DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

# EXPERIMENTAL SUB-STATIONS

BEAVERLODGE, ALTA.
FORT VERMILION, ALTA.
SALMON ARM, B.C.
BETSIAMITES, QUE.
FORT SMITH, N.W.T.
FORT RESOLUTION, N.W.T.
FORT PROVIDENCE, N.W.T.
SWEDE CREEK, YUKON.

## REPORTS OF THE EXPERIMENTALISTS IN CHARGE

For the Year 1922

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1924

# EXPERIMENTAL SUB-STATION, BEAVERLODGE, ALTA.

## REPORT OF THE SUPERINTENDENT, W. D. ALBRIGHT.

### SEASONAL NOTES

Geo. McLeod, Sheriff of Peace River, and an old timer in the Peace River country, having reached Grande Prairie ahead of the Klondike rush, states that the only summer in his experience in the North country which approached 1922 for drouth was 1898, the year of his arrival. In that summer, the ground was hard and cracked and smoke prevalent. Never in the intervening twenty-three years has he seen a season that would parallel the summer just closed.

A rather mild winter, with little snowfall until the latter half of January, was followed by a normal spring, sleighing terminating on the seventh of April, which month was practically devoid of precipitation. Seeding commenced at the Station on the 26th and the end of the month saw sixty-four grain plots sown as well as a hundred and thirty of clovers and grasses and a good start made with the garden planting. Winter rye seemed to have come through almost perfectly, while the plots of alfalfa and winter wheat were not unpromising. Melilot and clovers sustained a considerable degree of injury from the lack of snow protection until late winter. The injury was conspicuously most marked with plots which had approached maturity in the season of seeding.

About ten inches of snowfall occurred on May 8, followed by showers that gave meadows and early-sown crops an encouraging start. Then an extreme, long-continued and discouraging drouth set in over practically the whole of the Upper Peace River Region, broken by light local showers or sprinkles that rarely did more, in most localities, than momentarily refresh the crops. From May 16 to the end of August the precipitation at Beaverlodge was less than two inches, while the evaporation from an open-water surface was about 16 inches in the same time. Moreover, of the scant precipitation indicated, less than half an inch occurred in either of the two important crop months of June and July and what little did fall then was nearly all in sprinkles that promptly returned to the clouds. The only exception was a light snowfall on June 5, totalling nearly a fifth of an inch of moisture. This was followed by six degrees of frost the next morning, cutting back the potatoes and many fruit blossoms, besides doing more or less general injury to crop foliage. In some localities, Russian poplars were temporarily defoliated. On the Station, the green ash was the only tree thus affected.

Between frost and drouth, the crop of wild fruit over the prairie was nearly a failure and birds helped themselves to most of what little was produced. For the first time in the superintendent's residence of nine years, there was no crop of Saskatoons. Notwithstanding the combination of adverse conditions, there was a small-to-medium yield of domestic fruit in the experimental orchard. Red currants were best, followed by black currants, white, raspberries and strawberries, of which latter there were plenty for table use and a few to preserve.

In some localities of the North country, cereals were severely cut back by the June frost, and the ensuing dry weather gave them no fair chance to recover. On the Station, grain was not very noticeably affected by the low temperature, but only early-sown crops on well-prepared land got away to a satisfactory start and, for the first time in the history of the Station, there

was difficulty in getting a satisfactory stand of grass and clover seeds from summer seeding. A large proportion of these never germinated until late autumn. The only satisfactory catches were from late April and early May seedings, while even those made a comparatively scant top.

Of cereals, the early sowings were, in nearly all cases, much the better. Wheat, being perhaps a better drouth resister and nearly always a favoured crop anyway as to both preparation and sequence of seeding, far excelled oats in average results. Outside a few more fortunate localities such as the eastern end of Grande Prairie and the Rio Grande and Halcourt neighbourhoods in the southwest, the Pouce Coupé region to the northwest, and some points in the vicinity of Lesser Slave lake, oats were an exceedingly poor crop. This was particularly true of the plateau north of the Peace, where the wheat was comparatively good but the oats extremely thin and short.

### FEED SHORTAGE FORCED LIQUIDATION OF STOCK

Since all the Peace River region relies heavily upon its oat crop for stock feeding, the effect was to precipitate a disastrous liquidation, especially of cattle, many of which, or the parent stock thereof, had been purchased at extravagant prices during and immediately following the war. Easy credits had at that time stimulated inflation of stock and feed values, raising a peak of prices that was already above a permanent economic basis. The growth in live stock population thus vied with the feed supply even in normal years and stockmen felt at times much as though they were feeding dollar bills to their cattle. There were no adequate reserves of feed—even straw—to tide over a period of shortage, and when drouth conspired with a world era of deflation and hard times to force sales and depress values to the vanishing point, some settlers closed out their holdings for a fraction of what they had paid three years previously for the original stock and cursed the day they ever took cattle money. The net result has been to give the industry a severe reverse. The lesson the settler is gradually learning is to keep out of live stock until he has three essentials practically assured, viz: water, shelter and feed, with a reserve of the latter in sight against adversity. Far better to sell or hold over feed in a year of plenty than to buy in a year of dearth.

### CLIMATE SUITABLE FOR CATTLE AND HOGS

Initial experimental work with twenty-four cattle and eighty-eight hogs has confirmed the dictum of experience that, with proper methods, Peace River conditions are well adapted to the economical feeding of both these classes of animals. Cattle fattened well in an open-front pole-and-straw shed. Those receiving silage made a little more efficient use of their feed, but twelve had finished on the staple roughage, sheaf oats, with a very small meal ration and a very little hay at the last, also registered a performance that would compare creditably (considering the low meal consumption) with results in any climate or on almost any fodder.

Shoats were grown and finished off under summer conditions with a grain consumption (including a small per cent of tankage, but no dairy by-products) ranging from 3·7 up to 4·2 pounds of meal and tankage mixture per pound of gain. They had some green feed and a limited amount of parched grass pasture.

An experiment to compare the feeding value of hulless oats for pigs has been completed and a similar test with poultry is under way.

The busiest live stock on the Station was a colony of bees, which built up from forty-two pounds in the latter part of July to seventy-three pounds in August.

ECONOMIC FEED PRODUCTION

A pre-requisite to success in live stock husbandry is the economical production of suitable feeds such a sheaf oats, legume hay, rye pasture and feed grains on quantity basis. Towards this end, the Beaverlodge Station has been directing its greatest energy, with an encouraging meed of success. Alfalfa and sweet clover are the two legumes that have, so far, proven best adapted, with some hopes centering also upon the Late Swedish red clover (Altaswede).

Fully fifty acres of land were devoted to small-plot experiments comprising work with forage crops, cereals, horticulture, field husbandry and soil investigations. In connection with the latter, very useful data have been obtained from the evaporimeter and the soil thermograph installed in May under the supervision of the Dominion Field Husbandman. The latter instrument has largely corroborated the hypothesis advanced in earlier reports that, during much of the summer in Grande Prairie, the soil was either too cool or too dry, or too cool and too dry, and perhaps also too compact for decay and nitrification to be very active and that, consequently, although the land was rich in the elements of fertility, there was often a dearth of soluble nitrogen to promote active growth when cereal or gramineous crops followed each other in annual succession without intertillage to promote nitrification. Applications of nitrate and the evidence of legumes amply sustain the hypothesis. Thus in so far as soil conditions are concerned, nitrogen becomes a limiting factor in crop production second to moisture. This knowledge is of great importance in pointing the way to sound cropping practice and rational methods of soil treatment and it is respectfully submitted that in establishing this fact at this stage, the Beaverlodge Station has probably rendered a service of fundamental value to northern agriculture.

## Soil Temperatures at Beaverlodge

According to King in " The Physics of Agriculture," the nitrates in the soil do not develop until the temperature has risen above 41 degrees; the action of the germs is extremely feeble at 54 degrees and they do not attain their maximum activity until a soil temperature of 98 degrees Fahrenheit has been reached. At 70 degrees Fahrenheit the rate is far more active than at 60 degrees and at 80 degrees far more active than at 70 degrees.

In th light of these facts, it is significant that for the six years of 1916-1921, inclusive, the average five months summer temperature (May to September) of the atmosphere at Brandon, Manitoba, has been 4·55 degrees Fahrenheit warmer than at Lacombe, Alberta, and 6·16 degrees higher than at Beaverlodge. It is reasonable to expect that there would be a corresponding difference in soil temperatures, which would explain some peculiarities in cropping results at the Central and Northern Alberta Stations as compared with results in Manitoba. On the other hand, judging from records for the year 1921, the temperature at Ottawa averages considerably higher than that at Brandon—enough to suggest a striking disparity between Ontario and Western conditions.

But whilst comparisons of atmospheric temperatures are instructive, the evidence supplied by the soil thermograph charts is much more conclusive. The instrument is a Friez Soil and Water Thermograph and was installed last May. The bulb was buried so that its upper side was three inches beneath the surface of an exposed area of uncropped land which had been summer-fallowed the previous season also. According to thermometer records, the season was substantially above normal in respect to atmospheric temperature, the August maxima in particular running 8·32 degrees above the average for the preceding six years.

Following is a summarized comparison of the monthly means of maximum and minimum atmospheric temperatures for the summer of 1922 as compared with the averages for the years 1916-1921, inclusive:—

| | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| | ° F. | ° F. | ° F. | ° F. | ° F. | ° F. |
| Average mean temperature—1916–1921.. | 45·85 | 53·64 | 58·61 | 56·42 | 48·71 | 37·11 |
| Mean temperature—1922..... | 48·30 | 57·11 | 60·43 | 62·24 | 50·16 | 41·30 |

Examination of the thermograph charts shows that the automatic pen which inscribes the records did not reach 60 degrees Fahrenheit until the last day of May and on only forty days throughout the summer did it touch or pass that point, even momentarily. The highest twenty-four-hour average graph for the whole summer was only 59·25 degrees Fahrenheit on August 14, while the highest maximum reading was 64 degrees on August 18. A similar instrument at Swift Current, Saskatchewan, registered a maximum soil temperature of 82·5 degrees on August 3 while throughout the season the records averaged more than six degrees above those being indicated at Beaverlodge. On only ninety days did the indicator of the Beaverlodge thermograph pass the 55 degree mark during any portion of the twenty-four hours, and since the soil temperature drops fairly promptly as the sun descends, it is obvious that the average hours per day when the land was warm enough for even moderately active nitrification, must have been comparatively few. Is it any wonder that crops on summer-follow so rapidly outstrip those on fall or spring ploughing even in moist seasons; that June breaking (if properly worked to keep grass and weeds down) excels late breaking, whatever the moisture supply may be; that fall-ploughed grass land gives such poor crops the ensuing season; that our breaking never rots sufficiently to be back-set satisfactorily the same season; that nurse-crop seedings of grasses fall far below seedings made without nurse-crops; that old meadows devoid of legumes so soon become sod-bound and unproductive; that manure is slow in producing its effects; that nitrate of soda (which is extremely soluble) produced such prompt and striking results in 1922, both on old meadows and new seedings of grasses, or that inoculated legumes of the biennial and perennial classes so greatly outyield uninoculated?

Unquestionably, our soil temperatures are not favourable to rapid decay and nitrification, hence legumes which, when inoculated, take nitrogen from the air, are vitally important in northern agriculture.

The country in its pristine state supports a fine growth of native *leguminosae,* such as vetch, peavine and wild sainfoin, but the two former seem to need wind shelter, shade and moisture, and something to climb on, all of which they find in brulé. When these conditions are upset by the clearing of land, accompanied by repeated mowing or close grazing, the vetch and peavine largely disappear, the prairie becomes sod-bound with a lot of short grass, very scantily productive, except in the more favourable seasons. Meadows of tame grasses soon go the same way but the past two seasons have proven that inoculated patches of alfalfa grew strong and vigorous, where the Western Rye grass was dwarfed by drouth and lack of soluble plant food.

The accompanying comparison is interesting, bringing out a marked contrast between conditions at Beaverlodge, Grande Prairie, and at Swift Current, in southwestern Saskatchewan:—

TABLE showing number of days in each month of 1922 that the soil temperature, as registered by Friez thermographs, rose at any time above the respective degrees specified. (Note that this temperature represents maximum readings only, not means.)

| | Days above 50° Fahr. | | Days above 55° Fahr. | | Days above 60° Fahr. | | Days above 70° Fahr. | |
|---|---|---|---|---|---|---|---|---|
| | Beaver-lodge | Swift Current | Beaver-lodge | Swift Current | Beaver-lodge | Swift Current | Beaver-lodge | Swift Current |
| 1922 | | | | | | | | |
| May | 9 | 20 | 4 | 11 | 1 | 6 | ..... | ..... |
| June | 29 | 30 | 24 | 29 | 4 | 25 | ..... | 13 |
| July | 31 | 31 | 30 | 31 | 16 | 28 | ..... | 23 |
| August | 31 | 31 | 30 | 31 | 19 | 30 | ..... | 12 |
| September | 16 | 26 | 2 | 19 | ..... | 7 | ..... | ..... |
| October | ..... | 4 | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | 116 | 142 | 90 | 121 | 40 | 96 | ..... | 48 |

Let us make another comparison, taking the monthly means of the maximum and minimum daily readings at Beaverlodge and comparing them with the monthly means of the daily readings at Swift Current.

TABLE showing monthly means of maximum and minimum daily soil temperatures at Beaverlodge, Alta., and Swift Current, Sask., for the summer of 1922.

| Month | Beaver-lodge | Swift Current |
|---|---|---|
| | ° F. | ° F. |
| May 4 to 31 | 44·10 | 48·63 |
| June | 52·29 | 60·69 |
| July | 55·48 | 63·48 |
| August | 55·88 | 61·73 |
| September | 47·02 | 51·30 |
| Average of means | 50·95 | 57·16 |

## PRECIPITATION AND EVAPORATION

Early in May an evaporimeter was installed in an open location on the lawn. It consisted of a circular galvanized-iron tank four feet in diameter and two feet deep, filled with water to within two inches of the top and never allowed to fall below four inches from the top. Measurements were taken weekly and the depth of the week's precipitation added so as to give the total amount of vaporation from a free-water surface. The tank was in the ground with a projection of an inch or so to prevent water running in. It was screened from birds and animals by a fine-mesh poultry netting stretched over a neat, painted, octagonal frame. Following is the comparative record of precipitation and total evaporation by months:—

RECORD OF PRECIPITATION AND EVAPORATION, MAY 13 TO OCTOBER 31, 1922

| Month | Precipitation | Evaporation |
|---|---|---|
| | ins. | ins. |
| May 13 to 31 | 0·59 | 2·55 |
| June | 0·38 | 5·00 |
| July | 0·44 | 4·57 |
| August | 0·54 | 4·26 |
| September | 1·44 | 2·52 |
| October 1 to 21 | 0·07 | 0·94 |
| Totals | 3·46 | 19·84 |

## SUNSHINE RECORDS

A standard sunshine recorder was installed on August 1 but the prevalence of smoke so obscured the sun that it failed to record very many hours in the late summer or fall, while accumulation of hoar-frost on the glass orb has had a similar effect part of the time during the winter. Following are hours of bright sunshine registered per month.

RECORD OF SUNSHINE FROM AUGUST 1, 1922, TO DECEMBER 31, 1922

| Month | Number hours bright sunshine |
|---|---|
| August | 255·9 |
| September | 136·6 |
| October | 139·9 |
| November | 68·3 |
| December | 44·9 |

## PRECIPITATION AND TEMPERATURES

The 1920 report of this Station contained a summary of the monthly precipitation and temperature records for the five years 1916-1920. Below are similar data for the years 1921 and 1922 with seven-year averages carried down to date.

METEOROLOGICAL RECORD DOMINION EXPERIMENTAL STATION, BEAVERLODGE, ALTA., 1921

| Month | Average monthly temperatures | | Snowfall | Precipitation | Sleighing days |
|---|---|---|---|---|---|
| | Maximum | Minimum | | | |
| | ° F. | ° F. | ins. | ins. | days |
| January | 13·2 | −1·3 | 14·0 | 1·4 | 31 |
| February | 28·3 | 9·8 | 8·0 | 0·97 | 28 |
| March | 28·61 | 9·09 | 12·0 | 1·2 | 31 |
| April | 50·13 | 28·93 | ..... | 0·03 | 5 |
| May | 59·67 | 36·69 | ..... | 1·65 | ..... |
| June | 68·16 | 41·63 | ..... | 2·04 | ..... |
| July | 70·77 | 44·96 | ..... | 1·89 | ..... |
| August | 66·25 | 44·33 | ..... | 2·51 | ..... |
| September | 56·41 | 34·68 | ..... | 2·69 | ..... |
| October | 52·19 | 32·90 | ..... | 0·67 | ..... |
| November | 23·63 | 9·90 | 4·6 | 0·91 | ..... |
| December | 26·77 | 8·54 | 6·0 | 0·6 | 18 |
| Averages | 45·34 | 25·01 | ..... | ..... | ..... |
| Totals | ..... | ..... | 44·6 | 16·56 | 113 |
| Mean annual temperature | 35·17 | | | | |

METEOROLOGICAL RECORD DOMINION EXPERIMENTAL STATION, BEAVERLODGE, ALTA., 1922

| Month | Average monthly temperatures | | Snowfall | Total precipitation | Sleighing days |
|---|---|---|---|---|---|
| | Maximum | Minimum | | | |
| | ° F. | ° F. | ins. | ins. | days |
| January | 22·67 | 5·03 | 17·5 | 1·75 | 31 |
| February | 9·21 | −8·82 | 17·5 | 1·75 | 28 |
| March | 26·87 | 5·70 | 12·0 | 1·20 | 31 |
| April | 45·43 | 26·86 | 1·0 | 0·10 | 7 |
| May | 60·06 | 36·54 | 10·0 | 2·11 | ..... |
| June | 71·20 | 43·03 | ..... | 0·38 | ..... |
| July | 75·80 | 45·06 | ..... | 0·44 | ..... |
| August | 76·42 | 48·06 | ..... | 0·54 | ..... |
| September | 62·16 | 38·16 | ..... | 1·44 | ..... |
| October | 52·93 | 29·67 | 2·0 | 0·61 | ..... |
| November | 34·50 | 18·76 | 4·0 | 0·78 | ..... |
| December | 11·87 | 3·71 | 8·0 | 0·80 | 29 |
| Averages | 45·76 | 24·31 | ..... | ..... | ..... |
| Totals | ..... | ..... | 72·0 | 11·90 | 126 |
| Mean annual temperature | 35·03 | | | | |

SEVEN YEAR AVERAGE—1916 TO 1922

| — | Mean annual temperature | Snowfall | Precipitation | Sleighing days |
|---|---|---|---|---|
| | ° F. | ins. | ins. | days |
| Totals, 7 years | 237·72 | 471·6 | 112·646 | 925 |
| Averages, 7 years | 33·96 | 67·3 | 16·092 | 132 |

GRAIN AND LIVE STOCK SHIPMENTS FROM THE PEACE RIVER REGION

To Mr. J. A. Macgregor, Manager of the Edmonton, Dunvegan and British Columbia Railway, which, leading northwestward from Edmonton and forking at McLennan, affords the only present means of rail transport for the Peace River country, we are indebted for the subjoined figures of grain shipped out between September 1, 1921, and June 24, 1922, thus representing practically the exportable surplus of the 1921 crop.

For the purpose of compiling this report, the various shipping points have been grouped by regions. It will be noticed that the Grande Prairie district is the heaviest contributor with 644,000 bushels of wheat and 516,000 of coarse grains, making a total of 1,160,000 bushels. When it is taken into consideration that only a very minor fraction of Grande Prairie is yet broken and that the said district is but a very small proportion of the area available for settlement in the North country, some idea of the possibilities of Canada's hinterland may be conceived. All told, the Dunvegan line delivered into Edmonton, from the 1921 crop, over three and a half million bushels of grain in the period specified. Furthermore, during the calendar year of 1922 there were shipped into Edmonton off these lines 1,060 carloads of cattle, hogs and sheep. And, what with its newness and remoteness from world markets, the country is but in the swaddling-clothes infancy of its development.

TABLE OF GRAIN SHIPMENTS BY DISTRICTS OVER EDMONTON, DUNVEGAN AND BRITISH COLUMBIA RAILWAY BETWEEN SEPTEMBER 1, 1921, AND JUNE 24, 1922

| — | Wheat | Coarse grains | Aggregate |
|---|---|---|---|
| | bush. | bush. | bush. |
| From ten points between Edmonton and Athabasca river | 217,000 | 653,500 | 870,500 |
| From four points between Lesser Slave lake and Smoky river | 14,000 | 230,500 | 244,500 |
| From three points in Spirit River region | 196,000 | 258,000 | 454,000 |
| From three points in Grande Prairie district | 644,000 | 516,000 | 1,160,000 |
| From four points on the Peace River-Berwyn extension | 593,000 | 179,500 | 772,500 |
| Totals | 1,664,000 | 1,837,500 | 3,501,500 |

Mr. Macgregor also furnishes the following record of cars of cattle, sheep and swine from all districts by months in 1922:—

January, 49 cars; February, 52; March, 50; April, 53; May, 72; June, 49; July, 83; August, 40; September, 83; October, 249; November, 174; December, 106; making a total of 1,060 cars. Of these 734 carloads were cattle, 296 were hogs, and the remaining 30 carlots were sheep.

