	Oats to be cut	
		lb.	lb.	lb.	lb.
First date	1925	8,305·5	7,304·0	8,116·5	7,908·7
First date	1926	9,822·5	6,811·5	4,477·0	7,037·0
First date	1927	6,349·0	5,958·0	7,059·0	6,455·3
Total	.....	24,477·0	20,073·5	19,652·5	21,401·0
Second date	1925	7,157·0	5,799·5	6,460·5	6,472·3
Second date	1926	11,589·5	6,775·0	5,124·0	7,829·5
Second date	1927	7,027·0	6,241·0	5,459·0	6,242·3
Total	.....	25,773·5	18,815·5	17,043·5	20,544·2
Third date	1925	7,905·0	7,976·5	6,990·0	7,623·8
Third date	1926	11,085·5	6,197·0	4,735·5	7,339·3
Third date	1927	6,957·0	5,689·0	5,393·0	6,013·0
Total	.....	25,947·5	19,862·5	17,118·5	20,976,2
Fourth date	1925	.....	.....	.....	.....
Fourth date	1926	10,010·5	6,310·5	6,123·0	7,481·3
Fourth date	1927	8,042·0	6,699·0	6,578·0	7,106·3
Total	.....	18,052·5	13,009·5	12,701·0	14,587·7

EPITOME

Tabulated data from three seedings and observations on five are available from a Pasturing Test in Seeding Down, comprehending nine meadow crops and combinations seeded regularly in four paddocks, one without a nurse crop, one with a nurse crop of oats to be cut, one with a nurse crop of oats to be pastured and one with a nurse crop of winter rye to be pastured. Incidental features were occasionally introduced and a date-of-planting supplement was annually seeded with a mixture of four pounds per acre each of alfalfa, sweet clover, Western rye grass and brome.

With the exception of 1929, when lashing winds beat out tender unprotected meadow plantlets, much the strongest "catches" were obtained by seeding

alone and pasturing until late August to keep annual weeds from seeding. This system furnished a little choice summer pasture and comparatively good crops of hay.

In twelve out of thirteen years' experience at Beaverlodge a nurse crop has proven to be more or less a strangle crop. In this experiment the hay from eight perennial crops or mixtures seeded without a nurse crop and pastured during the first summer averaged 41·4 per cent more than that obtained by seeding with oats to be cut, practically all the difference being made up in the first meadow year.

The oats used as a nurse crop turned off 5,544·7 pounds of oat bundles, secured at the expense of some summer pasture plus a little over a ton of meadow hay.

Seeding with a mixture of oats to be pastured during the initial season was not quite fairly tested but did not commend itself unless where a bulk of summer pasture was especially desired.

The winter-rye paddock produced the most pasture but this crop proved too restrictive for best results in meadow seeding. Sweet clover seeded with it completed its life cycle before the rye yielded it the ground.

Rape as a pastured nurse crop failed to recommend itself in the one season when tried.

Spring cultivation of year-old meadows tore out some plants and disturbed others. In consequence, while the cultivated areas were cleaner than uncultivated ones until haying, weeds subsequently encroached somewhat among the mutilated stands.

In the first cutting after seeding sweet clover averaged from all treatments 3,022·3 pounds hay per acre compared to 1,954·8 pounds from alfalfa, a difference of 55 per cent. In extensive previous trials, during which winter injury had been rather more severe, sweet clover outyielded alfalfa only 43 per cent.

Among the perennials the combination of alfalfa and Western rye grass averaged the highest yield from eight cuttings taken off three seedings. Alfalfa-plus-brome was nearly as good, and straight alfalfa third best, cutting nearly a ton and a quarter per acre per annum from all methods of seeding. The sweet-clover-grass combinations ranked next with around a ton per acre and the brome-rye-grass mixture next.

Of all the crops tried Western rye grass by itself averaged the lowest weight, viz., 1,745 pounds per acre, as compared to 1,767 from brome only. The inferior showing of Western rye was traced to the severe effect of grasshoppers on it in the 1925 seeding. After the grasshopper plague ended rye grass pulled up decidedly, averaging over eighteen per cent more than brome from the six cuttings taken off the next two years' seedings. Hoppers had been previously observed to be very hard on Western rye.

PASTURING TEST IN SEEDING DOWN, 1930

Presenting 1928, 1929 and 1930 results in pounds of hay per acre from the average of duplicate plots under each treatment in the 1927 seeding

Designation	Year	Seeded with				Average 3 preparations (except winter rye)
		Winter rye to be pastured	No nurse crop	Oats to be pastured	Oats to be cut	
		lb.	lb.	lb.	lb.	lb.
Alfalfa	1928	1,257·0	1,659·0	1,169·0	1,932·0	1,587·0
Alfalfa	1929	1,629·0	1,387·0	1,394·0	1,507·0	1,429·0
Alfalfa	1930	3,354·0	3,194·0	3,461·0	3,699·0	3,451·0
Total 3 years	.....	6,240·0	6,240·0	6,024·0	7,138·0	6,467·0
Alfalfa and Western rye grass	1928	1,725·0	2,062·0	1,800·0	2,250·0	2,037·0
Alfalfa and Western rye grass	1929	1,760·0	1,985·0	1,684·0	1,845·0	1,838·0
Alfalfa and Western rye grass	1930	3,714·0	3,245·0	3,944·0	3,748·0	3,646·0
Total 3 years	.....	7,199·0	7,292·0	7,428·0	7,843·0	7,521·0
Western rye grass	1928	1,493·0	2,125·0	1,355·0	1,398·0	1,626·0
Western rye grass	1929	915·0	1,409·0	1,251·0	551·0	1,070·0
Western rye grass	1930	1,565·0	1,205·0	1,528·0	1,035·0	1,273·0
Total 3 years	.....	3,973·0	4,739·0	4,134·0	3,034·0	3,969·0
Alfalfa and brome	1928	1,640·0	2,062·0	1,658·0	2,115·0	1,945·0
Alfalfa and brome	1929	1,578·0	1,852·0	1,877·0	2,084·0	1,938·0
Alfalfa and brome	1930	3,796·0	3,356·0	4,402·0	3,954·0	3,904·0
Total 3 years	.....	7,014·0	7,270·0	7,937·0	8,153·0	7,787·0
Western rye grass and brome	1928	1,183·0	1,980·0	1,376·0	1,107·0	1,488·0
Western rye grass and brome	1929	1,046·0	1,423·0	1,448·0	1,251·0	1,374·0
Western rye grass and brome	1930	2,008·0	1,853·0	2,252·0	1,643·0	1,916·0
Total 3 years	.....	4,237·0	5,256·0	5,076·0	4,001·0	4,778·0
Brome	1928	1,102·0	1,479·0	927·0	801·0	1,069·0
Brome	1929	1,266·0	1,503·0	1,423·0	984·0	1,305·0
Brome	1930	2,166·0	1,682·0	1,851·0	1,420·0	1,651·0
Total 3 years	.....	4,534·0	4,669·0	4,201·0	3,205·0	4,025·0
Sweet clover and brome	1928	2,044·0	2,661·0	1,888·0	2,494·0	2,348·0
Sweet clover and brome	1929	1,298·0	1,815·0	1,522·0	1,169·0	1,502·0
Sweet clover and brome	1930	1,937·0	1,890·0	1,997·0	1,797·0	1,895·0
Total 3 years	.....	5,279·0	6,366·0	5,407·0	5,460·0	5,744·0
Sweet clover and Western rye grass	1928	2,470·0	3,070·0	2,456·0	3,046·0	2,857·0
Sweet clover and Western rye grass	1929	1,328·0	2,017·0	1,686·0	1,113·0	1,605·0
Sweet clover and Western rye grass	1930	2,015·0	1,612·0	1,862·0	1,565·0	1,680·0
Total 3 years	.....	5,813·0	6,699·0	6,004·0	5,724·0	6,142·0
Sweet clover	1928	2,199·0	3,660·0	2,533·0	3,571·0	3,255·0
Sweet clover	1929	.....	.....	.....	.....	.....
Sweet clover	1930	.....	.....	.....	.....	.....
Total 3 years	.....	.....	.....	.....	.....	.....
Average 8 kinds of crop (excluding sweet clover)	.....	5,536·1	6,066·4	5·776·4	5,569·8	5,804·1
Average 9 kinds of crop	.....	5,165·3	5,799·0	5,416·0	5,347·7	5,520·9

NOTES

1. Seeded May 31 on spring-ploughed land after a heavy mixed crop of oats and winter rye. After being ploughed, the land was harrowed, floated and again harrowed the day previous to seeding.
2. The plan was the same as that followed in the 1926 seeding except that the rape block was omitted.
3. The seed used was the Superintendent's home-grown stock of Western rye grass. The brome and legume seeds were obtained through Ottawa in 1927.
4. Delay in fencing the necessary paddocks considerably upset the test. Grazing of the winter-rye paddock did not commence until August 8 and grazing of the non-nurse-crop paddock not until August 15.

LEGUMES AND GRASSES

ALFALFA VARIETY TESTS

The six seedings of alfalfa variety tests under way at present afford extensive opportunity to study the value of this crop. Soil conditions vary greatly, with but little effect on the crop save as they affect the moisture supply. Stands are easily established since the experimental areas have become inoculated. Winter-killing is slight where judicious cropping methods are practised. One cutting per season is taken, designedly when the bloom is ten per cent out. Grass and weeds present some difficulty, though less where only one cutting per annum is made. Stands of Yellow-flowered Siberian appear to be the least able to resist invasion, although this variety has been advocated as especially hardy. In moist seasons it has compared very favourably with others in yield. In drouth seasons it has yielded very poorly. Two strains of Grimm seeded in 1923 have averaged a ton and a half of hay per annum during the past six years. Well-established stands of several varieties yielded from two to three tons of cured hay per acre in 1930, depending upon contour and moisture supplies. The heavy precipitation in the latter part of 1929 left a large reserve of soil moisture and this supplemented the normal rainfall of the spring of 1930, producing the heavy crop. July was dry and by the middle of August the reserve was exhausted. Little growth took place after that date.

The 1929 seeding suffered from a cutworm attack in the spring of 1930. Stands were thinned somewhat and plants weakened so that little crop was expected. After a favourable recovery yields of approximately a ton per acre were taken on July 7 and 8.

The aftermath of Sets 1 and 2, situated on a slope which catches the wash and seepage from a willow-enclosed depression, grew very patchy both as regards colour and abundance of top growth. Subsurface soil structure and mineral content were not investigated but it is surmised that a comprehensive study of the area would explain the growth irregularities.

The cattle were not allowed on the latter after August nor on the rye paddock after September 8. Altogether the rye paddock was grazed to the extent of 1 head for 34 nights; the non-nurse-crop paddock to the extent of 1 head for 24 nights. As each paddock comprised about 100 square rods (allowing a deduction for inferior production of the late seedings in the conjoined date-of-planting supplementary test grazed with it) these results figure out equivalent to about 27 full 24-hour days grazing per head per acre for the rye paddock and 19·2 days per head per acre for the non-nurse-crop paddock. These two paddocks were run over with the mower on August 22 to clip weeds and stems of rye.

5. The oats-to-be-pastured were too far advanced by the time the fence was completed and were simply mown and raked up. They were cut August 22 but lay until September 17 before being raked and weighed. An area of half an acre yielded 2,345 pounds of oat hay, or at the rate of 4,690 pounds per acre, after some waste. The oats-to-pasture paddock was thus really an oat-hay paddock this time.

6. The block drilled with oats-to-be-harvested was bound on September 10. Including the first-date seedings of the adjacent supplement, an area 63 by 222·5 feet, amounting to 0·32 acre, yielded 2,020 pounds as stacked, or 6,312 pounds per acre.

7. Good stands of meadow plants were obtained throughout the several blocks but there was some volunteer winter rye and it was feared that some weeds might have seeded through lack of sufficiently close early grazing.

8. In 1928 the plots of sweet clover only were cut on July 13; the remaining plots on July 23 and 24. Yields were rather low and the paddock seeded without nurse crop averaged only a little more hay than the block seeded with oats to be cut. Scrutiny of the table suggests that in this case the legumes did better where competing with a nurse crop but protected by its stubble than they did where eaten off closely and trampled by live stock. The straight grass plots, as usual, produced much their best yields from the non-nurse-crop paddocks. In other words, while the inclusion of a legume was in both an advantage it produced this time the greater relative increases in the oats-to-cut paddock.

9. In 1929 the alfalfa, alfalfa-and-Western-rye grass, and alfalfa-and-brome plots were cut on July 4. The remainder were cut on July 16. Yields from half a ton to a ton were obtained, those plots containing legumes yielding more than the straight grass plots. Brome tended to be predominant in mixtures with Western rye grass.

10. Taking the average of three preparations the 1930 yield of the plots of the 1927 seeding in which alfalfa occurred more than doubled the yield of the plots consisting entirely of grass. Brome outyielded Western rye grass where both were grown alone, and likewise where they occurred in mixtures with legumes. The alfalfa plots were cut on July 8, the alfalfa and Western rye grass plots on July 9, and the remainder on July 10. The east plot of alfalfa sown with winter rye to be pastured contained 5 per cent brome. In the same set alfalfa sown with oats to be cut contained 10 per cent timothy.

