DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL SUB-STATION

BEAVERLODGE, ALBERTA

REPORT OF THE SUPERINTENDENT

W. D. ALBRIGHT

FOR THE YEAR 1924

HOUSE AT BEAVERLODGE PROTECTED BY A SHELTER-BELT OF MANITOBA MAPLE AND OTHER TREES

Printed by authority of the Hon. W. R. Motherwell, Minister of Agriculture,

Ottawa, 1926

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DOMINION EXPERIMENTAL SUB-STATION, BEAVERLODGE, ALBERTA

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INTRODUCTION

According to the weather instruments, 1924 was favoured with rather more than a normal precipitation. In point of fact it was the driest crop year on official record in the Upper Peace River country.

Climaxing two preceding dry summers, it opened with an empty sub-soil reservoir. While the snow went slowly to the accompaniment of April flurries, which helped to keep the knolls damp, the total percolation was inadequate to support good growth very long. May and June together brought barely over an inch of rain, distributed chiefly in drizzles, never soaking the soil to any effective depth. The first two weeks of July produced one sprinkle, too light to record.

Pastures bleached white. Only among the scrub and in other sheltered places was there a good green bite, though cows on free range held up in their milk flow better than might have been expected. Hay was almost a complete failure. Grain just about stood still, then after holding its colour longer than might have been anticipated, began turning red, and by the end of June heading on the knolls at six inches or less in height. In the hollows it was a trifle longer, but everywhere very short. White tip was common in the wheat.

To make matters worse, the grasshopper plague, which wet weather had been desired to curtail, assumed alarming proportions; the short crop being threatened with extinction. An energetic campaign of poisoning was prosecuted, promoted by the Provincial Department of Agriculture through its District Representative, Mr. A. R. Judson, and most of the grain crop was saved, though not without more or less injury. According to Mr. Judson, two hundred tons of poisoned bait was spread in the Grande Prairie district; some sixty or seventy tons north of the Peace, and a little in Spirit River district. The burden of distribution was rendered heavy by the fact that the sparse rural population had to cover so much unbroken intervening land, which constituted ideal breeding grounds for the pest.

The drouth conditions were general over the Upper Peace River country and extended in degree down the river to Fort Vermilion. North of the river an extra depth of snow, lying late and soaking well into the ground, had postponed the severest effects of the dry weather. In Pouce Coupe, at Peace River town, and again east of the Smoky river in the Falher-McLennan neighbourhood, conditions were ameliorated by earlier rains than broke the drouth elsewhere, but in varying degree aridity was prevalent. The Fort St. John, Grande Prairie, and Spirit River districts were perhaps the driest.

The two former areas were also visited by a particularly abundant infestation of the locusts, assisted in their attentions to the crops by wireworms and cutworms in certain instances. Heel flies had commenced troubling the cattle in May.

There was little to complain of in the matter of temperatures, which, in contrast to reports from the older Prairie Provinces, were rather above normal. Only water was lacking.

At last on July 14, when some of the rivers were running dry and conditions seemed desperate, a thunderstorm brought an inch and a half of rain, followed by further showers, raising the July total to 1·91 inches. Frequent downfalls in August totalled 4·6 inches, followed by light showers in September.

The magic of Peace River growth occurred. Grasshopper injury was arrested. Pastures became luxuriant. Potatoes sprang into vigorous top growth. Oats and barley sent up strong, suckering stems, clothing knolls and hollows almost uniformly, in marked contrast to the irregular level of the first heads. Wheat did not sucker much and yielded a very light straw crop in consequence, though possibly more pounds of ripe kernels than were threshed from the coarse grains, whose secondary shoots failed to mature. Winter wheat and rye appeared to some advantage against the spring grains. In some favoured localities north of the Peace there were spring wheat yields running up to forty bushels, but these areas were localized.

During the drouth the one bright feature of the situation was the showing of cultivated small fruits and flowering shrubs, which, thanks to the retention of snow banks by shelter belts and manure, had the benefit of thorough spring soil-saturation, and achieved the best performance in the history of the Station.

The poor crop was garnered in a poor harvest season. Excellent weather around the middle of September induced producers to let the bulk of their oat crop stand in the hope that the late stems would yield some grain. Suddenly, on the morning of the twentieth, broke a temperature varying from twenty-four degrees Fahrenheit at the Station down to as low as sixteen on certain adjacent low-lying areas. This was succeeded by three days of rain, sleet, and snow, perioded by harder frost on the morning of the twenty-sixth.

Thenceforward the harvesters were beset with rain, snow, warm, muggy weather and frost by turns. Nearly all the late-gathered oats were "ricked" in long piles as wide as the length of two sheaves. There were few farms without steaming piles of feed. Even the early-threshed wheat graded tough or damp in most cases.

However, the worst fears were not realized. The heated feed nearly all escaped destruction and in most cases the cattle ate it better than was expected. Those husbandmen who had carried forward cheap seed and feed grain from the crop of 1923 and who had stock to consume the bundles of the 1924 crop did fairly well financially, though none got rich.

SOIL TEMPERATURES, SUMMER AND WINTER

Some very interesting records are being obtained by means of the soil thermograph installed in May, 1922, with the bulb placed three inches under the surface of bare fallow land. In this position it has been continued ever since, except from October, 1923, to May 13, 1924, during which time it was lifted for repairs.

The highest soil temperature occurred on July 25 at 6 p.m. when the register was 71.5 degrees Fahrenheit. This was not the occasion of the highest atmospheric temperature, which was 91 degrees on July 1. On that day the soil temperature was only 67 degrees, in spite of the fact that the weather then was bright, warm, and hot, having continued so for some days.

Study of the table goes to confirm the hypothesis advanced in early reports of this Station that during a comparatively brief proportion of the summer is the soil temperature high enough to favour rapid decay and nitrification of organic matter; hence that soluble nitrogen must often become a limiting factor of some importance in controlling crop yields. This was not true to so great an extent as usual in 1924 since the soil temperature was above normal while the moisture supply throughout the growing months of May, June, and July was away below

normal, so that in 1924 moisture rather than nitrogen became preponderantly the limiting factor in plant sustenance. However, it is to be noted that even in this warm, dry year the soil temperature never approached the optimum point for nitrification (about blood heat) and was generally far below that point.

Turning to another phase of the subject, attention is directed to the fact that during the sub-zero air temperatures of November and December, the thermometer once reaching forty below in the latter month, the soil thermograph did not drop lower than 19 degrees Fahrenheit, which it touched at 6 p.m. on December 28. This goes to suggest why winter wheat, alfalfa, small fruits, and other perennial crops are being successfully raised in the Peace River country. Undoubtedly it is largely owing to the protective influence of snow.

TABLE showing the number of days in each month of 1924, from May 13 to December 31, that the soil temperature, as registered by a Friez thermograph with bulb three inches beneath the ground surface, rose at any time above specified temperatures.*

Month	Days above 40° F.	Days above 45° F.	Days above 50° F.	Days above 55° F.	Days above 60° F.	Days above 65° F.	Days above 70° F.
May (from 13th)	19	19	13	1	0	0	0
June	30	30	27	15	6	1	0
July	31	31	31	30	17	8	1
August	31	31	28	16	7	5	0
September	25	20	13	8	0	0	0
October	2	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0

*NOTE.—This table represents maximum readings only, not means.

PRECIPITATION AT BEAVERLODGE, 1916–1924

—	1916	1917	1918	1919	1920	1921	1922	1923	1924	Average 9 years
January	0·70	2·50	1·12	0·65	3·85	1·40	1·75	0·70	1·20	1·54
February	0·30	1·00	1·20	0·70	0·20	0·97	1·75	0·0	0·44	0·73
March	1·45	0·95	1·36	1·95	2·12	1·20	1·20	1·60	1·40	1·47
April	0·09	0·37	0·60	0·82	1·82	0·03	0·10	0·23	0·15	0·47
May	0·21	6·62	0·22	1·04	1·15	1·65	2·11	0·23	0·45	1·52
June	0·45	1·02	2·29	2·48	3·17	2·04	0·38	1·26	0·60	1·52
July	3·98	0·41	3·59	2·22	2·52	1·89	0·44	3·65	1·91	2·29
August	0·47	0·88	1·71	2·14	2·66	2·51	0·54	0·92	4·60	1·82
September	0·52	0·21	0·42	1·78	1·80	2·69	1·44	0·37	1·43	1·18
October	0·56	1·82	0·97	2·18	1·65	0·67	0·61	0·18	1·99	1·18
November	0·10	0·39	0·55	2·34	0·43	0·91	0·78	0·12	1·43	0·78
December	1·50	2·60	1·10	1·78	0·75	0·60	0·80	0·50	1·57	1·24
Totals	10·33	18·77	15·13	20·08	22·12	16·56	11·90	9·76	17·17	*15·76

*Average calculated from an aggregate of nine years' precipitation, hence not a precise sum of vertical column above, on account of dropped decimals.

Month	Temperatures—Degrees Fahrenheit							Precipitation			Evaporation	Total sunshine	Sleighing
	Highest	Date	Lowest	Date	Average monthly maxima	Average monthly minima	Average monthly means	Rainfall	Snowfall	Total precipitation			
								inches	inches	inches	inches	hours	days
January	46	27	−26	18	16·38	− 2·87	6·75	.....	12·0	1·20	.....	81·4	31
February	46	26 & 27	−21	19	29·27	11·55	20·41	0·14	3·0	0·44	.....	112·4	29
March	47	6	− 4	29	35·19	16·61	25·90	.....	14·0	1·40	.....	150·3	31
April	71	27	11	3	46·37	26·23	36·30	.....	1·5	0·15	.....	205·0	9
May	82	13 & 14	28	8	65·71	37·90	51·80	0·45	.....	0·45	*4·34	279·8	0
June	89	30	34	18 & 21	68·03	42·23	55·13	0·60	.....	0·60	3·98	268·7	0
July	91	1	34	30	73·84	48·16	61·00	1·91	.....	1·91	4·64	253·9	0
August	84	10	32	30	66·67	43·09	54·88	4·60	.....	4·60	2·77	213·8	0
September	78	5	19	26	59·56	39·66	49·61	0·93	5·0	1·43	1·68	158·1	0
October	62	22	17	31	48·68	31·26	39·97	0·99	10·0	1·99	†1·10	104·6	0
November	53	28	−15	9 & 10	31·16	15·56	23·36	0·43	10·0	1·43	.....	80·2	0
December	42	11	−41	16	12·67	− 6·96	2·85	.....	15·7	1·57	.....	91·4	27
Totals	.....	.....	.....	.....	.....	.....	.....	10·05	71·2	17·17	‡18·51	1,999·6	127
Averages	.....	.....	.....	.....	46·12	25·20	35·66						

Highest temperature for year 91° Fah.
Lowest " " −41° "

*From 3rd to 31st. †To the 25th.
‡From May 3rd to Oct. 25th.

SUMMARY OF TEMPERATURE RECORDS, BEAVERLODGE, 1916–1924

Month	1924				1923				1922			
	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days
	Highest	Lowest			Highest	Lowest			Highest	Lowest		
January	46	−26	6·75	31	33	−29	5·24	31	42	−29	13·85	31
February	46	−21	20·41	29	47	−42	12·67	26	40	−30	0·19	28
March	47	− 4	25·90	31	45	− 9	22·83	26	47	−20	16·28	31
April	71	11	36·30	9	72	0	37·94	9	72	8	36·14	7
May	82	28	51·80	0	75	24	48·85	0	83	28	48·30	0
June	89	34	55·13	0	81	37	59·18	0	86	26	57·11	0
July	91	34	61·00	0	83	34	59·25	0	86	37	60·43	0
August	84	32	54·88	0	82	32	58·43	0	85	34	62·24	0
September	78	19	49·61	0	85	24	51·55	0	77	30	50·16	0
October	62	17	39·97	0	78	2	43·37	0	67	17	41·30	0
November	53	−15	23·36	0	60	1	33·83	0	50	− 5	26·63	0
December	42	−41	2·85	27	44	−29	18·81	19	44	−35	7·79	29
Averages			35·66				37·66				35·03	
Total days' sleighing				127				111				126

SUMMARY OF TEMPERATURE RECORDS, BEAVERLODGE, 1916–1924—*Con.*

Month	1921				1920				1919			
	Extremes Deg. F.		Average Monthly Mean	Sleighing days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days
	Highest	Lowest			Highest	Lowest			Highest	Lowest		
January	40	−26	5·95	31	42	−47·0	2·47	31	46	−14	22·11	31
February	48	−22	19·05	28	45	−12·0	23·35	29	38	−31	7·66	28
March	48	−22	18·85	31	47	−22·0	18·94	31	47	−34	10·24	31
April	64	18	39·53	5	50	−12·0	27·51	30	70	24	40·79	0
May	77	27	48·18	0	69	20·0	42·65	6	75	17·5	45·01	0
June	75	31	54·89	0	76	31·0	51·54	0	83	24	51·04	0
July	77	34	57·86	0	89	40·0	62·78	0	86	40	58·27	0
August	80	35	55·29	0	86	32·5	57·80	0	77	31	56·40	0
September	73	21	45·54	0	72	28·0	45·75	0	75	23	50·60	0
October	70	20	42·54	0	58	14·0	36·25	0	63	−10	28·60	10
November	50	−17	16·76	0	52	2·5	25·05	0	47	−24	12·60	30
December	51	−30	17·65	18	37	−20·0	10·60	31	45	−35	12·64	31
Averages			35·17				33·64				32·99	
Total days' sleighing				113				158				161

SUMMARY OF TEMPERATURE RECORDS, BEAVERLODGE, 1916–1924—*Con.*

Month	1918				1917				1916				Average	
	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Extremes Deg. F.		Average Monthly Mean	Sleighing, days	Average Monthly Mean	Sleighing days
	Highest	Lowest			Highest	Lowest			Highest	Lowest				
January	44	−36	7·29	31	45·0	−52·0	2·21	31	26·0	−48·5	−15·31	31	5·62	31·0
February	43	−34	8·33	28	47·0	−46	4·60	28	55	−33·0	15·88	29	12·46	28·1
March	48	−27	18·38	31	42·5	− 1	21·36	31	49	−19	17·37	24	18·91	29·6
April	65	3	38·03	14	57	7	34·53	11	62	21	40·38	0	36·79	9·4
May	76	22	45·57	0	78	17	45·59	0	73	24	48·11	0	47·12	0·6
June	78	30	53·83	0	78	35	53·31	0	82	25	57·28	0	54·81	0
July	89	29	57·70	0	84	32	59·37	0	79	34	55·67	0	59·15	0
August	75	35	56·93	0	84	30	56·49	0	83·5	27	55·66	0	57·12	0
September	78	25	53·19	0	78	19	48·05	0	77·5	27	49·15	0	49·29	0
October	66	10	37·40	0	71	3·5	36·90	2	71	17	41·12	0	38·61	1·3
November	54	−1	26·66	0	65	−14	38·00	0	51	−12·5	26·38	0	25·36	3·3
December	43	−17	19·06	31	42	−44	−12·35	31	39	−36·5	6·60	14	9·29	25·6
Averages	.....	.....	35·19	.....	.....	.....	32·33	.....	.....	.....	33·19	.....	*34·54	.....
Total days' sleighing	.....	.....	.....	135	.....	.....	.....	134	.....	.....	.....	98	.....	†128·9

*Average of vertical column above.
†Total of vertical column above.

GRASS SEED PRODUCTION

A line of production to which the work of the Beaverlodge Station has consistently pointed is the raising of grass and other high-priced seeds. It is gratifying to record that following the winning in 1923 by one Grande Prairie settler of third prize for hard red spring wheat at the International Hay and Grain Show, Chicago, another one, Robert Cochrane, of Grande Prairie, has this year obtained the same rating on timothy seed. Mr. Cochrane has been specializing on this for years as a commercial crop and grows it by the hundreds of acres, finding the seed crop profitable even when the growth of forage is very light.

GRAIN SHIPMENTS

We are under obligations to the railway officials for co-operation in compiling estimates of the grain and live stock shipments from Alberta stations north of Edmonton. Mr. R. H. Bell, Division Freight Agent of the Canadian National Railway, has furnished separate figures for the St. Paul, Athabasca, Whitecourt, and St. Albert-Magnolia sectors, respectively, of the Canadian National. Mr. J. Callaghan, Deputy Minister of Railways for Alberta, supplies similar figures for the Alberta and Great Waterways, while Mr. J. A. Macgregor, Manager of the Edmonton, Dunvegan and British Columbia Railway has been at pains to furnish, at our request, statistics by districts for the lines of which he has charge.

The table prepared from their information sets forth that 8,374,916 bushels of wheat and coarse grains were shipped out over these several lines, representing the crop year of 1924. Shipments over the Dunvegan line amounted to 1,559,568 bushels wheat and 1,334,755 of oats, or a total of 2,894,323 against 4,828,298 for the eleven months representing the statistical crop year of 1923. Production fell off particularly in the Grande Prairie district, from which grain shipments were hardly a third of those representing the crop year of 1923. In view of the character of the season it is surprising they held up as well as they did.

Mr. Macgregor appends to his statement a footing of the total grain shipments over the Dunvegan lines substantially representing the past four crop years. The duration of the first two shipping periods is not indicated, but we infer that the figures for 1921 cover the period between September 1, 1921, and June 24, 1922, as cited in our 1922 report.

SHIPMENTS OF GRAIN OVER THE EDMONTON, DUNVEGAN AND BRITISH COLUMBIA RAILWAY

	bushels
From the 1921 crop	3,501,500
" 1922 "	788,500
" 1923 "	4,828,298
" 1924 "	2,894,323

TABLE OF GRAIN SHIPMENTS BY DISTRICTS BETWEEN AUGUST 1, 1924 AND JULY 31, 1925

—	Wheat	Other grains	Aggregate
	bush.	bush.	bush.
From twelve points between Edmonton and the Athabasca river (E. D. & B.C. Railway)	620,090	845,361	1,465,451
From five points between the Athabasca and Smoky rivers (E.D. & B.C. Railway)	26,863	256,208	283,071
From five points west of the Smoky river and tributary to Spirit river (the principal winter depot of Pouce Coupe) (E.D. & B.C. Railway)	117,766	63,513	181,279
From five points in the Grande Prairie district (E.D. & B.C.)	356,536	154,780	511,318
From eight points on the Central Canada (chiefly north of Peace)	438,313	14,893	453,206
Totals on E. D. & B.C. and Central Canada Railways	1,559,568	1,334,755	2,894,323
Alberta and Great Waterways	279,911	*360,682	640,593
From stations on St. Paul line (Canadian National)			2,236,000
" " Athabasca line (Canadian National)			1,697,000
" " Whitecourt line (Canadian National)			351,000
" " St. Albert-Magnolia line (Canadian National)			556,000
Totals on Canadian National lines north of Edmonton			4,840,000
Grand total all lines			8,374,916

*Comprising 221,892 bushels oats and 138,790 bushels barley.

GROWTH OF DAIRYING

Dairying has been making rapid growth in the northern part of Alberta during the last few years. In 1924 ten creameries were operating in the province north of the latitude of Edmonton, besides one at Pouce Coupe just on the British Columbia boundary in the Peace River block. The 1924 output of the ten Alberta creameries is reported by Mr. C. Marker, Provincial Dairy Commissioner, Edmonton, as 1,385,166 pounds of butter, with a selling value at the factories of $427,800. The addition of the Pouce Coupe make raises these figures to 1,421,086 pounds of butter with $437,513.02, at the point of manufacture. Inclusion of dairy butter would raise the value well over the half million mark.

Referring particularly to the five Alberta creameries shipping over the Dunvegan railway, Mr. Marker's staff estimated that the 1924 production showed an increase of more than 68 per cent over 1923. The value figured out to an average of 30.7 cents per pound.

LIVE STOCK SHIPMENTS

Along with a sixty-eight per cent increase in the make of creamery butter in the five Alberta creameries on the Dunvegan lines was a very substantial augmentation on the shipments of live stock, especially hogs. The increase in hog shipments not only reflected the growth of dairying and the good crop of low-priced grain in 1923 but also, probably, represented a rather heavy liquidation of breeding stock, particularly sows, due to the scant and valuable grain crop of 1924. Had the settlers been in a position to carry forward a larger proportion of the cheap crop of 1923 and market it during 1924-25 in the form of high-priced animal products, a considerably greater value would have been ultimately derived from the 1923 production, while they would also be in a better fortified position to face the future. Good breeding stock is more easily sacrificed than replaced.

From the detailed figures kindly furnished by Mr. Macgregor it is learned that the Dunvegan line's shipments during 1924 showed considerably more even distribution throughout the twelve-month than in 1923, although forty per cent of the cattle were still shipped during the three low-priced months of September to November, inclusive.

STATEMENT of Cattle, Calves, Hogs, Sheep, and Horses shipped from points on the Edmonton, Dunvegan and British Columbia and Central Canada Railways during 1924. Summary by districts

Commodity	Edmonton to Athabasca River	Athabasca to Smoky River	Smoky River to Spirit River	Roycroft to Wembley (chiefly Grande Prairie dist.)	McLennan to Whitelaw (chiefly north of the Peace)	Grand total
Cattle	3,092	1,459	1,998	5,335	5,114	16,998
Hogs	6,994	3,640	3,292	9,883	8,350	32,159
Calves	118	33	54	149	.....	354
Sheep	1,018	96	24	379	190	1,707
Horses	87	54	68	101	17	327

LIVE STOCK SHIPMENTS—SUMMARY PRESENTING STATISTICS FROM ALL THE RAILWAYS

—	Number of Head each Class					Cars
	Cattle	Calves	Hogs	Sheep	Horses	
Dunvegan lines, tapping chiefly the Peace River district	16,998	354	32,159	1,707	327	
A. & G.W. Railway, running northeastwardly from Edmonton	2,200	.....	4,447	90	140	183
Three Canadian National branches north of Edmonton	*18,886	.....	83,334	1,366	350	1,842
Totals all lines north of Edmonton	38,084	354	119,940	3,163	817	
Total cattle and calves	38,438					

*This figure includes calves, of which no separate count was kept.

