DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

PROGRESS REPORT OF THE CHIEF SUPERVISOR

J. C. MOYNAN, B.S.A.

ON

THE ILLUSTRATION STATIONS

IN

MANITOBA, SASKATCHEWAN, ALBERTA and BRITISH COLUMBIA

FOR THE YEARS 1931 to 1933, INCLUSIVE

The home of John Tait, operator of the Illustration Station at Meota, Saskatchewan.

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PROGRESS REPORT ON ILLUSTRATION STATIONS

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As outposts, the two hundred and seven Illustration Stations, now in operation, link up the centrally located Experimental Farms with the farm problems of outlying districts. Nineteen of these stations are in operation in British Columbia, twenty-two in Alberta, thirty in Saskatchewan, fifteen in Manitoba, seventeen in Ontario, fifty-two in Quebec, nineteen in New Brunswick, twenty in Nova Scotia and thirteen in Prince Edward Island. These stations are located on privately owned farms and operated co-operatively with progressive farmers, having not only a personal, but a community interest in agricultural betterment. Some ninety-eight projects of investigation and comparative demonstrations constitute the main divisional activity, centering around problems of practical crop and live stock production, soil fertility, cultural methods, testing of crops and varieties deemed most suitable for the districts, conservation and use of farmyard manure, chemical fertilizers, crop sequence, farm layout, farm management, cost of production and assembling of meteorological data. Farm gardens, flowers, and trial orchards are established and developed under supervision, shelter belts planted, building and general home improvement undertaken.

CROP AND CULTURAL INVESTIGATIONS ON " BURN-OUT " LANDS

In Southern Saskatchewan and Southern Alberta, a considerable acreage of so-called " burn-out " land exists. The area under study lies west of Weyburn, the Illustration Station concerned being located at Radville on the Avonlea-Radville line. These burn-out areas are characterized by roughly circular depressions, varying in depth from four to six inches, and in width from a few feet to as much as thirty feet. These burn-out spots appear to have lost a considerable portion of original surface soil leaving exposed a grey-coloured, hard, impervious and somewhat unproductive zone. According to analysis the normal soil contains considerably more nitrogen and organic matter than the burn-out areas. Early settlers on these lands soon realized the problem they had in breaking up such soils to a sufficient depth and working them so as to improve their productivity, considerable power being required to pull ploughs and other tillage implements. The advent of the medium-sized tractor, and improvements in tillage implements, are two factors which have considerably helped in bringing such lands under cultivation. The most useful tillage implements for burn-out lands are found to be the mould-board plough, the disk harrow and the home-made float or scrubber. A special deep tillage implement called the Killifer chisel has been tested, but so far not for a sufficient period to justify a definite recommendation. Investigations under way, include such projects as the time and depth of breaking, the value of backsetting, floating, subsoiling, manuring, liming and other treatments designed to improve the tilth of the soil. Different crops, including wheat, oats, barley, flax, rye and sweet clover are sown to learn which would be best adapted to the local conditions and in the case of sweet clover, to study its residual effect. Comprehensive fertilizer trials are under way for the purpose of determining the nature of the deficiency of these burn-out soils.

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An interim report on investigations, now proceeding, was compiled and published under pamphlet Number 114, entitled, " The Improvement of Burn-out Lands in Southern Saskatchewan," and is now available for those interested in this problem.

KENVILLE HORTICULTURAL STATION

In 1931, an Illustration Station devoted entirely to horticultural projects was established at Kenville in the Swan River Valley, Manitoba. In this semi-northern location, it was felt that thoroughly useful tests could be made of fruits bred in southern prairie regions and those best suited to the north determined.

Station work includes variety and cultural trials with fruits, flowers and vegetables, while flowering shrubbery also finds a place. The operator owns a small greenhouse, which facilitates some experimental work as well as the demonstrations and comparative tests being carried on. Four acres of land are occupied in gardens and orchard, and in addition two acres of home grounds, on which various shrubs and trees are being set out.

VEGETABLES.—An extensive list of approved vegetables are planted each year and all varieties are name-staked for the information of visitors. Cultural practices for onions, peas, celery, corn and potatoes constitute an important project. Certified seed potatoes of the Gold Coin and Green Mountain varieties are grown and disposed of locally as seed. Garden corn has in the past three years been a feature crop. In 1933, the new medium variety, Dorinny, the early variety known as Banting, Sunshine and Golden Bantam were grown. Considerable seed was saved and is available for distribution. Large sweet Spanish onions were a heavy crop in 1933 and rows of them extending between the lines of newly planted apple and plum trees, made a most effective demonstration.

TREE FRUITS.—Since the inception of work, two acres have been planted with large fruits, comprising 215 trees. These embrace the following varieties.

Russian and Standard Apples	Morden Productions—Apples	Crabs
Duchess	Manton	Trail
Wealthy	Mantot	Elkhorn
Rosy Repka	Mortoff	Dolgo
Antonovka	Moris	Olga
Haralson	Manan	Osman
Watt	Spangelo and several not yet named	Gertrude
		Bedford
		Philips
		Robin

Plums	Sandcherry-Plum Hybrids	Cherries
Mammoth	Tom Thumb	Cheresoto
Minnesota No. 69	Mordena	Manmoor
Minnesota No. 79	Opata	
Minnesota No. 196	Sapa	
Compass Cherry	Ezaptan	
Tokato	Oka	
Assiniboine		
Pembina		
Number 2-21-6A		

Before station work started here, the operator had a small orchard which was bearing fruit. Last winter the rabbits gained access to this and completely ruined the trees by gnawing the bark off. Luckily the new trial orchard trees were young and received complete protection by a heavy snow cover, but to

prevent future damage a fence was erected in the fall of 1933. This was "Lay-flat" poultry netting six feet in width, and it appears quite a satisfactory fence for the purpose.

FLOWERS.—An extensive list of annuals is grown each year and all varieties name-staked. Not only is this a demonstration garden, but various cultural practices are employed and information regarding the suitability of varieties and strains recorded. A perennial border, some 200 feet long and 15 feet wide was laid out along the entrance drive in 1932. Flowering shrubbery and herbaceous plants are being added annually, until planting has been completed.

TRIALS WITH FIELD AND GARDEN CROPS, ALONG THE LINE OF THE HUDSON BAY RAILWAY

It is nine years since crop testing was initiated in this northern region. During the first five years activity was confined to that section south of Mile 214, and four years ago it was extended north to Churchill.

Due to the immense stretches of muskeg and naturally moist conditions in this country, results have so far indicated that cultivated crops develop better in a dry summer than when there is normal or heavy rainfall. The two best crop years were 1930 and 1932, both seasons of less than normal rainfall.

Frost damage has been very slight south of Pikwitonei (Mile 214). At Hudson Bay Junction, The Pas, Cormorant and Mile 137, grain has all been harvested without frost over the nine-year period. At Mile 214, there has been frost damage two years out of five. At Arnot (Mile 236), frost has occurred to damage crops every year but 1930. In the Gillam district, grain has come through without frost injury, excepting the first year of trials (1929). Over the southern stretches of the railway the last spring frost occurs on the average about June 8 and the first autumn frost about Sept. 2. From Mile 214 to Gillam (Mile 327) the frost free period has been but slightly shorter than further south. At Mile 236, however, the climate appears quite at variance with points either north or south as frosts have occurred every month of every year since work began, excepting in 1930 when July alone was frost free.

Short season vegetables, such as radish and lettuce have been grown successfully at all locations, including Churchill. North as far as Gillam, grain crops and a wide variety of vegetables and flowers have done quite well.

A feature of these trials has been the disappointing results during the first year or two after the soil is broken up. Once the land is well worked, aerated, and in sweeter condition, vast improvement is noted in growth. In the light of these findings, it is regarded as a mistake to believe that garden and field crops cannot be successfully grown in a given locality until a fair trial over a period of years has been made. After failures with all crops at Gillam in 1929-30, there have followed three years of complete success on the same soil, and Reward wheat has repeatedly been worthy of grading No. 1 Northern.

ILLUSTRATION STATIONS AS CENTRES FOR THE PRODUCTION OF PURE SEED

To determine, multiply and distribute seed with a view of establishing the most suitable crops and varieties on neighbouring farms is an active project, and an important service which the Illustration Stations are rendering in their respective communities. During the last three years, the operators in Nova Scotia and Alberta have led in the sale of wheat, oats and barley, those in the Peace River district in the sale of alfalfa, those in Manitoba in the sale of sweet clover, while the operators in Western Quebec, Eastern Ontario and Prince Edward Island led in the sale of red clover and timothy seed. The Prince Edward Island, New Brunswick and British Columbia operators were the largest and most important growers of certified seed potatoes.

The purity and the general quality of the seed produced and sold will be reflected in the fact that Illustration Station operators obtained sixteen placings with their exhibits at the World's Grain Exhibition at Regina, taking first placing in the early oat and sweet clover classes, with high placings in hard, red wheat. The accomplishments of R. G. Cowdery of Eriksdale, Manitoba, in seed production and exhibiting, indicate the nature of the work being conducted. In 1932, his clover obtained second placing at Chicago, and in 1933 he secured third place. His alfalfa seed has also been seventh or higher in four showings at the Toronto Royal. At the World's Grain Exhibition, he obtained ninth place with sweet clover. An interesting fact in connection with this operator, is that when Illustration Station work started on his farm in April, 1926, neither alfalfa, nor sweet clover were being grown on his farm, nor in this Inter-lake section of Manitoba. During the past season, the operators of stations throughout the different provinces, sold to their neighbours 26,930 bushels of oats, 16,518 bushels of wheat, 3,336 bushels of barley, 194 bushels of peas, 10,988 bushels of seed potatoes, 7,882 pounds of timothy seed and 17,251 pounds of clover seed.

LIVE STOCK IMPROVEMENT AND SALE OF BREEDING STOCK

Live stock and dairy products supply the principal source of revenue on sixty-nine per cent of the farms operated as Illustration Stations. It is, therefore, of economic importance, particularly in periods of low prices, that the Illustration Station operators and adjoining farmers should test or cull their herds and poultry flocks, so as to retain only the most productive. Economical individual milk production is aimed at, rather than at increased total production. All operators have undertaken a program aiming to build up their herds and poultry flocks, as centres from which neighbouring farmers might obtain pure-bred sires, breeding stock, poultry and hatching eggs. The sales of breeding stock last season comprising 69 bulls, 114 mature cows, 85 heifers, 316 hogs, 171 sheep, 662 cockerels, 438 pullets and 1,364 settings of hatching eggs.

IMPROVEMENT OF GARDENS AND FARM SURROUNDINGS

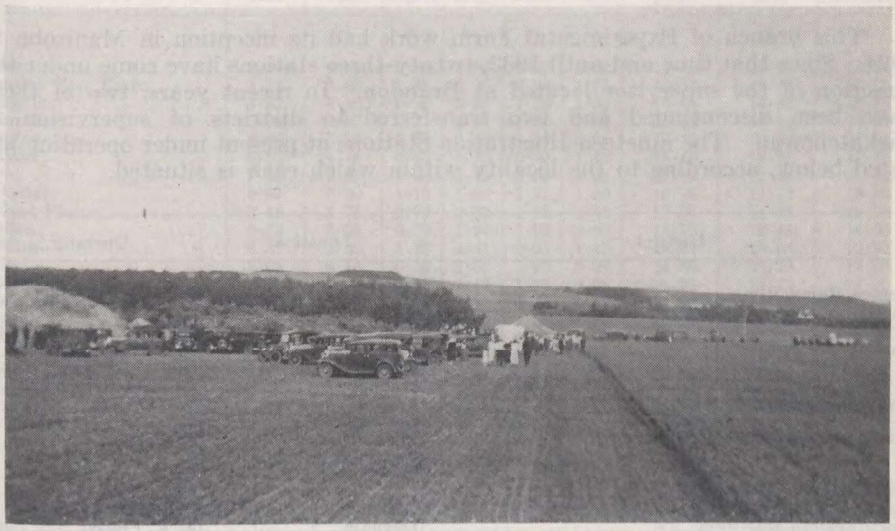
While Illustration Stations are primarily concerned with problems relating to crop and live stock production, the possibility of developing and maintaining attractive home-surroundings and adequate buildings is given due consideration in progress plans. On many stations windbreaks, hedges, shrubbery, lawns, perennial and annual flower borders are being steadily developed for the purpose of illustrating what varieties are best suited to a locality and how they can be most effectively planted. Trial orchards, including tree and small fruits are set out on stations where climate and facilities are agreeable, while specialized horticultural stations, designed to illustrate the important details of gardening have been established at such points as Avonlea, in Saskatchewan, and Kenville in Manitoba.

Building plans for new barns, homes and outbuildings are discussed with the operators as required. Other improvements, such as the laying of cement floors, putting in more and larger windows in farm buildings, installation of sheep dipping tanks and the painting or whitewashing of forty-two barns and homes in 1932 and seventy-five in 1933, on the farms operated as Illustration Stations were effected.

ILLUSTRATION STATION FIELD DAYS AND CO-OPERATIVE EFFORTS

A consistent effort has been made to increase the usefulness of the Illustration Stations and the service which they may render in the various farming communities served. In this connection, it is essential that crops grown, methods adopted and results of fact-finding projects, pertaining to local prob-

lems, be brought to the attention of the surrounding farmers. Field days held on the stations and, where possible, organized in co-operation with the local Agricultural Society, Farmers' Institute or Agricultural Representative, are one means undertaken to meet the farmers, to explain the work under way as well as the results obtained. In 1932, one hundred and thirty-two and in 1933, one hundred and forty-two field days were held.



The 142 field days held on Illustration Stations in 1933 were attended by 14,600 persons.

The attendance at Illustration Station field days in 1932 totalled 11,759, or an average of 89 per meeting. In 1933, there were 14,600 persons present, or an average attendance of 104 per meeting.

The supervisor has co-operated with representatives of the Provincial Departments of Agriculture, in school fairs, short courses, judging at exhibitions, ploughing matches and in grasshopper control work.

REPORT OF THE ILLUSTRATION STATIONS IN MANITOBA, SOUTH-EASTERN AND NORTHEASTERN SASKATCHEWAN AND NORTHWESTERN ONTARIO

Supervisor, D. A. Brown, B.S.A.

This branch of Experimental Farm work had its inception in Manitoba in 1924. Since that time and until 1933, twenty-three stations have come under the direction of the supervisor located at Brandon. In recent years, two of these have been discontinued and two transferred to districts of supervision in Saskatchewan. The nineteen Illustration Stations at present under operation are listed below, according to the locality within which each is situated.

District	Location	Operator
Kenora-Rainy River	Dryden	Robt. J. Johnston
District of Ontario		
"	Emo	Chas. J. Linquist
Eastern Manitoba	Dugald	Thos. Roberts
"	Gunton	Ellwood Fraser
"	Petersfield	Wm. Michael
Manitoba Inter-lake	Arborg	M. Shebeski
"	Eriksdale	Robt. G. Cowdery
Central Manitoba	Plumas	Fred Buschau
"	Katrime	A. E. Walker
"	Ste. Rose	Jos. Fitzmaurice
Southwestern Manitoba	Deloraine	Geo. Perry
"	Pipestone	Wm. Forder
Northwestern Manitoba	Dauphin	A. E. French
"	Gilbert Plains	G. H. Best
"	Roblin	R. A. Arnott
"	Swan River	Frank E. Smith
"	Kenville	A. A. Douglas
Northeastern Saskatchewan	Pelly	Wm. J. Bettinson
Southeastern Saskatchewan	Wawota	Chas. Pryce

REGIONAL PRECIPITATION AND CROP GROWTH

The winter of 1932-33 was long, and colder than usual, there being heavy snowfalls in all but the southwestern district of Manitoba. Spring opened auspiciously and under favourable conditions seeding became general before the end of April. Weather during May was admirably suited to plant growth, particularly wheat, which seldom looked better at this time of year. About the tenth of June, drought set in over the southern half of Manitoba and before July was well under way, it was evident that yields would be seriously reduced. This condition was more intense in the extreme southwestern corner and to make matters worse any growth left there by the drought was, toward the end of July, completely devoured by a heavy invasion of grasshoppers. North of the Canadian Pacific Railway main line, insects did little damage and the wheat crop averaged a fair yield. Coarse grains were, however, generally light. The Swan River Valley enjoyed a favourable crop year and yields in that district averaged higher than in any other part of Western Canada in 1933. Wheat prices ranged fifteen to twenty cents per bushel higher than in 1932, with other grains relatively higher. This assured fair returns to the farmer who had a good crop, but due to low average yields over the province as a whole, the year could not be classified as a bright one for farmers.

PRECIPITATION ON THE ILLUSTRATION STATIONS, FOR THE CROP YEAR AUGUST 1,1932 TO JULY 31, 1933, AND AVERAGES FOR THE THREE YEARS 1931-33 INCLUSIVE

Station	Fall	Winter	Summer 1933				Total for crop year Aug. 1, 1932 to July 1, 1933	Total for calendar year 1933	Average for calendar years 1931-33 inclusive
	Aug 1, to Oct. 31, 1932	Nov. 1, 1932 to Mar. 31, 1933	April	May	June	July			
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Arborg	3·94	4·85	0·80	1·65	1·23	1·02	13·49	16·07	16·21
Brandon Exp. Farm	4·71	3·00	1·39	3·75	0·94	1·61	15·43	19·55	19·57
Dauphin	4·57	4·40	0·20	3·57	1·78	1·52	16·04	16·88	16·12
Deloraine	5·31	2·67	2·31	2·61	2·00	1·02	15·92	14·73	14·51
Dryden	6·96	5·96	0·75	0·86	1·95	0·64	17·12	20·92	21·04
Dugald	5·62	4·46	0·65	5·30	0·95	1·42	18·40	19·22	17·39
Emo	7·05	12·67	1·08	2·40	2·60	1·33	27·13	23·46	24·32
Eriksdale	5·07	6·20	1·15	1·89	1·27	1·40	16·98	17·78	19·09
Gilbert Plains	3·46	3·78	0·75	2·39	1·13	0·86	12·37	14·60	13·78
Gunton	8·22	3·55	0·70	1·64	1·02	0·60	15·73	13·48	14·95
Katrime	6·31	3·32	1·35	3·31	0·95	1·17	16·41	18·66	19·92
Pelly	6·04	4·15	0·59	3·66	7·93	2·28	24·65	25·23	18·63
Petersfield	8·09	4·38	0·51	1·13	1·46	0·68	16·25	13·32	15·90
Pipestone	3·55	2·85	1·10	2·85	0·32	0·96	11·63	13·86	15·09
Plumas	4·77	6·75	0·63	2·60	1·68	1·48	17·91	15·63	16·52
Roblin	3·26	4·85	1·05	2·84	1·99	1·75	15·74	17·17	17·04
St. Rose	—	—	0·50	1·56	2·86	0·64	—	18·44	—
Swan River	3·85	5·40	0·90	3·87	5·34	1·69	21·05	23·68	18·73
Wawota	5·03	5·36	1·00	2·40	1·00	1·51	16·30	18·48	16·23

CROP ROTATION STUDIES

An important feature of station service is the study of the effect and the demonstration of the value of suitable cropping systems. Due to developments on prairie farms in recent years, including heavy weed infestation, increased soil drifting, poor crops and uncertain markets for each grain, farmers, particularly in Manitoba, are becoming more interested in crop rotations which embody greater acreages of fodder and pasture crop and less cash grain. Soil problems vary betweeen localities, indeed between neighbouring farms and there are likely to be individual differences in the type of farming engaged in especially when continuous grain farming is renounced. Appreciating these factors, the Brandon Experimental Farm and the Illustration Stations are exercising considerable effort to place the results of crop rotation studies in the hands of farmers. A department of service has been started which suggests cropping plans to farmers who request information as to how they can most effectively change their present programs of field crop management. While it is true, that many of the field crop problems in Manitoba may be attributed to years of continuous grain farming, it is not possible in a few years to remove the difficulties by means of better balanced crop systems. It requires several years for a series of crops in a rotation to complete one round of the fields.

In station trials, hay and pasture sod is ploughed at mid-summer. If hay land is not ploughed as soon as possible after the crop is removed, grain yields after sod ploughing are likely to be disappointing. It will be noticed that in every case, seeding to grass and legume is done with wheat on summer-fallow, or corn land in the longer rotations. Station results have shown conclusively that catches of grass and clover are fairly sure even in drier soils when seeded in this manner, but where seeding has been done with the second or third grain crop removed from fallow, catches, especially over southern Manitoba have been uncertain. The rotations under study on the fourteen Illustration Stations in Manitoba and Eastern Saskatchewan are as reviewed below.

THREE-YEAR ROTATION.—Wheat, oats or barley, sweet clover hay. This rotation is adapted mainly to northern and eastern districts. It is being practised on the stations at Gunton, Pipestone, Wawota, Ste. Rose and Roblin. At Pipestone, it has not been successful due to the light soil and lack of moisture. Under these conditions clover seeded with oats after wheat has too frequently been a failure, and the elimination of a black fallow under the dry conditions usually experienced in this district is not advantageous. On the other stations mentioned, this rotation has given a good account of itself. When it was started at Gunton, the land was badly infested with sow-thistle. Each year, as the clover hay has been removed and the land summer ploughed and cultivated as a fallow for the remainder of the season, the thistle has been thoroughly eradicated. At Roblin, this rotation has helped greatly to reduce Canada thistle and wild oats. Clover sod breaking reduces the thistle, while barley followed by clover helps to grow out wild oats. At Gunton, Roblin, Ste. Rose and Wawota, yields have been good, but at Pipestone, dry seasons have caused low yields and several complete failures in recent years.

THREE-YEAR ROTATION.—Wheat, sixty-day oat hay, sweet clover hay. This rotation is under trial only at the Pelly station. When work began here in 1929 the land was polluted with wild oats, Canada thistle and lesser amounts of sow-thistle. This short rotation was designed to grow out the wild oats and at the same time control thistles. After wheat, the land is fall ploughed and made ready for Sixty-day oats. These are sown early and with them sweet clover. The oats are cut for green sheaf feed and with them wild oats and other weeds are removed before their seeds drop. The oat stubble in which sweet clover is growing is lightly disked in the fall to cover any wild oats which may be lying on top and induce them to grow with the clover the following year. Clover is cut early in the summer for hay before weeds are ripening seeds, the land ploughed in July or early August and by such a plan, weed control has been most effective.

Yields on this rotation at Pelly have been very satisfactory and, as a means of quickly cleaning up land and at the same time growing a crop each year, it can be highly recommended in districts where rainfall averages 18 to 20 inches per annum.

THREE-YEAR ROTATION.—Oats or barley, sweet clover hay, pasture. This rotation is being studied on the Eriksdale station. The soil in this Inter-lake district is shallow and stony. It is difficult and costly to work and to make matters worse, sowthistle has everywhere a strong hold. This crop plan was devised to meet the situation. One ploughing in three years is all that is necessary. The clover field lies over and is used for pasture until ploughed as a fallow at mid-summer in the third year. The clover in the second year helps to subdue sow-thistle, while the fallow which precedes provides an opportunity to prepare a clean seed-bed for grain. For the two last years, the clover has been kept for seed and profitable yields secured. Barley has averaged 25 bushels per acre for the past four years, but the loss has been $5.53 per acre due mainly to the high cost of cultivation.

THREE-YEAR ROTATION.—Corn, grain, sweet clover hay. In the Winnipeg area at Dugald and Petersfield, this rotation is being tested because of the favourable crop sequence for fighting weeds and for the production of feed on dairy farms. The chief difficulty encountered has been to keep the corn clean. If this is done, barley or oats following it can be depended on to yield a good clean crop. Sweet clover in the third year further helps to reduce wild oats, thistles, mustards and other weeds. If corn land is kept clean and does not require ploughing for grain, the only ploughing the three crops need is that after the clover hay is removed. Average yields per acre for the past six years at Dugald have been: corn, 8½ tons; barley, 31 bushels; and clover hay, 1·68 tons.

Yields for the same period at Petersfield have been: corn, 9·33 tons; barley, 43 bushels and clover hay 2½ tons.

FOUR-YEAR ROTATION.—Fallow wheat and hay and break, coarse grain. This rotation is adapted to all districts within this area of supervision. It has however, been specially planned for lighter drier soils, where weeds are bad and soil improvement is sought. It was not started as a study in station work until 1931 and so far has been under observation only at Ste. Rose and Roblin. The method of alternating grain with fallow and clover hay provides effective means for weed control and grain is always on well prepared land. One of its chief advantages is in the reduction of fencing necessary. If the clover field is so planned to always run side by side with the summer-fallow and the two fields of grain, likewise kept together, one cross fence dividing the two grain fields from the fallow and clover fields can be made to serve all purposes. (See diagram).

Fallow	Wheat to clover
Clover hay and break	Coarse grain

FIVE-YEAR ROTATION.—Fallow, wheat, hay and break, wheat, coarse grain. This rotation is quite similar to that of a four-year duration with the exception that two successive grain crops are taken after hay. It is a well balanced crop system, useful for weed control and soil improvement, but each field requires separate fencing to permit full utilization. The stations at Pelly, Gilbert Plains, Wawota, Pipestone and Deloraine, are demonstrating this rotation. At Pelly and Gilbert Plains in the north where moisture is more abundant, yields have been good and results in soil improvement and weed control likewise encouraging. Results at Wawota have been consistently satisfactory, but at Deloraine and Pipestone drought in recent years has seriously reduced yields. In the tables under " Cost of Producing Crops " the yields of wheat on fallow and wheat after hay in this rotation make a very interesting study.

SIX-YEAR ROTATION.—Fallow, wheat, hay, hay, or pasture, and break, wheat. coarse grain. Because of having grass down two years followed by two years of grain this rotation is better adapted to localities receiving reasonable to high rainfalls than to drier sections. It is under trial at Swan River, Dauphin, Plumas, Katrime, Dugald, Petersfield, Gunton and Arborg, and results have shown that it is a good crop plan for a mixed farm where cultivated hay and pasture are necessary. It is proving worthy as a system for fighting weeds, and gives permanency to a farm management plan. As with the four-year rotation mentioned in the above review, fields can be so paired to reduce the fencing necessary. (See diagram.)

Pasture	Wheat seeded to hay	Coarse grain
Summer-fallow	Wheat after hay	Hay

WEED CONTROL

On the Illustration Stations, weed control is being successfully carried out at a number of points through cultural practices made possible by crop sequences which alternate grain, hay, pasture and summer-fallow. Weed maps are made of each station area and these are revised annually. After several years of such detailed study, it is possible to trace the effects of various crop rotations on the reduction of specific weeds. Wild oats, Canada thistle and perennial sowthistle

have been the main weeds dealt with since these three are so widespread and are responsible for the largest measure of damage inflicted by weeds in Manitoba.

WILD OATS.—This annual finds a congenial breeding ground in the grain fields of the prairies. Continuous grain-growing has encouraged its spread and from the economic standpoint, it possibly ranks first as a weed of importance. In sections of Northern Manitoba and Northeastern Saskatchewan, numerous samples of wheat taken directly from the thresher have been found to contain no less than 25 to 35 per cent of wild oats by weight.

The usual practice for the reduction of wild oats on grain farms has been to summer-fallow the land or skim-plough infested fields in the fall, cultivate and plough deeply in late spring after the weeds have started and then sow to barley. This method is effective when the early season is suitable for wild oat growth so that it can be turned down when ploughing. However, at the best, this is only a short lived remedy because if followed up by continuous grain crops the land will very soon be re-infested. The increase of perennial weeds such as thistles and quack grass has made it necessary in recent years to give summer-fallow very frequent cultivations. This practice is not conducive to the growth of wild oats and in many instances they lie inert through the fallow year to grow and infest the succeeding grain crop. Wild oats must be grown out to kill them in grain farming or when a method of rotations where hay is down only for a year or two is practised. This is being achieved on a number of Illustration Stations. The three-year rotation of wheat, barley, sweet clover hay, and the four-year rotation of fallow, wheat, sweet clover hay and coarse grain, at Roblin, have in the past six years brought about about a reduction of 60 per cent in wild oat infestation over the whole rotation area. The special three-year rotation of wheat, sixty-day oat sheaves and sweet clover hay, at Pelly, has reduced wild oats 70 per cent since it was started five years ago. At Gunton, Dugald, Plumas, Dauphin and Petersfield, the six-year rotation, as described in a foregoing section, has through its crop sequences including two years of hay or pasture, greatly reduced wild oats.

CANADA THISTLE.—The spread of this deep rooted perennial in Manitoba and Eastern Saskatchewan, is causing much concern because of the difficulty encountered in successfully controlling it. In a straight grain system, unless summer-fallow is sufficiently well worked to kill out the thistles, the chances for control are remote. The consistently worked fallow which never allows thistles to appear above ground is recognized as a successful, but expensive remedy. On the Illustration Stations, alfalfa when seeded in thistle infested soil, has been found a good method of control, if it remains down for four to six years. It appears that twice cutting of alfalfa hay each year gradually reduces the vigour of the thistle roots and after several years of such treatment, together with the competition from the alfalfa, thistles die out. A similar process has been observed on infested land seeded to pasture especially on open prairie farms. Several years of close pasturing greatly thins the thistles. In the mixed farming rotations, a very practical method of control is made possible in the breaking up of hay land. If the rotation is so planned that hay or pasture land is being broken in each field every three to six years, thistle control can be managed with little extra expense. The summer breaking of dry sod land for such perennials as Canada and sowthistle has been effective on the stations.

PERENNIAL SOWTHISTLE.—The same cultural procedure referred to in the case of Canada thistle would be applicable to sowthistle. The sowthistle, however, having a shallow and more tender root system can be more easily killed by cultivation. On the stations at Gunton, Plumas, Arborg, Ste. Rose, Dauphin and several others where it was a bad weed some years ago, ploughing of hay land in July, followed by thorough cultivation from then until freeze up has given better results than any other method. Crop systems on the stations in

only a few instances have grain following grain, so that ploughing behind the binder as a remedy for sowthistle has been seldom necessary. This, however, is a useful practice when a grain crop has been infested and grain must be grown on the land the next year again. While one season of thorough summer-fallow will clean up sowthistle, attempts at permanent control have been found most successful on the stations through the adoption of a good mixed farming rotation.

CULTURAL PRACTICES

Most of the cultural work directed towards crop production on the stations assumes the nature of weed control measures. However, a process that prevents competition of weeds with the cultivated crop paves the way to higher yields. This has been particularly true in relation to the production of fodder corn. The land in preparation is ploughed in the fall and kept clean by cultivation until the corn is planted. After the crop is in, the land is harrowed regularly every four days to one week until the plants are about six inches tall. This early systematic harrowing has the effect of controlling weeds, and reducing the necessary intertillage, which lowers the cost of production and insures a heavier yield.

Another cultural practice, which has already been referred to under the section on "Weed control" is that with respect to the time to break hay or pasture land for grain crops. It has been found on all Manitoba stations, that sod land should be ploughed about midsummer and thoroughly worked down prior to the grain harvest, if good crops are to be grown on it the next year. As previously mentioned, this practice is one of the most successful measures for the control of such perennials as sowthistle. Not only this but on early broken sod land wheat has averaged just 0·10 of a bushel less per acre than wheat on bare fallow for the past four years on twelve stations, where a direct comparison was possible. On Petersfield and Dugald stations where the soil is heavy, sod land is sometimes too hard in a dry summer to plough until autumn. In seasons when this occurs, wheat on fallow has yielded five to ten bushels more per acre than that after hay.

Disking newly established stands of sweet clover is a recently adopted practice on a number of stations and one worthy of mention. It was devised to augment the control of such annuals as wild oats and winter annuals such as stinkweed, peppergrass and the like. When the nurse crop of grain is removed many weed seeds fall to the ground and in dry seasons lie there inert while the sweet clover crop develops and is removed. Fall disking of the stubble in which the young clover seedlings are growing helps to cover the annual seeds and encourages them to grow the next year with the hay either to be smothered out or cut and removed with the clover before they can reproduce seed. The winter annuals which have grown into tiny rosettes of plants in the fall are easily torn out and killed by the disk. Early spring harrowing of the fields adds further to the effectiveness of the plan.

The disking is usually done in October after the clover growth has died down. The disk is set at half angle or slightly more, and of the numerous fields, thus treated in the past two years, no deleterious effects on the clover have been observed. If the stand of clover is good, the roots firmly established and the land in such a state that the disk will not lift it in hard lumps, the operation has been safely performed. It has met with success on the stations at Petersfield, Gilbert Plains, Roblin, Pelly and Swan River.

CHEMICAL FERTILIZER TRIALS

Triple Superphosphate.—During the past five years this fertilizer has been tried on all the prairie stations and at Dryden, Ontario, with wheat, oats and barley. From results which could be measured dependably, wheat has yielded

3 to 6 bushels per acre when treated with from 40 to 60 pounds of the chemical. Results have greatly varied but have been favourable to fertilizer on all but the Gilbert Plains station. The soil here is a light, rich, loam and in repeated trials both in the field and in the greenhouse, it has shown no beneficial reaction to triple superphosphate nor to any other single element or combination of elements. This is contrary to results throughout the Gilbert Plains district, where fertilizer is used rather extensively and where on numerous occasions the benefit has been as high as 15 bushels per acre of wheat.

Below is given a summary of fertilizer trials conducted in the greenhouse during the winter of 1932-33 with soil from Gilbert Plains, Gunton and Ste. Rose and also small plot tests conducted on the field at Ste. Rose in the summer of 1933.