## FORAGE CROPS

The fundamental importance of forage crops as a means of providing conditions for successful live stock raising and developing therewith a fertility-conserving system of farm husbandry amply warrants the large amount of attention being concentrated on this line of investigation at Beaverlodge. Some of the difficulties are novel and stubborn. Broadly speaking, it is much easier to produce heavy tonnages of cereal than of fodder crops, notwithstanding the greater frost resistance of most of the latter class.

### A PAGE FROM NATURE

In its pristine state the country produces its best growth in the vicinity of scrub or brule, where the sweep of cold, drying winds is checked; where leaf mould conserves moisture, at the same time favouring free areation of the soil; and where brush provides something for the wild vetch and peavine to climb. Where these conditions obtain, the naturally inoculated wild legumes make rank growth even though hot fires have consumed much of the vegetable mould, and accompanying the legumes, or in their wake, grasses flourish. Clearing, grazing and mowing soon change all this. As the open spaces widen, winds sweep across them, sucking the moisture out of the surface soil, even when there is still a fair supply in the subsoil. It is probable, too, that the heat developed by the direct rays of the sun is at times absorbed by the cold spring and early-summer winds. At all events the big open spaces become sere and scantily productive of herbage except for a few weeks when growing conditions are at their best, so that a ton of hay every alternate year is about the average production per acre. Plough up that same sod in June or early July, cultivate so as to conserve moisture and rot the sod and three or four tons per acre of thoroughly-cured oat bundles may be grown the next year without any difficulty at all. It is a dual question of available moisture and soluble plant food.

If, instead of being sown to oats, the land be seeded to grass, a liberal tonnage may be likewise secured but the longer the ley persists the scantier becomes the crop—at least until a minimum point is reached—because the physical conditions revert to those prevailing on the open prairie spaces and are usually remedied only by a repetition of the tillage process. Thus we glimpse why perennial hay crops, especially non-leguminous, shallow-rooted ones, are so sparingly productive in the West.

## OTHER HANDICAPS OF THE HAY CROPS

But there are other factors: Hay crops mature early in the season and consequently require their moisture and plant food early. In a district where April, May, and the early part of June are frequently dry and too cool for vital processes to be active in the soil, it stands to reason that grasses will be handicapped as compared with grains. Furthermore, their seeds furnish the seedling plants a scant fund of nutriment, and these are slower than grain plants in occupying the land. This factor in particular makes new seedlings of them very susceptible to infestation by prolific seeding, fast-growing annual weeds, such as Lamb's Quarters, Buckwheat, Shepherd's purse, Mustard, and others, not to mention perennials like Couch grass, Sweet grass, and Rose briars. Thus it comes that land which would grow an apparently clean crop of grain will, when seeded down, produce a dirty crop of hay unless very special culture be given. If seeded alone the weeds grow like trees the first year. If seeded with a nurse crop the weeds compete all too successfully the ensuing spring.

The growing of most leguminous hay crops, which are nearly all moisture lovers, is particularly handicapped by the rather usual early seasonal drouth. which is also, along with other factors, adverse to the culture of root crops. Millet and corn are restricted by temperatures. Sunflowers are sufficiently frost-hardy on a considerable percentage of farms but only moderate as drouth resisters and their value in the feeder's economy is not yet precisely determined.

It is apparent, then, that while the growing of grain crops is easy enough, apart from the frost hazard, forage-crop production is fraught with difficulties—difficulties, however, which can and must be solved. Towards their solution the Station is bending its best energies, seeding many hundreds of plots each year. Much of the work is still in progress, and current reports are largely in the nature of carrying the data forward with a view to future digest and compilation. If, therefore, our numerous tables strike the casual reader as academic exercises in mathematics we suggest that he leave these for the investigator and confine his attention to the deductions.

## SOME IMPORTANT DEDUCTIONS

A few practical points of prime importance may be here epitomized:—

Among grasses and clovers the hardiest, most drouth-resistant and most aggressive weed fighters should be chosen, with odds in favour of species which do not come to maturity too early in the season. By far the best adapted grasses so far tested are Brome grass and Western rye. Of the legumes the most likely are alfalfa for hay and Sweet clover for pasture, with some hope resting upon the Late Swedish Red Clover (Altaswede).

In all cases by far the largest yields of hay are obtained by seeding without nurse crops, though whether more profitable or not it is too soon to say. When a nurse crop is used it should not be sown long ahead of the small seeds.

Seeding alone and pasturing during the initial season is being tried as a means of keeping annual weeds from seeding while developing a strong stand capable of making rapid growth the second season. In this test good catches of brome and Western Rye grass and partial stands of alfalfa and Sweet clover were secured by July seeding even in a drouthy year.

Of the various legumes and grasses tried in mixtures, a blend of alfalfa and Western Rye grass has promised best for hay.

In the matter of dormant injury the winter of 1921-22, though moderate enough as to temperatures, proved the most serious to date, owing largely to lack of the usual snow protection until quite late. Common perennial and biennial

forage crops emerged in about the following order as to winter hardiness: (1) The grasses; (2) alfalfa; (3) White Dutch clover; (4) alsike clover; (5) sweet clover; (6) red clover.

In the matter of recuperative power the Sweet clover excelled the other legumes.

Generally speaking, the clovers wintered best on stands that did not reach full-blossom stage in the season of seeding. For the first time it was found that the clipped halves of the clover plots wintered more successfully than the unclipped.

The hardier strains of alfalfa have exhibited but little tendency to winter killing at Beaverlodge, when vigorous inoculated stands were obtained. Weeds and long-continued drouth are greater drawbacks. Brief periods of dry weather are well withstood by the deep-ranging roots.

Sweet clover, though less winter-hardy than the strains of alfalfa employed in the tests, is more productive under drouth.

All the comomn hay crops seed abundantly at Beaverlodge, though alfalfa never ripened much of its seed until 1922.

Inoculation has been shown to be a prime essential in the successful culture of the ordinary biennial and perennial legumes. With peas it has not been so vital, presumably because the preparatory tillage liberates a supply of soil nitrogen to carry the crop fairly well through one summer.

In two successive seasons alfalfa roots from one-year-old stands have been excavated to a depth of four feet and over, in very hard clay subsoils.

Corn has yielded but scantily. Sunflowers have run from as low as three tons per acre under adverse field conditions to as high as forty-four tons per acre in small plots under intensive culture in the garden. (See 1921 report.)

Field roots are a very irregular crop except under gardening conditions, by means of which ample crops of turnips can always be grown, while beet crops are also productive under the same conditions, although not so easy to start successfully and more subject than turnips to decay as the result of exposure to untoward autumn cold snaps.

## NOTES ON THE SUCCESSIVE SEASONS

In order that the results comprehended in the tables presented further on in this report may be intelligibly interpreted, we present herewith condensed notes on the successive seasons represented:—

*Seasonal Notes, 1919.*—Early disappearance of snow was followed by a prolonged period of cold, dry, windy weather, with some hard frosts during May. Although grasses and clovers had wintered well the new meadows made very slow growth, especially when they followed nurse crops, while old meadows were almost a failure. From the 1st of May to middle of July the total precipitation was only 4·16 inches. From the middle of July to the middle of September the rainfall was exceptionally copious, totalling 5·48 inches. By months it ran:—

| | | |
|---|---|---|
| April | 0·82 | inches |
| May | 1·04 | " |
| June | 2·48 | " |
| July | 2·22 | " |
| August | 2·14 | " |
| September | 1·78 | " |
| October | 2·18 | " |
| Total summer precipitation | 12·66 | " |

*Seasonal Notes, 1920.*—Following a long, hard winter with over eleven feet of snowfall saturating yet more thoroughly during the winter and spring a subsoil already well moistened by heavy precipitation in the fall of 1919, spring seeding

opened about the middle of May and after ten days' progress was interrupted by a prolonged period of wet weather. Precipitation by months was as follows:—

| | | |
|---|---|---|
| April | 1·82 | inches |
| May | 1·15 | " |
| June | 3·17 | " |
| July | 2·52 | " |
| August | 2·66 | " |
| September | 1·80 | " |
| October | 1·65 | " |
| Total summer precipitation | 14·77 | " |

*Seasonal Notes, 1921.*—This was the third successive season characterized by copious rainfall during the later weeks of the summer. The bulk of the April to September precipitation occurred after the middle of July, April being dry and rather warmer than usual. The first grain plots were sown April 18. The summer precipitation by months was:—

| | | |
|---|---|---|
| April | 0·03 | inches |
| May | 1·65 | " |
| June | 2·04 | " |
| July | 1·89 | " |
| August | 2·51 | " |
| September | 2·69 | " |
| October | 0·67 | " |
| Total summer precipitation | 11·48 | " |

*Seasonal Notes, 1922.*—A rather mild winter with practically no snow until the latter half of January was followed by a normal spring, sleighing terminating on April 7. Grain seeding commenced at the Station on April 26. About ten inches of snowfall occurred May 8, followed by showers. Extreme drouth was experienced from the middle of May forward, with less than two inches of rainfall from then until the 2nd of August. A light snowfall on June 5 supplied a fifth of an inch of moisture and was followed by six degrees of frost, injuring cereals in some regions though not perceptibly on the Station. Small seeds evinced extremely slow, sparse and irregular germination, excepting the very earliest sowings.

Precipitation and evaporation by months were as follows:—

| | Precipitation | Evaporation |
|---|---|---|
| | ins. | ins. |
| April | ·10 | ..... |
| May 1 to 12 | 1·52 | ..... |
| May 13 to 31 | ·59 | 2·55 |
| June | ·38 | 5·00 |
| July | ·44 | 4·57 |
| August | ·54 | 4·26 |
| September | 1·44 | 2·52 |
| October 1 to 21 | ·07 | % ·94 |
| October 22 to 31 | ·54 | ..... |
| | 5·62 | 19·84 |

## NURSE CROP EXPERIMENTS

A very important line of elemental experimentation is conducted at Beaverlodge under the name of the Main Nurse Crop Experiment, of which the fifth repetitive seeding was made in 1922. In this test, as originally designed, ten

kinds of grasses and clovers (including alfalfa) are sown in strips across four quarter-acre blocks of cereals and extending beyond these into a couple of check ranges seeded with nurse crops, one of the check ranges being always seeded on the same date as the strips through the grains, while the duplicate range is reserved for seeding ten days to a fortnight later. The check ranges ordinarily produce quite a growth of hay in the year of seeding. To test the advisability of leaving or removing this growth the south half of each plot in both check ranges is clipped in late summer and the clippings cured into hay. The north half is left untouched. Thereafter, yields of the two halves are taken separately until the sod is ploughed up. Thus there are virtually one hundred and twenty fortieth-acre plots of clover and alfalfa seeded with nurse crops and forty eightieth-acre plots in the two check ranges—one hundred and sixty in all. For fuller details as to rates of seeding, etc., the reader is referred to earlier reports of the Station.

To the plan as outlined occasional supplements have been added. For example, in the 1919 seeding an extra block of late-sown oats was drilled in and the ten grasses and clovers seeded promptly thereon with a view to determining whether when a nurse crop was used a late sowing of it would give any better chance to the "seeds." This block was designated the "green-feed block" in the Nurse Crop Experiment. Results from it seemed quite encouraging in the season of seeding but unfortunately the hopes raised were not fully borne out in the next and subsequent years.

### THE 1919 SEEDING

From the 1919 seeding of the Nurse Crop Experiment the grasses were left to produce three successive hay crops following the year of seeding. The legumes failed for lack of inoculation and had to be sacrified. Promptly after the last crop of hay was removed the sod was ploughed August 23 to 25. As usual, it was found that the rye-grass sod was the easiest to plough and to kill by disking. Brome, Kentucky blue and timothy sods were tough in about the order of mention, and the brome volunteered considerably in spite of disking.

As to hay yields, it will be noticed that the dry summer told heavily on all the grasses, though from a comparative standpoint brome and western rye emerged with flying colours as by far the most drouth-resistant. A little allowance must be made for the timothy, which in 1919—but never before nor afterwards—had been seeded at the rate of nine pounds per acre, this tending quickly to a sod-bound condition, especially in the check ranges, where the strongest plants had developed in the season of seeding. However, timothy fell down hard in 1922 in every experiment where it occurred. Very few plots of it produced a yield worth the labour of cutting and curing. Clay knolls had but a few short spears.

Nurse Crop table 1 brings out a very illuminating comparison of the five grasses involved. While the average 1922 crop of timothy from seventeen plots of the 1919 seeding was only 221 pounds per acre; of meadow fescue 330 and of Kentucky blue 525, the corresponding seventeen plots of western rye grass averaged 866 pounds and the same number of brome plots 1,345 pounds of hay per acre.

The same table impressively sums up three years' crop from all the plots and four crops from the south halves of the check ranges.

### GRAIN YIELDS OF THE NURSE CROPS

In endeavouring to arrive at a balanced judgment of the advantages of using a nurse crop versus seeding alone it is important to consider the yield of grain obtained in the one case, setting it against the extra tonnage of hay in

the other. Without at this time going too minutely into details it may be noted that the average yield of the four rates of sowing of Victory oats in 1919 was 82·37 bushels per acre; of four plots of Marquis wheat 47·6 bushels, and of four plots of O.A.C. No. 21 barley approximately 50 bushels per acre. The "green-feed" block of late-sown oats yielded from two swaths cut August 22, when barely in the milk, about three tons cured sheaves per acre. Such yields of grain compensate for quite a large shortage in the ensuing season's yield of hay, especially seeing that the second hay crop after a nurse-crop seeding quite often equals the corresponding crop from stands seeded alone.

It narrows down to this:—

*Where the object is the greatest possible crop of hay in the year following the seeding, it is certain to be produced by seeding alone, providing the weeds do not swamp it. Right here in the weed question is the real crux of the problem.*

COMPARING YIELDS OF HAY in pounds per acre from the five grasses seeded in 1919 in the Main Nurse Crop Experiment. Three successive years' results, except in the case of the south halves of the check ranges (clipped in the year of seeding) where four crops are given. To condense the table the yields of these areas in the initial season are doubled up in the columns with the 1920 yields.

| Designation of seeding | Timothy seeded at 9 lbs. per acre | | | | Western rye seeded at 9 lbs. per acre | | | | Meadow fescue seeded at 18 lbs. per acre | | | | Kentucky blue seeded at 18 lbs. per acre | | | | Brome grass seeded at 18 lbs. per acre | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *1920 | 1921 | 1922 | Ag'te. | *1920 | 1921 | 1922 | Ag'te. | *1920 | 1921 | 1922 | Ag'te. | *1920 | 1921 | 1922 | Ag'te. | *1920 | 1921 | 1922 | Ag'te. |
| Seeded alone. North half of Check Range B. (Not clipped year of seeding) | 2,700 | 480 | 160 | 3,340 | 2,500 | 2,160 | 720 | 5,380 | 4,600 | 960 | 240 | 5,800 | 3,110 | 520 | 480 | 4,110 | 6,900 | 1,360 | 1,160 | 9,420 |
| Seeded alone. South half of Check Range B. (Clipped year of seeding) | 2,320 / 3,000 | 440 | 20 | 5,780 | 800 / 4,640 | 1,480 | 720 | 7,640 | 560 / 3,040 | 880 | 520 | 5,000 | 0 / 2,950 | 520 | 560 | 4,030 | 1,840 / 7,300 | 1,760 | 1,120 | 12,020 |
| Seeded alone. North half of Check Range A. (Not clipped year of seeding) | 2,950 | 520 | 200 | 3,670 | 4,400 | 2,160 | 960 | 7,520 | 4,350 | 1,360 | 320 | 6,030 | 2,600 | 760 | 440 | 3,800 | 6,400 | 2,000 | 1,200 | 9,600 |
| Seeded alone. South half of Check Range A. (Clipped year of seeding | 2,640 / 4,350 | 280 | ..... | 7,270 | 1,360 / 6,400 | 2,040 | 960 | 10,760 | 320 / 4,800 | 1,360 | 320 | 6,800 | 0 / 4,240 | 440 | 960 | 5,640 | 1,920 / 7,600 | 2,440 | 1,520 | 13,480 |
| Seeded with 16 pecks Victory oats | 805 | 1,660 | 200 | 2,665 | 920 | 2,200 | 1,000 | 4,120 | 480 | 1,660 | 320 | 2,460 | ..... | 960 | 440 | 1,400 | 1,000 | 2,140 | 1,280 | 4,420 |
| Seeded with 14 pecks Victory oats | 630 | 900 | 160 | 1,690 | 960 | 1,860 | 540 | 3,360 | 520 | 1,640 | 360 | 2,520 | ..... | 1,160 | 600 | 1,760 | 1,000 | 2,200 | 1,720 | 4,920 |
| Seeded with 12 pecks Victory oats | 1,250 | 860 | 100 | 2,210 | 1,560 | 1,400 | 800 | 3,760 | 1,360 | 1,400 | 440 | 3,200 | ..... | 960 | 360 | 1,320 | 1,000 | 2,060 | 1,260 | 4,520 |
| Seeded with 10 pecks Victory oats | 1,520 | 1,360 | 260 | 3,140 | 1,680 | 1,760 | 780 | 4,220 | 1,720 | 1,520 | 260 | 3,500 | ..... | 960 | 360 | 1,320 | 1,000 | 2,060 | 980 | 4,040 |
| Seeded with 8 pecks Marquis wheat | 2,185 | 1,200 | 240 | 3,625 | 2,080 | 2,160 | 960 | 5,200 | 1,040 | 1,420 | 260 | 2,720 | ..... | 840 | 340 | 1,180 | 1,000 | 1,600 | 1,140 | 3,740 |
| Seeded with 7 pecks Marquis wheat | 1,645 | 1,180 | 340 | 3,165 | 1,280 | 1,880 | 890 | 4,050 | 1,160 | 1,220 | 300 | 2,680 | ..... | 940 | 520 | 1,460 | 1,000 | 1,780 | 1,280 | 4,060 |
| Seeded with 6 pecks Marquis wheat | 1,235 | 1,220 | 520 | 2,975 | 1,320 | 2,320 | 1,160 | 4,800 | 600 | 1,760 | 340 | 2,700 | ..... | 1,340 | 600 | 1,940 | 1,000 | 2,900 | 1,640 | 5,540 |
| Seeded with 5 pecks Marquis wheat | 1,020 | 1,320 | 360 | 2,700 | 1,600 | 1,940 | 1,060 | 4,600 | 400 | 2,180 | 500 | 3,080 | ..... | 1,420 | 840 | 2,260 | 1,000 | 2,600 | 1,680 | 5,280 |
| Seeded with 10 pecks O.A.C. No. 21 barley | 1,425 | 1,560 | 240 | 3,225 | 920 | 1,980 | 1,060 | 3,960 | 800 | 1,620 | 340 | 2,760 | ..... | 1,140 | 440 | 1,580 | 1,000 | 2,400 | 1,140 | 4,540 |
| Seeded with 8 pecks O.A.C. No. 21 barley | 1,620 | 1,520 | 380 | 3,520 | 1,000 | 2,300 | 940 | 4,240 | 680 | 1,720 | 440 | 2,840 | ..... | 1,240 | 900 | 2,140 | 1,000 | 3,000 | 1,800 | 5,800 |
| Seeded with 6 pecks O.A.C. No. 21 barley | 975 | 1,380 | 260 | 2,615 | 1,320 | 2,200 | 1,100 | 4,620 | 800 | 1,420 | 420 | 2,640 | ..... | 1,360 | 700 | 2,060 | 900 | 2,360 | 1,620 | 4,880 |
| Seeded with 4 pecks O.A.C. No. 21 barley | 850 | 960 | 200 | 2,010 | 1,640 | 1,640 | 520 | 3,800 | 920 | 1,020 | 120 | 2,060 | ..... | 960 | 240 | 1,200 | 1,000 | 1,640 | 1,120 | 3,760 |
| Seeded with 6 pecks oats for green feed | 920 | 600 | 120 | 1,640 | 1,440 | 1,740 | 560 | 3,740 | 1,160 | 1,060 | 120 | 2,340 | ..... | 1,000 | 160 | 1,160 | 1,280 | 1,880 | 1,200 | 4,360 |
| Averages (17 plots in each case) | 2,002 | 1,026 | 221 | 3,249 | 2,225 | 1,954 | 866 | 5,045 | 1,724 | 1,423 | 330 | 3,478 | 758 | 971 | 525 | 2,256 | 2,655 | 2,140 | 1,345 | 6,140 |
| Averages 13 plots seeded with nurse crops | 1,237 | 1,209 | 260 | 2,706 | 1,363 | 1,952 | 875 | 4,190 | 895 | 1,511 | 324 | 2,730 | ..... | 1,098 | 500 | 1,598 | 1,014 | 2,217 | 1,374 | 4,650 |
| Averages 4 plots seeded without nurse crops | 4,490 | 430 | 95 | 5,015 | 5,025 | 1,960 | 840 | 7,825 | 4,417 | 1,140 | 350 | 5,907 | 3,225 | 560 | 610 | 4,395 | 7,990 | 1,890 | 1,250 | 11,130 |

*(Including 1919 crop from S. Halves Check Ranges).