HORTICULTURE

That horticulture may to a certain extent solve its own moisture problem by utilizing snow was well demonstrated in 1924, when the showing in fruits, trees, and flowering shrubs was for months the one encouraging feature on the Station. As the windbreak plantation grows and thickens it holds increasing depths of snow. It has been the practice, after this has accumulated to a depth of a foot or so, to broadcast manure upon it. This makes for further accumulation and retards melting during winter chinook periods as well as in the spring. When the spring thaw occurs the snow melts first in the spaces between the clumps of manure and the bare ground in these spaces thaws out to some depth. Meanwhile the sun and warm air gradually eat away the snow still lying a foot or so deep beneath the lumps of litter. This last snow, as it melts, gradually soaks into the thawed ground between. Of course, while this is slowly taking place, the surface soil is not drying out as in the case of land bared early in the spring. Instead it is accumulating a reserve. Thus it came that when fields had little more than enough moisture for germination of the grain sown on them, the orchard and small-fruit plantation had its soil saturated to a depth of fully a foot, if not two or three times that, and throughout the acute drouth, lasting to mid-summer, one could easily kick up damp earth.

In addition to their effect in holding snow, the trees and shrubs reduce evaporation by checking the drying winds, besides directly shielding the sheltered blossoms, fruit, and foliage from lashing. The primary importance of a windbreak for western homes is not easily over-estimated.

Mr. P. Flint, gardener, has largely compiled the report on vegetables, flowers, and fruits.

POTATOES

About three hundred two-hundredth-acre plots of potatoes were grown experimentally in 1924. With the exception of the Date-of-Planting test, which for convenience was planted near the buildings, the plots were laid out on well-worked summer-fallow where cereal plots had been grown in 1922.

Thanks to fallow preparation and uniformly sloping land the germination was reasonably prompt and regular, and at digging time gaps in rows were exceedingly rare save in two or three cultural experiments where the treatment of certain plots was such as to result unfavourably. Even with good preparation and culture, the potatoes were in desperate need of moisture when the rainy weather commenced in mid-July. From then until September 20 growth was phenomenal, and excellent yields were obtained, though the tubers were inclined to be watery or soggy. Severe frost on the date mentioned cut the rank tops down.

Three hundred plots of potatoes under test at Beaverlodge.

VARIETY TESTS

Thirty distinct varieties of potatoes were compared in quadruplicate, besides four strains of certified Irish Cobblers, supplied by the Division of Botany two years ago, and fifty-one strains representing hill selections of certain kinds made at Beaverlodge Station in times past.

The outcome of the variety test is puzzling in more respects than one, but in nothing more than in the matter of comparative table quality. For instance, the staff have previously considered that the outstanding virtue of Wee McGregor

was the colour, texture and especially the flavour of its flesh, yet the 1924 cooking trial rated this variety almost at the bottom of the list, although, conversely, a subsequent trial of one of the selected strains of it turned out quite satisfactory. Possibly the table quality of this variety improved during storage. Again, the Early Ohio grew large, rough, and red and was badly discounted by the cooking test, though this is a potato of high repute. The Division of Botany's certified strains of Irish Cobbler earned favourable opinion, while Early Rose and Country Gentleman scored well up as usual. The Houlton and Everitt Rose, on the other hand, were at a discount, being rough and red-fleshed, cooking dark and soggy.

This matter of cooking quality, however, is a difficult one to judge satisfactorily, for several reasons. In the first place it varies markedly with the soil type. It follows that before a really fair table-comparison of varieties can be made, samples must be obtained from like soil types. Then again, it is suspected that frost effect on the vines may influence the matter, and, if so, may vary with the degree of maturity. Wet or dry weather probably acts differently upon varieties of diverse characteristics and different periods of maturation.

Perhaps the most reliable data is that relating to yields. In the list of 1924 yields British Queen, a rather widely popular white potato, stands at the top with 481 bushels per acre; Early Ohio second with 479; Burbank third with 456; Bovee fourth with 451, followed by Country Gentleman 447; Everitt Rose and Carman No. 1, each 437; Early Hebron 432; Epicure 430; American Wonder 427; Houlton Rose 423; Empire State 420; Gold Coin 418; Green Mountain 414; Wee McGregor 408; Morgan Seedling 402, etc.

Early Norther heads the list of seven varieties in a seven-year average, followed in turn by Country Gentleman, Gold Coin, Early Rose, Irish Cobbler (Lacombe strain), Table Talk, and Wee McGregor, the last being usually a low yielder.

Without venturing any final opinions as yet the Station would be inclined, in the light of results to date, to narrow the list of its recommendations by elimination of the following sorts, for reasons stated:—

Cow Horn—Low yield, poor shape, and very hard to dig.

Bluenose—Undesirable colour, low yield and hard to dig.

Table Talk—Too late to mature fully, except in the most favoured districts, though a good exhibition type; very smooth. Has root-stocks of too adventurous a disposition.

Irish Cobbler (Lacombe strain)—Same objections as to Table Talk but in somewhat less degree. Identity of this stock questioned by experts.

Early Norther—Coarse; very undesirable colour and quality in some seasons.

Houlton and Everitt Rose—Same objections as to Early Norther though in somewhat less degree.

Green Mountain—Rather late.

Iron Chief—Too late for district.

American Wonder—In some seasons a bit coarse and rather inferior in cooking quality; texture soapy.

Manitoba Wonder—Nothing wonderful as grown as Beaverlodge.

Country Gentleman and Bovee are medium-early, red potatoes of very similar type and quality which have given good account of themselves at the Station and the former usually, though not invariably, on other farms to which sold.

As an early potato and a main cropper for short-season neighbourhoods the good old Early Rose is hard to beat, especially if the tendency to red discloration of flesh can be eliminated. The usual type of Irish Cobbler is a good early potato, though deep-eyed and inclined to run hollow, if large. Extra Early Eureka is adapted as a very early potato, and in 1924 its cooking quality was high. In 1923 it was the reverse.

Variety	Colour (white, red, blue)	Data—1924					Yield per Acre							
		Eyes, (shallow, medium, deep)	Shape	Size (small, fair, good, large)	Scab	Yield per acre	Two-year average 1923-24		Three-year average 1922-24		Four-year average 1921-24		Seven-year average 1918-24	
					p.c.	bush. lbs.	bush.	lbs.	bush.	lbs.	bush.	lbs.	bush.	lbs.
Agassiz Special	w.	s.-m	oblong	large	2	358 0	281	23	223	42	..	..	..	..
American Wonder	w.	m.-d	oblong	large	14	427 42	317	1	245	36	247	23	..	..
Burbank	w.	shallow	flat, ellip	good	15	456 51	..	..	..	..	..	..	..	..
Bluenose	b.	medium	long	fair	trace	325 25	..	..	..	..	..	..	..	..
Bovee	r.	m.-d	oblong	large	9	451 31	358	13	275	7	260	58	..	..
British Queen	w.	shallow	flat, ellip	good	9	481 12	345	6	263	2	..	..	..	..
Carman No. 1	w.	shallow	oval	large	23	437 5	327	31	251	52	236	34	..	..
Country Gentleman	r.	medium	oblong	large	14	447 58	312	39	247	53	241	9	278	28
Cow Horn	yellow.-w.	shallow	curved	small	1	273 38	197	30	150	0	..	..	..	..
Early Bermuda	r.	m.-d	round	good	28	337 47	267	51	207	5	193	49	..	..
Early Hebron	r.	medium	oblong	large	14	432 50	335	25	263	20	253	36	..	..
Early Norther	r.	m.-d	oblong	large	10	377 5	293	50	227	5	238	38	288	55
Early Ohio	r.	m.-d	oblong	large	18	479 57	368	13	277	31	264	47	..	..
Early Rose	r.	medium	ellip	large	1	360 33	299	49	237	6	223	17	261	44
Empire State	w.	s.-m	ellip	large	20	420 35	316	30	250	21	255	14	..	..
Epicure	yellow.-w.	medium	ellip	good	9	430 55	336	50	258	38	238	42	..	..
Everitt Rose	r.	medium	oblong	large	23	437 18	354	1	272	29	259	0	..	..
Extra Early Eureka	w.	m.-d	round	large	2	390 18	329	12	248	21	231	0	..	..
Gold Coin	w.	s.-m	oval	large	27	418 1	317	59	240	20	241	51	273	24
Gold Nugget	green.-w.	medium	oval	good	22	336 17	302	43	237	22	..	..	..	..
Green Mountain	w.	shallow	oblong	large	14	414 37	314	42	246	50	237	12	..	..
Houlton Rose	r.	medium	ellip	large	24	423 27	333	6	262	15	263	25	..	..
Irish Cobbler—Estabrook	w.	deep	round	large	7	348 35	303	20	..	..	..	..	..	..
Irish Cobbler—Fawcett	w.	deep	round	large	22	386 15	303	57	..	..	..	..	..	..
Irish Cobbler—Lacombe	w.	shallow	long, oval	good	7	370 58	306	4	235	21	244	13	258	56
Irish Cobbler—McGregor	w.	deep	round	large	6	375 30	306	53	..	..	..	..	..	..
Irish Cobbler—Scales	w.	deep	round	large	3	371 37	295	3	..	..	..	..	..	..
Iron Chief	w.	shallow	long, oval	good	4	372 45	307	45	232	57	..	..	..	..
Manitoba Wonder	r.	medium	ellip	fair	8	358 1	291	41	232	47	..	..	..	..
Morgan Seedling	w.	shallow	oblong	large	15	402 12	311	40	243	9	236	59	..	..
Netted Gem	russet-w.	shallow	long	good	16	366 32	260	3	..	..	..	..	..	..
Red King	r.	shallow	long	small	4	375 15	247	0	..	..	..	..	..	..
Table Talk	w.	shallow	oval	fair	4	342 2	301	3	233	31	246	23	252	58
Wee McGregor	w.	medium	oblong	large	18	408 37	297	11	227	45	225	19	243	56

SPROUTING AND OTHER CULTURAL EXPERIMENTS

Limitations of space forbid a detailed review of the important cultural experiments under way. These will be available for future publication. A few deductions may be epitomized for current information.

(1) As a rule, planting potatoes early in May has given larger yields and also a higher percentage of dry matter content than has later planting, when dormant seed tubers were used. This, however, is not invariably the case, since much depends upon the season.

(2) Under Grande Prairie conditions, sprouting the seed potatoes by exposing them in trays in a light, warm place usually forwards maturity by from one to several weeks, and to that degree compensates for delayed planting.

(3) In seasons when the growing conditions are especially unfavourable during May and early June deferred planting of sprouted sets has sometimes given better results than very early planting of either sprouted or non-sprouted tubers. Late planting of non-sprouted sets seldom produces a full yield or a well-matured sample.

(4) When white sprouts have formed in cellar storage it has, during seven years work, invariably proven disadvantageous to break these off at planting, the average loss in yield by so doing amounting to 22.4 per cent. Energy is sacrificed when such a sprout is discarded.

(5) In some years, sets with white sprouts attached have yielded as well as sets with green sprouts formed in trays, but the results from the white sprouts are not so dependable, and it is suspected that where disease infection is present in the cellar it is likely safer and better to keep the seed tubers dormant in the cellar until spring and then treat with fungicide before any sprout has formed.

(6) While larger yields are usually obtained from shallow than from deep planting, a medium course is advised for the main crop.

(7) On the average of four years work hilling has reduced the yield by 4.9 per cent. Light drilling with a low, flat-topped mould is advised, however, as a means of reducing sunburn, and protecting the tubers from frost injury prior to digging.

(8) On the average of four years work there has been a loss in yield of 27.9 per cent from drying cut sets in the sun until they have lost about half their weight.

OTHER VEGETABLES

Sowing began in the hotbed on April 18, a few days earlier than in 1923. On April 25 sowing began outside. The garden had been fall ploughed and worked up well. Everything remained dry until July 15, when copious showers began to descend. Then followed a season as wet as the former had been dry, making it difficult to mature certain vegetables. During June and the first part of July, prospects were exceedingly poor for any results in garden stuff. Some crops as beans and radish germinated from the first and developed a fairly even stand, but most presented an exceedingly patchy appearance while others did not show up at all until nearly August 1, the seeds being in the ground three months.

Most years furnish a good supply of squash and a fair showing of other tender vegetables, but 1924 proved the poorest experienced in this line, since 1919 at least.

For the first time at this Station a few vegetables, such as tomatoes and cabbage, and a few flowers were watered a couple of times to tide them over the drouth. In preceding years this has been avoided that it might not be said

the Experimental garden was grown by means beyond the average gardener's resources. Until 1924 watering was confined to celery, to the hotbed and to seedlings transplanted during dry periods.

ARTICHOKES.—Home-grown tubers and a new strain, Mammoth French White Jerusalem received from Pennsylvania, were planted on June 9. These made a fair stand and consistent growth but were not taken up before the heavy frosts, hence results are unrecorded.

ASPARAGUS.—Some good results were achieved, but the limit of possibilities has not been attained.

BEANS.—On May 14 seven varieties or strains of common beans were planted. The drouth seemed to affect these least of all the vegetables, every row making a good stand. Returns would probably have been greater, however, in a more favourable year. The first picked was on July 28.

GREEN BEANS IN POUNDS PER ACRE

Masterpiece	4,500
Davis White Wax	3,593
Bountiful Green Bush (D. & F.)	3,031
Plentiful French (C.E.F.)	2,843
Yellow Eye	2,562
Red Valentine (S–B)	2,312
Bountiful Green Bush (C.E.F.)	2,312
Red Valentine (C.E.F.)	2,125
Stringless Green Pod (O. 5405)	2,062
Round Pod Kidney Wax (C.E.F.)	2,031
Wardwell Kidney Wax (Graham)	1,968
Stringless Green Pod (O. 2747)	1,750
Wardwell Kidney Wax (C.E.F.)	1,687
Refugee (O. 1631)	1,062
Round Pod Kidney Wax (McD.)	1,031
Challenge Black Wax (O. 592)	875
Hodson Round Pod	750

Hodson Round Pod proved late, no fruit until September 8. Challenge Black Wax is low in yield but that may not be the fault of the variety. The Masterpiece leads, as it has done in a previous year when tested. It is about twenty-five per cent better than Davis White Wax, its nearest rival. In quality both ranked high. Four varieties of broad beans were planted at the same time as the others. They also proved very hardy in the drouth and yielded a good supply for use, but frost came too soon to permit seed production.

Pole-beans comprised three: Sutton's runners, the Prize Winner, Pole Beans No. 1, O-5964, and Kentucky Wonder, received from Ontario. It proved a poor year to test these satisfactorily, yet they attained a height of four and five feet. Sutton's runners produced pods nearly twelve inches long.

BEETS.—Ten varieties and strains were sown on May 14 in rows three feet apart and 14.52 feet long, in triplicate. Stands were very uneven, some germinating early and some not till the end of July. The former produced as fine specimens as Beaverlodge Station ever raised, while the latter supplied a good quantity for pickling. The beets were lifted on September 20. The results cannot be taken as a fair comparison of varieties:—

Variety	Yield per Acre tons	lbs.
Early Model (Bruce)	15	1,166
Detroit Turnip (Graham)	13	333
Cardinal Globe (Rennie)	12	1,333
Extra Early (McK.)	10	1,500
Early Model (Graham)	9	1,500
Eclipse (McD.)	8	0
Crosby Egyptian (S–B)	7	1,333
Detroit Dark Red (McD)	7	500
Early Wonder (Ewing)	5	833
Detroit Dark Red (C.E.F.)	5	666

The Early Model, which leads the list, presents a good sample, while its runner-up, the Detroit Turnip beet, had many rootlets which hold the soil.

BORECOLE OR KALE was sown in the hotbed April 19 and transplanted June 10, producing magnificent plants.

BRUSSELS SPROUTS.—Three varieties, Dalkeith, Amager Market, and Paris Market, all made fine growth but failed to harden the sprouts.

CABBAGE.—Sown in the hotbed and transplanted to the cold-frame on May 30. Some damage was done by cutworms in the hotbed. After treating with poisoned shorts no further injury was observed. On June 9 they were transplanted to the open, and while it was a year difficult for transplanting, few died. They were watered when set out and twice after. On June 16 there was a high, drying wind which withered up other plants, and its effect was noticeable on the cabbage. Corrosive sublimate was again used to prevent root-maggots. However, after the rains came, almost all the plants were more or less affected. Still the percentage of loss was limited though growth would undoubtedly be checked. Resultant yields, though good, do not equal those of previous years.

The first used was Copenhagen Market on August 23. The Enkhuizen Glory heads the list in yield, while the Copenhagen Market, its old rival of previous years, is somewhat down, but each of its plants produced large, bold, round heads, decidedly firm. Jersey Wakefield stands higher than usual. The Early Winnigstadt is conical in shape like the Jersey Wakefield but is far behind in yield, as usual. The Dala, a new variety here, is second in yield, with large round heads and quite firm. It appears to be somewhat later than Enkhuizen Glory. In the Brandon Market some heads were fairly solid. Others were not. The Danish Ballhead is scarcely equal in size and firmness to previous seasons. The new Babyhead is an interesting addition to the list. Most are neat, firm and fine-grained. Marblehead Mammoth and Flat Swedish failed to harden up.

CARROTS.—Sown on May 29 and dug October 13. The main part of the rows being on depressed ground, there was sufficient moisture for germination, but a considerable part of the rows did not show up until the rains, so that here again the comparison of varieties is not trustworthy.

Variety	Yield per Acre	
	tons	lbs.
Improved Danvers (D. & F.)	7	1,750
Oxheart (S-B)	6	665
Chantenay (McD.)	5	20
Nantes Half Long (McD.)	4	585
Early Scarlet Horn (D. & F.)	4	540
Chantenay (C.E.F.)	3	1,000

Considering the adverse circumstances these results must be considered good. The flavour of each variety was excellent.

CAULIFLOWERS.—The usual three varieties, Early Dwarf Erfurt, Early Snowball, and Veitch Autumn Giant, were used and yielded in this order. Though checked by drouth and to some extent by root-maggots, these continued to grow and after copious showers of July presented a fine appearance. The Veitch Autumn Giant, though growing luxuriantly until its great leaves were two feet long did not all head up well. When well headed the Veitch has the largest heads. The first cauliflower was used on August 2.

CELERY.—The ten varieties sown in the hotbed on April 18, though watered carefully, did not grow well. This was thought to be due either to a deficiency in the heating of the manure or to the hotbed soil, which was from the previous

year's breaking, drouth having prevented the fibre from rotting. Finally being transplanted to the open, wanting moisture, the celery failed to make great headway. Some plants secured from a local hothouse did better. These grew to nearly a foot in height. In the end all were frozen in.

CITRON.—Though these were well watered when planted, the growth was tardy. Still some fruit formed, the largest being about the size of an egg.

CORN.—Thirteen varieties were planted May 14. Only about one-third of the plot came up before the rain. When the remainder appeared the whole presented a very irregular appearance. But two varieties produced usable ears, Pickaninny and Kloochman, Ottawa 860, and these only few in number. If the frost had left the Assiniboine for another week some very fine ears would have been obtained. The Pickaninny in the Date-of-Planting Test gave seventy-one usable ears. The size of ear accords with the name, none being more than four inches in length. The name also indicates the colour. Kloochman cobs were six inches or more in length. From one range suckers were removed but on account of the decided irregularity the advantage was not very perceptible. What advantage there was occurred in the range where the suckers had been removed.

CUCUMBER.—The Giant Pera, Prolific, Davis Perfect, Improved Long Green, Extra Early Russian, and West India Gherkin were in the test. All made some spread of vine but frost caught them too soon to develop much fruit. The Extra Early Russian (Burpee) proved the best, producing a number of fair specimens. Prolific (McK.) and Improved Long Green (McD.) also furnished some fruit.

EGG-PLANT.—Four varieties were sown in the hotbed April 26 and in the open May 19. The outside seeding was a complete failure as far as fruit was concerned. Only a few plants appeared about August 1, to be nipped by the light frost of August 30. Those in the hotbed grew nicely and some were transplanted to the open June 11. They proved easy to transplant and continued to flourish but succumbed to the first touch of frost without fruiting. Two plants left in the hotbed and protected did better, not only blooming but forming fruit. The season proved too brief for them to mature.

HORSE RADISH.—Spreads and grows.

KOHL-RABI.—The two varieties, Purple Vienna (Graham) and White Vienna (McDonald), developed almost equally well.

MUSKMELON and watermelon were again attempted, but with less promise of success than usual. A touch of frost in August ended their poor growth.

LETTUCE.—A small supply was early obtained from the hotbed, of the variety Crisp as Ice. Then followed a good supply from the fall planting, Grand Rapids variety. In the variety test scarcely a seed germinated of the thirteen varieties tested until towards August 1, when all came on with rapidity, making a fairly even stand. The Cos varieties, Trianon and White Paris, showed up well alongside the others.

OKRA was attempted both in the hotbed and in the open, without any success.

ONIONS.—The test of sets was a comparative failure, the bulbs having sprouted too much by the time they arrived. They had not vitality to withstand the drouth. In the variety test sown April 30 the seeds remained in the soil until close to August 1, a period of three months, and even then they came on slowly so that they never attained more than the small green-onion stage. The only onions for 1924 of any size were from the fall-and-spring-sowing test. Some of these were two and a half inches in diameter.

PARSLEY.—As usual this hardy vegetable gave a good account of itself, continuing fresh and bright through the hard frosts of September.

PARSNIPS.— On April 29 they were sown in four ranges, rows being 29·04 feet long and three feet apart. In two of the ranges they failed to appear until the latter part of July, and then it was too late to develop usable parsnips. These two ranges were discarded. In the others there were some of the finest specimens ever produced at the Station. In this test the comparison of varieties is fair, though not perfect.