RESULTS OF FERTILIZER TRIALS

Treatment	Rate per acre	St. Rose	St. Rose	Gunton	Gilbert Plains
		Field trials	Greenhouse	Greenhouse	Greenhouse
	lb.	Bushels per acre	Bushels per acre	Bushels per acre	Bushels per acre
Triple superphosphate	80	33·52	6·78	31·58	48·05
Ammonium phosphate	100	45·33	9·49	34·58	49·21
Ammonium sulphate	100	Not used.	6·30	26·92	51·14
Muriate of potash	100	35·94	6·35	25·09	44·17
Complete fertilizer	—	41·65	10·60	32·55	43·98
Check—no treatment	—	27·31	2·53	22·96	55·80

CHEMICAL FERTILIZER TRIALS AT DRYDEN, ONTARIO

The field in preparation for potatoes and roots is dressed with 15 tons per acre of barnyard manure. Half of the area planted to potatoes is then treated with 250 pounds per acre of 3-8-5 fertilizer and the same treatment accorded half of the turnip crop. The difference between fertilized and non-treated crop has so far been only slightly in favour of the fertilizer. In 1933, severe drought made it impossible to get comparative yields from the turnips but in the past two years the average yield from potatoes has been fertilized, 215 bushels per acre, not fertilized, 188 bushels.

Nitrochalk has been applied to clover and timothy hay at the rate of 125 pounds per acre during the last two seasons. The summer of 1932 provided fine conditions for this trial but no benefit from the application was received. In 1933, severe drought caused growth on hay fields and that treated with fertilizer showed no advantage.

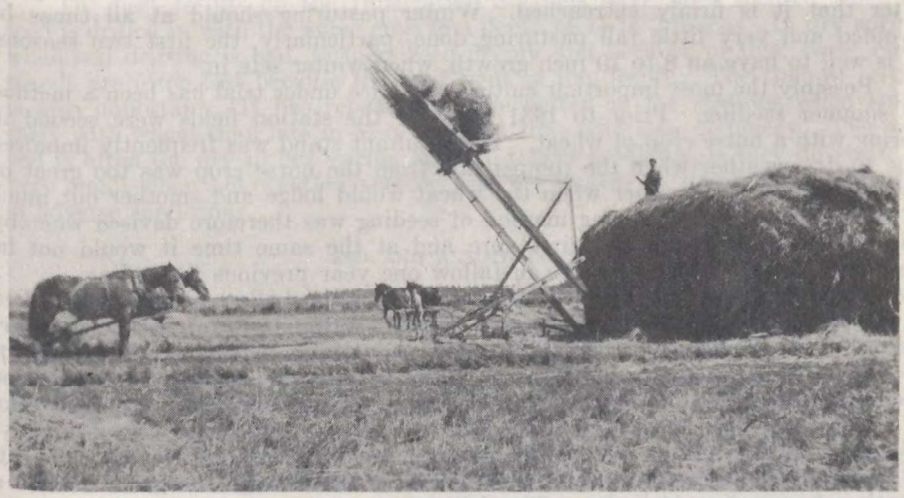
FORAGE CROPS

Because of the increasing importance of cultivated fodder crops in Manitoba, not only to meet the need of more and better feed, but also as a means of weed control, the stations are conducting several projects seeking the following information:—

(1) Adaptability of varieties to various soils and districts.
(2) The place for fodder crops in a mixed farm rotation.
(3) Cultural practices such as soil preparation, the amount of seed required, best time to sow, depth to sow and methods of cutting and curing.

ALFALFA GROWING.—The adaptation of alfalfa to the soils of the districts is being studied on all stations, the alfalfa being seeded alone or in hay mixtures on crop rotation fields. In every case, the Grimm variety is used. The work with alfalfa has shown that when given proper cultural care it can be successfully grown on all the Manitoba stations, excepting on the light dry soils. The deep rich loam of the Dauphin and Winnipeg areas is particularly well suited to it.

At Plumas, it does well on a light silt soil, but the water level is near the surface here and the long roots soon tap a reserve of moisture. The field at Dauphin was seeded in 1925 and for eight years has been cut three times annually. In that period, the total yield has been 35 tons per acre or an average of 4·37 tons.



Stacking alfalfa on the farm of Wm. Michael, Petersfield, Manitoba.

A summary of yields and costs is given in the following table:—

ALFALFA HAY OR SEED—YIELD AND COST OF PRODUCTION BY STATIONS

Station and location	Yield per acre pounds or tons		Cost per ton	Cost per acre		Profit or loss (—) per acre
	1933	Average 6 years	1933	1933	Average 6 years	Average 6 years
Winnipeg or Eastern District—						
Dugald	0·63	1·23	8·08	5·09	6·79	5·70
Gunton	1·50*	1·42	7·10	7·10	7·18	6·15 c.
Inter-Lake Area—						
Eriksdale (for seed)	34·30	141·07	0·12	4·25	7·40	22·35 d.
Central Manitoba—						
Katrime	2·00	.....	4·20	8·42	.....	5·59 a.
Plumas	3·75	.....	1·88	7·08	.....	19·17 a.
SW. Manitoba—						
Deloraine	1·25	.....	3·62	4·53	.....	1·75 a.
NW. Manitoba and NE. Sask.—						
Dauphin	4·36	3·95	1·75	7·64	9·85	26·25
Gilbert Plains	2·50	1·75	3·20	7·98	8·50	10·46
Roblin	0·35	1·26	14·17	4·96	7·13	5·34
Pelly	1·50	1·75	4·07	6·11	6·29	7·06 d.
Swan River	2·21	1·49	3·24	7·15	6·58	4·07 c.
NW. Ontario—						
Dryden	1·25	1·50	5·30	6·63	6·89	3·62 b.
Emo	4·50	3·88	2·08	9·34	8·62	18·51 b.

*In addition to a hay crop being taken at Gunton in 1933, 100 pounds of seed per acre were harvested from the second crop. This has been included in the cost figures.

(a) Down one year only. (b) Down two years. (c) Down three years. (d) Down four years.

From station results, it is evident that care must be taken to sow alfalfa on a well prepared firm seed-bed and to give it every chance to establish a stand. If the stand is poor, the field is not likely to be worth leaving down many years. With the high price of seed, this makes it a costly project. Once well established, care should be taken to bring it through the first two winters without injury, after that it is firmly entrenched. Winter pasturing should at all times be avoided and very little fall pasturing done, particularly, the first two seasons. It is well to have an 8 to 10 inch growth, when winter sets in.

Possibly the most important cultural practice under trial has been a method of summer seeding. Prior to 1931, most of the station fields were seeded in spring with a nurse crop of wheat. The resultant stand was frequently impaired due to dry weather when the competition from the nurse crop was too great or too extremely wet weather when the wheat would lodge and smother out much of the legume. The following method of seeding was therefore devised whereby successful stands would be fairly sure and at the same time it would not be necessary to let the land lie idle in fallow one year previous to seeding.

A reasonably clean stubble field is chosen and is shallow ploughed or disked in the fall. It is deeply ploughed early the next spring and worked as a summer-fallow until about the end of June when the alfalfa is seeded. The date of seeding between June 15 and July 15 is not of as great concern as having the seed-bed firm, level and clean and the time of seeding can well be in the wake of a rainstorm when there is abundance of moisture to start the plants off quickly. When using this method, 12 pounds of seed per acre has been found sufficient. It is mixed with about ½ bushel of oats and seeded through the grain drill to a depth not exceeding 1½ inches. The drill is set to sow a half-bushel of oats per acre. If the oats are dampened before the legume is mixed in and seeding done immediately afterwards, the alfalfa seed adheres to the grain and feeds more uniformly through the drill. The small quantity of oats is not to serve so much as a nurse crop, as to grow up as a protection for the first winter. If they make heavy growth they can be pastured down lightly but they should go into the winter with a 12-inch growth. The snow they collect will save the seedlings and supply moisture for the crop the following June. This method of seeding was used at Wawota in 1931 with excellent results in spite of that being one of the driest summers on record. In 1932, it was employed to establish splendid fields at Plumas and Katrime and a good field at Deloraine.

ALFALFA SEED GROWING

On soils where growth is usually heavy, alfalfa naturally sets seeds sparsely. However, at Eriksdale, on a stony shallow soil, seed crops can be harvested regularly. This being possible, fields for seed production have been established on the station. These will be added to in 1934 and several cultural methods, such as growing in rows versus broadcast for seed production will be tried. Seed has been taken from a field successively for four years. It was seeded broadcast and is now too thick for best results. The average yield for these years has been 141 pounds per acre produced at a cost of 12 cents per pound.

SWEET CLOVER

This crop is grown either alone or mixed with grass hay at twelve stations. Arctic white blossom has been chiefly used, but in 1933, Brandon Dwarf strain was seeded on ten stations, thus receiving its first trial off the Experimental Farm.

Sweet clover alone has, in the past four years, averaged 1¼ tons per acre of hay. It is always seeded with a nurse crop in the spring. In some cases the seed-bed is summer-fallow, in others, corn land or fall ploughed stubble land. From results at Pipestone, Deloraine and elsewhere in drier sections, it has been

found advisable to avoid seeding on loose fall or spring ploughed stubble land. The seed-bed for clover as for alfalfa, should be firm and moist. In six years' work at Pipestone, catches have not yet completely failed on corn land, but on stubble land there has been a complete failure in three of the years.

The best results on the Illustration Stations have been secured when the seed is drilled in with the nurse crop to a depth of 1½ to 2 inches. In dry springs, when soil drifting is bad, farmers seed deeply and because of this, sweet clover stands are often lost because the seed went in too deeply. The time of seeding is also important. It has repeatedly done better on the stations when seeded early with wheat than late in May or early June with oats or barley. The seed-bed is often too dry in late spring and the tender seedlings, if they do start, are very small when hot weather sets in, and are unable to stand the combination of adverse conditions.

RED AND ALSIKE CLOVERS

On the open plains, conditions on the whole are not conducive to the successful culture of red and alsike clovers. However, at the Arborg station in the Manitoba Inter-lake country, where soil is rich and moist, they have given very good results when used in the following mixture: 5 pounds each of western rye grass and meadow fescue to 3 pounds each of the clovers. A similar mixture has been tried during the past three years at Swan River, but the clovers have not yet established themselves vigorously there. At Dryden and Emo, in Northwestern Ontario, these clovers are being used both for hay and seed production. In the environment of these localities and on the heavy clay soils, they can be cultivated quite successfully for hay, but for some years satisfactory seed production has been a problem. An early strain of red clover was introduced from Quebec to the stations in 1931 and so far promises well. In three years' work with seed production at Dryden, results have only once been encouraging. In 1931 the clover crop was extremely heavy but as it headed cutworm larvae which came in myriads, devoured the blossoms and precluded the possibility of a seed crop. In 1933, drought was so severe that hay fields failed to grow anything worthwhile. The conditions in 1932 were conducive to seed setting and good crops were harvested. At these two Ontario stations an attempt is being made to get better crops of seed not only by improved strains but by adding necessary fertility to the soil through barnyard manure and chemical fertilizers. The effect of lime, and land plaster has also been sought but the period of experimentation has yet been too short to record results.

At Dryden, in 1932, half of the seed plot of red clover was clipped back on June 20 and first growth was allowed to go to seed on the other half. From the clipped back area 190 pounds of seed per acre were threshed compared to 40 pounds from that not clipped back.

WESTERN RYE GRASS

This remains one of the most dependable perennial grasses. It is successfully grown on all stations and fits well into a rotation of crops where sod land has to be ploughed a year or two after seeding. It is usually grown as a mixture with sweet clover on stations situated in southern or drier sections and with meadow fescue and alfalfa in northern and eastern areas. When mixed with clover, the rate of seeding is 8 pounds each and with fescue and alfalfa 5 pounds each of the three. The following table gives the yields and cost of production in 1933, also the average for the period grown:—

MIXED ALFALFA, WESTERN RYE GRASS, AND MEADOW FESCUE, FOR HAY DOWN FOR TWO YEARS—YIELD AND COST OF PRODUCTION

(In every case the seeding is done with wheat on summer-fallowed land)

Station location and region	Yield per acre. 1933	Six-year average	Cost per ton. 1933	Cost per acre	
				1933	Six-year average
	tons	tons	$	$	$
Winnipeg or Eastern District—					
Dugald, First year	1·25	0·83	6·88	8·61	8·72
Second year	1·25	1·30	4·79	5·99	7·73
Gunton, First year	2·25	1·79	3·65	8·22	9·29
Second year	2·25	1·38	2·75	6·18	6·37
Petersfield, First year	1·25	2·28	8·79	10·99	12·63
Second year	2·65	1·98	2·65	7·02	8·87
Inter-Lake Area—					
Arborg, First year	4·00	2·76	2·16	8·62	9·56
Second year	1·50	1·40	3·60	5·41	6·69
Central Manitoba—					
Katrime, First year	1·25	1·45	5·46	6·82	8·71
Second year	0·50	1·05	10·18	5·09	7·44
Plumas, First year	0·82	1·66	8·04	6·59	8·55
Second year	0·50	0·95	9·46	4·73	5·76
NW. Manitoba—					
Dauphin, First year	2·75	2·53	2·68	7·37	10·57
Second year	2·50	2·26	2·77	6·94	9·17
Swan River, First year	1·50	1·07	4·84	7·26	6·36
Second year	1·25	0·83	3·97	4·96	5·13
NW. Ontario—					
Dryden, *First year	1·25	1·25	6·54	8·18	8·18
Second year	0·42	0·71	21·17	8·89	7·50
Emo, *First year	1·50	1·67	6·30	9·46	10·76
Second year	.....	0·83	.....	.....	9·39

*The mixture at Dryden and Emo is composed of red and alsike clovers and timothy.
(a) Two year average.
(b) Four year average.

MEADOW FESCUE

Meadow Fescue is a finer quality grass than western rye and is limited in usefulness to the moister soils of northern and eastern districts. As a mixture with rye grass and alfalfa, it has given highly satisfactory results at Dugald, Petersfield, Gunton, Arborg, Katrime, Dauphin and Swan River. It not only yields a good crop of hay, but has the valuable characteristics of producing a strong aftermath, which provides autumn pasture.

TIMOTHY

Although of reputably high quality, timothy is little grown on the stations in this district of supervision. It does not usually yield well and in southern districts it has not been found suitable for hay in a crop rotation. It is included in a grass and legume mixture at the Swan River station in Manitoba and at Dryden and Emo in Ontario. The clay soils at these latter two places are favourable to timothy for both hay and pasture.

BROME GRASS

Because of its strong underground running root stems, which make it difficult to kill out once well established, brome is not used in station rotation work. Its endowments peculiarly fit it for permanent pasture and as such it serves a useful purpose especially in open plain regions.

ANNUAL FORAGE PLANTS

CORN.—Corn is grown in rotation with grains and hay at Pipestone, Deloraine, Dugald, Petersfield and Plumas. Considerable attention is being given to the study of methods of cultivation which prove most practical and least expensive. One of these was fully described under the section dealing with "Cultural Practices." During recent years when feed scarcity has been an acute problem, corn has regained considerable popularity. Station results indicate that it can serve a useful place when grown on light soils even in dry years. In the past three years, weather has been particularly dry at Pipestone and the six-year average yield of corn has been 4·67 tons per acre. At Dugald and Petersfield, in the Winnipeg and eastern district, the six-year average yield has been 8·5 and 9·3 tons per acre respectively. At Plumas, in Central Manitoba, the yield has been 5·9 tons. In 1930, at Deloraine, corn withstood the onslaught of grasshoppers better than any other field crop and convincingly proved its worth during years of grasshopper invasion.

MILLET.—A field of Hungarian millet was grown at Deloraine as a catch hay crop in 1933. It was seeded in early June, using about 30 pounds per acre drilled to a depth of 1½ to 2 inches. The land was prepared by fall ploughing and cultivation prior to sowing. In spite of the very dry summer, the yield was one ton per acre of good quality hay. Millets undoubtedly fill a useful place as an emergency crop in short feed years.

COST OF GROWING CROPS ON ILLUSTRATION STATIONS

In the development of a systematic farm improvement program, practical knowledge as to the cost of growing crops is distinctly advantageous. Such information makes it possible to ascertain the crops which can be most economically grown, also serves as a basis for checking up on rotation practices, farm management and cultural procedures, as well as the proper proportion of horse and manual labour in relation to size of farm unit.

When compiling the costs as given in the following table, such factors as, use of land, taxes, machinery, horse and manual labour, seed, twine, threshing, hauling and other activities which vary according to the task underway have been taken into consideration. Each operator keeps a daily record of the horse and manual labour employed in the production of each crop. Labour charges are calculated on the prevailing rate for both horse and manual labour in each district. Crop rates are fixed according to the average prices for the period through which the bulk of the crop in question is marketed.

Due to the variation in seasonal and climatic conditions throughout the area covered, the stations coming within certain zones or regions are classified together, which permits of a comparative study as to the response from the different crops in these regions. While the cost of producing other essential crops, such as oats, barley, etc. is not dealt with in this report, these data have been assembled and are available for enquiries on request. The following table summarizes the yields obtained and the cost of growing wheat on the different stations, also the average over a period of years.

YIELD AND COST OF PRODUCING WHEAT BY STATIONS

Station location and region.	Preceding crop or preparation.	Yield per acre		Cost per bushel 1933	Cost per acre		Profit or loss (—) per acre. Six-year average
		1933	Six-year average		1933	Six-year average	
		bush.	bush.	$	$	$	$
Winnipeg or Eastern District—							
Dugald	After fallow	13·00	21·00	0 83	10 75	14 17	1 26
"	After hay	Cut for hay	19·90	.....	9 37	11 03	2 22
Gunton	After fallow	16·00	20·67	0 69	11 13	13 89	4 26
"	After hay (grass)	15·00	16·50	0 52	7 90	10 14	1 17
"	After hay, clover	15·00	14·67	0 52	7 83	8 34	—1 64 a.
Petersfield	After fallow	22·50	29·67	0 58	13 11	17 24	5 79
"	After 2 years hay	21·00	20·04	0 41	8 66	12 12	3 31
Interlake Region—							
Arborg	After fallow	29·00	20·96	0 40	11 60	11 81	2 12
Central Manitoba—							
Katrime	After fallow	15·00	15·00	0 63	9 46	12 00	—1 96 b.
"	After two years hay	14·00	16·05	0 52	7 32	10 41	0 49 b.
Plumas	After fallow	12·00	14·83	0 80	9 57	13 10	—1 18
"	After 2 years hay	10·00	18·33	0 69	6 87	10 69	3 38
"	After corn	9·00	15·25	0 60	5 45	8 63	2 83
St. Rose	After fallow	30·00	15·83	0 35	10 39	11 06	—0 29
"	After sweet clover	none	23·50	.....	.....	9 19	2 16
SW. Manitoba and SE. Sask.—							
Deloraine	After fallow	12·25	8·63	0 75	9 21	10 07	—4 57 c.
"	After corn	11·50	15·75	0 57	6 61	6 58	—2 28 c.
"	After wheat	3·50	3·25	2 31	8 07	9 09	—6 31 c.
Pipestone	After corn	1·50	7·45	3 51	5 27	7 78	—1 21
"	After sweet clover	2·00	10·38	3 61	7 22	8 68	—1 84
"	After sweet clover	2·00	11·43	2 08	5 20	8 37	—1 50
Wawota	After fallow	10·00	16·42	0 87	8 70	11 33	1 41
"	After hay, grass and clover	15·00	16·92	0 47	7 06	9 89	2 85
"	After sweet clover	14·00	17·00	0 50	7 03	7 34	0 38 a.
NW. Manitoba and NE. Sask.—							
Dauphin	After oat hay, in place of fallow	31·50	27·58	0 30	9 55	12 46	8 77
"	After 2 years in hay, grass and alfalfa	32·50	30·70	0 28	9 17	14 07	9 03
Gilbert Plains	After fallow	16·50	24·75	0 69	11 43	15 58	2 55
Roblin	After fallow	28·25	20·00	0 37	10 44	13 54	1 32
"	After clover hay	18·00	20·17	0 48	8 68	11 35	4 06
Pelly	After fallow	27·00	26·25	0 40	10 94	12 64	0 01 d
"	After clover and grass hay	17·25	18·38	0 45	7 78	8 96	—0 09 d.
NW. Manitoba and NE. Sask.—							
Pelly	After clover hay	21·50	22·69	0 39	8 41	10 04	—0 44
Swan River	After fallow	40·00	32·33	0 28	11 37	10 69	4 31 c.

*Hay land on the heavy soil at Petersfield has been too dry to plough during the summer for the past three years and fall ploughing of the land has had a depressing effect on wheat yields following.

(a) Three year average.
(b) Five year average.
(c) Two year average.
(d) Four year average.

For the purpose of studying regional variation in its effect on wheat and general crop yields, it will be noted that this district of supervision is divided into five regions, namely, Winnipeg, or Eastern District, the Inter-lake, central Manitoba, southwestern Manitoba and southeastern Saskatchewan, also the northwestern Manitoba and northeastern Saskatchewan regions. In each case,

the preceding crop is indicated and as may be observed, wheat was grown following different crops, as the sequence in the rotational studies occurred and as they unfrequently occur on adjoining farms. From a study of yields and costs, it will be observed that the yield exercises the greatest influence on cost, low yields being associated with higher cost per bushel. This fact must be fully appreciated in practical wheat production and all controllable factors contributing towards yield carefully developed. Uncontrollable factors, such as drought, rust and insects have adversely affected crops.

Bare summer-fallow enforces vacancy of land from crop for a year, which increases the charge for rent, taxes and machinery against succeeding crops. When distributing fallow costs, two-thirds are applied to the first succeeding crop and one-third to the second. Nevertheless, fallowing is an expensive preparation and yields of wheat on it should be approximately one-third greater than for wheat after wheat or other grain crops, to make similar profits over cost. In the Manitoba district of supervision, wheat on bare fallow and wheat after hay grown in direct comparison, have during the past four years yielded almost the same, but due to greater expense incurred when grown on fallow, wheat on hay land has been produced at 9 cents per bushel less.

All cultivated hay and corn have been produced at reasonable cost on the stations since work began in Manitoba in 1924. On the average these crops show substantial profits, when measured in relation to their actual value as feed. Alfalfa, considering its permanency when once well established, and, its high value as a feed, has been one of the cheapest crops grown.

LIVE STOCK

Station work is not confined to field crop problems, but an active interest is taken in the improvement of all farm enterprises. Not least has been the encouragement of the breeding and feeding of better live stock. Cattle probably require more attention than other classes of commercial live stock on prairie farms. The many poor herds seen in the country are the result not only of promiscuous breeding, but lack of proper care and feed. These factors are all recognized in the Illustration Station program.

CATTLE.—During the past three years, five station operators have purchased pure-bred dual purpose Shorthorn bulls from the Brandon Experimental Farm herd. Fourteen of the eighteen general stations have good sires to head their herds and the majority of operators are expending considerable effort towards the improvement of cattle within their respective districts. In 1933, the operator at Dryden, Ontario, purchased a male and female at the Brandon Farm, with which to establish a dual Shorthorn herd on his station.

MILK TESTING.—Five of the Manitoba operators who depend for a large part of their income from dairying, have until the end of 1933, been members of Dominion Live Stock Branch Cow Testing Associations. In addition, weighing and testing of milk was begun in 1933, in co-operation with the station Supervisor, at Emo, Gunton and Plumas. The production of milk and fat from nine station herds is therefore being recorded and the following table includes these herds which have been under test more than one year:—

SUMMARY OF MILK AND FAT PRODUCTION, MANITOBA STATION HERDS

Station	Number of cows finishing a lactation period		Breed	First year herd tested		1933	
	Year test begun	1933		Average milk per cow	Average pounds fat	Average milk per cow	Average fat per cow
				lb.	lb.	lb.	lb.
Arborg	7 (1931)	5	Grade Holstein Shorthorn	4,998·0	173·6	6,723·0	253·8
Dugald	5 (1929)	13	Pure Holstein	7,290·0	248·0	10,017·2	345·6
Eriksdale	9 (1932)	10	Shorthorn	3,035·5	123·0	4,249·3	175·9
Petersfield	4 (1928)	9	Grade Holstein Shorthorn	7,729·0	305·4	7,496·3	305·0
Swan River	5 (1932)	5	Pure bred Holstein	7,711·7	275·6	6,739·4	245·5

At Swan River, two heifers in their first lactation helped to reduce the average for 1933.

Arborg station has sold five poor cows since testing began there, and the increase of production in a two-year period has been a feature of station work.

The Eriksdale herd has been bred along beef lines but three poor cows were last year weeded out and a definite production improvement has been launched since testing began.

SWINE

Twelve stations have good pure bred Yorkshires. Foundation stock at Katrime, Pelly, Petersfield, Plumas, and Wawota, was secured from the Brandon Farm herd. The influence of better breeding has been widely spread from a number of these stations, particularly the ones at Plumas, Petersfield, Pipestone, Wawota, Pelly and Swan River. The latter station has for several years entered and taken prizes in the Manitoba Bacon Litter Competition. The benefits to be derived in a community by the introduction of a good strain on to a station has been amply demonstrated at Wawota. Early in 1932, this station operator purchased a bred sow at Brandon. From her first litter, he retained three good young sows and sold several to neighbours. In 1933, his young pigs sold readily in the community and since the purchase of the parent sow he has now disposed of 25 head for breeding stock in the district.

POULTRY

The grading up of poultry is not as difficult a problem as that encountered with the larger classes of live stock. Good flocks have been developed on all stations. All are Barred Rocks, with the exception of those at Dauphin and Roblin, and foundation stock was in each case secured from the Brandon Farm. During the past three years, 1,300 dozen eggs, and 202 male birds have been sold from the stations to neighbours for breeding purposes. In this same period modern poultry houses have been erected at Wawota, Katrime and Dryden. Winter egg production is annually increasing and the general care and feeding of poultry on the stations is receiving keener and more intelligent attention.

HORTICULTURE

Interest in good vegetable, flower and fruit gardens and in the beautification of home surroundings is greatly increasing on all the stations and on farms in station districts. No department of demonstrative activity attracts visitors more than that dealing with garden projects and in recent years since special talks on garden crops have been announced for women, the attendance at field meetings has obviously increased.

VEGETABLE GARDENS

The best known varieties or strains of all commonly required vegetables find a place in station gardens and visitors are given information as to the most satisfactory varieties and the best cultural practices.

FLOWER GROWING

Annual flower gardens are gaining in popularity and the 1933 display on eighteen stations has never been surpassed. Operators are encouraged to pick seed from all suitable strains which mature. In some cases, neighbours of the station have been invited to come and pick seed for themselves from these gardens, and thus extend the interest and practicability of growing flowers on the farms.

While annuals depend largely on the nature of the season for their success herbaceous perennial flowers are particularly adapted to varying conditions of soil and moisture, requiring less attention than annuals to get similar results, and they are peculiarly suited to farm gardening. In recent years, the planting of herbaceous perennial borders has received special attention on the Illustration Stations, the first one being started at Pipestone in 1929. In spite of the dry sandy soil and droughty seasons, this border has done exceptionally well and by natural enlargement of roots the area now occupied has been doubled since the inception of the work. A number of root cuttings has been given to neighbours. Similar borders were started at Wawota, Pelly and Swan River in 1930, at Dugald, Katrime and Kenville in 1932, and at Dryden and Gunton in 1933. Prior to the establishment of station work, perennials had been grown at Arborg, Dauphin, Gilbert Plains and Roblin, and these gardens have been added to from time to time.

FLOWERING SHRUBS

The material in these borders included such flowering shrubs and herbaceous roots as lilac, honeysuckle, spirea, elder berry, caragana, roses and cotoneaster all in variety.

HERBACEOUS ROOTS

Tall—Delphinium, lychnis, helenium, lavatera, lilies, peony, Anchusa, hollyhocks and daisies. *Medium*—Columbine, companula, poppy (Oriental), iris, phlox and daisies. *Low*—Thymus, candytuft, phlox (subulata), tulips and dianthus.

TRIALS WITH TREE FRUITS

Since the introduction some years ago of hardy large fruits suitable to prairie environment, orcharding has continually expanded until now the names of apples and plums developed on the Great Plains are familiar to farmers everywhere. Because of a continuous call for information regarding the growing of fruit, the stations have set out a number of trial orchards which are designed to meet the needs of a given territory and to try out the newer productions from the Morden Experimental Station. Up to the present such orchards have been started at Arborg, Dryden, Eriksdale, Gilbert Plains, Gunton, Katrime, Pelly, Pipestone, Plumas, Wawota, and extensive work at Kenville. Similar plantations will commence at Dugald, Emo and Petersfield in 1934.

The success with these orchards has so far been quite encouraging. The one at Katrime includes a large variety of fruits, many now coming into bearing, and results have been such that the soil and location here can be considered one of the best in Manitoba for orchard trees. While the Plumas trees are later than at Katrime, indications are that the situation and the soil here are just as con-

genial. Not on all stations is there windbreak protection as adequate as is generally advocated, but growth has been hardy and normal. In fact, the results of station demonstrations would justify the conclusion that protection by shelter belts, although important, is not as essential as protection from the ravages of rabbits and mice in winter. In the past two winters, where orchards have not been properly fenced, rabbits have ravenously attacked the trees and peeled the bark off them. They constitute the greatest menace to prairie fruit growing and when planning to plant out an orchard it is well to first consider the feasibility of fencing to keep out rabbits in winter.

Trial orchard on the Illustration Station at Kenville, Manitoba, planted in 1932.

TREE PLANTATION AND THE HOME GROUNDS

Since station work began in 1924 over 30,000 caragana seedlings have been dug and sent out from the Brandon Farm to be used chiefly for hedging and windbreak purposes around the farm homes of operators. Within the past two years, new windbreaks each including 800 to 1,000 trees have been planted at Pipestone and Petersfield, while at Pelly many shrubs and specimen trees have been set out to further enhance what were already attractive grounds. On the majority of stations some work has been done to improve home surroundings and future plans include a fairly comprehensive program.

FIELD MEETINGS

Field meetings are held on as many of the stations as possible each summer. These meetings are the main avenue through which results are conveyed to the public. In 1928, the total attendance at ten such gatherings was 370. In 1933, 1,100 attended nine meetings.

Publicity has been accorded the results of fact finding and demonstration work not only through these meetings but by the publishing of numerous press articles in local papers and through the Division of Extension and Publicity, Central Farm, Ottawa, as well as by radio talks over CKX, Brandon, and meetings in communities other than those wherein stations are located.

Several operators maintain an active interest in grain shows. F. E. Smith, of Swan River, has for some years taken a very high place with wheat at both the Toronto Royal and Chicago International. At the World's Grain Show, Regina, 1933, he secured the championship for Early Oats and seventeenth for Hard Red Spring wheat. R. G. Cowdery, of Eriksdale, has been a consistent winner during the last four years with alfalfa and sweet clover seed at Toronto and Chicago. At the latter show, he secured second for clover in 1932 and third in 1933. At the World's Grain Show, his sweet clover was placed ninth. Both these exhibitors have repeatedly been at the top in Provincial Seed Shows. The operators at Deloraine, Gilbert Plains, and Katrime have also successfully competed with clover and alfalfa at the Manitoba Provincial Show in recent years.

REPORT OF THE ILLUSTRATION STATIONS IN SOUTHERN SASKATCHEWAN

E. C. Sackville, B.S.A., Supervisor

During the year 1933 fifteen Illustration Stations were operated in the district served by the Swift Current Experimental Station. With the exception of Canora in the East Central area, all of these stations are located in the southern part of the province.

The following are the names and addresses of the farmers who are co-operating by carrying on Illustration Station work in this district of supervision:—

Location	Operator
Avonlea	J. W. Miller
Canora	C. Hoehn
Chaplin	W. W. Lockwood
Fox Valley	Chris. Mutschler
Herbert	M. Holmes
Lisieux	Omer Prefontaine
Piapot	E. Scherck
Parkbeg	T. L. Humphrey
Riverhurst	N. C. Rudd
Radville	J. H. Stockton
Shaunavon	Jas. Speirs
Trossachs	Chas. Carlson
Tugaske	Robt. Wilson
Weyburn	E. Meredith
Willow Bunch	G. Boisvert

REGIONAL PRECIPITATION AND THE GROWTH OF CROPS

The amount of rain and snow that falls during the year is one of the major influences on crop production over this district of supervision. The Illustration Station rain gauge is generally the only recording equipment installed in the locality and as such affords unique information for the present and records a history of the past, and as this record of the past extends back over a number of years it becomes a guide for the future.

Rainfall which comes in the autumn, especially late autumn, is mostly retained in the soil for the use of the succeeding crop either on summer-fallow or stubble land. This, in addition to the current seasonal rainfall, largely determines the yield of crop.

In the following table a summary is given of the precipitation (rain and snow) for the year 1933 and including the autumn 1932.

PRECIPITATION TABLE—SUMMARY

Region and station	Fall Aug. 1 to Oct. 31, 1932	Winter Nov. 1, 1932, to Mar. 31, 1933	Summer, 1933				Total for crop year Aug. 1, 1932, to July 31, 1933	Total for calendar year ending December	
			April	May	June	July		1933	Average 1931-1933
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Open Plains Region—									
Avonlea	3·84	2·30	1·08	3·14	1·58	0·22	12·16	10·88	10·45
Chaplin	2·92	1·36	0·57	2·14	1·52	1·03	9·54	12·08	11·00
Fox Valley	1·69	1·67	0·93	1·10	1·82	.....	7·21	9·60	7·40
Herbert	5·45	2·00	0·59	2·09	1·73	0·23	12·09	12·08	12·13
Lisieux	1·35	2·30	1·54	2·72	2·16	0·44	10·51	15·03	11·24
Parkbeg	3·38	2·07	0·70	2·74	2·27	0·08	11·24	12·55	10·88
Piapot	3·10	1·20	0·70	1·56	1·87	.....	8·43	11·32	10·98
Radville	3·81	2·57	1·31	5·99	2·21	2·46	18·35	18·51	16·55
*Riverhurst	3·18	.....	0·17	2·12	1·32	0·43	7·22	8·96	8·81
*Shaunavon	1·97	.....	0·79	2·41	3·68	0·90	9·75	11·60	10·33
Trossachs	4·07	0·95	1·23	7·33	2·75	1·14	17·47	15·95	12·86
Tugaske	3·64	1·61	0·35	2·43	1·91	0·20	10·14	11·88	10·22
Weyburn	3·88	1·17	1·39	6·88	4·55	1·85	19·72	21·34	14·39
Willow Bunch	3·21	1·72	1·44	3·60	1·98	0·64	12·59	15·52	12·48
Park Belt Region—									
Canora	6·54	3·43	0·56	4·13	5·67	2·22	22·55	21·34	15·57

* Snowfall record not taken.