## THE 1920 SEEDING

For reasons detailed in the previous report, all the nurse crop seedings of legumes and three ranges of grass plots of the 1920 seeding had to be ploughed up in the ensuing spring. Nurse Crop table 2 tabulates the hay yields of the standing plots of the grasses. It agrees with table 1, covering the 1919 seeding, in establishing the decided superiority of brome and western rye as drouth resisters. The other grasses were nowhere in the comparison, save on occasional plots where contour assured them a more-than-average supply of moisture. Timothy in this instance shows up slightly better than in the 1919 seeding, relative to fescue and Kentucky blue. This was probably due to thinner seeding and one year's briefer ley. In the check ranges Kentucky blue did nearly as well as timothy, but the nurse crop seedings of it were too weak to produce any crop worth mentioning, even in this the second cropping season. A tendency of Kentucky blue is here strikingly exemplified. It requires a long time to establish itself. Nurse crop seedings of it have never in our tests yielded any hay until the third season. In the first year after the grain they merely develop a bottom.

It may be observed that one plot of brome (the south half of Check Range A) gave an almost negligible yield in 1922. It is fortunate that the plan and scope of the Nurse Crop Experiment affords opportunity for extensive averaging and cross-averaging, thus virtually assuring the advantages which elaborate replication would otherwise be necessary to secure.

GRAIN YIELDS OF THE 1920 NURSE CROPS

| | | | |
|---|---|---|---|
| Average yield of four quarter-acre blocks Ligowo oats.....per acre | 98 bush. | 28 lbs. | |
| Average yield of four quarter-acre blocks of Huron wheat slightly frosted..... " | 39 " | 11 " | |
| Average yield of four quarter-acre blocks O.A.C. No. 21 barley " | 53 " | 22 " | |

COMPARING YIELDS OF HAY in pounds per acre from the five grasses seeded in 1920 in the Main Nurse Crop Experiment. Two successive years' results in all cases and three years' crop in the case of the south halves of the check ranges (clipped in the year of seeding). To condense the table the yields of these areas in the initial season are doubled up in the columns carrying the 1921 yields.

| Description of Seeding | Timothy at 6 lbs. per acre | | | Western rye at 9 lbs. p. ac. | | | Meadow fescue at 18 lbs. p. ac. | | | Kentucky blue at 18 lbs. p. ac. | | | Brome at 18 lbs. p. ac. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *1921 | 1922 | Ag'te. | *1921 | 1922 | Ag'te. | *1921 | 1922 | Ag'te. | *1921 | 1922 | Ag'te. | *1921 | 1922 | Ag'te. |
| Seeded alone. North half of Check Range B. (Not clipped year of seeding | 2,160 | 240 | 2,400 | 4,160 | 1,080 | 5,240 | 3,000 | 200 | 3,200 | 2,280 | 560 | 2,840 | 5,880 | 2,320 | 8,200 |
| Seeded alone. South half of Check Range B. (Clipped year of seeding | 400 / 2,080 | 280 | 2,760 | 800 / 4,160 | 880 | 5,840 | 3,200 | 80 | 3,280 | 1,520 | 120 | 1,640 | 1,040 / 2,560 | 640 | 4,240 |
| Seeded alone. North half of Check Range A. (Not clipped year of seeding) | 2,800 | 320 | 3,120 | 5,520 | 960 | 6,480 | 3,400 | 80 | 3,480 | 1,480 | 240 | 1,720 | 4,160 | 2,040 | 6,200 |
| Seeded alone. South half of Check Range A. (Clipped year of seeding | 1,680 / 2,000 | 200 | 3,880 | 1,840 / 4,080 | 1,560 | 7,480 | 2,920 / | 80 | 3,000 | 960 | 200 | 1,160 | 1,280 / 3,080 | 40 | 4,400 |
| Seeded with 16 pecks Ligowo oats | 740 | 120 | 860 | 1,400 | 580 | 1,980 | 820 | 100 | 920 | ..... | 20 | 20 | 680 | 860 | 1,540 |
| Seeded with 14 pecks Ligowo oats | 800 | 20 | 820 | 2,040 | 1,060 | 3,100 | 1,020 | 100 | 1,120 | ..... | 20 | 20 | 1,040 | 1,140 | 2,180 |
| Seeded with 12 pecks Ligowo oats | 680 | 80 | 760 | 1,640 | 1,040 | 2,680 | 1,340 | 80 | 1,420 | ..... | 20 | 20 | 880 | 1,000 | 1,880 |
| Seeded with 10 pecks Ligowo oats | 680 | 60 | 740 | 1,480 | 900 | 2,380 | 980 | 100 | 1,080 | ..... | 20 | 20 | 1,080 | 980 | 2,060 |
| Seeded with 8 pecks Huron wheat | 1,480 | 180 | 1,660 | 2,040 | 920 | 2,960 | 1,220 | 200 | 1,420 | ..... | 20 | 20 | 1,520 | 1,580 | 3,100 |
| Seeded with 7 pecks Huron wheat | 1,560 | 240 | 1,800 | 2,560 | 980 | 3,540 | 1,220 | 280 | 1,500 | ..... | 80 | 80 | 1,840 | 2,080 | 3,920 |
| Seeded with 6 pecks Huron wheat | 1,120 | 220 | 1,340 | 2,840 | 1,060 | 3,900 | 1,580 | 180 | 1,760 | ..... | 80 | 80 | 1,120 | 1,300 | 2,420 |
| Seeded with 5 pecks Huron wheat | 1,240 | 160 | 1,400 | 2,800 | 900 | 3,700 | 1,560 | 140 | 1,700 | ..... | 140 | 140 | 1,340 | 1,700 | 3,040 |
| Seeded with 8 pecks O.A.C. 21 barley | 1,840 | 380 | 2,220 | 2,240 | 1,380 | 3,620 | 1,180 | 140 | 1,320 | ..... | 40 | 40 | 800 | 640 | 1,440 |
| Seeded with 7 pecks O.A.C. 21 barley | 720 | 200 | 920 | 1,980 | 960 | 2,940 | 1,340 | 160 | 1,500 | ..... | 80 | 80 | 760 | 960 | 1,720 |
| Averages (14 plots in each case) | 1,570 | 193 | 1,763 | 2,970 | 1,018 | 3,988 | 1,770 | 137 | 1,907 | 446 | 117 | 563 | 2,076 | 1,234 | 3,310 |
| Averages 10 plots seeded with nurse crops | 1,086 | 166 | 1,252 | 2,102 | 978 | 3,080 | 1,226 | 148 | 1,374 | ..... | 52 | 52 | 1,106 | 1,224 | 2,330 |
| Averages 4 plots seeded without nurse crops | 2,780 | 260 | 3,040 | 5,140 | 1,120 | 6,260 | 3,130 | 110 | 3,240 | 1,560 | 280 | 1,840 | 4,500 | 1,260 | 5,760 |

*(Including 1920 crop from S. Check Ranges.)

## THE 1921 SEEDING

The 1921 seeding developed some facts of prime importance:—

(1) *Inoculation of Clovers made Nurse Crop Seedings Successful.*—In contrast to the first three years' work with this test, in all of which cases the legumes were sown without prompt or any inoculation and practically failed in consequence, the legume areas in 1921 were promptly inoculated, with results that stand as a complete reversal of the earlier experience. This time, notwithstanding drouth for some weeks after seeding, the clovers and alfalfa made practically a full stand among the cereals and had sufficient vigour to come through the very trying winter with a small percentage of mortality, though not without some root injury, attributed to lack of snow protection in the dormant season.

GOOD STAND FROM INOCULATED SEED

Alfalfa in a co-operative inoculation experiment, conducted under the auspices of the Beaverlodge Sta. by Gordon S. Moyer of Elmworth, Alta. Seeded June 1, 1921, with inoculated seed. Photographed early July, 1922. Note 18-inch stake barely visible in foreground. Yield of hay from one cutting 3,230 pounds per acre.

(2) *Clipping Clovers Reduced Winter-killing.*—For the first time in four years' trial the clipped halves of certain clover plots in the two check ranges (which are seeded without nurse crops) wintered better than the unclipped. This was conspicuously true in the case of red clover and alsike, but noticeable as well on the white dutch. With sweet clover it seemed also true when judged in the spring, although as the season progressed the unclipped areas of this crop improved and pulled decidely ahead of the clipped portions, outyielding them as in former years by a considerable margin. Why the sweet clover should have reacted differently in this respect than did the true clovers is not clear. Possibly, for one thing, the stubble had been cut a little too short, and there may be other factors. Alfalfa, like most of the grasses in the test, produced much more heavily in 1922 from areas not clipped in 1921. Alfalfa being a perennial might be expected to respond differently than biennials to the clipping treatment.

It would appear that while liberal top-growth is of distinct advantage in bringing clovers and alfalfa through the winter, yet in the case of certain of them this may sometimes be more than offset by allowing them to bloom too freely in the initial season, particularly if followed by a winter without snow protection. In 1922 an open fall had allowed the unclipped portions of the clover plots to come into full bloom, while the other portions were held back somewhat in their stage of development by cutting on August 24.

(3) *Alsike and Red Dwarfed by Drouth.*—The third point emphasized by the results from the 1921 seeding is that, even with inoculation to help it, the clovers, particularly alsike, are hopelessly dwarfed by a season of pronounced drouth. This is true in a measure of all the legumes, but notably of alsike, red clover and alfalfa in the order named. Sweet clover, if it survives the winter at all, has a great capacity to "come back" and is less restricted in yield by drouth than are any of the foregoing.

Both sweet clover and alfalfa, by reason of their deep-ranging roots, are able to grow vigorously through drouth if the subsoil has a good moisture supply. But when weather and soil are both dry growth is necessarily curtailed and of the two crops, sweet clover is able to withstand drouth and continue making top growth much better than alfalfa, notwithstanding the deeper root system of the latter. The biennial sweet clover gives all its energy to the production of crop in the second year, while the perennial alfalfa conserves energy to carry on into the third and subsequent seasons. Perhaps this explains the difference in their behaviour.

ALFALFA AS A DROUTH RESISTER

An inoculation test plot on the Station seeded June 3, 1921. Photographed July 1, 1922, when the first cutting was ready to mow. Height about 16 to 22 inches. Yield about 1¼ tons per acre after a 3 months' precipitation of 2.59 inches of which less than half an inch had occurred in the preceding six weeks.

All the common hay legumes, even to sweet clover, are moisture lovers and do relatively best in wet seasons. In very dry years native grasses and weeds get the better of them. Under irrigation alfalfa is a great weed fighter, and without irrigation it holds its own fairly well in humid summers.

Not only do the legumes seem directly handicapped by dearth of moisture but it also appears at times as though drouth diminished nodule development. Certainly it is much harder to find nodules in a dry season, even when pains

are taken to lift earth with the roots and soak it gently away. However, in the absence of more conclusive evidence this tentative opinion must stand as a mere speculation.

Be that it may, the season of 1922 emphasized that alsike and red clover are utter failures under drouth. The former, though presenting a good stand in nearly all the plots, did not grow tall enough to cut. It produced seed in great abundance, but some such attachment as a clippings receptacle on a lawn mower would have been required to collect the heads. The red clover did a little better, but its yield of hay was almost negligible. Because of a sprinkling of Shepherd's Purse all the standing plots of clover were disced up after haying with a view to germinating the weed seeds before ploughing. The same weed had led to a ploughing up in early spring of one-half the nurse-crop plots of both grasses and clovers. It is very evident that as the land becomes older and more generally polluted with weed seeds only the most vigorous-growing may be relied upon. Others will usually be permissible only if cultivated in rows.

### SEEDING ALONE AND PASTURING TO CONTROL WEEDS

In the 1921 seeding an extra range had been included to test the plan of pasturing in order to control weeds during the season of seeding. An area of land badly polluted with the seed of Shepherd's Purse was enclosed with a fence and a milch cow pastured on it from time to time. The area included seedings of the ten kinds of grasses and legumes used regularly in this experiment. The cow kept the weed down very well except in patches immediately surrounding her droppings. In August she was substituted by three sheep, which sheared off everything except a fringe around each lump of cow manure. Here some seed matured.

The close autumn grazing of the sheep proved rather severe on the clovers, especially as the ensuing winter was characterized by extremely little snow protection throughout much of its duration. Nevertheless, they all came through with at least partial stands, alfalfa being perhaps the best of the legumes, although the sinking of a well in the midst of the legume area marred the test and, together with other reasons, led to the whole block being ploughed up. The grasses made quite a promising early spring growth, and the outcome, so far as it went, afforded a measurement of encouragement.

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

| Description of Seeding | Alsike at 5 lbs. p.a. | | Common Red at 10 lbs. p.a. | | Alfalfa at 10 lbs. p.a. | | Sweet Clover at 10 lbs. p.a. | | Timothy at 6 lbs. p.a. | | Western Rye at 12 lbs. p.a. | | Meadow fescue at 18 lbs. p.a. | | Kentucky Blue at 18 lbs. p.a. | | Brome Grass at 18 lbs. p.a. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 | 1921 | 1922 |
| Seeded alone. North half of Check Range B. (not clipped in year of seeding) | ..... | ..... | ..... | 80 | ..... | 2,560 | ..... | 2,560<br>1,440 | ..... | 2,600 | ..... | 3,720 | ..... | 1,880 | ..... | 1,360 | ..... | 4,480 |
| Seeded alone. South half of Check Range B. (clipped in year of seeding) | 1,760 | ..... | 1,320 | 680 | 2,240 | 1,280 | 2,640 | 1,120<br>1,200 | 1,760 | 1,120 | 1,360 | 3,360 | ..... | 2,560 | 280 | 1,000 | 960 | 2,840 |
| Seeded alone. North half of Check Range A. (not clipped in year of seeding) | ..... | ..... | ..... | 480 | ..... | 1,840 | ..... | 2,240<br>1,360 | ..... | 1,520 | ..... | 3,360 | ..... | 1,320 | ..... | 640 | ..... | 3,000 |
| Seeded alone. South half of Check Range A. (clipped in year of seeding) | 480 | ..... | 660 | 1,160 | 1,040 | 1,360 | 2,160 | 1,720<br>880 | 1,360 | 400 | 1,040 | 1,960 | ..... | 1,960 | ..... | 1,480 | 180 | 3,320 |
| Seeded with 16 pecks Banner oats per acre | ..... | ..... | ..... | 240 | ..... | 740 | ..... | 840 | ..... | 640 | ..... | 1,040 | ..... | 740 | ..... | 480 | ..... | 640 |
| Seeded with 14 pecks Banner oats per acre | ..... | ..... | ..... | 200 | ..... | 520 | ..... | 820 | ..... | 560 | ..... | 700 | ..... | 600 | ..... | 380 | ..... | 840 |
| Seeded with 12 pecks Banner oats per acre | ..... | ..... | ..... | 140 | ..... | 440 | ..... | 640 | ..... | 280 | ..... | 700 | ..... | 460 | ..... | 300 | ..... | 740 |
| Seeded with 10 pecks Banner oats per acre | ..... | ..... | ..... | 220 | ..... | 420 | ..... | 780 | ..... | 660 | ..... | 800 | ..... | 540 | ..... | 420 | ..... | 900 |
| Seeded with 8 pecks Huron wheat per acre | ..... | ..... | ..... | 560 | ..... | 720 | ..... | 1,160 | ..... | 800 | ..... | 1,320 | ..... | 840 | ..... | 460 | ..... | 920 |
| Seeded with 7 pecks Huron oats per acre | ..... | ..... | ..... | 600 | ..... | 700 | ..... | 760 | ..... | 1,000 | ..... | 1,420 | ..... | 860 | ..... | 520 | ..... | 1,780 |
| Averages (10 plots in each case) | ..... | ..... | ..... | 436 | ..... | 1,058 | ..... | 1,752 | ..... | 958 | ..... | 1,838 | ..... | 1,176 | ..... | 704 | ..... | 1,946 |
| Averages 6 plots seeded with nurse crops | ..... | ..... | ..... | 327 | ..... | 590 | ..... | 833 | ..... | 657 | ..... | 997 | ..... | 673 | ..... | 427 | ..... | 970 |
| Averages 4 plots seeded without nurse crops | ..... | ..... | ..... | 600 | ..... | 1,760 | ..... | 3,130 | ..... | 1,410 | ..... | 3,100 | ..... | 1,930 | ..... | 1,120 | ..... | 3,410 |

*Notes on Grass and Legume Seedings of 1921*

(1) Land unevenly prepared. Part of the alsike and red clover plots in the check ranges followed hoe crop, chiefly turnips, after which the growth was much less rank than after fallow. The brome, Kentucky blue and meadow fescue followed hoe crop, chiefly potatoes, while the remaining plots were on land fallowed in 1920. The land where the nurse crop occurred was partly as above but the barley and thinnest seedings of wheat followed very diverse cropping and treatment.

(2) The legumes were inoculated by broadcasting soil. Satisfactory catches were thus obtained among the grain but drouth curtailed the yield in 1922 and weeds obliged the ploughing up of the legumes seeded with barley and with the two thinnest sowings of wheat.

(3) After haying in 1922 all the nurse-crop seedings of both grasses and legumes were sacrificed because of a scattering infestation of Shepherd's Purse, a greatly dreaded weed on the experimental areas.

(4). YIELDS OF GRAIN PER ACRE FROM NURSE-CROP AREAS

| — | Total crop | Grain |
|---|---|---|
| | lbs. | bush. lbs. |
| Yield from acre of Banner oats | 6,215 | 98 10 |
| Yield from half acre Huron wheat (portion left for hay yields) | 7,576 | 56 30 |

THE 1922 SEEDING

The fifth successive seeding was made in 1922 according to the plan originally laid out in 1918 and on exactly the same area, which had grown potatoes in 1921 and was prepared by surface cultivation for further cropping. Seed-bed conditions in 1922 seemed ideal but the unprecedented drouth resulted in a very weak growth of all the hay crops that were sown with nurse crops. Brome grass, western rye and alfalfa finally made the best stand, with sweet clover about fourth in order. Kentucky blue, meadow fescue, and timothy did very poorly. In the check ranges better stands were obtained all round, although the later-sown range (B) did not give nearly so good a plant as did the earlier-sown range (A), which germinated during the period of early moisture.

It is gratifying to note that, thanks to inoculation, the five legumes made a much better showing by autumn than they had done in the much more favourable season of 1918, when they had been sown without attention to this essential point. The alfalfa in particular made almost a full stand in spite of the drouth.

Quantities of grass and clover seed were in all ten cases the same as 1918, with the single exception of the western rye grass, which, going upon past experience, was sown at 12 pounds per acre, resulting in a far better catch compared to the other grasses than had been obtained in the earlier years, when it had been sown at six to nine pounds.

The twelve quarter-acre blocks used as nurse crops for the ten grasses and legumes were drilled April 27 and 28. The seeds of the legumes seeded across the Nurse Crop blocks and in one check range were inoculated April 28 with nitro culture supplied by the Division of Botany and were sown that evening, the alfalfa and sweet clover seed being put on last, when it was becoming quite dusk. All the strips were harrowed directly after sowing. The corresponding strips of grasses were seeded and harrowed the next forenoon. The second check range (B) was seeded May 17 and 18.

According to plan, the south halves of both check ranges were mown about the middle of August and the clippings, where collectable, cured into hay. Yields

as taken August 25 were very light, figuring out on an acre basis as in Nurse Crop table 4. The seed of meadow fescue appears to have been mixed in some way with that of field brome grass (Bromus arvensis).

The very moderate take of sweet clover as compared with alfalfa was due in part, at least to the fact that the latter was cut with a long stubble to avoid killing it. The low yield of brome is attributable to the tendency of this grass to develop a bottom before producing too much top growth. A full stand of it was obtained. The absence of any crop at all from timothy in the season of seeding is quite contrary to all previous experience and reflects the drouthy season.