Variety	Yield per acre	
	tons	lbs.
Hollow Crown (Graham)	7	155
Guernsey XXX (S-B)	6	500
Hollow Crown (O. 3421)	5	855

PEANUTS.—Sown on May 15, Spanish and New Dixie varieties, but drouth is apparently not favourable to the growth of the peanuts. However, a few plants did appear. They proved an easy prey to the first light frost. No great future can be predicted for this crop in Grande Prairie.

PEAS.—Thirty-two varieties or strains are in this test sown in duplicate on May 6. The whole pea plot presented a very patchy appearance, some rows not appearing before the middle of July. In others, a half or a third of the row failed. Following the rain almost all came, but before this time the green peas of the early growth were being picked, so that from early July till well into September green peas were being gathered.

The Stratagem heads the list for yield, but its large pods were not so well filled as the pods of some other varieties. American Wonder and Gregory Surprise have small, well-filled shells. The comparatively low yield of the Graham lot of Stratagem as compared with the C.E.F. strain is probably a reflection of the season's erratic results. Taking one year with another, Thomas Laxton still ranks high. Of the seedlings received from Invermere, No. 3 had the largest pods, one being six inches long with ten peas. Several had nine a piece.

PUMPKIN.—The main variety test was a complete failure. A plant started in a mud-band and transplanted to the shelter produced a pumpkin ten inches in diameter but failed to fully mature it before severe frosts. Two specimens from the date-of-planting test had just begun to ripen. This is the first time in four years to report failure to ripen any pumpkins.

RADISH.—The early sowing in the hotbed produced a few radishes, then the fall-versus-spring-sowing provided an abundant supply. In the variety test the stand was almost complete with every one of the seven varieties. These rivalled the beans in defying the drouth and growing in spite of the dry period. Root-maggots, however, were in evidence. The " White Icicle " probably was the most immune and retained its cripness much longer than the others.

RHUBARB.—All rows of previous plantings developed well notwithstanding the drouth, and provided good supplies, but during the first part of July the effect of the dry period was very noticeable. However, the prolonged wet season succeeding produced a new and more vigorous growth than that of spring. Seedlings of the variety Ruby, received from Ottawa in 1923, proved the most desirable, red, rich, and crisp. The varieties sown in 1924 were almost total failures, few seeds germinating. This vegetable, so welcome in early spring and so easy to grow, is a valuable asset to any garden. Just when the plants were coming on nicely, say eight to ten inches high, some disease affected the leaves, which were perforated with innumerable holes. Many of them turned a rusty brown and died. The disease could not be positively identified by the Division of Botany at Ottawa, but good cultural conditions were prescribed and when the rain supplied these the trouble practically disappeared.

SPINACH.—The Victoria, Viroflay, and New Zealand all did well, after the rain, though very little before.

SWISS CHARD.—Only a few plants appeared at first, but these developed into handsome plants. The rest made a fair showing later.

SOLANBERRY.—These were sown in the open and in the hotbed. The former were not at all a success while the latter gave good plants for transplanting, which proved easy. Two left in the hotbed bloomed profusely and bore a quantity of ripe fruit, in taste somewhat like that of the tomato.

SQUASH.—As with the Pumpkin the main variety test was a complete failure. The only specimens of the squash to attain usable size were a few in the date-of-planting test.

TOBACCO.—On May 15, seed of Petit Havana tobacco was sown in the hotbed, in mud-bands, and in the open. The last was an entire failure. The others were slow in germinating and slow for a time after, but produced good plants which proved easy to transplant, continuing to grow well in the open. A few Connecticut Seed Leaf received locally from Mr. R. E. Leake, had got a somewhat better start and grew to be about four feet high. They were about to bloom when the frost came. Some plants were taken in to cure just before the frost.

TOMATO.—Ten varieties were sown in the hotbed and transplanted to the open June 10, but were not perfectly even in sturdiness. These were trimmed to one stalk. The yields for six plants each, which are not equal to those of 1923, are as follows:—

Variety—	Pounds per acre
Earliana Grade 2 (Langdon)	8,906
Alacrity X Hipper 0-3040	6,906
Select Earliana (Moore)	6,781
Chalk's Jewel (Wm. Thompson)	6,031
Alacrity 4-9-2	5,875
Burbank (Wm. Thompson)	5,562
Burbank (Bruce)	4,593
Pink, Plant 1, 0-3039	2,968
Greater Baltimore (Stokes)	2,531
Bonny Best (Stokes)	2,531

Another test was arranged, leaving all trusses of fruit on versus leaving three trusses versus leaving two trusses versus leaving one. While reliance cannot be placed on this experiment the results are given, using two varieties.

PRUNING TOMATOES

—	Leaving all trusses		Leaving 3 trusses		Leaving 2 trusses		Leaving 1 truss	
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
Bonny Best	1	1½	1	4½	1	3	0	6
Alacrity	1	14½	0	15½	2	3½	1	0
Averages	1	8	1	2	1	11½	0	11

In this test the pruning of the trusses was done without removing more foliage than necessary, though all the plants were trained to a single stem.

In the whole garden only ten tomatoes were ripened. About three bushels of green ones were gathered. One fruit weighed half a pound; others six ounces each.

HERBS.—Sage, Thyme, and Summer Savory are easily grown, are hardy and thrive well. A couple of roots of mint were planted three years ago and now spread to the size of a table. From this patch a good number of roots have been supplied to start others. Mint apparently will grow anywhere and may be planted spring, summer, autumn, or winter. At the last time it would be better inside. It will grow if given a chance.

FALL VERSUS SPRING SOWING OF VEGETABLES

In order to ascertain the advantage of sowing in the fall in comparison with spring sowing, one row of seven vegetables was sown on November 8, 1923, each variety occupying twenty-two feet. The varieties used were:—

Carrot—Chantenay.
Beet—Detroit Dark Red.
Cabbage—Copenhagen Market.
Onion—Large Red Wethersfield.
Radish—Scarlet White Tip (McDonald)...
Lettuce—Grand Rapids.
Turnip—Early Purple Milan.

The soil in the autumn was very dry, no rain falling after August.

In spring, on May 8, 1924, another row of the same vegetables was sown alongside. At this time the lettuce of the fall sowing was nicely up. Some radishes and some onions were showing. On June 20 the fall-sown lettuce had been in use. The spring-sown radishes were being gathered.

The fall-seeded carrots had poor germination and even the spring sowing was a failure on account of weather conditions. The fall carrots weighed 3 pounds; the spring 6 pounds.

BEETS.—Many germinated from the fall sowing earlier than from the spring. There were some good beets in the former, but the spring sowing were mostly small ones that came up after the rain. Weights: fall 14 pounds, spring 10 pounds.

CABBAGE.—The fall sowing produced only one plant, but it weighed 12 pounds. The stand in the spring sowing was fairly complete, giving a weight of 56½ pounds.

ONIONS.—The advantages were with the fall sowing, though the other was almost as good. Some bulbs measured two and a half inches through. Weights: 6 pounds and 5 pounds, respectively.

RADISH.—Poor in the fall sowing, not many seeds germinating, but the competing stand was nearly perfect and furnished a good supply for the table.

LETTUCE.—The fall gave earlier germination and a fairly good stand. Spring sowing was delayed by drouth. The advantage of fall sowing was greatest in the case of lettuce.

TURNIP.—The fall sowing did not survive, while the spring sowing showed a complete stand.

DATE OF PLANTING TEST OF VEGETABLES

It is a constantly recurring query, "What is the best time to sow vegetables?" For seven years now this test has been conducted. Over such a course of years some useful indications can be secured. The drouth affected every one of the fourteen kind of vegetables in this test. Even at the first sowings some were planted in the dust. One shower amounted to a fourth of an inch

and moistened the top, but the ground being so dry, the moisture soon evaporated. There were hot, drying winds in the third and fourth plantings. Thus results from this single year are erratic. Most of the seeds did not germinate until subsequent to the rain of July 15, after which they promptly appeared. In the following table one hundred represents the highest yield and the others are rated in proportion:—

DATE OF PLANTING TEST, VEGETABLES, 1924

Crop	1st date April 25	2nd date May 6	3rd date May 9	4th date May 16	5th date May 23	6th date May 29
Beans	23	59	100	29	29	0
Beets	2	16	100	52	73	52
Cabbage	49	74	100	86	57	2
Cauliflower	23	39	100	76	10	0
Carrots	100	93	55	9	36	3
Corn	25	90	100	100	40	0
Parsnips	71	100	84	20	33	9
Peas	38	85	69	100	87	76
Radish	100	100	100	100	100	100

It will be seen here that eight of the fourteen vegetables present highest yields for 1924 from the third and fourth sowings. Note in this table that the last sowing was the poorest, as usual.

FRUITS

CURRANTS.—It was the banner year to date for red and white currants. The former in particular were laden with masses of fruit. The three leading varieties of reds yielded more than half as much as they had done in the seven previous bearing seasons, though they had been well weighed on several occasions. New Red Dutch and Victoria Red each yielded 15½ pounds of fruit per bush, which, if we assume that each bush drew from an area of forty-eight square feet, would figure out to over seven tons per acre.

The whites produced more in 1924 than their total crop since planted over eight years ago. All yields are given as calculated to a basis of six bushes, though in some cases the crop from only five was actually picked and weighed, the sixth bush being reserved for visitors and proportionate allowance made.

The currant fruit worm, so troublesome in 1923, was little in evidence. The bushes were twice sprayed for aphids.

The black currants have not been doing well the last two years. They have perhaps been pruned too heavily in order to obtain cuttings for distribution. Some of the younger black bushes of the same varieties, in another portion of the grounds did much better than those under test.

RED CURRANT YIELDS—SIX BUSHES OF EACH VARIETY

Designation	New Red Dutch	Cumberland Red Ottawa 492	Victoria Red	Fay Prolific	Wilder
	lbs.	lbs.	lbs.	lbs.	lbs.
Aggregate yield 1917–1919	30·5	39·0	27·5	0·2	
Yield 1920	42·0	29·0	37·0	1·5	
Yield 1921	72·25	55·25	62·75	13·2	3·5.
Yield 1922	56·5	29·25	31·87	8·93	0·87
Yield 1923	25·30	8·58	7·47	2·13	1·20
Yield 1924	93·6	76·7	93·6	25·35	40·62
Total	320·15	237·78	260·19	51·31	46·19

WHITE CURRANTS

Designation	Large White Ottawa 551	White Cherry Ottawa 550
	lbs.	lbs.
Aggregate yield 1917–1919	7·75	4·4
Yield 1920	1·0	5·0
Yield 1921	5·25	12·5
Yield 1922	9·75	9·0
Yield 1923	Not recorded	
Yield 1924	66·3	73·12
Totals to date	90·05	104·02

BLACK CURRANTS

Designation	Topsy Ottawa 568	Collins Prolific Ottawa 565
	lbs.	lbs.
Aggregate yield 1917–1919	18·4	14·3
Yield 1920	38·0	26·0
Yield 1921	37·3	33·4
Yield 1922	7·43	1·71
Yield 1923	12·0	4·2
Yield 1924	5·68	5·68
Totals to date	118·81	85·29

GOOSEBERRIES.—Eleven of the fifteen Oregon Champion bushes set out in 1922 continue to thrive and began bearing but produced not more than a cupful for the season.

HUCKLEBERRIES.—At the suggestion of an old C.P.R. Telegraph operator and through the courteous co-operation of Mr. J. A. Macgregor, manager of the E.D. & B.C. Railway, some bushes of a species of huckleberry were received from the vicinity of Glacier, British Columbia, where they grow wild in a park and are said to be much appreciated by train crews and passengers. Though transplanting conditions were most adverse, several seemed finally to survive.

RASPBERRIES.—This choice fruit was abundant and the large size of the berry was noticeable. The Herbert variety retains its place for hardiness combined with quality and yield. Records were kept of only part of the crop, but the rows recorded yielded 148 quarts of fruit from a row not over eighteen rods long. Assuming that it drew from a width of half a rod this would figure out to a yield of 2,631 quarts estimated at 3,946 pounds per acre. They were sprayed twice to control red spider.

SASKATOONS.—The hedges continue their growth and furnished a good supply of fruit. They began to bloom May 19, were in fine bloom on May 24, and on June 5 the bloom was gone. Birds and others claimed a considerable share of the fruit, but the part picked and recorded furnished 84 quarts from a row about twenty rods long.

STRAWBERRIES.—This luscious fruit should hold a substantial place in any farm garden. For the outlay of time and care, the returns from a domestic standpoint are worth while. On June 26 the first ripe strawberry was picked. On July 11 there was a good picking, followed by continued pickings until August 10. From three rows 320 feet long and spaced four feet, planted in

1922, were gathered 157 quarts, or 1,779 quarts per acre, and five rows planted in 1923 yielded 48 quarts, or 1,067 per acre. The 1923 planting had few strong, early-struck plants. These berries, which are of the Early Dakota variety, had received no rain to amount to anything until picking commenced. They were well mulched, however.

APPLES.—What with freezing back, and repeated girdling by mice and rabbits the 1916 plantation of apple trees is reduced to roots, stumps and recent suckering growth. It is gratifying to report that most of them are still alive, despite all these trials. More is expected from recent plantings. The Siberian, Magna, and Beauty crabs received from Brookings, South Dakota, in 1922 have made fair growth but have not yet bloomed.

In May, 1924, a further stock of young apple trees was received from the Central Farm, Ottawa, consisting of two Blushed Calville, Ottawa, 4,845; two Charlamoff, Ottawa, 4,880; three Anis, Ottawa, 4,836; Three Antonovka, Ottawa, 4,844; three Ostrakoff, Ottawa, 4,893; one Printosh, Ottawa, 4,840; two Rosilda, Ottawa, 4,841. Nearly all these took root.

CHERRIES.—One tree of native choke cherries and three strains of sand-cherries are growing on the Station. The choke cherry has attained a height of about eight feet and bore a good crop of little-appreciated fruit. The sand cherries comprise the Hudson's Bay, received as rooted plants in the fall of 1920; the Select, seeds of which were received at the same time, and the Champa, three specimens of which were procured from Professor Hansen, of South Dakota, in the spring of 1922. The latter on June 4 commenced blooming this year for the first time. The Select has a rather upright bush form somewhat resembling a young willow. It seems hardy and healthy and the fruit is of good size, but a smaller percentage ripened than in the case of the Hudson's Bay, which has recumbent bushes, some already spreading out to a diameter of seven or eight feet. These were heavily laden with fruit about the size of marbles and when fully ripened made a very good stew somewhat like that of the small black cherries of the East. When dead ripe it is by no means bad to eat out of hand. Less than half the fruit was fully ripened when caught by frost on September 20.

PLUMS.—The first fruit of this class to ripen at Beaverlodge was the sand-cherry-plum hybrid known as the Tom Thumb cherry, though it more nearly resembles a small plum. Three fruits set on a tree or bush planted in 1922 but though fully coloured did not entirely soften in advance of the September killing frost. The Pembina and Ojibwa plums, received from Professor Hansen with the Tom Thumb, have not yet bloomed. The Nigra plums, grown from seed, have not fruited nor have they been free from tip-killing.

GRAPES.—The wild grape vines have not yet been removed from their seeding bed. They live and grow a little higher each year, but are rather easily nipped by autumn frosts.

FLOWERS

In this season, so difficult in which to secure a satisfactory display in the highest sense, bloom on one part of the Station or another continued from early spring well into November. First of all were the pansies, the plants of which lived over the winter. They appeared in richest colour. Soon after appear the Iceland poppies. They are next the pansies in continuity of bloom. Very little later a mass of white was seen on the Sweet Rocket, and this continued for months. Meantime the larkspur plants have grown until their large blue

spikes are even with a person's head. They also bloom and bloom. Insects appeared in myriads, but one application of Black Leaf 40 disposed of the whole. Later still bloomed the delicate baby's breath, from which is gathered sprays that add grace to the bouquets. Bunches of these in vases may continue the charm through the winter. All the above are easy to start and require little attention for years.

Of the bulb family, tulips were the first to gratify the eye with exquisite grace of form and glory of colour. True the bloom is not long-lived. On May 14 the display began with six white Pottebakkers. On May 9 a hundred lovely white forms adorned the plot. Poor soil and dry weather militated against the perfection one would wish. May 24 saw forty-seven Duchess de Parma in their rich dark shades, also twenty-four canary-yellow Chrysolora. A bed of Darwin tulips has one variety, Rev. Ewbank, with a mauve colour, while all the rest display many tints of red. While the bloom is falling from the tulip beds, yellow forms of daffodil appear. Though the daffodils have not at this Station the attraction possessed by other flowers, their development denotes possibilities.

The display of irises was at its best on July 3. One variety, Poeticus, is mainly cream with purple towards the end of the petals.

Possibly the chief attraction of the year centered in the pæonies, planted only in the autumn of 1922 and spring of 1923. A goodly number bloomed together. Georgeous is a fitting word to describe them.

The bulbs of gladioli kept well through the winter and the same varieties as in previous years were planted on May 26. Planting earlier would be more advantageous. The ground was quite mellow. Water was poured in the holes, which were four or five inches deep, for the planting. June 16 saw many of their sword blades coming well through. It was August 26 when the Maiden's Blush gave the first bloom. Then followed the Prince of Wales, of whose bloom one if free to repeat the word gorgeous. Brilliant then disclosed its beauty. On September 20 all the blooms were frozen. The season was too short for all the varieties to bloom. Gladioli bulblets are developing new bulbs.

Spite of adverse weather, a good display of sweet peas was presented. A few sown in the hotbed and transplanted gave the best results, but this may not always be true. Blooming commenced on July 22 and continued till September.

Drought defeated an attempt to secure a special row of three biennials and thirteen perennials.

A bed of pansies and Calofornia poppy, which seeds itself, provided months of bloom.

At the beginning of July, prospects for an array of flower beds equal to those of 1923 faded away. In fact it was a question whether anything would survive the drouth. The change made by the July showers was conspicuous and yet too late to bring the majority of the annuals to bloom. However, Ten Weeks stocks, phlox, candytuft, sweet alyssum, sunflowers, tagetes, zinnia and leptosiphon all bloomed. Kochia contributed to the symmetry of the beds.

Some flowers very much desired failed to bloom, as for instance wallflower, Canterbury bell, portulaca, salvia, nicotiana. Climbing plants, such as Canary flower, wild clematis, scarlet runner, after a struggling existence, developed healthy vines and bloomed profusely. One other may be mentioned, Artemisia, called summer fir, a most graceful deep-green plant, pyramidal in shape like the spruce or other fir trees.

A new bed of tulips, eight varieties of Darwins, three of Single, two of Double, two of May Flowering, and two of Breeder tulips, was planted October 21. Besides these were planted galanthus, or snowdrop, Muscari, and Chionodoxa bulbs, also one hundred Scilla and one hundred Crocus.

The Manitoba maples transplanted in 1916 and the Russian poplars started from cuttings in 1920 are attaining the proportions of small trees, although rather bushy in form. The maples were permitted to grow thus to provide bottom protection from wind for adjacent plantings. The Russian poplars were malformed as the result of cutting back to stumps following rabbit injury in 1922-23. Willows are thriving and their hedges thickening up. The Laurel willow is not immune to tip killing. Native balm of Gilead seems to have established itself satisfactorily after transplanting. The Green ash is maintaining a slow, steady growth. Of interest to many were the seedling Manitoba oaks from 225 acorns received through the courtesy of Prof. F. W. Brodrick of the Manitoba Agricultural College and planted October 18, 1923.

The row of native white spruce transplanted to the grounds in 1919 is making good headway. To fill in gaps among the Indian Head plantations of Scotch pine, jack pine, and white spruce—gaps due to an unfortunate delay in receipt of the original stock from the depot—a further consignment of about thirty of each was received. A majority of the replacements took root, notwithstanding the withering drouth. Some of the Scotch pine received in 1920 and planted into rather indifferent soil are now doing fairly well. It seemed as though their growth were retarded at first by proximity to a strip of native sod. This was broken in 1923 and planted to sunflowers in 1924. Whether from increased age or improved cultivations conditions, or both, the trees have made much greater headway since, more particularly this year.

In flowering shrubs or trees, caragana appears to have a permanent place for the Peace River district, ornamental the year round whether in shelter belt, in hedge, in clump, or in individual growth. As early as May 19 a few sprays of its yellow bloom appeared and continued until June 25. The flower buds of the Tartarian honeysuckle began to unfold on May 28 and on June 11 the shrubs were in full purple bloom—a splendid sight. By July 22 the flowers were followed by the red berries, which held until September 1, when they began to drop. Several were gathered for seed.

A welcome sight in the North are the rows of lilac in bloom. The Chinese lilac is perfectly hardy at Beaverlodge and is graceful in appearance, but it does not bloom so early nor has it the perfume or exquisite appearance of the Common lilac, which, however, is less hardy. For the first four or five years after transplanting the latter killed back considerably, but during the past three winters it has not killed at all and has borne increasing numbers of blooms. How much of the improvement may be due to the effect of the increasing height and thickness of the shelter belt is not known. The fact that certain plantings in still rather exposed locations bloomed well this year warns against hasty conclusions.

On May 20 the first signs of colour were seen on the common lilac (*Syringa vulgaris* Condorcet) and on June 2 its great spikes were shedding a rich fragrance, though on June 15 it was noted as still in full bloom. Shortly after the Condorcet had appeared, another variety, *Syringa vulgaris,* Geo. Bellair, unfolded its dense spikes of a deeper colour.

The wild honeysuckle remains vigorous though a rust or blight mars its foliage towards the latter part of the summer.

Rosa rugosa continued its bloom and fragrance for two months, commencing June 20.

The root of *Spiraea arguta* (snow garland) persits; though the top kills back badly.

Among a number of other plants stimulated to a late second bloom by the occurrence of prolonged wet weather succeeding drouth, conspicuous was the snowberry, whose white fruits were interspersed among a profusion of September flowers.

A native mountain ash, scarcely three feet tall, bore several clusters of red berries, which suddenly disappeared during the first cold snap, perhaps into the crops of birds.