THE OPEN PLAINS REGION, SOUTHWESTERN AREA.—There are three stations located in this area, Shaunavon, Piapot and Fox Valley. While to some extent similar conditions prevailed throughout this area, Shaunavon received a much more favourable rainfall than the other two stations and harvested a much better crop. At Piapot and Fox Valley conditions for crop production were the most unfavourable experienced since Illustration Station work was undertaken. The rainfall at Piapot during 1932 was well above the average and the carry-over of moisture was favourable for the 1933 crop. At Fox Valley the reserve of moisture was about the average. The rainfall during the growing season of 1933 at Fox Valley and Piapot was only about 4 inches, while at Shaunavon it was 7·7 inches. There was sufficient rain to give the grain a favourable start, but during the early part of June there was a period of extreme heat which affected all crops. During July there was no effective rain at either Piapot or Fox Valley and with the hot weather which prevailed this month crops ripened prematurely. At Shaunavon there were some good rains early in July and crops made favourable growth and recovered considerably from the set back received earlier in the season. But the extreme heat of the latter part of July ripened the crops too quickly, which reduced the yields.

First dates of seeding on these Stations ranged from April 20 to 26, and first harvesting of wheat was done July 31.

THE OPEN PLAINS REGION, SOUTH CENTRAL AREA.—The following stations are located in this area: Riverhurst, Tugaske, Herbert, Chaplin, Parkbeg, Avonlea, Willow Bunch and Lisieux.

On the stations in this area the rainfall of the season of 1932, including that of the same autumn was above the average, so there was a favourable reserve of moisture in the soil for the 1933 crop. The rainfall during the first two months of the growing season of 1933 was well above the average, but during June and July it was below average. Early in June there was a period of extreme heat which gave all crops a setback and weeds gained ground at this time. Later, rains helped the situation, but after the middle of July the extreme heat and lack of moisture forced crops to maturity.

Dates of the beginning of seeding on the stations in this area ranged from April 29 to May 15 and harvesting of wheat started at the end of July or early in August.

THE OPEN PLAINS REGION, SOUTH EAST AREA.—There are three stations located in this area: Radville, Trossachs and Weyburn. Climatic conditions during 1933 were more favourable for growing crops here than on the stations further west. The rainfall during the growing season was much heavier, and until early in July the moisture supply was sufficient for favourable growth. After this time the weather turned hot and dry, which ripened the crops too fast. The yields of wheat were a little above the average, although prospects earlier in the season gave hope of much higher yields. First seeding date on these stations was May 4 and first harvesting of wheat was done at Radville August 4.

THE PARK BELT REGION, EAST CENTRAL AREA.—At the Canora station, the season of 1933 was favourable for crop production. The snowfall of the 1932-33 winter was fairly heavy, and during the growing season of 1933 there was a rainfall of over 12 inches which promoted a favourable growth of all crops. On July 17 there was a windstorm accompanied by rain which caused considerable lodging of the grain, but later it came back to quite an extent and ripened normally. The hot weather during the latter part of July and early August assisted in ripening the grain in good time with no damage from rust in the wheat. Some rust developed in both the Victory and Banner oats, but Gopher ripened practically free.

Seeding on the station was started May 2 and harvesting August 8.

CROP ROTATION STUDIES

On the farms in the Open Plains Region of Southern Saskatchewan, with very few exceptions, the most common rotation is made up of two crops of grain and a fallow. On the Illustration Stations in this part of the province, a number of crop rotations are being tried, but the three-year one just referred to has been featured on all these stations and is used as a standard from which others are measured. A two-year system whereby only one crop of grain is grown before fallowing is also under test at a number of stations, chiefly in the areas of lowest average rainfall. A few farmers are also working with this rotation. These are considered as rotations for grain growing, but can be used also for growing feed such as cereal hay crops. During 1933 this rotation was carried out on six stations.

Rotations which include a regular hay crop such as sweet clover, alfalfa or one of the grasses are usually classed as mixed farming rotations. Some of these ranging from three to six years have been tested on the stations. After experimenting with these for over 10 years, on some stations, the results have not proven satisfactory. The difficulty of obtaining stands of these crops and their heavy moisture requirements make them unsuitable for use in crop rotations in this part of the province.

Grain crops following hay in a rotation where a summer-fallow intervenes in this southern area have not done any better than on the ordinary summer-fallow following two crops of grain. In the case of the grasses the following crop of grain has as a rule been lower in yield. Frequent failures of these regular hay crops have made it necessary to make more use of the ordinary grain crops for hay, such as oats, fall rye, spring rye and beardless barley. These have proven much more dependable sources of feed.

The two-year rotation of wheat and fallow has been under test at Fox Valley for six years and at Herbert for 7 years. The results on both stations have shown

a little higher average yield of wheat in this rotation than in the three-year with two crops of grain and fallow. Weeds have been controlled more effectively in this rotation than in any of the others.

In the corn, wheat rotation which is under trial on six stations, the average yield of wheat after corn has been less than after fallow and about midway between that on fallow and stubble land.

In the east central area at Canora the hay crops have done much better and as a rule fit in quite well in rotations along with grain crops.

WEED CONTROL

The weeds which give the most trouble on the stations in Southern Saskatchewan are the annuals such as Russian thistle, pigweed, tumbling mustard, frenchweed and others. Of these Russian thistle is the worst and it has become very widespread, being found now on all the stations in this region. One of the worst features of this weed is its exceptionally low moisture requirement as compared with grain or other crops. When it is growing in competition with these crops, yields are seriously reduced, especially in dry seasons.

In attempting to control Russian thistle and other annual weeds, chief dependence is placed on efficient cultural methods along with a suitable system of cropping.

Of the rotations under test on the stations, some have been found more efficient for the control of these weeds than others. The two-year system of one crop and summer-fallow has usually resulted in a cleaner crop than the three-year, where two crops are grown before fallowing. This was quite noticeable on the fields at Herbert in 1933 and at Fox Valley in 1932.

In those rotations which include a regular hay crop such as grass or clover, the results in weed control have been disappointing. The stand of hay as a rule is thin and this allows weeds to get in and increase.

Frequent summer-fallowing has proven one of the most satisfactory methods of controlling weeds. Linked up with cultural practices is the problem of soil drifting. For this reason the method of fallowing is very important. As far as possible cultural methods are followed which will control the weeds efficiently at low cost and at the same time leave the land in condition so that danger of soil drifting will be minimized.

In the preparation of the summer-fallow, some form of surface cultivation is given first to kill weed growth early, before it has robbed the soil of moisture to any extent. Surface working may be continued at different times later as necessary for weed control, or the land may be ploughed and cultivated as necessary later. The surface worked fallow has usually proven more efficient in the control of annual weeds than the ploughed and yields of grain have been fully as high. Under some conditions however, ploughing leaves the soil in a more lumpy state to resist wind action. The ploughing is not done deep, as this tends to bury the weed seeds so they will not germinate readily. In the spring before seeding fallow land, sufficient time is allowed for weeds to germinate, then a shallow cultivation is given just previous to drilling.

When a second crop is grown after fallow, the practice is to burn off thistles or other weeds if necessary in the spring, then prepare the land either by ploughing, disking, cultivating or one way disking. When disking is the method followed the land is first given a single stroke, then allowed to stand for a short time for weeds to start. It is then double disked and sown at once. In some cases the second working is done with the cultivator. Unless the soil is too

fine, a stroke of the harrow is given about four to six days after seeding. It has been found that when conditions are unfavourable for starting weeds, the ploughing or one way disking will usually give a cleaner crop than the disking or cultivating.

When oats or barley are grown in the rotation, weeds are controlled more effectively than with wheat, especially on the stubble land. Fall rye has also been found a good weed fighter in this way. Barley has been found especially useful in the control of wild oats, as it can be sown late and this gives a chance to kill a great many weeds before seeding.

At Canora station in the east central area, there are perennial weeds, such as sowthistle and Canada thistle as well as the annuals. The general plan followed for the annual weeds is the same as on the other stations. For the control of the perennials, summer-fallowing with persistent cultivation from the early part of July until freeze-up has been the practice. During the early part of the summer-fallowing period, those cultural methods are followed which control the annual weeds and later in the season the perennials are given the necessary attention.

The rotations used provide for a proportion of bare summer-fallow and also a partial summer-fallow each year. In the latter case, an early hay or fodder crop, such as sweet clover or oats for hay, is taken off early in July and the land summer-fallowed during the remainder of the season.

Although this work has been carried on for only a short time, the results have been encouraging and have shown the possibility of controlling these weeds. However, experience has shown that in the case of the partial fallow, unless the hay makes a good stand and the crop is taken off early, the results in weed control will not be satisfactory.

EXPERIMENTAL WORK ON THE " BURN OUT " SOILS AT RADVILLE

The work on the experimental area at Radville was continued during 1933. Last year a change was made in the plan of work so as to include more experiments in tillage methods.

During the first few years in which this work was carried on, chief attention was given to methods of breaking and treatment of the new land. The new plan now includes ten different methods for preparing the summer-fallow and four for the stubble land. The different treatments for the summer-fallow were given last year, but the stubble treatments were only started this spring. These are all being carried out in duplicate on one-acre fields, using a three-year rotation of fallow, wheat, wheat.

In the following tables the different treatments are described and the resulting yields given for this year on both fallow and stubble land.

SUMMER-FALLOW EXPERIMENTS

Treatments	Yield 1933 Wheat per acre
	bush.
1. Surface work, using one-way disk first, subsequent work with the cultivator as required for weed control	20·5
2. Surface work with ordinary disk first, subsequent work with the cultivator as required	24·5
3. Disk first, plough 4-5 inches June 10-20, subsequent work with the cultivator as required	23·5
4. Disk first, plough 6-7 inches June 10-20, subsequent work with the cultivator as required	22·0
5. Same treatment as No. 3 and sow ammonium phosphate 40 pounds per acre with wheat the next spring	23·5
*6. Same treatment as No. 3 and apply 20 loads rotted manure per acre principally in burn-outs previous to ploughing	23·2
*7. Plough under sweet clover (sown with stubble crop previous season) about June 15, subsequent work with the cultivator as required	24·0
8. Duplicate of treatment No. 3	24·5
9. Disk and cultivate as required for weed control. Sow sweet clover June 25. Plough in late fall or early spring before sowing wheat	26·0
10. Cultivate with the Killifer chisel cultivator half of the field in the fall, half in the spring, then fallow with one-way disk same as No. 1 (not chiselled this spring)	24·5

* Sweet clover did not make a stand this year.

NOTE.—Yields recorded were taken this year from the original and duplicate fields. The wheat was a good stand and a clean crop.

STUBBLE LAND EXPERIMENTS—WHEAT PER ACRE

Treatments	Yields 1933	Yields of duplicates 1933	Average of fields and duplicates
	bush.	bush.	bush.
1. Fall plough, disk, cultivate or harrow as required previous to seeding	11·8	11·7	11·7
2. Spring plough, disk, cultivate or harrow as required before seeding	14·7	11·3	13·0
3. One-way disk and sow	17·7	17·0	17·3
4. Double disk and sow	19·0	17·0	18·0

FERTILIZER EXPERIMENTS

Previous to this year most of the experiments with fertilizers have been conducted on small plots (1/50-acre). The four years' results from this work have shown that the phosphates and barnyard manure have given some response, but other fertilizers have proven of no practical benefit.

The experiments with commercial fertilizers this year include trials on one-acre fields with superphosphate and ammonium phosphate only. The details and results of these trials are shown in the following table:—

Fertilizer	Rate	Yield of wheat per acre, 1933
	lb.	bush.
1. Superphosphate	35	20·0
2. Check	No fertilizer	21·5
3. Superphosphate	35	21·5
4. Ammonium phosphate	35	23·0
5. Check	No fertilizer	18·5

NOTE.—Field 1 was damaged by gophers.

SOIL DRIFTING

During this year three projects were carried on for the purpose of studying methods of controlling soil drifting.

An experiment in methods of summer-fallowing was started last year at Weyburn on a large field adjoining the Illustration Station. The purpose of this was to study the effect of the different cultural methods on soil drifting. The following four methods are being tried:—

(1) Use the one way disk for first operation when weed growth is two to four inches high and again when a similar growth occurs. If further work is necessary for weed control give a stroke of the duckfoot cultivator.

(2) Surface work with sufficient frequency to maintain good weed control, first operation with the disk. Subsequent operations can be done with the cultivator, rod weeder or disk, whichever will do the work most satisfactorily.

(3) Disk after weeds have started. Plough in June and surface work as necessary remainder of the season to control weeds.

(4) Standard fallow same as No. 3. Sow cover crop of one-half bushel of oats per acre August 5.

Wheat was sown on all these fields this spring, following a stroke of the disk. On account of a favourable supply of moisture during the early part of the season, soil drifting was not a serious factor this year. There was but little damage on any of these fields from this cause, so it was difficult to make a comparison of the different treatments. The cover crop which was sown August 2 last year did not make much growth, chiefly on account of the damage from grasshoppers.

The same experiment was continued on another summer-fallow field this year in preparation for a crop in 1934.

At Avonlea a strip farming project was started this spring. A quarter section was laid out in strips varying from 8 to 15 rods in width. The cropping plan followed is a two-year rotation of grain and fallow on part of the land and a three-year rotation of two crops and fallow on the remainder.

The grasshopper infestation was so bad that most of the crops were destroyed by the middle of June. These crops being more exposed to grasshoppers invasion than the larger fields suffered more damage. There was a good rainfall early in the growing season and not much damage from soil drifting.

At Fox Valley an experiment has been carried on for 5 years in methods of summer-fallowing. The purpose of this work is to study the effect of each method on:—

(1) The yield of wheat.

(2) The cost of preparing the fallow.

(3) The effect of each method on soil drifting.

A quarter section is used for this work and the system of cropping is a two-year rotation of fallow, wheat. The quarter section is divided into eight fields of 20 acres each and half the land is fallowed each year in a block.

Five years' results are now available and following are the average yield of wheat and cost of fallowing from each treatment:—

YIELD OF WHEAT AND COST OF FALLOWING

Treatment	Yield per acre	Cost of fallowing, per acre
	bush.	$
Surface work only	11·4	4 88
Surface work, plough July	10·6	5 70
Surface work, plough June	10·1	5 92
Fall plough, surface work next season	5·0	5 09

These results show that:—

(1) Surface worked fallow has given the best results, both from the standpoint of yield of crops and cost of preparation of the fallow.

(2) Ploughing either in June or July has given nearly the same yield and cost.

(3) Fall ploughing previous fall gave the lowest average yield and ranks second in cost.

Observations have been made each season on the effect of each method on soil drifting and weeds.

Although there has been some damage to the crop from soil drifting practically every year, in 1932 there was very serious damage from this cause. That year almost half the crop area had to be resown. The fallow that was fall ploughed has always given the most trouble from soil drifting and so serious has the loss been, that this method has been abandoned. Judging from observations made, the surface worked fallow had drifted the least of any.

In reference to weeds, which are practically all annuals, each method has proven effective, providing the work was done in time. However, in the surface worked fallow, Russian thistle, which is the chief weed, has been most effectively controlled with the least cost.

The crop on this land is always harvested with the header. This leaves a high stubble and when it is worked in during the fallow year helps to hold the soil and is an important factor in contributing to the good results from the surface worked fallow.

FERTILIZER TRIALS

Both superphosphate and ammonium phosphate were tested this year on three stations and superphosphate alone on two. In all cases the fertilizer was sown with wheat on summer-fallow at rates varying from 25 to 40 pounds per acre. On four stations a fertilizer drill was used, while on the other two the fertilizer was mixed with the wheat and both sown together through the ordinary grain drill. During the early part of the growing season, on all stations there was a stronger growth of the fertilized crop. As the season advanced and the weather became dry and hot in July, this heavier growth received a severe setback and more than the ordinary crop. The final results, however, still showed some increases in yield on all but one station. The results of these tests are set out in the following table:—

SUMMARY OF RESULTS WITH FERTILIZER 1933

Station	Fertilizer used	Rate in pounds	Wheat yield per acre	
			Fertilized crop	Unfertilized crop
			bush.	bush.
Shaunavon	Superphosphate	25	12·0	10·5
Herbert	Superphosphate	35	7·2	7·2
	Ammonium phosphate	30	7·2	7·2
Willow Bunch	Superphosphate	25	8·5	6·0
Trossachs	Superphosphate	40	21·5	16·0
	Ammonium phosphate	40	15·7	16·0
Radville	Superphosphate	35	21·5	21·5
	Ammonium phosphate	35	23·0	21·5

NOTE.—Both superphosphate and ammonium phosphate were sown with wheat at Weyburn, but on account of the uneven sowing of the fertilizer drill an accurate test could not be made.

SHELTER BELTS

In the spring of 1933, 2,005 trees were planted in shelter belts on Illustration Stations. On five of these a shelter belt had already been established and on these an effort was made to improve the shelter by planting a row of white spruce inside the other trees.

Following are the different kinds of trees and the number of each planted: Ash, 430; elm, 260; poplar, 145; caragana, 550; white spruce, 620.

This was a favourable spring for planting trees and they made a good start. Later in the summer when there was a long dry spell with extreme heat, the spruce suffered and on some stations quite a number died. However, some of the operators were able to bring them through almost 100 per cent by watering at a critical period. On the whole, the other trees made favourable growth.

In addition to these plantings in 1933, land was prepared on seven stations for planting trees in 1934.

GARDENS

The early spring was favourable for the growth of both vegetables and fruits and these made a good start. Later in the summer with dry, hot weather and grasshopper damage on many stations, growth was not so favourable, but in spite of this most of the gardens produced a fair quantity of vegetables. There were a few stations where grasshoppers did considerable damage and very little was produced from the gardens.

Plantings of small fruits were made on 14 stations this year and tree fruits on 12. The plan followed is to plant a few units each year with a view to building up a fair sized plantation which in time will supply the needs of a farm family.

HORTICULTURAL STATION

Work was continued this year on the horticultural station at Avonlea on the farm of Joseph Dombowsky. On the whole the tree fruits came through the winter well and it was not necessary to do much additional planting this spring. The small fruits wintered well with the exception of raspberries, as quite a few of these plants died.

Some additional plantings were made of small fruits such as currants, gooseberries, raspberries, strawberries and rhubarb. These made a favourable growth with the exception of the raspberries and strawberries.

Grasshoppers did some damage but more to the tree fruits than to the others, as they stripped off a good many of the leaves.

There was a little fruit this fall on some of the plum and cherry trees. The older currants and gooseberries also produced some fruit and a few strawberries were picked as well. The rhubarb plantation now consists of 36 plants of Macdonald and 4 of Ruby planted six feet apart each way. This has made good growth and supplied some excellent rhubarb.

The shelter around the orchard has grown very well this season and is protecting the plantation.

FIELD MEETINGS

Field meetings were held on 12 stations this year with a total attendance of 660 people and an average of 55 for each station. The Supervisor was assisted at these meetings by the Superintendent of the Swift Current Experimental Station and the field man of the Provincial Dairy Branch for the district. The program at each meeting included, first, an inspection of the fields, then addresses by the speakers and a picnic lunch at the conclusion. At each station the people showed keen interest in the work and in the discussion of some of the problems in crop production.

CEREAL CROPS

WHEAT.—The main source of revenue for this area is the wheat crop, and the money obtained for the wheat in many cases comprises all the income of the farm. This is not the result of choice nor does it follow from a desire to neglect or refrain from the growth of other crops, but it comes from the inexorable summer droughts that have recurred in recent years and from the inherent character of the wheat plant that enables it to make a stronger stand against adverse moisture conditions than the other commonly grown grains are able to do.

Wheat occupies a preferred place in satisfying the requirements for a high class human food. Wheat also leads the farm cereals in tenacity of life that will withstand to a remarkable degree the vicissitudes of the drought and heat of summers. Fortunate it is for the stretch of Southern Saskatchewan that is under review in this report that the wheat plant so combines excellence and fortitude that it can be grown to better advantage than any other crop that could be employed in the hazardous seasons that are apt to prevail in this region.

The following table gives figures concerning yields and costs of producing wheat:—

WHEAT YIELD AND COST OF PRODUCTION BY STATIONS

Location of station and region	Wheat after	Number of years grown	Yield per acre		Cost per bush.	Cost per acre		Profit or (−) loss per acre
			1933	Average	1933	1933	Average	Average
			bush.	bush.	$	$	$	$
Open Plains Region								
Avonlea	Fallow in 6-year rotation, Marquis	3	10·0	8·3	0 92	9 22	9 73	−6 31
	Fallow in 3-year rotation, Marquis	10	11·0	12·9	0 85	9 33	13 02	0 49
	Wheat in 3-year rotation, Marquis	10	6·0	8·0	1 33	7 98	11 58	−3 79
	Fall rye in 2-year rotation, Marquis	.....	3·0	.....	1 89	5 68	.....	.....
Fox Valley	Fallow in 6-year rotation, Marquis	3	1·1	3·1	6 23	6 85	7 49	−6 35
	Fallow in 6-year rotation, Marquis	6	1·5	15·6	4 69	7 04	11 59	1 28
	Fallow in 2-year rotation, Marquis	6	Failure	16·0	.....	8 32	12 94	−0 30
	Fallow in 3-year rotation, Marquis	3	Failure	13·3	.....	6 76	11 21	0 51
	Wheat in 3-year rotation, Marquis	3	Failure	1·4	.....	6 16	7 25	−6 64
	Wheat continuously, Marquis	6	Failure	6·3	.....	3 78	7 05	−0 93
	Corn in 6-year rotation, Marquis	6	1·0	5·6	4 04	4 04	6 30	−3 92
Herbert	Fallow in 3-year rotation, Marquis	11	5·6	13·4	1 63	9 15	13 77	−1 06
	Wheat in 3-year rotation, Marquis	11	3·2	6·7	2 37	7 59	11 00	−4 38
	Fallow in 2-year rotation, Marquis	9	9·8	11·8	1 16	11 36	14 64	−3 91
	Fallow in 6-year rotation, Marquis	4	7·2	8·5	1 28	9 22	10 32	−6 60
Lisieux	Fallow (ploughed) in 3-year rotation, Marquis	4	4·0	5·4	2 05	8 19	10 12	−7 09
	Fallow (surface worked) in 3-year rotation, Marquis	4	3·0	4·8	2 53	7 61	9 44	−6 77
	Wheat (spring ploughed), in 3-year rotation, Marquis	3	3·3	1·4	2 15	7 10	7 78	−7 12
	Wheat (surafce worked), in 3-year rotation, Marquis	3	4·0	1·3	1 59	6 38	6 74	−6 06
	Fallow in 2-year rotation, Marquis	4	5·5	4·5	1 84	10 14	12 19	−9 79
	Fallow in 4-year rotation, Marquis	4	9·0	7·0	0 96	8 68	10 30	−6 44
	Hay in 3-year rotation, Marquis	4	4·0	5·0	1 15	4 59	7 46	−4 56

WHEAT YIELD AND COST OF PRODUCTION BY STATIONS—*Continued*

Location of station and region	Wheat after	Number of years grown	Yield per acre		Cost per bush.	Cost per acre		Profit or (−) loss per acre
			1933	Average	1933	1933	Average	Average
			bush.	bush.	$	$	$	$
Parkberg	Fallow in 3-year rotation, Marquis	2	7·2	7·8	1 16	8 36	8 76	−5 54
	Wheat (ploughed in 3-year rotation, Marquis	2	2·6	3·3	2 72	7 08	7 48	−6 16
	Wheat (disked) in 3-year rotation, Marquis	2	1·0	1·5	6 03	6 03	6 44	−5 85
	Fallow in 5-year rotation, Marquis	3	8·0	4·6	1 27	10 19	9 42	−7 44
	Fallow in 2-year rotation, Marquis	9	7·7	14·6	1 32	10 17	13 65	1 47
	Fall rye in 2-year rotation, Marquis	.....	Failure	.....	.....	4 82	.....	.....
Piapot	Fallow in 3-year rotation, Marquis	6	4·0	21·5	1 62	6 53	10 59	4 78
	Corn in 6-uear rotation, Marquis	6	Failure	14·8	.....	3 42	6 58	4 46
	Hay in 6-year rotation, Marquis	6	Failure	16·4	.....	4 17	6 96	5 21
	Fall rye in 2-year rotation, Marquis	3	Failure	8·6	.....	3 71	5 33	−2 15
	Fall wheat in 3-year rotation, Marquis	3	Failure	6·3	.....	4 48	5 82	−3 38
Radville	Fallow in 3-year rotation, Marquis	10	19·0	20·3	0 47	8 98	13 51	6 33
	Fallow in 2-year rotation, Marquis	6	12·0	10·3	0 96	11 49	10 32	−3 41
	Fallow in 5-year rotation, Marquis	3	18·5	12·5	0 57	10 59	10 86	−5 47
	Wheat in 3-year rotation, Marquis	10	11·0	10·3	0 71	7 79	10 93	0 85
Riverhurst	Fallow in 3-year rotation, Marquis	11	Failure	16·3	.....	7 09	13 05	3 80
	Wheat in 3-year rotation, Marquis	11	Failure	11·2	.....	6 43	11 12	−2 35
	Fallow in 6-year rotation, Marquis	3	Failure	2·4	.....	7 09	8 56	−7 70
	Sweet clover in 2-year rotation, Marquis	8	Failure	11·9	.....	4 54	9 00	2 94
Shaunavon	Fallow (surface worked) in 3-year rotation, Marquis	.....	10·5	.....	0 78	8 21	.....	.....
	Fallow (surface worked ploughed July 20) in 3-year rotation, Marquis	.....	9·5	.....	0 92	8 74	.....	.....
	Fallow (surface worked ploughed June 15) in 3-year rotation, Marquis	.....	9·0	.....	0 94	8 48	.....	.....
	Fallow (surface worked ploughed June 15 and superphosphate applied with Marquis) in 3-year rotation	.....	12·0	.....	0 73	8 79	.....	.....
	Corn in 3-year rotation Marquis	.....	9·3	.....	0 82	7 63	.....	.....
Trossachs	Fallow in 3-year rotation, Marquis	9	16·0	15·9	0 53	8 45	12 23	2 67
	Wheat in 3-year rotation, Marquis	9	10·0	8·9	0 72	7 24	10 16	0 21
	Fallow in 3-year rotation with hay, Marquis	3	20·5	12·5	0 43	8 80	8 75	−3 33
	Fallow in 2-year rotation, Marquis	2	15·0	15·2	0 66	9 93	10 29	−3 84
Tugaske	Fallow in 3-year rotation, Marquis	11	1·6	15·3	5 24	8 39	13 63	1 73
	Wheat in 3-year rotation, Marquis	11	Failure	11·2	.....	6 68	11 58	−5 22
	Fallow in 3-year rotation with sweet clover, Marquis	11	Failure	13·0	.....	7 87	11 89	0 77
	Fallow in 3-year rotation with sweet clover ploughed in, Marquis	2	Failure	3·6	.....	8 19	9 69	−8 43
	Fallow in 6-year rotation, Marquis	3	Failure	2·4	.....	7 87	9 13	−8 29

WHEAT YIELD AND COST OF PRODUCTION BY STATIONS—*Concluded*

Location of station and region	Wheat after	Number of years grown	Yield per care		Cost per bush.	Cost per acre		Profit or (−) loss per acre
			1933	Average	1933	1933	Average	Average
			bush.	bush.	$	$	$	$
Weyburn.....	Fallow in 3-year rotation, Ceres 1933.....	9	37·0	22·8	0 32	11 80	13 26	7 40
	Wheat in 3-year rotation, Marquis.....	9	18·0	18·3	0 48	8 65	12 78	7 01
	Fallow in 6-year rotation, Marquis.....	3	8·0	8·0	1 19	9 52	10 27	−7 07
Willow Bunch.	Fallow in 3-year rotation, Marquis.....	.....	3·7	.....	2 19	8 10	.....	.....
	Fallow in 2-year rotation, Marquis.....	.....	2·2	.....	4 51	9 92	.....	.....
	Fallow in 2-year rotation, Reward.....	.....	3·0	.....	3 41	10 22	.....	.....
	Fallow (ploughed) in 3-year rotation, Marquis.....	.....	7·5	.....	1 18	8 82	.....	.....
	Fallow (surface worked) in 3-year rotation, Marquis.....	.....	8·5	.....	0 98	8 34	.....	.....
	Fallow, superphosphate put in with Marquis in 3-year rotation.....	.....	8·5	.....	1 06	8 98	.....	.....
	Fallow (sweet clover ploughed in) in 3-year rotation, Marquis	.....	4·0	.....	2 27	9 09	.....	.....
	Wheat, Marquis.....	.....	2·8	.....	2 52	7 06	.....	.....
Park Belt Region								
Canora.....	Fallow in 6-year rotation, Reward.....	3	28·0	20·8	0 41	11 59	11 42	−2 47
	Hay and break in 6-year rotation, Marquis.....	3	22·0	14·6	0 42	9 16	9 20	−2 72
	Hay and break in 4-year rotation, Ceres.....	2	27·0	22·7	0 35	9 32	8 89	0 82
	Fallow in 2-year rotation, Ceres.	.....	34·0	.....	0 41	14 02	.....	.....
	Fallow in 2-year rotation, Reward.....	.....	31·0	.....	0 42	13 00	.....	.....
	Fallow in 2-year rotation, Marquis.....	.....	32·0	.....	0 43	13 86	.....	.....

At Canora, yields of wheat ranged from 22 to 34 bushels per acre. Three varieties, Marquis, Reward and Ceres have all been under test here. Ceres was introduced two years ago on account of its ability to withstand rust to quite an extent. It has also proven a good yielder. Reward has shown some resistance to rust and is earlier than either Marquis or Ceres, but has not given quite as high yield as either of the other two varieties. All of these wheats are of high quality.

At Radville and Trossachs, yields of wheat ranged from 12 to 20 bushels and at Weyburn from 8 to 37 bushels per acre. Marquis is the standard variety for these stations, but Reward has been tried as well at Radville and Weyburn. It has not proven as high in yield, but is of excellent quality and has ripened earlier than Marquis. Ceres has also been grown at Weyburn during the past two years and so far has given good results.

In the South Central area at Avonlea, Herbert, Parkbeg, Lisieux and Willow Bunch yields of wheat ranged from 5 to 11 bushels per acre of good quality grain. At Tugaske only one field was threshed which gave a very low yield of 1½ bushels per acre, while at Riverhurst and Chaplin there was no wheat worth threshing. Marquis is the standard variety used all through this area and is the variety used on all stations, although one field of Reward has been grown each year at Willow Bunch.

In the southwestern area, Marquis is the variety grown on all three stations. At Piapot and Fox Valley, some of the fields of wheat were not worth threshing and those threshed gave very low yields, ranging from one to four bushels per acre. At Shaunavon, while yields of wheat were not high, they were much better than on the other two stations, running from 6·5 to 12 bushels.

Winter wheat has been grown on the Piapot Station for the past three years, and this is the first year it has failed when grown on stubble land. Yields have ranged from 4·5 to 14·5 bushels per acre. It was sown on fallow for two years, but in 1931 most of the crop was cut off by soil drifting in the spring.

In this district of supervision, crops other than wheat occupy a small acreage and do not enter in a major way into the farming program.