ALFALFA FOR SEED PRODUCTION

Two rows of Grimm alfalfa seeded in 1923 have borne a nice crop of seed in three of the six years they have been harvested for seed. Four rows seeded in 1926 beside the 1923 seeding have produced two satisfactory crops of seed. In 1929 and 1930 satisfactory sets were secured but unfavourable weather in August and September was not favourable for maturity and only light crops were taken.

The 1923 rows yielded 8·9 pounds of seed per acre which graded No. 2 at the Dominion Seed Branch, Calgary. The germination was 91 per cent. This test draws from 0·28 acre.

The four rows of the 1926 seeding threshed 19 pounds of seed from 0·61 acre. This is at the rate of 31·1 pounds per acre. The seed germinated 85 per cent and graded No. 2.

The half-acre area which had been broadcast in 1923 has become so grassy that only a very light crop of seed can now be obtained. In this plot the alfalfa has been completely displaced in places by stands of Western rye grass or brome grass. The invasion is progressive as the grasses ripen and shed their seed before the alfalfa is ready to cut. The 1930 crop amounted to 6 pounds per acre of No. 3 seed, which germinated 85 per cent.

The 1929 seeding of eleven varieties or strains in rows for seed production survived the winter although the test is situated on a very exposed knoll. A cutworm attack in June weakened the stand considerably but a favourable recovery was effected. A light set of seed resulted and most of what was formed failed to ripen. Every opportunity was given the crop to ripen. Following its exposure to a snow-blanket for several days, during which time some shattering undoubtedly took place, plans were laid for harvesting the crop to secure any seed that may have ripened. Another storm intervened before this was accomplished.

VARIETY TEST SWEET CLOVER

The seven varieties of biennial sweet clover sown in quadruplicate on June 10, 1929, produced a satisfactory stand in the year of seeding and in the spring of 1930 gave every indication that they would make fully an average crop of hay. Unfortunately a serious cutworm outbreak practically denuded the stand and for some time it was feared that the test was a complete failure. Partial recovery was effected. When the plots were cut on July 17 stands were complete but maturity uneven. Varietal evaluations are denied. Yields averaged from one to two tons of cured hay per acre.

VARIETY TESTS WITH ALSIKE, WHITE AND RED CLOVERS

The moisture reserve carried over from the previous year together with the normal rainfall falling in the spring of 1930 produced a crop of white and alsike clovers that could be mown. The alsike plot of the 1927 seeding yielded in 1930, 3,933 pounds per acre and the white clovers averaged half a ton to a ton and a quarter. From the one cutting obtainable during the three years this stand has been down, the Wild English strain has yielded only 1,159 pounds from the average of duplicate plots. The Commercial stock was best of all, producing 2,979 pounds in three years.

The 1930 yields of the 1928 seeding averaged from three-quarters to better than a ton of cured hay per acre. The two Danish strains, Stryno and Morso, outyielded the rest considerably. Alsike averaged 3,854 pounds besides having produced three-quarters of a ton in 1929, whereas the white clovers in this seeding were then not tall enough to cut.

The 1927 seeding of the red clovers yielded from two to three tons per acre. Altaswede averaged 6,519. The Late Swedish plots of the 1928 seeding averaged 4,352 pounds of cured hay per acre.

All the clover stands of the 1929 seeding were nearly complete but weak when first observed in the spring of 1930. Following this, the plants in irregular-shaped patches disappeared. Later on cutworms were found riddling the stands. By July 1 the area was bare except for the merest trace of growth in the Wild-English-White-clover plots. Partial recovery was effected later in the summer but satisfactory yield data could not be secured. The field notes taken during the season do not show any specific cause of the erratic behaviour. It is thought that some winter-killing took place, associated, probably, with disease. The spring appearance of these plots was conspicuously poorer than that of older stands. The 1929 seeding had been made June 11, on a loose, deep, black loam. These conditions undoubtedly attracted the cutworm moth, and the looseness of the soil may also have conduced to winter injury, though this is conjectural.

RESULTS OF VARIETY TEST WITH WHITE AND ALSIKE CLOVERS, 1930

Pounds of cured hay per acre from the 1928, 1929 and 1930 crops of the 1927 seeding.

(Average of duplicate plots)

Variety	Per cent stand	Yield cured hay per acre			
		1928	1929	1930	Total
		lb.	lb.	lb.	lb.
White Dutch (Commercial)	93	470	Nil	2,509	2,979
Mammoth White Dutch	85	345	Nil	1,832	2,177
Wild English White Dutch	(say 45	Nil	Nil	1,159	1,159
White Dutch (Ladino)	(say)40	Nil	Nil	1,756	1,756
White Dutch (Stryno)	85	418	Nil	1,442	1,860
White Dutch (Morso)	88	153	Nil	2,172	2,325
*Alsike	(say) 80	2,001	346	3,933	6,280

* 1 plot only.

NOTE

1. The test was cut on July 17 in 1930.

RESULTS OF VARIETY TEST WITH RED CLOVERS, 1930

Yields in pounds of cured hay per acre from the 1928, 1929 and 1930 crops of the 1927 seeding.

(Average of duplicate plots)

Variety	Yield of cured hay per acre			
	1928	1929	1930	Total
	lb.	lb.	lb.	lb.
Early Swedish	3,916	2,631	4,740	11,287
Medium Swedish	5,057	5,023	5,217	15,297
Late Swedish	5,081	4,778	4,991	14,850
Red (Oxdrift)	5,046	4,958	5,673	15,677
Red (St. Clet)	3,322	2,329	5,283	10,934
Altaswede	5,161	3,994	6,519	15,674

NOTES

1. Seeded in duplicate June 9, 1927, on an area (rear of Course 1) where the previous season's seeding of these clovers had killed out completely. Good catches were obtained and they wintered well.
2. In 1928 they grew nicely and yielded well. Through pressure of work the early clovers were not cut until July 21, when the late ones were ready; some of the early kinds then had 50 to 90 per cent of seed set.
3. Stands still intact in 1929.
4. The test was cut on July 17 in 1930. The extra moisture supply available for the crop resulted in yields from 4,740 to 6,519 pounds per acre.

KINDS AND VARIETIES OF GRASSES

Brome again outyielded Western rye grass in the 1930 crop of the 1927 seeding, but the total yields of these two grasses in the three years since seeding places the Western rye slightly in the lead. In this period both grasses have averaged a little less than a ton and a half of cured hay per annum as compared with an average of 1,806 pounds for the three strains of timothy and 820 pounds for orchard grass. The 1929 yields of the timothy strains were lower than those obtained from the initial crop and the 1930 yields still lower. In 1928 the Boon strain plots averaged 2,594 pounds; in 1929, 1,835 pounds, and only 1,328 pounds of cured hay in 1930. This decline accords with results from former seedings.

On a favourable location for the test the four timothy plots of the 1929 seeding averaged 3,648 pounds per acre, followed by meadow fescue at 3,563 pounds. Brome with 3,389 pounds outyielded Western rye grass at 2,930 pounds per acre.

Where not unduly exposed to drying agencies there was sufficient moisture in 1930 to produce a satisfactory hay crop of even the most exacting grasses. But where moisture was less abundant there was a tendency to emphasize moisture requirements. Western rye and brome grass are the most consistent-yielding grasses included in the grass seedings.

VARIETY TEST OF MILLETS

Five varieties of millets were tested again in 1930, with the usual results. Triplicate plots of each variety were sown on May 19 on land cropped to corn and multiplication plots of cereals in 1929 and roots in 1928. The seed was broadcast from the grass-seeder attachment of a 14-run drill set as to sow 14 pounds of alfalfa per acre. The soil was well mulched but was becoming dry on top. There was plenty of moisture below the surface. Soaking rains totalling 2·5 inches fell on May 24-26. Germination was even and prompt but subsequent growth slow due to the cool season. When cut with the mower on September 12, yields ranged from 3,061 pounds of cured hay per acre for Hog to 4,401 pounds for the Common variety. Common and Siberian were the choice of the varieties under test in 1930.

FIELD ROOTS

MANGELS.—Six varieties of mangels were tested in 1930. Seeding was accomplished on May 7. The cold weather afterwards delayed germination and it was not until June 11-13 that the stands were judged 50 per cent complete. Wind, together with injuries from flea beetles, caused gaps in the stands and thinning was unnecessary. Spraying with arsenate of lead gave satisfactory results. The two varieties Royal Giant and Giant Yellow Globe had the most complete stands during the season. Each variety showed some bolts by harvest time. Royal Giant yielded 22,781 pounds of roots, with 2,149 pounds of dry matter per acre. Giant Yellow Globe yielded 21,536 pounds of roots per acre. With a dry matter of 18·4 per cent, Danish Improved yielded 1,654 pounds of solids although the weight of roots was only 9,010 pounds per acre.

The mangels were pulled September 30.

SUGAR BEETS.—Three sugar beets were seeded in quadruplicate on May 7 and emerged June 10-11. Thinning was not necessary as the stands suffered greatly in the windstorm on June 13. Arsenate of lead was dusted on the plants twice during the season. The plots were hand-hoed three times. Fredericksen had largest percentage of bolts with 1·5 per cent. The yield of roots per acre for the two varieties, Dippe, and Rabbethge & Giesecke, was 9,449 pounds,

but the last-named variety had the higher percentage of dry matter. Highest yield was obtained from the variety Fredericksen with 11,867 pounds of roots per acre. The roots were of medium size when pulled September 30.

SWEDES AND TURNIPS.—The first seeding of swedes and turnips was made May 7. The plants emerged by June 6, but reseeding was necessary as a result of the activities of the turnip flea beetles (*Phyllotreta vittata*). The second seeding emerged June 30. Thinning to a foot apart was done three weeks afterwards. Twice during the summer the plants were sprayed with arsenate of lead to prevent destruction by the turnip beetles. The treatment was effective and a satisfactory crop was obtained, considering the late date of seeding. The yield of Purple Top Mammoth turnip was 28,971 pounds of roots per acre. The swedes had lower yields of roots per acre but a higher percent of solids with a yield of 2,827 pounds dry matter per acre. The roots were pulled October 24.

CARROTS.—The three varieties of carrots were planted May 6 and emerged June 6-10. The stands were thinned out the first of July to 3-4 inches apart. Every variety showed an appreciable number of bolts. Improved Short White had the highest yield of green weight per acre with 15,163 pounds of roots and 1,459 pounds of dry matter per acre. Danish Champion gave the lowest yield of green weight, 13,405 pounds per acre, but the highest per cent dry matter with 11·4 per cent. This variety yielded 1,525 pounds of dry matter per acre. The carrots were harvested October 23.

FIELD CABBAGE.—An introductory seeding of field cabbage was made. Seeding in the open and in the hotbed was tried.

The Giant Drumhead variety was sown in the open on May 7 in drills with the Planet Junior seeder. Emergence took place by June 12-14. The plants were thinned July 23 to three feet apart each way. This left thirty plants per plot.

Rather delicate plants were transplanted from the hotbed July 18 by means of the mud treatment, using a mixture of cow manure and soil held together with water. Two thirds of an inch of rain fell July 23; this helped them to get a good start. At harvest time, October 25, the plants sown in the open showed 2·3 per cent of heads, but those transplanted failed to head up. The former gave best results and yielded over 11 tons of green weight per acre.

Providing this crop can secure a satisfactory start it promises to warrant further attention.

RESULTS OF VARIETY TEST, FIELD ROOTS, 1930

(Average of quadruplicate plots)

Mangels

Variety	Date of emergence	Per cent of normal stand	Per cent of bolts	Yield per acre		Per cent dry matter
				Green weight	Absolute dry matter	
				lb.	lb.	
Golden-Fleshed Tankard (Steele Briggs)	June 13·0	52·5	0·8	18,972	1,752	9·2
Yellow intermediate (C.E.F.)	" 11·3	60·0	0·5	18,313	2,171	11·9
Danish Improved (D. & F.)	" 12·0	61·3	2·0	9,010	1,654	18·4
Prize Mammoth Long Red (Steele Briggs)	" 11·0	61·3	0·8	17,580	1,837	10·5
Royal Giant Sugar Beet (Steele Briggs)	" 11·0	76·3	1·8	22,781	2,149	9·4
Giant Yellow Globe (Steele Briggs)	" 11·0	75·0	0·5	21,536	2,145	10·0
Average	.....	.....	.....	18,032	1,951	10·8

RESULTS OF VARIETY TEST, FIELD ROOTS, 1930—*Concluded*

(*Average of quadruplicate plots*)

Sugar Beets

Dippe	June 10·5	62·5	0·3	9,449	1,674	17·7
Rabbethge and Giesecke	" 10·8	45·0	0·5	9,449	1,771	18·7
Fredericksen	" 10·8	75·0	1·5	11,867	2,319	19·5
Average				10,255	1,921	18·7

Swedes

Bangholm (Kentville)	June 30·0	100·0	Nil	23,037	2,827	12·3
Average				23,037	2,827	12·3

Turnips

Purple Top Mammoth (Steele Briggs)	June 29·0	100·0	15·0	28,971	2,543	8·8
Average				28,971	2,543	8·8

Carrots

Improved Short White (Steele Briggs)	June 9·0	93·8	0·8	15,163	1,459	9·6
Improved Intermediate White (Ewing)	" 10·0	96·3	0·8	13·991	1,482	10·6
Danish Champion (C.E.F.)	" 6·0	96·3	0·8	13,405	1,525	11·4
Average				14,186	1,489	10·5

Field Cabbage

(Average of sextuplicate plots)

Giant Drumhead (Sutton) Open	June 12·7	87·5	2·3	22,634	3,513	15·5
Giant Drumhead (Sutton) Hotbed		74·2	0·3	13,405	2,039	15·2
Average				18,020	2,776	15·4

DRY-MATTER YIELDS OF VARIOUS ANNUAL FORAGE CROPS

Since 1926 a comparison of the dry-matter yields produced by various annual forage crops has been made. Until the present season data on barley, wheat, legumes and oat-legume mixtures have been available but the completion of several projects has now limited the comparisons. The restricted list includes oats, millet and intertilled crops. The crops considered in 1930 were grown on fall-ploughing after cereals, summer-fallow or on breaking after alfalfa in rows for hog pasture.