PRESENTING YIELDS obtained, 1922, from the clipped halves of the Check Ranges in the Nurse Crop Experiment

| Description of Seeding | Yields in pounds per acre | | |
|---|---|---|---|
| | Range A | Range B | Average |
| Alsike | | | |
| Common Red | | | |
| White Dutch | | | |
| Alfalfa | 240 | 1,040 | 640 |
| Sweet clover | 640 | 720 | 680 |
| Timothy | | | |
| Western rye grass | 960 | 480 | 720 |
| Meadow fescue | 40 | | 20 |
| Kentucky blue | | | |
| Brome | | 40 | 20 |

## THE STUBBLE NURSE CROP TEST

The Stubble Nurse Crop Test is supplementary to the Main Nurse Crop Experiment, differing from it essentially in that the ten kinds of legumes and grasses were sown with a nurse crop of oats on spring-ploughed land that had produced a heavy stand of grain the year before. In the Main Nurse Crop Experiment the preparation has always been either summer-fallow, hoe cropping, or breaking done the previous season. Rates of sowing of the small seeds were the same as in the Main Nurse Crop Experiment, the timothy in 1919 having been everywhere seeded at nine pounds per acre. The legumes, sown without inoculation all failed and had to be ploughed up.

Results from the grasses here are valuable in bringing out the need of thorough preparation in order to success in seeding down. Even making allowance for the fact that the past two seasons have been extraordinarily poor hay years, the meagre results from this course are arresting. Data reported to the Division of Chemistry indicate that lack of soluble nitrogen has been an important factor, since applications of nitrate to meadows have produced striking results.

Nurse Crop tables 5 and 6 present the successive and total crops from this plan of seeding down.

STUBBLE NURSE CROP TEST—Three years' yield of hay from the 1919 seeding of grasses. Yields calculated to a per acre basis from one-sixteenth-acre plots.

| Designation | Net yield per acre 1920 (less weeds) | Net yield per acre 1921 | Net yield per acre 1922 | Three years aggregate yield |
|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. |
| Timothy | 1,200 | 360 | 272 | 1,832 |
| Western rye grass | 640 | 736 | 424 | 1,800 |
| Meadow fescue | 640 | 552 | 24 | 1,216 |
| Kentucky Blue | | 384 | 336 | 720 |
| Brome | 784 | 920 | 576 | 2,280 |

*Notes*

(1) Note the effect on the second crop of timothy from an original seeding of 9 pounds per acre.

(2) The western rye grass seed, being chaffy, was probably not sown thickly enough for best results. Its stand was rather uneven.

STUBBLE NURSE CROP TEST—1920 SEEDING

Where the legumes had failed in the 1919 seeding the land was again spring-ploughed and on June 16, 1920, the area was once more drilled to oats for green feed, this being the third successive cereal crop following breaking. The ten grasses and clovers regularly employed were again seeded, this time in half-width strips so as to include ten in the space formerly occupied by the five legumes. This time the seed of the latter was inoculated, with results completely reversing all former experience. Not only did the average yield of the four best legumes double the yield of the four best grasses in 1921 but their stands persisted partially into the second cropping season, the alfalfa decidedly outyielding the best grass.

STUBBLE NURSE CROP TEST—Presenting two years' successive total yields of hay from the 1920 seeding of the Stubble Nurse Crop Test.

| Designation | Yield hay per acre 1921 | Yield hay per acre 1922 | Aggregate two years' crop |
|---|---|---|---|
| | lbs. | lbs. | lbs. |
| Alfalfa | 1,539 | 2,136 | 3,675 |
| Alsike | 700 | 262 | 962 |
| Common red clover | 1,335 | 294 | 1,629 |
| Sweet clover | 1,945 | 228 | 2,173 |
| Brome grass | 705 | 1,408 | 2,113 |
| Kentucky Blue | ..... | 226 | 226 |
| Meadow fescue | 553 | 553 | 1,106 |
| Western rye grass | 750 | 1,101 | 1,851 |
| Timothy | 745 | 600 | 1,345 |

A NURSE CROP TEST WITH HUBAM, BIENNIAL SWEET CLOVER, ALFALFA, LATE SWEDISH CLOVER, AND WINTER RYE

To compare the above crops under varying conditions of seeding and at the same time to introduce a comparison of flax with other cereals as a nurse crop, a special experiment was laid out in 1921. Plots of Premost flax, Liberty hulless oats, and Eureka beardless-hulless barley were drilled with intervening spaces left to serve as checks. The flax and oats were drilled May 17, the barley May 19. On the latter date, soil-inoculated seed for the above-mentioned legumes was sown across the strips of grain, leaving one strip where winter rye at five pecks per acre was cross-drilled on June 10.

It will be seen that the arrangement provided for each legume, as well as the rye, three check plots where no nurse crop was grown and a plot each seeded respectively on flax, oats, and barley. The result was interesting. Dry weather setting in soon after the legumes were seeded prevented a complete germination and greatly retarded growth, especially in the nurse-crop plots of oats and barley. The flax proved a very non-restrictive nurse crop, allowing almost as free a growth of clovers as did the check plots. Indeed, the sweet clover and alfalfa decidedly choked the flax. All the legumes made weak catches in the oat and barley nurse crops. Alfalfa, as usual, made the best

stand, with sweet clover second and Late Swedish the poorest. The winter rye being sown in the midst of acute drouth made a much weaker growth than usual among the oats and barley, but a good strong growth on the checks and among the flax.

In September when hard frost was in prospect, the check-plot seedings of the legumes were mown for hay. Only the sweet clovers produced any top growth worth raking together, although the alfalfa had the best stand. In the latter part of the season the Hubam had shot up rather rapidly but its yield of hay, although considerably ahead of the first season's growth of Biennial Sweet, was not large enough to be profitable and certainly not such as to recommend it in preference to the latter. In the nurse-crop plots it was a failure. That is to say, it gave not a stem tall enough to cut, and, being an annual, promised nothing for the next season.

On September 26 winter rye was drilled on a strip which the Hubam had occupied. Despite the very late date of seeding, an even stand was obtained both on grain stubble and on intervening fallow.

COMPARISON of the 1922 yields of Hubam and Biennial Sweet. Yields given in pounds per acre.

| — | Biennial Sweet | Hubam |
|---|---|---|
| First Check | 189 | 858 |
| Second Check | 132 | 313·5 |
| Third Check | ..... | 33 |
| Average all Check Plots | 107 | 401·5 |
| Average all N. Crop Plots | ..... | ..... |

## A PASTURING TEST IN SEEDING DOWN

All previous investigations into the problem of seeding down to meadow having indicated that the crucial difficulty lay in keeping weeds under while developing a vigorous plant of the hay crop to be established, it was decided to amplify the simple pasturing test which had been introduced in 1921 as a supplement to the Main Nurse Crop Experiment.

Accordingly, a block was laid out in 1922 on which to try out the plan of keeping weeds from seeding by pasturing stock during the season of seeding.

The usual ten grasses and clovers were sown on May 30 in rod-wide strips across four ranges as below, the land being spring-ploughed ground after variety plots of cereals in 1921.

(*a*) With oats to be harvested;

(*b*) Without nurse crop and not to be pastured;

(*c*) Without nurse crop but to be pastured the first season;

(*d*) With oats to be grazed during summer.

A replica of this layout was sown July 13 and 15, seeding of this latter being deferred longer than proposed because of the protracted drouth.

Dry weather caused an exceedingly sparse and irregular germination of most of the small seeds and such a spindling growth that it seemed hopeless to think of preserving any plants if stock were turned on early. Most of the few weeds that came were pulled to avoid complications on adjacent areas. The oats sown on the first date were bound on August 22, but all the areas intended for pasturing were afterwards enclosed with a fence and grazed off. As with all other 1922 seedings, western rye and brome made by far the best

" catches " throughout, timothy, meadow fescue and Kentucky blue producing very ragged stands, even on the blocks where no oats had been sown. Sweet clover and alfalfa made partial stands on the Check Ranges but not so good in the nurse crop blocks. The true clovers made a very indifferent showing everywhere. The earlier date of seeding proved greatly superior to the later one, so far as the grasses and clovers were concerned. Nurse crops had a particularly bad effect in this season of drouth.

None of the grasses or clovers were cut for hay during the initial season but it may be of interest to record the yields of the blocks of oats used as nurse crops. The later seeding gave rather the heavier yields, due presumably to its having made a part of its growth during a period of light showers and cool autumn weather.

| Designation | Date Seeded | Date Cut | Yield of oat sheaves cured weight in lbs per acre |
|---|---|---|---|
| First seeding (average of two blocks) | May 30 | Aug. 22-25 | 1,568 |
| Second seeding | June 13-15 | October | 2,618 |

## GRASS AND CLOVER MIXTURE EXPERIMENT

For a succinct outline of the plan and purpose of this experiment inaugurated in 1918, the reader is referred to previous reports, especially pages 20, 21 and 22, Experimental Sub-stations for the year 1921.

The test has now run into its fifth successive seeding and is realizing valuable results which will be presently available for compilation and exhaustive analysis. Broadly speaking, the year's work has confirmed earlier deductions, pointing the advantage of western rye among the grasses and alfalfa among the three basic legumes under comparison. The marked disadvantage of sowing a nurse crop several weeks ahead of the seeding-down mixture is emphasized by the incidental nurse crop test which is a regular feature of this experiment.

PRESENTING YIELDS OF HAY IN POUNDS PER ACRE FROM THE 1919 SEEDING

| Designation | 1920 Crop Pounds per Acre | | | 1921 Crop Pounds per Acre | | | 1922 Crop Pounds per Acre | | | Three years' crop Range A full seeding | Three years' crop Range B two-third seeding | Three years' crop, average both ranges |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Range A full seeding | Range B two-third seeding | Average two ranges | Range A full seeding | Range B two-third seeding | Average two ranges | Range A full seeding | Range B two-third seeding | Average two ranges | | | |
| *Alsike and Red Clover Series* | | | | | | | | | | | | |
| Clovers only | 1,080 | 560 | 820 | 1,000 | ..... | 500 | ..... | ..... | ..... | 2,080 | 560 | 1,320 |
| Clovers and timothy | 2,520 | 2,920 | 2,720 | 1,120 | 1,220 | 1,170 | 240 | 240 | 240 | 3,880 | 4,380 | 4,130 |
| Clovers and western rye | 3,080 | 2,680 | 2,880 | 2,200 | 2,320 | 2,260 | 1,100 | 1,060 | 1,080 | 6,380 | 6,060 | 6,220 |
| Clovers and meadow fescue | 3,080 | 2,360 | 2,720 | 920 | 1,900 | 1,410 | 120 | 80 | 100 | 4,120 | 4,340 | 4,230 |
| Clovers and three grasses | 3,840 | 2,520 | 3,180 | 1,140 | 1,820 | 1,480 | 200 | 260 | 230 | 5,180 | 4,600 | 4,890 |
| Clovers and five grasses | 3,600 | 2,920 | 3,260 | 1,240 | 1,780 | 1,510 | 400 | 320 | 360 | 5,240 | 5,020 | 5,130 |
| Averages | 2,867 | 2,327 | 2,597 | 1,270 | 1,506·6 | 1,388·3 | 343·3 | 326·6 | 335 | 4,480 | 4,160 | 4,320 |
| *Red Clover Series* | | | | | | | | | | | | |
| Clover only | 720 | 760 | 740 | 1,200 | ..... | 600 | ..... | ..... | ..... | 1,920 | 760 | 1,340 |
| Clover and timothy | 2,520 | 2,960 | 2,740 | 1,460 | 1,460 | 1,460 | 440 | 280 | 360 | 4,420 | 4,700 | 4,560 |
| Clover and western rye | 2,400 | 2,840 | 2,620 | 3,000 | 2,620 | 2,810 | 1,440 | 1,320 | 1,380 | 6,840 | 6,780 | 6,810 |
| Clover and meadow fescue | 2,440 | 2,120 | 2,280 | 1,880 | 1,720 | 1,800 | 140 | 400 | 270 | 4,460 | 4,240 | 4,350 |
| Clover and three grasses | 3,080 | 2,680 | 2,880 | 1,580 | 1,640 | 1,610 | 340 | 400 | 370 | 5,000 | 4,720 | 4,860 |
| Clover and five grasses | 2,840 | 2,800 | 2,820 | 1,160 | 1,720 | 1,440 | 420 | 400 | 410 | 4,420 | 4,920 | 4,670 |
| Averages | 2,333 | 2,360 | 2,346 | 1,713·3 | 1,526·6 | 1,620 | 463·3 | 466·6 | 465 | 4,510 | 4,353·3 | 4,431·6 |
| *Alfalfa Series* | | | | | | | | | | | | |
| Alfalfa only | 1,520 | 1,760 | 1,640 | 960 | 1,120 | 1,040 | 740 | 660 | 700 | 3,220 | 3,540 | 3,380 |
| Alfalfa and timothy | 2,280 | 2,640 | 2,460 | 1,180 | 1,320 | 1,250 | 240 | 320 | 280 | 3,700 | 4,280 | 3,990 |
| Alfalfa and Western rye | 2,280 | 4,000 | 3,140 | 1,860 | 2,180 | 2,020 | 1,240 | 960 | 1,100 | 5,380 | 7,140 | 6,260 |
| Alfalfa and Meadow fescue | 3,240 | 2,680 | 2,960 | 1,400 | 1,260 | 1,330 | 200 | 520 | 360 | 4,840 | 4,460 | 4,650 |
| Alfalfa and three grasses | 2,560 | 3,400 | 2,980 | 940 | 1,340 | 1,140 | 320 | 280 | 300 | 3,820 | 5,020 | 4,420 |
| Alfalfa and five grasses | 4,120 | 3,920 | 4,020 | 1,860 | 1,280 | 1,570 | 480 | 320 | 400 | 6,460 | 5,520 | 5,990 |
| Averages | 2,666 | 3,066 | 2,866 | 1,366·6 | 1,416·6 | 1,391·6 | 536·6 | 510 | 523·3 | 4,570 | 4,993 | 4,781 |
| Grand averages | 2,622 | 2,584 | 2,603 | 1,450 | 1,483·3 | 1,466·6 | 448·0 | 434·4 | 441·1 | 4,520 | 4,502 | 4,511 |

YIELDS IN POUNDS PER ACRE FROM FIVE-GRASS MIXTURES AFTER NURSE CROPS—1920 CROP ONLY. PLOTS BROKEN AFTER ONE CUTTING OF HAY

| Designation | Red and Alsike plus five grasses | Red clover plus five grasses | Alfalfa plus five grasses | Averages |
|---|---|---|---|---|
| After Ruby Wheat | 1,440 | 1,040 | 1,240 | 1,240 |
| After oats for green feed | 1,000 | 520 | 1,240 | 920 |
| Averages | 1,220 | 780 | 1,240 | 1,080 |

*Notes*

(1) The land where this experiment was located was high and rolling with a thin layer of black loam. It was backset deeply and seeded June 11, 1919, and not cut in the year of seeding.

(2) The nurse-crop strips were ploughed up in 1920 and two clover plots of range B early in 1921.

PRESENTING YIELDS OF HAY IN POUNDS PER ACRE FROM THE 1920 SEEDING

| Designation | South Halves (clipped in year of seeding) | | | | | | | | Average aggregate both ranges three crops | North Halves (not clipped in year of seeding) | | | | | | Average aggregate both ranges two crops |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Range A, (full seeding) | | | | Range B, (two-third seeding) | | | | | Range A, (full seeding) | | | Range B, (two-third seeding) | | | |
| | 1920 | 1921 | 1922 | Aggregate three years | 1920 | 1921 | 1922 | Aggregate three years | | 1921 | 1922 | Aggregate two years | 1921 | 1922 | Aggregate two years | |
| *Alsike and Red Clover Series* | | | | | | | | | | | | | | | | |
| Clovers only | 320 | 1,360 | 247 | 1,927 | 560 | 760 | 520 | 1,840 | 1,883·5 | 1,880 | 495 | 2,375 | 1,280 | 440 | 1,720 | 2,047·5 |
| Clover and timothy | 1,360 | 1,280 | 664 | 3,304 | 1,280 | 1,840 | 240 | 3,360 | 3,332 | 1,960 | 415 | 2,375 | 1,120 | 160 | 1,280 | 1,827·5 |
| Clover and western rye grass | 1,120 | 1,800 | 1,339 | 4,259 | 1,280 | 2,600 | 2,000 | 5,880 | 5,069 | 2,120 | 1,422 | 3,542 | 2,920 | 1,680 | 4,600 | 4,071 |
| Clover and meadow fescue | 1,200 | 2,320 | 418 | 3,938 | 1,520 | 2,120 | 440 | 4,080 | 4,009 | 2,200 | 502 | 2,702 | 2,520 | 560 | 3,080 | 2,891 |
| Clover and three grasses | 720 | 1,840 | 546 | 3,106 | 1,760 | 2,120 | 680 | 4,560 | 3,833 | 2,080 | 504 | 2,584 | 2,560 | 520 | 3,080 | 2,832 |
| Clover and five grasses | 1,200 | 2,160 | 765 | 4,125 | 2,240 | 2,280 | 600 | 5,120 | 4,622·5 | 2,040 | 722 | 2,762 | 2,120 | 520 | 2,640 | 2,701 |
| Averages | 986·7 | 1,793·3 | 663·1 | 3,443 | 1,440 | 1,953·3 | 746·6 | 4,140 | 3,791·5 | 2,046·6 | 676·6 | 2,723·3 | 2,086·6 | 646·6 | 2,733·3 | 2,728·3 |
| *Red Clover Series* | | | | | | | | | | | | | | | | |
| Clover only | 560 | 2,400 | ..... | 2,960 | 320 | 1,640 | 560 | 2,520 | 2,740 | 2,520 | ..... | 2,520 | 3,120 | 560 | 3,680 | 3,100 |
| Clover and timothy | 2,400 | 2,440 | 960 | 5,800 | 800 | 1,160 | 600 | 2,560 | 4,180 | 1,600 | 40 | 1,640 | 1,600 | 480 | 2,080 | 1,860 |
| Clover and western rye grass | 80 | 1,960 | 1,280 | 3,320 | 1,040 | 1,960 | 1,760 | 4,760 | 4,040 | 1,480 | 1,200 | 2,680 | 3,000 | 1,920 | 4,920 | 3,800 |
| Clover and Meadow fescue | 720 | 2,440 | 440 | 3,600 | 720 | 2,400 | 600 | 3,720 | 3,660 | 2,840 | 720 | 3,560 | 2,520 | 520 | 3,040 | 3,300 |
| Clover and three grasses | 1,760 | 1,640 | 560 | 3,960 | 880 | 2,880 | 400 | 4,160 | 4,060 | 1,360 | 600 | 1,960 | 2,160 | 560 | 2,720 | 2,340 |
| Clover and five grasses | 1,840 | 1,800 | 440 | 4,080 | 1,200 | 2,160 | 120 | 3,480 | 3,780 | 1,280 | 560 | 1,840 | 1,560 | 280 | 1,840 | 1,840 |
| Averages | 1,226·7 | 2,113·3 | 613·3 | 3,953·3 | 826·7 | 2,033·3 | 673·3 | 3,533·3 | 3,743·3 | 1,846·6 | 520 | 2,366·6 | 2,326·6 | 720 | 3,046·6 | 2,706·6 |
| *Alfalfa Series* | | | | | | | | | | | | | | | | |
| Alfalfa only | 560 | 760 | 480 | 1,800 | 2,160 | 2,080 | 1,640 | 5,880 | 3,840 | 1,440 | 840 | 2,280 | 2,240 | 1,240 | 3,480 | 2,880 |
| Alfalfa and timothy | 1,120 | 2,120 | 160 | 3,400 | 1,840 | 1,680 | 120 | 3,640 | 3,520 | 1,880 | 160 | 2,040 | 2,280 | 320 | 2,600 | 2,320 |
| Alfalfa and western rye grass | 880 | 1,880 | 960 | 3,720 | 1,760 | 2,280 | 1,400 | 5,440 | 4,580 | 1,640 | 560 | 2,200 | 2,640 | 2,200 | 4,840 | 3,520 |
| Alfalfa and meadow fescue | 1,040 | 2,360 | 480 | 3,880 | 960 | 2,040 | 240 | 3,240 | 3,560 | 2,320 | 280 | 2,600 | 2,880 | 560 | 3,440 | 3,020 |
| Alfalfa and three grasses | 2,000 | 2,280 | 400 | 4,680 | 1,040 | 1,840 | 240 | 3,120 | 3,900 | 2,920 | 520 | 3,440 | 3,200 | 520 | 3,720 | 3,580 |
| Alfalfa and five grasses | 1,840 | 3,200 | 1,320 | 6,360 | 1,440 | 1,280 | 200 | 2,920 | 4,640 | 3,720 | 1,080 | 4,800 | 2,320 | 480 | 2,800 | 3,800 |
| Averages | 1,240 | 2,100 | 633·3 | 3,973·3 | 1,533·3 | 1,866·7 | 640 | 4,040 | 4,006·6 | 2,320 | 573·3 | 2,893·3 | 2,593·3 | 886·6 | 3,480 | 3,186·6 |
| Grand averages (three series) | 1,151 | 2,002·3 | 636·6 | 3,789·8 | 1,266·6 | 1,951·1 | 686·6 | 3,904·4 | 3,847·1 | 2,071 | 590 | 2,661·1 | 2,335·5 | 751·1 | 3,086·6 | 2,873·8 |

| | 1921 | 1922 | Total two years |
|---|---|---|---|
| Legumes and five grasses after nurse crop of bulless oats (only three plots left for hay)— | | | |
| In Range B. of the Red Clover and Alsike Series | 1,080 | 480 | 1,560 |
| In Range B. of the Red Clover Series | 900 | 300 | 1,200 |
| In Range B. of the Alfalfa Series | 1,060 | 300 | *1,360 |

*An unusually poor showing for alfalfa, especially from the 1922 crop.