The following table gives data concerning yields and costs of producing these crops on station fields:—

YIELD AND COST OF PRODUCTION OF BARLEY, OATS, RYE, CORN, HAY

Location of station and region	Crop sequence	Number of years grown	Yield per acre, bushels or tons		Cost per bushel or ton
			1933	Average	1933
					$
Open Plains Region:					
Avonlea	Barley, Hannchen after wheat	3	Failure	1·3	
	Fall rye hay after oats		0·8		6 74
	Oats, Banner used for hay after corn		1·0		5 01
	Corn, N.W. Dent after barley	2	1·0	0·9	7 26
	Fall rye used for hay after wheat		0·8		5 56
Chaplin	Spring rye after fall rye		4·5		1 27
	Spring rye used for hay after fall rye		0·5		12 38
	Oats used for hay, after fall rye		0·5		12 48
Fox Valley	Oats, Banner on fallow	6	Failure	26·1	
	Fall rye on fallow	6	Failure	8·9	
	Fall rye after wheat		Failure		
	Barley after corn	6	1·0	15·4	3 84
	Spring rye after wheat		Failure		
	Fall rye replacing sweet clover		Failure		
	Colsess Barley replacing sweet clover		Failure		
	Corn, N.W. Dent after hay	6	0·25	0·16	21 24
Herbert	Barley, Hannchen after wheat	4	Failure	7·7	
	Oats, Banner after fallow		4·0		2 13
	Fall rye hay after oats	2	0·6	0·7	10 71
	Oats and spring rye for hay on fallow		1·0		9 03
Lisieux	Oats, Banner on fallow		0·5		19 98
	Oats, Banner after wheat		0·5		14 08
	Fall rye on fallow		6·5		1 50
	Spring rye cut for hay after oats		1·0		5 82
	Barley cut for hay after wheat		0·4		13 22
Parkbeg	Spring rye hay, after wheat		0·6		14 13
	Oats, hay, after wheat		0·6		11 77
	Oats, Banner after fallow		0·8		9 67
	Fall rye after wheat		0·4		9 00
Piapot	Fall rye after wheat (Hay 1933)	6	0·25	10·7	19 16
	Fall rye on fallow		Failnre		
	Fall rye after wheat	3	Failure	8·1	
	Barley, Hannchen cut for hay after hay		0·25		23 44
	Corn after fall rye	6	0·25	1·12	27 60
	Oats on fallow cut for hay		0·75		7 32
	Brome grass	6	Failure	0·9	
	Sweet clover after wheat		0·37		10 73
	Alfalfa	6	Failure	1·1	
Radville	Oats on fallow	2	24·0	32·0	0 36
	Hay, sweet clover after oats		2·0		3 77
	Alfalfa and sweet clover mixed		2·0		3 04

YIELD AND COST OF PRODUCTION OF BARLEY, OATS, RYE, CORN, HAY—*Conc.*

Location of station and region	Crop sequence	Number of years grown	Yield per acre, bushels or tons		Cost per bushel or ton
			1933	Average	1933
					$
Riverhurst	Fall rye for hay after oats		0·2		26 00
	Oats, Banner after corn		Failure		
	Corn, N.W. Dent after barley		Failure		
	Barley, Hannchen after wheat		Failure		
	Sweet clover after wheat	8	Failure	0·8	
	Brome grass		Failure		
	Alfalfa		Failure		
Shaunavon	Oats, Banner on fallow		35·0		0 27
	Oats, Banner after corn		25·0		0 25
	Barley, Trebi on fallow		30·0		0 31
	Barley, Trebi after corn		25·0		0 25
	Corn, N.W. Dent		1·0		7 21
	Sweet clover		Failure		
	Western rye grass		Failure		
Trossachs	Oats on fallow	2	26·0	23·0	0 38
	Hay, sweet clover		1·6		4 04
	Hay, alfalfa and sweet clover		1·6		3 67
Tugaske	Barley after wheat		Failure		
	Oats after corn		Failure		
	Oats after wheat		Failure		
	Corn after barley	3	0·5	1·3	12 06
	Fall rye for hay after oats		0·4		13 65
	Western rye and brome grass	6	Failure	0·4	
	Sweet clover after wheat		Failure		
Weyburn	Barley, Trebi after wheat	3	30·0	22·0	0 28
	Oats, Victory after barley		6·0		1 04
	Oats, Victory after hay		6·0		1 08
Willow Bunch	Oats, Victory after fallow cut for hay		0·75		13 60
	Oats, Banner after wheat	2	7·5	11·2	0 98
	Barley, Hannchen after wheat	2	9·0	14·5	0 80
	Hay, sweet clover and oats		0·75		9 68
Park Belt Region—					
Canora	Hay, alfalfa and western rye, 1st year	3	0·5	0·9	14 48
	Hay, alfalfa and western rye, 2nd year	3	0·75	0·8	7 70
	Oats, Victory after wheat		58·0		0 19
	Oats, Gopher after wheat		56·0		0 19
	Hay, sweet clover after barley	3	2·0	1·1	2 73
	Oats after wheat	3	58·0	45·9	0 16
	Barley, Hannchen after oats		42·5	28·5	0 21

OATS.—Oats were sown on all 15 stations this year, but only on 7 was there a crop worth threshing and with three exceptions these were all on fallow or corn land. Yields varied all the way from 4 to 58 bushels per acre. The quality also varied a good deal and was good where yields were high or fair, but where yields were low the grade was low.

On stations in the Open Plains Region the highest yield was at Shaunavon on fallow with 35 bushels per acre, at Trossachs and Radville 24 to 26 bushels all on fallow. At Weyburn where grasshoppers caused very severe damage, the yield was only six bushels. At Willow Bunch yields ranged from 5 to 7 and at Herbert the yield was 4 bushels per acre of poor grade. In most cases these crops promised much higher yields, but the damage from the hoppers increased during the latter part of the season.

At Canora in the Park belt where there was no hopper infestation, yields were much higher, ranging from 56 to 58 bushels per acre.

The variety of oats used on most of the stations is Banner. At Weyburn Victory is the variety grown, while at Willow Bunch both Banner and Victory

and at Canora Banner, Victory and Gopher are all under test. Banner gave best results at Willow Bunch this year, while at Canora Banner and Victory were equal in yield and Gopher only two bushels behind. Gopher is one of the best of the early varieties, being about ten days ahead of the others grown on the station.

BARLEY.—Barley was sown on twelve stations this year and was threshed on four. Like oats this crop received severe damage from the grasshoppers. Under conditions where it was sown early however, in some cases it produced a satisfactory crop in spite of this. Yields were highest at Canora with 42·5 bushels per acre. On the other stations yields ranged from 9 to 35 bushels. On the whole the quality of grain was good. The variety of barley grown on most of the stations is Hannchen, a two-rowed barley. On a few stations, Trebi, a six-rowed variety is being grown.

FALL RYE.—Fall rye was seeded on nine stations this year. In most cases it was sown for a hay crop, but on three stations was grown for grain. The only grain threshed was at Lisieux on fallow, where it yielded 6·5 bushels per acre. As a hay crop at most places it supplied a fair quantity of feed under unfavourable conditions.

SPRING RYE.—Spring rye was grown on three stations this year. Most of this crop was used for feed, but at Chaplin one field was threshed, giving a yield of 3·7 bushels.

SUMMARY FOR THREE YEARS

During the past three years, the yield of cereal crops on the stations in Southern Saskatchewan has been low. In 1931, chiefly on account of the drouth conditions and soil drifting over most of this area there was no grain worth threshing on many of the stations. On the six stations where grain was threshed, the average yield of wheat was only 5·7 bushels per acre. On stubble land there were only two stations where any wheat was threshed the average yield was 3·4 bushels. Oats on stubble land failed to produce grain worth threshing. On fallow and corn land, the average yield on four stations was 11·9 bushels per acre. Barley was harvested on three stations and gave an average yield of 14·3 bushels.

In 1932 on the whole there was a more favourable rainfall and on four stations it was sufficient to produce about an average crop, a good crop on one and below average on the remainder. This was the first year of the grasshopper infestation and on some stations they caused a good deal of damage, particularly to oats and barley. The average yield of wheat on fallow was 13·4 bushels and on stubble land 8·7 bushels per acre. Oats on fallow and after corn on six stations gave an average yield of 27·3 bushels per acre. On stubble land there were only two stations where the oats were worth threshing and the average yield on these was 16 bushels per acre. Barley was sown on eight stations and threshed on five, with an average yield on these of 25·8 bushels.

In the year 1933 there was sufficient moisture for the production of a good crop of cereals on a few stations, but on the others, yields were below average. The grasshopper infestation was much heavier and more widespread than last year. Wheat on fallow was threshed on all but one station and the average yield on all the others was 9·3 bushels. Wheat on the stubble land was threshed on ten stations out of fourteen, and the average yield on these was 6·5 bushels. Oats were harvested for grain on seven stations and on these the average yield was 22·2 bushels on fallow and 12·8 bushels on stubble land. Barley was threshed on four stations with an average yield of 16·2 bushels per acre.

On the stations in the east central area, during the past three years conditions have been more favourable. The year 1931 was one of low rainfall

even in this area and the yield of all cereal crops was considerably below the average. Wheat on fallow gave an average of 22·1 bushels and on stubble land 9·5 bushels per acre. Wheat following hay this year failed to produce a crop worth threshing. Oats were cut for green feed on one station and on the other gave 24·3 bushels of grain per acre. The average yield of barley was 22·5 bushels per acre.

In 1932 with a more favourable rainfall grain yields were higher, wheat producing 24·2 bushels per acre on fallow and 16·1 bushels after hay. Oats gave 47·3 bushels, barley 21·2 bushels per acre.

In 1933 conditions were favourable for crop production and the yield of all cereal crops was high. The average yield of wheat on fallow was 31·8 and following a hay crop 24·5 bushels. Oats gave 47 and barley 42·5 bushels per acre.

FORAGE CROP TESTS

The experience in growing forage crops on the Illustration Stations in the southern part of the province has shown that the so called common hay crops such as grasses, alfalfa and sweet clover cannot be depended on as a source of feed. There are many seasons, particularly those of low rainfall in which they either fail to make a stand or give a satisfactory yield. Cereal crops such as oats, fall and spring rye have also been used for hay to quite an extent and these have been found much more dependable.

During the year 1933 there were only four stations where any of the regular hay crops made a stand worth cutting. At Radville and Trossachs good yields of sweet clover and a mixture of sweet clover and alfalfa were obtained and at Piapot and Willow Bunch a light crop of sweet clover was taken off. At Willow Bunch the clover stand had to be supplemented, which was done by reseeding in about a half regular seeding of oats. At Piapot and Riverhurst, brome grass and alfalfa failed to make sufficient growth for a hay crop and at Weyburn alfalfa and western rye failed. On nine stations sweet clover and western rye sown either singly or in combination on 13 fields failed to make a stand worth leaving for hay. Except on permanent hay fields, cereal crops for hay were substituted where the others failed and were also grown on other fields as a part of the regular plan of cropping. A fair amount of hay was secured from these cereal crops, except at Riverhurst and Fox Valley where conditions were most unfavourable. At Lisieux one ton per acre of spring rye hay was obtained on stubble land while at Tugaske, where even wheat was practically a failure about one-half ton per acre of fall rye hay was produced.

Corn was grown on six stations and under very unfavourable conditions furnished a fair amount of feed. It failed on one station due chiefly to cutworm damage. Yields ranged from ¼ to one ton per acre. At Canora in the east central area under more favourable conditions forage crops gave much better results. Yields of alfalfa, western rye and sweet clover ranged from ¾ to 2 tons per acre.

SUMMARY FOR THREE YEARS

A summary of the results with forage crops on the Illustration Stations in Southern Saskatchewan during the past three years shows a low average production. In 1931 conditions were very unfavourable on all stations except Piapot. This was the only station where any of the regular hay crops were worth cutting. Sweet clover and western rye mixture gave a yield of ½ ton per acre and alfalfa in rows one ton. There were only three other stations where forage crops of any kind were worth cutting. At Radville and Tugaske oats gave a yield of about ½ ton of hay per acre and at Fox Valley fall rye and oats gave ¼ ton each.

In 1932 under more favourable conditions yields were better. The hay crops seeded last year failed to make a satisfactory stand this spring and had to be either supplemented or substituted with other crops. Permanent brome and alfalfa at Piapot and alfalfa at Weyburn, however, gave average yields of about one ton. Oats on six stations gave an average of 0·83 of a ton of hay. Fall rye on four gave an average of 0·7 of a ton and spring rye gave one ton per acre on one station.

In 1933 yields were not quite so good. The regular hay crops, however, gave practically the same results. Fall rye was cut on six stations with an average yield of 0·44 of a ton. Oat hay was cut on seven and gave an average yield of 0·70 of a ton and spring rye on three stations also gave 0·70 of a ton per acre.

In the Park Belt region the regular hay crops have given better results. In 1931 the rainfall was light in this territory and yields of hay were less than usual, ranging from 0·37 to 1 ton per acre. Following the dry season of 1931 the stand on the newly seeded fields was thin in 1932 and some reseeding with oats had to be done. However, yields of the mixed crop were fairly good, ranging from 1 to 1½ tons per acre. In 1933 there was a good stand of hay with yields from ½ to 2 tons per acre.

REPORT OF THE ILLUSTRATION STATIONS IN NORTHERN SASKATCHEWAN AND NORTHEASTERN ALBERTA

N. F. Bell, B.S.A., Supervisor

In the Northeastern Alberta and Northern Saskatchewan district of supervision, directed from the Experimental Station, Scott, Sask., there are eighteen Illustration Stations now in operation, each designed to serve its own district, and distributed over a territory 700 miles from east to west and 250 miles from north to south and serving parts of the semi-arid plain, the park belt and wooded areas further north. These stations necessarily carry a wide range of projects. Some projects are common to all stations, others are designed to meet special local problems. The following projects are discussed in this report: crop rotations, cereal varietal tests, soil drifting, phosphate fertilizers, forage crops, distribution of seed grain, weed control, horticulture, poultry, live stock and field days.

The locations of the stations and names of the operators are as follows:—

Station	Operators
Castor, Alta.	C. F. Pals
Chauvin, Alta.	E. A. Pitman
Consort, Alta.	C. A. Fawcett & Sons
Glenbush, Sask.	J. C. Grant
Guernsey, Sask.	C. H. Snider
Hafford, Sask.	Henry Hudek
Kindersley, Sask.	Robt. Simpson
Lens, Sask.	H. J. Larcombe
Lloydminster, Sask.	Hugh Hill
Loverna, Sask.	Robt. Brumwell
Meadow Lake, Sask.	Martin Gran
Meanook, Alta.	Fred MacIntyre
Meota, Sask.	John Tait
Paddockwood, Sask.	G. L. Endicott
Spruce Lake, Sask.	Harry Eagle
St. Paul, Alta.	Hector Therrien
Tisdale, Sask.	H. A. Last
Wainwright, Alta.	G. C. Boyd

In this report reference will be made from time to time to the work being conducted at the above named points. When this is done, it will refer to that being conducted co-operatively by the Division of Illustration Stations with the parties whose names are as listed for the district concerned.

PRECIPITATION AND THE GROWTH OF CROPS

The crop season of 1933 opened about a week later than the average date for the past seven years. At Kindersley, seeding operations began on April 23, while at St. Paul, seeding did not commence until a month later. The average date of commencing seeding was May 11.

PRECIPITATION RECORDS AT ILLUSTRATION STATIONS IN NORTHWESTERN SASKATCHEWAN AND NORTHEASTERN ALBERTA FOR THE CROP YEAR AUGUST 1, 1932, TO JULY 31, 1933

Stations	Province	Fall	Winter	Summer, 1933				Total for summer months	Total for crop year, Aug. 1, 1932 to July 31, 1933
		Aug. 1, to Oct. 31, 1932	Nov. 1, 1932 to Mar. 31 1933	April	May	June	July		
		in.	in.	in.	in.	in.	in.	in.	in.
Castor	Alta.	.....	.....	0·81	2·73	1·97	1·36	6·87	.....
Chauvin	"	2·33	1·80	0·90	2·18	2·33	1·16	6·57	10·70
Consort	"	3·42	1·58	0·70	1·66	1·86	0·66	4·88	9·88
Glenbush	Sask.	3·92	1·55	0·45	1·87	1·59	1·95	5·86	11·33
Guernsey	"	.....	.....	0·57	2·20	2·52	2·63	7·92	.....
Hafford	"	2·98	3·50	0·88	1·57	1·49	1·10	5·04	11·52
Kindersley	"	2·13	0·85	0·55	1·69	1·09	0·71	4·04	7·00
Lens	"	4·60	2·90	0·00	3·00	2·75	1·55	7·30	14·80
Lloydminster	"	1·55	4·60	1·12	1·91	3·04	1·54	7·61	13·76
Loverna	"	4·33	0·75	1·34	1·62	1·19	0·70	4·85	9·93
Meadow Lake	"	3·59	3·73	0·20	3·70	3·38	2·62	9·90	17·22
Meanook	Alta.	4·22	2·24	0·95	0·77	3·70	2·62	8·04	14·50
Meota	Sask.	2·48	3·65	1·20	1·89	1·77	1·56	6·42	12·55
Paddockwood	"	3·65	3·47	0·35	2·48	1·71	1·56	6·10	13·22
Spruce Lake	"	2·51	3·00	0·39	1·94	2·88	1·46	6·67	12·18
St. Paul	Alta.	1·72	2·59	0·80	2·71	2·73	2·99	9·23	13·54
Tisdale	Sask.	7·37	2·44	0·00	2·60	2·06	2·17	6·83	16·64
Wainwright	Alta.	1·91	2·35	0·80	5·16	1·71	1·22	8·89	13·15

Reference to the precipitation table indicates a fair supply of moisture at all stations early in the season, with drought conditions following during July, which wrought serious damage to crops in the south and central parts of this area.

Drought, together with grasshoppers and wheat stem sawfly brought almost a total crop failure at Loverna and greatly reduced yields at Kindersley and Consort. Yields at some of the more northerly stations ranging as high as 45 bushels of wheat per acre indicate a more favourable season in the north.

In comparison with the precipitation listed above for the crop year 1933, that obtained at the different stations for the average of the two crop years, 1931 and 1932, was as follows: Glenbush, 15·53 inches; Guernsey, 14·57 inches; Kindersley, 11·33 inches; Lloydminster, 14·56 inches; Loverna, 10·91 inches; Meadow Lake, 20·24 inches; Meanook, 16·34 inches; Meota, 16·19 inches; Spruce Lake, 13·89 inches; St. Paul, 16·48 inches; Tisdale, 15·12 inches; and Wainwright, 16·16 inches.

CROP ROTATIONS AND THEIR ADAPTATION

To meet existing problems and to study the local, general and special needs of the districts in Northern Alberta and Northern Saskatchewan, as previously referred to, twenty-one types of crop rotations and modifications of rotations and cropping systems varying in length from one to six years are under trial. The three-year rotation of fallow, wheat, wheat is used as a check with which to compare the others.

Two-year Rotation.—The two-year rotation of fallow and wheat has been used at Kindersley on heavy brown, loose top soil, for the past nine years. It has given slightly better returns than the three-year rotation of fallow, wheat and wheat, but has fallen below the returns of the six-year rotation fallow, wheat, oats, sweet clover hay, wheat and western rye or sweet clover hay. Alternate wheat and summer-fallow has certain advantages which makes it popular in some districts where land is not priced too high, soil drifting not a serious prob-

lem, diseases such as root-rot are not prevalent and where moisture is a limiting factor. Furthermore, a reasonably good crop can be expected by this system even in the drier years. Weeds have been well controlled by this method but it is not complete and cannot be recommended as an exclusive farm rotation even in the drier area because of feed requirements where animals are maintained.

COMPARISON OF THREE ROTATIONS AT THE KINDERSLEY STATION

(For Six Years, 1928–1933)

Rotations	Yield per acre	Cost per acre	Profit or (−) loss per acre
	tons or bushels	$	$
Two-year rotation—			
Fallow	.....	5 85	.....
Wheat	23·8	14 53	0 56
Average	.....	7 27	0 28
Three-year rotation—			
Fallow	.....	5 82	
Wheat	23·7	13 37	2 47
Wheat	11·7	9 80	−3 77
Average	.....	7 72	−0 43
Six-year rotation—			
Fallow	.....	6 60	.....
Wheat	25·8	13 73	3 95
Oats	39·7	11 10	0 17
Sweet clover	1·13	7 67	1 16
Wheat	12·4	9 51	−0 60
Mixed hay	1·14	8 10	1 18
Average	.....	.....	0 97

At Wainwright, Alberta, a two-year rotation has been used for nine years and has shown a profit of $7.44 per acre. In this rotation sunflowers replace fallow and have always produced a profitable crop even in the driest years. Wheat following sunflowers has yielded 24·2 bushels in comparison with 25·6 bushels of wheat after fallow. This rotation has been the most profitable one on this station, but its use is limited to the extent that sunflowers can be fed profitably on the farm because there is no cash market for this crop. It requires considerable labour to keep weeds under control, and with a heavy crop being harvested every year with nothing returned to the soil, there is also the matter of permanence to be considered.

THREE-YEAR ROTATION.—The three-year rotation, fallow, wheat and wheat has been used extensively throughout the prairies for many years, but its popularity is waning fast in the northern districts. It is used on the Illustration Stations as a check on other rotations and also for varietal tests. On new land in wheat growing districts it provides the farmer with a quick cash crop, but weeds soon become troublesome and certain diseases of wheat seem to increase with this cropping system. It provides neither hay or coarse grain. At Meadow Lake, wild oats have increased greatly in this rotation while they have practically disappeared from the five year rotation adjoining it, consisting of fallow, wheat, oats, barley and hay.

A three-year rotation of wheat, oats and hay has been tried out at Meota, Spruce Lake, Meanook and Lloydminster and promises well for the northern district where moisture supply is fairly dependable. The yield of wheat has been lower by 1·1 bushels, than wheat after fallow. Oats have given a satisfactory crop, while a profitable sweet clover crop has replaced bare fallow. The

success of this rotation depends very largely on the ability of the farmer to use the sweet clover hay profitably and it is important that the clover sod be ploughed as soon as possible after the crop is removed.

A COMPARISON OF THREE ROTATIONS AT SPRUCE LAKE FOR THE FOUR YEARS, 1930-1933

Rotations	Yield per acre	Cost per acre	Profit or loss per acre
	bush.	$	$
Three-year rotation—			
Fallow	.....	4 98	.....
Wheat (Reward)	33·1	11 08	2 75
Wheat	21·8	9 79	−0 36
Average for rotation	.....	6 96	0 80
Three-year rotation—			
Wheat (Reward)	30·5	8 64	4 33
Oats (Banner)	58·2	8 35	0 41
	tons		
Hay (S. clover)	1·69	8 09	3 77
Average for rotation	.....	8 36	2 87
Four-year rotation—			
Fallow	.....	5 27	.....
Wheat	37·2	11 41	3 65
Oats	64·6	10 82	−0 33
	tons		
Hay	1·50	7 30	2 76
Average for rotation	.....	7 44	1 52

FOUR-YEAR ROTATION.—Three, four-year rotations have been used on the Illustration Stations. 1. Fallow, wheat, wheat, oats. 2. Fallow, wheat, oats, hay. 3. Fallow, wheat, hay, oats. The first of these has been used extensively by farmers in the northern part of Alberta and Saskatchewan and given satisfaction. It has been used at the St. Paul station for five years and has shown an average profit for the rotation of $2.09 as compared with an average profit of $1.18 from the six-year rotation of, fallow, wheat, wheat, oats, hay, hay, due chiefly to the fact that the hay crop failed in two seasons out of five. Fallow, wheat, oats and hay has shown good results where ever tried on the Illustration Stations. The actual cash profits were lower than in the three-year rotation of wheat, oats and hay, but where weeds had gained a fast hold, the four-year rotation with hay crop, followed by a long fallow (from July until a year from the following spring) has been effective.

The cropping order of the last two years of this rotation has been reversed at Chauvin, Castor, Wainwright and Guernsey, at the first three stations mentioned in order to give the small grass and clover seed the benefit of the firmer seed-bed, and higher moisture line after fallow thus assuring a better catch of grass; and at Guernsey where perennial sowthistle seed is scattered every year in order to control that weed.

FIVE-YEAR ROTATION.—Five-year rotations are used at Meadow Lake, Lloydminster and Meanook. The Meadow Lake station used fallow, wheat, oats, barley and hay, which had given excellent results in controlling weeds, providing cash crops of wheat and oats, barley and hay, which can be sold for cash or used as feed. Wheat after fallow in this rotation has averaged 38·5 bushels for the past five years as compared with 34·0 bushels for wheat after fallow in the three year rotation of fallow, wheat and wheat at the same station for the same period.

COMPARISON OF ROTATIONS AT MEADOW LAKE FOR 5 YEARS, 1929–1930

Rotations	Yield per acre	Cost per acre	Profit or loss per acre
	tons or bush.	$	$
Three-year rotation—			
Fallow		5 05	
Wheat, Reward	34·0	12 10	7 23
Wheat, Reward	27·9	10 66	4 38
Average		7 58	3 87
Five-year rotation—			
Fallow		5 35	
Wheat, Reward	38·5	12 19	8 25
Oats, Banner	79·2	12 38	7 34
Barley, Trebi	57·6	11 06	1 57
Hay, sweet clover, western rye	1·75	6 80	6 50
Average		8 49	4 73

At Lloydminster and Meanook the rotation used is fallow, wheat, oats, hay and hay. This rotation has rather more land development to hay than is required on many farms. On the other hand, two crops have been grown from one seeding and over a period of years the second crop of hay has shown the best returns in the northern districts.

At Tisdale, Lens and Paddockwood a five-year rotation with a sixth field in alfalfa has given good results. In this rotation the crop order is fallow, wheat, hay, wheat, oats, then after five years the alfalfa field is broken up and included in the rotation and another field seeded to alfalfa. Unfortunately, there has not been a check rotation used at Tisdale with which to compare the results of this rotation and the other two stations have been in operation only two years so that figures cannot be given to show the results.

Six-year rotations are the longest used on the stations in this district. At Loverna (in the dry district) a six-year rotation is used as follows: Fallow, wheat, hay, corn, wheat and oats. During the past two years wheat after fallow averaged 10·8 bushels, wheat after corn, 11·8 bushels and wheat after fallow in the three-year rotation. Fallow, wheat, wheat, yielded 9·4 bushels and wheat on the wheat—fallow rotation yielded only 6·8 bushels. Corn has seldom shown a profit in itself, but the crop almost pays its way and the succeeding crop has returned a better average profit than has wheat after fallow.

A six-year rotation of fallow, wheat, wheat, oats, hay and hay is used on six Illustration Stations and considered as a whole, is quite a satisfactory rotation, particularly on the northern stations. The two years in hay followed by a long fallow make this rotation useful in controlling wild oats.

The results of these rotation studies would indicate that:—1. Short rotations and frequent fallows are generally more satisfactory in the drier districts. 2. The large percentage of near or total failures with grass and clover in drier districts makes the extensive use of these crops an unsafe practice in such districts. 3. In the park belt and wooded districts of the north, hay, clover and alfalfa are comparatively sure crops and can be used advantageously in rotations. 4. The proportion of land devoted to hay crops must be limited to the ability of the grower to dispose of the crop profitably whether as a cash crop or fed to live stock.

CEREAL VARIETAL TESTS

During the past five years, Marquis, Reward and Garnet wheat have been compared in forty-three tests. The following table shows the comparative yields and number of days required to mature the crop at the points shown:—

TABLE SHOWING YIELDS AND DAYS MATURING FOR MARQUIS, REWARD AND GARNET WHEAT ON THE ILLUSTRATION STATIONS LISTED FOR THE NUMBER OF YEARS STATED.

Stations	Number of years tested	Marquis				Reward				Garnet			
		Fallow		Stubble		Fallow		Stubble		Fallow		Stubble	
		bush.	days	bush.	days	bush.	days	bush.	days	bush.	days	bush.	days
Hafford	2	13·2	97	17·3	97	16·3	97	17·4	93	17·1	97	17·0	93
Lloydminister	4	27·0	122	.....	.....	26·1	115	.....	.....	30·1	115	.....	.....
Marcelin	3	29·0	115	21·3	108	22·2	104	21·3	103	24·2	104	21·5	102
Meadow Lake	5	38·1	117	31·8	114	34·0	111	26·2	108	36·8	111	28·7	108
Meanook	3	23·2	116	.....	.....	27·0	114	.....	.....	24·7	114	.....	.....
Meota	2	23·0	103	12·0	107	23·5	95	15·0	92	24·3	92	15·5	92
Paddockwood	2	25·5	103	19·3	92	20·8	103	20·4	91	26·5	103	26·8	92
Spruce Lake	5	30·1	118	.....	.....	29·4	115	.....	.....	30·8	114	.....	.....
St. Paul	3	31·7	115	.....	.....	29·9	111	.....	.....	31·7	112	.....	.....
Average	.....	28·41	114	22·86	106	26·89	109	21·46	101	28·82	110	23·33	101

The last five years have been exceptionally free from early fall frosts, with the result that the later maturing variety (Marquis) has ripened and produced a good quality of grain in most years. When the early frost did strike, Marquis wheat invariably suffered serious damage. At St. Paul, in 1933, Reward and Garnet graded No. 2, while Marquis was badly frosted and graded "Feed." In 1930, in several instances, Reward and Garnet were harvested before fall rains and snow damaged the crop and graded No. 1 and 2. Marquis, maturing later, suffered seriously, in some cases grading 4 and 5 tough.

The results of these tests indicate that in the more northern districts, Reward or Garnet is a better risk than Marquis. Of the two earlier varieties, Garnet has outyielded Reward by almost two bushels per acre. This has been offset to some extent by the fact that in about half of the test Reward sold at one grade higher than Garnet and only in one test was Garnet graded better than Reward. Garnet has shown a tendency to lodge on well prepared fallow in the north, while Reward stood up well. Loose smut has practically disappeared in Reward fields on these stations.

At Kindersley, Marquis and Reward have been compared side by side for the past five years, with the yields favouring Marquis by 7·5 bushels per acre. This indicates that Marquis is the better variety in districts where frost is not a serious factor.

SOIL DRIFTING

The soil drifting problem has been given special attention at Guernsey and Loverna for several years. At Guernsey, moisture conditions are usually favourable to the growing of hay crops and while the sandy nature of the soil tends to permit drifting, it has been found that with the continued and systematic use of sod-forming hay crops in rotations and the surface cultivation of the soil in such manner as to keep stubble and other trash on top of the soil, drifting can be kept at the minimum. The duck-foot cultivator and rod-weeder are much used implements on this station. Top dressing the fields with barnyard manure had been helpful for this purpose and on more than one occasion phosphate fertilizer promoted the growth of grain sufficiently to withhold drifting, while wheat on the unfertilized check field was seriously injured. At Loverna, the soil drifting problem is more serious and more difficult to control on account of the lighter precipitation and greater evaporation. The soil is somewhat heavier than at Guernsey. Grass or sod forming hay crops are very uncertain at this station. Three fields of 50 acres each have been devoted to a study

of this problem. The following methods are being compared in three year rotations of fallow, wheat, wheat: 1. The use of Gopher oats sown in triple rows 12 feet apart about July 1, in the fallow year and cut for hay before maturity. 2. The use of a light seeding of brome grass (2 pounds per acre) in the first wheat crop, subsequent cultivation to be regulated to control but not entirely destroy the brome grass. 3. The use of the one way disk to keep trash on top of the soil. This project was started in 1933.

PHOSPHATE FERTILIZERS

Tests comparing the yields and dates of maturity of wheat or oats treated with ammonium phosphate with wheat or oats untreated were again carried on at 14 Illustration Stations, with the results shown in the following table:—

RESULTS OF FERTILIZER TESTS ON ILLUSTRATION STATIONS IN NORTHERN SASKATCHEWAN AND NORTHERN ALBERTA FOR 1933

Station	Province	Variety	Machine	Rate of application ammonium phosphate	Fertilized		Check	
					Yield	Days	Yield	Days
					bush.		bush.	
Consort	Alta.	Marquis	Attachment	40	18·2	101	13·8	107
Chauvin	Alta.	Bannsr	"	.....	72·0	91	63·0	91
Glenbush	Sask.	Reward	"	40	25·5	100	18·3	100
Guernsey	Sask.	Marquis	"	40	20·0	113	20·0	113
Hafford	Sask.	Garnet	"	40	20·6	100	17·2	100
Lens	Sask.	Garnet	"	40	43·0	98	33·0	98
Loverna	Sask.	Marquis	Seed drill	40	1·3	.....	1·3	.....
Meadow Lake	Sask.	Reward	"	40	45·0	102	37·5	107
Meanook	Alta.	Reward	Attachment	40	20·0	112	20·0	112
Meota	Sask.	Reward	"	40	10·5	85	15·0	89
Paddockwood	Sask.	Reward	Seed drill	40	27·0	99	20·8	103
Spruce Lake	Sask.	Reward	Attachment	40	31·0	96	24·5	105
St. Paul	Alta.	Garnet	"	16	32·8	98	31·2	98
St. Paul	Alta.	Garnet	"	24	36·0	98	32·4	98
Wainwright	Alta.	Marquis	"	40	16·8	107	16·4	107

The abundance of soil moisture available in the early part of the growing season made it possible for fertilized fields to germinate quickly and to make a strong growth early. In May and June, practically every fertilized field appeared greener and healthier in a general way than the check, but when the drought came, as it did to the majority of these stations, the stronger growth seemed to have exhausted the reserve moisture from the soil and the crop suffered severely. In the drier districts the increases in yields are offset to some extent by the lower yields taken from fields treated with fertilizer in the previous year. This was not noticeable on stations where drought was not a serious factor. In the more northerly stations, ammonium phosphate appeared to hasten maturity by several days, which is an important factor where frost hazards are great.

The results of the 1932 and 1933 tests on these Illustration Stations clearly indicate the need of more experimental work with fertilizers in Northern Saskatchewan and Northern Alberta.

At Consort, wheat on land fertilized in 1932 yielded 7·5 bushels and matured 8 days earlier than the check which yielded 10·2 bushels. While the two fields at Glenbush were cut on the same day and would appear to have matured about the same date, from personal observation it was seen that the fertilized field matured about four days earlier. The fertilized field at Guernsey appeared to start earlier in the spring and for a short time it appeared to be considerably ahead of the check. When the field day was held on August 10, the fertilized

field gave indications of a heavier yield, but at threshing time no difference in yield was found. This result was not in keeping with that obtained on Mr. Snider's farm, nor on previous tests on the station. At Hafford, drought caused the crops to dry up rather than ripen so that the date of maturity shown simply means the date of cutting. On the Loverna station, crops dried up and the grasshoppers took what little there was left. Fertilizer again proved its value on the Meadow Lake station, not only in increasing yield, but in hastening maturity at this most northerly Illustration Station east of Athabasca. The fertilized field showed no indication of earlier maturity nor greater yields at any time during the summer on the Meanook station. The soil varied from peat to white or grey bush soil. Fertilized wheat on the Meota station started earlier and for a time promised a heavy crop, but when the dry weather came, it just dried up. In field 1, where fertilizer was used in 1932, the yield in 1933 was 12 bushels per acre, while in the check field it was 15 bushels per acre. At St. Paul, the station fields were fertilized at 16 and 24 pounds per acre. During the growing season, the fertilized fields appeared to be a few days earlier in maturity. The fertilized field at Wainwright suffered more severe frost damage than did any other field on the station for no apparent reason.