The only source of dry-matter yields for Banner oats in 1930 were the two-full-rate nurse-crop seedings of the Method-of-Seeding test. These plots were cut late in the season after a period of wet and windy weather. It is possible that some of the yield was lost, hence the relatively poor showing for oats this year.

Rape and kale outyielded oats in dry matter by 16·5 per cent.

Sunflowers catapulated to top place with 5,054 pounds of dry matter per acre as compared with oats at 4,142 pounds. The green weight of the sunflowers was about the same as in 1924 but their dry matter percentage was higher.

Swedes yielded only 2,827 pounds of dry matter due principally to the activities of various kinds of insect pests. Reseeding was necessary.

Carrots retained the unenviable position which they have held since 1926.

A comparison of feeding values would rate these crops differently. Dry-matter yields are but one measure of value.

DRY-MATTER PRODUCTION OF VARIOUS CROPS

Kind	Preparation for 1930 crop	Number of plots involved	Yield dry matter, 1930	Per cent compared with oats as 100				
				1930	1929	1928	1927	1926
			lb.					
Sunflowers	Breaking after alfalfa	10	5,054	122·0	37·9	51·9	63·0	76·3
Rape and kale	" "	32	4,827	116·5	238·0	143·3	51·0	58·9
Banner oats	Summer-fallow	24	4,142	100·0	100·0	100·0	100·0	100·0
Millet	Fall ploughing after cereal	15	3,379	81·6	64·0	46·0	38·0	56·3
Swedes	Breaking after alfalfa	4	2,827	68·3	157·4	73·8	60·0	43·0
Turnips	" "	4	2,543	61·4	64·0	64·0	60·0	43·0
Corn	" "	44	2,195	53·0	14·1	32·3	11·0	21·9
Mangels	" "	24	1,951	47·1	57·3	78·5	25·0	21·1
Sugar beets	" "	12	1,921	46·4	73·3	57·0	16·0	25·7
Carrots	" "	12	1,489	35·9	43·5	38·3	21·0	7·3

SOIL BACTERIOLOGY

RELATIVE EFFECTS OF INOCULATING ALFALFA SEED AT VARYING INTERVALS IN ADVANCE OF SEEDING

Upon the suggestion of the Dominion Bacteriologist a simple experiment was undertaken in 1928 to compare the effect of inoculating alfalfa seed at various intervals in advance of seeding. The soil-glue method of inoculation was employed, and, after being treated, the samples of moistened, earth-coated seed were held in a room where a moderate temperature prevailed.

The plots inoculated a week in advace of sowing exhibited conspicuously the tallest and heaviest crop as well as the most abundant bloom and the deepest green colour. The plots inoculated two weeks in advance of sowing were not quite so good as those inoculated twenty-four hours in advance. In every set decidedly the poorest of all the inoculated plots were those where the seed was inoculated immediately before sowing. In fact they yielded a little less than the uninoculated.

Similar yield data were obtained from the same stands in 1930, although there were no pronounced variations in appearance. The plots inoculated a week in advance of sowing increased their spread in yield and those inoculated immediately before sowing outyielded the checks.

Considering the total crop obtained during the two years the plots inoculated a week in advance yielded 27·31 per cent more than the checks, those inoculated two weeks before 17·11 per cent more, those inoculated 24 hours in advance 16·29 per cent more and the plots inoculated immediately before seeding 2·78 more than the checks.

The advantage of inoculation has been positive in all cases when the results for the two years are considered. It is possible that where the seed had been inoculated immediately before seeding the inoculation was not sufficiently effective to influence the first crop but multiplied enough to benefit materially the second year's crop.

ECONOMIC FIBRE PRODUCTION

Further data were secured in 1930 regarding the possibilities of fibre production in the Peace River district. A rate-of-seeding test with hemp was broadcast May 8 in duplicate plots on land cropped to potatoes in 1929. The seed was sown at 50, 60 and 70 pounds per acre. Germination was satisfactory but the crop made very slow growth due to cool, windy weather the forepart of the season and the light precipitation in July. A short crop ranging about five feet, was cut with the mower on November 1 and left on the stubble to ret during the winter. There was no appreciable effect shown by the different rates of seeding.

FIBRE FLAX

Duplicate seedings of J. W. S. fibre flax were made May 20. A combined test for seed and fibre production was sown immediately south of the hemp on the same preparation. Rates of seeding were 84, 98 and 112 pounds per acre. Adjoining this test and extending across land cropped to swedes in 1929 a test using one and two bushels of seed per acre was sown for seed production only. Both tests were drilled since in former years broadcast stands germinated irregularly depending on the seeds reaching the moisture. Germination was prompt and complete in 1930.

Results obtained to date indicate that in a normal season the rainfall is scarcely sufficient to produce a heavy yield of fibre. The crop in 1930 attained a height of from 25 to 27 inches in fairly thin stands. A serious objection regarding the seed-production possibilities is the very great tendency for the J. W. S. variety to shatter seed when ripe. The bolls open at maturity and a light breeze is sufficient to scatter the seed.

The threshed grain was roughly cleaned at the Station and sent to the Economic Fibre Production Division of the Central Experimental Farm, where it was cleaned to suit the requirements of the seed trade.

J. W. S. seeded at one bushel per acre for seed production yielded 264·5 pounds of No. 1 seed per acre and 19 pounds of No. 2 seed. The two-bushel seeding yielded 280·5 pounds of No. 1 and 18 pounds of No. 2 seed. In the combined seed and fibre test yields were greater. Duplicate plots averaged 499·5, 492·0 and 487·5 pounds of seed per acre when sown at 84, 98, and 112 pounds per acre, respectively.

The flax plots were cut or pulled on September 12 following a period of very windy weather. Shattering was excessive and it was difficult to decide when the crop should be harvested to obtain the maximum yield.

HORTICULTURE

From a horticultural point of view the season of 1930 was disappointing. A few of the salient features were cold, wind and rain until the end of June; a severe drouth during July, August and early September; an unusually severe and early fall frost; a plague of cutworms and of half-a-dozen species of leaf-beetles and flea-beetles. Moreover a change in staff of the horticultural department resulted in a somewhat different concentration of interest.

VEGETABLES

Economy forbidding the publication of a complete annual review of all phases of the work, it becomes necessary to curtail one section or another each year. This time the vegetable section is most extensively reduced, only a few notes of special significance being presented.

A notable effect of the season was its tendency to induce bolting. Many vegetables that are normally biennials showed an unusually high percentage of bolted flower stalks in their first year. This, according to T. F. Ritchie, Assistant in Vegetable Gardening, Central Experimental Farm, was probably due to the early check in growth brought about by the weather conditions. The more particular examples of premature bolting were found in beets, rhubarb and cauliflower, though carrots and even parsnips showed some.

DATE OF PLANTING VEGETABLES

Again a project was carried on to investigate the time for sowing of the different kinds of vegetables. It will be realized that no one date will prove so decisively superior that one can say "This is the time to sow" this or that vegetable. It was hoped, however, by repetition over a period of years to obtain an indication of the approximate dates when the different types of vegetables should be sown.

Thirteen vegetables were sown 1930 in duplicate plots each week for eight weeks, starting April 16 and ending June 4.

As a general survey of the records of the past few years the following observations would seem to be justified under average conditions:—

1. It does not pay to rush the garden seeding too early in the spring. The very early seedings are inclined to be erratic in their results.

2. The end of April or the first part of May seems to be early enough for most of the commoner, hardier vegetables, as onions, radish, lettuce, peas, beets, carrots, parsnips, and cabbage, while as a rule good results can be obtained with seeding as late as May 24. Parsnips will stand pretty early seeding and the first pickings of peas, though not necessarily the largest yields, are generally obtained from quite early sowings. The second week of May appears to be a good average season to sow corn, beans, pumpkins, squash and cauliflower. If sown too early the stand and vigour of the plants appear to suffer. If left too late they do not have time to mature their produce.

DATE OF PLANTING OF VEGETABLES—RESULTS IN 1930

Kind of vegetable	First date April 16	Second Date April 23	Third date April 30	Fourth date May 7	Fifth date May 14	Sixth date May 21	*Seventh date May 30	Eighth date June 4
Onion	Located in a draw and badly flooded hence no test.							
Parsnip	51	86	100	33	76	65	65	45
Carrot	71	100	81	90	84	66	41	51
Cauliflower	No heads produced.		Only 1 set yielded	No heads	.....	Only 1 set yielded	No heads	Only 1 set yielded
Cabbage	42	65	100	15	58	99	84	21
Squash	83	64	54	8	100	79	33	31
Pumpkin	88	76	21	70	100	70†	89	49
Beets	86	92	100	83	86	98	100	67
Beans	12	71	100	80	87	55	95	73
Corn	58	71	100	83	53	98	68	None matured
Peas	74	100	84	90	85	74	74	71
Radish	Badly flooded—stands very irregular and patchy.							
Lettuce	100	100	100	100	100	100	95	95

This table gives the percentage comparison of yields based on 100 for the highest yield for each kind of vegetable. Thus 1st date parsnip yielded 51 per cent of third date parsnips.

* This plot should have been seeded May 28 but excessive rains kept the soil too damp for planting until May 30.

† One plot only. Duplicate plot was destroyed.

FRUIT

CURRANTS

Currants again demonstrated their adaptability and productivity. Light frosts on the mornings of May 18, 19 and 21 may possibly have injured the blooms somewhat. However, the yields were satisfactory. Though the reds in

the old plantation were somewhat below the previous thirteen-year average the blacks and whites were mostly well up. The younger plantings of 1927 and 1928 all gave greatly increased yields, having made an excellent, thrifty growth.

Aphids, though appearing quite early, were easily controlled until near the end of the fruiting season by spraying with Black Leaf 40. A test was conducted in which the determination of the efficacy of a single dormant spray in destroying the winter eggs was the object. On March 17, when the covering of snow over the bushes ranged from two to twenty-five per cent, and when the official thermometer registered 40° Fah. a spray of an English ovicide, Carbocraven, was applied to a long row of currant bushes in the east garden. On May 6 one half of this row was sprayed again. On the whole no difference could be noted in aphis attack, the one spray apparently being as successful as two applications in effecting control. Possibly the second was too late to be effective as an egg destroyer. Later in the season aphids appeared on both portions of the row.

An unfortunate mishap occurred, when, in zealous endeavour to control tent caterpillars, the currant and gooseberry bushes were sprayed with arsenate of lead. The control was almost perfect but unfortunately a change to dry weather left the fruit covered with a heavy coating of the poison dust. As the fruit was barely formed at the time of the spraying it should normally have been washed clean by rains long before it was ready for use. However, the long period of drouth resulted in the adhesion of the coating of poison and in a considerable amount of otherwise unnecessary labour in preparing the fruit for consumption. As yet no deaths have been reported from among the consumers.

RED CURRANTS (1916 PLANTING), 1930

Fourteen years' crops. Average yield per bush in pounds

Year	New Red Dutch*	Cumberland Red* 0-492	Victoria Red*	Fay† Prolific	Wilder Red*
	lb.	lb.	lb.	lb.	lb.
Aggregate 1917–1919	5·08	6·50	4·58	0·04	0·00
1920	7·00	4·83	6·17	0·30	0·00
1921	12·04	9·21	10·46	2·64	0·58
1922	9·42	4·88	5·31	1·79	0·15
1923	4·22	1·43	1·25	0·43	0·20
1924	15·60	12·78	15·60	5·07	6·77
1925	8·65	6·20	5·90	2·82	3·40
1926	6·67	8·44	12·34	4·17	7·67
1927	11·82	7·89	9·14	2·02	6·05
1928	9·58	7·18	8·00	3·86	2·92
1929	14·78	11·43	14·56	5·26	5·35
1930	10·89	6·11	7·96	1·40	2·61
Average—14 years	8·27	6·21	7·23	2·13	2·55

* Average of 6 bushes. †Average of 5 bushes.