A hop vine climbed twenty-five or thirty feet up one end of a building.

A number of specialties were received from Dakota, comprising two New Ulm black walnuts, two Siberian almonds, two Semipalatinsk bush honeysuckle, two May Day trees, two Manitoba hazelnuts, and two Lavatera. All started except the hazelnuts. Native dwarf hazelnuts planted in 1921 or 1922 are thriving.

Another 1924 addition consisted of eight Virginia creepers, two from Brooks, Alta., and six of the self-fastening variety from the Horticultural Division of the Central Experimental Farm. Although mostly planted in dry locations on raised banks surrounding building foundations, seven of the eight were started by the aid of some watering.

EFFECT OF FROST ON VARIOUS GARDEN CROPS

The first severe killing frost of the season was recorded on the morning of September 20, when 24 degrees Fahrenheit was registered. The next two nights the readings were 33 degrees and 32 degrees respectively. Notes upon the effect were taken September 22.

Vegetables.—showing little or no signs of frost—Celery, beets, onions, cabbage family, parsley, lettuce (slight), carrots, parsnips, kale, horse radish, sage, thyme, and mint. Spinach and Swiss chard showed little effect.

Vegetables injured but not killed—Artichokes were affected considerably. Broad beans stalks were not injured but the fruit was spoiled. Tobacco plants were bedraggled but not entirely destroyed. Rhubarb showed some effect. Pea pods were injured but the vines not killed. Hemp nearly destroyed.

Vegetables killed—All tender vines, as pumpkin, squash, common beans. All tomatoes left in the garden. Egg plant and peanuts. Corn may be said to have been killed.

Trees and shrubs showing little or no signs of injury—Willow, balm of Gilead, Common lilac, snowberry, almonds, bush honeysuckle, wild clematis (scarcely a sign).

Trees and shrubs with leaves tinged—Manitoba maple, Manitoba oak, Chinese lilac, caragana, ash, lavatera, wild honeysuckle, hazel nut, high bush cranberry, mountain ash, Tartarian honeysuckle

Trees and shrubs badly hurt—Virginia creeper, walnut (New ulm), May Day tree.

Fruit trees—Grape foliage killed. Plums of every variety, leaves tinged. Sand cherry bushes not noticeably affected, but fruit injured. Currant and gooseberry leaves tinged. Saskatoon leaves dying. Apples of all kinds, scarcely a sign of frost. Raspberries and strawberries not perceptibly affected.

Flowers—Early frosts destroyed dahlias, balsams, nasturtiums, and salvia, and when the thermometer dropped to 24 degrees F. on September 20, alyssum, sunflowers, canary flower, zinnia and sweet peas were destroyed. Salpiglossis, hollyhock, sweet sultan, kochia, godetia were greatly injured. On October 20th, linaria, which was about the first to bloom in spring and had persisted all summer, was still beautifully blooming. The same was true of the pansies. The fragrant bloom of the stocks was just ending. Candytuft also blooming still. Plants of snapdragon, pyrethrum Canterbury bell, wallflower, and arabis were still green and healthy.

NOTES ON LEAF PERSISTENCE TAKEN OCTOBER 25, 1924

(Following two periods of snow and frost with temperatures as low as 19 degrees F.)

Apple—Holding leaves yet. Crabs, some faded, some fallen.

Ash—All leaves fallen.

Balm of Gilead—All fallen.

Semipalatinsk Bush honeysuckle.—One tree stripped, from the other none fallen.

Caragana—Mostly fallen.

Choke cherry—All dead, fifty per cent fallen.

Currants—Black, mostly green, few fallen. Red, all dead, mostly fallen. White, all dead, mostly fallen.

Dwarf birch—Nearly all fallen.

Gooseberry—Fifty per cent fallen.

Grapes—All dead and mostly fallen.

Hazel nut—Dead but not fallen.

Hops—Faded but not fallen.

Lavatera—Most leaves green yet. Top leaves dead but not fallen.

Lilac—Chinese, nearly all fallen. Common, all green but many green fallen.

NOTES ON LEAF PERSISTENCE TAKEN OCTOBER 25, 1924—*Concluded*

Manitoba maple—All dead but some stay on.
May Day tree—All fallen.
Mountain ash—All fallen.
Nigra plum—mostly green; a few fallen.
Pembina plum—Faded somewhat but none fallen.
Raspberry—Mostly green yet; some fallen.
Russian poplar—All dead and fallen.
Sandcherry—Select, mostly fallen; some green. Hudson's Bay, mostly fallen.
Saskatoon—Leaves nearly all fallen.
Snowberry—Some faded; some green.
Spiraeas—Faded but not fallen.
Strawberry—None fallen; top leaves reddened.
Tartarian honeysuckle.—All fallen.
Walnut—Dead but not fallen.
Willow—Laurel, green yet; scarcely any fallen. Red, all faded; very few fallen.
Wild clematis—mostly green; some fading; none fallen.

CEREALS

With a spring store of moisture scarcely penetrating the furrow pan of the knolls; with less than eleven-tenths of rainfall between the first of May and the middle of July; and with grasshoppers greedy for what scanty growth there was, the lot of the cereal experimentalist was beset with many thorns. While the April-drilled grains nearly all germinated in very fair regularity, promising well enough for a short time, drought soon revealed its effects in an extremely irregular height, varying from short in the hollows to an utterly dwarf stature on the knolls, indicating sharp and frequent diversity in soil and sub-soil conditions, although the land, to casual appearance, would seem reasonably uniform. When grain heads at six inches in height it prompts a farmer to wonder how low his binder can cut. That such diminutive stems should finally have ripened any kernels at all is a reminder that the Peace River country can produce crops on less moisture than any other non-irrigated district with which the writer is familiar. Cold nights and moderate day temperature enable the crop to stand by for long periods and still take advantage of the moisture when it arrives.

In 1924 the limit was well-nigh reached, however. So utterly abnormal were the conditions that varietal comparisons were quite upset. Dates of heading were much more closely bunched than usual, and there was even less spread in the dates of ripening. Indeed, in some instances the usual order was reversed. When we find Huron wheat maturing ahead of Marquis, Red Bobs, Garnet, and Reward, we know that something is askew.

When at last in midsummer the downpour did commence, a strong secondary growth of all grains except wheat and flax started up but this never ripened.

ROD-ROW PLOTS

This year a system of rod-row testing was adopted. Each variety or seed stock was tested in quadruplicate. Each rod-row plot consisted of three rows each a rod long. The centre row was hand-sown with a definite weight of seed. The row on either side was sown through a garden drill. In all there were four hundred and ninety of these rod-row plots, comprising twenty-six varieties of wheat, twenty-seven of oats, and twenty-two of barley. There was also one or two minor experiments and a few head-row selections of certain varieties.

Where stocks permitted, Beaverlodge seed was tested against that sent from Ottawa. The rod-row system is an excellent innovation, enabling the trial of many new kinds on a small area of land and lending itself well to minute note taking.

EXPERIMENTAL DETAILS

Excepting one range of pea plots, the spring-sown cereals followed 1923 hoe crop, the land of which had been heavily manured in the preceding season. Buckwheat, rye, oats, and wheat were on potato ground, the flax and one range of pea plots on corn stubble, and the barley on sunflower stubble. The duplicate range of peas followed rape in drills.

Practically all the regular one-seventieth-acre variety plots of spring grain were in duplicate. All except the one range of peas on rape ground were drilled about eight rods long and seven feet wide, with two-and-one-half-foot paths. At harvest time all but the pea plots had the first and second drills removed from each side. The ends of all were trimmed off, leaving the area for calculation of yields five feet wide and 124·45 feet long, or one-seventieth of an acre.

SPRING WHEAT

Nine varieties of spring wheat were sown April 29, at about one and a half bushels per acre, slightly more than this being allowed in the case of the large-kerneled varieties. The drill lever was set in the fourth notch, putting seed into moisture at a medium depth.

Huron wheat again leads the list, surpassing Marquis by a substantial margin for the tenth successive season and piling up a ten-year average betterment of 22·1 per cent. It seems to excel in both drought and frost resistance. Notwithstanding its hardiness and prolificacy it has not become generally popular, growers fearing penalty on the grade. A buyer who knows the variety will not usually allow more than No. 2 or No. 3 for it no matter how attractive the sample. Whilst the defects of Huron will probably bar it from extensive planting in the West, its cardinal virtues possess a real significance and may prove of service in hybridization work.

Next to Huron stands Kitchener, which exceeds it still by a bushel per acre on the three-year average. Both are a little late to be generally safe, taking the years as they come.

A medium-early, high-yielding, non-shattering quality wheat is required. So far as can yet be judged Garnet seems to come near meeting the need. It is as early as Ruby, which is to say a week or ten days ahead of Marquis; has very fair length of straw; does not shatter nearly so badly as Ruby; appears to rate well in milling quality, according to Ottawa advices, and in the average of the past three years comes within thirty-two pounds per acre of Marquis' yields.

Reward is another new kind which although very attractive in sample and quite as early as Garnet does not equal the latter in yield here.

Early Triumph has held its own with Marquis during the past three years.

The seven-year averages comparing Huron (41 bushels 44 pounds per acre), Marquis (36 bushels 23 pounds), and Ruby (27 bushels 45 pounds) are instructive as are also the ten-year averages of 41 bushels 53 pounds for Huron and 34 bushels 18 pounds for Marquis. Not every wheat-growing region can produce so good an average covering a series of its very driest years.

SPRING WHEAT—VARIETY TEST, BEAVERLODGE, 1924

Variety	Days to Mature			Yields of Threshed Grain per Acre					
	1924	Average 3 years 1922 to 1924	Average 5 years 1920 to 1924	1924	Average 3 years 1922 to 1924	Average 5 years 1920 to 1924	Average 6 years 1919 to 1924	Average 7 years 1918 to 1924	Average 10 years 1915 to 1924
				bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.
Early Red Fife, O. 16	115·0	121·0	123·0	15 41	25 50	35 24	.. ..	.. ..	.. ..
Early Triumph	113·0	118·3	.....	15 0	25 44	.. ..	.. ..	.. ..	.. ..
Garnet, O. 652	113·0	116·3	.....	18 55	25 6	.. ..	.. ..	.. ..	.. ..
Huron, O. 3	112·5	120·5	123·7	23 45	30 35	41 11	42 2	41 44	41 53
Kitchener	114·0	121·0	124·0	21 49	31 38	42 19	.. ..	.. ..	.. ..
Marquis, O. 15	113·0	120·3	122·4	18 58	25 38	35 57	37 40	36 23	34 18
Red Bobs	113·0	119·0	121·2	15 40	23 37	36 3	37 33	.. ..	.. ..
Reward, O. 928	113·0	116·0	.....	14 32	22 1	.. ..	.. ..	.. ..	.. ..
Ruby, O. 623	112·5	116·1	115·3	13 28	20 0	27 21	28 27	27 45	.. ..

OATS

A dozen oats were continued in the regular variety plots. They were drilled fairly deeply on the last day of April, with the index set at from 2¼ to 3½ bushels per acre, depending upon variety and size of kernel. The two hulless oats were sown with the index levers set as for seven pecks of wheat.

Heads began to shoot on Dominion Day and the primary growth, with its short, irregular straw, ripened from the tenth to twenty-first of August. Daubeney was cut on August 12; Liberty and Legacy on September 2. By this time there was much bottom verdure in most of the plots and the remaining kinds were left to see whether this suckering growth would mature as it did in 1923. It had started too late, however, and a hurried harvesting on September 27 was compelled by bad weather. A very irregular percentage of shattering of the ripe heads occurred. No reliable conclusions are deducible from the yield figures, which are given, however, as essential to long-term averages.

Were good yields reported and off years excluded, the percentage basis would be affected. The farmer must make the most of what he gets every year and is interested in a comparison that takes in the run of the seasons as they come. Omission of off-season crops from the tables would also exaggerate the general per-annum yields in a way to discount experimental data.

It is noticeable how well Banner shows up, not only in 1924 but in the long-term averages. While Victory exceeds it by a bushel in the six-year column, the two or three-day advantage of Banner in earliness more than offsets this for districts where maturity is at all precarious. Victory is undoubtedly a better exhibition oat, but for the settler's own use a superior oat to Banner is not yet proven.

Gold Rain is a close rival of Banner, but its yellow colour will probably weigh against it as a market oat.

Abundance is normally two or three days earlier than Banner, but did not appear to maintain this advantage in 1924. Soil variation may be a factor in the case.

Leader seems to be losing ground.

Columbian and Prolific are meritorious new kinds.

Legacy is a promising medium-early oat.

Daubeney is too precocious, producing in a dry year straw too short to harvest properly, and never yielding very highly.

Of the two hulless, Laurel has again proven too short strawed for a dry season. Liberty maintains a creditable record.

OATS—VARIETY TEST, BEAVERLODGE, 1924

Variety	Days to mature					Yield of threshed grain per acre								
	1924	Average 2 years 1923-1924	Average 3 years 1922-1924	Average 5 years 1920-1924	Average 7 years 1918-1924	1924	Average 2 years 1923-1924	Average 3 years 1922-1924	Average 4 years 1921-1924	Average 5 years 1920-1924	Average 6 years 1919-1924	Average 7 years 1918-1924	Average 8 years 1917-1924	Average 9 years 1916-1924
						bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.
Abundance	109·0	119·5	116·0	117·4	121·8	29 33	44 20	42 12	56 6	67 7	74 20	79 30	78 12	.. ..
Banner, O. 49	109·0	119·0	117·3	119·4	.....	36 25	50 12	47 5	58 32	72 28	82 28	.. ..	.. ..	.. ..
Columbian, O. 78	111·0	119·0	.....	.....	.....	34 18	52 29	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Daubeney, O. 47	102·0	116·0	111·3	108·9	111·2	18 20	29 29	33 2	42 19	49 27	55 24	50 22	62 31	63 0
Gold Rain	112·0	121·0	117·0	118·6	.....	34 12	50 0	46 20	58 6	71 1	.. ..	.. ..	.. ..	.. ..
Laurel, O. 477	112·5	120·7	116·1	.....	.....	16 27	28 3	27 10	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Leader	111·5	120·2	118·8	121·3	....	32 16	49 19	46 10	57 28	70 28	.. ..	.. ..	.. ..	.. ..
Legacy, O. 678	108·0	119·0	115·0	.....	.....	27 9	43 17	40 19	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Liberty, O. 480	109·5	119·2	115·1	116·6	121·4	13 16	27 10	25 24	35 21	43 5	47 33	52 16	.. ..	.. ..
Ligowo	109·0	119·5	117·6	118·8	123·8	29 7	47 20	48 5	59 11	70 23	77 30	84 8	82 30	83 18
Prolific, O. 77	111·5	119·2	.....	.....	.....	27 22	47 11	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Victory	112·5	120·7	119·1	121·5	126·7	34 14	56 32	49 26	62 8	76 21	83 27	86 9	85 20	87 2

BARLEY

Variety tests with barley were no more satisfactory than with oats. When to cut was very perplexing. The earlier maturing kinds were harvested September 1st and 2nd, these including Eureka, O.A.C. 21, Early Chevalier, and Trebi. The remaining three were left to mature a little better, and as favourable weather continued week after week, bringing the suckering growth on remarkably, harvesting was deferred day after day. When the frost of September 20 terminated growth, the second growth had some heads, but the ripe ones had wasted considerably.

Eureka is distinctly a feed barley, for which purpose it is commended by its earliness, good yield of solid meat, and beardlessness. Defects are a pronounced tendency to smut infection and loss of heads through breaking off when ripe and through lack of erect standing of the ripe straw.

BARLEY—VARIETY TEST, BEAVERLODGE, 1924

Variety	Days to Mature			Yields of Threshed Grain per Acre					
	1924	Average 3 years 1922 to 1924	Average 5 years 1920 to 1924	1924	Average 3 years 1922 to 1924	Average 4 years 1921 to 1924	Average 5 years 1920 to 1924	Average 6 years 1919 to 1924	Average 9 years 1916 to 1924
				bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.	bush. lbs.
Bearer, O. 475..... (6)	113·0	118·3	.....	8 40	37 17	.. ..	.. ..	.. ..	.. ..
Charlottetown No. 80... (2)	113·5	116·5	.....	8 14	29 27	... ...	... ...	... ...	... ...
Early Chevalier..... (2)	110·0	114·6	113·0	8 5	25 33	30 40	35 33	37 27	33 22
Eureka..... (6)	111·0	113·3	111·8	10 3	30 3	33 40	38 4	.. ..	.. ..
Hannchen..... (2)	112·5	118·5	116·5	7 33	33 13	39 13	43 11	... ...	... ...
O. A. C. No. 21..... (6)	109·0	113·0	111·8	6 7	25 29	32 8	40 4	42 34	37 3
Trebi..... (6)	112·5	117·1	.....	6 45	29 3	39 43	.. ..	.. ..	.. ..

PEAS

The ripe, primary growth was so short as to be almost incapable of pulling with a scythe. One or two of the early kinds were bunched but these shattered considerably and during the later wet weather sprouted. The remaining varieties never were pulled. The second growth was rendered "squashy" by the first frost, while most of the ripe pods had shed their contents on the ground.

SPRING RYE

The O.A.C. No. 61 and Ottawa Select varieties of spring rye having been propagated side by side for three years until there was probability of considerable intermixing, and both having been found of about equal merit, with slight odds, perhaps, in favour of the Ottawa sort, it was thought best to continue with but the one variety, save in the rod-rows. It gave 8 bushels 42 pounds—about the same quantity of grain as the barleys. Its four-year-average yield of 25 bushels 32 pounds does not very eloquently recommend spring rye as a grain crop.

FLAX

Novelty flax was again compared with Premost in a duplicate trial. Sown May 20 on corn stubble, they made small and irregular growth but improved after the rains came and were left standing as long as possible. Novelty was estimated to be a couple of days later than Premost in ripening,

their respective periods needed for full maturity being estimated at 131 and 129 days. The plots were pulled on October 4, yielding relatively better than other grains. The seven-year average yield of 11 bushels 43 pounds for Premost, covering one year of failure from spring frost, is not displeasing.

SPRING RYE AND FLAX—VARIETY TESTS, BEAVERLODGE, 1924

—	Days to Mature			Yields of Grain per Acre					
	1924	Average 2 years 1923 to 1924	Average 4 years 1921 to 1924	1924		Average 4 years 1921 to 1924		Average 7 years 1918 to 1924	
				bush.	lbs.	bush.	lbs.	bush.	lbs.
Spring Rye—									
Select, O. 12	125	.....	125	8	42	25	32	..	..
Flax—									
Premost	129	131	.....	9	14	.....		11	43
Novelty	131	.....	.....	10	32	.....		.....	

BUCKWHEAT

Each of three varieties of buckwheat were seeded on two dates, May 20 and June 10. Against the Common, obtained from a Winnipeg firm in 1923, were tested the D and G strains of Tartarian secured from the Experimental Farm at Nappan, Nova Scotia. These Tartarians were found rather late for the district. No kind matured all its crop and the abrupt advent of killing frost put them down, so that by the time more important harvesting was accomplished the buckwheat was flat. Heavy subsequent volunteering showed that a good deal of grain had ripened, and if the first sowing of the Common had been cut in mid-September, or even directly after the frost, a passable yield would have been secured.

WINTER GRAINS

Three kinds of winter rye and three of winter wheat were compared in single plots sown August 10, 1923, under perfect seed-bed conditions. The ryes were in small plots 14 feet by 46.5 feet, this being the size permitted by the quantity of seed available for one of the kinds. The wheats were drilled in plots fourteen feet by ten rods, with the marginal drills finally removed. Late in August three strains of Kharkov were received from Macdonald College, Quebec, and in order to try them against the familiar Turkey Red, a small supplementary experiment was laid out on an inferior strip of summer-fallowed clay land that happened to be then available. The four plots were sown August 27, 1923, which was quite too late to give them an adequate top growth and accordingly subjected them to a rather severe wintering ordeal. They came through with weakened though fairly even stands, but their straw was short.

Covering one year (1922-23) of severe winter injury and three successive years of drouth, the seven-year-average yield of Turkey Red winter wheat is 24 bushels 35 pounds per acre. In the same period the Ottawa Select winter rye yielded 41 bushels 19 pounds. Rosen rye, advocated strongly a few years ago in southern Alberta, has not compared well in either of the two years it has been tested. It does not appear to be hardy enough. Likewise, O.A.C. No.

104 winter wheat, after acquitting itself very well in 1921, killed out badly in 1922-1923 and 1923-1924. Kanred, is quite similar to the Turkey Red, but seemed scarcely so hardy as the strain of the latter propagated for years past in Grande Prairie. The Macdonald College strains of Kharkov are promising, but no conclusions may yet be wrawn regarding these.

OTHER WINTER CROPS

Other winter crops sown were Hairy or Sand vetch, black winter oats, winter barley, and winter emmer, the two latter supplied by the Ontario Experimental Union for co-operative test. Of the four grains last mentioned all killed out completely save the hairy vetches. These, after considerable shattering, yielded six bushels per acre, which, at half the retail price quoted by seedsmen, would be a very paying crop indeed if some economical way could be found of harvesting the procumbent vines.

FIELD HUSBANDRY

THICKNESS OF SEEDING EXPERIMENT WITH GRAINS

Each rate of sowing of each of the three cereals has been represented since 1918 by a single quarter-acre plot, and the slightly rolling nature of the land has caused decided inconsistency in the results from year to year. Even the average of seven years' trials establishes no very pronounced conclusions. There seems to be a tendency for very thick seeding to fine and shorten the straw and, if too thick, to reduce the yield, though hastening maturity a trifle, more especially in the case of oats.

Very thin seedings fill up their stands considerably by stooling and, thanks to this plus longer and stouter straw and heads, yield nearly as well as medium seedings. Thin seedings rather favour the meadow crops seeded among them as well as any weed whose seed may lie in the ground.