FORAGE CROPS

OATS.—Oats continue to rank first among forage crops in the districts served by the Illustration Stations discussed in this report. The low cost of seed and the fact that the crop can be handled without special machinery are much in its favour. It can be used as a cleaning crop by seeding late and cutting for green feed or it can be used as a reserve feed supply to be sold as a cash crop if not needed when the new crop is assured. This crop is used both as a cash crop and as a forage crop on all of these Illustration Stations.

SUNFLOWERS.—Sunflowers are used in a two-year rotation at Wainwright and have given very satisfactory results with a nine-year average dry weight yield of 4·5 tons per acre and costing $2.58 per ton. The succeeding wheat crop has yielded 1·5 bushels per acre below that on fallow in a nine-year period. This crop, however, has limited uses and its value depends largely upon the ability of the grower to feed it profitably. Corn has been grown on a number of stations in past years, but has been discontinued at the majority of them because of light yields and the large percentage of crop failures.

CORN.—At Loverna, corn has produced over four years, an average yield of 1·25 tons dry weight which almost pays its way and wheat after corn has yielded 12·7 bushels per acre as compared to 13·1 after fallow. The corn crop appears to have a limited field of usefulness in northern sections.

SWEET CLOVER AND WESTERN RYE GRASS.—Grasses and legumes have proven much more successful than either corn or sunflowers and play an important part in the majority of rotations used on these stations.

In the drier sections of the prairies, the hay crop has not been an outstanding success. Failure to obtain a satisfactory stand during the first year and extremely light yields in dry years have accounted for many failures. On the other hand, soil drifting has become so serious in some parts that any grass crop that will form a sod may be valuable even though the hay yield be less than enough to return a direct profit. At Kindersley, sweet clover and western rye have given a six-year average yield of 1·14 tons per acre, while alfalfa has averaged 0·65 of a ton per acre for eight years. At Loverna, the four-year average yield of mixed hay has been slightly under three-quarters of a ton.

In the park belt or wooded areas of the north, the hay crop has been much more dependable and profitable. At Meadow Lake, sweet clover and western

rye grass grown in a five-year rotation have given a 1·75 ton average for five years. Alfalfa has ranged from 1·00 to 3·00 tons of choice hay every year. The hay crop has never failed at this station.

In the past three years there were 113 fields of hay on these stations. Of these, 95 fields, or 84 per cent produced crops, 16 per cent failed. The average yield of the 95 fields was approximately 1·20 tons per acre. Seed production of the crops is discussed in section entitled "Distribution of Seed."

Sixty fields were seeded with a mixture of Grazier western rye grass and Arctic sweet clover and produced an average yield of 1·33 tons from 49 of them. The remaining 11 failed to produce a crop. Of 26 fields of sweet clover, 22 fields averaged 1·62 tons per acre, four failed, and 27 fields of alfalfa had three failures. The remaining 24 fields produced approximately 1·50 tons per acre.

The results of these tests indicate: (1) need of further experimental and demonstrational work with grasses and legumes, (2) need of more drought resistant grasses for the drier sections, (3) that sweet clover, western rye grass and alfalfa are among the most profitable and dependable crops grown in the more northern sections of the cultivated areas in these provinces, (4) that Grimm alfalfa can be grown at least as far north as township sixty in Saskatchewan and sixty-five in Northeastern Alberta.

For further study in this work, 54 fields and 224 small plots were seeded to grass and clovers in 1933. The latter included:—

Alfalfa	Clovers	Grasses
Grimm	Arctic Sweet	Brome
Sask. 40	Alta Swede red	Timothy
Ladak	White Dutch	Crested wheat
Cossack	Alsike	Grazier western rye
	Alpha No. 1	Red top
		Reed canary

DISTRIBUTION OF SEED

Since the Illustration Stations were first established the policy of growing only pure seed of the most suitable varieties has been followed. The produce of this pure seed has been sold by the operators to neighbours at the elevator price for the same grade or a small margin above it. In certain districts where stations have been in operation for a few years, elevator men claim that as much as 90 per cent of the grain they buy was from seed grown on the Illustration Stations. In 1933, more than 20,000 bushels of seed grain were sold by 17 operators, as compared with 12,000 bushels in 1932 and 4,930 bushels in 1931.

In addition to seed grain, 10,081 pounds of Grazier western rye grass seed, 100 pounds of brome, 2,230 pounds of sweet clover and 200 pounds of Grimm alfalfa seed was produced and sold by six operators. One of these operators, C. A. Fawcett & Sons, of Consort, Alberta, grew and exhibited the winning sample of sweet clover at the World's Grain Show in Regina in 1933, and Mr. Hill, the operator of the Lloydminster station, won 7th, 13th and 14th prizes in three classes of peas.

WEED CONTROL

The weed problem is a serious one to every farmer, whether his farm is infested with weeds or not. If weeds are not present the problem is to keep them out. If the land is already infested the problem is to get them out. In this respect the Illustration Station is no exception. The weed problem always is present.

On the majority of Illustration Stations prevention is the biggest problem. Wind, water, birds, live stock, threshing machines and even automobiles are known to carry weeds.

Where weeds have been introduced the methods used on the stations to control them have been: (1) use of clean seed grain or grass; (2) use of a rotation that will permit the proper kind of cultivation to control the kind of weeds present; (3) proper use of the right implement at the right time.

The result of the use of these means of control on the Illustration Stations indicate that perennial sowthistle, Canada thistle and wild oats can be effectively controlled while growing crops of grain or hay. Stinkweed and ball mustard seed will remain in the soil for years without germinating and a field may appear clean in one season and badly infested the next.

At Guernsey, perennial sowthistle, Canada thistle and wild oats growing on a sandy alkaline soil with strong tendencies to drift offered a real problem, but a four-year rotation of fallow, wheat, hay, oats, used for the past eight years has given good results in both cleaning the land and preventing drifting. It has also produced an average of 16·3 bushels of wheat, 1·52 tons of hay and 39·0 bushels of oats per acre for this period. Clean seed has always been used. Surface cultivation has been used almost entirely in the past three years.

In this rotation, it has been found that thistles almost disappeared in the second year, having either been killed or so badly weakened in the fallow that they did not cause trouble in the wheat crops. Wild oats have never been entirely controlled by fallow and usually appear in the next crop. In the hay crop, the third year of the rotation, sowthistle usually appears and a few wild oats grow but these are harvested with the hay before seed is formed.

The sod is cultivated in July and partially fallowed, the rod-weeder being used to keep sod and stubble on top. The succeeding oat crop has been comparatively clean. At Meadow Lake, wild oats have increased in a three-year rotation of fallow, wheat, wheat but have practically disappeared from the five-year rotation, fallow, wheat, oats, barley, hay, which adjoins it.

At Hafford, special work is underway with wild oats and darnel, but this work will require more time before the results will be known.

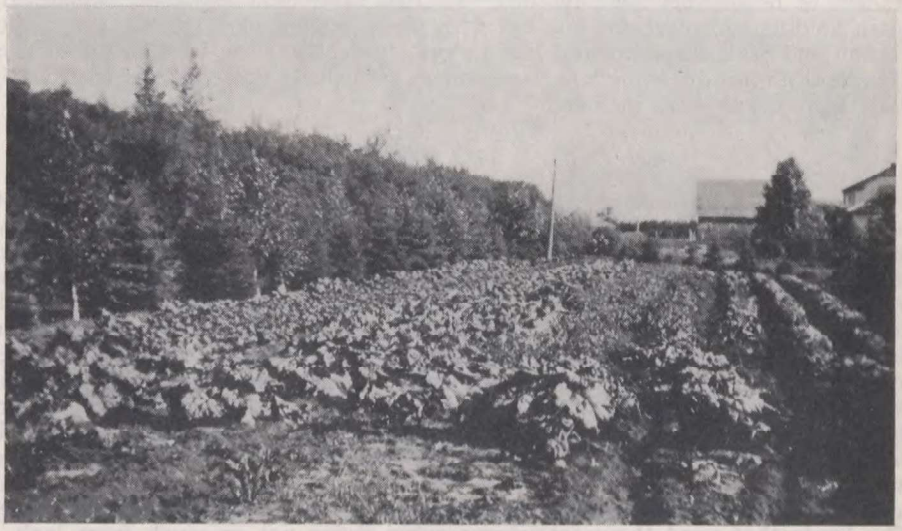
Alfalfa has made a poor stand against weeds until well established, but afterwards it has taken possession of the land, crowding weeds out.

HORTICULTURE

THE FARM GARDEN.—In addition to the station proper, the farm garden has become a definite project in the Illustration Station work. Every operator grows a good garden and the farm table obtains its ample supply of vegetables from it, even at Kindersley and Loverna in a season like 1933. The flower garden varies according to the tastes and ambitions of the operator or his family from a small bed to more elaborate grounds that rank among the show places of the province. At eleven stations, lawns have been prepared and seeded down with excellent results where moisture conditions are fair or good, but in the drier districts it is evident that a more drought resistant lawn grass than has been available is required to make an attractive lawn. In 1933, a total of about three acres of land was seeded to lawn grasses of various kinds for further study.

HOME ORCHARD TRIALS.—Apples, crabs and plums have not reached the stage where they can be regarded as a success from a dollar and cents point of view, but operators who have been experimenting with them are obtaining results that encourage further trials in hopes that in the not too far distant future the prairie farmer may grow his own plums, crabs and perhaps apples. The oldest plantation on these stations is at Meota where the operator cleared a piece of land in the centre of a bluff in 1923 and planted the following trees in 1924: six Transcendent crabs, six Herbernal, three Anis apple, six Opata plums, six

Compass cherries and six Manitoba plums. For several years the results were discouraging, for rabbits did severe damage every winter and what escaped the rabbits killed back to within a foot of the ground. In 1927, one Osman crab was added and in 1929 one Hibernal, two Dolga, one Patten Greening and one Duchess of Oldenburg. The Osman has never killed back and in 1932 it produced twenty-six pounds of good fruit and the Dolgas produced ten pounds of small red crabs of excellent flavour. The Dolgas have not killed back but sun scald rather badly. In 1931 and 1932 the plantation was enlarged and a large number of trees of various kinds were added to it. In 1932, 190 pounds of apples and 200 pounds of plums were picked (120 pounds of the latter were Opatas). In 1933, the yield per tree was lighter but the total yield was greater with a few more trees bearing fruit. Raspberries have also produced well at this station.



The farm garden on the Illustration Station at Guernsey, Saskatchewan, with crops planted in long rows to permit horse cultivation.

At Guernsey the shelter belt was planted and the fruit trees are younger and about 100 trees are just beginning to bear fruit.

The interest shown in this phase of the work has been keen, and to further test out hardy varieties, more than 300 plum and apple trees have been planted on seventeen stations since 1931. Shelter belts have been extended and land prepared to plant 1,000 more trees which are now ordered.

Tree Plantation.—Shelter belts have been planted on the majority of these stations, where native bush has not given sufficient protection and, with one exception, the remainder have prepared the land and ordered trees for 1934 planting. About 2,000 spruce have been planted to add performance to existing shelter belts.

From no other phase of the work has the influence of the Illustration Station reflected greater in the districts served than from that of the home grounds with its gardens of vegetables, flowers, shelter belts and fruit plantation.

POULTRY

Just as the Illustration Stations have become a source of supply for pure seed so are they becoming a source of supply for pure-bred poultry of improved type. In 1933, 2,600 eggs for hatching and 130 cockerels and pullets were sold from these flocks for breeding purposes. This represents an increase of 50 per cent in egg sales and 20 per cent in breeding stock over 1932. In order to keep up and improve their flocks, operators secured 525 three weeks old chicks, 25 pullets and 15 cockerels from the Experimental Station at Scott in 1933.

Eight poultry houses have been built or rebuilt and three moved to new sites and more favourable conditions. While there is still plenty of room for improvement, the work is progressing favourably. At Loverna, the operator has made turkey raising a profitable side line that has become a community enterprise. In 1932, a carload of dressed poultry, mostly turkeys, was pronounced by the graders to be of very high quality. In 1933, two carloads were shipped and again holding top place for quality, with birds descending from the Illustration Station and Scott Experimental Farm stock, in nearly every farm in the district. Mammoth bronze breeding was used almost exclusively until 1933 when Bourbon Reds and crosses were included.

LIVE STOCK

CATTLE.—The herds of cattle on the Illustration Stations range from one to two cows on the grain farms to herds of well over a hundred head further north, and in quality from the common grade to pure-bred herds which rank among the best in the two provinces. On the grain farms, where only one or two cows are kept, no attention has been given to milk records or the improvement of the cattle, but where cattle are an important branch of the farm business there has been a general improvement. The scrub bull has long since disappeared and only pure-bred bulls of the better types are being used on the grade herds, while the pure-bred herds have been improved by culling out inferior animals and by the addition of sires that in ordinary times would sell at prices beyond the range of practical farmers. In 1933, seven good pure bred bulls were purchased by these operators. Considering as a whole the greatest improvement has been made on the best herds and the weakest link in the cattle business is the feed. The herds that need the most improvement suffer not so much from lack of breeding as from lack of better care and feeding.

The pure bred herds include the following breeds: Shorthorns, Aberdeen-Angus, Holsteins, Ayrshires, and Red Polls. A herd of grade Shorthorns at Meota Illustration Station has averaged more than 6,500 pounds of 4·2 per cent milk per cow in the past year. There are usually 20 cows milking in this herd. The milk from five herds with a total of 70 cows is now being weighed and recorded. Four herds are tuberculin tested and are free from that disease.

SWINE

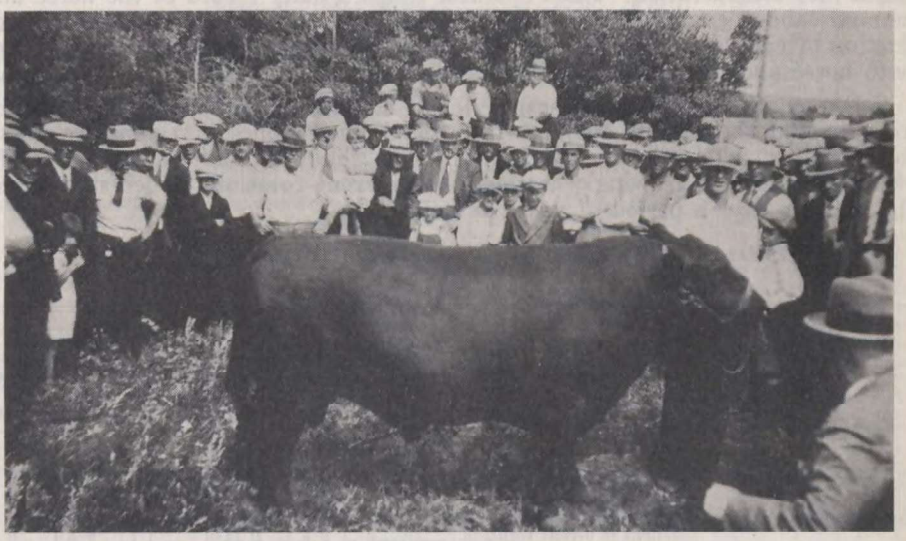
Operators of Illustration Stations anxious to contribute their share in supplying the British quota of Wiltshire sides are raising only pigs that will produce a large percentage of that grade. Sixteen females and eight male Yorkshires from the Dominion Experimental Station, Scott, and a number of other sources were purchased as a source of supply for breeding stock of the right type. These pigs are the progeny of advanced registry stock in most cases but the young stock is being sold at just about pork prices to farmers seeking better breeding stock. In 1933, fifty-seven young Yorkshires were sold to farmers.

Every operator who raises pigs for market now owns one or more pure-bred Yorkshire sows of the approved type.

FIELD DAYS

The Illustration Stations located from 80 to 250 miles distant from the nearest Experimental Farm serve as a connecting link between the farmer on the land and the Experimental Farm. It is only through well organized field days on the Illustration Stations that the best results can be obtained.

Since 1932, an Experimental Farm Exhibit has been taken to the Illustration Stations and set up in a large tent as a general attraction. In addition to the Illustration Station supervisor, whose duty it is to report on the work of the station, one member of the Experimental Farm Staff and a representative of the



Live stock demonstration—Blackcap Heatherbrook, herd sire on the Illustration Station at Chauvin, Alberta.

Provincial Department of Agriculture addressed the meetings on subjects in which they are specialists. With this type of program the average attendance increased from 60 in 1931 to 125 in 1932 and to 163 in 1933 when the same type of program but a new exhibit was used. The increased attendance tells only part of the story, for the most encouraging part is the changing attitude of the farmers towards the work and the increased interest shown.

The benefits derived through these field days are not all on one side by any means for at these meetings the farmer, the member of the Experimental Farm staff, the Illustration Station operator, the supervisor and representatives of the Provincial Department of Agriculture meet on common ground right out in the districts where problems are met and studied. It is there that the farmer can see what the station has to illustrate and where he can make known his needs.

The field day has had a very direct influence on the work on the station. The fact that from 100 to 300 of his neighbours are coming to inspect his station and discuss his work, stimulates action and interest even in the best of operators. The interest shown by these people encourages every one connected with the work to put just a little more into it. The sale of seed grain, poultry and breeding stock has increased in about the same ratio as the attendance at the field days.

In the Northern Saskatchewan and Northern Alberta district of Illustration Station supervision and development, a wide variation in soil types and seasonal conditions exists. By keeping in mind the fact that stations are located in the open plains, park belt and wooded country, the cause of the wide variation in crop yields and cost of growing wheat on the different stations will be better understood.

When compiling the costs as given in the undermentioned table, such factors as use of land, taxes, use of machinery, seed, twine, horse and manual labour, threshing, hauling and other activities, which vary with the task have been taken into consideration. Each operator keeps a daily record of the horse and manual labour employed also the incidental expenditure incurred in the production of each crop. Labour charges are calculated on the prevailing rate for both horse and manual labour in each district.

Due to the variation in seasonal and climatic conditions throughout the area covered, the stations coming within the different zones or regions are classified together in their respective zones. The following table summarizes the yields and cost of growing wheat on the different rotations under study, also the average over a period of years as indicated.

YIELDS OF WHEAT AND COST OF PRODUCTION IN DIFFERENT ROTATIONS

Stations and their regional location	Wheat after	1933		Number of years grown	Average	
		Yield per acre	Cost per bushel		Yield per acre	Cost per bushel
		bush.	$		bush.	$
Chauvin, Alta.	Fallow in 6-year rotation	19·0	0 51	1	19·0	0 51
	Fallow in 4-year rotation	19·0	0 51	1	19·0	0 51
Consort, Alta.	Fallow in 6-year rotation	14·3	0 62	1	14·3	0 62
	Wheat in 6-year rotation	9·5	0 74	1	9·5	0 74
	Fallow in 3-year rotation	13·9	0 64	2	20·0	0 48
	Wheat in 3-year rotation	10·2	0 70	2	17·8	0 48
	Fallow in fertilizer 3-year rotation	18·2	0 57	2	23·3	0 47
	Wheat in fertilizer 3-year rotation	7·5	0 93	2	17·3	0 50
Glenbush, Sask.	Fallow in 4-year rotation	22·0	0 38	4	38·7	0 29
	Fallow in 6-year rotation	23·7	0 36	4	38·6	0 29
	Wheat in 6-year rotation	17·3	0 42	4	25·6	0 35
	Fallow (fertilized plot	25·5	0 38	2	34·7	0 32
	Fallow (check, no fertilizer	18·3	0 44	2	25·8	0 36
Guernsey, Sask.	Fallow in 6-year rotation	18·8	0 49	2	24·8	0 42
	Wheat in 6-year rotation	18·3	0 44	2	22·3	0 37
	Fallow in 4-year rotation	20·0	0 51	8	16·3	0 78
	Fallow (fertilized plot	20·0	0 51	1	20·0	0 51
	Fallow (check, no fertilizer	20·0	0 45	1	20·0	0 45
Hafford, Sask.	Fallow in fertilizer 3-year rotation	20·3	0 51	2	21·4	0 44
	Wheat in fertilizer 3-year rotation	12·0	0 63	2	13·5	0 54
	Fallow in 3-year rotation	17·1	0 50	2	18·6	0 45
	Wheat in 3-year rotation	13·1	0 56	2	17·0	0 47
	Fallow in 6-year rotation	18·5	0 50	2	25·3	0 41
	Fallow in 4-year rotation	13·6	0 52	1	13·6	0 52
	Fallow (test plot)	9·0	1 00	5	25·8	0 52
	Fallow (test plot)	7·5	1 18	5	18·2	0 73
Kindersley, Sask.	Fallow in 6-year rotation	9·0	1 00	6	25·8	0 53
	Oats in 6-year rotation	1·75	3 87	6	13·1	0 61
	Hay in 6-year rotation	0·75	9 01	6	12·4	0 77
	Fallow in 3-year rotation	9·3	0 91	6	23·7	0 56
	Wheat in 3-year rotation	3·3	1 95	6	11·7	0 84
	Fallow in 2-year rotation	13·5	0 76	6	23·8	0 61
Lens, Sask.	Fallow, in fertilizer, 3-year rotation	43·0	0 29	1	43·0	0 29
	Wheat, in fertilizer, 3-year rotation	33·0	0 29	1	33·0	0 29
	Fallow in 3-year rotation	33·0	0 32	2	28·5	0 33
	Wheat in 3-year rotation	28·0	0 33	2	26·0	0 34
	Fallow in 6-year rotation	30·0	0 36	1	30·0	0 36
	Hay in 6-year rotation	28·0	0 25	1	28·0	0 25
Lloydminster, Sask.	Fallow, fertilizer	43·3	0 28	1	43·3	0 28
	Fallow, check	39·7	0 28	1	39·7	0 28

YIELDS OF WHEAT AND COST OF PRODUCTION IN DIFFERENT ROTATIONS—*Concluded*

Stations and their regional location	Wheat after	1933		Number of years grown	Average	
		Yield per acre	Cost per bushel		Yield per acre	Cost per bushel
		bush.	$		bush.	$
Loverna, Sask.	Fallow in 6-year rotation	2·8	2 25	4	13·1	0 66
	Corn in 6-year rotation	4·3	0 94	4	12·7	0 48
	Fallow in 3-year rotation	2·8	2 25	7	17·5	0 51
	Wheat in 3-year rotation	.....	.....	7	9·2	0 87
	Fallow in 2-year rotation	2·5	3 10	2	6·4	1 15
Meadow Lake, Sask.	Fallow in 3-year rotation	32·0	0 30	5	38·4	0 32
	Wheat in 3-year rotation	22·0	0 38	5	28·3	0 38
	Fallow in 5-year rotation	37·5	0 27	5	38·5	0 32
	Fallow (fertilized plot)	45·0	0 27	2	46·5	0 28
	Fallow (check, no fertilizer)	37·5	0 27	2	39·0	0 29
Meanook, Alta.	Hay, fallow, in 3-year rotation	20·0	0 41	3	27·5	0 31
	Fallow in 5-year rotation	9·0	1 02	2	19·5	0 51
	Fallow (fertilized plot)	20·0	0 47	2	23·2	0 38
	Fallow (check, no fertilizer)	20·0	0 41	2	23·7	0 32
Meota, Sask.	Fallow in fertilizer, 3-year rotation	10·5	1 07	2	19·5	0 61
	Wheat in fertilizer, 3-year rotation	12·0	0 73	2	19·5	0 52
	Fallow in 3-year rotation	13·5	0 73	2	23·5	0 46
	Wheat in 3-year rotation	15·0	0 57	2	23·5	0 44
	Hay, in 3-year rotation	17·0	0 43	2	25·2	0 31
	Fallow in 6-year rotation	14·5	0 66	1	14·5	0 66
	Wheat in 6-year rotation	15·3	0 57	1	15·3	0 57
Paddockwood, Sask.	Fallow in fertilizer, 3-year rotation	27·0	0 39	2	29·3	0 35
	Wheat in fertilizer, 3-year rotation	20·0	0 39	2	24·0	0 35
	Fallow in 3-year rotation	20·7	0 42	2	22·1	0 39
	Wheat in 3-year rotation	17·3	0 45	2	19·9	0 41
	Fallow in 6-year rotation	27·8	0 34	1	27·8	0 34
St. Paul, Alta.	Fallow in 6-year rotation	26·8	0 37	5	33·6	0 38
	Wheat in 6-year rotation	20·8	0 41	5	23·5	0 46
	Fallow in 4-year rotation	29·0	0 32	5	32·6	0 38
	Wheat in 4-year rotation	16·8	0 49	5	23·2	0 46
	Fallow in 3-year rotation	31·1	0 31	4	38·5	0 32
	Wheat in 3-year rotation	35·8	0 24	4	56·4	0 19
Spruce Lake, Sask.	Fallow in 4-year rotation	31·0	0 31	4	37·2	0 31
	Fallow in 3-year rotation	27·5	0 34	4	33·1	0 33
	Wheat in 3-year rotation	18·0	0 44	4	21·8	0 45
	Sweet clover in 3-year rotation	24·5	0 31	4	30·5	0 28
	Sweet clover in fertilizer, 3-year rotation	31·0	0 29	1	31·0	0 29
Wainwright, Alta.	Fallow in 3-year rotation	16·0	0 58	9	25·6	0 53
	Wheat in 3-year rotation	16·0	0 51	9	22·0	0 58
	Sunflowers in 2-year rotation	22·4	0 29	9	24·2	0 43
	Corn in 2-year rotation	22·4	0 29	2	22·4	0 33
	Fallow in 4-year rotation	16·4	0 56	1	16·4	0 56

The cost per ton or bushel varies inversely with the yield, which is influenced greatly by factors beyond the control of the farmer. The acre cost, however, has a narrower range, containing a number of more or less fixed charges and others that are, to some extent, influenced by the efficiency of the operator and the outfits used. In 1933, the cost of ploughing in 159 fields ranged from 60 cents to $1.71 with an average cost of 96 cents per acre. This difference was not all due to soil condition, because some of the heavier soils were ploughed at a relatively low cost, while some of the most expensive ploughing was done on lighter soils.

Three or four mediocre horses attached to a single bottom plough, turning one and a half to one and three-quarter acres per day, make ploughing expensive. On the other hand, six or eight fair-sized, well fed horses pulling a two or three bottom plough, turning six to eight acres per day help to lower the cost. Ploughing is the most expensive cultural operation and the costs reported from these Illustration Stations when carried through to the bushel measure ranges from 3 cents to 8½ cents per bushel for wheat, on the basis of a twenty bushel average; or from 4 to 11½ cents per bushel on the 15 bushel average stubble crop.

The average of all the wheat fields on each station has been taken to represent the yields, cost per acre, cost per bushel, for that station. The average yield shown is the lowest average since 1929 when the low average of 15·6 bushels per acre was obtained.

REPORT OF THE ILLUSTRATION STATIONS IN SOUTHERN ALBERTA

R. E. Everest, B.S.A., Supervisor

The issue of 1930 was the last report of this district that went to press and the present review will include the years 1931, 1932 and 1933.

Illustration Stations at fourteen points were supervised from the Experimental Station, Lethbridge, during the years 1931 and 1932. In 1933 work at Foremost was discontinued, leaving thirteen stations for supervision during the year. Twelve of these stations were under dry farming conditions and two were on irrigated land.

The following is a locality sequence list of the stations, together with the names of the fourteen operators. Commencing near the International Boundary, with locality Milk River, operator C. A. Dittbenner, the direction is north by east in this order: Foremost, T. M. Calhoun; Orion, George Wagar; Whitla, Wm. N. Babe; Bindloss, John Barnes; Jenner, Nels Klein; Cessford, G. E. Griffith; Sunnynook, R. Montgomery; thence to Youngstown, R. L. Coad. The direction from Youngstown is west by north to the near foothill country at Chedderville, A. May, in the Rocky Mountain House district. From Chedderville along the west of the province the course is south by High River, B. F. Kiser, to Pincher Creek, 1931-32, Sandgren and Carlson, and 1933, D. J. Cyr. The irrigated stations conclude the list, Glenwoodville, 1931-32, the late Glen Wood, and 1933, Wm. Dale Wood, still close to the foothill territory; and Kipp, C. M. Nicol, operator, in the open prairie country near the city of Lethbridge.

These fourteen station points lie within a square with sides about two hundred miles in length, extending from the International Boundary north and from the Saskatchewan boundary west. In 1932 the fourteen stations within this district of supervision comprised 671 acres in which were represented 155 fields. Field areas ranged from ten acres in permanent pasture to one-half acre blocks in grass and clover tests. One hundred and four of the fields were each five acres in extent. The area under contract was a little lower for 1931 and 1933 than it was for the year 1932.

REGIONAL PRECIPITATION AND GROWTH OF CROPS

Two tables of precipitation figures are given; the first records the precipitation of the crop year 1933, covering from August 1, 1932, to July 31, 1933, also a column giving the total for the calendar year 1933, and one column giving the average for the three calendar years, 1931 to 1933 inclusive. The second table carries the calendar year totals for nine years and an average of nine years covering the period 1925 to 1933 at the nine Illustration Stations for which the figures are available, and in each table records from the Experimental Station, Lethbridge, are included for purpose of information and comparison.

PRECIPITATION

Station	Fall	Winter	Summer, 1933				Total for crop year, Aug. 1, 1932 to July 31, 1933	Total for calendar year ending December	
	Aug. 1, to Oct. 31, 1932	Nov. 1, 1932 to Mar. 31, 1933	April	May	June	July		1933	1931-33
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Milk River	4·23	4·44	4·16	1·25	2·51	0·26	16·85	17·60	16·39
Foremost	7·49	4·17	2·00	2·94	5·24	Nil	21·84	20·73	18·53
Orion	7·25	3·00	2·16	3·55	4·96	0·25	21·17	16·13	15·14
Whitla	6·36	3·32	1·48	2·77	1·70	0·34	15·97	13·99	13·12
Bindloss	3·74	0·88	0·48	1·20	1·10	0·50	7·90	8·50	9·79
Jenner	6·27	1·33	0·80	1·68	2·12	0·33	12·53	11·04	11·54
Cessford	3·98	1·50	0·51	1·50	0·93	0·22	8·64	8·30	9·59
Sunnynook	3·21	1·55	1·00	1·38	0·25	0·40	7·79	6·99	8·26
Youngstown	4·12	1·56	0·58	2·62	1·58	0·56	11·02	12·77	11·10
Chedderville	7·71	6·10	1·30	5·63	4·98	1·97	27·69	26·12	25·45
High River	5·66	4·30	2·00	2·01	0·88	0·08	14·93	12·42	15·42
Pincher Creek	5·26	3·58	2·43	1·65	0·57	0·24	13·73	16·74	15·61
Glenwoodville	2·58	4·35	2·00	1·18	0·94	0·11	11·16	11·09	13·14
Kipp	5·54	6·50	1·67	1·52	1·26	1·08	17·57	18·14	16·43
Lethbridge	5·70	5·83	2·49	1·80	1·32	0·92	18·06	19·17	16·61

PRECIPITATION BY STATIONS DURING LAST NINE CALENDAR YEARS 1925-1933, INCLUSIVE

Year	Orion	Whitla	Bind-loss	Jenner	Youngs-town	High River	Pincher Creek	Glen-wood-ville	Kipp	Leth-bridge
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1925	14·45	15·93	13·18	13·49	13·58	15·49	22·15	16·50	19·48	18·76
1926	8·97	10·57	18·26	11·02	13·07	17·29	20·46	14·24	16·22	16·23
1927	22·33	26·28	19·84	22·64	21·07	22·39	33·60	30·74	22·37	23·85
1928	11·85	14·06	9·19	10·87	11·00	14·22	20·94	19·85	18·58	18·07
1929	12·38	11·55	6·25	8·37	8·42	13·65	20·05	18·10	18·40	19·71
1930	9·01	16·13	9·54	14·25	11·96	17·30	15·66	12·92	11·97	12·34
1931	10·64	8·01	6·69	7·65	6·84	10·34	12·86	11·34	11·26	11·42
1932	18·64	17·36	14·17	15·93	13·68	23·50	17·23	16·99	19·88	19·24
1933	16·13	13·99	8·50	11·04	12·77	12·42	16·74	11·09	18·14	19·17
Average	13·82	14·88	11·74	12·81	12·49	16·29	19·97	16·86	17·37	17·64

The autumn of 1930 was fair in the amount of moisture received. The winter of 1930-31 was low in precipitation, leaving the soil bare of snow and exposed to the sweep of wind. Moisture during the spring months of 1931 was scarce and the winter dried land surface was left an easy victim to the prevailing high winds that wrought havoc with the young grain crops over a large part of the province. Summer rains at all but two points were too light to bring grain crops along to a good yield. May precipitation did not reach two inches at any of the fourteen stations; June exceeded three inches at only two and July exceeded three inches at three station points.

Autumn weather, over the district covered by this report, was such that threshing and other outside operations could be comfortably attended to before winter set in. Apart from Chedderville, which is in the wooded area and fairly close to the mountains, the precipitation for 1931 was below the average.

The autumn of 1931 was near the mean in amount of moisture received. The winter of 1931-32 did not contribute a heavy snow fall. Spring rains of 1932 commenced generally on April 20, with all stations reporting more than one inch of rain and seven points over two inches of precipitation in April. The month

of May gave over two inches of rainfall at ten out of the fourteen stations, and June over two inches at eleven out of the fourteen points. At eight stations recorded for a period of eight years, 1925 to 1932 inclusive, the average of this eight-year period is exceeded by the totals of 1932. From the foregoing comparisons it appears to be a safe deduction that in precipitation over the portion of Alberta that this report covers, 1932 may be classified in moisture received as coming between the average and a wet season. The salutary influence of the rainfalls recorded is that they started in April and broke up the drought conditions of the previous two and, in some instances, four years, and thus favoured a satisfactory germination of spring sown crops and subdued an apparent tendency to soil drift.