Of the above varieties Wilder Red is a large-fruited sort of good quality, while Fay Prolific is a medium-to-large sort. Both, however, lack somewhat in hardiness, from which cause their average yields are depressed. The New Red Dutch, Cumberland Red and Victoria Red are high yielders of good-quality, medium-sized fruit, Victoria Red having the largest fruit of the three, while New Red Dutch has been the heaviest yielder, partly perhaps from accident of location.

WHITE AND BLACK CURRANTS—(1916 PLANTING), 1930

Fourteen years' crops. Average yields per bush in pounds

Year	Large White 0-551*	White Cherry 0-556†	Collins Prolific 0-565*	Topsy Black 0-568*
	lb.	lb.	lb.	lb.
Aggregate 1917-1919	1·29	0·73	2·38	3·07
1920	0·17	0·83	4·33	6·33
1921	0·88	2·08	5·57	6·22
1922	1·63	1·50	0·29	1·24
1923	not rec'd	not rec'd	0·70	2·00
1924	11·05	12·19	0·95	0·95
1925	4·74	2·95	3·30	3·85
1926	7·81	15·75	1·33	1·71
1927	6·28	0·08	3·18	1·43
1928	4·74	5·89	2·38	2·45
1929	7·14	10·06	6·82	8·15
1930	6·15	2·96	8·45	7·61
Average 13 years	3·99	4·92	.....	.....
Average 14 years	.....	.....	2·83	3·22

*Average of 6 bushes.
†Average of 5 bushes. Since two bushes of this variety flank a gap where a bush had failed it is possible that the method of computation confers on this sort a slight unfair advantage.

Both of the above white and black varieties are excellent sorts, though of the blacks Topsy is possibly preferable to Collins Prolific, having a somewhat thinner skin and less astringent flavour.

BLACK AND WHITE CURRANTS—1927 PLANTING—1930

Average yield in pounds per bush from three bushes of each variety

Variety	1929	1930	Total 2 years
	lb.	lb.	lb.
Eclipse	5·58	13·75	19·33
Clipper	3·02	11·13	14·15
Saunders	3·81	11·56	15·37
Black Champion	2·38	7·75	10·13
Collins Prolific	1·52	5·50	7·02
Magnus	1·79	9·75	11·54
Eagle	2·88	10·31	13·19
Kerry	3·65	6·25	9·90
Black Naples	2·65	7·56	10·21
R. C. Mission, Grouard, variety (?)	3·75	9·50	13·25
White Grape	0·46	3·29	3·75

All these are good average sorts. Black Champion produces the berry of best quality, being unusually large, shiny, sweet and attractive. It is a medium yielder but definitely the latest sort on the Station. Saunders produces a berry that is somewhat above the average in size and quality and is one of the earliest varieties grown at Beaverlodge. One of the most reliable of all the black currants is Collins Prolific, which is rather better than average in size, texture and flavour of berry and earliness, though low in total yield.

BLACK CURRANTS—1928 PLANTING—1930

Average yield per bush from six bushes of each variety

Variety	1929	1930	Total 2 years
	lb.	lb.	lb.
Victoria Black	0·19	2·43	2·62
Buddenborg	0·21	4·47	4·68
Merveille de la Gironde	0·18	3·28	3·46

All three above varieties are very good. Victoria Black is unusually large.

RED CURRANTS—1928 PLANTING—1930

Average yield in pounds per bush from *two bushes of each variety.

Variety	1929	1930	Total 2 years
	lb.	lb.	lb.
Ruby	0·02	2·72	2·74
Holland	0·03	2·38	2·41
Raby Castle	0·06	3·16	3·22
London Market	0·06	2·28	2·34
Diploma	0·05	1·57	1·62
Cherry	0·05	1·31	1·36
Versailles	0·07	1·57	1·64
Red Grape	0·23	2·63	2·86

*These eight varieties were set out in hexad form, but owing to an error when planting four of the sets became confused, leaving only two in which the varietal names are known for certain.

Two-years' notes tend to confirm the opinion that Cherry is one of the most desirable on the score of size, flavour and quality, although down somewhat in yield.

GOOSEBERRIES

Oregon Champion is the outstanding gooseberry as yet. Whether because of crowding or some other reason, the four bushes in the original plantation are away down in yield, giving only 9 pounds 14 ounces or an average of just less than 2 pounds 8 ounces per bush. In 1928 five bushes were transplanted to the east garden. These produced a very good crop of 41 pounds 2 ounces, or an average of just under 8 pounds 4 ounces per bush.

Of the three new varieties set out in 1927, two produced fruit for the first time. Seven bushes of Houghton yielded 14 pounds, an average of two pounds per plant. One bush of Smith Perfection gave three and a quarter pounds.

All the gooseberries yet tried tip-kill quite seriously each year, but Oregon Champion has so far proved itself least susceptible.

SASKATOONS

Both the pruned hedge and the unpruned row of Amelanchier annually attract the favourable attention of visitors. Especially is this so during blossom time, around the end of May or first part of June, when the pruned hedge is particularly admired, and during the fruiting season, from mid-July to the middle of September, when the crop is greatly relished. This year, owing to the drouth of August, the berries tended to dry out, especially on the heavily-laden, unpruned row. As a result only 70 quarts of fruit, 1,244 quarts per acre, were picked from this row, though this amount represents but a small percentage of what could have been gathered. The fruit on the pruned hedge was better this time than that of the other.

Twelve White saskatoon bushes received from the C.P.R. Irrigation Station at Brooks, Alberta, and set out in the spring of 1929 continued to thrive, though none have as yet bloomed. Fourteen White saskatoon root cuttings received from F. R. Ganzeveld, Buffalo Lake, Alta., on June 9 were set out in the aboretum. Only one made any growth.

STRAWBERRIES

Although by the middle of June the strawberry patch was covered with a mass of bloom, the crop, as usual, was far from what might be expected. The four rows of Early Dakotas planted 1928 yielded 112 pounds 12 ounces, or 1,034 pounds per acre. This is 158 pounds per acre more than the yield for the same plot in 1929, though the fruit was smaller and, toward the end of the season, badly shrivelled by the heat and drouth. The row of plants obtained from Mr. W. L. Brainard in 1928 gave but 19 pounds ½ ounce, 698 pounds per acre. This amounts to 535 pounds per acre less than obtained in 1929.

This deterioration on the part of the Brainard stock would seem to substantiate the suggestion made in 1929 that the inferior results obtained of late years at the Station are due to local cause. Particularly is the suspected presence of a fusarium disease indicated as being likely, though nothing is yet very definite or clear.

The fact that stock from the inferior plots, when sent out to householders throughout the country, so frequently gave results superior to those obtained on the Station, indicated another possibility. It was thought possible that unsatisfactory or infected soil might be the cause of the trouble, hence plots were set out during late summer in three widely different locations on different soil-types. In this way it was hoped to obtain a guide for future work. Unfortunately the drouth at transplanting time proved too severe and it is doubtful if, by the time spring arrives, any of the plants set out will be alive.

A test of late-summer versus spring planting, started in 1929, proved a complete failure, as very few of the 1929 plants survived. The several varieties received in 1927 continued to deteriorate; therefore as many young plants as possible were salvaged and set out in new plots, the old patches being harrowed out.

The 1929 planting as well as one made this spring of the Stebart variety failed completely.

RASPBERRIES

The season of 1930 proved but average for raspberries. There was an abundance of bloom and for the first part of the season the crop was unusually fine. It is probable that the drouth of August eventually exerted its influence, for during the latter part of the season, the berries dwindled considerably in size.

The first picking of all varieties except Adams 87 was July 30 and the last September 18. In the case of Adams 87, the dates were August 11 and September 11, respectively. The Herbert row produced 161 pounds 11 ounces or 3,541 pounds per acre, as compared with 4,790 pounds per acre in 1929 and 3,171 pounds in 1928. The rows of Newman and Viking set out in 1928 increased considerably in vigour and size. As a result the yields are well up. From the Newman plot there were 46 pounds 11 ounces of fruit, a yield of 3,201 pounds per acre, compared with 1,054 pounds per acre in 1929. The Viking variety produced 30 pounds 6 ounces or 2,138 pounds per acre, as against 563 pounds per acre in 1929. The variety received from Winona, Ontario, in 1927, Adams 87, gave a yield of only 416 pounds per acre while in 1929 it produced 440 pounds. This variety, however, has not had a fair chance as it is badly crowded by a growing caragana hedge.

On May 3, thirteen black raspberries were received from the Patmore Nursery. Only two of them survived the transplanting.

Spur blight again appeared extensively in the test row of Herberts. This was severely cut out before the canes were laid down for the winter. The remainder of the plan of campaign against the disease involves spraying the young suckers in the spring with Bordeaux 3-6-40, with a spreader of resin-fish-oil soap added.

APPLES

Once again a novel sight was provided for visitors, some of whom had never before seen real apples on living trees.

Two of the trees which bore fruit in 1929 suffered severely from accidents during the winter. One was broken off a short distance from the ground by a runaway team. The other had been allowed to develop a very weak crotch between the two main branches. Sometime during the winter it split.

However, two trees matured almost fully ripe fruit. One, the Osman crab that bore 31 apples in 1929, gave 81 apples for a total weight of 2 pounds 15½ ounces. The other tree, a Beauty crab received from Professor Hansen, Brookings, South Dakota, in 1922, bore this year for the first time. The apples produced were well coloured and fairly ripe, but exceedingly small, little larger than a raspberry, 20 fruits weighing but 4½ ounces. An Hibernal apple received from Morden, 1925, was profusely covered with bloom, but did not set any fruit.

An addition to the orchard was made when 1,000 hardy apple seedlings and 100 sandcherry seedlings were set out May 2 and 3. These were received April 29 from the Country Guide, Winnipeg, Manitoba. When surveyed during the early summer over 70 per cent of the apples and 80 per cent of the sandcherries were recorded as having survived. Later in the summer these percentages were increased considerably by a number of plants which were slow in leafing out and thus had appeared dead at the time of the first count.

PLUMS

As usual, considerable tip-killing was evidenced by the plum family, though little severe damage was done. Most of the *Prunus nigra* and *Prunus americana* bore considerable bloom, especially on the lower branches. Many of them set a little fruit, which did not ripen. A few set a great deal of fruit which did not ripen. A few, especially of *P. nigra*, set a little fruit which did ripen fairly well, and a few set no fruit at all. The fruit which ripened was found to be rather dry and pithy though making an edible preserve.

SANDCHERRIES AND TOM THUMB CHERRIES

In the spring 1930 it was decided to grub out a certain block of the Select variety which had not as yet ripened any fruit to speak of. Unfortunately all the Champa bushes were taken out at the same time. On the Select and Hudson Bay varieties fairly large crops of fruit were borne. Altogether eight bushes practically ripened their fruit before the frost.

Four of the six Tom Thumb cherries received from Morden in the spring of 1929, produced two and a quarter pounds of almost ripe fruit, which made excellent jelly.

GRAPES, PEARS AND FLOWERING CRABS

Over one hundred native Manitoba wild grapes and ten Amur grapes were received from Morden, Manitoba, in the fall of 1928 and heeled in. In the spring of 1929 they were planted out. All but seven of the wild grapes survived their first winter in the open, and made a healthy vine growth. A few of the

plants in a hollow were covered with straw but they showed no improvement over the unprotected ones. Six wild grapes and seven Beta grapes received from Brooks, Alberta, at the same time and treated in a similar manner also grew vigorously.

A hardy pear (*Pyrus ussuriensis*) and several *Malus baccata* again survived the winter and made a satisfactory growth. None of these has yet bloomed. Six Hopa crab apples received from Brooks in the fall of 1928 and set out in 1929 all progressed well during 1930 though showing some tip-killing in the spring.

FLOWERS

The season definitely favoured perennials and biennials. These made an excellent floral display in spite of the unseasonable weather, far surpassing the annuals and demonstrating that, all things considered, the over-wintering species should be the foundation of the ordinary flower garden. Some of them require more skill in handling, but they yield a greater return for the energy expended.

As usual the procession of bloom was led by the Scilla, which opened its modest blue flowers on April 20. Thenceforward the profusion and variety increased rapidly. The blooming season opened slightly earlier than in 1929 but was abruptly terminated considerably sooner. Many of the hardier species seemed relatively unhurt by the low temperature of September 24-25, when 18° Fah. was recorded, but were unable to withstand the continued cold weather which followed. By October 2 only a very few maintained their colour, the pansies blooming fairly freely until November 11.

PERENNIALS AND BIENNIALS

TULIPS.—After the passing of the scilla and crocus, the main attraction of the spring flower beds is the tulip. Commencing on May 20, when Artus first opened its red cup, the different types of tulips succeeded one another for over a month, providing an abundance of flowers while most other plants were still leafing out. May 21 saw the first blooms of the Chrysolora and Keiserskroon. Murillo showed its white petals June 4 and was closely followed by La Merveille on June 5, and shortly afterward by the other Darwins. This year the tulips made a rather unusually fine growth, the tallest Darwin being 32 inches while the average was about 30, in height. This is quite tall even for Darwins and much beyond what might be expected from the smaller early-flowering kinds.

ICELAND POPPIES.—The bloom remained on the Iceland poppy rather more briefly than is normally the case. The first appeared June 4 and the last of the continuous bloom was killed by the frost of September 24-25.