On the whole, medium rates seem best where grain alone is the object. In a district where forcing maturity is desirable, thick seeding of oats on summer-fallow or breaking has a point to recommend it, though something doubtless depends upon variety. Banner does not seem to respond to thick seeding so well as Abundance.

Varieties of oats and barley were the same as used the year before, Banner and Trebi, but the new Garnet wheat was substituted for Ruby. The positions of the three grains were transposed from the 1919 arrangement, wheat being placed where barley had been before, oats where wheat had been, and barley on the original oat block. Measurements were exact, as usual, and marginal drills were excluded from the calculations. The grains were seeded May 6 on sunflower stubble.

Drouth caused the grain on the drier knolls to head at six inches or less in height, dwarfing the heads likewise. A large percentage of heads were lost. July rains brought on a suckering growth of oats and barley, which was much taller and stouter than the primary stalks, but it never ripened. The wheat did not sucker in this way and its total crop was accordingly light.

The eight-peck seeding of wheat was cut on August 8 when very ripe; the other strips August 30; barley September 2 when the early heads were breaking off while the green ones were yet devoid of substance, and the oats on September

27 after frost had put a period to development. The oats partly spoiled in the stack, although seemingly put together in fair condition, considering the season. Consequently neither total crop nor grain yields were obtained from the oats, though they produced plainly the heaviest tonnage of total crop, thanks largely to the strong secondary growth.

No satisfactory explanation occurs to account for the fact that in 1924 the thickest sowing of barley threshed the most grain per acre. The opposite might have been expected. Observation throughout the progress of the experiment warns against the use of more than seven or eight pecks of barley seed per acre, since from a ten-peck seeding the straw and heads incline to be fine and short.

Thickness of Seeding Test with Cereals, Beaverlodge, 1924

All plots ¼ acre in area.

Designation (Varieties used in 1924)	Weight total crop at threshing		Threshed grain per acre						Ratio grain to total crop	
	1924	Average 4 years 1921-1924	1924		Average 4 years 1921–1924		Average 6 years 1919–1924		1924	Average (quant.) 4 years 1921-1924
	lbs.		lbs.	bush. lbs.	lbs.	bush. lbs.	lbs.	bush. lbs.	%	%
Wheat—Garnet. —										
Seeded at 5 pecks	492	3,818	208	3 28	1,690	28 10	1,967	32 47	42·27	44·26
" 6 "	724	3,966	380	6 20	1,811	30 11	2,013	33 33	52·48	45·66
" 7 "	876	3,939	432	7 12	1,808	30 8	2,064	34 24	49·31	45·91
" 8 "	800	3,905	372	6 12	1,729	28 49	2,097	34 57	46·50	44·28
Averages	723	3,907	348	5 48	1,759	29 19	2,035	33 55	47·64	45·04

	Weight total crop at threshing		Threshed grain per acre						Ratio grain to total crop	
	1924	Average 3 years 1922-24	1924		Average 3 years 1922–1924		——		1924	Average (quant.) 3 years 1922-24
	lbs.	lbs.	lbs.	bush. lbs.	lbs.	bush. lbs.			%	%
Barley—Trebi.—										
Seeded at 4 pecks	1,200	3,285	352	7 16	1,686	35 6	——		29·33	51·31
" 6 "	944	3,056	274	5 34	1,584	33 0			29·03	51·83
" 8 "	1,124	3,229	368	7 32	1,657	34 25			32·74	51·32
" 10 "	1,028	3,012	454	9 22	1,585	33 1			44·16	52·63
Averages	1,074	3,145	362	7 26	1,628	33 44	——		33·81	51·75

N.B.—Oat crop of 1924 heated in stack and could neither be threshed not weighed with any fair or instructive result.

Varieties used:—

1918–1919	Marquis wheat,	Victory Oats	O.A.C. No. 21 barley.
1920	Huron "	Ligowo "	O.A.C. No. 21 "
1921	Huron "	Banner "	O.A.C. No. 21 "
1922	Ruby "	Victory "	Trebi barley.
1923	Ruby "	Banner "	Trebi "
1924	Garnet "	Banner "	Trebi "

SEEDING WINTER RYE WITH OR AFTER SPRING GRAIN

In June, 1923, about seventeen acres of a twenty-acre field of back-setting, half sown to barley and half to wheat, was cross-drilled to winter rye a month after the spring grain was sown, skips being purposely left here and there for autumn-drilling on stubble. The wheat was on fall ploughing and the barley on spring ploughing. The latter was so very thin that in places the rye got too much of a start and reduced the yield of barley about twenty-five per cent, judging from samples taken from limited measured areas. The wheat had a better stand and the rye there just merely established itself, as desired. In the fall the field would have afforded a nice bit of pasture if fenced. In the gaps left for autumn seeding little of the rye germinated until late, if at all, nor did it show up much the next spring. The June-drilled rye emerged in fair condition, making a somewhat thin but fairly even stand. It intercepted spring wash and got away to an early growth, making a far more promising crop in the extreme drouth than any other cereal or grass crop on the farm. Half the area was cut for hay soon after it headed out, yielding about three-quarters of a ton per acre. A better second cutting was anticipated, but drouth and grasshoppers killed it out. The part left for grain was estimated to yield about fifteen bushels per acre. Considering the conditions and the small cost of production it was perhaps the most profitable crop on the farm.

INTERCULTIVATED ENSILAGE CROPS

THINNING TEST WITH SUNFLOWERS

A duplicate thinning test with sunflowers yielded, as formerly, very inconsistent results. Four spacing were compared, viz., 6, 9, 12, and 15 inches apart in the row, all rows being three feet centred.

Results of this and previous work would indicate that the precise rate of sowing sunflowers were not vitally important and that ordinary drill work should be satisfactory for commercial culture.

DATES OF PLANTING SUNFLOWERS

It was to be expected that comparatively early planting of sunflowers would be distinctly advantageous in 1924, unless in the case of precocious kinds, which might approach too near the budding stage ere the long-deferred rains commenced. Three weekly planting dates, ranging from May 15 to 29, showed progressively decreasing yields.

Contrary to expectations, a converse tendency was exhibited in the column of dry-matter percentages. It may be that this was due to failure to get a true composite in sampling, though it must be said that in neither the present year nor in 1923 has there been such a pronounced difference found between the dry-matter percentages of late, immature and early, well-matured varieties as one might be inclined to expect. It seems probable that the degree of humidity in the pre-harvest weather may affect this matter; and there may be other factors.

The net result of Beaverlodge tests to date favours early-May planting of sunflowers—not always in the mere matter of yield, but almost invariably if yield and maturity both be considered.

PRESENTING results of the Date of Planting Test with sunflowers, Beaverlodge, 1924. Triplicate hundredth-acre plots of first and third dates; quadruplicates of the second date. Seed sown with garden drill in rows three feet apart, on breaking. Harvested and weighed September 12.

—	Per cent Stand			Date 50 p.c. in bloom	Per cent in bloom at harvest	Average height at harvest	Pounds per Acre		Per cent dry matter
	June 17	July 11	Final				Green weight	Absolute dry matter	
						inches			
1st date (May 15).....	72	91	97	Aug. 28	87	57	26,300	3,511	13·35
2nd date (May 22).....	19	81	96	Sept. 2	68	58	22,700	3,136	13·81
3rd date (May 29).....	6	89	96	.....	41	58	20,600	2,952	14·33

CORN VERSUS SUNFLOWERS

As in 1923, sunflowers have yielded more than twice as many pounds of dry matter per acre as corn. Against this, however, must be charged the fact that they leave the soil in poorer condition to produce the following crop. Whether this deficiency is due merely to a more complete exhaustion of soil moisture by sunflowers than by corn, or whether other factors enter in is not yet clear.

COMPARING yields of two varieties of corn and one variety of sunflowers, Beaverlodge, 1924. Test in duplicate. Plots 1/86 acre each. Soil, an inferior clay loam, surface-worked after pea plots. Varieties corn, Red Dent (Brandon) and Quebec 28 (MacDonald College). Sunflowers, Early Ottawa.

Crop	Yield of Green Weight		Yield Dry Matter		Per cent dry matter in crop
	Pounds per acre	Comparative percentages	Pounds per acre	Comparative percentages	
Corn.....	6,622	100	775	100	11·70
Sunflowers.....	13,975	211	1,798	232	12·87

FORAGE CROPS

Some eighteen hundred plots of meadow crops have been seeded on the Beaverlodge Station commencing with the year 1918. Work has been chiefly directed to the dual end of finding out what grasses and leguminous hay or pasture crops will best grow here and how to grow them. The problems are very perplexing and it cannot be claimed that they are yet solved, although data of real value has been accumulated, the ground is cleared of many misconceptions, and certain leads have been opened up along which purposeful effort may now be directed.

ALFALFA

The known list of meadow crops has been pretty well simmered down to four: western rye and brome among the grasses; alfalfa and sweet clover among the legumes. As in other regions, the prudence of sowing the latter mixed with grasses rather than by themselves has been indicated. If sown in this way, the grass helps to occupy the land, subdue the weeds and fill up vacancies that may be caused by winter-killing of the less-hardy legume.

Where this course is resorted to it is important to make a judicious blend. Some grasses, such as brome and timothy, tend to choke alfalfa down to diminutive stature, but the bunching habit of western rye does not exert such influence to nearly so great an extent, and the most promising hay mixture yet demonstrated at the Station is a combination of alfalfa and western rye. This is true,

at least, from a cropping standpoint. Feeding experiments have not been made. The great drawback to the mixture is the present high cost of hardy varieties of alfalfa seed. In this connection it is very gratifying to record that good paying crops of alfalfa seed have been ripened on the Station for the third successive season. Against this it must be admitted that the first four attempts at seed production were failures. The seed in all those years set freely, but a very inconsiderable proportion of it ripened, even from the first cutting. It is hoped that as acclimated strains are developed, alfalfa seed may be more regularly produced. If that comes to pass it would appear that one of the big forage-crop problems of the North will be advanced toward a solution.

While climatic conditions adapt the Peace River country very much better to the production of cereal growth than to perennial forage crops, and while it is out of the question to expect anything like the yields of alfalfa that are obtainable under irrigation or in more humid climates, yet it is a fact that with good culture the crop may be successfully grown, yielding more heavily than the best-adapted grasses. On the other hand, it is much more exacting in its requirements. It is somewhat less winter-hardy, will not so well stand abuse in the matter of late cutting or winter pasturing, and in a dry climate will not fight weeds well, especially when young. Many weeds counted of slight importance in other climates will multiply in a Peace River alfalfa stand and greatly impair it or choke it out. Extra-clean tilth is imperative if one is to grow alfalfa in the North. Of course inoculation has long since been established as essential, and it is also important to seed under conditions that will enable the crop to root strongly in its initial season.

Thus it comes that in the Peace River country alfalfa must be regarded as a crop for a good farmer. The poor farmer may make a failure of it. This also goes to explain why for most purposes the Station recommends seeding it in a mixture with western rye grass.

As to methods of culture, the Station recommends broadcast seeding for hay, intercultivated drills for hog-pasture or for seed-production.

Finally, as to the comparison of yields with those possible under irrigation, it is to be noted that while they may be as one to three this is no disproof of profitable culture, since the Peace River farmer is spared the expense of irrigation. A true comparison is with the grasses grown under similar conditions, and if, as has been already demonstrated, alfalfa when given a proper chance may yield not only more but better hay than these, while improving the soil at the same time, surely it is worth making some considerable effort to produce.

SWEET CLOVER

As a pasture crop sweet clover is undoubtedly worthy of favourable attention, particularly since its seed is much cheaper than alfalfa seed and can be regularly produced at home. When once rooted, it is more drouth-resistant than alfalfa, but it is not so easy to establish in a very dry season and it is distinctly less winter-hardy than the varieties of alfalfa employed on the Station. In some winters it is common to find a good many roots destroyed and most of the rest decayed through at a point one and a half to two inches below the surface. According to investigation by Dr. R. Newton, of the University of Alberta, this is likely caused by a form of sclerotinia. That it seems to make its most serious inroads in severe winters may be due to a lowering of resisting power. When an inch or two of fairly sound root is left attached to the crown and the spring opening is not too extremely unfavourable, the short pieces of healthy root branch out with a vigorous new growth and usually re-establish themselves so successfully as to support a strong top, considerably outyielding even alfalfa in a dry summer.

PRESENTING results in pounds of hay per acre from the five grasses and four legumes seeded 1921 in the Main Nurse-Crop Experiment. Three years' crop in all cases and four years in the case of the south halves of the Check Ranges (clipped in year of seeding). As White Dutch clover produced no yield of hay it was excluded from the table. Sweet clover in the Check Ranges gave two cuttings in 1922 and would have done so from the Nurse-Crop areas if left.

Description of seeding	Alsike at 5 lbs. per acre			Common Red at 10 lbs. per acre			Alfalfa at 10 lbs. per acre				Sweet Clover at 10 lbs. per acre				Timothy at 6 lbs. per acre			
	*1922	1923	1924	*1922	1923	1924	*1922	1923	1924	Ag'te	*1922	1923	1924	Ag'te	*1922	1923	1924	Ag'te
Seeded alone. North half of Check Range B. (Not clipped year of seeding)	.....	.....	.....	80	.....	.....	2,560	1,400	1,889	5,849	4,000	.....	.....	.....	2,600	1.160	323	4,083
Seeded alone. South half of Check Range B. (Clipped year of seeding)	1,760	.....	.....	1,320 / 680	.....	.....	2,240 / 1,280	320	828	4,668	2,640 / 2,320	.....	.....	.....	1,760 / 1,120	280	42	3,202
Seeded alone. North half of Check Range A. (Not clipped year of seeding)	.....	.....	.....	480	.....	.....	1,840	320	1,152	3,312	3,600	.....	.....	.....	1,520	520	0	2,040
Seeded alone. South half of Check Range A. (Clipped year of seeding)	480	.....	.....	660 / 1,160	.....	.....	1,040 / 1,360	160	591	3,151	2,160 / 2,600	.....	.....	.....	1,360 / 400	160	0	1,920
Seeded with 16 pecks Banner oats	.....	.....	.....	240	.....	.....	740	.....	.....	.....	840	.....	.....	.....	640	.....	.....	.....
" 14 " "	.....	.....	.....	200	.....	.....	520	.....	.....	.....	820	.....	.....	.....	560	.....	.....	.....
" 12 " "	.....	.....	.....	140	.....	.....	440	.....	.....	.....	640	.....	.....	.....	280	.....	.....	.....
" 10 " "	.....	.....	.....	220	.....	.....	420	.....	.....	.....	780	.....	.....	.....	660	.....	.....	.....
" 8 " Huron wheat	.....	.....	.....	560	.....	.....	720	.....	.....	.....	1,160	.....	.....	.....	800	.....	.....	.....
" 7 " "	.....	.....	.....	600	.....	.....	700	.....	.....	.....	760	.....	.....	.....	1,000	.....	.....	.....
Averages (10 plots in each case)	224	.....	.....	634	.....	.....	1,386	.....	.....	.....	2,232	.....	.....	.....	1,270	.....	.....	.....
Averages 6 plots seeded with nurse-crops	.....	.....	.....	327	.....	.....	590	.....	.....	.....	833	.....	.....	.....	657	.....	.....	.....
Averages 4 plots seeded without nurse-crops	560	.....	.....	1,095	.....	.....	2,580	550	1,115	4,245	4,330	.....	.....	.....	2,190	530	91	2,811
Averages 2 plots not clipped in year of seeding	.....	.....	.....	280	.....	.....	2,200	860	1,521	4,581	3,800	.....	.....	.....	2,060	840	161	3,061
Average 2 plots clipped in year of seeding	1,120	.....	.....	1,910	.....	.....	2,960	240	709	3,909	4,860	.....	.....	.....	2,320	220	21	2,561

*Including 1921 crop from south halves of Check Ranges.

Description of seeding	Western rye grass at 12 lbs. per acre				Meadow fescue at 18 lbs. per acre				Kentucky blue at 18 lbs. per acre				Brome grass at 18 lbs. per acre			
	*1922	1923	1924	Ag'te.	*1922	1923	1924	Ag'te.	*1922	1923	1924	Ag'te.	*1922	1923	1924	Ag'te.
Seeded alone. North half of Check Range B. (Not clipped year of seeding)	3,720	1,800	933	6,453	1,880	920	289	3,089	1,360	560	793	2,713	4,480	2,040	1,031	7,551
Seeded alone. South half of Check Range B. (Clipped year of seeding)	1,360 / 3,360	1,040	576	6,336	0 / 2,560	320	44	2,924	280 / 1,000	0	373	1,653	960 / 2,840	480	292	4,572
Seeded alone. North half of Check Range A. (Not clipped year of seeding)	3,360	680	1,014	5,054	1,320	160	124	1,604	640	20	245	905	3,000	320	494	3,814
Seeded alone. South half of Check Range A. (Clipped year of seeding	1,040 / 1,960	200	676	3,876	0 / 1,960	160	211	2,331	0 / 1,480	160	242	1,882	180 / 3,320	360	734	4,594
Seeded with 16 pecks Banner oats	1,040	.....	.....	.....	740	.....	.....	.....	480	.....	.....	.....	640	.....	.....	.....
Seeded with 14 pecks Banner oats	700	.....	.....	.....	600	.....	.....	.....	380	.....	.....	.....	840	.....	.....	.....
Seeded with 12 pecks Banner oats	700	.....	.....	.....	460	.....	.....	.....	300	.....	.....	.....	740	.....	.....	.....
Seeded with 10 pecks Banner oats	800	.....	.....	.....	540	.....	.....	.....	420	.....	.....	.....	900	.....	.....	.....
Seeded with 8 pecks Huron wheat	1,320	.....	.....	.....	840	.....	.....	.....	460	.....	.....	.....	920	.....	.....	.....
Seeded with 7 pecks Huron wheat	1,420	.....	.....	.....	860	.....	.....	.....	520	.....	.....	.....	1,780	.....	.....	.....
Averages (10 plots in each case)	2,078	.....	.....	.....	1,176	.....	.....	.....	732	.....	.....	.....	2,060	.....	.....	.....
Averages 6 plots seeded with nurse-crops	997	.....	.....	.....	673	.....	.....	.....	427	.....	.....	.....	970	.....	.....	.....
Averages 4 plots seeded without nurse-crops	3,700	930	800	5,430	1,930	390	167	2,487	1,190	185	413	1,788	3,695	800	638	5,133
Averages 2 plots not clipped in year of seeding	3,540	1,240	973	5,753	1,600	540	206	2,346	1,000	290	519	1,809	3,740	1,180	762	5,682
Average 2 plots clipped in year of seeding	3,860	620	626	5,106	2,260	240	127	2,627	1,380	80	307	1,767	3,650	420	513	4,583

NOTES.

(1) Part of the alsike and red clover plots followed hoe-crop, chiefly turnips, after which the growth was much less rank than after fallow. The brome, Kentucky blue, and meadow fescue followed hoe-crops, chiefly potatoes, while the remaining plots were on land fallowed in 1920.

(2) Range A was seeded April 26; Range B on May 7th.

(3) The impracticability of protecting certain of the stands from Shepherd's purse necessitated ploughing up in 1922 the nurse-crop areas that had been seeded on barley and on the two thinnest sowings of wheat.

(4) In the spring of 1923 all the remaining areas originally seeded with nurse crops were ploughed up and the land put in hoe-crops.

(5) On May 31st, 1923, the plots of red, alsike, White Dutch, and sweet clover in the check ranges were scuffled up, the latter being later reseeded to a mixture of sweet clover and grass.

FIVE GRASSES THOROUGHLY COMPARED

Comparing the grasses one with another we find that in two extensive series of experiments comprehending timothy, meadow fescue, and western rye grass, introducing 149 plots of each grass and covering six annual seedings, meadow fescue has yielded 2.9 per cent less and western rye grass 56.4 per cent more hay than timothy. In the one series in which Kentucky blue and brome grass were included, the latter yielded within two per cent as much as western rye, while Kentucky blue gave only 47.8 per cent as much as timothy and considerably less than a third as much as rye grass or brome. Furthermore, in extensively replicated experiments during both 1923 and 1924, western rye grass sod has been the easiest to break and to get rid of, while after breaking it has borne heavier crops of barley than has the sod of any other grass compared, meadow-fescue sod ranking second, with sods of Kentucky blue, brome, and timothy not nearly so productive as the rye-grass sod. This work on the residual effects of the grasses needs further repetition, however, ere too sweeping conclusions be drawn.

OTHER FORAGE CROPS

Sunflowers have been found more than twice as productive as corn although followed in dry years by extremely limited crops of grain. Millets are ill adapted.

Ten years' work with field roots has been reviewed, making out a very poor case indeed for the extensive culture of this class of crop. Of the various classes of field roots, turnips are decidedly the best adapted, but even these in 1923 were far outyielded in dry matter by oats grown at a fraction of the labour cost. In that year the determined dry-matter content of a crop of oats grown on summer-fallow was more than two and a third times that of swedes and nearly six and a half times that of mangels. The late-sown oat crop that year as cut with a mower yielded over four tons of absolute dry matter per acre. Oats alone have proven one of the most productive and economical forage crops and have a large place to fill with the northern stockman, although for best results they should be supplemented by other feeds.

In all the forage-crop work in 1924, yields of green weight were first obtained, weighed samples being then taken for dry-matter determination. Yields of cured hay are estimated from the absolute-dry-matter weights on a standard basis of twelve per cent moisture in cured hay.

THE NURSE-CROP TEST

For details of the scope and purpose of the Nurse-crop test readers are referred to earlier reports, but it may be well to explain in passing that in the test as originally designed ten kinds of grasses and legumes for hay production are sown in strips across four quarter-acre blocks of each of three cereals (wheat, oats, and barley), the four strips of each grain running from thin up to thick rates of sowing. The meadow seedings extend beyond these blocks of grain into a couple of check ranges seeded without nurse-crops. The check ranges ordinarily produce quite a growth of hay in the year of seeding.