Autumn weather over this district of supervision varied somewhat. In the east, threshing and other outside operations were finished without serious interference. South and west rains and snows halted threshing considerably. So pronounced was this interrupting weather that in some vicinities a noticeable acreage at the close of the year had stooks standing out awaiting conditions that would render threshing possible. The autumn of 1932 evidently varied somewhat in moisture received over different localities. The south and west parts of the district recorded considerable precipitation in rain and snow, while in the east to north area the moisture supply was not liberal. The snow fall for early months of 1933 was not heavy in any section. By February over Southern Alberta soil drifting was becoming serious. Across the south where the drift was becoming most marked the month of March came in kindly, and with frequent snow falls allayed the soil drift menace. Summer precipitation was a fickle thing. The Foremost-Orion line had been well served in the previous autumn and then throughout the early summer of 1933 became the wet belt of this district.

July ushered in a general dry period and only an almost complete absence of rainfall in this closing stage of growth prevented the Foremost line from harvesting a bumper crop. Over the greater part of this supervisory district drought prevailed through the entire season. North of the Red Deer river, citing the Cessford-Sunnynook-Youngstown area, where folk are very familiar with drought, the dry condition of 1933 had hardly been equalled in past years, and in the southwest the Pincher Creek area experienced a drought that was unprecedented in the memory of the settlement. Apart from the Foremost-Orion stretch of country, the district included in this report had a very disappointing crop season in 1933.

SOIL MOISTURE TESTS

In the month of November the operators of stations that lie in districts where lack of moisture is the factor that causes most anxiety obtained information on the condition of their fallow and stubble land in regard to moisture content. The method followed was to sink a hole in two places in fallow to the depth where soil would not hold together when squeezed in the hand and note the measurement. In stubble, four holes were sunk. The averages for these fallow and stubble moisture tests are given at each point for the years 1930 to 1933 inclusive.

SOIL TESTS MADE ON STATION FIELDS IN THE AUTUMN TO ASCERTAIN THE RESERVE OF MOISTURE FOR CROPS OF THE SUCCEEDING YEAR

Place	Kind of land	November 1930	November 1931	November 1932	November 1933
		ft. in.	ft. in.	ft. in.	ft. in.
Milk River	Fallow	5 0*	*6 0	*5 0	*6 0
	Stubble	2 5	2 11	2 4	1. 10
Orion	Fallow	2 6	2 0	5 0	3 10
	Stubble	1 5	0 8	2 5	1 3
Whitla	Fallow	2 5	2 6	2 10	2 5
	Stubble	2 4	1 3	2 2	1 2
Bindloss	Fallow	3 4	2 0	3 1	1 0
	Stubble	1 7	0 2	1 0	0 10
Jenner	Fallow	2 2	2 4	2 8	2 6
	Stubble	1 7	0 6	1 8	0 4
Cessford	Fallow	3 8	1 3	3 3	3 1
	Stubble	2 5	0 6	1 6	0 9
Sunnynook	Fallow	2 10	0 11	2 1	1 9
	Stubble	2 2	Nil	0 6	1 6
Youngstown	Fallow	*5 0	1 3	3 0	1 3
	Stubble	1 9	Nil	2 3	0 8
Lethbridge	Fallow	6 0	2 10	*6 0	*6 0
	Stubble	1 6	0 3	1 6	2 0

* Indicates that dry soil was not reached at the figure given.

From the table, it may be seen that for the amount of moisture held in soil at the close of the year, or the moisture content that it was expected would carry over into the succeeding crop season, the autumns stand in the following order: for highest amount of moisture in soil, first 1930, second 1932, third 1933 and lowest 1931.

SEED SALES

Notwithstanding the financial stringency prevalent among the farming public, station operators sold considerable quantities of seed grain to their neighbours for the crop years 1932 and 1933. The year 1931, which is included in the figures that are given, was the lowest in volume sold of the three years named. Purchasers in this three-year period 1931-33 numbered 139. The amounts of seed sold as follows: wheat, 4,021 bushels; winter rye, 185 bushels; barley, 264 bushels; oats, 3,392 bushels; field peas, 300 pounds; timothy seed, 10,000 pounds; white blossom sweet clover seed, 200 pounds; and of potatoes, 3,540 pounds. The 10,000 pounds of timothy seed at Pincher Creek was reported for the year 1932 and no doubt was sold through the co-operative cleaning plant, and a good portion of this large amount may have left the immediate district.

MARQUIS WHEAT

The operators of stations are now recognized in their respective communities as being a reliable source of seed supply in close up to registered Marquis wheat. First generation registered Marquis wheat is sown on one five-acre field by each operator annually. The product from this field carefully kept and sown the following year furnishes a supply of a good standard of seed wheat for sale to others in the vicinity who desire to purchase. In some instances exchanges are effected by the neighbour placing in grain elevator to the credit of the operator

the bushels agreed upon as payment for the seed wheat obtained. Resulting from the spread of seed by the Stations in these ways a noticeable steady improvement has taken place in quality and uniformity of the wheat grown in the neighbourhood of Illustration Stations.

FIELD MEETINGS

In 1932, field meetings were held in July and August at nine stations and in 1933 in July at four stations. Speakers for these gatherings were drawn from the staffs at the Experimental Stations at Lethbridge and Lacombe, the Seed Branch at Calgary, the Entomological Laboratory at Lethbridge, a fertilizer authority of the Consolidated Smelter Products and a soils professor from the University of Alberta, Edmonton. Attendance from the neighbourhood in which meetings were held varied from twenty-five to two hundred people. Operators of the stations concerned and editors of local newspapers in their respective capacities contributed to the success of these informative undertakings.

CROP SEQUENCE AND ROTATION STUDIES

Rotations generally used in the open plains region are, fallow, wheat and wheat, or fallow, wheat. The frequency of the fallow whether every other year or once in three years is governed to quite an extent by the precipitation average for the district. In a run of years when precipitation is light the trend is towards the fallow and grain crop alternating, for in these years the second crop may not make a harvest or be so small that the return is not worth the effort while in years of freer precipitation the second crop may give a good account of itself.

Results at Jenner are taken as an illustration in the table below,

Year	Wheat, first crop after fallow	Wheat, second crop after fallow	Wheat alternating with fallow	Precipitation
	bush. per acre	bush. per acre	bush. per acre	in.
1931	13·00	7·00	12·50	7·65
1932	19·50	10·50	19·00	15·93
1933	7·25	2·75	8·00	11·04

In 1933, the second crop yield of 2·75 bushels would not justify the time and trouble given to seeding, harvesting and threshing an acre of crop. In 1932 with a 15·93 inch precipitation and a second crop yield of 10·50 bushels per acre the three-year rotation would be a favourable consideration. The balance, over the years, between these two and three-year crop sequences is rather fine and resolves itself largely into a matter of individual choice.

In the open plains region two other three-year rotations and two additional two-year rotations are in use, largely with the object of securing a supply of forage feed for live stock. The three-year rotations consist of fallow wheat seeded with sweet clover in the first and in the second instance wheat seeded with sweet clover and western rye grass, and the third year hay. When the small seeds in the third year fail to make a full stand they are supplemented by a seeding in of oats or when the small seeds fail entirely the field is ploughed and oats sown in for a sheaf feed, or threshed grain crop.

The two-year rotations include corn, first alternating with wheat and in the second rotation alternating with fallow.

Using Bindloss for an example, a comparison follows of wheat on fallow with wheat on corn ground recognizing the amount of corn fodder obtained for feeding purposes.

RESULTS AT BINDLOSS

Year	Wheat on fallow	Wheat on corn land	Corn alternating with wheat	Precipitation
	bush. per acre	bush. per acre	tons per acre	in.
1931	7·00	6·00	1·00	6·69
1932	10·40	8·00	5·00	14·17
1933	6·00	2·00	Only pasture	8·50

The corn and fallow alternating is followed at Jenner. The operator prizes corn fodder for winter feeding of live stock. In growing corn after wheat the operator avers that there is quite a bit of work required to keep the crop clear of weeds and that in a dry year he would get only a small return in tonnage; while to plant corn on fallow there is not a great deal of work involved to keep corn clean and there is the best possible chance of obtaining a fair to good supply of fodder per acre in return.

JENNER RECORDS

Year	Wheat on fallow	Corn on fallow	Precipitation
	bush. per acre	bush. per acre	in.
1931	13·00	4·00	7·65
1932	19·50	1·00	15·93
1933	7·25	1·10	11·04

During the past two years corn results at Jenner were considerably reduced by the inroads made by grasshoppers at the close of the season when oats and corn were the last remaining crops for attack.

The following four-year rotations were in use on a station near the foothills 1931-1932 with the object of weed control.

Four-year crop sequence of

1st year—Summer-fallow.
2nd year—Wheat.
3rd year—Oats, seeded with sweet clover; green feed.
4th year—Hay and plough soon after haying.

Four-year crop sequence of

1st year—Summer-fallow.
2nd year—Wheat, seeded with western rye grass and sweet clover.
3rd year—Hay and break.
4th year—Barley.

In 1933, on the change of station location at Pincher Creek, five- and six-year courses of field treatments were laid down as follows:—

Five-year crop sequence of

1st year—Summer-fallow.
2nd year—Barley, seeded alfalfa and timothy.
3rd year—Hay.
4th year—Hay.
5th year—Wheat.

Six-year crop sequence of
1st year—Summer-fallow.
2nd year—Wheat, seeded with alfalfa and western rye grass.
3rd year—Hay.
4th year—Hay.
5th year—Wheat.
6th year—Oats.

The above four rotations have not in any case completed a cycle to give records from which conclusions may be drawn.

Upon nine stations an additional field is devoted to alfalfa in rows or broadcast as the precipitation for the district indicates.

IRRIGATED STATIONS

Ten-year crop sequence of
1st year—Alfalfa hay.
2nd year—Alfalfa hay.
3rd year—Alfalfa hay.
4th year—Alfalfa hay.
5th year—Alfalfa hay.
6th year—Alfalfa hay.
7th year—Wheat.
8th year—Corn.
9th year—Oats.
10th year—Barley seeded with alfalfa.

Eight-year crop sequence of
1st year—Alfalfa hay.
2nd year—Alfalfa hay.
3rd year—Alfalfa hay.
4th year—Alfalfa hay.
5th year—Wheat.
6th year—Sugar beets.
7th year—Sugar beets.
8th year—Barley seeded with alfalfa.

Upon the irrigated stations there is in addition to one of the above rotations a well fenced permanent pasture which is laid out with a border system of irrigation. The mixture used in seeding this pasture totals twenty-two pounds per acre, and is made up of Kentucky blue grass, six pounds; English blue grass, six pounds; western rye grass, four pounds; alfalfa, four pounds; and timothy seed, two pounds.

CEREAL CROPS

Over the Lethbridge Experimental Station district of supervision, wheat is the main cereal crop. Marquis is the variety of wheat used on the prairie stations and in general matures a grain of excellent quality. This wheat has inherent characteristics that make it attractive from a milling standpoint and its habit of growth in strength of straw, tenacity of kernel to stem, ability to yield and mature within the frost free season of the open plains region render it a good standard wheat for general use.

Marquis was the variety of wheat used for the tabulation that follows.

WHEAT YIELD AND COST OF PRODUCTION BY STATION FOR 1933 AND THE AVERAGE FOR 1931-33

Location of station and region	Wheat after	Yield per acre		Cost per bushel 1933	Cost per acre		Profit or (−) loss per acre 3-year average
		1933	3-year average		1933	3-year average	
		bush.	bush.	$	$	$	$
Open Plains Region—							
Milk River	Wheat in 3-year rotation	3·50	9·75	2 29	8 00	8 97	−5 30
	Fallow in 3-year rotation	5·50	11·17	1 73	9 53	10 40	−5 99
	Fallow in 3-year sweet clover rotation	8·17	12·81	1 16	9 49	10 28	−5 17
	Corn in 2-year rotation	8·55	12·45	0 64	5 49	6 35	−1 52
Orion	Wheat in 3-year rotation	16·00	13·17	0 37	5 97	6 70	−1 20
	Fallow in 3-year rotation	19·00	14·33	0 36	6 89	7 30	−1·27
	Fallow in 3-year sweet clover rotation	23·50	15·17	0 29	6 92	7 19	−0 73
	Corn in 2-year rotation	17·60	.....	0 28	4 90	.....	
Whitla	Wheat in 3-year rotation	11·60	11·97	0 59	6 79	7 74	−3 08
	Fallow in 3-year rotation	12·60	11·10	0 61	7 67	8 23	−3·86
	Fallow in 3-year sweet clover rotation	10·00	9·87	0·74	7 40	8 69	−4 67
	Fallow in 2-year rotation	13·80	.....	0·66	9 04	.....	
Bindloss	Wheat in 3-year rotation	Nil	6·73	.....	5 86	7 07	−4 70
	Fallow in 3-year rotation	6·00	7·80	1 23	7 40	7 82	−4 70
	Corn in 2-year rotation	2·00	5·33	2 24	4 47	4 88	−2 81
Jenner	Wheat in 3-year rotation	2·75	6·75	2 05	5 64	6 38	−3 77
	Fallow in 3-year rotation	7·25	13·25	0 90	6 51	7 51	−2 32
	Fallow in 3-year sweet clover rotation	6·00	12·25	1 05	6 31	7 14	−2 38
	Fallow in 2-year rotation	8·00	13·17	0 99	7 93	8 81	−3 63
Cessford	Wheat in 3-year rotation	Nil	5·20	.....	4 49	5 51	−3 85
	Fallow in 3-year rotation	Nil	4·37	.....	5 12	6 09	−4 65
	Fallow in 3-year sweet clover rotation	Nil	4·60	.....	5 02	5 78	−4 20
	Corn in 2-year rotation	Nil	3·33	.....	2 80	3 43	−2 36
Sunnynook	Wheat in 3-year rotation	Nil	4·33	.....	4 05	5 39	−4 00
	Fallow in 3-year rotation	Nil	5·00	.....	5 30	5 63	−4 03
	Fallow in 3-year sweet clover rotation	Nil	5·00	.....	5 38	5 90	−4 30
Youngstown	Wheat in 3-year rotation	Nil	5·00	.....	4·48	6 18	−4 41
	Fallow in 3-year rotation	5·50	9·00	1 18	6 49	7 62	−4 21
	Fallow in 3-year sweet clover rotation	3·00	7·00	2 11	6 33	7 13	−4 47
Foothill Region—							
High River	Wheat in 3-year rotation	4·50	17·50	2 26	10 15	12 17	−5 76
	Fallow in 3-year rotation	8·00	25·50	1 58	12 62	14 89	−5 07
	Fallow in 3-year sweet clover rotation	15·00	26·17	0 86	12 90	15 02	−4 75
Irrigated Stations—							
Glenwoodville	Alfalfa in 8-year rotation	24·00	30·95	0 66	15 78	15 82	−3 04
Kipp	Alfalfa in 10-year rotation	19·00	23·33	0 94	17 82	19 91	−10 56

Over the three-year period 1931 to 1933, the price level for wheat has been very low and only abnormally high yields could have shown a profit over production costs. Contrariwise, however, two years out of this three-year period were low in acre yields and the third was only moderate in amount of wheat harvested. The uninterrupted minus sign (—) in the profit or loss per acre average in the table above indicates the difficulty that the wheat grower has been experiencing.

WHEAT YIELD AND COST OF PRODUCTION ON FALLOW AND SECOND CROP LAND IN AN AVERAGE GOING BACK TO 1925 FOR 9 YEARS AND TO 1927 FOR 7 YEARS

Location of station	Sequence of crop	Number of years averaged	Yield per acre	Cost per acre	Profit or loss (−) per acre
			bush.	$	$
Open Plains Region—					
Orion	Wheat on fallow	9	19·40	9 88	7 23
	Wheat second crop	9	13·93	8 65	3 12
Whital	Wheat on fallow	9	17·64	11 24	4 89
	Wheat second crop	9	12·91	10 78	0 42
Bindloss	Wheat on fallow	9	16·52	10 79	5 81
	Wheat second crop	9	12·14	9 02	2 89
Jenner	Wheat on fallow	7	17·90	10 17	5 10
	Wheat second crop	7	11·50	8 73	1 56
Cessford	Wheat on fallow	7	15·50	9 51	5 35
	Wheat second crop	7	10·27	7 79	1 32
Youngstown	Wheat on fallow	9	12·72	10 21	1 98
	Wheat second crop	9	9·15	9 34	0 02
Foothill Region—					
High River	Wheat on fallow	9	33·17	18 57	9 84
	Wheat second crop	9	26·35	15 62	7 54

In the table above a longer view is taken of wheat growing and marketing. For seven station points where nine- or seven-year averages are available each point remains a plus in the profit or loss column. The size of this profit figure in each instance, however, is diminishing as the low prices for wheat continue. From these analyses it appears that wheat growers are employing the reserves of resources stored up in earlier years or else they are borrowing upon the future.

COMPARISON OF AVERAGE YIELD IN RELATION TO AVERAGE PRECIPITATION OVER A SHORT AND LONGER PERIOD OF YEARS

Location of station and region	Sequence of crop	Number of years averaged 1931 to 1933	Yield per acre	Rainfall per year	Number of years averaged 1925 to 1933	Yield per acre	Rainfall per year
			bush.	in.		bush.	in.
Open Plains Region—							
Orion	Wheat on fallow	3	14·33	15·14	9	19·40	13·82
	Wheat second crop	3	13·17	.....	9	13·93	.....
Whitla	Wheat on fallow	3	11·10	13·12	9	17·64	14·88
	Wheat second crop	3	11·97	.....	9	12·91	.....
Bindloss	Wheat on fallow	3	7·80	9·79	9	16·52	11·74
	Wheat second crop	3	6·73	.....	9	12·14	.....
					1927 to 1933		
Jenner	Wheat on fallow	3	13·25	11·54	7	17·90	12·96
	Wheat second crop	3	6·75	.....	7	11·50	.....
Cessford	Wheat on fallow	3	4·37	9·59	7	15·50	11·87
	Wheat second crop	3	5·20	.....	7	10·27	.....
					1925 to 1933		
Youngstown	Wheat on fallow	3	9·00	11·10	9	12·72	12·49
	Wheat second crop	3	5·00	.....	9	9·15	.....
Foothill Region—							
High River	Wheat on fallow	3	25·50	15·42	9	33·17	16·29
	Wheat second crop	3	17·50	.....	9	26·35	.....

In the foregoing comparison table there is a uniformity of relationship in six out of the seven points studied. The first station on the list (Orion) is the exception. For Orion the short period has the higher precipitation average and the lower yield per acre. This can be explained in part by the eccentric growing season of 1933. A frost on the 11th of June may have retarded somewhat the

development in wheat head. A greater check however to the 1933 wheat yield at Orion was a good moisture supply to the end of June, promoting a growth foundation for an abundant crop, then in July an absence of rainfall for the first fifteen days, a shower amounting to a quarter of an inch on the 16th day, and then no more moisture for the month. The fields of wheat looked like 35 bushels and on station fallow yielded 19 bushels per acre. Had the 1933 season carried through in a uniform manner for July at Orion, this point would be in line and not appear as an exception to the relationship indicated in the table between yield per acre and precipitation. Carrying the examination further, it may be seen that the top inches of precipitation of the longer period above the short exert a greater producing power than any of those inches that are within the level of the two figures. Plant sustenance, moisture and then a further amount is the condition that contributes to higher yields of wheat over the area of country represented by the points tabulated in the table that has been given above.

OATS AND BARLEY

These cereal crops are grown for feed purposes upon the foothill and irrigated stations. Oats are also grown at times as a substitute crop on the open prairie stations. When the field seeded to sweet clover fails to produce a stand oats is seeded in to augment what clover there is for hay, or if the clover is a complete failure the field is prepared as a seed-bed, oats sown and taken as green feed, or they may be threshed for grain. The varieties of oats used in this work are Banner and Victory and in barley, Trebi and O.A.C. No. 21.

GOPHER OATS AT CHEDDERVILLE

The introduction of Gopher oats in 1931 has proved acceptable to the operator and other farmers in the district. Maturing a few days earlier than Banner the Gopher oats has an advantage in earliness for a short season locality. This oat does not go heavy to straw, however the grain yield in proportion to straw is good.

In 1932 yields were, Banner 38·50 bushels and Gopher oats 47·50 bushels per acre. For the seed germination test Banner was rejected with 64 per cent while Gopher oats germinated 90 per cent and passed for seed purposes. In 1933 the germination test for Gopher oats from Chedderville went to 95 per cent.

From the six bushel seed lot of Gopher oats provided for the Chedderville Station in 1931 a considerable spread of the variety has taken place over the district.

HAY CROPS IN THE OPEN PLAIN REGION

Western rye grass broadcast or in every drill spout, and alfalfa in rows 36 inches apart have been seeded with regular persistence upon station fields since the inauguration of work in 1915.

Western rye grass sowings in the main and more particularly of late years have met with little success.

Alfalfa in rows is largely dependent upon catching a moist season the year that it is seeded in order that the seedlings may have a chance to establish themselves, then with cultivation and care a limited amount of choice feed may be obtained in favourable years.

In the 1930 Annual Report sweet clover results were summarized and conclusions drawn from the work that had commenced with this crop in 1921.

In this present report it is deemed desirable to extend this review forward to include the years 1931-32 and 33 for points where the seedings with sweet clover have continued.

SWEET CLOVER REVIEW

Since 1921 sweet clover has been seeded regularly upon the Illustration Stations. The plan followed in the main has been to sow with wheat on fallow. If a full stand came through the following year, the field was taken for hay. If a partial stand was the result a seeding in of oats would be made to supplement the clover crop. Should the stand of sweet clover be very meagre, the field is ploughed and sown to oats.

The table below summarizes the results obtained in the growing of sweet clover on Alberta Illustration Stations over a period of years.

RESULTS WITH SWEET CLOVER ON ALBERTA ILLUSTRATION STATIONS

Place	Number of years sown	Years failure	Years supplemented with oats	Years clover alone	Total yield	Average yield	Cost of seed per ton hay	Average yearly precipitation
					tons	tons	$	in.
Bindloss	1924-1932 9	4	2	3	4·48	0·50	2 42	1925-1933 10·62
Cessford	1926-1932 7	5	1	1	1·40	0·20	6 17	1927-1933 11·87
Delacour	1921-1926 6	2	1	3	4·05	0·67	1 75	1923-1926 20·45
Foremost	1921-1925 4	3	1	.....	0·40	0·10	11 33	1923-1926 11·83
Grassy Lake	1921-1928 7	3	1	3	5·60	0·80	1 64	1921-1927 13·90
High River	1921-1932 12	4	3	5	11·80	0·98	1 32	1923-1933 16·73
Jenner	1927-1932 6	4	1	1	1·62	0·27	4 59	1927-1933 12·96
Milk River	1921-1925 4	1	.....	3	3·40	0·85	1 46	1923-1926 14·90
Orion	1923-1932 10	3	6	1	4·59	0·46	2 67	1923-1933 13·36
Pincher Creek	1921-1929 8	.....	.....	8	11·60	1·45	0 83	1921-1929 21·37
Whitla	1922-1932 11	7	1	3	3·92	0·36	3 55	1923-1933 15·08
Youngstown	1922-1932 11	4	5	2	7·75	0·70	1 80	1923-1933 12·75

By the table above it may be seen that sweet clover does not give adequate returns in all districts. Where the average yearly precipitation does not exceed fifteen inches, sweet clover is a somewhat hazardous crop to depend upon for feed. When prolonged summer drought conjointly with intense heat prevails the sweet clover seedlings become brown, shrivel up and die before their root systems become established.

In the districts of Pincher Creek, High River and Milk River, sweet clover is recognized as a possible hay and pasture crop.

This biennial clover has been before the farming public for the past thirteen years and by actual trial is finding the areas where it may be sown to advantage.

FORAGE CROPS

At the two irrigated stations, alfalfa enters into the cropping plan in a major way. One-half of the number of fields on the Glenwoodville station are taken up with this hay crop and three-fifths of the fields at Kipp are growing alfalfa. On each of these farms the resulting alfalfa hay is easily utilized by feeding at home to live stock, and in this work alfalfa forms a large part of the feed supply required. Grimm is the variety of alfalfa seeded. For 1933, the yield of hay in two cuttings on certain fields went to 3·30 tons at Glenwoodville and to 3·50 tons per acre at Kipp.

FODDER CORN

This crop on six of the prairie stations has been seeded each year. The variety grown is Northwestern Dent and of this variety northern grown seed is planted. The crop is cut for harvesting, bound and stooked and later used as cured fodder. At the Milk River station from a portion of the corn field ears have been stripped and the grain obtained used in poultry feeding. The tonnage of corn crop obtained varies, but in every instance the forage produced is prized. The operator on the station at Jenner, in his desire to have corn as a forage crop, plants corn on fallow land each year. By this system hand work is kept low as the clean fallow requires little cultivation for weeds, and with the moisture reserve stored from the preceding year a good assurance is obtained for at least a fair crop of corn.

CHEMICAL FERTILIZER TRIALS

TESTS ON WHEAT, OATS AND BARLEY.—Fertilizer trials studying the effect of ammonium phosphate and triple superphosphate on wheat, oats and barley yields were conducted in 1933 upon the irrigated stations at Glenwoodville and Kipp and on a dry land station at Youngstown. In the tables that are given following the observations, A.P. is an abbreviation for ammonium phosphate and T.S. for triple superphosphate, and the figures given with each pair of letters are the pounds applied per acre. In each instance the fertilizer was put into the soil through a combine fertilizer drill. The yields given are all obtained from small sample areas. Grain samples were from twin rod-rows. Alfalfa samples were actual mower bar cut strips computed to an acre basis. The alfalfa samples were carried on through mechanical driers to determine the percentage of dry matter.

Kipp.—The triple superphosphate on alfalfa corrected to a considerable degree the trouble of low yielding alfalfa fields. Where farm yard manure was put on alfalfa as a top dressing in autumn of 1932 the increase in yield from use of triple superphosphate was greatly reduced in spread from where no manure had been applied.

The yields of alfalfa given are from the second cutting made on September 12. At time of first cutting, July 6, there was not a discernable difference in the treated and untreated portions of the field.

Ammonium phosphate on wheat, oats and barley promoted an earlier maturing of crop, wheat by five days, oats by seven days, but barley is not on a comparable basis owing to a rain intervening between times of sowing treated and untreated parts of the field. However, the half of the barley field that received ammonium phosphate was well ahead of the check half in ripening.

Glenwoodville.—Field "A" in wheat was top dressed with farm yard manure in the autumn of 1932 and ploughed out of alfalfa sod. The yield of wheat in 1933 from an application of fifty pounds per acre of ammonium phosphate was increased on an average by 6·2 bushels per acre. This increase is not so marked as the difference in barley yield on Field "D" of 26·3 bushels per acre favouring the treated half of field.

From these returns it is apparent that in the instances given, farm yard manure closed up considerably the spread in yield from the use of commercial fertilizer between treated and untreated portions of field.

Youngstown.—The season of 1933 was so droughty that second crop wheat did not reach a harvesting stage. Wheat on fallow was cut but moisture had not been adequate for normal growth. Grasshoppers were doing serious damage by July 15 and sawfly was working injury by July 29.

The soil at Youngstown went into 1933 in a comparatively dry state. The following is the precipitation by months to the end of July, 1933: January, 0·15; February, 0·30; March, 0·71; April, 0·58; May, 2·62; June, 1·58; July, 0·56; or a total for the seven months of 5·92 inches.

Neither triple superphosphate nor ammonium phosphate were of marked benefit in 1933 at Youngstown. The residual effect will be a point for observation in 1934 and succeeding years.

YIELDS OF WHEAT, OATS AND BARLEY IN FERTILIZER TEST AT THE ILLUSTRATION STATION AT KIPP, 1933

(A.P.=Ammonium phosphate)

Field	Crop	Treatment	Sample	Yield per acre	Average yield per acre	Height of straw	Average height of straw	Weight per measured bushel	Average weight per measured bushel
					bush.	ft. in.	ft. in.	lb.	lb.
C	Wheat	A.P. 50 lb.	1	25·21		2 8		63·0	
	"	"	2	30·77		2 9		63·0	
	"	"	3	45·37		2 9½		61·3	
	"	"	4	29·82		2 9		60·5	
					32·79		2 9		62·0
C	Wheat	Check	1	20·59		2 6		63·0	
	"	"	2	16·94		2 4		64·0	
	"	"	3	19·37		2 4		63·0	
	"	"	4	18·42		2 3		62·0	
					18·83		2 4½		63·0
E	Oats	A.P. 50 lb.	1	46·84		2 7		41·5	
	"	"	2	54·22		2 10		40·0	
	"	"	3	67·53		3 3		38·5	
	"	"	4	Discarded, grasshoppers.					
					56·20		2 10½		40·0
E	Oats	Check	1	33·06		2 5		39·5	
	"	"	2	37·06		2 6		41·0	
	"	"	3	37·19		2 7		41·0	
	"	"	4	37·43				38·0	
					36·18		2 6½		39·9
F	Barley	A.P. 50 lb.	1	34·78		2 0		49·0	
	"	"	2	30·19		2 0		47·5	
	"	"	3	27·94		1 8		52·0	
	"	"	4	26·39		1 10		43·5	
					29·82		1 10½		48·0
F	Barley	Check	1	22·31		1 7		49·5	
	"	"	2	15·55		1 8		47·0	
	"	"	3	16·58		1 5		50·0	
	"	"	4	18·04		1 7		52·0	
					18·12		1 6½		49·6

SECOND CUTTING ALFALFA YIELDS ON THE ILLUSTRATION STATION AT KIPP, SEPTEMBER 12, 1933

(T.S. = triple superphosphate)

Field	Crop	Treatment	Sample	Yield per acre green weight	*Yield per acre hay weight	Average green weight	Average hay weight	Per cent dry matter
				tons	tons	tons	tons	%
B	Alfalfa....	Top dressed with manure in fall of 1932 and T.S. 100 lb. in spring of 1933.....	1	3·76	1·10	.....	.....	26·56
	"	" "	2	5·73	1·62	.....	.....	25·78
	"	" "	3	6·34	1·70	.....	.....	24·41
	"	" "	4	5·04	1·54	.....	.....	27·73
						5·22	1·49	
B	Alfalfa....	Top dressed w th manure in fall of 1932—check.....	1	4·60	1·34	.....	.....	26·56
	"	" "	2	3·47	1·03	.....	.....	26·95
	"	" "	3	3·65	1·07	.....	.....	26·76
	"	" "	4	1·29	0·46	.....	.....	32·42
						3·25	0·97	
G	Alfalfa....	T.S. 100 lb. 1933.....	1	4·45	1·22	.....	.....	25·00
	"	"	2	4·31	1·26	.....	.....	26·56
	"	"	3	2·99	0·89	.....	.....	27·15
	"	"	4	4·90	1·39	.....	.....	25·78
						4·16	1·16	
G	Alfalfa....	Check.....	1	1·20	0·37	.....	.....	27·73
	"	"	2	1·26	0·41	.....	.....	29·88
	"	"	3	1·10	0·35	.....	.....	29·10
	"	"	4	1·24	0·39	.....	.....	28·32
						1·20	0·38	
H	Alfalfa....	T.S. 100 lb. 1933.....	1	3·99	1·11	.....	.....	25·39
	"	"	2	5·08	1·44	.....	.....	25·78
	"	"	3	5·03	1·35	.....	.....	24·41
	"	"	4	4·45	1·29	.....	.....	26·37
						4·64	1·30	
H	Alfalfa....	Check.....	1	1·54	0·48	.....	.....	28·52
	"	"	2	1·00	0·34	.....	.....	30·47
	"	"	3	1·00	0·32	.....	.....	29·49
	"	"	4	0·53	0·18	.....	.....	30·27
						1·02	0·32	

* The hay weight given is arrived at by adding ten per cent for moisture to the calculated weight of dry matter.