COLUMBINE.—This desirable perennial commenced blooming June 10 but did not retain its flowers very long. Though the faded blossoms were cut off, there was no second crop, possibly because of the dry weather.

FORGET-ME-NOT (Myosotis).—This charming border plant continues to demonstrate its hardiness and earliness. The first pale blue flowers appeared May 13.

IRIS AND PEONY.—These are two of the finest, hardiest and most desirable of perennials for the North. They are almost perfectly adapted, being free-blooming, and relatively immune from insect pests. Moreover, the foliage of both is quite attractive; thus they appear to good advantage even when not in bloom.

The first iris opened out its bearded flower on June 26. The peonies commenced to bloom early in July, when the irises were at their best. For about two weeks the irises and peonies were a glorious blaze of colour, till the former began to fade.

DIANTHUS.—Pinks and sweet williams again demonstrated their charm and utility.

PYRETHRUM.—This is a medium-season, hardy perennial, particularly useful for providing cut flowers. If the blossoms are not removed but are allowed to go to seed the plant becomes quite displeasing.

HOLLYHOCKS.—Hollyhocks again performed as biennials, the plants from seed sown August, 1929, and from the self-seedings of 1929 giving much the best bloom. Many extremely pleasing spikes, of varying shades, were produced, one plant reaching a height of eight feet eight inches.

SIBERIAN PERENNIAL LAVATERA.—This is a species closely allied to the hollyhock. Though an herbaceous perennial it makes a shrub-like growth attaining a height of seven feet, and develops a mass of pink bloom, which persists until the severe frosts of autumn. Its popularity is well deserved. A specimen was found growing in Mrs. Conibear's garden at Fort Smith, N.W.T., where it has bloomed for years.

SWEET ROCKET.—Though almost weed-like in its persistence, this perennial maintains its snowy white bloom so long as to make it a decided asset in a perennial border.

GLADIOLUS.—Once again the season proved too short for satisfactory development of the choicest varieties of these glorious flowers. Maiden Blush was the earliest, as usual, the first petals unrolling August 20. Gradually others followed until by September 8 there were many dozens of Maiden Blush in bloom. On September 2, Prince of Wales commenced to open. September 8 saw the first Halley and Marechal Foch in blossom. These latter three are all greatly superior to Maiden Blush, but are rather late. Several other varieties had commenced to show the faintest tinge of colour in the buds when the lives of all were cut short by the frost of September 22. (The gladioli had been planted rather too close for best results without watering.)

DELPHINIUM.—The delphiniums did not make such a satisfactory showing as usual. Several choice plants were broken down by a wind of early July. Most of the others were severely attacked by aphids. The first blue appeared on a flower stalk June 23.

DAHLIAS.—Again it was demonstrated that satisfactory results cannot be expected from dahlias grown from spring seeding. The frost-free period is too brief. Two plants grown from cellar-wintered tubers bore a number of white blossoms. A few seedlings got so far as to produce flower buds before being killed on September 22.

PERENNIAL PHLOX.—The pyramidal perennial phlox produced such a glorious mass of snow-white bloom that it immediately became immensely popular. It is very promising but has been tried on the Station only two years.

MISCELLANEOUS.—The sedums, veronica, and ribbon grass are all thriving. The Shasta daisies, eryngium and hardy geraniums are making a very fair growth. Several species of achillea are all vigorous and almost weed-like in hardiness. Of the campanulas but one has survived and bloomed this year.

ANNUALS

The annuals were discouraging. Only one small bed made anything like the showing that might be expected. Sixty varieties of sweet peas were sown April 15. For almost six weeks no sign of these could be found. Then gradually, in a very irregular manner, occasional plants appeared. Eventually a fair showing was made by the blossoms, though a height of only three feet was attained by the vines.

Poppies, linaria and calendula throve as usual. Stocks, phlox, candytuft, phacelia, pansies, maize, kochia and sunflowers all gave mediocre results.

ORNAMENTAL TREES AND SHRUBS

By yearly acquisitions the Station is accumulating an excellent collection of trees and shrubs representative of the more adaptable types. A comparatively few years ago it was thought that none but the ironclad ornamentals would endure, but each year's experience with the extending arboretum broadens the horizon of possibilities. It has now become apparent that many of the less hardy but more desirable sorts can be used to excellent advantage in landscape plantings.

Sometimes a certain amount of winter-killing of the tops of many varieties is experienced and occasionally an unusually heavy snowfall or a violent wind damages some bushes by breaking a few of the branches. None but the very hardiest can be safely planted in exposed positions. Therefore a fundamental of landscape planting in this Northern prairie and park region is to use the definitely adapted varieties for shelter belts and background, reserving the more exotic sorts for sheltered places in the foreground. By observation of this principle excellent results can be obtained with many varieties of trees and shrubs which otherwise might be expected to fail.

Already one hundred and ten varieties and species of trees and shrubs have been tried out for at least a year. To these have been added sixty new sorts received during 1930.

An attempt has been made to summarize the work with ornamentals. It should be noted, however, that the location of the premises near the top of a hill is rather favourable in the matter of climatic severity; therefore due allowance must be made in selecting varieties for planting on less favoured areas. The more reliable sorts, as far as evidenced by our experience, are indicated.

EVERGREENS

ARBORVITAE.—American *(Thuja occidentalis)*—C. E. F., 1928.
—Siberian *(Thuja wareana)*—C. E. F., 1928.

Two specimens of each were planted in the spring of 1928. There is now but one *T. occidentalis* living, the others having killed out. Not very promising as yet.

JUNIPER.—Common *(Juniperus communis)*—Morden, 1927.

This hardy, low-growing shrub is vigorous. It is useful for foundation and mass planting.

PINE.—Austrian *(Pinus nigra)*—C. E. F., 1928.
Bull *(Pinus ponderosa)*—C. E. F., 1928.
Jack *(Pinus banksiana)*—Indian Head, 1922, 1924.
Mugho *(Pinus mughus)*—Morden.
Scotch *(Pinus sylvestris)*—Indian Head, 1920, 1922 and 1924.
Dropmore, 1929.

Of a number of plants of *P. nigra, P. ponderosa* and *P. mughus* planted in 1928 but one small *P. nigra* remains. None of these three appears to be adapted to the climate. *P. banksiana* is native and completely hardy. It is of some use for shelter-belt planting, being easily obtained locally, but is not very attractive as a specimen. *P. sylvestris* somewhat resembles *P. banksiana* in form and hardiness. It is, however, much more attractive being a richer, more bluish green. It is one of the most desirable evergreens for windbreak, group or specimen plantings on high land.

SPRUCE.—Norway *(Picea excelsa)*—Morden.
White *(Picea canadensis)*—Indian Head, 1922, 1924 and local.
(Picea excelsa borealis)—Dropmore, 1929.

The two latter spruces appear to be quite well adapted. *P. canadensis* is native and entirely hardy. It is a great deal more desirable and attractive than *P. nigra,* the black swamp spruce. A number of seedlings of *P. excelsa borealis* were received from the Dropmore Nursery in the spring of 1929. Over sixty of them survived the winter and are making an excellent growth. *P. excelsa* does not appear so well adapted, though it may be satisfactory if sheltered.

DECIDUOUS TREES AND SHRUBS

ASH.—Green *(Fraxinus lanceolata)*—Indian Head, 1921 and 1928.

Specimens of this hardy tree have been growing on the Station for over nine years. It has been employed mainly for shelter-belt plantings. It grows rather slowly, therefore should be used in conjunction with some more rapid-growing species. It leafs out somewhat late in the spring and is one of the first to part with its foliage in the fall. Long life, hardiness, and general freedom from insect pests are its reputed assets. In 1930 its leaves had all dropped before the end of September. In at least two seasons it has been temporarily defoliated by a late spring frost, but it sent out fresh foliage each time.

BARBERRY.—Japanese *(Berberis thunbergii)*—C. E. F., 1928. Morden, 1928.

Planted in the spring of 1928, all but one of the barberry plants are still living. Several of them showed a few yellow and red flowers this year though the bloom was not profuse. Some tip-killing was evidenced and it is probable that many of the flower buds were injured by frost. Possibly bending the bushes over and covering them with earth may give sufficient protection to ensure more abundant bloom.

BASSWOOD.—*(Tilia americana)*—Morden, 1925.

This rather exotic species, native to the prairies in Southern Manitoba only is but partially hardy. Two or three specimens out of six originally planted have been growing since 1925. As a rule they freeze back somewhat, but the most sheltered specimen has made headway. It has large, broad, attractive leaves which normally succumb to the first heavy frost. Where planted it should be given as much protection as possible.

BIRCH.—Canoe *(Betula papyrifera)*—C. E. F., 1928
Morden, 1928.
Seedlings (B. sp. including *B. pubescens*)—Morden, 1929.
Dropmore, 1929.
Dwarf native (B. sp.).

B. papyrifera, planted in the arboretum in 1928, has survived two winters but has usually killed back somewhat. It does not appear to have extensive possibilities.

Ten groups of Betula seedlings, grown from seed obtained from the Arnold Aboretum, were received from Morden, Man., in 1929, along with a few *B. pubescens* from Dropmore. These have since made a vigorous growth, displaying an increasing tendency to produce attractive pendulous branches. They give promise of being valuable tree types, but should be planted in sheltered locations, being subject to wind injury.

BITTERSWEET.—Japanese or Oriental *(Celastrus orbiculatus)*—C. E. F., 1928.

Though planted in 1928 none of the Japanese bittersweets have yet bloomed. Two of the five bushes set out have died and the others have suffered extensive tip-killing. In spite of this one has made a fair growth and may possibly do better as it becomes better established.

BLUEBERRY.—*(Vaccinium* sp.)—Local, 1928.

This is a native species of which only one specimen has been successfully transplanted. It has made a vigorous growth but has not yet bloomed. Some doubt attaches to the identity of the specimen.

BUFFALO BERRY.—*(Shepherdia argentea)*—Morden, 1926.

Planted in 1926, several specimens of this shrub have since made an excellent growth. Quite early in the spring small silvery leaves are thrown out. During the summer a number of bright, red berries develop, which are very attractive, and, to some tastes, palatable. Because of its habit of making a strong, dense growth close to the ground, it seems probable that the buffalo berry would form an effective hedge.

BULBERRY—Yellow *(Shepherdia canadensis,* var. *Xanthocarpa)*—Brooks, 1928.

A number of plants of the yellow bulberry were received in the autumn of 1928 and set out in the spring of 1929. Most of them are making a fair growth though none has yet shown colour.

CARAGANA.—*(Caragana arborescens)*—C. E. F., 1916.
(Caragana frutex)—Indian Head, 1919.
(Caragana sophoræfolia)—C. E. F., 1916.
(Caragana pygmæa)—Indian Head, 1925.

Originally introduced from Siberia, the caraganas are among the best adapted and most dependable shrubs for the West. They are almost completely winter-hardy, but subject to a certain amount of injury through the breaking of branches by wind and snow. Their bright green foliage and mass of yellow, pea-like flowers make them very attractive, either as individual specimens, as trimmed hedges, or as wind-breaks. They commenced to bloom this year on June 4 and were in full bloom by June 15.

Caragana arborescens (Siberian pea tree), is the most generally valuable of the larger-growing species. *Caragana frutex* has a duller, more drab appearance and suckers badly.

Caragana sophoræfolia (formerly called cuneifolia) is a rather rare sort and has no particular advantage over *C. arborescens.* The leaves are somewhat finer and the shade less dense.

Caragana pygmæa is a dwarf variety producing small, fine leaves and a mass of bloom. It is particularly useful for small group plantings in lawns or for low hedges.

CHOKE CHERRY—

One specimen has grown vigorously for a number of years, but bears more aphides than fruit. In spite of the unsightly effect of this insect upon the foliage the shrub is rather impressive.

CINQUEFOIL.—*Potentilla fruticosa*—Morden, 1928.

The cinquefoil is a dwarf shrub, growing only fifteen to eighteen inches in height and producing a mass of yellow, butter-cup-like flowers. It began blooming June 11 and continued through the entire season until the first severe autumnal frosts in the latter part of September. On October 28 some green leaves were still persisting.

CLEMATIS.—Ground *(Clematis recta)*—Seed, Bugnet, 1925.

Unlike the other species of clematis this is not a climbing plant. Each winter it kills back extensively but makes a fine recovery and produces a great wealth of white flowers, which persist until injured by the fall frosts.

COTONEASTER.—Viking *(Cotoneaster acutifolia)*—Morden, 1927.

The Viking Cotoneaster is proving to be an excellent bedding shrub. The bloom is rather inconspicuous, but the succeeding black fruit is a great attraction, contrasting to good advantage with the leaves, which turn red in the autumn. As late as November 8 the bushes carried the black drupes and a few red leaves.

CURRANT.—Alpine *(Ribes alpinum)*—C. E. F., 1928.
Golden *(Ribes odoratum)*—Morden, 1928.