To test the advisability of removing or leaving this initial season's growth the south halves of all the plots in both check ranges are clipped in the late summer and the clippings cured into hay. Thereafter, the south or clipped halves are harvested separately from the north or unclipped halves as long as the stands remain.

The original plan has been varied by occasional supplements. Particularly it has been sought to learn whether, when seeding without nurse-crops, annual

weeds could be prevented from seeding by the grazing of animals on the stands during the first year and strong plants still secured, capable of giving a good crop of hay in the ensuing season.

The tables presenting the results of the 1922, 1923 and 1924 seedings are withheld until the full cropping data from each shall be available.

THE GIST OF SEVEN YEARS' FINDINGS

In this as in the 1923 report an attempt has been made to bring together in the form of quantitive averages, supplemented by percentage comparisons, the mass of data yielded by seven croppings representing six years' successive seedings in the nurse-crop test. It is not an easy mass to digest, and until the final crop harvest is taken no attempt at fine-cut deductions will be made. A few comparisons of the grasses have been introduced on a previous page, emphasizing the value of western rye and brome.

The comparison of nurse-crop with non-nurse-crop seeding is less conclusive, for several reasons. In the first place, some of the nurse-crop-seeded plots have had to be ripped up at times as failures. Should these be represented by zero yields and included in the average or should they be omitted from the reckoning altogether? The latter is the treatment that has usually been followed, but manifestly it is not quite fair, since it takes no account of the sacrifice of seed nor of a year's loss of the land.

Again, the weed factor is a perplexing one to deal with. On the experimental areas hand-weeding is imperative for reasons best appreciated by one who has done such work; yet every sensible farmer knows that not much hand-weeding is practicable in raising hay commercially in Western Canada. Nurse-crops tend to subdue weeds considerably in the year of seeding, but in the weak, slow-starting stands of new meadow the intruders too often get the better of the desirable species, particularly of legumes. These points suggest a few of the difficulties met with in interpretation of the data.

It may serve the present purpose to point out that after rejecting as failures some of the poorest nurse-crop-seeded plots, the remainder have yielded not much more than half as much hay per annum as plots seeded without nurse-crops and left unclipped in the year of seeding. In the first cropping year the contrast is very much greater, but in the second and third plots seeded alone usually fail considerably, while the nurse-crop seeding may give its best yield in the second cropping year, thus improving its position relative to the non-nurse-crop seeding.

It may be well to set forth here a comparison of per-acre-per-annum yields of the five grasses employed under various conditions of seeding. In doing so, for purposes of more direct and fair comparison the plots seeded alone and clipped in the year of seeding have their initial season's yields counted in with the next crop, so that their production may be averaged on the same number of crop years as in the case of plots not clipped in the year of seeding. The calculation is mathematically wrong but intrinsically correct.

AVERAGE PER-ACRE-PER-ANNUM YIELDS
(as computed on a uniform basis)

Designation	Yield in Pounds per Acre				
	Timothy	Western rye	Meadow fescue	Kentucky blue	Brome
Seeded alone and clipped in year of seeding	1,845	2,603	1,335	902	2,575
Seeded alone and not clipped in year of seeding	1,451	2,377	1,279	833	2,591
Seeded with nurse crops	834	1,354	746	362	1,279

In studying the table it may be noticed that certain grasses seem better adapted than others to nurse-crop seeding, timothy and western rye succeeding rather better, relatively speaking, than brome. This does not mean that timothy seeded with a nurse-crop will outyield brome seeded that way, for brome is usually more productive under either condition of seeding, but it does not establish itself very promptly under the nurse-crop method. Kentucky blue gives a very poor account of itself under this system and is always very slow in becoming established.

At first glance it might appear as though it were profitable in most cases to cut and cure the crop offering in the initial season. The appearance is rather exaggerated by the fact that the seasons were much more favourable for grass growth than in the later years, which should ordinarily have been their main cropping periods, but in which all hay yields were so disastrously affected by drought.

Another deduction that might be rather unjustifiably drawn by the casual reader is that brome was conspicuously a crop which it was unprofitable to clip in the initial season. This may be true, but the superintendent, having observed all the plots carefully, has reason to suspect that the appearance may have been over-stressed by accident in location.

These are examples going to illustrate how treacherous experimental data may be unless checked by close systematic observation and interpreted with great care and discernment.

As to comparison of the several nurse-crops employed, it seems clear that of the three leading cereals wheat is the most suitable and oats the most restrictive. Flax gives the seeds an excellent chance, but is ineffective in holding down weeds and is often itself interfered with by a strong growing meadow crop seeded among it.

As between the effect of thick versus thin seedings of the nurse-crop, there has not been found so much difference as one might expect, although, on the whole, thin seedings seem somewhat the more favourable to the meadow crop.

Under Peace River conditions a nurse-crop is at best a strangle crop, its chief claim to favourable attention being that it gives a substantial return in the season of seeding-down, thus probably more than compensating for the subsequent reduced yields of hay. It is a question, however, whether any of the methods originally embraced in the Nurse-Crop Test are the best ones possible in the district. The plan of seeding alone and pasturing during the season of seeding has given sufficiently hopeful indications to warrant further trial.

THE GRASS AND CLOVER MIXTURES EXPERIMENT

This second of two major series of forage crop experiments is nearing completion. While the whole question of mixtures is by no means disposed of, some very definite indications have been obtained, and since certain of the crops represented in the plan have proven themselves unworthy of further consideration, economy of effort will be served by concentrating upon blends of those that are suited. For an outline of the scope and conduct of the experiment to date, the reader is referred back to our 1923 report.

As to deductions, it will suffice in this report to note that western rye acquits itself most favourably among the grasses, while alfalfa is outstandingly the best of three leguminous bases. Its showing is really more creditable than the tables would indicate, since the series of plots in which alfalfa occurs have usually been located on the highest and driest soil, least favourable to hay crops. The blend of alfalfa and western rye grass looks good. Sweet clover and brome have not been included in this particular experiment.

It may be well to reiterate that in the nurse-crop supplement to this experiment it has been very forcefully brought out that when meadow crops are to be seeded with nurse-crop, the small seeds should be put into the ground as soon as the grain. The more head start the nurse-crop gets the worse it is for the meadow crop seeded among it.

THE 1923 SEEDING

As fine a promise for hay as could be desired in any country was the spring showing of the plots in the 1923 seeding of the Grass and Clover Mixtures Experiment. Particularly good were the two ranges of the series in which alfalfa was the leguminous base. Thick, even stands showed strong, dark-green plants of alfalfa uniformly distributed. In the other series the red clover and alsike were excellent on some plots, although winter-injured on others. As usual, the alfalfa revealed no evidence of harm. Visitors were much impressed by these plots, particularly by the alfalfa. Of course these plots had all been sown on well-prepared summer-fallow and hand-weeded during the year of seeding. They also had the advantage of a not-too-rolling piece of ground, receiving a certain amount of snow moisture from higher land.

As the drouth intensified, even these plots began to show the effects of it, being decidedly "spotty" according to variations in contour and subsoil. The final yields averaged not over a quarter or a third of the early promise. The hay was of fine quality, however.

PRESENTING THREE YEARS' YIELDS OF HAY IN POUNDS PER ACRE FROM THE 1921 SEEDING OF THE GRASS AND CLOVER MIXTURES EXPERIMENT

—	1922 crop			1923 crop			1924 crop			Three years' crop Range A (full seeding)	Three years' crop Range B (two-thirds seeding)	Three years' crop, Average both ranges
	Range A (full seeding)	Range B (two-thirds seeding)	Average of both Ranges	Range A (full seeding)	Range B (two-thirds seeding)	Average of both ranges	Range A (full seeding)	Range B (two-thirds seeding)	Average of both ranges			
Alsike and Red Clover Series—												
Clovers only	680	0	340	680	.....	340	2,200	.....	1,100	3,560	.....	1,780
Clover and timothy	320	260	290	600	40	320	169	16	92	1,089	316	702
Clover and western rye grass	1,840	1,240	1,540	2,540	1,660	2,100	515	834	674	4,895	3,734	4,314
Clover and meadow fescue	840	440	640	760	520	640	328	143	235	1,928	1,103	1,515
Clover and three grasses	440	360	400	460	600	530	716	428	572	1,616	1,388	1,502
Clover and five grasses	840	980	910	520	360	440	599	624	611	1,959	1,964	1,961
Averages	826·6	546·6	686·6	926·6	530	728·3	754·5	340·8	547·3	2,507·8	1,417·5	1,962·3
Red Clover Series—												
Clover only	860	.....	430	.....	.....	.....	.....	.....	.....	860	.....	430
Clover and timothy	280	560	420	340	1,140	740	183	291	237	803	1,991	1,397
Clover and western rye grass	1,360	1,620	1,490	2,340	3,120	2,730	647	273	460	4,347	5,013	4,680
Clover and meadow fescue	460	820	640	580	760	670	156	1,016	586	1,196	2,596	1,896
Clover and three grasses	380	900	640	280	960	620	348	227	287	1,008	2,087	1,547
Clover and five grasses	1,180	2,200	1,690	1,060	940	1,000	219	387	303	2,459	3,527	2,993
Averages	753·3	1,016·6	884·9	766·6	1,153·3	960	258·8	365·6	312·2	1,778·8	2,535·6	2,157·1
Alfalfa Series—												
Alfalfa only	2,380	1,500	1,940	900	1,060	980	394	999	696	3,674	3,559	3,616
Alfalfa and timothy	860	940	900	460	500	480	368	462	418	1,688	1,902	1,795
Alfalfa and western rye grass	2,260	1,920	2,090	3,340	1,780	2,560	1,720	992	1,356	7,320	4,692	6,006
Alfalfa and meadow fescue	980	1,060	1,020	1,180	900	1,040	1,063	1,169	1,116	3,223	3,129	3,176
Alfalfa and three grasses	980	1,040	1,010	580	1,040	810	432	551	491	1,992	2,631	2,311
Alfalfa and five grasses	1,560	1,660	1,610	960	900	930	870	461	665	3,390	3,021	3,205
Averages	1,503·3	1,353·3	1,428·3	1,236·6	1,030	1,133·3	807·8	772·3	790·3	3,547·8	3,155·6	3,351·5
Grand averages (three series)	1,027·7	972·2	999·9	976·6	904·4	940·5	607	492·9	549·9	2,611·4	2,369·5	2,490·3

SUPPLEMENTARY RESULTS FROM NURSE-CROP SEEDING, A VERY THIN STAND OF RUBY WHEAT

Designation	1922 crop		1923 crop		1924 crop		Aggregate three years' crops
	Occurring only in Range A	Occurring only in Range B	Occurring only in Range A	Occurring only in Range B	Occurring only in Range A	Occurring only in Range B	
Red clover and alsike only	320		*500		*1,156		1,976
Red clover, alsike and five grasses		230		240		731	1,201
Red clover only	350						350
Red clover and five grasses		1,730		920		331	2,981
Alfalfa only	1,470		880		891		3,241
Alfalfa and five grasses		720		830		401	1,951

*Yield from one plot only. The other ploughed up.

NOTES

(1) The land where this seeding was plotted had been under variety plots of cereals in 1919, in green-feed and potatoes in 1920, was disked in the spring of 1921, later ploughed, packed, left lying awhile, then disked and packed. Legume seed inoculated.

(2) As growth under these conditions of preparation was only moderate, no portion of the plots from this seeding was cut in the initial season.

(3) Winter-killing of clovers occurred extensively in 1921-22 on certain plots, while others more favourably situated as to topography, etc., came through fairly satisfactorily and produced some crop in spite of drouth.

(4) It was noted in 1922 that the nurse-crop seedings showed up much better than usual, there being some crops from the legumes after nurse-crops, which was contrary to previous experience in this series. The improvement was attributed to three factors: (1) Inoculation of the legumes; (2) the extreme thinness of the stand of Ruby wheat, and (3) needed winter protection by the grain stubble.

(5) On May 31, 1923, winter-killed plots were scuffled up as follows: Three, that is to say, all the remaining legume-only plots in Range A of the Red Clover Series; one red-clover plot in Range B; the easterly nurse-crop-seeded plot of red clover and alsike in Range A, and the only red-clover-and-alsike plot in Range B of that series. Accident of location, of course, affected very much the matter of winter-killing.

(6) In 1924 the plots were mown on July 21.

(7) Land ploughed early in August and subsequently disked.

(8) Inoculation of the legumes resulted in their making a very much better showing, relative to the grasses, than they had done in earlier seedings, and this despite severe injury by unfavourable winters.

Results from the 1922 and 1923 seedings of the Grass and Clover Mixtures Experiment are withheld until full cropping data from these two seedings may be available.

SUMMARY of cropping data down to 1924 from experiments with grasses in six successive seedings (1918 to 1923, inclusive) of two series of experiments, viz., the Nurse-Crop Experiment and the Grass and Clover Mixtures Experiment

Designation	Yield in Pounds per Acre				
	Timothy	Western rye	Meadow fescue	Kentucky blue	Brome
Aggregate of 123 plot-harvests from 53 nurse-crop-seeded plots of each grass in the Nurse-Crop Experiment	102,631·0	166,578·0	91,856·0	44,624·0	157,415·0
Aggregate of 40 plot-harvests from 12 plots of each grass seeded alone and clipped year of seeding in the Nurse-Crop Experiment	51,674·0	72,900·0	37,382·0	25,278·0	72,124·0
Aggregate of 28 plot-harvests from 12 plots of each grass seeded alone and not clipped the year of seeding in the Nurse-Crop Experiment	40,640·0	66,562·0	35,820·0	23,334·0	72,566·0
Average of 191 plot-harvests from 77 plots of each grass in the Nurse-Crop Experiment	1,020·6	1,602·3	864·1	488·1	1,581·7
Percentage comparisons	100%	156·9%	84·6%	47·8%	154·9%
Aggregate of 180 plot-harvests from 72 plots of each grass in the Grass and Clover Mixtures Experiment	238,447·0	371,948·0	256,114·0	.....	.....
Grand averages of 371 plot-harvests, representing 149 plots of each grass in both experiments	1,168·2	1,827·4	1,135·2	.....	.....
Percentage comparisons	100%	156·4%	97·1%	.....	.....

SPECIAL ALFALFA EXPERIMENTS

A SIX-YEAR YIELD OF ALFALFA

That in the absence of inoculation, drill culture may be expected to give better yields of alfalfa than broadcast culture, while the reverse may often prove true with inoculated stands, would appear to be indicated by the results of a cultural test seeded in 1918. This deduction is supported by much other evidence upon the farm. When the stand was originally laid down, inoculation did not seem to be effective and in the first cropping year the drills far outyielded the broadcast stands. As nodules gradually developed on the roots the tables turned and in the later years the broadcast stands have regularly produced the larger crop. Not to encourage too sweeping deductions from this fact, it should be pointed out that the broadcast area had an undoubted advantage in location, for it received each year across one part of it extensive seepage of snow water from an adjacent bluff. Also, in the severe winter of 1922-23 the rows sustained more winter-killing than did the broadcast area, and to what extent this may have been due to position and to what extent to culture there is no means of knowing. The broadcast area has several times been thoroughly disked up to subdue grass and weeds, seemingly with advantage to the alfalfa.

Allowing for all these factors, but on the other hand taking into account the drawback from lack of effective inoculation on the start, as well as the run of very bad seasons for the past few years, the performance of the broadcast area must be regarded as quite encouraging, in contrast to the crop that might have been expected from grass in the same duration of stand and under the same set of conditions.

PRESENTING six season's yields of hay in pounds per acre from alfalfa plots in the Cultural Test, 1918, seeding of north (only remaining) range

Designation	1924 Crop			Aggregate six years	Average six years
	First cutting	Second cutting	Total two cuttings		
Average of four plots seeded in drills....	*802	914	1,716	13,243	2,207
Average of all broadcast seedings.....	*1,123	1,278	2,401	17,180	2,863

*Broadcast area and drills harvested together. Figures based on assumption that proportionate yields corresponded to those from second cutting.

SOIL REQUIREMENTS FOR ALFALFA

In the spring of 1924 every one of the numerous alfalfa stands on the Station had a fine, even, healthy appearance and only the unrelenting drouth prevented excellent yields. It was noticed, however, that stands established early in the season of 1923 or previously, stood the ordeal much better than the smaller and doubtless shorter-rooted plants resulting from late 1923 seeding; also that prominent dry knolls produced a scant growth not to be compared with that found in the hollows.

Systematic excavations in 1921 and 1922 have revealed that alfalfa roots will penetrate very tight subsoils to surprising depths but more promptly find their way down through porous strata, hence from young stands in a drouthy year one may expect much better results from alfalfa growing on the more permeable soil types. Since these loamy humus types are, in many cases, more likely than raw clays to yield up a fair supply of soil nitrogen, uninoculated stands are liable to do better on them in any season. But, given inoculation, with early-sown, well-developed plants and with a reasonable amount of rain or subsoil moisture, a very fine growth of alfalfa may be expected on some, at least, of our non-acid clays. This much has been already demonstrated.

ALFALFA AS A SEED PRODUCER

Until the year 1922 alfalfa never ripened any seed worth mentioning, even from the first cutting. It podded abundantly but a very inconsiderable quantity of seeds matured. For the past three years, however, maturing conditions have been more favourable and very satisfactory crops have been taken from many stands. A few of our co-operative experimenters have also ripened seed from their plots.

On June 21, 1923, two areas were sown with home-grown seed from the previous season's harvest. One was a long strip adjacent to a row of trees and the land had been summer-fallowed for two or three years. Here two drills were sown two feet apart and 2,060 feet long, amounting to an area of 0·28 acres, assuming that each row drew from three feet only. It is very doubtful whether the outer row would have yielded any less had there been another one three feet from it, while the row of trees served to flank the other one. It is probable, therefore, that the true area drawn upon was about as calculated.

The other area was a half-acre block of fallow which was seeded with a grain drill, whose disks covered the seed.

The broadcast area required considerable weeding, although the land had seemed quite clean at seeding. This supports the advice to sow in rows where seed production is the object. The seed yield was also much heavier, owing probably to the plants being better developed. The rows yielded at the rate

of 293 pounds per acre of seed, which graded No. 3 at Calgary on account of being rather imperfectly cleaned and containing some brown, shrunken, and hard seeds. At the low price of twenty cents a pound this would amount to $58.60 per acre, besides which the finely-chopped straw, containing a goodly proportion of leafy, suckering shoots, made a very fair quality of feed. The broadcast area yielded 144 pounds per acre.

All the alfalfa-seed crops were cut with the binder.

VARIETY AND STRAIN TESTS OF CLOVERS AND ALFALFA

Where the variety plots of clovers had failed and had been torn up in 1923 a new layout of plots had been seeded that year to compare varieties of alfalfa, sweet clover, red clover, alsike, and white clover in duplicate hundredth-acre plots. There were four strains of alfalfa, viz., Grimm (from Brooks, Alberta), Beaverlodge seed, Cossack, and Yellow-flowered Siberian, the two latter from Paramount Alfalfa Farm, at Rife, Alberta. All the stands were good, but the Beaverlodge and Brooks strains grew the tallest, with Cossack intermediate and Yellow-flowered Siberian very dwarf and low-set. It will be interesting to see how these four kinds stand up under a long-distance test for hardiness and production.

Three pairs of sweet clover plots afforded a duplicate comparison of white-blossomed from Ottawa, white-blossomed, home-grown seed, and yellow-blossomed. There was no observable difference between the first two, but the yellow-flowered was decidedly shorter and bloomed earlier than the white. It might be the preferable kind under certain conditions, but on the hard clay knoll where this test was conducted and in a year as dry as 1924 the yellow-flowered did not recommend itself as likely to prove productive.

Hubam, the much lauded annual sweet clover, has been discarded as unworthy of serious consideration unless for a few limited special purposes, such as orchard cover-cropping or late season nectar secretion.

In contrast to alfalfa and melilot, none of the red clovers acquitted themselves well. Some plots in the hollows had fairly good " formations " but on the more prominent exposures all the red clover plots exhibited considerable winter-killing. It seemed as though the French and Italian strains suffered particularly, but the land was too uneven and the replication insufficient to warrant confident deductions as among the strains and varieties of this crop.

Several alsike plots were devoted to a comparison of northern Ontario seed with that propagated for a generation at Beaverlodge. Both made full enough stands, which also survived the winters, but the growth was dwarfed by drouth. In a " draw " where some snow moisture had seeped down, it was tall enough that the heads could have been clipped with an ordinary mower bar. On the ridges, a lawn-mower could not have cut them although they were in all cases plentiful enough.

The most conclusive result of all was found in the unduplicated plots of white clover, which were located on nearly level land where single plots provided more dependable comparisons than duplicate plots did with the red clovers.

Seven kinds of white clover were represented, of which the two outstandingly best were the Danish strains, Strymo and Morso, which have also given best results at Lacombe and Fort Vermilion. These were noted as showing one hundred per cent stands in the spring. The second-best stand was exhibited by the Ottawa seed, with a spring persistence of 85 per cent, while the commercial strain of White Dutch had only 40 per cent, and the Ladino, a much-heralded pasture clover from the south, emerged with a 30 per cent showing. The two poorest plots were the Kentish and Scottish white clovers, with vital percentages of only 3 per cent and 1 per cent respectively.

VARIETY TEST OF SUNFLOWERS

Ten varieties of sunflowers were compared in quadruplicate hundredth-acre row-plots, on a narrow strip of 1923 breaking on high, rolling land. Until the middle of July growth was meagre, but thenceforward rapid. Harvesting was accomplished on September 13, a full week in advance of any frost harmful to sunflowers. Green weights were taken promptly after cutting, and from a quantity of each plot-harvest run through a cutting box a two-pound sample was taken for determination of the absolute dry-matter content.