YIELD OF WHEAT AND BARLEY IN FERTILIZER TEST AT THE ILLUSTRATION STATION AT GLENWOODVILLE, 1933

(A.P. = ammonium phosphate)

Field	Crop	Treatment	Sample	Yield per acre	Average yield per acre	Weight per measured bushel	Average weight per measured bushel
				bush.	bush.	lb.	lb.
		Top dressed manure and ploughed out of alfalfa, autumn, 1932.					
A	Wheat.....	A.P. 50 lb. 1933.....	1	30·0			
	"	"	2	32·8			
	"	"	3	38·0			
	"	"	4	29·2			
					32·5		
A	Wheat.....	Check.....	1	26·8			
	"	"	2	29·0			
	"	"	3	24·0			
	"	"	4	25·3			
					26·3		
D	Barley.....	A.P. 50 lb. 1933.....	1	79·8	.....	52·0	
	"	"	2	78·9	.....	52·0	
	"	"	3	77·6	.....	51·0	
	"	"	4	69·5	.....	52·0	
					76·4	.....	51·8
D	Barley.....	Check.....	1	43·0	.....	52·0	
	"	"	2	45·6	.....	51·5	
	"	"	3	59·8	.....	51·5	
	"	"	4	52·1	.....	49·0	
					50·1	.....	51·0

YIELD OF WHEAT ON FALLOW IN FERTILIZER TEST AT THE ILLUSTRATION STATION AT YOUNGSTOWN, 1933

(T.S. = triple superphosphate. A.P. = ammonium phosphate)

Field	Crop	Treatment	Sample	Yield per acre	Average yield per acre	Height of straw	Average height of straw	Weight per measured bushel	Average weight per measured bushel
				bush.	bush.	ft. in.	ft. in.	lb.	lb.
O	Wheat....	T.S. 100 lb....	A_1	2·33	.....	1 2	.....	.....	
	"	" ...	B_1	4·67	.....	1 8	.....	.....	
	"	" ...	C_1	4·42	.....	1 7	.....	.....	
					3·81	.....	1 5⅔	.....	
O	Wheat....	Check.....	A_2	3·51	.....	1 6	.....	.....	
	"	"	B_2	4·78	.....	2 0	.....	.....	
	"	"	C_2	9·70	.....	1 10	.....	61·5	
					6·00	.....	1 9⅓	.....	
O	Wheat....	T.S. 70 lb.....	A_3	4·58	.....	1 4	.....	.....	
	"	" ...	B_3	7·70	.....	1 8	.....	.....	
	"	" ...	C_3	6·37	.....	1 10	.....	.....	
					6·22	.....	1 7⅓	.....	
O	Wheat....	Check.....	A_4	2·86	.....	1 3	.....	.....	
	"	"	B_4	9·30	.....	1 10	.....	60·0	
	"	"	C_4	9·94	.....	2 0	.....	58·0	
					7·53	.....	1 8⅓	.....	59·0
O	Wheat....	T.S. 20 lb.....	A_5	4·32	.....	1 8	.....	.....	
	"	" ...	B_5	11.06	.....	2 0	.....	61·0	
	"	" ...	C_5	9·76	.....	2 5	.....	57·0	
					8·36	.....	2 0½	.....	59·0
O	Wheat....	Check.....	A_6	13·00	.....	2 5	.....	61·0	
	"	"	B_6	15·75	.....	1 11	.....	56·0	
	"	"	C_6	7·80	.....	1 10	.....	.....	
					12·18	.....	2 0⅔	.....	58·5
P	Wheat....	A.P. 80 lb.....	A_1	18·30	.....	2 5	.....	60·0	
	"	" ...	B_1	17·44	.....	2 6	.....	60·0	
	"	" ...	C_1	7·54	.....	1 6	.....	.....	
					14·43	.....	2 1⅔	.....	60·0
P	Wheat....	Check.....	A_2	15·56	.....	2 5	.....	62·0	
	"	"	B_2	11·73	.....	2 2	.....	58·0	
	"	"	C_2	11·68	.....	1 9	.....	60·0	
					12·99	.....	2 1⅓	.....	60·0
P	Wheat....	A.P. 25 lb.....	A_3	15·31	.....	2 6	.....	62·5	
	"	" ...	B_3	9·29	.....	1 10	.....	60·0	
	"	"	C_3	6·62	.....	1 7	.....	.....	
					10·41	.....	1 11⅓	.....	
P	Wheat....	Check.....	A_4	13·20	.....	2 4	.....	63·0	
	"	"	B_4	5·83	.....	2 2	.....	.....	
	"	"	C_4	9·02	.....	1 11	.....	56·5	
					9·35	.....	2 1⅓	.....	59·7
P	Wheat....	A.P. 15 lb.....	A_5	12·70	.....	2 1	.....	63·0	
	"	" ...	B_5	8·83	.....	2 0	.....	60·0	
	"	" ...	C_5	8·10	.....	1 8	.....	.....	
					9·88	.....	1 11	.....	61·5

GREY WOODED SOILS REGION—THE CHEDDERVILLE STATION

In 1927, on request, a station was located in a wooded district that had a fertility problem. Moisture was ample, but crops would not grow. This condition at the time was regarded as somewhat limited and isolated. The area was called "Poverty hill" and locally it was said that no one could make a living there, and another name for the spot was "Starvation Ridge." We now have to

widen our view and take in large areas under the classification Grey Wooded Soil. The Soils Department of the University, Edmonton, which is pioneering in the soil survey work of Alberta, is finding that a considerable percentage of the province comes under this classification. Also, it is stated that much of the land that is receiving the settlement from extremely dry areas is grey wooded soil.

Since 1927 the work on the Chedderville farm has received the personal attention and direction of the Superintendent of the Experimental Station, Lethbridge. By trial through the range of cultural practice, including fallowing, with fertilizers from farmyard manure to chemical fertilizers, singly and in combinations, and with special land condiments of gypsum, lime and sulphur, the work has been carried forward and the fact has been ascertained that in this particular area soil is deficient in sulphur to such an extent that it restricts the growth of all legumes. In traversing the various treatments, soil correction has taken place from certain applications so that nurse crops and clovers have come on to luxuri-

A grey wooded soil at Chedderville, Alberta. Plot on the left illustrates the response from a necessary application of 50 pounds of sulphur per acre.

ant growth and residual effects have been favourable. The operator, who formerly found it difficult to grow crops to feed his live stock, is now carrying more animals each year and he is optimistic in regard to his farm and home outlook. The names " Poverty Hill " and " Starvation Ridge " are being pushed aside.

The work upon this farm has attracted more than local attention. Therefore it seems reasonable to conclude that the discovery of a sulphur deficiency upon the Chedderville Station can be regarded as a definite accomplishment and one that may have a distinct value to farming in other sections of the grey wooded soils region.

FARM HOME GARDENS

The past three years have been difficult years for the improvement of farm home surroundings in the open plains region. Added to drought has been pest damage, so that in some instances where garden produce got by the dry time it was finally doomed by grasshoppers that ate everything green that was above ground.

Shelter belts also suffered severely. By the close of 1933 many tree plantings were dead or at a low ebb in vitality from recurring drought years.

Where conditions have been favourable, farm vegetable gardens have strengthened their position in the economy of farm life. Gardens have increased in size and have been better prepared and better cared for than was the case in earlier years of work.

A windbreak, a double area for garden purposes, one-half for the current year's planting and one-half at rest in fallow to store moisture for alternating year of crop, is the plan followed in the Plains Region.

Lawns, shrubs and flowers, where at all possible, are improving features of Illustration Station home surroundings. As the years move by, community life and home appearance acquire a larger place in the attention of the resident farmer.

REPORT OF ILLUSTRATION STATIONS IN THE PEACE RIVER DISTRICT

By L. M. Godfrey, B.S.A.

Up to the end of 1933, five Illustration Stations were established in the Peace River region and supervised from the Dominion Experimental Sub-Station, Beaverlodge, Alta. Two of them are in what was formerly known as the Peace River Block of British Columbia, the other three in Alberta. The original station at Baldonnel, B.C. (Fort St. John district), operated by J. W. Abbott, was established in 1924. In 1930, two additional stations were started, the one at Dreau, Alta. (east of the Smoky River in what is better known as the Falher-Girouxville District), operated by A. B. Belanger; the other at Fairview, Alta., operated by Alex. McKenzie. Operations of a fourth station were established on the farm of Norman D. Dow, B.S.A., Pouce Coupe, B.C., in 1931. During the latter part of 1932, S. J. Fewang, an old-time settler whose farm adjoins the town of High Prairie, Alta., was chosen to be the operator of a fifth station. Operations on the High Prairie location commenced in the spring of 1933.

THE SEASONS

The winter of 1930-31 was open and exceptionally mild. Spring work on the land was early, commencing at Baldonnel on April 20. Seeding operations were under way at Fairview, April 25; at Pouce Coupe, April 27; at Baldonnel, April 28 and at Dreau, May 7. The growing season was average, although the Baldonnel district was favoured with an extra-heavy rainfall in May and June. Cutting commenced on August 12 at Fairview, August 20 at Dreau, August 24, at Pouce Coupe and August 28 at Baldonnel. There was no frost and grades were excellent.

The winter of 1931-32, on the other hand, was long and cold. The snowfall was heavy and there was an excess of soil moisture in the spring. Spring opened late. Seeding operations were not general until May 17 and at the end of the first week in May, the land in many localities still contained an excess of moisture. Cool weather until June brought slow growth. Thus when hot, drouthy weather became general in June, July and August, crops headed short. However, although on the whole the season was unpropitious, open harvest weather saw grain cutting and threshing operations through with little interruption. There was no injurious frost, but yields, of course were down.

The winter of 1932-33 was a repetition of the previous winter and spring was exceptionally late in 1933. Seeding commenced at High Prairie on May 10; at Dreau and Fairview, May 12; Pouce Coupe, May 17; and Baldonnel, May 19. The moisture supply was ample during the growing season and growth was excellent but the season was late and severe frosts at the end of August and early in September found their mark. Inclement harvest weather repeatedly interrupted and hindered harvesting and threshing operations. Cutting at Fairview, commenced on August 23; at Baldonnel and Dreau, August 25; at Pouce Coupe, August 26; and at High Prairie, August 30. Yields were fair, but grades were exceptionally poor on account of the frost.

RECORD OF PRECIPITATION

GROWING SEASONS, 1931, 1932, 1933 AND AVERAGE. IN EACH CASE THE FIGURE IS FOR THE TOTAL OF THE FOUR-MONTH PERIOD, MAY, JUNE, JULY AND AUGUST

Year	Baldonnel, B.C.	Dreau, Alta.	Fairview, Alta.	High Prairie, Alta.	Pouce Coupe, B.C.
	in.	in.	in.	in.	in.
1931	11·39	6·93	7·74	10·70	6·04
1932	3·73	6·85	6·94	7·61	3·79
1933	9·12	7·75	5·58	8·07	7·43
Three-year average	8·08	7·18	6·75	8·79	5·75

CROP ROTATION TRIALS (PEACE RIVER DISTRICT)

Rotation trials were first commenced in 1927 at the Baldonnel station, when five rotations designated, "A" "B" "C" "D" and "E" the crop sequences of which are listed in the following table, were established to determine the effect of

Crop sequence and rotation study fields on the Illustration Station at Fairview, Alberta.

seeding down to certain legume and grass mixtures on subsequent grain crops as compared with straight summer-fallow. Each of these rotations had by the end of 1932 made one rotation cycle. In 1933, they began their second cycle with a full season summer-fallow.

Owing to lack of effective inoculation in the initial stages the legumes had little influence upon the first hay yield and could have had little on the ensuing yields of grain. For all practical purposes the meadows in this first course of these rotations were simple grass meadows rather than mixtures. Distinct differences appeared in the 1932 crops following the two grasses respectively employed. In 1932, oats occurred on all five blocks. Plots "A" "B" "C" and "D" had all been broken out of sod in 1930 and given a part season fallow, while "E" had been given a bare summer-fallow in 1929 (one year in advance of the time it was due) and had since been cropped to wheat, oats, oats. Its third crop of oats was 22·8 bushels per acre as compared with 36·0 for the second grain crop after sweet clover and rye grass sod, 29·8 bushels for the second crop after western rye and alfalfa, 15·8 for the second crop after brome and alfalfa and 15·6 for the second grain crop following the brome plus sweet clover sod. Thus the third grain crop in "E" exceeded the second crop after the two brome sods by 7·1 bushels of grain or 45 per cent. The second grain crop after rye

grass sod, however, more than doubled the corresponding crop after brome and exceeded the third year grain yield of rotation "E" by 10·1 bushels or 44 per cent.

Difficulty has been encountered with volunteer brome grass on rotations "A" and "B." Before these two fields could be ploughed in 1933 a crop of brome hay of approximately a ton per acre was taken off. The brome sod was originally broken in 1930, but has persistently volunteered each year since.

Rotation series "A" to "E" are on trial at the Baldonnel station only.

SUMMARY OF YIELDS, ROTATIONS A, B, C, D AND E AT BALDONNEL

Rotation	Year	Crop	Yield per acre
			bush.
A—Grain after brome and sweet clover	1930	Hay	
	1931	Oats	56·3
	1932	Oats	15·6
B—Grain after brome and alfalfa	1930	Hay	
	1931	Oats	59·8
	1932	Oats	15·8
C—Grain after western rye grass and alfalfa	1930	Hay	
	1931	Oats	64·3
	1932	Oats	29·8
D—Grain after western rye grass and sweet clover	1930	Hay	
	1931	Oats	61·5
	1932	Oats	36·0
E—Grain after fallow (fallow in 1929)	1930	Wheat	35·6
	1931	Oats	49·3
	1932	Oats	22·8

In 1930, an amended series of rotations was worked out and is now on trial for the most part at all five of the Illustration Stations of this inspectorate. These rotations (F, J, H, I, G, K, L, and M) are designed to compare manuring with non-manuring; a wheat-fallow sequence with a wheat-fallow oats-fallow sequence; a seeding down rotation with a straight grain-fallow rotation and a grass-legume seeding mixture with a straight grass seeding; a non-nurse crop seeding of grasses and legumes with a nurse crop seeding of the same. Following is an outline of these rotations.

Rotation "F"—A three-year crop sequence of
1st year—Fallow.
2nd year—Wheat.
3rd year—Wheat.

Rotation "J"—A three-year crop sequence of
1st year—Manured fallow.
2nd year—Wheat.
3rd year—Wheat.

Rotation "H"—A six-year crop sequence of
1st year—Fallow.
2nd year—Wheat seed to western rye grass.
3rd year—Hay.
4th year—Hay (break in July).
5th year—Oats.
6th year—Oats.

Rotation "I"—A six-year crop sequence of
1st year—Fallow.
2nd year—Wheat seeded down to western rye-grass and sweet clover.
3rd year—Hay.
4th year—Hay (break in July).
5th year—Oats.
6th year—Oats.

Rotation "G"—A six-year crop sequence of
1st year—Fallow.
2nd year—Wheat.
3rd year—Wheat.
4th year—Fallow.
5th year—Oats.
6th year—Oats.

Rotation "K"—A six-year crop sequence of
1st year—Manured fallow.
2nd year—Wheat.
3rd year—Wheat.
4th year—Manured fallow.
5th year—Oats.
6th year—Oats.

Rotation "L"—An eight-year crop sequence of
1st year—Fallow.
2nd year—Wheat.
3rd year—Wheat.
4th year—Part-season fallow seeded in June to western rye and sweet clover. No nurse crop.
5th year—Hay.
6th year—Hay (break in July.)
7th year—Oats.
8th year—Oats.

Rotation "M" is the same as rotation "L" except that the summer-fallow is manured and the second year hay crop is winter manured. Rotation "M" is being illustrated only on the Baldonnel, Dreau and High Prairie stations. Rotation "L" is under way on all five stations.

Rotations "F" "J" "G" "H" and "I" have been established on all stations. Rotation "K" is only at Baldonnel and High Prairie.

In 1933, rotations "L" and "M" were summer-fallowed until late in June when they were seeded to western rye grass and sweet clover without a nurse crop. The grass and clover were sown at High Prairie on June 10; Dreau, June 20; Fairview, June 23; Baldonnel, July 3 and Pouce Coupe, July 14.

The western rye grass second year hay meadows of rotations "H" and "I" were broken in July or early August of 1933 after a crop of hay had been taken off first. The average hay yield from rotation "H" from Baldonnel, Dreau, Fairview and Pouce Coupe was 2,436·7 pounds per acre. The average for rotation "I" from the same stations was 2,423·7 pounds. Rotation "I" had sweet clover growing with the western rye grass in 1932. The breaking of the hay meadows in 1933 commenced on July 1 at Fairview; July 27 at Baldonnel; August 2 at Dreau, and August 9 at Pouce Coupe. As work was just established on the High Prairie location in 1933, an oat crop was grown in place of the second year crop of hay.

VARIETY TESTS WITH CEREALS

Spring Wheat.—In 1931 and 1932, three varieties of spring wheat, Reward, Garnet and Marquis, were compared at Baldonnel, Dreau and Fairview. In 1933, test plots for these three wheats were established on the stations at High Prairie and Pouce Coupe. Whenever possible composite samples of each variety were obtained and officially graded at Edmonton. The highest yields for the

three-year period 1931 to 1933 were produced at Dreau, where Marquis averaged 38·0 bushels per acre; Garnet, 36·9 bushels and Reward, 29·2. The grand average yields for the three years at Baldonnel, Dreau and Fairview were Marquis, 32·0 bushels per acre, Garnet, 30·2 and Reward, 27·2. In other words Garnet outyielded Reward by eleven per cent.

The grading results have unmistakably favoured the earlier maturing varieties, Reward and Garnet. Of these two, Reward has obtained a number one grade on six occasions while Garnet has never graded better than two Northern. Marquis on the average has graded decidedly below Reward and Garnet, mainly because of immaturity.

Oats.—For the past three years Banner and Victory oats have been compared at Baldonnel, Dreau and Fairview. In 1932 variety test plots of Banner and Victory were established at Pouce Coupe and in 1933 at High Prairie. The highest average yield for the three years was produced at Dreau, this being 80·3 bushels per acre for Banner. The lowest average yield was also produced at Dreau, being 53·8 bushels for Victory. The grand average yields for the three years, 1931 to 1933, at the three first named stations were, Banner, 71·0 bushels per acre and Victory 61·0, a difference of 10 bushels per acre in favour of Banner.

From this the impression would be gained that Banner has invariably outyielded Victory, and it has to a large extent at Baldonnel, Dreau and Fairview. However, on the Pouce Coupe station the reverse has been consistently found the case, both before variety test plots were established and after, with the result that the operator is an enthusiastic grower of Victory. Looking at his yields for 1932, this might seem a little surprising as Victory apparently yielded only 47 bushels per acre whereas Banner yielded 56·0 bushels. However, this is explained by the fact that a third of the Victory plot was completely destroyed on the south side by a severe attack of cutworms. An amended yield, therefore, taken as if from the remaining two-thirds of the original seeding, would run at approximately 70·5 bushels per acre, 13·5 bushels more than Banner.

Liberty (hulless) oats have been grown in variety test plots at Dreau and Fairview since 1931. The three-year grand average yield at these two stations was 42·7 bushels per acre.

Owing to what is believed to be a highway infestation of wild oats on the High Prairie station, the variety test oat plots were cut for green feed immediately the oats commenced to head. A second cutting was made later, followed by shallow cultivation.

Barley.—For the past two years O.A.C. No. 21 barley has been grown at the Pouce Coupe station. In 1933 it yielded fifty bushels per acre. The average yield, 1932 and 1933, was 42·7 bushels. Both years it graded 3 Extra C.W.

Winter Wheat.—For a number of years Turkey Red winter wheat has been grown on the Baldonnel station. Seeding is usually done August 10 and 15. In 1930, the seeding date date was August 11; in 1931, August 13; in 1932, August 15; and in 1933, August 12. The average yield for three years, 1931, 1932 and 1933, is 37·0 bushels per acre.

Turkey Red winter wheat has never failed to produce a paying yield at this station. It is generally from two to three weeks earlier than any of the spring wheats. In 1933, it was the only cereal that escaped the frosts at Baldonnel. The most objectionable feature is its tendency to lodge, particularly if the stand is heavy. The sample has always shown a percentage of starched kernels. In 1933, there were about 50 per cent. Some of the held over crop locally milled in 1933 gave excellent satisfaction to the miller and his customers. No seeding, at Baldonnel, has ever suffered from winter-killing by more than one or two per cent.

On August 23, 1933, a plot of Kharkov M.C. 22 winter wheat was seeded for the first time at Dreau. This seeding was rather late. However, a fair growth and rosetting appeared before winter set in.

VARIETY TEST CEREALS

(Yields per acre at Baldonnel, Dreau, Fairview and Pouce Coupe, 1931, 1932 and 1933)

Cereals and variety	Baldonnel, B.C.				Dreau, Alta.				Fairview, Alta.				Pouce Coupe, B.C.			Grand average Baldonnel Dreau and Fairview
	1931 bush.	1932 bush.	1933 bush.	Average bush.	1931 bush.	1932 bush.	1933 bush.	Average bush.	1931 bush.	1932 bush.	1933 bush.	Average bush.	1932 bush.	1933 bush.	Average bush.	bush.
Wheat—																
Reward	34·5	19·5	28·2	27·4	24·4	23·8	39·5	29·2	24·9	21·0	29·0	25·0	.....	34·5	.....	27·2
Garnet	36·3	21·4	28·6	28·8	26·3	38·4	46·1	36·9	26·4	22·0	26·0	24·8	.....	34·0	.....	30·2
Marquis	41·0	22·0	29·2	30·7	29·8	38·4	45·9	38·0	25·6	25·0	31·0	27·2	.....	34·5	.....	32·0
Oats—																
Banner	93·8	36·0	48·2	59·3	98·5	43·2	99·3	80·3	86·4	62·5	71·0	73·3	56·0	67·0	61·5	71·0
Victory	89·3	28·2	46·5	54·7	65·1	36·0	60·3	53·8	81·2	70·0	72·0	74·4	47·0	75·0	61·0	61·0
Liberty (hulless)	.....	.....	.....	.....	36·3	29·1	67·3	44·2	41·6	35·8	46·0	41·1	.....	.....	.....	Dreau and Fairview 42·7
Barley—																
O.A.C. No. 21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35·5	50·0	42·7	.....
Winter wheat—																
Turkey Red	46·2	29·2	35·7	37·0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

VARIETY TEST CEREALS

(Grading Results at Baldonnel, Dreau, Fairview and Pouce Coupe, 1931, 1932 and 1933)

Cereal and variety	Baldonnel, B.C.		Dreau, Alta.			Fairview, Alta.			Pouce Coupe, B.C.	
	1932	1933	1931	1932	1933	1931	1932	1933	1932	1933
Wheat—										
Reward	1° a/c immature	Feed Wheat	1 Hard	1 Hard Smutty	Poor 1° Trace Smut	1°	Poor 1°	3° a/c green		3° a/c frost and immature
Garnet	2°	Poor No. 6	2°	2° Smutty	3° a/c frost and green	2°	2°	3° a/c frost and green		Poor 3° a/c frost
Marquis	2° a/c starchy 38% star. kernels	Feed Wheat	Poor 3° 27% red	2° Smutty 51% red	Poor 3°	2°	2°	No. 5 a/c frost and green		No. 6 a/c frost and green
Oats—										
Banner	2 C.W. White	Ex. 1 Feed a/c frost	1 C.W. White	3 C.W. a/c mix.	2 C.W. White		2 C.W. White a/c stain and odd green	2 C.W. White	1 C.W. White	2 C.W. White
Victory	Sp. Feed a/c frost	No. I Feed a/c frost and green	1 C.W. White	No. I Feed a/c mix and green	Ex. I Feed a/c frost		3 C.W. oats a/c mixture and green	3 C.W. a/c green	1 C.W. White	2 C.W. White
Barley—										
O.A.C. No. 21									Ex. 3 C.W. 6-row	Ex. 3 C.W. 6-row
Winter wheat—										
Turkey Red	2 Alta. winter a/c starchiness im-mature	No. 3 red winter								

FORAGE CROPS

In the program of each of the stations, forage crops are playing an important part for seed, for hay and for soil improvement. Both legumes and grasses are grown.

ALFALFA.—On the whole, alfalfa has been a particularly successful and encouraging crop from the standpoint of both seed and hay production.

The Baldonnel operator has undoubtedly taken the lead in the production of alfalfa seed. His first seeding for this purpose was made in 1927 when 5½ acres of Grimm were seeded in 36-inch rows and produced creditable yields until 1933, when severe damage was wrought by early September frosts, and only 50 pounds of Number 3 seed were produced per acre. In 1932, this seeding had produced 242 pounds per acre of number one seed. A new seeding was made at Baldonnel in 1931, but the 1933 seed crop of this stand also was badly damaged by frost. Nineteen thirty-three was the first year in six years' trials at Baldonnel that a failure was reported on account of frost damage.

Row seeding is advantageous in the Peace River for seed production and most of the Illustration Station seed plots have been laid down in this way.

In 1932, alfalfa was grown for seed production for the first time on the Illustration areas at Dreau, Fairview and Pouce Coupe. The yield at Dreau after once cleaning was 365·0 pounds per acre. At Fairview rows yielded 267·5 pounds of cleaned seed per acre as compared with 100 pounds from a broadcast stand. The yield at Pouce Coupe was only 25 pounds per acre, but this was on account of a severe attack of cutworms which, after badly thinning the stand in the first place, practically stripped the plants in May and June of 1932.

Hay yields have been encouraging. At Baldonnel, a five and one-half acre field of Grimm alfalfa has given a two-year average, 1932 and 1933, for the first cutting of 2·87 tons per acre, for the second cutting 0·87 of a ton. In 1933, the first cut was taken July 7 and the second, August 15. A two-year average alfalfa hay yield at Dreau, 1932 and 1933, is 2·47 tons per acre. In 1933, the second year hay crop at Dreau yielded 2·97 tons per acre from the first cutting and 0·66 of a ton from the second, making a total of 3·63 tons per acre from the two. The first cutting was made July 15, the second, August 16. Ordinarily, two cuttings are not practised. Occasionally, the second can be taken without any great risk providing it is made before August 15, but generally the risk of winter injury is too great. The Beaverlodge Sub-station's experience is that stands best retain their vigour and resist weed encroachment if cut but once per annum.

At Pouce Coupe, in 1933, a half-acre strip of alfalfa which had been sown in 1931, as an erosion preventive, yielded 2·70 tons per acre.

SWEET CLOVER.—In 1932, sweet clover was grown in broadcast stands at Dreau, Fairview and Pouce Coupe, and cut for seed. It was cut at Fairview, September 5; Dreau, September 19; and Pouce Coupe, September 24. The clover was threshed on October 1 at Fairview; October 6 at Dreau; and October 8 at Pouce Coupe. The yields were very encouraging, being 850·0 pounds per acre at Fairview; 578·5 pounds per acre at Pouce Coupe; and 394·0 pounds at Dreau.

WESTERN RYE GRASS.—Of the grasses, only western rye grass so far has been grown for seed production. In two years' trials at the Pouce Coupe station it has been a successful seed crop. In 1932, it yielded 305 pounds per acre, was cut August 6 and threshed October 8. In the autumn of 1932, one-half of the plot was manured at the rate of approximately 10 tons per acre and the remaining half was left unmanured. The following year the manured half yielded 1,024 pounds of uncleaned seed per acre and the unmanured 823 pounds. The manured plot exceeded the unmanured in seed production by 201 pounds, or 24 per cent.

BROME GRASS.—A two-acre field of brome grass at Dreau, cut July 18, 1932, and July 22, 1933, averaged for the two years 0·89 of a ton per acre. A similar

two-year average for western rye grass at the same station shows 0·95 of a ton per acre.

NEW SEEDINGS.—In 1933, numerous new seedings were made. At Dreau and Fairview, sweet clover was sown at 14 pounds per acre, along with a nurse crop of Reward wheat. A demonstration plot of Crested wheat grass was sown at each of the stations, including High Prairie, at the rate of 14 pounds per acre.

At High Prairie, seven additional demonstration plots of an acre each were sown respectively, to alfalfa at 12 pounds per acre; alsike at 5 pounds; Alta-swede red clover at 10; sweet clover at 14; timothy at 5; western rye grass at 14, and a mixture of brome at 10; alfalfa at 7, and timothy at 2. These latter plots were all seeded without a nurse crop and on land which was part season summer-fallowed until July 1.

SEED SALES BY OPERATORS

During 1933, the Baldonnel operator sold 260 bushels of Reward wheat seed, 54 bushels of Marquis, 412 bushels of Banner oats, 248 bushels of Victory, 12 bushels of Chancellor peas and 912 pounds of Grimm alfalfa seed. The Dreau operator sold 30 bushels of Reward wheat seed, 30 pounds of Grimm alfalfa seed and 160 pounds of Arctic sweet clover. The operator at Fairview reports the selling of 200 bushels of Reward wheat, 1,800 bushels of Banner oats for seed, 600 pounds of Grimm alfalfa and 1,400 pounds of Arctic sweet clover. At Pouce Coupe, the sales were 5 bushels of Reward for seed, 20 bushels of Victory, 30 bushels of O.A.C. No. 21 barley, 200 pounds of Arctic sweet clover and 250 pounds of western rye grass seed.

HORTICULTURE

An effort is made to encourage the keeping of a good garden and the beautifying of the general home surroundings on farms operating as Illustration Stations. A keen interest is taken in this work and the results are exceedingly creditable. All gardens are well kept, orderly, clean and as abundant as possible according to the will of the season. On field days, the gardens invariably attract special attention.

At Baldonnel, the operator has since 1931 moved the site of his garden to a new location around which he has planted a shelter belt of Balm of Gilead, spruce and Saskatoon. The Saskatoons were very slow to take hold. In fact, they were not very promising for the first two seasons. However, in 1933 their progress was exceptionally encouraging and was worth waiting for. The operator of the Fairview station also has a splendid windbreak established.

LIVE STOCK

It is noteworthy that most of the Yorkshire breeding swine in the northern territory of the British Columbia Peace River Block has originated from Lacombe stock bought by the Baldonnel operator. In 1933, a new registered Yorkshire boar was purchased by him, again from the Dominion Experimental Station, Lacombe.

An interesting pasturing practice has been carried on to much success by the operator of the Pouce Coupe station. The dairy herd is grazed alternately on sweet clover and on oat and wheat pasture. The result has been that an average milk yield is given and an excellent condition maintained without a supplementary grain ration from June until November. Supplementary roughage is supplied in September, October and November.

FIELD MEETINGS

During the period 1931 to 1933, nine field days were held on the Illustration Stations in this inspectorate. The average attendance had increased from 57 in 1931 to 105 in 1933. All operators have co-operated whole-heartedly in the holding of field days.

REPORT OF THE ILLUSTRATION STATIONS IN BRITISH COLUMBIA

R. M. Hall, B.S.A., Supervisor

With the establishment of a new station at Strathnaver in the spring there were nineteen Illustration Stations in operation in British Columbia in 1933, or one more than in the two previous years. Three of these stations are located on Vancouver Island, one in the Pemberton District, three in the Cariboo, five in the Southern Interior, five in the Central Interior along the Canadian National Railway and two in the Peace River block. The two in the Peace River district are directed with headquarters at the Experimental Sub-Station at Beaverlodge, Alta., the remaining seventeen, as listed below, are directed from the Agassiz Experimental Farm.

Location	District	Operator
Alberni	Vancouver Island	Charles Chase.
Duncan	Vancouver Island	B. Young.
Courtenay	Vancouver Island	Halliday Bros.
Australian	Cariboo	Chas. Beath.
Strathnaver	Cariboo	R. Yardley.
Quesnel	Cariboo	W. A. Johnston.
Armstrong	Southern Interior	W. B. McKechnie.
Grand Forks	Southern Interior	J. T. R. Lawrence.
Lumby	Southern Interior	H. C. Catt.
Revelstoke	Southern Interior	Thos. Griffiths.
Salmon Arm	Southern Interior	Geo. Patterson.
McBride	Central Interior	J. T. Oakley.
Prince George	Central Interior	J. Blackburn.
Prince George	Central Interior	J. S. Johnson.
Smithers	Central Interior	Wm. A. Sproule.
Vanderhoof	Central Interior	D. Turcotte.
Pemberton Meadows	Pemberton	W. E. Blakeway.

In this report, reference will be made from time to time to the work being conducted at these points. When this is done, it will also refer to that being conducted co-operatively by the Division with the parties whose names are as given. The results herein enumerated would not be possible were it not for the effective and loyal co-operation given by this group of farmers who have turned over portions of their farms for a comparative and co-operative study of local agricultural problems.

PRECIPITATION AND CROP GROWTH

No other province in the Dominion presents such a variation in soil types and climatic conditions as does British Columbia. The Southern Interior is generally considered as representing the dry belt, but Smithers in the Bulkley Valley only recorded 10·90 inches in 1933. Vancouver Island points rise in the scale with Courtenay leading. Other points take intermediary positions.

The principal factor affecting the relationship of precipitation to crop growth is the amount of rainfall that occurs during the growing season. If this amount is bunched during the early and middle portions of plant growth, good yields can be obtained. This favourable condition prevailed at Smithers producing the yield of alfalfa comparable with districts receiving twice the amount of rainfall.

The other extreme is witnessed at Alberni, a point recording 47·07 inches of rainfall in the twelve months but with only 4·08 inches in the five months from April to August inclusive. This condition is particularly reflected in the low yield of potatoes at this point. Sod land with its natural mulch of grass stalks and roots returned yields even above the average.

This leads to another factor influencing the relationship of precipitation to crop growth, namely the water holding power of the soil. A short rotation of four years' duration as practised at Alberni is a commendable one for maintaining the humus content to a high level. Each field has a good second growth of hay ploughed down every four years and manured as well. Cultural operations keep the soil in good physical condition, thus promoting the optimum possibilities for moisture conservation.

Total precipitation in 1933 in order of the amount recorded:—

Courtenay	56·04 inches	Quesnel	21·47 inches
Duncan	47·21 "	Lumby	20·56 "
Alberni	47·07 "	Vanderhoof	18·02 "
Pemberton	44·35 "	Salmon Arm	17·72 "
Revelstoke	41·65 "	Armstrong	17·55 "
McBride	28·11 "	Australian	15·46 "
Prince George	26·55 "	Grand Forks	14·86 "
Salmon Valley	23·45 "	Smithers	10·90 "

NOTE: Strathnaver incomplete 9·21 inches recorded from July to December inclusive.

FERTILIZERS, TIME OF APPLICATION

This project was started in 1931 for the purpose of determining the most opportune time of applying commercial fertilizers to the potato crop, and has reference in particular to Vancouver Island. Applying the fertilizer in the drill or furrow at time of planting is also studied as compared to broadcasting at time of planting. A 3-10-8 mixture is used applied at the rate of 1,000 pounds per acre. All plots are manured at 16 tons per acre.