Alpine currant is a rather low-growing shrub which tip-kills somewhat. It bloomed this year but does not appear to be well adapted. The golden currant is a taller-growing shrub with bright, deeply indented, attractive leaves. In the early summer it produces golden-yellow flowers which develop into large, shiny, black berries. In the autumn, the leaves, which had not commenced to fall by October 28, change to a mixture of green, shading into a deep, warm red. The golden currant appears to be moderately frost-resistant, but is subject to some breakage by wind.

DOGWOOD.—Native *(Cornus* sp.*)*—Local.
Red Osier *(Cornus stolonifera)*—Morden, 1929.
Siberian *(Cornus alba sibirica)*—D. and F., 1927.
Variegated *(Cornus alba argentea marginata)*—C. E. F., 1928.

All the above dogwoods are hardy. None has yet attained a height of four feet. They are not particularly attractive as individual specimens, except for early-autumn foliage contrasts, but their red bark, and in the case of the variegated one the green and yellow leaves, have a value in colour contrasts. The bloom is white but not showy. Though the leaves are shed quite early in the fall, the bushes form a pleasing effect against the white background of the winter snow.

ELDER.—American Golden Elder (*Sambucus canadensis aurea*)—Brooks, 1928.
European Red (*Sambucus racemosa*)—Morden, 1928.

Though the common elder is not hardy, killing back almost to the ground each winter, it has thus far recovered well and made a vigorous growth. It throws out great, white, umbell-like blooms, but the berries which follow do not even approach maturity. It is rather an exotic species, not to be widely recommended. The European red elder is much more hardy and is one of the most impressive shrubs. It makes an enormous growth each year, sometimes sending out branches over six feet long in a single season. The leaves are finely cut and deeply indented, while the fruits which form in large clusters, are a bright red and quite attractive.

ELM.—*American* (*Ulmus americana*)—Seed, Morden, 1925.

This species has been growing for a number of years and appears to be useful as a tree form. It is semi-hardy, being subject to some tip-killing and wind injury, and suckers rather badly. It is popular with the rabbits, which are especially fond of its bark. In some other parts of Alberta it is very subject to aphis attack but this has not yet occurred at Beaverlodge.

FLOWERING CRAB.—*(*Malus baccata*)—Morden, 1927,
(*Pyrus ussuriensis*), Dropmore, 1929,
Hopa crab (*Malus niedzwetzkyana seedling*)—Brooks, 1928.

Malus baccata is reported to be very hardy and beautiful, though it tip-kills somewhat and has not yet bloomed. *P. ussuriensis* is a very hardy pear, which has not bloomed as yet. The Hopa crab suffers some killing-back and has not flowered, but its deep, beet-red leaves indicate that it may possibly prove a valuable species.

* Formerly all grouped under genus "Pyrus". Now "Pyrus" is restricted to pears while "Malus" applies to apples and crabs.

HAWTHORN.—*Crataegus coccinea*)—Morden, 1928.

Several specimens of hawthorn planted in 1928 have all died. It gives little promise of becoming adapted.

HAZELNUT.—Native beaked (*Corylus cornuta*)—Local, Saskatoon Mountain, 1921.

The dwarf hazelnut is an attractive, clean, slow-growing shrub well worthy of consideration in planning a foundation group-planting. The leaves are dark-coloured, finely imbricated, and fairly persistent in the autumn. During the last two years a few of the peculiar fruits have formed.

HEARTNUTS.—(*Juglans sieboldiana cordiformis*)—Nuts, J. A. Neilson, 1926.

In the spring of 1926 a few of these nuts, supplied by Jas. A. Neilson, were planted. They germinated successfully and have continued to make annual progress although subject to fairly severe winter injury from frost and excessive snow. They are not very promising.

HONEYSUCKLE.—Bearberry (*Lonicera involucrata*)—Mrs. O. H. Johnson, 1923,
Native wild (*Lonicera* sp.)—Local, 1921 & 1922,
Tartarian (*Lonicera tatarica*)—C. E. F., 1919,
Tartarian semipalatinsk (*L. tatarica semipalatinsk*)—Brookings, S. D., 1924.

The native bearberry honeysuckle or twin blackberry grows about three feet high and produces an abundance of foliage. During the summer the deep pink blossoms develop into twin, shiny black berries which are cupped by the leaves or bracts in the peculiar way common to honeysuckles. It could be used for mass shrubbery planting. The native wild honeysuckle throws out yellow flowers which mature to form orange-red berries. It is quite attractive and is one of the easiest of all bushes to transplant. Its chief demerit is that the leaves in late summer are subject to a mildew. Both varieties of Tartarian honeysuckle are well-adapted shrubs which should be among the first planted. They are hardy and may be used for border, shelter-belt or individual planting. They produce a great mass of rosy-pink and white flowers which later develop into red berries in the case of the common variety, and into orange berries on the Semipalatinsk. Another strain of the common Tartarian honeysuckle throws out white flowers. All were in full bloom by June 18.

For the past seven or eight years the Tartarian honeysuckles have annually produced a wealth of bloom. In 1930 the bloom fell short of the normal amount, and a "wilt" developed on the lower part of the bushes, mainly on the south side. Later this wilt became a blight which killed the lower branches and twigs. At first it was thought that the frosts of May 18, 19 and 21 had been the cause but it was decided to send some of the affected material to a plant pathologist for examination.

Dr. G. B. Sanford, Dominion Plant Pathologist, at Edmonton, reported that the fungus spores found on the twigs appeared to be Ascochyta, but that further examination would be required. Several lots of material were sent to Dr. John Dearness, of London, Ontario, a mycologist and a member of the Canadian Division of the American Phytopathological Society. He reported finding evidences (spores and pycnidia) of a fungus which appeared to be *Diplodina tatarica*, and which he had found some years before on honeysuckle bushes from the Central Experimental Farm. As the Beaverlodge plants were originally obtained from the Central Experimental Farm in 1919, it is possible that the fungus had since remained on bushes in a more or less dormant state, and that this year the late-spring frosts damaged the bushes sufficiently to allow the fungus to reproduce and develop. Further investigation is necessary before any definite conclusions can be drawn.

HORSE CHESTNUT.—*(Aesculus hippocastanum)*—Morden, 1929.

Several of these were planted in the spring of 1929. They were badly frozen back during the winter, though not killed. The few leaves thrown out in 1930 were early touched by frost and had fallen by September 30. It is possible they may prove hardier upon becoming better established, but as yet they cannot be recommended. At Oliver they are proving hardy though growing slowly.

LEAD PLANT.—*(Amorpha fruticosa)*—Morden, 1928.

Though planted only in 1928 the lead plants are making a fine growth. They have light-green, compound, exceedingly attractive leaves which, however, unfold late in the spring and are shed rather early in the autumn. During the latter part of the summer, peculiar purple and brown flower spikes are thrown out. This bush gives definite promise of being well worth trial.

LILAC.—Chinese *(Syringa villosa)*—C.E.F., 1916 and 1919.
Common *(Syringa vulgaris)*.—C.E.F., 1919.
Georges Bellair *(Syringa vulgaris* Georges Bellair).—C.E.F., 1916.
Condorcet *(Syringa vulgaris* Condorcet)—C.E.F., 1916.
Marie Lemoine *(Syringa vulgaris* Marie Lemoine)—Prairie Nurseries, 1928.
Japanese tree *(Syringa japonica)*—C.E.F., 1928.
Persian *(Syringa* sp.)—Prairie Nurseries, 1928.

Of the lilacs the Chinese lilac is the hardiest and the safest to use. It is less attractive than the common lilac but is completely reliable. For the first few years the common lilac was killed back considerably and failed to bloom. For the past six or seven it has bloomed annually, though this year the clusters were not so numerous as usual, possibly as a result of injury by the unusually severe May frosts. Of the three named varieties of common lilac, Marie Lemoine has not yet bloomed. May frost reduced the bloom of the common lilacs, especially the Condorcet variety, which is the first to open. The Georges Bellair was less reduced. There appears to be little difference in hardiness. Bloom commenced on June 10 and reached its maximum by June 18. The Japanese tree lilac and Persian lilac were acquired in 1928 and have not yet produced any flowers, though both appear hardy and very promising.

MAPLE.—Amur or Ginnalian *(Acer ginnala)*—Morden, 1925.
Manitoba *(Acer negundo)*—C.E.F., 1916.
Silver *(Acer saccharinum)*—Morden, 1927.

Thus far *A. negundo* has proved to be the hardiest of the three. It makes a rapid growth, is fairly hardy and is relatively free from pests at Beaverlodge, where thus far it has escaped aphis attack, though in other parts of Alberta it is badly attacked by this pest. Mr. A. Paton, of the Provincial Parks Board, mentions a case at Red Deer where the Manitoba maple was completely killed by aphides during a certain dry season. Here occasionally it suffers some damage from tip-killing, though latterly this has been much less serious than it was in the early years. It is excellent for shelter-belt planting. The Amur and the Silver maple are both definitely more tender than the Manitoba species. They normally tip-kill somewhat, but removal of the dead wood leaves a very attractive bush. The Amur or Ginnalian maple has fine, deeply-cut leaves and a bright red bark. The Silver maple has shiny, silvery-backed leaves, and a dull brown bark. The leaves of both turn crimson in the autumn. These two species, though not completely hardy, are very attractive and may be used in sheltered locations.

MAY DAY TREE.—*(Prunus padus commutata)*—Brookings, S. D., 1924.

The May Day tree is one of the promising shrubs under trial. It leafs out very early in the spring and with one exception was the earliest of all the shrubs to bloom, showing the first flowers on May 27 and being a mass of beautiful white bloom on May 30. It has not always escaped killing back but sustained no injury in 1929-30.

MOCK ORANGE.—*(Philadelphus coronarius)*—C.E.F., 1916.

Planted in 1916 has survived in stunted form but during the past two or three seasons has borne on the more recumbent branches some of its beautiful aromatic waxy blossoms—appropriate for weddings if there were enough (blossoms) to go around.

MOUNTAIN ASH.—European, also known as Rowan tree, *(Sorbus aucuparia)*—C.E.F., 1928.

Native *(Sorbus americana)*—Local, Saskatoon Mountain, 1921.

It is thought that several specimens of both kinds of mountain ash have been growing for several years, though no clean-cut botanical distinctions have been discerned. The supposed specimens of the European are upright-growing,

Mountain ash in fruit (*Sorbus sambucifolia*). (Photo by the Superintendent).

while one or two specimens known to represent the native are dwarf shrubs. The former have killed back sharply once or twice whereas the latter have tip-killed little if at all. Nevertheless these are now much the shorter. All make pleasing individual specimens, particularly when the numerous clusters of fruit have matured to a rich, red colour. The fruits are supposed to be edible and are said to make good jelly and wine but have never been utilized on the Station.

NINEBARK.—*(Physocarpus opulifolius)*—Morden & C.E.F., 1928.

The ninebark is very similar to the spiraeas, especially to the snow garland (*S. arguta*). The foliage is larger and coarser than that of the snow garland, more closely resembling the leaf of the currant, but the white flowers are borne in clusters much like those of the spiraea. The ninebark has stipules and shining seeds, while the spiraea has no stipules. The ninebark tipkills slightly and is not quite so attractive as the spiraea. However, it is possibly somewhat more certain of producing an abundance of bloom, and should be well worth planting for the sake of variety.

OAK.—Manitoba (*Quercus macrocarpa*)—Acorns, Man. Agric. College, 1923.
Shingle (*Quercus imbricaria*)—Morden, 1928.

The Shingle oaks were received from Morden in 1928, while the specimens of *Q. macrocarpa* were grown from acorns planted on the Station in the autumn of 1923. They are very similar types and both seem promising. They leaf out rather late. With the approach of autumn their leaves turn various shades of red from a bright crimson to a dull maroon. In 1930 the leaves had all dropped before October 28.

OHIO BUCKEYE. (Pavia).—(*Aesculus glabra*)—Morden, 1926.

Ohio Buckeye is closely related to and very similar to the horse chestnut. It appears to be somewhat hardier for it has survived over four years and continues to make a fair growth. It occasionally tip-kills somewhat but not seriously as yet.

PEMBINA.—High Bush Cranberry. (*Viburnum trilobum*)—C.E.F., 1916 and Local, Saskatoon M't'n, 1921.

This is a native plant highly regarded by many landscape gardeners. Growing under crowded conditions on the Station it has not attracted much attention here. The leaves hang late in the autumn.

POPLAR.—Aspen, (*Populus tremuloides*).
Balsam or Balm of Gilead (*P. balsamifera*)—Local, 1920 & 1922.
Chinese—Brooks, 1928.
Northwest—Prairie Nurseries, 1928.
Russian (*P. petrowskyana*)—Indian Head, 1921.

All five species of poplar have proven hardy and worthy of consideration. Two, the aspen and Balm of Gilead, are native and easily obtained. Aspen has bright-green, quaking leaves. In the autumn they turn a yellow or warm golden colour, depending on the season. This species makes a fair specimen tree but is reported to be rather short-lived and is a favourite host for tent caterpillars. Balm of Gilead has darker foliage and is freer from pests. It develops a symmetrical pear-tree form. Its bark is palatable to rabbits. It has a tendency to sucker freely and sends out long roots which eventually bulge up above the ground level so as to interfere with the lawn mower. For this reason it is no longer planted on lawns and campuses where these defects would prove serious. Russian, Chinese and Northwest poplars all seem hardy. The Russian species makes a rapid growth, and is for this reason a standard tree for wind-break planting but is subject to canker and is not long-lived. Chinese poplars have

made a clean, upward growth. They tip-kill somewhat but bear promise of being useful for roadside plantings. Northwestern poplar is reported hardy except for being subject to canker. It branches out more than the Russian.