The broad inference from the experiment is a confirmation of the previous deduction that medium-early kinds, such as Early Ottawa 76 and Manchurian, were most desirable for the district. Giant sunflowers of the Mammoth Russian class are too late to produce very much bloom in the average year, while the dwarfed Rosthern Mennonite type is too often stunted by adverse conditions, producing insufficient tonnage. Credit should be allowed, though, for the fact that when dry weather causes them to bud very low they are liable to respond to late rains with a burst of multiple heads, compensating, in part, for their diminutive stature. The short, much-branched stalks are not so convenient to handle as single-headed stalks of medium length.

ARTICHOKES VERSUS SUNFLOWERS

Through the courtesy of Joseph C. Sibley, proprietor of River Ridge Farm, of Franklin, Pennsylvania, the Station was furnished with three lots of tubers of the Mamoth French White Jerusalem artichoke to try against the Common Jerusalem already propagated for several years at Beaverlodge as a garden crop A row of Manchurian sunflowers was sown for comparison with both varieties of artichokes. The first lot of Mammoth French White tubers came through the Forage Plants Division, Ottawa, and were planted May 17. Directly afterwards, a bushel arrived by mail from Pennsylvania and were planted May 19. Unfortunately, these had suffered considerable decay in transit and upon being advised of this, Dr. Sibley most generously forwarded another lot, which reached us in June and were planted in the garden on the 9th of that month, making a fairly even row about three feet tall.

The tubers were planted in rows three feet apart and spaced, varyingly, twenty-four, thirty-six, and seventy-two inches apart in the respective rows. Defective conditions and drouth precluded any satisfactory comparison of the results of the several spacings.

Owing, doubtless, to the long shipment, the Pennsylvania tubers did not seem to exhibit so prompt germination nor make so good a yield as the Common Jersualem of Beaverlodge raising and no present deductions are attempted. The Mammoth French White has elsewhere proved itself far superior to the Common and will be given further trial.

The best row of Common Jerusalems yielded 16,400 pounds green weight per acre, containing 2,404 pounds absolute dry matter. The comparative row of Manchurian sunflowers seeded no earlier yielded 31,600 pounds green weight and 3,896 pounds dry matter. The best row of Mammoth French White Jerusalem produced 11,200 pounds, containing 1,840 pounds absolute dry matter.

By comparison with the sunflowers, the artichoke stands were tardy, ragged, and short, but much allowance must be made for the condition of the seed tubers. If the quality of the forage is all that is claimed by Dr. Sibley and if the tubers of the Mammoth French White retain their vitality in the ground over winter, as the tubers of the Common Jerusalem have hitherto done, the crop may have possibilities.

COMPARING ARTICHOKES WITH SUNFLOWERS. PLANTED ON BREAKING OF PREVIOUS YEAR ON LOWER END OF WINDBREAK STRIP

Designation	Green weight per acre	Per cent dry matter	Pounds dry matter per acre
	lbs.		
Plot 2, Jerusalem (B.L.) 36 inches	6,600	14·55	960
" 3, M.F.W. Jerusalem (Ottawa)	2,800	14·66	410
" 4, Jerusalem (B.L.) 36 inches	8,200	14·66	1,202
" 5, " " 24 "	1,500	14·44	216
" 7, M.F.W. Jerusalem, 72 inches	5,600	16·43	920
" 8, " " 72 "	3,900	15·16	591
" 9, " " 36 "	6,600	15·60	1,029
Sunflowers (Manchurian-McKenzie)	31,600	12·33	3,896

MISCELLANEOUS BROADCAST FORAGE CROPS

The millets more than maintained their uneviable reputation. Five varieties were seeded June 6 in duplicate plots, but the weather then was too dry for germination even of millet.

Rape, seeded in certain soil-fertility investigations, behaved as formerly, standing drouth poorly, especially where sown broadcast, but responding with a nice growth when favourable weather arrived. It is clearly a crop that demands plenty of moisture and available plant food and succeeds best in drills. Utilization, except for pasture, is rather inconvenient.

Hairy vetches sown August 10, 1923, produced a nice crop of seed in 1924 though a good deal of it was lost by shattering in the coil. The threshed yield amounted to six bushels per acre.

Spring vetches, or tares, were sown as usual along with the variety plots of peas, but drouth ruined the test.

FIELD ROOTS

TEN YEARS' EXPERIMENTS WITH FIELD ROOTS AT BEAVERLODGE

Field roots have been grown experimentally at Beaverlodge during the past ten years with very irregular non-success. That they have seldom been given optimum conditions is admitted. Being considered a crop of very minor importance to the district, the seeding of them has been usually deferred until after more important experiments have been attended to, with the occasional result, as in 1922, of decidedly inferior germination compared to what might have been expected from earlier seeding.

A study of the meteorological records throws light on the result. Snow usually goes in April and its disappearance is commonly followed by cold, drying winds, with very scanty precipitation. A summary of the records for nine years, 1916-1924, reveals an average total precipitation of 0.47 inches for April and 1.52 inches for May, the latter having been enhanced by the abnormal volume of snow and rain occurring in May, 1917, amounting to a total of 6.62 inches. If this one abnormal year were deducted then the May average would be less than an inch. The nine-year average of June precipitation is only 1.52 inches and its occurrence, moreover, is irregular. July, with 2.29 inches, is the wettest average month and this is too late to get field roots away to a proper start, though it promotes rapid growth of stands previously well established. The nine-year average precipitation totals only 15.76 inches of moisture and a proportion of this is lost by spring run-off or by washing down the slopes when the

occasional heavy rains cannot be readily absorbed by the clayey subsoil. Unlike as at Fort Vermilion or in various limited areas of river flats, there is at Beaverlodge no sub-irrigation through an open subsoil; and such is nowhere common on the plateau of the western part of the Peace River country. The conditions not only place rather narrow limitations upon yields of moisture-loving forage crops but go to explain the difficulty of getting full braids regularly and promptly established. Too often the languishing stands are subjected to lashing winds, attacks of cutworms, red turnip beetles, or other insects, and occasionally to late spring frosts.

It is true these adverse conditions might be improved by providing garden conditions or by growing in the sheltered, snow-saturated space between an outer and an inner windbreak, but few Peace River settlers can provide those conditions at present, and if they could, such areas would be circumscribed and might be desired for other purposes. Results obtained by such practice would hardly be representative of those generally to be expected.

Drawbacks do not cease when the crop is grown. More than once the keeping quality of mangels has been injured or destroyed by an untimely cold snap of exceptional severity, while field carrots have seldom been mature enough to keep in the root cellar. Thus it appears that while in some seasons the roots could be safely left to grow until late October or even into November, this is too risky. To avoid undue risk, mangels should be lifted by early October and turnips by about the middle of the month. This often deprives them of weeks of growing weather in which otherwise they might add considerably to their tonnage.

STORAGE AND WINTER FEEDING

Storage and winter feeding, even for early use, are quite a problem. Safe winter storage can certainly be provided, but at some cost, and unless so situated that it may be easily entered from the stable or a warm feed room, the inconvenience of getting out and pulping during forty-below-zero weather is liable to exceed the advantage derived, especially in a remote pioneer region where transportation costs depress the net unit values of animal products.

After some experience in feeding roots from a cellar with an outdoor approach, the writer would hesitate to accept many as a present for mid-winter feeding. The labour cost of utilization in such circumstances is too high and the returns too meagre. A few for fall feeding; for spring-tonic effect for poultry, pigs, or for cows at freshening might be another matter.

SUMMARIZING TEN YEARS OF EXPERIMENTS WITH FIELD ROOTS, BEAVERLODGE, 1915-1924

Year	Swede Turnips — Averages all varieties grown	Mangels — Averages all varieties grown	Sugar Beets — Averages all varieties grown	Field Carrots — Averages all varieties grown	Fall Turnips — Averages all varieties grown
	lbs. per acre.	lbs. per acre.	lbs. per acre	lbs. per acre	lbs. per acre
1915	36,666	34,949	.....	21,000	.....
1916	.....	11,818	.....	5,321	.....
1917	24,386	14,390	.....	11,937	.....
1918	42,540	26,360	20,040	23,338	.....
1919	11,777	18,000	7,466	Frozen in ground Oct.	....
1920	26,346	15,342	15,981	11,141	46,802
1921	40,689	18,567	14,932	13,290	55,885
1922	1,431	945	810	0	5,130
1923	30,123	13,971	8,520	3,066	34,830
1924	34,844	16,135	5,159	2,879	40,949
Average 5 years—1920-1924	26,687	12,992	9,080	6,075	36,719
Average 7 years—1918-1924	26,821	15,617	10,415	7,673	.....
Average 8 years—1917-1924	26,517	15,464	.....	8,206	.....

Fourteen varieties of Swede turnips, twelve of fall turnips, two dozen of mangels, seven of sugar beets and twelve of carrots were compared in 1924, dry-matter determinations being made in all cases. It is not thought worth while presenting these results at this time, beyond what is comprehended in the ten years' summary.

SOIL FERTILITY INVESTIGATIONS

RESIDUAL EFFECT OF VARIOUS GRASSES

Following up an interesting experiment in 1923 to compare the effect of various grass sods upon the ensuing yield of grain, a similar test was planned when breaking up the sod of the meadow plots laid down in the 1920 seeding of the Nurse-crop Test. (See reports on forage crops.)

In this test ten grasses and legumes had been seeded both with and without nurse-crops, but the nurse-crop seedings of the legumes had to be sacrificed through lack of prompt inoculation. In the check ranges some of them finally established themselves, and in the third cropping season (1923) alfalfa yielded two cuttings. The breaking of its sod was thereby delayed for a few weeks. During the prevailing series of poor hay seasons the yields of the grass plots were extremely light indeed.

In late July, 1923, after removal of the third annual crop of hay, the sods were broken, excepting the alfalfa plots referred to and one of two ranges of grass plots that had been seeded with barley. This latter range, lying at the foot of the long block, was reserved to be broken in September by way of comparing fall breaking with July breaking to be followed by September backsetting.

With the two exceptions noted, the sods were ploughed July 20 and 21, by which time midsummer rains had nearly everywhere moistened the soil to the sole of a six-inch furrow, although occasionally a little dry ground was turned up at that depth. In ploughing, care was taken to avoid having any back furrows or dead furrows in the more important test areas.

The July-broken plots were all double-disked once or twice and later in the summer backset; the exact date of the second ploughing not being recorded. At the time of backsetting the remaining range of sod plots was broken out. All were then double-disked in preparation for winter. In the spring of 1924 the land was harrowed down smooth.

On May 9, 1924, Eureka (hulless) barley was drilled into the moisture, the index levers being set as for seven pecks of wheat.

POOR STAND ON BLUE GRASS SOD

Germination was fairly prompt and even all over the block, save on the sod of Kentucky blue grass, which seemed very tough so that the barley on this rod-wide strip was conspicuously thin and backward throughout. On the four other grass sods little or no difference was discernible for months. Moisture was conspicuously the limiting factor and it seemed as though the outcome would be negative except in respect to Kentucky blue grass. The whole area was about to be cut enbloc when the Superintendent, taking a final survey, was impressed with the poor appearance of the barley on timothy sod compared with that after western rye grass and fescue. Others concurring in the opinion, it was thought best to obtain comparative data.

On account of short crop and bad weather a one-six-hundredth-acre area of eight swards in the north halves of the original check ranges was hand-pulled. After the pulling was accomplished it was thought well to obtain further data

by cutting from the remainder of each rod-wide strip of sward a full binder swath. Before doing so the old paths were cut out. As the six-foot binder was purposely driven through the grain to ensure a full swath in every case, the area of each binder swath was practically 0·072 acre (72/1000). The binder was driven in the same direction each time to ensure an even pick-up.

When pulling the six-hundredth-acre plots, and again upon reaping the larger areas, it was remarked how much stouter and taller the barley was on the rye grass and fescue sods than on the timothy and brome sods and how much poorer still on the blue grass strip. The binder swath through the rye grass yielded nearly a third more sheaves than the equal swath on the adjoining strip of timothy sod. The row of stooks standing side by side at the ends of the strips furnished a striking object lesson. It is felt that much the most conclusive comparison is afforded by these six binder swaths.

Some peculiar inconsistencies were found in the crop from the pulled areas of the check ranges, notably in the yield of threshed grain. Of course, the whole block consisted of an irregular mixture of early and late shoots and the six-hundredth-acre plots were too small to be very dependable. More decisive contrasts could be published by excluding them and considering the binder swaths only.

It will be observed that the tables present not merely the yields of barley but also the preceding yields of hay, both the three-year aggregates and immediately preceding (1923) crops. Study of the percentage table brings out the fact that while the rye grass strip had yielded six and two-thirds times as much hay as timothy in 1923 and might therefore have been presumed to have exhausted soil moisture much more thoroughly, yet in spite of this fact, in 1924 its sod produced 42·4 per cent more total crop of barley and 13·8 per cent more grain.

Kentucky blue, on the other hand, although giving a negligible yield of hay in 1923, yielded in 1924 only 86·6 per cent as much total crop of barley as did the timothy sod.

Meadow fescue, while yielding lightly of hay, was followed by a very fair yield of barley, while brome grass, producing in 1923 nearly seven times as much hay as timothy, was succeeded in 1924 by substantially the same barley crop as followed timothy. It is well to note that the brome strip had flanked a roadway and may possibly have been favoured as to sub-soil moisture, though as generous margins of hay and grain were discarded, it is not thought that serious error entered here.

From the dual standpoint of hay production and yield of ensuing grain crop, western rye ranks away ahead of any other grass unless it be brome, beating timothy as it did in the corresponding experiment reported in 1923. In that year the rye grass sods had yielded 25·1 per cent more barley than the timothy sods.

Just what may be the fundamental explanation of these striking differences in productiveness of various grasses and grass sods is a question engaging the active attention of the Station, in co-operation with the Division of Chemistry.

From the fact that in various years applications of nitrate of soda to growing crops have produced prompt and conspicuous benefit on timothy but not nearly so much benefit to rye grass, except, perhaps, in the case of long-standing leys, and from a mass of other evidence too elaborate to be detailed here, it has been suspected that in some way the explanation is connected with the factor of soluble nitrogen, though just how remains to be seen. Whether, as has been suggested by Cornell authorities, certain crops like timothy exert a root-exudate action depressive of nitrification; whether the highly carbonaceous composition of timothy residues conduces to slow decay; whether the physical condition of the surface soil resulting from the growth of these respective crops accounts for the behaviour; whether it is a combination of two or more of these

factors, or whether the explanation lies in some direction not yet suggested cannot at present be decided.

Timothy in the North country and Kentucky blue to a much greater extent form tight swards like that of brome which may compact the soil unduly, drinking up the light showers that constitute so much of the precipitation in some years and possibly keeping the surface layer in a dry, compact, inert condition unfavourable to vital processes. Western rye, on the contrary, is a bunch grass, which for years after being laid down appears to preserve a somewhat more open condition of the land, likely leaving it a little more receptive to moisture and better aerated. Certain it is that of all the grass sods under trial western rye seems to break with the lightest draft and to turn the most friable furrow.

It is very desirable to compare the effect of grass sods with those of alfalfa and clover, but no wholly satisfactory opportunity has yet presented itself.

Rape, as usual, proved a poor preparatory crop.

TABLE giving the yields of hay and the 1924 yields of Eureka barley after various swards in the original check (non-nurse crop) ranges of the 1920 seeding of the Nurse-Crop Experiment. Average of two plots in each case.

Eureka Barley following:	Yields in Pounds per Acre			
	Aggregate of hay for 3 years, 1921-1923	Hay in 1923	Total Crop of barley, 1924	Grain crop of barley, 1924
Brome	7,980	780	2,430	648·5
Kentucky blue	2,280	0	2,430	589·0
Meadow fescue	3,360	20	2,250	436·5
Western rye	6,760	900	2,850	362·0
Timothy	2,840	80	1,980	439·5
Alsike	Not on record	.....	2,610	472·0
*Alfalfa	"	.....	1,920	306·5
Rape	"	.....	2,220	318·0

*Aftermath removed in 1923 and ploughing deferred thereby so that this plot went into winter with rather scant moisture supply. Also, the alfalfa volunteered considerably in 1924 thus competing with the barley.

TABLE giving the yields of hay and the 1924 yields of Eureka barley after swards in the main part of the 1920 seeding of the Nurse-Crop Experiment. Averages of eight plots in each case, a six-foot binder swath representing the barley crop after each sward.

Eureka barley following:	Yields in pounds per acre			
	Aggregate of hay for 3 years 1921-1923	Hay in 1923	Total crop of barley 1924	Grain crop of barley 1924
Brome	3,437	920	1,500	375
Kentucky blue	102	52	1,083	337
Meadow fescue	1,485	120	1,736	493
Western rye	3,880	850	2,069	525
Timothy	1,313	141	1,458	431

TABLE giving the yields of hay and the 1924 yields of Eureka barley after various swards in the 1920 seeding of the Nurse-Crop Experiment. Average of ten plots in each case. (Combining results from both hand-pulled areas in check ranges and binder swaths through remaining areas).

Eureka barley following:	Yields in pounds per acre			
	Aggregate of hay for 3 years 1921–1923	Hay in 1923	Total crop of barley 1924	Grain crop of barley 1924
Brome	4,346	892	1,686	429·7
Kentucky blue	538	42	1,352·4	387·4
Meadow fescue	1,860	100	1,838·8	481·7
Western rye	4,456	860	2,225·2	492·4
Timothy	1,619	129	1,562·4	432·7

TABLE giving the percentage comparison of the yields of hay and the 1924 yields of Eureka barley after the various swards in the 1920 seeding of the Nurse-Crop Experiment, using timothy as the basis of comparison. (Average of ten plots in each case).

Eureka barley following:	Comparison of yields on a percentage basis			
	Hay crops over a period of 3 years, 1921–1923	Hay crop 1923	Total crop of barley 1924	Grain crop of barley 1924
	p.c.	p.c.	p.c.	p.c.
Brome	268·4	691·5	107·9	99·3
Kentucky blue	33·2	32·6	86·6	89·5
Meadow fescue	114·9	77·5	117·7	111·3
Western rye	275·2	666·7	142·4	113·8
Timothy	100	100	100	100

Surmising that chemical analysis of the crop might throw inferential light upon the cropping data, the Station sent samples of both straw and threshed grain to the Division of Chemistry, C.E.F., Ottawa. These samples were respective composites of the swaths cut with the binder. The outcome is thus presented by Dr. Frank T. Shutt, Dominion Chemist.

ANALYSIS OF STRAW (CROP OF 1924)—EUREKA BARLEY*

Lab'y. No.	Previous Crop	Moisture	On Dry Matter Basis	
			Nitrogen	Protein N. x 6·25
		p.c.	p.c.	p.c.
81017	Brome	7·28	2·05	12·84
81021	Kentucky Blue	7·13	2·02	12·63
81020	Meadow Fescue	7·27	2·04	12·74
81018	Western Rye	7·93	2·10	13·15
81019	Timothy	6·84	1·79	11·23

*Analysis by Dominion Chemist.

ANALYSIS OF GRAIN (CROP OF 1924)—EUREKA BARLEY*

Lab'y. No.	Previous Crop	Wt. of 1000 Kernels	Moisture	On Dry Matter Basis	
				Nitrogen	Protein N. x 6·25
		grms.	p.c.	p.c.	p.c.
81213	Brome	31·34	8·98	3·14	19·63
81214	Kentucky Blue	36·31	9·75	3·04	18·98
81212	Meadow Fescue	33·37	7·18	3·01	18·79
81211	Western Rye	32·07	10·42	3·21	20·05
81215	Timothy	36·78	9·19	2·97	18·50

*Analysis by Dominion Chemist.

"Commenting briefly on these results it is first to be observed that the nitrogen results for both straw and grain are exceptionally high. This it appears is to be accounted for by the immaturity of the barley crop following unusual seasonal conditions. The Superintendent at the Beaverlodge Station writing us in this connection states:—

"The growing conditions of the season were such as to produce a thin, dwarfed primary growth during the long early summer period of dry weather. When the rains came in July a much stronger suckering growth was sent up, but this was too late to produce much substance in its kernel. In fact a good many of the heads of this late growth threshed none at all. I should say, at a rough guess, that fully 75 per cent of the weight of total crop consisted of this late growth, which should, as you suggest, be more truly described as barley hay. This would explain the high nitrogen content of the straw and also to some extent of the grain."

"With respect to the results from the crops after western rye grass and timothy, respectively, the nitrogen data for both straw and grain furnish significant evidence in support of the supposition that the soil following the growth of timothy, for one reason or another, afforded to the barley crop less available nitrogen than did the soil after western rye grass."

NITRATE APPLICATIONS ON BARLEY

When planning the residual-effects test just described, two ranges of grass plots at the foot of the piece and originally laid down with barley as a nurse-crop were reserved for a test of (*a*) summer breaking followed by autumn back-setting as against (*b*) autumn breaking without back-setting. Each range was four rods long and five rods wide, five grass strips, each a rod wide.

Across the north end of each of these two ranges nitrate of soda was applied on May 23 at the rate of one pound per square rod (160 pounds per acre). The arrangement was such as to provide in each case a square rod of fertilized area after each grass in both these ranges. There were thus twenty comparative areas:—

Five sod areas of July breaking treated in spring with nitrate.
" " " " " not treated in spring with nitrate.
" " " of September breaking treated in spring with nitrate.
" " " " " not treated in spring with nitrate.

Representing each of these twenty areas, a one-six-hundredth-acre was hand-pulled. From the ten to which nitrate of soda had been applied little increase could be found that was positively attributable to fertilization, and what increases were recorded did not occur in the timothy plots, where they were especially looked for. This may have been partly due to the small scale of the test areas, exaggerating the effect of possible accidents in stand, soil, wastage, etc. On the average of ten comparisons the nitrate-fertilized yielded 7·7 per cent more total crop of barley and 11·1 per cent more threshed grain than did the non-nitrate areas. It was apparently a season when moisture rather than available plant food was the chief limiting factor, though, again, we are confronted with the fact that the strip of timothy which yielded so little hay in 1923 fell so decidedly short of the rye grass strip in the 1924 yield of barley. This seems to modify the moisture hypothesis somewhat. It is quite possible that the nitrate appli-

cation failed to become washed down to the roots of the barley in time to be of much benefit at the stage when nitrates were chiefly required. After its application there was not so much as a tenth of an inch of rain at one time until June 19, when about two-fifths of an inch fell on that and the succeeding day.