PRESENTING YIELDS OF HAY IN POUNDS PER ACRE FROM THE 1921 SEEDING

| Designation | Range A (full seeding) | Range B (two-third seeding) | Average of both ranges |
|---|---|---|---|
| | lbs. per acre | lbs. per acre | lbs. per acre |
| *Alsike and Red Clover Series—* | | | |
| Clovers only | 680 | ..... | 340 |
| Clover and timothy | 320 | 260 | 290 |
| Clover and western rye grass | 1,840 | 1,240 | 1,540 |
| Clover and meadow fescue | 840 | 440 | 640 |
| Clover and three grasses | 440 | 360 | 400 |
| Clover and five grasses | 840 | 980 | 910 |
| Averages | 826·6 | 546·6 | 686·6 |
| *Red Clover Series—* | | | |
| Clover only | 860 | ..... | 430 |
| Clover and timothy | 280 | 560 | 420 |
| Clover and western rye grass | 1,360 | 1,620 | 1,490 |
| Clover and meadow fescue | 460 | 820 | 640 |
| Clover and three grasses | 380 | 900 | 640 |
| Clover and five grasses | 1,180 | 2,220 | 1,690 |
| Averages | 753·3 | 1,016·6 | 884·9 |
| *Alfalfa Series—* | | | |
| Alfalfa only | 2,380 | 1,500 | 1,940 |
| Alfalfa and timothy | 860 | 940 | 900 |
| Alfalfa and western rye grass | 2,260 | 1,920 | 2,090 |
| Alfalfa and meadow fescue | 980 | 1,060 | 1,020 |
| Alfalfa and three grasses | 980 | 1,040 | 1,010 |
| Alfalfa and five grasses | 1,560 | 1,660 | 1,610 |
| Averages | 1,503·3 | 1,353·3 | 1,428·3 |
| Grand averages (three series) | 1,027·7 | 972·1 | 999·9 |

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

| Designation | Pounds hay per acre | |
|---|---|---|
| | Occurring only in Range A | Occurring only in Range B |
| Red clover and Alsike only | 320 | ..... |
| Red clover, Alsike and five grasses | ..... | 230 |
| Red clover only | 350 | ..... |
| Red clover and five grasses | ..... | 1,730 |
| Alfalfa only | 1,470 | ..... |
| Alfalfa and five grasses | ..... | 720 |

## *Notes*

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

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

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

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

## THICKNESS OF SEEDING EXPERIMENT WITH GRASSES

An experiment to throw light on the question how thickly grasses may be most advantageously seeded was commenced in 1919 and four annual seedings have now been made. At first, only timothy and rye grass were employed. In 1922 Red Top was added partly with a view to introducing this grass as a separate crop so that its suitability might be better judged than when included merely in mixtures as heretofore. (See last section.) The data are carried forward in three tables, all of which bring out conspicuously the superiority of Western rye grass as a dry-season hay crop, the inferiority of Red Top for such conditions, and the effect of nurse crops in restricting the yields of hay seeded with them. The effect of various rates of seeding of the different grasses employed is somewhat confused and obscured by the slight variations in soil and contour.

PRESENTING, IN POUNDS PER ACRE OF HAY, THREE YEARS' RESULTS FROM 1919 SEEDING

| Designation | Seeded without nurse crop | | | | Seeded with nurse crops | | | |
|---|---|---|---|---|---|---|---|---|
| | 1920 | 1921 | 1922 | Agg'te. 3 years | 1920 | 1921 | 1922 | Agg'te. 3 years |
| Timothy at 2 lbs. per acre..... | 5,440 | 1,548 | 440 | 7,428 | 880 | 1,940 | 520 | 3,340 |
| " 3 " ..... | 5,360 | 980 | 280 | 6,620 | 1,520 | 2,280 | 600 | 4,400 |
| " 4 " ..... | 5,600 | 980 | 200 | 6,780 | 1,680 | 2,160 | 400 | 4,240 |
| " 5 " ..... | 5,200 | 1,056 | 200 | 6,456 | 2,320 | 2,880 | 360 | 5,560 |
| " 6 " ..... | 4,640 | 980 | 200 | 5,820 | 2,240 | 2,440 | 440 | 5,120 |
| Average of five plots..... | 5,248 | 1,108·8 | 264 | 6,620·8 | 1,728 | 2,340 | 464 | 4,532 |
| Western rye at 4 lbs. per acre..... | 4,000 | 3,128 | 920 | 8,048 | 800 | 3,700 | 1,280 | 5,780 |
| " 5 " ..... | 4,160 | 3,168 | 920 | 8,248 | 1,120 | 3,280 | 1,720 | 6,120 |
| " 6 " ..... | 3,680 | 3,384 | 1,360 | 8,424 | 1,200 | 3,520 | 1,660 | 6,380 |
| Average of three plots..... | 3,946·7 | 3,226·6 | 1,066·7 | 8,240 | 1,040 | 3,500 | 1,553·3 | 6,093·3 |

*Notes.*

(1) History of Area.—1917, land broken; 1918 cereal plots east and west; 1919 spring-ploughed in May and harrowed twice, seeding in 1919 at rates specified, in plots north and south, crosswise of the cereal plots. North half of each plot was seeded with a nurse crop of 3 bushels of oats per acre, the two north swaths of which were cut for hay when oats were in the milk, yielding 6,240 pounds oat hay per acre. Volunteer grain rendered it impracticable to obtain the cured weight of the grasses produced on the south halves in the initial season.

(2) Land apparently uniform, except that the six-pound seeding of rye grass sown without nurse crop was located on rising ground.

PRESENTING TWO AND THREE YEARS' RESULTS IN POUNDS OF HAY PER ACRE FROM THE 1920 SEEDING

| Designation | Seeded without nurse crop | | | | Seeded with nurse crop | | |
|---|---|---|---|---|---|---|---|
| | 1920 | 1921 | 1922 | Agg'te. 3 years | 1921 | 1922 | Agg'te. 2 years |
| Timothy at 2 lbs. per acre | 1,600 | 2,720 | 160 | 4,480 | 1,960 | 80 | 2,040 |
| " 3 " | 1,760 | 3,200 | 160 | 5,120 | 1,880 | 40 | 1,920 |
| " 4 " | 1,440 | 3,600 | 120 | 5,160 | 1,900 | 20 | 1,920 |
| " 5 " | 2,400 | 3,600 | 320 | 6,320 | 2,200 | 20 | 2,220 |
| " 6 " | 2,400 | 3,600 | 320 | 6,320 | 2,040 | 80 | 2,120 |
| Average five plots | 1,920 | 3,344 | 216 | 5,480 | 1,996 | 48 | 2,044 |
| Western rye at 6 lbs. per acre | 1,920 | 5,520 | 2,880 | 10,320 | 2,120 | 1,320 | 3,440 |
| " 8 " | 1,120 | 6,720 | 3,440 | 11,280 | 2,480 | 1,440 | 3,920 |
| " 10 " | 1,120 | 4,480 | 2,320 | 7,920 | 2,440 | 1,440 | 3,880 |
| Average three plots | 1,386·6 | 5,573·3 | 2,880 | 9,840 | 2,346·6 | 1,400 | 3,746·6 |

## *Notes*

(1) Location abutting the 1919 seeding.

(2) 1917 broken; 1918 cereal plots (east and west); 1919 summer-fallow; 1920 seeded May 31, plots north and south, crossing previous plots of cereals. North two rods of each plot seeded with a nurse crop of oats (cut in milk) and beardless hulless barley cut very short when grain was nearing maturity. South rod of each plot seeded without nurse crop.

(3) Soil appeared reasonably uniform, although the thickest seeding of rye grass was handicapped by being on rising ground.

PRESENTING ONE AND TWO YEARS' RESULTS IN POUNDS OF HAY PER ACRE FROM THE ONE-EIGHTIETH ACRE PLOTS SEEDED IN 1921

| Designation | Seeded without nurse crop (clipped about Aug. 24, 1921) | | | Seeded with nurse crop |
|---|---|---|---|---|
| | 1921 | 1922 | Agg'te. 2 years | 1922 |
| Timothy at 2 lbs. per acre | 1,200 | 800 | 2,000 | 320 |
| " 3 " | 1,680 | 520 | 2,200 | 180 |
| " 4 " | 1,800 | 280 | 2,080 | 120 |
| " 5 " | 1,880 | 320 | 2,200 | 160 |
| " 6 " | 1,320 | 440 | 1,760 | 196 |
| Average five plots | 1,576 | 472 | 2,048 | 195 |
| Western rye at 6 lbs. per acre | 1,120 | 1,080 | 2,200 | 560 |
| " 8 " | 1,160 | 1,160 | 2,320 | 800 |
| " 10 " | 880 | 1,880 | 2,760 | 504 |
| " 12 " | 720 | 1,240 | 1,960 | 560 |
| " 14 " | 520 | 1,240 | 1,760 | 480 |
| Average five plots | 880 | 1,320 | 2,200 | 580 |
| Red Top at 6 lbs. per acre | 160 | 560 | 720 | 120 |
| " 8 " | 200 | 560 | 760 | 100 |
| " 10 " | 400 | 560 | 960 | 130 |
| " 12 " | 500 | 320 | 820 | 130 |
| " 14 " | 280 | 240 | 520 | 400 |
| Average five plots | 308 | 448 | 756 | 176 |

*Notes*

(1) Location—South of 1920 seeding of this test .

(2) History of area—Broken 1917; cropped in 1918 to cereal plots running east and west; summer-fallowed in 1919; cereal plots same direction in 1920; spring-worked and spring-ploughed in 1921 and seeded to this test, with plots running north and south.

Several western rye plots, particularly those seeded at 12 and 14 pounds, and more particularly the latter, were mutilated and reduced in yield by the necessity of pulling and clipping volunteer oats where rows of stooks had stood on the variety plots of 1920.

(3) From the two strips of oats grown as a nurse crop across the north halves of these ranges a good quality of green-feed was cut about September 12, amounting to 5,500 pounds per acre. The area might be roughly classed as three-fifths stubble ground and two-fifths summer-fallow, after the scuffled paths between the two previous season's grain plots. Growth on the paths was about twice as heavy as on the stubble strip.

(4) In the very short, poor crop of hay secured in 1922 a considerable percentage of stubble occurred for which an estimated deduction was made.

## INOCULATION EXPERIMENTS WITH LEGUMES

An inoculation experiment with sweet clover, alfalfa and alsike was seeded in 1921 on a hill at the rear of the Station area, this location being chosen in order to minify the danger of the check plot becoming inoculated by accidental agency. Three plots of each legume were seeded on July 2 and 3, the highest plot of each being a check, the second a plot sown with soil-inoculated seed (applied by the glue method), while the third and lowest plot in each case was sown with seed which had been treated with nitro culture. As the soil gradually improved descending the slope, rather the best conditions were unavoidably afforded to the culture-inoculated plots and the poorest to the check plots, though the difference in soil quality between these and the plots sown with soil-inoculated seed was not great in any instance and almost negligible in the case of the sweet clover plots.

In respect to the sweet clover and alfalfa, marked contrasts both as to colour of foliage and vigour of growth occurred between the checks and the inoculated plots during August of the season of seeding. The contrast was abrupt, straight-edged and conclusive. Later on, some nodules commenced to develop on the roots of the legumes in the check plots so that, as predicted in our 1921 report, the yields produced during the second year did not show the degree of contrast that might otherwise have been expected. True, the culture-inoculated plot of alfalfa produced more than double the yield of the uninoculated plot, but part of this difference may be ascribed to its more favourable location. It may be said, however, that among the inoculated plots the culture inoculation was a little the more prompt and thorough in manifesting nodule development during the season of seeding though both systems turned out well. In yield, as well as in appearance during the growing season the fully inoculated plots of alfalfa evinced a marked superiority over the partially-inoculated check plots. With sweet clover the contrast was much less marked, while the alsike plots had winter-killed so extensively that no attempt was made to take the yields, the scattering plants being left to ripen seed. Some winter-killing and a great deal of root injury had occurred in the sweet clover plots but these exhibited such a marked recuperative power that the yield of the aftermath exceeded the first

cutting in two out of three cases. The aftermath of the alfalfa was irregular, varying according to the permeability and moisture supply of the subsoil. The alfalfa was mown only once.

The subjoined yields should be interpreted in the light of the foregoing explanations. It will be seen that by reason of winter injury the sweet clover produced on the average less hay in two cuttings than the alfalfa did in one.

ALFALFA VERSUS SWEET CLOVER

| Designation | Pounds of cured hay per acre | | | |
|---|---|---|---|---|
| | Sweet Clover | | | Alfalfa |
| | First cutting | Second Autting | Aggregate two cuttings | One cutting only |
| Uninoculated | 853 | 773 | 1,626 | 1,520 |
| Soil-inoculated | 933 | 1,306 | 2,239 | 2,640 |
| Nitro-culture incoulated | 1,226 | 1,760 | 2,986 | 3,320 |
| Averages | ..... | ..... | 2,283 | 2,493 |

## ALFALFA ROOT PENETRATION OF HARD SUBSOILS

Following up some interesting evidence obtained in 1921 (see page 39, Report of Experimental Substations for 1921) further data of interest was secured by excavation in 1922. It was observed during the summer's drouth that certain patches of alfalfa continued to grow with reasonable vigour while other areas of the same fully inoculated plots showed a wilty and somewhat stunted first growth, besides producing very little aftermath. (See last section.) To determine the cause, if possible, a trench somewhat over six feet deep was sunk in one of the plots cutting across a strip where the aftermath was fifteen or eighteen inches high. Each end of the pit was sunk in a spot where the aftermath, though healthy enough in colour, was too short to be worth mowing. It was found that the hard clay soil was underlaid by an irregularly folded layer of sand, approaching much closer the surface at some points than at others. Under the big-topped alfalfa the sand layer was from three to four feet below the surface and the roots, after reaching it, had found progress easy down to the depths of subsoil moisture. Several tap roots of alfalfa had followed down between the bark and the decayed wood of old willow roots—legacy of the scrub growth which had once been cleared off the land. One of these alfalfa roots, from a sixteen-months'-old stand was removed to a depth of five feet five inches, with probably at least a foot broken off. A number of others, penetrating without adventitious aid, were removed to a depth of four and a half feet. In fact a good many fine fibrous alfalfa roots were exposed in the lower strata of the six-foot trench.

Where the sand did not occur within the root zone the alfalfa roots had found penetration less easy, although several of these were picked out to a depth of three and a half to four feet, or very near it, with the attenuated ends broken off, as usual.

Just how tight a subsoil alfalfa roots can force their way through and what conditions of moisture are necessary to this end is still an undetermined question. There is no doubt that the roots from a new stand will enter a porous subsoil more readily than a compact one, but there is plenty of evidence that they will penetrate very hard clay under certain conditions. It may be noted in this connection that a four-year-old stand of alfalfa located elsewhere did

not exhibit to any great extent the unevenness of aftermath found on the new seeding in question but turned off a fairly uniform second growth well worth cutting for hay. The subsoil of the latter area was not examined.

## CULTURAL EXPERIMENTS WITH ALFALFA

Double importance attaches to the data afforded by the plots in this experiment. In the first place, they are of value as showing what may be expected from a stand of alfalfa persisting for several years. Seeing that the alfalfa in this case was self-inoculated and therefore greatly handicapped in its first cropping year and to some extent in its second, while the fourth season was one of extreme drouth, the four years' results are rather encouraging.

The primary object of the experiment was to compare broadcast seedings with rows, in each case at various rates per acre. The broadcast plots were about equal and have been regarded as one large plot, though originally seeded at from five to ten pounds per acre.

It has seemed that in the case of the drills the thinner rates of seeding have been rather preferable and the broadcast usually preferable to either rate of sowing in rows, except that during the first two years, while inoculation was lacking or incomplete, the inter-cultivated rows had a decided advantage, presumably because tillage promoted nitrification in the soil, besides conserving moisture. After inoculation became general the broadcast areas consistently outyielded the rows, until the latter part of the drouth year of 1922, when the aftermath of some of the rows was slightly heavier than from the broadcast area. Though positive conclusions are hardly yet justified by this experiment, it would seem as though a crowded condition of alfalfa plants such as might result from any but the most sparing seeding of rows, was detrimental, and that, given inoculation, clean tilth, and a reasonable moisture supply, broadcast sowing was conducive to the best and most economical cropping results in hay production.

Alfalfa cultivated in rows is hard to cut with a mower, especially when the land is stony, becomes very dirty when rained upon in the swath and is inclined to make a wiry-stemmed hay. For hog pasture or for seed production the row system of culture has its advantages.

The following table is interesting:—

PRESENTING FOUR SEASONS' YIELD OF HAY IN POUNDS PER ACRE FROM ALFALFA PLOTS IN THE CULTURAL TEST. 1918 SEEDING NORTH (ONLY REMAINING) RANGE

| Designation | Yield 1919 one ctg. only | Yield 1920 | | | Yield 1921 | | | Yield 1922 | | | Total crop four years | Average per annum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First cutting | Second cutting | Total two cuttings | First cutting | Second cutting | Total two cuttings | First cutting | Second cutting | Total two cuttings | | |
| 30-inch drills at 2 lbs. | 3,120 | 1,980 | 840 | 2,820 | 2,520 | 1,035 | 3,555 | 480 | 1,110 | 1,590 | 11,085 | 2,771 |
| 30-inch drills at 4 lbs. | 2,400 | 1,260 | 720 | 1,980 | 1,800 | 1,065 | 2,865 | 780 | 840 | 1,620 | 8,865 | 2,216 |
| 24-inch drills at 2·5 lbs. | 1,320 | 1,740 | 1,440 | 3,180 | 1,920 | 1,620 | 3,540 | 810 | 1,290 | 2,100 | 10,140 | 2,535 |
| 24-inch drills at 5 lbs. | 960 | 1,200 | 1,320 | 2,520 | 1,860 | 1,140 | 3,000 | 900 | 1,290 | 2,190 | 8,670 | 2,167 |
| Broadcast —average several rates. | 1,243 | 1,250 | 1,775 | 3,025 | 2,634 | 1,431 | 4,065 | 1,638 | 829 | 2,467 | 10,800 | 2,700 |

## GRASSES AND CLOVERS FOR SEED PRODUCTION

The raising of small seeds having been previously indicated as a profitable line of production for the Peace River country, facing, as it yet does, a long and costly transport, several fortieth-acre plots were specially seeded in early June, 1921, to afford further data as to yields which might be reasonably expected. The layout comprehended broadcast plots of alsike, alfalfa, common biennial white blossom sweet clover, common red clover, and wild sanfoin (a prevalent native plant), as well as a plot of alsike clover in drills. Plots of timothy, western rye grass and hairy vetches were also sown, but too late in the summer to develop more than a feeble plant and the plots were not saved for seed the next year as intended. Most of the hairy vetches winter-killed. These certainly could not be said to have had a fair test.

The legumes were all inoculated and made a strong growth the first season, the true clovers coming well into bloom. As in other experiments seeded the same year the alsike, thus blooming, winter-killed badly, while the common red and sweet clover were also greatly injured, the plots being on a prominently exposed knoll.

Nearly every sweet clover root was frozen off and decayed from about two inches below the crown downwards. A minority of the plants survived, and, branching from both root and stem, finally developed a strong growth, making almost a thick enough stand for a full crop of seed, though much too thin for hay.

The common red was too thin to yield a full crop of seed. Unfortunately the record of its yield has been lost.

The wild sanfoin exhibited very deficient, tardy and irregular germination, the seeds having been sown in their seed pods owing to the non-feasibility of hulling or scarifying them by means at hand. The stand in 1922 was insignificant and development scant.

The alfalfa came through with the best stand but not without some injury to the lower lengths of the roots.