The following table shows this year's results on Vancouver Island Stations:

AVERAGE COLLECTIVE YIELDS OF POTATOES AT ALBERNI, DUNCAN AND COURTENAY, 1933

When applied	Yield per acre	
	Average	Increase over check
	tons	tons
Check, manure alone no fertilizer	5·72	—
Manure and chemical fertilizer 2 months before planting	10·15	4·43
Manure and chemical fertilizer 1 month before planting	9·14	3·42
Manure and chemical fertilizer broadcast time of planting	9·38	3·66
Manure and chemical fertilizer applied in drills time of planting	9·42	3·70

Plots were replicated twice and results were consistent between stations. The early application of fertilizers returns the highest yield, especially where summer drought follows during June, July and August. By applying broadcast early in March soluble nutrients are brought into available form for plant use, consequently giving higher returns than when applied at planting time and followed by limited rainfall. Alberni suffers repeatedly from dry summers. This year rainfall during June, July and August only totalled 1·83 inches whereas March alone registered 5·30 inches. The results from three years' study indicate that for Alberni climatic conditions commercial fertilizers should be applied at least two months before planting potatoes.

The fertlizer used this year cost $17 per acre. With potatoes selling for $25 per ton the extra yield over check plots receiving no fertilizer proved that chemical fertilizers were a good investment. Actually only 55 per cent of the cost of the fertilizer or $9.35 is chargeable against the potato crop. The balance is spread over the following crops in the rotation.

WEED CONTROL MEASURES ON ILLUSTRATION STATIONS

Weeds collect their toll from the farmer's toil in this province as elsewhere. New weeds that hitherto were unknown are creeping into certain districts. Control measures in this respect can be effective by eradicating each patch as it appears and before it overruns the entire field, farm and district. This applies to certain persistent perennial weeds as couch grass, Canadian thistle and hairy peppergrass. The latter weed is getting into the Armstrong district. Our operator at that point has been successful so far, through constant vigilance, in pulling and clipping persistently each small patch as it appeared on his farm and roadside.

Where certain weeds have become established, cultural and chemical means must be adopted for their effective control. To aid and assist in controlling the weed problem the first step is naturally to make sure that only seeds free from weeds are sown. Chemical sprays, while effective in the case of certain rough leafed weeds as the mustard, cannot be considered practical when necessary to adopt control measures on a large scale.

Cultural methods, combining a study of the habits of growth with timely operations, must necessarily prove the most economical method of control. Land must be worked to insure a high state of tilth favourable for plant growth, whether free from weeds or not. If weeds are present, cultural operations should be carried out at times most favourable for their control.

Couch grass on the Courtenay station is tackled in an energetic manner. One hay field was particularly bad with this persistent weed. After the hay crop was removed in 1932, ploughing the sod was attempted with a fair degree of success. Harrowing loosened a large proportion of the roots, leaving them on the surface. Cross ploughing and harrowing were again carried out in two weeks' time, leaving more roots exposed to the hot August sunshine. The cultivator with mould boards attached was then used to cross ridge the field, alternating with the plough in each operation. Spring tooth harrows kept the roots to the surface and where lying thick they were raked and burned. Root stocks were never allowed time to recover from one operation to the next. In 1933 this six-acre plot was in potatoes and corn. This was a good follow-up crop, as hoeing and cultivation given throughout the season made it impossible for any of the couch to become re-established.

Cultural practices preparing for and in growing the hoed crop is the most effective and economical method of controlling weeds on Illustration Stations.

THE CONTROL OF MUSTARD BY CHEMICAL SPRAY

Spraying tests were conducted during the past season on the Courtenay station whereby mustard growing in oats was treated with varying strengths of copper sulphate in solution.

The field in question was also seeded down to clover and grasses with the oats. Treatment was carried out when the mustard plants were quite small, just showing the first leafy growth. At this time the oats were two to four inches high and the clover was nicely germinated. Three and four per cent solutions of copper sulphate were used, with suitable areas being left for check purposes. The solution was applied with an ordinary small pneumatic sprayer.

The optimum condition was found to be cloudy weather, but free from rain for 48 hours after application. Time must be allowed for the plants to absorb the solution. Rain washes it off and excessive sunshine evaporates the water, leaving the ineffective dried-up copper sulphate on the outside of the foliage.

By spraying in the initial stages of growth less volume is required, also the affected plants when small are not so liable to recover. All treated areas showed a remarkable reaction. No appreciable difference could be noted in the results

from using 3 and 4 per cent solutions of copper sulphate. A 95 per cent kill on mustard was effected. Not only that, but the area thus relieved of growing weeds gave its best to the oats and clover. The oats were a deeper colour, stooled well and developed rapidly. The clover was unharmed and produced a good catch.

Mustard growing in a mixture of oats, peas and vetch was sprayed with a 5 per cent solution of copper sulphate. The area selected for treatment was particularly bad with mustard and all foliage and the ground was thoroughly saturated with the spray. Practically a perfect kill was registered on the mustard and no harm done to the growing crop. In fact, the area thus treated showed the oats, peas and vetch a foot higher in mid-season than on the untreated area.

One hundred gallons of the solution usually covers one acre. Based on results obtained thus far in the work, a 3 per cent solution has been found most satisfactory. In other words, 30 pounds of copper sulphate per acre, costing from 8 to 10 cents per pound, in 100 gallons of water. Equipment and labour costs are in addition, but where an orchard sprayer is available larger areas may be treated on a practical basis.

SYSTEMATIC ROTATIONS AND THEIR INCORPORATION INTO FARM PRACTICES

Rotations followed on the Illustration Stations in British Columbia were, in the first instance, laid down after a careful survey of the operators' needs and the requirements of the district concerned. The site selected was usually a portion of the farm situated on the main road, a vantage point for display. Fields were divided into the number corresponding to the length of the rotation adopted.

The primary object, of course, in establishing any systematic cropping program is to give greater returns, and at a reduced cost through the more economical use of labour and machinery. Should the rotations thus originally adopted prove their practical advantage, it is the objective that the operator will implement similar practices on his back fields; secondly, that the illustration shown will prove of sufficient value to become the established practice of the district.

The work at present embraces rotations running from three years as at Duncan to ten years' duration at Armstrong, Lumby, and Quesnel. Each station follows only one rotation at a time, subject of course to modification should the occasion demand it. Thus comparative studies of two or more rotations under similar conditions are prohibited with the small farm units that prevail in this province. To be most effective, however, any initial rotational system adopted should be sufficiently elastic to lend itself to necessary changes as found expedient from time to time. For instance the Illustration Station at Australian was first opened in 1931 with a five-year rotation using a grass and clover mixture for seeding down. Alfalfa was at the same time tested out in a small way in order to ascertain its possibilities for greater development. There is every hope from present indications to warrant changing to the longer rotation of ten years' duration using alfalfa as the basic forage crop. Each field will thus be down to sod six instead of three years as formerly. Costs in seed and labour will be reduced. At the same time a greater tonnage of forage higher in protein content will be harvested allowing a greater concentration of livestock.

The cropping arrangement at Salmon Arm is likewise being altered this year to meet a rising need. The original seven-year rotation of alfalfa is being extended to eight years to permit seeding down alfalfa without a nurse crop. Results from all stations growing alfalfa to date show that seeding alfalfa alone gives the best and most economical stands during the period in the rotation that it is allowed to remain down.

At the same time and in conjunction with the foregoing change in the rotation at Salmon Arm, the entire method of field management is being rearranged. The original frontal plots are being extended to include all the back field area, thus bringing all tillable land within the fold of one working unit, and under the eight-year cropping program. The larger fields will permit the more economical use of machinery and reduce the labour costs of working each plot to the minimum.

Results, beneficial or otherwise, will not of course be fully appreciated at once, though admittedly a step forward in accordance with the principles of good field management. A systematic rotation can be incorporated into a general farm practice to meet individual needs as required. Each field receives in turn similar treatment, weeds are controlled, yields are increased, crops are grown in the proper proportions, and soil fertility is maintained.

COST OF PRODUCTION

The work of the Division would not be complete without keeping records of yields and cost of producing each crop grown. In this way knowledge is obtained which is valuable in determining whether to continue growing a given crop or not. Each phase of expense in this connection is computed on local values as investment, taxes, horse and manual labour. A standard value is given machinery of $2.85 per acre. Manure is valued at $1.50 per ton spread.

The following tables in this report provide interesting data. The value of these data naturally increases with the years that a station is in operation. Those who studied our annual reports in the past will observe that in this report tabulation is under headings of subject matter instead of by individual stations. This allows for a closer study, crop by crop, than previously. A report on the entire program of the season's activities is not attempted but the picture presented will serve to convey in concise form the major problems in hand and results thereof.

The following table gives the average yield and cost of growing various crops on Illustration Stations, 1933.

AVERAGE YIELDS AND COST OF PRODUCTION

Crops	Number of stations	Yield per acre	Cost per unit
			$
Potatoes.....tons	6	8·79	9 62
Corn..... "	3	11·66	4 26
Turnips for table use..... "	2	14·20	5 20
Oats.....bush.	10	57·00	0 29
Spring wheat..... "	6	24·50	0 73
Fall wheat..... "	1	43·50	0 70
Clover hay.....tons	7	2·39	8 33
Mixed hay..... "	5	2·78	5 20
Alfalfa, first year..... "	5	3·45	5 51

Yields from hoed crops are slightly lower this year on account of the drought in mid-season. On the other hand hay yields are higher, especially first year alfalfa. Of the latter crop, two stations made 3 cuttings, one, 1 cutting and the balance made 2 cuttings.

POTATO CULTURE

Six stations are actively engaged in potato growing. The area varies from two to four acres, depending on that available for hoed crops and on marketing facilities. The demand for certified seed potatoes is also fairly brisk and they

are grown by all Illustration Station operators in this project. The following table gives the yields and cost of production at six stations in 1933, as well as the average to date.

POTATOES—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of cost per acre, 1933.						Average		
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual labour	Horse labour including teamster	Seed and miscellaneous	Use of machinery	No. of years grown	Yield per acre	Cost per ton
	tons	$	$	$	$	$	$	$	$	tons	$
Alberni	4·39	14 15	9 50	16 69	13 75	10 33	9 00	2 85	8	8·71	14 26
Courtenay	12·88	6 47	10 00	18 70	24 13	17 65	10 00	2 85	10	12·00	11 49
Duncan	7·18	14 09	10 00	24 16	17 75	21 15	25 25	2 85	6	7·39	17 11
Pemberton	8·95	9 10	2 70	12 90	32 20	16 80	14 00	2 85	1	8·95	9 10
Quesnel	8·81	6 44	2 25	9 60	15 83	16 20	10 00	2 85	2	6·67	8 06
Revelstoke	10·50	6 10	3·80	10·60	19 00	17 80	10 00	2 85	2	14·17	4 85

With few exceptions yields conform to the average, excepting at Alberni where the yield was considerably reduced on account of the extremely dry summer. Costs on the whole are lower and net returns for the potato crop this year show a good profit.

Cultural methods vary in different districts according to coastal or interior locations. At Alberni and Duncan potatoes are grown on sod land, ploughed in February and manured at 16 tons per acre. At Courtenay the crop follows O.P.V. and fall rye. The latter serves as a cover crop and excessive leeching is thus prevented. Fall ploughing is practised at Pemberton, Quesnel and Revelstoke and manure is added during the winter months. Early spring cultivation with a disk or spring tooth harrow works the soil up nicely, and when furrowed out for planting a seed-bed of good depth is assured. The average rate of seeding was 1,000 pounds per acre ranging in time from May 12 at Duncan to May 22 at Revelstoke and Courtenay. Harvesting took place during first two weeks in October. The high cost of seed for Duncan was due to newly purchased certified seed of the Early Epicure variety.

Roguing the crop adds to the manual labour costs but the resulting yield of potatoes sells largely for certified seed. Seed of high quality and free from disease is thus maintained. Experiments in the past have shown conclusively the value of planting only the best seed procurable.

Potatoes never fail to respond to generous treatments of chemical fertilizers up to 1,000 pounds per acre, together with manure at 16 tons per acre. A 3-10-8 mixture is used in illustration work where manure is also applied. The three-year average increase over check plots for potatoes at Alberni, Courtenay, and Duncan was 3·55 tons per acre. The cost of the fertilizer giving this increase was $11.40 per acre.

FIELD CORN

Three stations, Armstrong, Courtenay and Salmon Arm co-operate in growing corn and relative yields and costs are studied. Yields this year were 10, 13 and 12 tons per acre respectively, with corresponding costs per ton of $4.29, $3.90 and $4.58.

The five-year average for Armstrong is 9·40 tons per acre at $5.60 per ton. Courtenay shows a seven-year average tonnage of 18·64 costing $2.85. Salmon

Arm returned over a period of six years 12·71 tons per acre at an average cost of $5.60.

The relationship of yield and cost is strikingly shown in the results in Courtenay. The yield is down, 5·64 tons below average, with a corresponding increase in cost of $1.05 per ton.

Armstrong and Salmon Arm stations fall plough, and manure is applied at the rate of 16 tons per acre during the winter months. No commercial fertilizer is used. The Courtenay operator ploughs latter part of March, turning under a good growth of fall sown rye.

Seeding should not be done until a good friable seed-bed is worked up. From 20 to 25 pounds of seed per acre is used, sown either in rows or hills. Armstrong seeded May 10 and Courtenay May 29. Seeding is carried out late every year at the latter point as increased yields result from the fall rains.

Harrowing the young crop is cheaper and safer than using the cultivator. Weeds are knocked out close up to the plants and there is no danger of breaking the small roots as is often done when using a cultivator. Frequent cultivating after the corn is a foot high combined with hoeing will assure rapid clean growth under minimum rainfall conditions.

The variety grown does not affect the yield so much as the cultural practices followed and the timely performance of each operation. Northwestern Dent is proving satisfactory at Armstrong and Salmon Arm, Golden Glow is likewise a good yielder at Courtenay.

TURNIPS

The varieties suitable for table use were grown this year at Revelstoke and Pemberton. Yields were fairly good running 15 tons and 13·4 tons per acre respectively, with corresponding costs of $5.08 and $5.32 per ton. After grading 75 per cent were marketable at $15 per ton. Revelstoke has grown turnips now for two years, average yield being 22·50 tons per acre at an average cost of $3.90 per ton.

Hall's Westbury has proven very successful at Revelstoke, being a smooth root of excellent quality. The first seeding of this variety at Pemberton was not entirely successful and re-seeding took place with Boving. Initial preparation of the seed-bed is carried out as for other hoed crops, ploughing sod land, manuring at 16 tons per acre and subsequent cultivation with harrows or the disk. Commercial fertilizers were tested out in different amounts and combinations at Pemberton on the turnip crop. Superphosphate and muriate of potash were applied with and without sulphate of ammonia. The best combination from the standpoint of marketable turnips and cost was 160 pounds of triple-superphosphate and 48 pounds of muriate of potash per acre.

The resulting crop was 90 per cent marketable, whereas the plots receiving 80 pounds of sulphate of ammonia per acre as well were rough and of lower quality though higher in yield. Further study will be made in the use of fertilizers in 1934.

OATS

This important crop is grown on the majority of stations and generally is the nurse crop for seeding down to grass and clover mixtures after the hoed crop. If grown alone on sod or stubble, the land is fall ploughed 4 to 6 inches in depth and disked lightly to compress the furrow slice. Subsequent disking or harrowing or both is followed in the spring to work up a seed-bed or good tilth. The seeding rate varies from 60 to 90 pounds per acre, depending on moisture conditions and whether the crop is being used for a nurse or not. It is advisable to give one or two strokes of the harrow after seeding to smooth out the lumps and give an even firm soil condition that will promote uniform germination and growth. Incidently the surface will make a smooth sod for the following years down to hay.

The earliest seeding was at Alberni on April 18, harvested August 19. The latest sowing and harvesting was at Prince George, May 24 and September 12, respectively. Days for maturing on all stations averaged 109. All but one of the stations grow the Victory variety. Prince George continues with Banner with excellent results as the average yield for eleven years shows.

The following table gives the yield and cost of production for 1933 as well as the average to date.

OATS—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Average		
	Yield per acre	Cost per bushel	Number years grown	Yield per acre	Cost per bushel
	bush.	cts.		bush.	cts.
Alberni	61	49	8	61·20	63
Armstrong	50	29	3	38·00	37
Australian	57	28	1	57·00	28
Courtenay	40	53	7	61·28	66
Lumby	53	21	3	41·00	34
McBride	75	17	10	60·20	30
Pemberton	55	23	1	55·00	23
Prince George	25	58	11	65·30	27
Revelstoke	51	44	2	54·00	39
Salmon Arm	79	26	6	72·03	36
Salmon Valley	29	35	5	39·40	39
Strathnaver	30	38	1	30·00	38

Many of the stations show a cost exceeding the 1933 average of 29 cents, for producing a bushel of oats. This does not mean, however, that growing oats should be discontinued on these stations, but rather the method of further reducing the costs should be studied through improved cultural practices resulting in increased yield. Yield appears to be the main factor in lowering or raising the cost per bushel. Over a period of years high average yield has been secured at Alberni, Courtenay, McBride, Prince George and Salmon Arm.

WHEAT

Spring and fall varieties are grown usually with success in the Southern Interior and on Vancouver Island. The winter of 1932-33 caused considerable winter-killing and in the Armstrong district practically 100 per cent was thus damaged. The operator at that point re-seeded the killed-out fall wheat plot with Marquis thus avoiding the loss of a crop year. To assure the maximum success with fall wheat, the grain should be sown early enough to become well established before freeze-up occurs. Armstrong seeded September 18, in 1931, at 90 pounds per acre (Crail Fife). The crop was cut July 18, 1932, and threshed 44 bushels per acre. The Duncan district is adapted for growing fall wheat and seeding may take place up to the second week in October. Dawson's Golden Chaff was sown October 10, 1932, cut July 26 this year, and yielded 43·5 bushels per acre at a cost of 61 cents per bushel. The cost per acre was $32.77 and made up of the following items: use of land and taxes $10, manure and fertilizer $3.75, manual and horse labour $10.85, machinery $2.85 and seed, twine and threshing $5.32.

Seeding in the Southern Interior was finished in April, Armstrong and Salmon Arm April 22, with harvesting August 9 and 14, respectively, making 109 and 114 days from seeding to harvesting the crop. The yield at Armstrong was 22 bushels costing 76 cents per bushel, and at Salmon Arm 55 bushels costing 53 cents per bushel. Central British Columbia points experienced a poor season for wheat. The cold backward spring delayed seeding until the second week of

May. Maturity ranged from September 1 at Quesnel, to September 9 at McBride, Vanderhoof and Smithers. Frosts reduced the yields and grade, especially at Vanderhoof and McBride, where several hard frosts occurred before harvesting. The yields were as follows: McBride 12 bushels at 84 cents per bushel, Vanderhoof 21 bushels at 60 cents, Smithers 13 bushels at $1.13, and Quesnel 24 bushels at 69 cents. The average time for maturity was 116 days for all stations growing spring wheat.

CLOVER HAY

Red and alsike clover are still the predominant legume hay crops in the province, especially in the coastal areas, as the Fraser Valley and on Vancouver Island. Seeding down takes place with a nurse crop, generally oats, sown at a lower rate than if grown alone. Sixty to seventy-five pounds per acre gives a good yield and at the same time does not excessively blanket the clover catch. Potato or corn land is in excellent condition for obtaining the best stands, especially when manure and fertilizer have been applied the previous year in growing the hoed crop. In making up the mixture to be sown, it is advisable to use varieties of grasses that mature at approximately the same time, thus allowing for producing hay of the maximum quality. The mixture commonly used on most stations comprises red clover 10, alsike 2, white dutch 1, timothy 2, meadow fescue 2, Italian rye 4, making a total of 21 pounds per acre. Harrowing or rolling after seeding will add to the firmness of the seed-bed, bringing the moisture close to the surface and thereby promoting quick and uniform germination. The foregoing mixture may be varied in the quantity of each variety used depending on the class of live stock carried. This one is particularly adaptable for giving second-year hay that is better for cattle than if a larger percentage of timothy was included.

Yields and costs for 1933 were as follows: Alberni, 2·74 tons at $8.57 per ton, Australian 3·15 tons at $3.25, Courtenay 2·00 tons at $11.45, Duncan 2·00 tons at $14.26, Pemberton 2·90 tons at $5.61, McBride 1·50 tons at $6.07, Prince George 1·60 tons at $6.21, Revelstoke 2·33 tons at $5.53, and Salmon Valley 2·00 tons at $4.49 per ton. Over a period of years high average yields have been secured at Alberni (2·66 tons, 6-year average), Courtenay (2·67 tons, 9-year average), Duncan (3·07 tons, 4-year average), Prince George (1·88 tons, 11-year average), and Salmon Valley (1·78 tons, 8-year average).

The high average cost of producing clover hay on the three Vancouver Island stations, Alberni, Courtenay and Duncan, is still below the market price, or for what it can be laid down if brought in. The crop has to absorb its portion of manure and fertilizer costs. This factor combined with high capitalization makes it imperative that the maximum yields of good quality hay be obtained. A few stations encountered adverse weather conditions during haying this year which added to the manual labour cost considerably. The season was not favourable for high yields but when all stations are considered as a unit representing the province, the results are indicative of sound practices being followed in cultural and harvesting methods.

The station at Duncan cut June 19, with the other stations following from July 12 at Courtenay to August 3 at Salmon Valley.

ALFALFA

Alfalfa does well over a wide range of climatic conditions. Its place in the farm rotation of crops is being extended each year with beneficial results both to the soil and when fed to live stock. One or more cuttings may be made each year depending on the rainfall. Armstrong and Vanderhoof districts, experience dry summers and limited rainfall throughout the year. Rapid recovery is therefore lacking once the first cutting is made and the fields are left

until the next year. Salmon Arm on the other hand has plenty of sub-soil moisture and although the precipitation is average three cuttings are made. Lumby, Quesnel and Smithers usually cut twice during a favourable season. Grand Forks is the only station with irrigation facilities and three cuts is the general practice at that point. Alfalfa is seeded at from 10 to 15 pounds per acre without a nurse crop on all stations except Salmon Arm. The higher rate of seeding is recommended where good moisture conditions are assured. Growth is thick and rapid and a finer quality of hay will result. A good catch was secured at Salmon Arm this year using Marquis wheat, as a nurse crop, which threshed 55 bushels per acre. Rate of seeding, wheat 60 pounds and Grimm alfalfa at 15 pounds per acre.

Good cultural practices determine to a very large extent the success of the stand. Thorough preparation of the seed-bed, preferably after a hoed crop, inoculation with viable bacteria and seeding as a rule without a nurse crop will give the young alfalfa plants an opportunity to become established. Seeding down after sweet clover and summer-fallow is followed on a few stations with excellent results.

A study of the following table will give a comparison of yields and costs on the different stations growing this crop.

ALFALFA—YIELD AND COST OF PRODUCTION BY STATIONS

Stations	Year	1933		Itemized statement of cost per acre, 1933					Years grown		
		Yield per acre	Cost per ton	Use of land and taxes	Manure	Manual and horse labour	Machinery	Seed		Yield per acre	Cost per ton
		tons	$	$	$	$	$	$		tons	$
Armstrong	1st	2·65	7 23	6 00	—	4 80	2 85	*5 50	7	1·60	16 52
"	2nd	2·00	9 07	6 00	3 00	2 80	2 85	*3 49	6	1·83	13 65
"	3rd	1·90	10 96	6 00	1 50	2 80	2 85	*7 67	4	1·85	12 32
"	4th	1·50	12 66	6 00	—	2 60	2 85	*7 53	9	1·74	11 60
Lumby	1st	3·30	4 65	2 70	—	6 00	2 85	*3 80	2	2·80	5 83
"	2nd	3·30	4 96	2 70	0 50	6 00	2 85	*4 33	1	3·30	4 96
Salmon Arm	1st	5·12	4 50	6 00	3 50	9 95	2 85	0 75	5	4·73	5 55
"	2nd	4·51	4 91	6 00	3 15	9 25	2 85	0 90	4	5·44	4 45
"	3rd	5·00	4 33	6 00	1 20	9 80	2 85	1 80	3	5·60	3 87
"	4th	1·72	8 35	6 00	—	5 50	2 85	—	1	1·72	8 35
Smithers	1st	3·41	6 54	2 25	—	12 00	2 85	*5 22	2	2·33	7 77
"	2nd	3·25	4 60	2 25	—	11 10	2 85	*2 86	1	3·25	4 60
Quesnel	3rd	3·10	4 01	2 25	—	6 65	2 85	1 00	2	2·30	4 77
"	4th	2·20	4 40	2 25	—	2 70	2 85	1 00	1	2·20	4 40
Vanderhoof	1st	2·77	4 63	2 25	—	2 82	2 85	*4 92	6	1·58	12 18
"	2nd	2·30	4 05	2 25	—	3 60	2 85	0 60	4	1·61	11 86
Grand Forks	1st	5·10	8 22	9·00	—	13 50	2 85	*10 43	2	5·81	7 55
" (Irrigation)	2nd	4·60	9 66	9 00	—	17 15	2 85	*9 09	1	4·60	9 66

*Includes pro rata charges for the year when seeded down without a nurse crop. The total costs for that year are spread over the number of years the alfalfa will be left down.

A study of the table shows that yields in 1933 were satisfactory at all locations and in most cases were higher than the average to date. In all cases excepting one, the yield from the first year alfalfa was higher than the second, third and fourth year alfalfa. Over a period of years high yields have been secured at Salmon Arm, Lumby and Grand Forks.

The cost per ton varies from $4.01 to $12.66 and this variation is due mainly to the difference in yield, manual and horse labour, and in seed charges. Where no nurse crop is used the cost of sowing and caring for the crop during the first year is spread over the number of years the alfalfa will be left down. This has a tendency to increase the cost per ton.

MIXED HAY

Considerable clover comes up in the crop the second year making hay of excellent feeding value. Yields on the average are greater than for clover hay, even when viewed over a period of years. The root system has steadily developed throughout the first year, especially that of the perennial grasses, until the maximum productivity is reached in the second year after seeding down. Cutting started on July 5 at Alberni, and ranged up to August 3 at Salmon Valley. The yield and cost of production was as follows: Alberni, 3·40 tons at $6.30 per ton, Australian 1·97 tons at $4.08, Prince George 2·80 tons at $5.36, Prince George (third year) 2·40 tons at $5.20, Quesnel 3·25 tons at $3.91, Salmon Valley 2·50 tons at $5.71, McBride 2·50 tons at $4.04 per ton. An average of 3·18 tons was secured at Alberni over a five-year period and an average of 2·26 tons at McBride over an eight-year period.

A study of the above shows on the whole that second year sod returns higher yields than first year hay. The difference is more marked at Alberni than at other points on account of the longer growing season and unlimited rainfall. Third year hay is included for Prince George, which follows a five-year rotation. This is one of the oldest stations in the province and results over ten and eleven years indicate a very narrow spread in yields between first, second and third year hay.

The cost of seed is equally spread over the number of years down to hay. The high figure shown for Salmon Valley includes pro rata charges for the loss of a crop year in 1931 and re-seeding costs.

ANNUAL HAYS

The most widely grown annual hay is a mixture of oats and peas, sown at the rate of 2 and 1 bushels per acre respectively. If spring vetch is included the oats are reduced in rate and vetch up to 30 pounds per acre is used. Common millet has also been used to excellent advantage, especially where late seeding is necessary. It was sown in 1932 at Revelstoke on June 13 and cut September 16 yielding 2·50 tons of cured hay per acre. Rate of seeding was 30 pounds per acre. The operator noted that both cattle and horses relished the hay, leaving no waste.

Hulless barley was cut for hay this year at Armstrong. It was intended for grain but the heads failed to fill. The stand yielded 2 tons of excellent cured fodder, which made superior horse feed as noted by the operator on his station report.

Oats, peas and vetches were sown in a mixture at the rate of 60, 60 and 20 pounds respectively, at Courtenay, Pemberton and Prince George stations. At Courtenay and Prince George the crop was harvested as silage and gave six and four tons respectively, while at Pemberton the crop was cured for hay and gave 1·70 tons per acre. These yields compare very closely with the averages to date.

Whether grown for ensilage or for hay the above mixture is expensive when considered by itself. The main objection is in the cost of seed. Harvesting conditions were such in 1933 that only one station was successful in ripening and threshing a portion of the crop for seed purposes. However O.P.V. has a place among important farm crops as an annual hay and as a cleaning crop. When grown for hay or ensilage after harvest cultivation allows for weed control and the crop may thus be considered one of the best substitutes for a regular hoed

crop such as corn or potatoes. A satisfactory rate of seeding for average conditions has been found to be, oats 60, peas 60 and vetch 20 pounds per acre. The resulting fodder lends variety to the usual ration and all live stock relish the change. Dairy cows increase in milk production and those finishing baby beef find this crop, when cured for hay, to a large extent replacing expensive concentrates. It is advisable to sow an early maturing variety of peas in the mixture. The mixture used on the various stations this year was Victory oats, Bluebell peas and Spring vetch.

SWEET CLOVER

Sweet clover has a place in western agriculture as a soil builder and at the same time provides a hay tonnage hard to equal under the same conditions as other forage crops. The same bacteria thrive on its root system as on alfalfa. Hence where it is grown the way is paved for the establishment of alfalfa. It also affords excellent pasture if sufficient stock is carried to keep it grazed down. Enough will generally mature and thus re-seed for the next year. It makes an excellent soiling crop, comparable to alfalfa for dairy stock as ascertained from results on the Armstrong station year after year.

Seeding down to sweet clover is done with a nurse crop of wheat, oats or barley and 10 to 12 pounds per acre are used, depending on moisture conditions. The hay crop is ready early in July of the following year and after its removal the practice is followed of ploughing and a short summer-fallow the rest of the season. This prepares the soil for seeding down to alfalfa the following spring. Manure is added during the summer-fallow period and weed seeds are thus germinated. The soil is inoculated for alfalfa and successful stands of the latter crop are obtained.

Sweet clover for hay is cut before growth is too rank and coarse, allowing plenty of time to cure in small coils before storing. Yield and cost of production in 1933 were as follows: Lumby 3·40 tons at $4.89 per ton, Quesnel 1·41 tons at $7.63, Smithers 3·00 tons at $3.60, Vanderhoof 1·54 tons at $5.78 per ton. At Vanderhoof sweet clover for hay has been grown for five years with an average yield of 1·36 tons.

LIVE STOCK IMPROVEMENT

This phase of Illustration Station work is receiving more attention each year and at the present time all operators who have dairy herds now have pure-bred sires heading their herd, and also keep milk and butterfat records. Four new sires were added to the herds during the last three years. Declining prices for butterfat the last three years has focused attention on the non-productive cow in the herd more than in the past and has been responsible for some weeding out in this connection. Districts served by the Illustration Stations in Central British Columbia are beginning to realize the important part that live stock plays in the balancing of the farm revenue. In the past the revenue was largely from the sale of hay but now that market is gone and live stock and their products are more important.

The following table gives the milk and butterfat production of seven dairy herds where complete records were kept throughout the year:—

DAIRY HERD PRODUCTION, 1933

Name of station	Breed	Number of cows milked	Average days lactation	Average milk production	Average per cent butterfat	Highest cow production fat	Lowest cow production fat
				lb.		lb.	lb.
Armstrong	Jersey	13	305	6,623	5·03	470	234
Alberni	Grades	5	305	5,765	4·40	408	287
Courtenay	Jersey	12	305	5·826	4·20	401	141
Duncan	Jersey and Holstein	12	305	8,662	4·28	410	271
Prince George	Holstein	11	305	6,534	3·93	295	120
Telkwa	Guernsey	5	305	4,930	5·29	401	208
Salmon Arm	Ayrshire	5	305	5,421	4·00	225	203

An examination of the table shows that the average production of five of the seven herds is comparatively good. The herd at Duncan composed of twelve cows gave the high average of 8,662 pounds of milk and 371 pounds of butterfat. In this herd there are no extremely low individuals, the poorest cow giving 271 pounds of fat.

Five of the operators are raising beef cattle and have choice foundation herds. Registered sires head the herds in all cases, the one at Lumby owned by Mr. Catt was purchased in 1932 from the Prince of Wales ranch. This bull was awarded the Junior Championship at several of the western fairs during the season. Two of the operators have purchased thirty-four good grade Shorthorn heifers as a start toward beef cattle production. With the increased production of forage crops, their marketing must be increasingly effected through the medium of choice beef. Finishing with home grown grains is encouraged and progress is being made in this direction. One operator has turned off twenty-four head as baby beef in the past two seasons. This type of carcass is in good demand and from the breeder's point of view the turnover is on a yearly basis.

Three operators have bred up flocks of sheep excellent in type. An early maturing lamb crop is aimed for, and a premium is always forthcoming for a well-finished carcass.

Swine herds of Yorkshires and Berkshires predominate. Some operators use the cross in catering to the type of finished animal demanded by the local trade. The Dominion Experimental Farm at Agassiz is a source of supply of excellent breeding stock for those operators preferring Yorkshires. Weanlings of either sex from Advanced Registry stock are purchased by one or more operators yearly thus maintaining the breeding stock on a high plane of perfection.

HOME IMPROVEMENTS

It is advantageous, not only to the operator of an Illustration Station, but to the neighbourhood as a whole to have and enjoy home surroundings of beauty and culture. A well kept lawn, though small, is a delight to all. Flower and vegetable gardens reflect the personality of the attendants.

Each year seeds of varieties found suitable to local needs are sent to all operators. During the past three years six lawns have been seeded down. One hundred and ten ornamental shrubs were supplied and set out. One hundred and fifty irises and other perennials have gone into borders, moulding lawns into pleasing landscapes. Thus the esthetic value of home life has been enhanced and progress along these lines will continue from year to year.

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