PINCHERRY.—Native (*Prunus pennsylvanica*)—Mr. C. O. Pool, 1925.

The pincherry is occasionally found locally though not generally in large numbers. It produces a great mass of white blossoms quite early in the spring and makes a large bushy growth. Several specimens obtained in 1925 are now ten to twelve feet tall. This species is closely related to the May Day tree and might be almost as satisfactorily used for lawn plantings. It has borne little fruit but a possible explanation is offered by Georges Bugnet, who states that where too well nourished, as in gardens, the pincherry is likely to fruit sparingly.

ROSES.—Planted previous to 1930.

Agnes—(Rugosa Hybrid).
Betty Bland (*Rosa blanda*)—C.E.F., 1928.
Cabbage—C.E.F., 1928.
Japanese (*Rosa rugosa*).
General McArthur (Hybrid Tea).
Grootendorst "Carnation Rose" (Rugosa Hybrid)—Prairie Nurseries, 1928.
Hansa (Rugosa Hybrid)—Prairie Nurseries, 1928, and Morden.
Harison (Yellow, Austrian Briar) (Supposedly *R. spinosissima*)—C.E.F., 1928.
Hugh Dickson (Hybrid Perpetual).
Moss—C.E.F., 1928.
Red-leafed (*R. rubrifolia*)—Morden, 1928.
Souvenir de Claudius Pernet (*Pernetiana*).
Scotch rose (*R. spinosissima*)—C.E.F., 1928.
Valeria—C.E.F., 1928.

Of the above roses only the Betty Bland and Valeria have failed, and their failure was probably due more to the misfortunes of circumstances than to their lack of hardiness, as both are reputedly hardier than the Hybrid Tea rose, General McArthur, or the Hybrid Perpetual, Hugh Dickson, both of which have survived.

The Agnes is a cream-coloured Rugosa hybrid bred at the Central Experimental Farm, Ottawa. Only one specimen, however, has survived from the 1928 planting and probably as a result of too severe pruning it has bloomed very scantily. It appears that the Rugosa and its hybrids bear chiefly on the older wood and should not be pruned back severely, as the hybrid-teas require to be.

The Cabbage rose, planted in the autumn of 1928 bloomed but was not particularly admired.

The Japanese rose performed well, as usual.

General McArthur, the choice hardy pink planted in 1927, flowered for its fourth successive season, commencing in July and finishing in August. Its accustomed period of second bloom was forestalled by the frost of September 24-25.

Grootendorst, the free-blooming, small-flowered, red Rugosa hybrid planted in the autumn of 1928, commenced blooming July 6 and continued until killed by the late September frosts.

Hansa, a light-tipped red, one of the best and most prolific of the Rugosa hybrids, bloomed abundantly from July 6 to late September.

Harison Yellow, planted in the spring of 1928, is an Austrian briar with a beautiful shade of yellow. The two specimens bloomed for about a week from July 14.

General McArthur rose bush blooming in early August. Planted 1927, this bush has come successfully through three winters blooming for four successive seasons. In 1928 it bloomed until October 10, in 1929 until October 17 without autumn protection.
(Photo by the Superintendent)

Hugh Dickson acquitted itself particularly well in this its fourth successive season of bloom. Commencing shortly after the General McArthur it continued intermittently until near the end of September, at times presenting a profusion of buds and blossoms. This variety has lately been subject to leaf spot, for which it was sprayed with Bordeaux mixture on May 31. This appeared to check the disease very well until towards the end of the season.

The Red-leafed rose (*R. rubrifolia*) seems quite hardy and presents a striking foliage effect. The bloom is not impressive.

That rich creamy yellow, the Souvenir de Claudius Pernet, planted in 1927, appeared first to have winter-killed in spite of the protection given it but the

root survived and threw up fresh stems, which produced a number of choice blooms. It commenced flowering later than the Hugh Dickson and was much more sparing and intermittent but was still in bloom until the late September storm. This rose is of the Pernetiana group, similar to the Hybrid-Tea.

The Scotch rose (*R. spinosissima*) commenced on July 11 a brief blooming period of a week or ten days. The bush is hardy and not unattractive.

RUSSIAN OLIVE.—*(Elæagnus angustifolia)*—Morden, 1925.

The Russian olive is a medium-tall, semi-hardy shrub. It has a golden-brown bark and leaves of a greenish-grey, both of which are valuable in colour groupings. Against the brighter green, or later in the season the reds, of the Ginnalian maple leaves, the colours of the Russian olive stand out in a pleasing contrast.

SALTBUSH.—*Silver (Halimodendron argenteum)*—Morden, 1928.

Though subject to some tipkilling, the several salt-bush plants set out in the arboretum in 1928 are thriving. Some bloom was produced this year but their main attraction lies in the light-green shade of the foliage. The bushes have an attractive form and may be recommended for planting in favoured locations.

SASKATOON.—Native *(Amelanchier canadensis)*—Local, 1918.

Twelve years of trial have proved that, once established, the native Saskatoon takes kindly to domestication. One row has been maintained as a clipped hedge, and one row has been allowed to grow unpruned. Both methods of treatment have been entirely successful, the clipped hedge being especially beautiful when in full bloom, which is normally during the end of May and the

Saskatoon hedge in bloom, June 5, 1930. (Photo by the Superintendent).

first part of June. Failure in transplanting of the Saskatoon commonly results from leaving too much top. At Beaverlodge the hedges were established by strewing root masses thickly into a furrow and covering with earth. A short stub of top growth appeared to be of no disadvantage and may even be a slight advantage but it is not essential. As a matter of convenience both hedges were planted in July but experiments are under way to ascertain the most favourable season.

SIBERIAN FLOWERING ALMOND—*(Prunus nana)*—Brookings, S. D., 1929.

Though not immune from tip-killing this is one of the most beautiful and desirable shrubs that have been tried. It was the earliest of all to bloom, the delicate pink blossoms bursting forth on May 19 before the leaves had commenced to show.

SILVERBERRY.—Wolf willow *(Elæagnus agentea)*—Local, 1928.

This is a native, easily propagated, hardy shrub, closely related to the Russian olive. It is not, however, so attractive and suckers badly, tending to become a nuisance.

SNOWBALL.—*(Viburnum opulus sterile)*—D. and F., 1927.

The snowball appears to be unable to stand the severe climate. Though still living after several years it is killed back extensively each winter and has not yet bloomed. This species cannot be recommended.

SNOWBERRY.—*(Symphoricarpus albus)*.

The native snowbery has not been given a fair trial. It has survived a number of years, in one case crowded in the windbreak and in another in a hedge. This year it was set out as a hedge plant in the arboretum. The leaves are retained quite late in the fall.

SPINDLE TREE.—Wahoo *(Euonymous atropurpureus)*—Morden, 1927.

This tree survives the winter but does little else. It bears scant promise and cannot be recommended.

SPIRAEA.—Snow garland *(Spiræa arguta)*—C. E. F., 1916.
(Spiræa billiardii)—Prairie Nurseries, 1928.
(Spiræa alba).
(Spiræa bumalda).
(Spiræa froebeli)—Prairie Nurseries, 1928.
Oriental *(Spiræa media)*—C. E. F., 1928.
(Spiræa sorbilfolia)—Morden, 1928.
Van Houtte's *(Spiræa van houttei)*—Morden and C. E. F., 1928.

Of the six surviving species of spiræa, the snow garland appears to be perhaps the hardiest. It has bloomed successfully for a number of years, and can be fairly well recommended. Van Houtte's spiræa is a more desirable species but is not so reliable as to bloom, none being produced this year. Possibly sufficient protection can be provided by bending the tops over and holding them down with earth. The Oriental spiræa has been tried for only two years but promises to be entirely hardy and a free bloomer. *Spiræa froebeli, S. billiardii* and *S. sorbifolia,* all seem to be quite hardy but have been under observation less than two years. *S. froebeli* produces clusters of mauve flowers while the bloom of the two others is white. The sorbifolia is recognized as particularly hardy. Its foliage is attractive but its bloom not especially so.

SUMACH.—Smooth *(Rhus glabra)*—Morden, 1925 and Brooks, 1928.

The Sumach is a low-growing shrub producing leaves which become a beautiful, fiery red in the autumn. It is by no means completely hardy, but if well sheltered is worth planting for its colour effects.

TAMARACK OF LARCH.—Native *(Larix laricina)*—Local, 1916.
European *(Larix europæa)*—Morden, 1928.

Even under the adverse conditions of extreme crowding the native tamarack transplanted years ago from a swamp survived and made a fair growth. This year it was moved to a more favourable site and made a remarkable recovery. Given a fair chance it should be well worthy of background planting. Small specimens should be chosen for transplanting. The European larch would appear from present evidence to be unsuited, all the specimens set out in 1928 having died.

TAMARIX.—*(Tamarix pentandra)*—Brooks, 1928.

This is an attractive lace-like shrub sometimes called summer-flowering cypress. The "Hardy" sort is quite hardy, being but slightly tip-killed. It bears small needle-like leaves which are deciduous, and long, thin spikes of dainty pink flowers. The "Half-hardy" all killed out.

WILLOW.—Britzensis *(Salix alba chermesina)*—Morden, 1925.
Bronze golden britzensis *(Salix vitellina britzensis)*—Brooks, 1929.
Golden *(Salix alba vitellina)*—Morden, 1925.
Green *(Salix acutifolia)*—Morden, 1925.
Laurel *(Salix pentandra)*—Indian Head, 1922.
Red *(Salix* sp.*)*.
Russian Willow *(Salix* sp.*)*—Indian Head, 1921.
Weeping *(Salix alba niobe)*—Morden, 1928.

These five or six distinct willow species are all named from the colour of their barks. They can be successfully used in various combinations for colour contrasts. The hardiest are the native red and the green willows. The golden is moderately hardy and more attractive. The britzensis and the laurel willows appear to be the least hardy, but the laurel with its broad, dark-green, shiny leaves is perhaps during summer the most pleasing of all. The hardier species can be used to good advantage for wind-break plantings, supplementing taller-growing sorts.

Though grown successfully in other parts of the prairies, the Niobe weeping willow has been a notable failure here. Instead of growing into a tree and drooping downwards, the specimens commenced weeping at the ground level and so had to droop upwards. Moreover, each winter the great interlaced branches produced during the summer kill back to the ground, and the "crown" developed by the junction of many limbs has a tendency to rot and split. It is possible that severe pruning may yet make an attractive tree of it, but the hope makes heavy demands on optimism.

CHANGES IN NOMENCLATURE

By the courtesy of Dr. W. T. Macoun, Dominion Horticulturist, and Mr. W. R. Leslie, Superintendent of Morden Experimental Station, a number of corrections in nomenclature were made in the foregoing report. For the benefit of those who might possibly be misled or confused the changes made are listed below.

Picea borealis to *P. excelsa borealis* (M.).
Caragana frutescens to *C. frutex* (O.).
Caragana cuneifolia to *C. sophoræfolia* (M.).
Cotoneaster pekinensis—Peking contoneaster, Probable synonyms (O.).
Cotoneaster acutifolia—Viking contoneaster, Probable synonyms (O.).
Sambucus canadensis auera—Common Elder to American Golden Elder. (M.).

Variegated dogwood—*Cornus alba variegata* to *C. alba argentea marginata.* (M.).
Pyrus baccata to *Malus baccata.* (M.).
Hopa Crab now recognized as a *Malus niedzwetzkyana* seedling (O.).
Native beaked hazelnut—*Corylus* sp. to *C. cornuta.* (O.).
European Mountain Ash—*Pyrus aucuparia* to *Sorbus aucuparia* (M.).
Native Mountain Ash—*Pyrus* sp. to *Sorbus americana* (M.).
High Bush Cranberry—*Viburnum* sp. to *Viburnum trilobum* (M.).
Snowberry—*Symphorocarpus fructu alba* to *S. albus* (M.).
Spiræa frobelia to *S. froebeli* (M.).
Spiræa billardia to *S. billiardii* (M.).
Tamarix to *T. pentandra* (M.).
Britzensis willow—*Salix alba britzensis* to *S. alba chermesina* (M.).
Golden Willow—*Salix* sp. to *S. alba vitellina* (M.).
Green willow—*S.* sp. to *S. acutifolia.* (M.).

CLIMBING PLANTS

Climbing plants have not proven themselves so adaptable as have the shrubs. Eight species, including an annual, canary vine, have been tried and not all are entirely satisfactory. However, several have been found quite hardy, while several others may safely be used to create pleasing effects providing some pains are taken in their care.

BITTERSWEET.—American *(Celastrus scandens)*—D. and F., 1927.

Two plants set out in 1927 have made a very slow growth, tip-killing badly. It is possible that increased hardiness may result from a longer period of establishment and acclimatization.