A few days after the above plots were seeded and in a somewhat similar situation a single drill of Arctic sweet clover was sown. In addition to the above was a scant sixtieth-acre plot of a hardy Ottawa strain of alfalfa which had been established in 1918 and always left for seed production, producing each season a very heavy growth of pods but never fully maturing much seed until 1922, when an excellent crop of fine quality was threshed.

Threshing of the small seeds was accomplished with the small separator used for cereal plots, though it had to be run at too high a speed for the good of the machine, and the material required to be fed very slowly. The big sweet clover stalks were hard on it.

Lack of proper facilities to clean the alfalfa seed resulted in its being graded No. 3 by the Seed Laboratory at Ottawa, on account of containing too large a percentage of inert material and a little immature seed. Otherwise the quality and germination were excellent. To hull, and if possible to scarify, the sweet clover seed, it was run through a Eureka smutting, scouring and separating machine, such as is used in flour mills for scouring wheat. This removed many adhering hulls and most of the light seed, as well as considerable good seed, reducing the weight by about 40 per cent, but as a scarifier it was not a success.

The following table gives the yields of sweet clover after being thus treated. The yields of alfalfa are reckoned by deducting from the total weight threshed the percentage of inert material reported by the Seed Laboratory. In ordinary farm practice the yields would fall a little short of the figures thus reported for alfalfa, since a little good seed would be wasted in cleaning.

YIELDS OF SWEET CLOVER SEED—1922

| Designation | Size of plot (fraction of an acre) | Date of harvesting | Yield of seed before running through smutter | Yield of seed after running through smutter | Net yield per acre | Remarks |
|---|---|---|---|---|---|---|
| | | | lbs. | lbs. | bush. lbs. | |
| Arctic sweet clover in row | 1/180 | Aug. 23 | 4·75 | 3 | 9 0 | Much seed shattered in field |
| Common biennial sweet broadcast. | 1/40 | " 25 | 15 | 9 | 6 0 | Badly winter-killed and some shattering. |

YIELDS OF ALFALFA SEED—1922

| Designation | Size of plot (fraction of an acre) | Date of harvesting | Gross yield of seed | Per cent germination | | Per cent inert material | Net yield seed per acre | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | 4 days | 10 days | | | |
| | | | lbs. | | | | bush. lbs. | |
| Alfalfa in rows, seeded 1918 | 1/60 | Sept. 23 | 6·5 | 88 | 93 | 6·36 | 6 5 | Considerable shattering under stooks. |
| Alfalfa broadcast, seeded 1921 | 1/40 | " 15 | 4·5 | 91 | 94 | ·96 | 2 58 | |

A test of Hubam (annual) against biennial white blossomed sweet clover was conducted in the garden with seed furnished by the Ontario Agricultural Experimental Union of Guelph, Ont. In this case the melilots were sown May 6 in 36-inch drills with a view to seed production. Neither matured seed. Until mid-summer the biennial seemed quite as forward as the annual, but latterly the Hubam shot up and blossomed profusely, while the biennial came only partly into bloom. The latter had decidedly the more leafy growth, which is also more procumbent. It is possible that with earlier seeding some pods might have matured their contents, but as the season was an unusually favourable one for seed maturation the indications were not favourable to annual sweet clover as a regular seed producer, nor for any other important purpose in the Peace River country, except perhaps as an orchard cover crop to furnish bee pasture in the late fall.

## VARIETY TESTS WITH SUNFLOWERS AND CORN

### SUNFLOWERS

Fourteen varieties and strains of sunflowers were seeded May 17 on a piece of spring-ploughed oat stubble where seventy-five bushels per acre of Liberty oats had grown in 1921. Drouth told heavily upon the crop, which was extremely poor on the whole area, but particularly so upon the knolls and ridges. The crop was cut early in September without much injury from frost. Space available did not permit duplication of plots so that the results are not to be regarded as more than a rough indication of the merits of the sorts tested.

TABLE OF SUNFLOWER YIELDS, 1922

| Variety | Per cent of full stand | Per cent in full head | Per cent budded only | Average height | Yield per acre |
|---|---|---|---|---|---|
| | | | | | lbs. |
| Mammoth Russian (McD.) | 78 | 6 | 94 | 34 | 3,690 |
| Early Ottawa No. 76 | 79 | 90 | 10 | 38 | 3,840 |
| Mixed Memmonite | 80 | 95 | 5 | 34 | 4,770 |
| Brook's Dwarf | 81 | 90 | 10 | 42 | 5,490 |
| Prolific White | 60 | 70 | 30 | 34 | 2,220 |
| Manteca | 75 | 72 | 28 | 38 | 5,580 |
| Friesen (1921 seed) | 78 | 96 | 4 | 37 | 5,520 |
| Burns (1921 seed) | 72 | 88 | 12 | 48 | 5,820 |
| R. No. 1 (1921 seed) | 79 | 100 | ..... | 41 | 4,560 |
| Saunders' Early | 92 | 10 | 90 | 38 | 8,550 |

CORN

Thirteen varieties of field corn were compared under conditions similar to those afforded the sunflowers. Planting was done in drills on May 18. Notes on development were made September 11 and cutting and weighing followed directly. The crop had been touched with frost though not badly shrivelled. It would have made no further progress, however.

Twitchell's Pride again distinguished itself by producing the largest yield of green weight and attaining the highest maturity, one hundred per cent of its stalks forming ears. Canada Yellow and Quebec 28 vied for second place. The corn, like the sunflower plots was unduplicated, though the arrangement was such as to afford as reasonably close a comparison as might be expected from single plots on rolling land.

TABLE OF FIELD CORN YIELDS, 1922

| Variety | Per cent of full stand | Height tallest stalks | Average height | Per cent ears formed | Yield per acre, green weight |
|---|---|---|---|---|---|
| | | inches | inches | | lbs. |
| Wisconsin No. 7 | 84 | 55 | 29 | 0 | 1,620 |
| Northwestern Dent | 92 | 45 | 29 | 5 | 2,730 |
| Leaming | 76 | 47 | 28 | 1 | 2,280 |
| Improved Leaming | 75 | 50 | 29 | 0 | 2,370 |
| Compton's Early | 78 | 54 | 32 | 0 | 2,760 |
| Longfellow | 72 | 52 | 31 | 1 | 2,250 |
| Golden Glow | 65 | 50 | 30 | 0 | 2,820 |
| White Cap Yellow Dent | 62 | 50 | 30 | 0 | 2,730 |
| Bailey | 57 | 48 | 29 | 0 | 2,760 |
| North Dakota | 64 | 58 | 33 | 0 | 1,500 |
| Twitchell's Pride | 89 | 58 | 34 | 100 | 3,270 |
| Canada Yellow | 76 | 57 | 32 | 15 | 3,090 |
| Quebec No. 28 | 75 | 56 | 30 | 12 | 3,090 |

## FIELD ROOTS

That field roots are not well adapted for extensive culture under present conditions in the North country was again illustrated by the experimental data. Given garden conditions of preparation and culture, with wind protection assured, they may be fairly regularly produced in creditable quantities, but as a field proposition they are subjected to too frequent vicissitudes. When the spring and early summer are dry or windy it is difficult to obtain a good braird and get the crop away to a thrifty start, without which yields are unlikely to be profitable.

Having received for test in 1922 a much larger number of varieties of field roots than preparation had been made to accommodate, the superintendent was at a loss where to plant them. By the time necessary arrangements were made the dry weather was close at hand so that the roots, though germinating, almost completely perished, leaving but a few roots per row. Under the circumstances variety comparisons are idle but as a means of computing average annual production over a term of years the weight of crop from a standard variety of each class of roots is included.

TABLE OF FIELD ROOT YIELDS, 1922

| Variety | Yield per acre tons | lbs. |
|---|---|---|
| Swedes, average five varieties | 0 | 1,431 |
| Greystones | 2 | 1,180 |
| Mangels, Yellow Intermediate | 0 | 945 |
| Sugar beets, Vilmorin's Improved | 0 | 810 |

## FIELD HUSBANDRY

### THICKNESS OF SEEDING EXPERIMENT WITH GRAINS

This experiment has now been carried through for five years. An acre each of wheat, oats and barley is divided into four quarter-acre strips, each 10 by 16 rods, the rates of seeding being as follows: Wheat at 5, 6, 7 and 8 pecks per acre; oats at 10, 12, 14 and 16 pecks per acre; barley at 4, 6, 8 and 10 pecks per acre.

The varieties of grain employed in 1922 were Ruby wheat, Victory oats and Trebi barley. In previous seasons other varieties have been used, viz: Banner, Victory and Ligowo oats, Marquis and Huron wheat and O.A.C. No. 21 barley. Thus the results are representative in a general way of standard varieties and the run of the seasons. Both factors seem to modify the results.

Unfortunately, the soil conditions have not always been so uniform as is desirable, albeit the best has been done with what land was available. The barley, in particular, has been so affected in this way that it has not been thought wise to attempt averages as yet, though the tests in 1919 and 1922 were fair enough.

The experiment with all three grains was badly marred by frost in the initial year (1918) so that this is omitted from the average computations with wheat and oats. The four-year averages of these two cereals are instructive.

Speaking broadly, it has been surprising how little the yield of either total crop or threshed grain has been affected by any variations in the rate of seeding within the compass of this test. This has been true in wet, dry and medium seasons. There are degrees of variation, of course, but it is a question whether these have not been more largely due to accidental factors, such as soil quality and contour, than to the factor under investigation. In general, the results rather tend to favour the medium rates of sowing but the advantage is neither regular nor pronounced. Even in the past extremely drouthy season when thin seeding might have been expected to show up to marked advantage, the seven-peck seeding of Ruby wheat produced the highest yield, while both the twelve and fourteen-peck seedings of Victory oats outyielded the ten-peck. With the barley, however, the thinnest (four-peck) seeding surpassed all the others. With all three grains the lowest yield in 1922 was obtained from the thickest seeding, the straw of which, especially in the case of the barley and oats, exhibited unmistakable evidence of a too heavy stand, it being short and unduly fine. All the barley plots were so badly affected by the drouth that many of the heads barely emerged from the shot blade and though the sample of grain was passable, the small separator delivered it with a mess of adhering awns.

The soil was surface-worked potato ground where a similar experiment had been located in 1918, followed by experiments with glass plots seeded down at that time. The seed bed was good and the grain drilled April 27 and 28. The Trebi barley and Ruby wheat were cut on August 14 and 15 and the Victory oats on August 21.

Study of the four-year average column will naturally raise the question why northern farmers seed so thickly as they do. The answer is, to promote maturity. In the average season, each half-bushel of oats added to the rate (within the limits of this test) has seemed to hasten maturity about a day. With wheat and barley the influence has not been so positively evident.

In the experiment, the four strips of each kind have usually been cut on the same day, and as harvest is usually hurried for fear of frost, the effect has been, perhaps, rather to favour the thicker seedings so far as yield results are concerned. The net outcome to date points to the prudence of a medium

course, with regard, always, to conditions of seed bed and season, as well as to the nature of the variety in use.

THICKNESS OF SEEDING TEST WITH CEREALS, 1922

All plots one-quarter acre in area

| | Weight total crop per acre at threshing | Weight grain per acre, 1922 | Per cent grain to total crop (1922 only) | Grain per acre 1922 | Aggregate yield grain, 4 years | Average yield of grain in 4 years |
|---|---|---|---|---|---|---|
| | lbs. | lbs. | | bush. lbs. | lbs. | bush. lbs. |
| *Wheat* | | | | | | |
| Variety—Ruby. | | | | | | |
| Seeded April 27. | | | | | | |
| Harvested Aug. 15. | | | | | | |
| 5 pecks per acre | 2,520 | 1,224 | 48·57 | 20 24 | 9,631 | 40 8 |
| 6 " " | 3,040 | 1,472 | 48·42 | 24 32 | 9,871 | 41 8 |
| 7 " " | 3,040 | 1,502 | 49·40 | 25 2 | 10,137 | 42 14 |
| 8 " " | 2,400 | 1,198 | 49·91 | 19 58 | 10,165 | 42 21 |
| Totals | | | | | 39,804 | |
| Averages | 2,750 | 1,349 | 49·05 | 22 29 | 2,487 | 41 27 |
| *Oats* | | | | | | |
| Variety—Victory. | | | | | | |
| Seeded April 28. | | | | | | |
| Harvested Aug. 21. | | | | | | |
| 10 pecks per acre | 2,800 | 1,564 | 55·85 | 46 0 | 10,750 | 79 1 |
| 12 " " | 3,000 | 1,644 | 54·80 | 48 12 | 10,855 | 79 27 |
| 14 " " | 2,980 | 1,616 | 54·22 | 47 18 | 11,487 | 84 15 |
| 16 " " | 2,776 | 1,444 | 52·01 | 42 16 | 11,151 | 81 33 |
| Totals | | | | | 44,243 | |
| Averages | 2,889 | 1,567 | 54·24 | 46 3 | 2,765 | 81 11 |
| *Barley* | | | | | | |
| Variety—Trebi. | | | | | | |
| Seeded April 28. | | | | | | |
| Harvested Aug. 15. | | | | | | |
| 4 pecks per acre | 2,840 | 1,642 | 57·81 | 34 10 | | |
| 6 " " | 2,400 | 1,318 | 54·91 | 27 22 | | |
| 8 " " | 2,880 | 1,488 | 51·66 | 31 0 | | |
| 10 " " | 2,504 | 1,286 | 51·35 | 26 38 | | |
| Averages | 2,656 | 1,433 | 53·95 | 29 41 | | |

DATES OF SEEDING

Owing to lack of space in the block prepared for the cereal experiments the test with different dates of seeding was not repeated, except with oats. Following is the comparison. The variety used was Victory:—

| Date of Seeding | Date of Harvesting | Days to Mature | Yield per acre |
|---|---|---|---|
| | | | bush. lbs. |
| April 27 | August 21 | 116 | 35 14 |
| May 16 | " 25 | 101 | 33 0 |

In 1922 all early seedings got away to a good start and made their early vegetative development in a period of more favourable weather than was the case with later seedings. In quite a few seasons later seedings made the more vigorous growth of vegetation.

## SEEDING WINTER RYE WITH SPRING GRAIN

The experiment of cross-drilling winter rye on spring grain a month after the latter is sown was inaugurated in 1920, the spring grains on which it was tried being oats and barley. In neither case was the yield of spring grain reduced by thus cross-drilling the rye, while in 1921 a yield of rye grain amounting to 30 bushels and 43 pounds per acre was harvested. On May 7, 1921, a mixture of timothy and western rye grass was drilled in on the stand of rye, the single-disc drill being run several times of the land to ensure even distribution of the seed. A full stand of grass resulted and with a more favourable season in 1922 there was prospect of at least a small yield of hay. As it was, the yield was trifling, as in the case of all other nurse-crop seedings.

The experiment of cross-drilling rye on spring grain was repeated in 1921 but, owing to a dry season and too long a lapse between the sowing of the spring and the winter grains, the catch was not nearly so good as before. In addition to this, a teamster, mistaking instructions, disced across the rye plot in the fall. Despite all this maltreatment, there was a partial stand showing up in the spring of 1922—enough to add further recommendation to the plan. It was not convenient to leave the plot, however.

On June 10, 1922, winter rye was again cross-drilled this way on small plots of flax, Eureka (beardless-hulless) barley and Liberty hulless oats, as well as across intervening check plots of fallow. The flax and oats had been seeded May 17, the barley May 19. Under the conditions of extreme drouth which prevailed in 1922, the rye seeded on the spring grain naturally made a small showing, excepting that seeded among the flax. However, a good deal of it made a start.

For purposes of comparison, a parallel strip of rye was drilled September 6 across the stubble of the spring grain plots on an area which had first been seeded down to Hubam (annual sweet clover). Late as it was, this seed also germinated.

Rye seems to be about the only cereal crop that is sufficiently hardy and vigorous to be seeded profitably in the north country without ploughing to prepare the land and its use in this way represents a great saving of labour.

## INTER-CULTIVATED ENSILAGE CROPS

The area of unmanured, spring-ploughed oat stubble on which the variety tests with sunflowers and corn were located afforded space for a date of planting experiment with both crops as well as a thinning test with sunflowers and a test of hill versus drills with corn. While laid out so as to afford a substantial parity of conditions for the test, the land was an undulating piece of clay with a thin-loam top soil—rather substandard compared to the average area of the Station. The result was a poor and extremely uneven crop, the thinner soils showing up to marked advantage. Average yields were very low, in marked contrast to a small patch of sunflowers in the garden on well-manured summer-fallow, where they grew eight to nine feet tall and, had there been enough of them to compute yields from, would probably have turned off fifteen tons per acre in spite of the drouth. A similar, though not quite so extreme, contrast between field and garden results was afforded in 1921. Sunflowers appear to respond well to feeding.

ENSILAGE CROPS—DATES OF PLANTING

| Dates of Planting | Corn | Sunflowers |
|---|---|---|
| | Wisconsin No. 7 lbs. per acre (green weight) | Mammoth Russian lbs. per acre (green weight) |
| May 13 | 2,130 | 3,600 |
| " 18 | 1,620 | 3,180 |
| " 25 | 1,320 | 2,940 |
| Averages | 1,690 | 3,240 |

A fairly distinct advantage in favour of early seeding is apparent in the case of both crops.

SPACING SUNFLOWERS

The unduplicated test on this point yielded, as last year, rather inconclusive data. The variety used was Early Ottawa. The stands were irregular, hence the thinning was also.

THINNING EXPERIMENTS WITH SUNFLOWERS

| | Yield per acre lbs. |
|---|---|
| Thinned to 6 inches apart | 7,440 |
| " 7 " | 5,520 |
| " 8 " | 5,340 |
| " 9 " | 5,040 |
| " 10 " | 5,640 |

CORN IN HILLS VERSUS DRILLS

A duplicate test was conducted with two varieties, viz: Northwestern Dent and Wisconsin No. 7. A triplicate test with another variety was marred by insufficient seed. Results were erratic and contradictory. Taking only the duplicate test, the average results are as below:—

| | Yield per acre lbs. |
|---|---|
| Drills | 2,970 |
| Hills | 2,430 |

COMPARATIVE YIELDS OF CORN AND SUNFLOWERS

Although sunflowers have always outyielded corn at the Beaverlodge Station, comparable yields in figures are available for but two years, viz: 1921 and 1922, and even as to these there is a possibility of slight error due to difference in the degree of wilting when cut. However, the comparison is perhaps accurate enough for practical purposes.

The 1921 comparison was on rich, well-prepared land and the season was a good one for such preparation, though rather adverse for crops on stubble ground. The variety of corn was Sweet Kloochman, the sunflowers Early Ottawa 76.

In 1922, comparison was on unmanured, spring-ploughed land that had produced a heavy crop of oats in 1922 and represented the average of twenty-three plots each of corn and sunflowers grown in variety and cultural tests, the sunflowers having, if anything, a slight advantage in location. The season, as explained above, was extremely unfavourable.

COMPARING TWO-YEAR YIELDS OF CORN AND SUNFLOWERS

| Year | Corn per acre | Sunflowers per acre |
|---|---|---|
| | tons lbs. | tons lbs. |
| 1922 (field) | 1 597 | 2 1,031 |
| 1921 (garden) | 12 891 | 35 387 |

## BROADCAST ANNUAL FORAGE CROPS

Twelve fortieth-acre plots on land adjoining the inter-tilled crops and prepared as for these, afforded a triplicate comparison of oats only, oats and peas, oats and hairy vetches, and oats, peas and vetches (o.p.v. mixture). North of these were two eightieth-acre plots providing a rather inadequate test of two kinds of millet, while two other eightieth-acre plots were sown to rape and spring rye. The rape seed proved defective and only a stray stalk grew.

Quantities of oats, peas and vetches sown were as follows:—

Oats only.—Banner oats (Ont. grown) at 2 bushels per acre.

Oats and peas.—Banner oats 1 bushel and peas, chiefly Arthur variety, 1½ bushels.

Oats and Vetches.—Banner oats 1 bushel and Hairy vetches 36 pounds.

O.P.V. Mixture.—Banner oats 3 pecks, peas 1 bushel and Hairy vetches 18 or 20 pounds. (In the three lots of this mixture the peas and vetches were drilled together and proportions are only approximate.)

It having been found in 1921 that, when the legumes were sown at the same time as the oats, the cereal dwarfed the pulse, the plan adopted in 1922 was to drill the legumes on May 16, and, after they had germinated, to sow the oats. These were accordingly drilled in a week or so after the peas and vetches. This time it was the oats that were handicapped, owing to the freakishly dry season which gave late seedings no fair chance to germinate. The oats in the oats-only plots (being sown at the same time as the peas and vetches) gave a larger tonnage than did any of the combinations, this corresponding with previous experience at Beaverlodge Station. The order of standing was practically the same in each of the three ranges. The peas had been treated with nitro culture, while the vetches are naturally inoculated through the prevalence of the wild species, yet neither of these crops seemed to stand well such severe drouth as was experienced the past summer.