A much more decided difference occurred in the comparison of the range broken in summer and backset in September with the autumn-broken range. The former yielded 53·5 per cent more total crop and 31·5 per cent more threshed grain than did the late-ploughed range.

So far as total crop weights were concerned, the difference was substantial in the case of every sod except that of western rye, but in respect to threshed-grain yields there was some irregularity, due, doubtless, to conditions already explained.

The brome sod ploughed in September, 1923, volunteered freely from its root-stocks in 1924, but the brome sod ploughed twice was all killed except a scattering root here and there. Some volunteering of blue grass occurred in the area that was twice ploughed—more, apparently, than in the area broken in September. It seemed as though this particular sod had been laid back before it had rotted and that backsetting was rather favourable to the re-establishment of its turf. This inference, however, is by no means conclusive and may be contradicted by further work.

TABLE comparing twice-ploughed and September-broken sods and also effect of an application of nitrate of soda on the yield of Eureka barley grown after various grasses broken by two different systems, Beaverlodge, 1924. Pulled plots 1/600 acre each

Eureka barley following:	Yield in pounds per acre					
	Total crop from autumn breaking	Total crop from autumn back-setting	Average of the two preparations	Grain from autumn breaking	Grain from autumn back-setting	Average of the two preparations
Not treated with nitrate—						
Brome	1,020	1,500	1,260	279	180	229·5
Kentucky blue	1,320	1,620	1,470	445	279	362·0
Meadow fescue	1,500	2,700	2,100	161	280	220·5
Western rye	1,920	2,040	1,980	353	477	415·0
Timothy	1,440	2,880	2,160	306	531	418·5
Averages	1,440	2,148	1,794	308·8	349·4	329·1
Treated with nitrate—						
Brome	1,380	2,160	1,770	325	335	330·0
Kentucky blue	1,620	2,460	2,040	235	596	415·5
Meadow fescue	1,560	2,760	2,160	271	608	439·5
Western rye	1,620	1,680	1,650	319	255	287·0
Timothy	1,320	2,760	2,040	306	405	355·5
Averages	1,500	2,364	1,932	291·2	439·8	365·5
Grand averages	1,470	2,256	.....	300	394·6	.....

	Total Crop	Grain
Per cent increase yield of ten nitrate over ten non-nitrate plots	7·7%	11·1%
Per cent excess yield of autumn backset over autumn breaking	53·5%	31·5%

ANIMAL HUSBANDRY

SILAGE VERSUS GREEN-FEED FOR FATTENING CATTLE

While demonstrating the somewhat higher efficiency of a silage over a non-silage ration in respect to gains made and finish obtained on fattening cattle, the feeding experiment in 1921-22 failed to prove it as economical, owing to the higher cost of nutrients in the form of silage; and as the mid-winter use of succulent feed is attended with inconvenience in a cold climate, it was decided that in the 1923-24 operations the silo would not be opened until the coldest weather was over.

Twelve two-year-old and two well-grown yearling steers were picked up during the winter and were carried along on a mutual ration of oat sheaves, locally called "green feed." All horns were promptly removed with the clippers, and it was remarked at the second weighing, taken about three weeks after the operation, that three individuals showing Hereford markings appeared to suffer a much more severe setback than did a pair of Shorthorn grades of like age from the same herd. Eventually, all made good recovery.

During the fifty-four days from January 10 to March 4, thirteen head, receiving a mixed assortment of oat sheaves, but with no other roughage nor any chop, registered daily gains averaging five-ninths of a pound.

After the experimental feeding commenced, the "green feed" used was some that had been cut in the very early milk, so that it contained little substance inside the hull. It is a class of feed frequently available in the North and was chosen for comparison with silage.

On March 4, the animals were individually weighed, divided evenly as to ages and as evenly as possible according to weights, type, and thrift. On March 6 experimental feeding commenced. The silage lot was given silage and meal in the morning, followed by water and then green feed; water about five p.m., silage and meal followed by green feed in racks in the evening. The green feed lot had similar treatment, their meal being sprinkled on uncut oat sheaves. During day time the silage lot usually had the run of a corral in which the water tank was situated, while the other lot had to be content with twice-a-day watering. Block salt was accessible at all times, with some coarse salt fed in cold weather. All were bedded with straw. The feeding period was calculated as ninety days.

The cattle were held till early June. Unfortunately, and contrary to usual experience, the Edmonton market this year sagged off at that time under the influence of rather heavy receipts. Furthermore, the Northern stock train carrying the experimental cattle had a bad trip and consequently, it is not surprising that the shrinkage was excessive and the cattle in poor condition for selling.

In calculating the shrinkage and also the gains, the average of two careful farm weighings, made respectively on June 2 and 4, were taken just prior to the animals being driven to the depot. The average shrinkage per head was 102 pounds for the silage-fed and 102.5 pounds for the non-silage-fed lot. The percentages were 8.1 per cent and 8.3 per cent.

In 1922 the shrinkage on ten head of silage-fed cattle (six yearlings and four two-year-olds) was 4.8 per cent, while the shrinkage on ten non-silage cattle of the same ages as the others was 5.3 per cent.

It is likely that in the matter of shrinkage on silage-fed animals something may depend upon how the stock is treated just prior to shipment. The Station's practice is to withhold grain or succulent feed for a day or so prior to shipment. It is possible that in both 1922 and 1924 the slightly higher finish of the silage lots went to hold down their percentage of shrink.

SILAGE FROM CURED CEREAL MIXED WITH FRESH-CUT SUNFLOWERS

The silage used in this experiment was of first-class quality composed of ripe cured cereal mixed with fresh-cut sunflowers less than fifty per cent in bloom.

In September, 1923, about three tons of stook-cured Trebi barley, three tons of very weedy and immature but thoroughly-cured oat stooks, and two tons of rather early-cut but well-cured Ruby wheat polluted with some seeds of Shepherd's purse, were hauled to the silo and stacked there in advance of filling. About thirty-two tons of fresh sunflowers were well mixed with the cereals at filling.

Supplementary to an experimental study of the "Losses in Wilting and Ensiling Sunflowers," by Dr. R. Newton and W. R. Brown, of the University of Alberta, a sample of the wheat-sunflower mixture as fed from the Beaverlodge silo was analyzed at Edmonton and reported upon as follows: —

"The sample which Mr. Albright forwarded was taken from the wheat-sunflower mixture. It wag enclosed in a tin container, and reached the laboratory apparently in perfect condition. Its appearanes and odour showed it at once to be first-quality silage, a judgment which is fully borne out by the followine analysis:—

"Moisture	69·20 %
Total acid	0·855%
Non-volatile acid as lactic	0·527%
Volatile acid as acetic	0·328%
Ratio non-volatile to volatile acid	1 : 0·62
Amino nitrogen as crude protein	0·416%
Water-soluble N as crude protein	0·992%
Total nitrogen as crude protein	2·695%
Ratio water-soluble to total N	1 : 2·72
Volatile base as ammonia	0·020%

"The nature of the ratios of non-volatile acid to volatile acid, and of water-soluble nitrogen to total nitrogen, indicates the fermentation to have been of highly desirable type, with a minimum amount of protein-splitting and wastage.

"The results of our examination of the wheat-sunflower silage from Beaverlodge are such as to lead us to support Mr. Albright in his conclusion that 'Four years' experience strongly commends to me the practice of ensiling fresh-cut sunflowers with cured cereals where the height of the silo permits sufficient pressure to ensure proper packing and curing.' "

For the purpose of computing the absolute-dry-matter content of silage, Dr. Newton's analysis was relied upon. The dry-matter content of "green feed" was estimated at 85 per cent, which was high enough considering its sappy condition and the bit of snow occasionally weighed with it as loaded. Chop was assumed to run 89 per cent absolute dry matter.

SILAGE RATION MORE EFFICIENT BUT OAT SHEAVES MORE ECONOMICAL

Study of the tabulated record will reveal that both lots of cattle made good gains on a very moderate meal consumption per head. The silage-fed lot was fed, on the average, only twenty-two pounds more absolute dry matter per head, probably wasting a smaller proportion of their ration than did the non-silage-fed lot. The silage cattle made somewhat better gains, excelling the others by 11.05 per cent in relative efficiency, per pound of absolute dry matter as expressed in gains of weight. The silage cattle also attained a slightly higher finish, shrank a trifle less in shipping, and brought, on the average, nine cents more per hundredweight, the cattle being individually appraised and sold by numbers.

For all these several advantages, the higher cost of the silage ration, whether considered as in dollars per head or in cost per unit of dry-matter content, threw a net balance of twenty-five cents per head in favour of the non-silage ration.

Under Grande Prairie conditions, silage is a considerably more expensive feed than green sheaf oats per unit of dry matter content.

Taken in conjunction with all previous experience at the Station, the 1924 test goes to substantiate the deduction drawn from an all-winter experiment in 1921-22, that cattle can be well and cheaply fattened with inexpensive shelter

and on feeds which the locality is adapted to produce in quantity, so long as attention is paid to such factors of comfort as bedding, draft-proof shelter, and tempered drinking water.

"The excellent response made in 1922 by the 'green feed' bunch during the last period when a small feed of hay was introduced lends support to the opinion that during the winter months at least, the variety which would be supplied by a good leguminous hay would be of more advantage in cattle feeding than the succulence supplied by silage."

TABLE COMPARING RESULTS OF SILAGE AND NON-SILAGE RATIONS FOR FINISHING STEERS, BEAVERLODGE, 1923–1924

Designation	Silage Lot			Non-Silage Lot		
	Weight	Absolute dry matter	Value	Weight	Absolute dry matter	Value
	lbs.	lbs.	$ cts.	lbs.	lbs.	$ cts.
Average weight per head on March 4	1,065			1,062·7		
Average of two drafts (June 2 and June 4)	1,260			1,236·5		
Average selling weight, Edmonton	1,158			1,134		
Average shipping shrinkage per head	102			102·5		
Average shipping shrinkage, per cent	8·1%			8·3%		
Average gain per head, basis of farm weights	195			173·8		
Average daily gain	2·16			1·93		
Silage consumed per head at $5 ton (cost price)	1,814	558·71	4 53			
Green feed consumed per head at $6.25 ton (cost price)	1,330	1,130·50	4 16	1,959	1,665·15	6 12
Oat chop consumed per head at $18 ton (cost price)	264	234·96	2 38	264	234·96	2 38
Barley consumed per head at $20 ton (cost price)	269	239·41	2 69	269	239·41	2 69
Salt consumed per head at $60 ton (cost price)	14	14	0 42	16	16	0 48
Estimated weight absolute dry matter fed per head		2,177·58			2,155·52	
Cost of feed per head			14 18			11 67
Cost of feed per head per day			0 158			0 13
Cost of feed per hundredweight of gain			7 27			6 71
Average daily meal ration	5·82			5·82		
Average selling price per hundrsdweight			5 65			5 56
Average selling price per head			65 45			63 06
Relative percentage efficiency of the two rations per pound dry matter as expressed in gains produced	111·05%			100%		
Relative selling price per head, after deducting from the silage lot the advantage of 2·3 pounds greater initial weight at $5.65 per cwt			65 32			63 06
Extra feed cost per head of the silage ration			2 51			
Extra net selling value of silage lot per head			2 26			
Superior economy of green-feed ration per head						0 25

NOTE.—Experimental feeding commenced March 6. Period computed as ninety days.

COST OF WINTERING CALVES

In addition to the experimental work with Government-owned stock, this Station undertook to ascertain the feed cost of wintering twelve privately owned calves, fed with no expense to the Departmental account save the slight amount of time involved in taking weights and keeping records. The practice was to weigh the loads of oat bundles and hay and to feed the roots, silage, and meal by measure, a vessel of each being regularly weighed and the daily ration thus computed.

The calves were weighed at weaning and again one hundred days later. The final weights were taken on June 3, extending to a total period of 192 days. During the month of May the calves had the run of a rather closely cropped pasture by day, but there was little for them to graze except old grass. Throughout the winter they had access to a straw stack, and while the aim was to supply all the fodder they would eat in other forms, they undoubtedly consumed some straw, particularly during the latter period.

The calves (practically all dehorned with caustic when young) were housed in an open-front, straw-loft, log building. They were watered twice a day and had regular access to salt. Birth dates ranged from March to August, most occurring in May. Eleven calves were grade Shorthorn. The twelfth was of unknown male parentage. Although the third-oldest calf in the lot, this one was a poor doer and pulled down the average gains, being lighter on March 3 than its August-dropped pen mate. One fine calf had to be altered after weaning and one heifer, evidently of Shorthorn-Hereford breeding, was delivered in May of a bull calf. She was but a few hours over fourteen months of age when her calf was born. On November 24, at a little over six months' average age, the calves weighed in at 425½ pounds.

On December 19 they averaged 450.8 pounds, having gained a pound apiece per day during the twenty-five days of the weaning period, in spite of the setback to the altered calf, which gained only ten pounds in that time. They were fed chiefly on immature oat sheaves, with a small feed of hay and a trifle of pulped turnips and oat chop.

After the silo was opened on March 6, silage was fed to the calves and soon afterwards roots were discontinued, as well as the small crushed oat ration. A fortnight later, however, barley meal was introduced at the rate of about a pound per head and continued to the end of May. During this second period of 92 days the calves did particularly well and were a very attractive lot in the spring, averaging 644 pounds apiece at a little over thirteen months of age at the end of 192 days on test.

The net daily gain per head during the 192-day period was 1.14 pounds, put on at a feed cost of 5⅖ cents a day, or $4.69 per hundredweight of gain, not counting salt, straw, or May pasture. In other words, a calf was carried over winter and increased 219¼ pounds in weight at a feed cost of $10.28, the bulk of the feed being green sheaf oats. The meal ration averaged out merely 93 pounds per calf, or less than half a pound daily, costing, at current prices when ground, less than half a cent daily.

The figures take no account of straw, pasture, shelter, salt, water, or labour.

COMPARISON BY PERIODS OF FEED CONSUMED, ABSOLUTE DRY MATTER, FEED COSTS AND GAINS, TWELVE CALVES, NOVEMBER 24, 1923, TO JUNE 3, 1924

Designation	First, or 100-day period (Nov. 24-Mar. 3)	Second, or 92-day period (Mar. 4-June 3)	Total, or 192-day period (Nov. 24-June 3)
Cost of feed	$61·97	$61·45	$123·42
Cost of feed per head	$ 5·16	$ 5·12	$ 10·28
Cost of feed per head per day	$ 0·052	$ 0·056	$ 0·054
Total gains	1,110 lbs.	1,521 lbs.	2,631 lbs.
Gain per head	92·5 "	126·75 "	219·25 "
Gain per head per day	0·925 "	1·377 "	1·14 "
Cost of feed per cwt. gain	$5·58	$4·04	$4·69
Absolute dry matter to produce one pound of gain	12·56 lbs.	7·34 lbs.	9·54 lbs.

FEED AND FEED COST BY PERIODS AND IN THE AGGREGATE FOR TWELVE CALVES WINTERED NOVEMBER 24, 1923, TO JUNE 3, 1924

Designation	Weight of feed	Absolute dry matter	Value
	lbs.	lbs.	$ cts.
100 days (Nov. 24 to March 3)—			
Roots at $6.00 per ton	830	91	2 49
Green-feed at $6.25 per ton	12,310	10,464	38 47
Hay at $10.00 per ton	3,380	2,974	16 90
Oat chop at $18.00 per ton	457	407	4 11
Rape, etc., at weaning	77	10	(?)
Straw ad libitum	(?)	(?)	(?)
Total placed in mangers	17,054	13,946	61 97
92 days (March 4 to June 23)—			
Roots at $6.00 per ton	70	8	0 21
Green-feed at $6.25 per ton	8,301	7,056	25 94
Hay at $10.00 per ton	280	246	1 40
Oat chop at $18.00 per ton	35	31	0 32
Barley chop at $20.00 per ton	628	559	6 28
Silage at $5.00 per ton	10,920	3,276	27 30
Straw ad libitum and old grass pasture in May	(?)	(?)	(?)
Total placed in mangers	20,234	11,176	61 45
192 days (Nov. 24 to June 3)—			
Roots at $6.00 per ton	900	99	2 70
Green-feed at $6.25 per ton	20,611	17,519	64 41
Silage at $5.00 per ton	10,920	3,276	27 30
Hay at $10.00 per ton	3,660	3,221	18 30
Oat chop at $18.00 per ton	492	438	4 43
Barley chop at $20.00 per ton	628	559	6 28
Rape, etc., at weaning	77	10	(?)
Straw ad libitum, old grass pasture, etc	(?)	(?)	(?)
Total placed in mangers	37,288	25,122	123 42
Total meal ration per calf	93	.....	0 89
Average daily meal ration per calf	0·48	.....	0 46

BEES

The parent colony and two 1923 swarms resulting from the "colony" of hybrid Italians received from Lacombe in July, 1922, wintered very successfully and were removed from the house cellar on May 2 and 3, when the somewhat belated pussy willows were showing pollen. At the first examination on May 8 all the hives were found to contain brood in all stages. The 1923 prime swarm (No. 202) had bees to cover six or seven frames, but only about eight pounds of stores left and had to be fed. The original hive had bees to cover three or four frames, and the secondary swarm about enough to cover five frames, both these being well supplied with honey. There seemed to have been little mortality, notwithstanding that mice had been troublesome in the cellar in the early winter and that a dead one was found in the bottom of the secondary swarm (No. 203). During May the bees seemed to find plenty of pollen and some nectar, working on willow until around the middle of May, also anemone, Manitoba maple, raspberry, wild gooseberry, sandcherry, saskatoon, and other blossoms.

During the summer some perplexing experience was encountered in requeening. The net result was that after establishing four nuclei, three of which seemed away to a good start, it was necessary to unite two successively in a vain attempt to requeen what had been the strongest parent colony. What with this and bad autumn weather the count by the end of the season was only four colonies, the strongest of which was believed to be queenless, while one of the others was weak.

At the end of October the weather turned stormy and cold. The bees were protected with false cases slipped down over the hives and packed inside with straw. These had been made and used back in September. On November 22 all the four colonies were carried into the cellar. The stores supplied for the winter consisted of honey plus 54 pounds of sugar to the four colonies.

All told, the season which had begun so auspiciously ended rather disappointingly, save in one respect. The quality of the honey was excellent. But the yield was small and the final condition of the colonies was uncertain. Starting in the spring with three satisfactory colonies and a spare super of honey, the apiary in autumn registered a net increase of one in count of colonies, 92 pounds of extracted honey and a quantity of drawn comb.

The best yield from any colony was 62 pounds from No. 202, which had seemed in a fair way to make a fine record, and probably would have done so but for the requeening difficulties.

That the poor showing was due to mishaps that may be avoided in future, rather than to inadaptability of the district for honey production seems probable. It is pertinent to record that a beginner named Frank Guthrie, in the town of Grande Prairie, started with a purchased colony in the spring of 1924 and from various causes left the bees congested in the hive body until near the end of July. Supering then, he had the satisfaction of seeing them draw, fill, and cap three or four frames of foundation in five days, besides working on other sheets in the super. In the fall he put away two heavily stored colonies, besides extracting eighty or ninety pounds of honey. Certain other beginners in less favoured districts had a less fortunate experience, owing in part to prolonged drouth curtailing the usual wild bloom. But all, so far as known, experienced quite an improvement with the fireweed flow.

EXTENSION WORK

As the prolonged drouth not only detracted from appearances but introduced conditions that threatened to defeat instructive comparisons, picnics were not this year especially invited by the staff. A considerable number of people came, nevertheless, and some of them were good enough to express surprise at the showing made under the circumstances.

The Station was honoured by inspection calls from two important touring bodies. One comprised a substantial proportion of the Provincial Legislature, headed by Premier Greenfield and his Minister of Railways, Hon. V. W. Smith. The other accompanied Sir Henry W. Thornton, President of the Canadian National Railways. The members of these parties looked over the work, sampled the products and were supplied with mimeographed memoranda setting forth outstanding results of the experimental effort as well as general facts about the Peace River country.

Material was sent out to widely separated points for nine co-operative experiments in the inoculation of alfalfa, and for seven others comparing Late Swedish red clover, some with alfalfa and some with alsike clover. One hundred and eighty-one packages of small-fruit stock were distributed to settlers, 1,241 letters were received and 1,235 answered, besides which 141 postcards and 37 circulars were mailed relating to fruit-stock distribution and co-operative experiments.

One article was prepared for "Seasonable Hints" and eleven for general distribution to the press, besides a number of exclusive and special contributions, interviews, etc.

A week was spent during March participating with officers of the Provincial Department of Agriculture in short-course work, touching five points both

north and south of the Peace. Upon two other occasions lantern-slide addresses were given to local audiences, one of them addressed also by the Dominion Agrostologist.

In January, a well-patronized local seed fair was judged at Lake Saskatoon, and in August, at the urgent request of the Dominion Seed Branch, a week was devoted to inspection of standing grain entered for registration, from Lake Saskatoon to Falher.

Sir H. W. Thornton addressing a meeting at Beaverlodge, August 12, 1924.

An informal but profitable session for apiarists was held at the Station upon the occasion of the Dominion Apiarist's visit and opportune calls were made at the same time upon three beginners in beekeeping.

Four divisional officers from the Central Farm visited the Station during the summer and after inspecting the plots were shown as much of the surrounding country as practicable, the Superintendent accompanying one on a trip to Fort St. John on the Upper Peace; another to Fort Vermilion, some four hundred and fifty miles northeast of Beaverlodge by trail and river boat. These trips enabled the writer to prepare a memorandum of agricultural resources by districts, which was appreciated by the visiting railroad men and subsequently published locally as well as in the Canadian National Railways magazine.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1926.