CLEMATIS.—Golden *(Clematis tangutica)*—Seed, Georges Bugnet, 1925.
Native *(Clematis ligusticifolia).*

One of the most vigorous, persistent climbers is the golden clematis. It makes a dense, matted growth and produces a great many attractive golden flowers which are succeeded by white, downy tufts of seed. It is well adapted for screening a wood-pile, a garage, or an implement shed. Its greatest disadvantage is the mass of seed produced, which becomes untidy during the autumn and tends through volunteering to be a nuisance in the garden.

The species of clematis native in Southern Alberta is easily obtained and is far more attractive than a bare wall or fence. It is not, however, so showy as the golden species, the flowers being white and less conspicuous.

MATRIMONY VINE.—*(Lycium halimifolium)*—Morden, 1928.

The matrimony vine was received in 1928 from Morden, Manitoba, and for the first year grew rapidly. During the winter of 1929-1930, however, it was killed back severely, thus did not maintain its excellent showing. It is probable, however, that the root is quite hardy for during the past season it suckered extensively, sending up numerous shoots. Further experience is necessary before this climber can be recommended.

NATIVE HOP.—*(Humulus lupulus)*—Mrs. Mary Thompson, and Morden, 1928.

Though called a native hop, this species is not known to be native to the Peace River country, but to Manitoba. It is, however, probably the best-adapted and most generally useful of the climbing plants. It is completely hardy and makes a vigorous growth, attaining each year a height of 25 feet. It dies down to the ground in winter but starts growing early in the spring and makes exceedingly rapid progress. It is easily propagated by root divisions and is well worth planting.

ROSES.—Climbing.

Among the year's acquisitions were half a dozen climbing roses, comprising two each of Crimson Rambler, Dorothy Perkins and Chatillon Rambler, all received from the Horticultural Division of the Central Experimental Farm, Ottawa, Ontario. All but one bloomed.

Both the Chatillon Ramblers were for a time well laden with pink flowers.

Other climbing roses, also received from Ottawa, were two each of Gold Finch, Paul's Scarlet Climber and Climbing Dr. Van Fleet, none of which bloomed.

VIRGINIA CREEPER.—Self-fastening *(Ampelopsis quinquefolia,* var. *hirsuta)*—C. E. F., 1924.

Non-fastening *(Ampelopsis quinquefolia)*—Brooks, 1924.

The self-fastening Virginia creeper is unfortunately not quite sufficiently hardy to withstand the extremes of winter. The root survives, however, and each year the vine makes some progress, usually to be tip-killed the following winter. In 1930 an attempt was made to protect the tender tips by making a frame of stakes around the plant and filling the space between with straw. This may prove to be sufficient to bring the vines through the winter.

The non-fastening creeper seems more hardy, and where it does need protection can be more easily brought through the winter. By allowing the vines to climb up a screen of coarse-meshed wire, as chicken-wire, the whole thing can be rolled down, if thought necessary, and banked over with dirt. By this means, providing care is taken in rolling and unrolling the wire so as not to break the vines, considerable satisfaction can be obtained from the planting of this variety. Both types should be planted on the sheltered side of the house if possible, and in such a situation the non-fastening variety may often winter fairly well without special protection.

BEES

WINTERING 1929-1930

Eight colonies of bees, including two which comprised a two-storey hive, were prepared for the winter in the autumn of 1929. Three of these were packed outside in a quadruple wintering case and five were stored in the cellar of the Superintendent's residence.

All colonies had queen excluders above and below to keep out mice. They also had folded newspapers placed on top of the upper excluder, to absorb any moisture given off by the hive during the winter.

Feeding, which had been delayed by a September snowstorm, was commenced October 16. About 120 pounds of granulated sugar were fed to the eight colonies. The colonies were carried into the cellar and packed in the wintering case November 19, final arrangements being completed the following day.

In addition to the arrangements already mentioned the colonies placed in the cellar had the lids staggered forward a few inches to improve the ventilation. Those packed in the quadruple wintering case had the excluders and newspapers placed in them, a shavings quilt tucked in over all, loose shavings filled in around the edges, and a few bags of chaff laid in to fill up the space. November 20 chaff, etc. was packed under the case. The latter was swathed with tar paper, and earth was banked about the lower edge.

The double colony was quite active and remained so during most of the winter. Possibly that is the reason why both colonies in the double hive died during the winter. Of the eight colonies prepared for the winter these were the only two that died. Five of the remaining six came out fairly strong in the spring, and one emerged in a rather weak and depleted state.

SPRING NOTES

First activity of the outside bees was noticed April 22, when they were observed bringing in pollen. On that day the cellared colonies were carried out and placed in vacant quadruple wintering cases. The following day the first spring examination of all colonies was made.

Wintering outdoors gave a higher percentage of surviving colonies with a greater strength in active bees and considerably more brood and eggs than did cellar-wintering. These observations accord fairly well with those of the previous year, 1929, when, however, the spring strength in bees was much greater in the cellared colonies.

Early in May six two-pound packages of bees, with queens, were received from Alabama. All married safely and were introduced to their new homes in the accustomed manner, viz. by removing the syrup can, placing the wire cage upside-down on a small block in a hive with four or five frames, and suspending the queen in her small cage between two of the frames. The total cost of the bees, queens, express and customs clearance was $6.52 per package colony. The itemized expenses were as follows:—

6 3-pound packages of bees at $4 per package	$24 00
6 untested queens at $1 each	6 00
Express on two cartons bees	7 52
H. T. Higinbotham (arranging customs clearance of bees)	1 60
Total cost of bees (including freight and customs clearance)	$39 12

Cost of one package, $6.52.

On May 10 the new package colonies were examined when it was found that, in spite of fairly favourable weather, the bees were reluctant to leave their cages, and were not particularly interested in releasing their queens—only one of the queens having been freed. Therefore the queens were all released by prying the wire loose, while in the evening the bees were shaken out of their cages.

Allowing for the unusually backward weather conditions throughout May and June the colonies built up fairly well. From May 24 to the end of June nearly six inches of rain fell, most of the days being cold, dull and windy.

During an examination on July 23 a little sac brood was discovered in two of the colonies. This was apparently controlled by natural agency as none was noticed at later examinations.

About the middle of May the Manitoba maples were being worked by the bees, and shortly afterward the sand-cherries, currants and fruit trees supplied some pollen and nectar. On June 4 the saskatoons were in full bloom, while June 15 found the caragana bloom at its height.

On July 23 the wintering cases were removed from the colonies that had been quartered in them, and the rough board shelters surrounding the cellared and package colonies were taken away. On July 3 one of the outdoor-wintered colonies was placed on scales.

MANIPULATION

For various reasons comparatively little manipulation was attempted during 1930.

Several colonies were requeened by supersedures. However, only one swarm was experienced, July 23, when a very strong colony which had previously superseded its old queen, attempted to force an increase in the apiary by natural multiplication. However, the swarm was hived and returned to its parent colony.

The method used to control swarming was the laborious but efficient one of destroying the queen cells and providing ample room.

Just previous to feeding, one package colony, which was low in stores and queenless was united with another weak package colony.

WINTERING 1930-31

Unusually early and persistent cold weather delayed the removal of supers and feeding, which latter was not commenced till October 25. Moreover, as further cold weather intervened, absorption of the syrup was not entirely satisfactory and feeding had to be terminated November 6.

In all 160 pounds of granulated sugar syrup were fed to eleven colonies, of which four were package colonies, one was a combination of two package colonies, five were overwintered colonies, and one a union of an overwintered colony with the nucleus.

Three of the colonies are stored in the cellar of the Superintendent's residence and eight are packed outside in quadruple cases.

THE HONEY CROP

Considering the adverse weather conditions throughout the season, the honey yield, though not all that might be desired, was not exactly disappointing.

As has been mentioned, May and June were cold and rainy with considerable wind. July and August were quite warm and arid, the anticipated nectar flow being dried up during the forepart of August. September and October brought many cool, cloudy days. Altogether it was a season quite unsuited to the garnering of a large supply of honey.

The colony which was placed on scales July 3 showed no increase until July 9. From then it registered a fairly steady gain in weight to a maximum on August 12, after which it exhibited an equally regular, though much smaller daily loss. Thus the honey flow lasted just over a month, July 9 to August 12.

The greatest daily gain was $7\frac{1}{2}$ pounds, recorded for each of the two days August 6 and 7. August 8 with $6\frac{3}{4}$ pounds and August 4 with 6 pounds are the only other days showing a gain of 6 pounds or more. During September only two days, September 7 with $1\frac{1}{4}$ pounds and September 8 with $\frac{1}{4}$ pound, produced any gains in weight.

Nevertheless the twelve colonies produced something over 600 pounds of honey, an average of over 50 pounds per colony. Five hundred and sixty-eight pounds were packed in five-pound pails while about 15 pounds were served at picnics during the year. Approximately 35 pounds were stored in comb-honey sections, of which however, only twelve were marketable, as the remainder were not sufficiently well filled.

The bulk of the honey was derived from clovers and alfalfa, fireweed and wild flowers. It was well ripened, of a very light amber colour, and of a medium mild flavour.

The averages from five colonies of package bees and from four wintered colonies were hardly significantly different.

Conditions conduced to an exceptionally successful installation of packages and there is little doubt that considering both labour and consumption of stores the packages were this year more convenient and profitable than the over-wintered colonies. This, however, might not always prove true and since in cases of queen losses in shipment it would be of great advantage to have a few queen-right colonies with which to unite orphaned packages, it is probably sound practice to pack at least some of the strongest colonies each autumn. It seems quite feasible to strengthen the apiary by the purchase of packages.

EXTENSION AND PUBLICITY

Extension work made heavy demands. During the year the Superintendent travelled over fifteen thousand miles. He addressed 36 meetings within the territory especially served by the Station. Eight of these were afternoon meetings with an average attendance of 42. Twenty-eight were evening meetings with an average of 94. The total attendance was 2,972, averaging 82·5 per meeting. The duration was seldom less than two hours and practically all the talks were illustrated with lantern slides, chiefly of views taken on the premises.

Eight meetings were addressed in Vancouver, Victoria and the Lower Mainland of British Columbia under the auspices of the "On-to-the-Peace Association," more than a thousand people being thus reached. Lantern slides were used except at a couple of business men's luncheons.

Briefer addresses were delivered at sundry functions, both east and west, bringing the year's aggregate audience up well over four thousand.

Two new Illustration Stations were established and supervised along with the one continuing at Baldonnel, in the Fort St. John district.

In July a trip to Herschel Island was made in one of two R.C.A.F. seaplanes. The purpose was to visit Experimental Sub-Stations in the Mackenzie district, to report upon the advisability of extending work in that field and to get in touch with men who might be interested in conducting it. The trip occupied practically a month and involved travelling 1,470 miles by train, 4,015 by air and a hundred or so by automobile. A large amount of accurate data was accumulated and supplemented by correspondence. All told, about three months' time was devoted to this inquiry, including the recording and checking of data and the preparation of a report, which recommends the development of a system of co-operative experiment in that promising region, where agriculture and horticulture are likely some day to find a home demand created by mining and other activity, and where fur farming holds large possibilities.

Under the heading "Timely Hints from the Beaverlodge Substation" a weekly budget of discursive and practical items has for nearly three years been sent out to the Northern newspapers. Five local weeklies now use it in toto and two provincial papers in part. Many encouraging letters concerning this feature are received. Twelve press articles were prepared for the Division of Extension and Publicity and two for "Seasonable Hints," while eleven articles were written at editors' special requests. In all, 73 articles were prepared, besides numerous news items.

A hundred good photographs were taken, including about fifty obtained on the Northern trip.

A mailing list in the neighbourhood of twelve or fifteen thousand names has been built up.

Crop reports were sent regularly to half a dozen departments and commercial institutions.

The Staff judged one field-crop competition and two seed fairs, assisting at a third.

The usual number of visitors were welcomed, including four good-sized neighborhood picnics and the "New Outlook Special" party of 200 members. Other visitors included His Honour, Lieut.-Governor Randolph Bruce, of British Columbia, and party; F. H. Kitto; Dr. Ray E. Neidig and Mr. R. I. Hamilton, Chief Assistant, Division of Forage Plants, Central Experimental Farm, Ottawa. The Minister of Agriculture, Deputy Minister, and the Director of Experimental Farms were conspicuously missed.

Seed was put up for fifteen farmers co-operating in the trial of forage crops and for twenty-seven rod-row co-operative experiments with grain.

Thirty-three farmers' experiments with phosphates were supervised in co-operation with A. R. Judson, then District Agriculturist, and in the autumn the crop of the twenty men who had applied phosphate to cereals was threshed, weighed and reported from the Station.

Correspondence showed healthy growth, amounting to 2,723 letters received and 3,505 dispatched, along with 612 circulars.

Distribution of planting material comprised 173 packets of ornamental and flower seeds and 388 packages of nursery stock, besides sundry donations to callers.

Minor service was rendered in the several respects in which every Experimental Station is expected to serve.

Over and above the preparation of the annual report, the equivalent of at least one man's full time was occupied with Extension work and special assignments.

There is no use wasting fuel on a hidden lamp.

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