When the crop was weighed it seemed in a rather tough condition and one range was re-weighed later when all was thoroughly cured out. The following table presents for comparison the weights as first taken, with an average of each crop and a revised calculation based upon an estimated average shrinkage of 15 per cent.

TABLE GIVING RESULTS IN POUNDS OF CURED CROP PER ACRE FROM EACH OF THREE RANGES OF PLOTS COMPARING BANNER OATS WITH COMBINATIONS OF OATS AND LEGUMES

| Designation | Oats only | Oats and peas | Oats and vetches | Oats, peas and vetches |
|---|---|---|---|---|
| Range 1 | 1,320 | 720 | 520 | 1,060 |
| Range 2 | 1,400 | 1,020 | 840 | 1,280 |
| Range 3 | 1,320 | 840 | 700 | 1,200 |
| Average (less shrinkage) | 1,144 | 731 | 583 | 1,003 |

TABLE PRESENTING COMPARISON OF ALL BROADCAST ANNUAL FORAGE CROPS, 1922

| Designation | Yield cured crop, pounds per acre |
|---|---|
| Oats only, average of triplicate test | 1,144 |
| Oats and peas, average of triplicate test | 731 |
| Oats and vetches, average of triplicate test | 583 |
| Oats, peas and vetches, average of triplicate test | 1,003 |
| Spring rye (single test only) | 2,006 |
| Common millet (single test only) | 918 |
| Siberian millet (single test only) | 748 |
| Rape (failure from bad seed) | ..... |

NOTE.—The millet did relatively much better than usual, the weather being exceptionally warm and dry.

## SUMMER-FALLOW SUBSTITUTES

No experiments have been conducted at Beaverlodge with the growing of cereals in rows and intercultivating them in lieu of bare-fallowing the land. That is to say, no direct comparison has been attempted. Nevertheless, the suggestion was tried in a modified form in 1922.

Some ten acres of summer-fallow had been ploughed deeply but allowed to dry out on top awaiting an opportunity to remove a liberal crop of rock turned up from the bottom of the furrow. When protracted drouth threatened to curtail feed supplies below the limits of necessity, it was decided to drill oats and a little beardless barley in rows thirty inches apart in the hope of providing some fodder. Drilling was done on July 12. It is usually advised to drill the grain in double or triple rows, partly to facilitate harvesting. The kinds of annual weeds troublesome in the north country, however, such as Lamb's Quarters, Buckwheat and Shepherd's Purse, promised trouble if this plan were adopted, hence single rows were sown. Germination was so tardy and irregular that it was feared for a while some of the seed would lie over to make trouble by volunteering in 1923. The germination was conspicuously better on the portion where a heavy coat of winter-applied manure had kept the land quite moist until ploughing. In the end, practically all the seed germinated and a nice fresh growth resulted, part of it heading out. It was found impracticable to harvest these single drills with the binder but a moderate quantity of very excellent grazing was afforded. After being allowed access to it for a couple of hours per day, the cows increased greatly in their flow of milk. Moreover, this pasture remained green and good until the latter part of October. From this standpoint the trial was quite successful, but the inconvenience of tillage as compared with an open sweep of bare fallow was considerable and a hand-hoeing was necessary to prevent the seeding of weeds growing along the drills. It seems doubtful whether the practice will commend itself for general adoption in the north.

## UNDERDRAINAGE

In the dry season of 1922, the experimental underdrain, laid the summer previous, produced no noticeable beneficial result, except to make earlier seeding possible in the hollow through which it ran. A couple of other underdrains running through the lawn, one draining a cellar and the other a water closet, seemed rather to have an adverse effect, although in the early summer a particularly rank and green growth of grass marked the drain leading from the closet pit. Later, this growth parched and the ground became bare here, the drain being a very shallow one.

# CEREALS

### SEASONAL NOTES

Extreme drouth resulted in a precocious maturity of all varieties of cereals, harvesting being accomplished well in advance of fall frosts. The grain was hard but the kernels much leaner than usual and yields not in line with those commonly expected in the older provinces. Speaking generally, the out-turn of grain from summer-fallow was only about forty to fifty per cent of what it would be in a normal year. That even this much was obtained in a season when the April to August precipitation was only 3.57 inches and much of that in sprinkles which dried almost as soon as they fell, is attributed to four factors, viz: (1) the fertility of the soil; (2) the fact that a considerable proportion of the plant food and moisture accumulated by fallowing can be carried over the winter to benefit the ensuing crop; (3) a moderate summer tempera-

ture with restricted evaporation in consequence, and (4) a dense smoke screen from neighbouring forest fires, which obscured the sun for weeks during what would otherwise have been a very trying period. The latter factor, of course, was adventitious and deplorable. The others are characteristic. A region which can raise a two-fifths crop in what has been pronounced the drouthiest season in twenty-four years can hardly be called a "dry" country, except metaphorically.

The rapidity with which the grain ripened—prematurely in many instances—made it more difficult than usual to gauge the relative maturation periods of the several varieties and the 1922 notes on this score are presented with reservations. They may not in all cases be accurate.

### OUTSIDE DRILLS EXCLUDED FROM COMPUTATIONS

Where crops are grown in plots with cultivated paths between them, the outside drills grow taller and ranker by reason of the extra proportion of plant food and moisture available to their feeding roots. The effect is to exaggerate considerably the tonnage per acre. The yield of threshed grain is not always correspondingly augmented, because, in wet seasons with tardy harvests, the plots are often cut before the margins are fully ripened, and in such cases the inclusion of the marginal area might conceivably reduce per-acre yields besides impairing the sample of grain. In seasons like 1922 it is the other way, the outer drills decidedly outyielding the interior ones. In any case, the interests of reliability are to be served by removing the outer drills, since the object of plot work is to compare as accurately as may be the behaviour of varieties and methods under field conditions, and if, as seems probable, different kinds will react in different ratio to the stimulus of marginal advantage, then it is important to remove the outside drills so as to approach more nearly to practical field conditions. With this in view, the two outer drills were pulled from each side of every plot before harvesting. That is to say, a twenty-drill plot was reduced to sixteen drills, except in a very few instances where, for one reason or another, the principle was carried out in a modified form.

When pulling these drills, there was no thought of threshing them, hence convenience was served in some instances by pulling the margins several days in advance of the harvesting of the remaining portions. Upon the suggestion of the Dominion Agrostologist, who visited the station just prior to threshing, it was decided to thresh the marginal drills separately. This was done, and after the yield of the main plot was calculated, a second calculation was made showing how the yield would have worked out if the whole plot had been threshed together and the harvest calculated on that basis. A third column shows the percentage of exaggeration that would thus have resulted. In nearly every case the percentage of error is large. The one exception is a beardless barley, which probably shattered much worse from the outside than from the inner drills. The percentage of difference is small in the case of the Eureka hulless-beardless barley which, having been seeded very late, was cut somewhat immature, thus reducing the advantage of its marginal drills.

Apart from these two barleys, it will be noted that the error which would have been introduced by including the margins in a dry year is very considerable and *varies markedly with different varieties*. For instance, with the two exceptions already noted, it varies in the case of barleys from 9·9 per cent up to 24·8 per cent; in the case of spring wheat from 8·1 per cent up to 18·3 per cent, and in the case of oats from 8·2 per cent up to 28·5 per cent. Allow for the fact that some border drills were pulled prematurely while others were not. Concede the possibility of experimental error here and there—though the work was done with considerable care—and there still remain enough differences in the coefficients of error to provoke thought and to emphasize the prudence of margin-elimination as a fixed policy.

ERROR IN YIELDS BY INCLUDING MARGINS

| Variety | Yield per acre as calculated after removal of outside drills | Yield per acre as would be obtained if whole plot taken | Exaggeration that would have bee introduced by including margins | |
|---|---|---|---|---|
| *Oats* | lbs. | lbs. | Per cent | |
| Black Winter | 1,493 | 1,696 | 13·6 | |
| Mammoth (Kite) | 1,443 | 1,590 | 10·2 | |
| Alaska | 1,262 | 1,366 | 8·2 | |
| Daubeney, Ottawa 47 | 1,344 | 1,471 | 9·4 | |
| O.A.C. No. 3 | 1,229 | 1,392 | 13·2 | |
| Liberty Ottawa 480 | 767 | 871 | 13·5 | |
| Legacy Ottawa 678 | 1,179 | 1,326 | 12·4 | |
| German Heath | 1,146 | 1,300 | 13·4 | |
| Abundance | 1,287 | 1,518 | 17·9 | |
| Gold Rain | 1,353 | 1,643 | 21·4 | |
| Ligowo | 1,674 | 1,973 | 17·8 | |
| Banner Ottawa 49 | 1,386 | 1,782 | 28·5 | |
| Leader | 1,353 | 1,590 | 17·5 | |
| O.A.C. No. 72 | 1,468 | 1,729 | 17·7 | |
| Victory 1st date | 1,204 | 1,465 | 21·6 | |
| Victory 2nd date | 1,122 | 1,300 | 15·8 | |
| *Irregular-sized plots* | | | | |
| Laurel Ottawa 477 | 874 | 1,018 | 16·4 | |
| Swedish Crown | 1,357 | 1,640 | 20·8 | |
| *Barley* | | | | |
| Success | 1,056 | 1,161 | 9·9 | |
| Beardless (local) | 1,072 | 996 | − 7·1 | |
| Albert Ottawa 54 | 693 | 792 | 14·3 | |
| Himalayan Ottawa 59 | 970 | 1,139 | 17·4 | |
| Chinese Ottawa 60 | 957 | 1,188 | 24·1 | |
| O. A. C. No. 21 | 1,204 | 1,445 | 20·0 | |
| Early Chevalier Ottawa 51 | 1,188 | 1,392 | 17·1 | |
| Trebi | 1,290 | 1,611 | 24·8 | |
| Hannchen | 1,386 | 1,584 | 14·3 | |
| Bark's Excelsior | 1,449 | 1,710 | 18·0 | |
| Bearer Ottawa 475 | 1,303 | 1,491 | 14·4 | |
| Canadian Thorpe | 1,006 | 1,181 | 17·3 | |
| Charlottetown No. 80 | 1,155 | 1,425 | 23·3 | Cut green. |
| Eureka | 1,196 | 1,240 | 3·6 | Seeded late. |
| *Wheat* (Spring) | | | | |
| Ruby Ottawa 623 | 934 | 1,108 | 18·6 | |
| Early Triumph | 1,518 | 1,663 | 9·5 | |
| Supreme | 1,155 | 1,306 | 13·0 | |
| Red Bobs | 1,254 | 1,425 | 13·6 | |
| Reward Ottawa 928 | 1,196 | 1,339 | 11·9 | |
| Garnet Ottawa 652 | 1,311 | 1,551 | 18·3 | |
| Ey. Red Fife Ottawa 16 | 1,443 | 1,617 | 12·0 | |
| Marquis Ottawa 15 | 1,311 | 1,518 | 15·7 | |
| Marquis 10 B | 1,336 | 1,570 | 17·5 | |
| Huron Ottawa 3 | 1,666 | 1,932 | 15·9 | Half plot. |
| Kitchener | 1,691 | 1,986 | 17·4 | |
| Kitchener (Wheeler) | 1,740 | 1,881 | 8·1 | |
| *Wheat (Winter) and Rye (Winter and Spring)* | | | | |
| Turkey Red (7 pks.) | 1,105 | 1,254 | 13·4 | |
| Turkey Red (8 pks.) | 1,072 | 1,240 | 15·7 | |
| Winter Rye | 1,398 | 1,475 | 5·5 | Margins pulled early. |
| Spring Rye Ottawa 12 Select | 1,039 | 1,155 | 11·1 | |
| Spring Rye O.A.C. 61 | 1,097 | 1,201 | 9·4 | |

## SPRING WHEAT

To the six well-known varieties of spring wheat grown in 1921 were added four new promising sorts besides a couple of strain selections of varieties already under test. From Ottawa were received the Garnet and the Reward, the former acquitting itself especially well, outyielding Ruby decidedly and appearing to be almost as early. From Dr. Seager Wheeler were obtained two strains representing selections he has made from the Red Bobs. These are called Early Triumph and Supreme. Dr. Wheeler also supplied us with his 10 B. strain of Marquis wheat and with Kitchener of his own growing. Both did slightly better than adjoining plots of the same varieties, representing our own seed stocks, though this might have been due to any one or more of several factors, such as higher vitality of seed.

### Early and Late Ripened Close Together

The spring wheats were sown April 26 and 27. Harvesting began on August 15 with Ruby, Garnet and Reward, concluding on the 21st with Marquis, Huron and Kitchener, the spread in dates being much less than usual, owing to hot, dry weather.

### SOIL CONDITIONS

The land was of a sharp, eastern slope about as even of contour as the station affords. It was partly breaking and partly summer-fallow, each plot having substantially the same proportion of each, though not exactly. However, since the slant of the line marking the two preparations was very gradual and varieties had been placed in approximate order of earliness, the net effect was to provide closely comparable conditions to varieties of the same range of maturation, the latest kinds being slightly favoured over the earliest.

The breaking having been done in early July, and the soil of this area being a raw, whitish-clay knoll, the wheat plots were all handicapped as compared with what they could have done had the preparation and soil all been as good as the summerfallow portion. This was quite evident from examination of the plots and further illustrated by the fact that an acre of Ruby on unploughed potato land yielded much more heavily than did the same wheat in the variety test.

### NOTES ON VARIETIES

*Early Red Fife, Ottawa 16,* a practically bald red wheat of high quality, matures in about the same period as Marquis, but shatters too easily and scarcely equals Marquis in average yield during the three years it has been under trial.

*Early Triumph.*—Dr. Wheeler's earlier selection from the Red Bobs. Grown beside the Ruby it seemed to head about as soon as the latter, yet was adjudged three days later in ripening. Gave a relatively high yield in this the first year under test here. Somewhat subject to shattering, and not free from yellow berry.

*Garnet, Ottawa 652,* Dr. Saunders' new and very promising early wheat, grown at Beaverlodge for the first time, headed a little later than Ruby but matured with it and outyielded it almost forty per cent. The new sort may have had a very slight advantage in soil. While not equalling the Early Triumph this year in yield and not heading quite so soon, it seemed a little earlier in ripening and produced a fine sample of apparently high-quality grain of the Ruby type but rather larger and deeper coloured. This variety will not be available for distribution for a few years.

*Huron Ottawa 3.*—For the eighth successive year this hardy, bearded wheat has outyielded Marquis, the plots being always located side by side and special precaution taken to ensure a close comparison of the two kinds. Owing to an unfortunate skip in drilling, only a half-width plot of Huron could be used and the variety may have had a little accidental advantage in 1922, but its eight-year average of 44 bushels 22 pounds against 35 bushels 59 pounds from Marquis cannot be explained on the score of accidental advantage. Though no earlier than Marquis, it is hardier, and in frost years gives not only a considerably heavier yield but a better-looking, even if not as good a milling, sample. While it is desirable for a wheat-exporting district to specialize on high-quality wheats, yet from the standpoint of a homesteader who raises wheat under frost hazard and partly with a view to feed production, the Huron has claims to attention, against Marquis, though fortunately there are now some early high-quality wheats which promise better than either for most parts of the Peace River District.

*Kitchener.*—This strong-strawed, square-topped variety, originated as a sport from Marquis and propagated by Dr. Wheeler, has given a surprisingly good account of itself during the three years it has been grown at Beaverlodge, heading the list in yield for that period and surpassing its parent variety by an average of 6 bushels 43 pounds per acre. This result is at variance with data reported from other Stations and needs checking by a long-term test, but is certainly creditable so far as it has gone. Kitchener is no earlier than Huron or Marquis—perhaps a day later, if anything.

*Red Bobs.*—This and its progeny, the Early Triumph and Supreme, are about the only strictly bald wheats on the list. Red Bobs has been the subject of much divergent opinion both as to earliness and yield. As regards the former character it was noted that it headed this year almost as early as Ruby but as usual did not ripen with it. At Beaverlodge, Red Bobs usually continues filling and hardening until within two or three days of Marquis. This year all dates of maturity were closer together tha unsual and the Red Bobs stands intermediate between Ruby and Marquis. To this advantage of two or three days in earliness over Marquis may be added a four-year-average betterment of a bushel in yield and this despite a tendency to shatter rather too freely. From some regions where rust is troublesome, Red Bobs is not favourably reported on but in the Peace River country where rust is not feared, the Red Bobs has very favourable claims to attention. It stands erect, while the straw is of very uneven length, the heads have, thus far at this Station, exhibited a more homogeneous character than have the heads of Marquis.

*Reward Ottawa 928* did not equal Garnet in yield but one season's test cannot be regarded as determining the merit of a variety. Headed before Garnet but ripened at about the same time. Produced a larger berry of beautiful shape and colour. This variety will not be available for distribution for a few years.

*Ruby Ottawa 623.*—On a four-year average this variety compares as follows, with the only three that have been grown beside it for a corresponding period:

SPRING WHEAT—AVERAGE YIELDS

| Variety | Average yield four years | | Average days to mature fully |
|---|---|---|---|
| | bush. | lbs. | |
| Huron | 47 | 3 | 131¼ |
| Red Bobs | 43 | 50 | 128¾ |
| Marquis | 42 | 44 | 130¼ |
| Ruby | 31 | 35 | 121 |

Of these four wheats, the Ruby is the surest to produce a high grade and will make a crop in some years when, over considerable areas, the others fail. This applies with more force in field practice than in plot tests. Narrow plots appear to be measurably protected from frost by radiation of heat from the bare paths between and besides they may sometimes be left longer than it would be prudent to leave the field.

Early disposal of harvest is a strong point in favour of a kind like Ruby. Its milling quality ranks high. The straw is of fair length but the heads are short, the yield rather low and the grain prone to shatter. Ruby has had a place in the north but seems likely to be superseded by some of the new likely sorts such as Garnet or Reward.

*Supreme.*—So far as can be judged from a single year's trial, this selection of Dr. Wheeler's seems less meritorious for the district than the Early Triumph. It is not quite so early as the latter, and, in common with all the later-ripening sorts, showed more tendency to piebald.

*Kubanka.*—Grown in the garden only in comparison with Marquis, has in each of two years proven too late to be recommended as a safe crop.

*Black Durum,* though rather earlier than Kubanka, is also too late for the district.

SPRING WHEAT—TEST OF VARIETIES

| Variety | Date of seeding, 1922 | Date of cutting, 1922 | Estim. days to mature fully, 1922 | Yield per acre, 1922 | Average yield three years, 1920-22 | Average yield four years, 1919-22 | Average yield five years, 1918-22 | Average yield eight years, 1915-22 |
|---|---|---|---|---|---|---|---|---|
| | | | | bush. lbs. | bush. lbs. | bush. lbs. | bush. lbs. | bush. lbs. |
| Early Red Fife, Ottawa 16 | April 26 | Aug. 21 | 117 | 24 3 | 41 11 | ..... | ..... | ..... |
| Early Triumph | " 26 | " 19 | 114 | 25 18 | ..... | ..... | ..... | ..... |
| Garnet, Ottawa 652 | " 26 | " 15 | 111 | 21 51 | ..... | ..... | ..... | ..... |
| Huron, Ottawa 3 | " 26 | " 21 | 117 | 27 46 | 47 19 | 47 3 | 45 38 | 44 22 |
| Kitchener | " 26 | " 21 | 117 | 28 11 | 48 17 | ..... | ..... | ..... |
| Kitchener (Wheeler) | " 27 | " 21 | 117 | 29 0 | ..... | ..... | ..... | ..... |
| Marquis, Ottawa 15 | " 26 | " 21 | 117 | 21 51 | 41 34 | 42 44 | 39 56 | 35 59 |
| Marquis 10B., (Wheeler) | " 26 | " 21 | 117 | 22 16 | ..... | ..... | ..... | ..... |
| Red Bobs (Wheeler) | " 26 | " 19 | 114 | 20 54 | 43 26 | 43 50 | ..... | ..... |
| Reward, Ottawa 928 | " 26 | " 15 | 111 | 19 56 | ..... | ..... | ..... | ..... |
| Ruby, Ottawa 623 | " 26 | " 15 | 111 | 15 34 | 30 46 | 31 35 | 29 58 | ..... |
| Supreme (Wheeler) | " 26 | " 19 | 116 | 19 15 | ..... | ..... | ..... | ..... |

NATURAL CROSSING OF WHEATS

In 1921, a handful each of Kubanka, Black Durum and a pure strain of Marquis received from Dr. Chas. E. Saunders were grown in the garden in rows three feet apart, but, owing to an error in seeding, the rows were of irregular length, with one sort continuing on where another left off. When harvesting, however, all due pains were taken to avoid admixture in making up the sheaves. The heads of all varieties as grown in 1921 had appeared very regular and true to type. The Black Durum (from a commercial channel) had been handpicked to remove wild oats and other impurities.

Seed from the 1921 crop of all three varieties was sown in 1922 in parallel rows of even length.

In the Kubanka row were several plants with heads of Marquis' external characteristics, also some heads of Marquis shape and size but with beards of the Huron rather than the Kubanka type, the beards being more nearly parallel to the axis of the head than is the case with Kubanka awns. There were also a couple of plants bearing heads that seemed to show a varying compromise with the Black Durum type.

In the Marquis row of 1922 were at least two heads which decidedly suggested hybridization with Black Durum, the glumes having the dark colour of

the latter and a rudimentary awn only a fraction of the length of a typical Black Durum awn.

In the two Black Durum rows the evidences of hybridization were not so marked, though there seemed to be a few heads whose glumes ran a little to straw colour in place of the purplish black of the Black Durum.

The practical importance of these observations lies in the fact that such apparent tendency to natural crossing is liable to result in a progressive breaking up whenever a few stray kernels of one variety are introduced into a field of grain having substantially the same period of maturation. May this not explain some of the diversity in type that is occurring with Marquis wheat in the West?

## OATS

Fourteen varieties of oats were compared under summer-fallow conditions, the land being harrowed in the spring before drilling. Seeding was performed on April 27. Harvesting commenced with Alaska, Daubeney and O.A.C. No. 3 on August 7, concluding August 21 with Swedish Crown, Victory and the Black Winter oat. The Leader might well have been left until the same date but for reasons of convenience was harveted two days sooner.

*Abundance.*—By a six-year-average yield of 89 bushels and 21 pounds, this leading oat of the district has fairly well demonstrated its adaptability. Outside the precocious group, which numbers fine-strawed sorts like Daubeney and Alaska, it is one of the earliest we have, being three to five days earlier than Ligowo and five to seven days ahead of Victory. By a corresponding ratio it falls short of these in yield and is a coarse-hulled oat.

*Alaska* is rather earlier than necessary for most growers; fine-strawed and a low yielder. Grain of rather plumper appearance than that of some other very early oats.

In the rich High Prairie district west of Lesser Slave Lake, oats of this class are called "Little" oats in contradistinction to standard sorts like Abundance and Banner, which are known as "Big" oats. On that fabulously rich, deep black silt, the "big" oats so often fail to stand up and ripen that the Orloff, belonging to the "'little" oat class, has been grown largely for grain production.

*Banner Ottawa 49,* though falling down somewhat in 1922, still heads the yield column for the four years it has been grown, with an average of 99 bushels 3 pounds to its credit. A very hard oat to beat for general usefulness.

*Black Winter.*—This oat, obtained from a local settler, is supposed to be adapted for either autumn or spring seeding. The small sample sown in the fall of 1921 all winter-killed, the winter being an exceptionally trying one due to lack of snow covering. Sown in the spring of 1922 it made a first-class stand, grew a fine straw and yielded fairly well but was late in ripening.

*Daubeney, Ottawa 47* has vindicated itself as a good oat of its class, though it finds no widespread favour. It is a better quality oat than it looks, but its long, slim kernel is unprepossessing. During the past seven years it has yielded three-quarters as much grain as the Ligowo.

*German Heath* (our own designation) is an oat of obscure origin obtained by a Canadian officer in Germany, where it was supposed to have been bred for the heath lands. The tag inside the sack was inscribed "Garton's Abundance X Sixty Day." It is early but its precise merits remain to be determined.

*Gold Rain* is a good-quality, yellow-hulled variety, medium-early but scarcely equalling the best of the other standard kinds in yield, during the three years it has been grown at the Station.

*Laurel, Ottawa 477*, a new hulless oat bred by Dr. Chas. E. Saunders, surprised the Station staff by attaining a higher yield (notwithstanding its short straw and unpromising appearance) than Liberty. The stand may have been too thick for the season.

*Leader* is a cluster-headed oat which exhibits a tendency to diversity of type. It is productive, but late, and the straw in some seasons displays a tendency to lodge.

*Legacy, Ottawa 678*, another new introduction, proved early but its yield was disappointing as compared with the run of main croppers.

*Liberty, Ottawa 480* (hulless) gave a poorer account of itself than usual, but it is now possible to compare this oat in the light of a five-year performance. In that time it has produced 63 per cent as many pounds of grain as Ligowo, or approximately seven-eights as much meat per acre. Its field qualities are good. It is being used with satisfaction as a porridge meal but its utility for stock feeding remains to be determined.

*Ligowo* heads the five-year average and comes within two bushels of Victory on the seven-year. It led by a substantial margin in 1922. It is an oat of good field qualities, medium in date of maturity, ranking with Banner in this regard. It is productive and of good feeding quality, but the somewhat long and open awn end detracts from its appearance. It has, nevertheless, given a good account of itself in the district and some very heavy weights per measured bushel have been reported. An excellent sort indeed.

*Mammoth* (Kite).—The Alberta newspapers of last winter (1921-22) carried an item about a new oat discovered by Alby Kite, of Cluny, Alberta. From a plant which attracted his attention, Mr. Kite propagated a strain he called the Mammoth and, upon request, kindly supplied the Beaverlodge Station with seed for a test. The sample proved to be a very plump, white oat, with a rather thick hull, however. It matured reasonably early and gave a very fair yield. Time, of course, is needed to establish its relative merit and to determine whether it is actually a new oat or an old friend in new habitat.

*O.A.C. No. 3*.—The fortunes of war are the portion of this as of all other varieties, as chance or season pushes it up or down the scale of the yield column. It is an oat of the Alaska and Daubeney class, ranking, at present, intermediate between these in productiveness.

*O.A.C. No. 72*.—Another oat of Guelph origination was introduced through a very small plot in 1921 and compared in the regular way in 1922. It classes with Banner, which it seems to be rather successfully rivalling in its native province of Ontario but has demonstrated, as yet, no outstanding claims to attention at Beaverlodge.

*Swedish Crown* is a Svalof (Sweden) creation valued by some Scottish stockmen because of the reported feeding quality of its leafy straw. It will be tested further.

*Victory* is a pleasing oat of vigorous character and high quality, bred at Svalof, Sweden, and regarded as a keen rival of Banner, although it is two or three days later. Its prolificacy is demonstrated by the fact that on a seven-year average it has outyielded the Ligowo by nearly two bushels per acre, yet, strangely enough, it yielded nearly fourteen bushels less than Ligowo in 1922, though to all appearances on quite as good a piece of land.

With the greatest of care, experimental errors will creep in to change the rating of close varieties from year to year, but experimental error of this dimension could hardly escape recognition where the plots were closely watched. There may be obscure principles coming in to cause such fluctuations. Meantime, unless or until such are discovered, we can only trust to long-term averages of carefully conducted work.

## OATS—TEST OF VARIETIES

| Variety | Date of cutting 1922 | Days to mature fully 1922 | Days to mature average three years | Yield 1922 | | Average yield two years | | Average yield three years | | Average yield four years | | Average yield five years | | Average yield six years | | Average yield seven years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | bush. | lbs. | bush. | lbs. | bush. | lbs. | bush. | lbs. | bush. | lbs. | bush. | lbs. | bush. | lbs. |
| Abundance | Aug. 14 | 109 | 116 | 37 | 29 | 67 | 26 | 82 | 9 | 89 | 19 | 94 | 0 | 89 | 21 | | |
| Alaska | " 7 | 102 | ..... | 37 | 4 | 49 | 32 | | | | | | | | | | |
| Banner Ottawa 49 | " 19 | 114 | 119 | 40 | 26 | 67 | 18 | 87 | 27 | 99 | 3 | | | | | | |
| Black Winter | " 21 | 116 | ..... | 43 | 31 | | | | | | | | | | | | |
| Daubeney Ottawa 47 | " 7 | 102 | 104 | 39 | 18 | 55 | 9 | 63 | 4 | 68 | 22 | 75 | 4 | 73 | 32 | 72 | 16 |
| German Heath (Freebom) | " 12 | 107 | ..... | 33 | 24 | | | | | | | | | | | | |
| Gold Rain | " 14 | 109 | 117 | 39 | 27 | 66 | 13 | 85 | 3 | | | | | | | | |
| Laurel—Ottawa 477 (Hulless) | " 12 | 107 | ..... | 25 | 24 | | | | | | | | | | | | |
| Leader | " 19 | 116 | 122 | 39 | 27 | 66 | 2 | 85 | 29 | | | | | | | | |
| Legacy—Ottawa 678 | " 12 | 107 | ..... | 34 | 23 | | | | | | | | | | | | |
| Liberty—Ottawa 480 (Hulless) | " 12 | 107 | 114 | 22 | 19 | 43 | 32 | 53 | 25 | 58 | 11 | 62 | 18 | | | | |
| Ligowo | " 19 | 114 | 118 | 49 | 8 | 71 | 1 | 86 | 3 | 93 | 0 | 98 | 30 | 94 | 23 | 93 | 27 |
| Mammoth (Kite) | " 14 | 109 | ..... | 42 | 15 | | | | | | | | | | | | |
| O.A.C. No. 3 | " 7 | 102 | 104 | 36 | 5 | 52 | 23 | 63 | 24 | | | | | | | | |
| O. A. C. No. 72 | " 19 | 114 | ..... | 43 | 6 | | | | | | | | | | | | |
| Swedish Crown | " 21 | 116 | ..... | 39 | 31 | | | | | | | | | | | | |
| Victory | " 21 | 116 | 122 | 35 | 14 | 67 | 18 | 89 | 26 | 97 | 8 | 98 | 0 | 95 | 5 | 95 | 23 |

## BARLEY

From the 1921 list of barleys one was dropped, while four introductions brought the total up to fourteen. Most of them were seeded April 28 and 29, but the seed of Charlottetown No. 80 was not received in time to drill before May 2. The Eureka beardless-hulless, held back for hot-water treatment, did not get into the ground until May 17. The Albert, Success and a local hooded sort were out August 7, having ripened in 100 to 101 days. Canadian Thorpe was quite on the green side when harvested on August 25—119 days after seeding.

Scarcely any shattering occurred. Dry weather not only curtailed yields but seemed to make both kernels and beards very tenacious.

### OATS VERSUS BARLEY

The relative productiveness of barley and oats under Grande Prairie conditions is well brought out by the subjoined comparison of seven-year average yields of a leading kind of each grain in pounds per acre.

| | Average yield seven years, 1916-1922, pounds grain per acre |
|---|---|
| Barley, O.A.C. No. 21 | 1,932 |
| Oats, Ligowo | 3,189 |
| Per cent advantage oats over barley | 65% |

While for certain purposes, such as finishing pigs, barley is much more valuable per pound than oats, the converse applies for other uses. Barley matures in fewer days but if caught by frost between heading and maturity, it is far more susceptible than oats. It shatters worse, lodges more easily and is mean to handle. It makes a less restrictive nurse crop for seeding down, however, and has a place to fill, but not a major place, as yet.

*Albert, Ottawa 54* (6).—Very early; too low in yield to be recommended.

*Bark's Excelsior* (6).—Very productive, but late.

*Bearer, Ottawa 475* (6).—A coarse, prolific sort, was tried in 1922 for the first time. The date of maturity of this sort was not so closely observed as it should have been. It seemed to belong to the late class and yielded well.

*Beardless,* local (hooded), resembling Success and grown beside it for comparative study. Divergence not very well marked, except that the character of the local sort was somewhat heterogeneous.

*Canadian Thorpe* (2), a prize-winning barley, seed of which was furnished by Dr. Seager Wheeler, proved very late and gave only a moderate yield, but the sample was attractive.

*Charlottetown No. 80* (2).—This Prince Edward Island-bred variety, now on its first probation in Grande Prairie, is supposed to have the advantage of dropping many of its beards before harvest, but the season was not favourable to such an apostasy and the awns stuck " closer than a brother." Fairly promising.

*Chinese, Ottawa 60* (2).—Another novice. Early but short of straw and scant of avoirdupois. May have been seeded too thickly for a thirsty summer.

*Early Chevalier, Ottawa 51* (2).—This well-known two-rowed barley has now completed at Beaverlodge a cycle of seven years, during which time it has yielded about seven-eighths as much grain per acre as the O.A.C. No. 21. It is somewhat slithery to handle but produces a good sample of grain and in

ordinary years is disposed to part with its beards rather than its kernels in the wind. There was no loss of either this year. Matures in about the same time as O.A.C. No. 21, being thus medium-early.

*Eureka,* beardless-hulless (6).—A productive barley possessing the very great advantage of being beardless. In past years it has exhibited two grave defects. First, as the grain matured, the very heavy heads bore down the straw, causing much lodging. This loss could probably be overcome on a field scale by pasturing the stubble by cattle or hogs. The other defect was a well-marked tendency to loose smut, which neither prompt rogueing nor regular treatment with formaldehyde controlled. In 1921 about five per cent of the heads were smutty on emerging from the sheath. In 1922 the seed was subjected to the hot-water disinfection recommended by the Dominion Cerealist, Ottawa. Directions for this rather precarious treatment were carefully followed, with the gratifying result that not only was the germination substantially unimpaired but close observation failed to discover a single smutty head in the resultant crop.

*Hannchen* (2).—Falling below O.A.C. No. 21 when first introduced in 1920, this two-rowed sort, obtained from Saskatoon, has been steadily improving its relative position and is now only about a bushel behind its six-rowed rival in the three-year column, while standing a good second to Bark's Excelsior in 1922. It is not a show barley and grows rather too short a straw.

*Himalayan, Ottawa* 59, hulless (6).—A pure line selection from Guymalaye, which it now supersedes, yielded fairly well.

*O.A.C. No. 21* (6).—Until recently the favourite main cropper at Beaverlodge. A good kind, fairly early, a consistent yielder, but a poor show barley and too tenacious of its atrocious awns. Seven-year average yield of 40 bushels 12 pounds.

*Success,* hooded (6).—An arrant failure. Shatters far too easily.

*Trebi* (Bark) (6), a very promising introduction by Don. H. Bark, gave a phenomenal account of itself in 1921 and though exceeded by three kinds this year, still heads the two-year average. Four or five days later than O.A.C. No. 21 but two or three days earlier than Bank's Excelsior and Hannchen. A better show barley than O.A.C. No. 21 and a promising cropper, only for the barbarous attribute which it shares in common with most unregenerate scions of Sir John Barleycorn.

BARLEY—TEST OF VARIETIES

| Variety | Date of seeding, 1922 | Date of cutting, 1922 | Estim. days to mature fully, 1922 | Days to mature average 3 years, 1920-22 | Yield per acre, 1922 | Average yield 2 years, 1921-22 | Average yield 3 years 1920-22 | Average yield 4 years, 1919-22 | Average yield 7 years, 1916-22 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | bush. lbs. | bush. lbs. | bush. lbs. | bush. lbs. | bush. lbs. |
| Albert, Ottawa 54 (6) | April 28 | Aug. 7 | 101 | 100 | 14 21 | 18 43 | 24 11 | 24 47 | ..... |
| Bark's Excelsior (6) | " 28 | " 21 | 115 | ..... | 30 9 | 47 30 | ..... | ..... | ..... |
| Bearer, Ottawa 475 (6) | " 28 | " 21 | 115 | ..... | 27 7 | ..... | ..... | ..... | ..... |
| Beardless, local (hooded) | " 29 | " 7 | 100 | ..... | 22 16 | ..... | ..... | ..... | ..... |
| Canadian Thorpe (2) | " 28 | " 25 | 122 | ..... | 20 46 | ..... | ..... | ..... | ..... |
| Charlottetown, No. 80 (2) | May 2 | " 22 | 114 | ..... | 24 3 | ..... | ..... | ..... | ..... |
| Chinese, Ottawa 60 (2) | April 28 | " 12 | 106 | ..... | 19 45 | ..... | ..... | ..... | ..... |
| Early Chevalier, Ottawa 51 (2) | " 28 | " 14 | 108 | 109 | 24 36 | 35 25 | 42 2 | 43 12 | 35 26 |
| Eureka (Hulless and beardless) (6) | May 17 | " 22 | 104 | ..... | 24 44 | 35 1 | 41 35 | (seeding delayed, 1922) | |
| Hannchen (2) | April 28 | " 21 | 115 | 114 | 28 42 | 43 4 | 48 19 | ..... | ..... |
| Himalayan (Hulless), Ottawa 59 (6) | " 28 | " 12 | 106 | ..... | 20 10 | ..... | ..... | ..... | ..... |
| O. A. C. No. 21 (6) | " 28 | " 14 | 108 | 109 | 25 4 | 38 23 | 49 27 | 51 6 | 40 12 |
| Success, Beardless (hooded) | " 29 | " 7 | 100 | ..... | 22 0 | 19 25 | ..... | ..... | ..... |
| Trebi (Bark) (6) | " 28 | " 19 | 113 | ..... | 26 42 | 49 31 | ..... | ..... | ..... |

## SPRING RYE

Two varieties were seeded April 26 and harvested on the same date in the latter part of August. Last year's standing was reversed, but, on the two-year average, Saunders' Select, O. 12, has rather the edge on Dr. Zavitz' production, the O.A.C. No. 61.

SPRING RYE—TEST OF VARIETIES

| Variety | Yield per acre, 1922 | | Average yield two years 1921-22 | |
|---|---|---|---|---|
| | bush. | lbs. | bush. | lbs. |
| O. A. C. No. 61 | 19 | 33 | 28 | 16 |
| Saunders' Select, Ottawa 12 | 18 | 31 | 30 | 47 |

## FIELD PEAS AND VETCHES

Eight varieties of field peas and one of vetch were compared in unduplicated plots on a piece of raw willow land broken in early July, 1921, and not by any means in first-class condition for crop production in an adverse season. The seed of the peas was inoculated with nitroculture and it seemed for a time as though there would be some results, but, later on, this was not certain and a couple of check plots yielded substantially as well as those sown with treated seed. Raw land and drouth resulted in a very short growth of vine, small pods and a small but well-ripened sample of grain from all varieties. Relative maturity was difficult to judge. The vetch, sown later than the peas, seemed rather worse affected by the drouth and yielded very lightly, though the sample of seed was good.

*Alaska.*—An early pea compared here for the first time through the good offices of a neighbour.

*Alberly Blue* (Edmonton).—Compared on a plot scale with Arthur for two years, has not equalled the latter in yield but is somewhat earlier. Not sufficiently tested to pronounce upon.

*Arthur, Ottawa 18.*—A white pea, good when it matures but not early enough to be safe for the district. Occasional complete or partial loss of the crop explains its low eight-year average yield of 17 bushels and 50 pounds.

*Chancellor D., Ottawa 26.*—A small, smooth, white, early pea, bred by Dr. Saunders, promises very well for the Peace River District, averaging 28 bushels 26 pounds during the past two years.

*Early White.*—A small, white, early kind received through Professor G. H. Cutler of the University of Alberta, did not, by its single plot, vindicate the high reputation of the variety in Saskatchewan and elsewhere. However, the test area was not so even as desirable and Early White may have been handicapped in location.

*Empire,* a blue pea received from the University of Alberta, is worthy of careful test.

*O.A.C. No. 181* (Guelph).—The seed of this promising early Ontario-bred pea was not received in time to sow before May 2, five days after the other seven kinds, and was then grown on a half-size plot—the only area remaining in the range. The grain as grown was a medium-small white.

*White Alberta,* another of the four kinds received through the courtesy of Professor Cutler, has been grown for two years beside the Chancellor D., a pea which it closely resembles in all essential characteristics. As yet, the Alberta sort has scarcely equalled its Ottawa rival, but it is too soon to judge.

*Common Vetch.*—Drouth and poor soil rendered yield abnormally small. At seedsmen's prices, however, the value of the crop would not be so bad after all. In average seasons this seed could easily be produced to supply the home demand for forage crop purposes and probably for shipment out.

PEAS AND VETCHES—TEST OF VARIETIES

| Variety | Date of seeding | Date of pulling | Est. days to mat re fully | Yield per acre, 1922 | Average yield two years 1921-22 | Average yield eight years |
|---|---|---|---|---|---|---|
| | | | * | bush. lbs. | bush. lbs. | bush. lbs. |
| Alaska | April 27.. | Aug. 22.. | 122 | 12 6 | .... .. | ..... |
| Alberly Blue (Edmonton) | " 27.. | " 22.. | 124 | 10 30 | 21 45 | |
| Arthur, Ottawa 18 | " 27.. | " 22.. | 127 | 13 24 | 24 51 | 17 50 |
| Chancellor D, Ottawa 26 | " 27.. | " 22.. | 122 | 14 31 | 28 26 | |
| Early White | " 27.. | " 22.. | 122 | 11 49 | ..... | |
| Empire | " 27.. | " 22.. | 122 | 12 58 | ..... | |
| O. A. C. No. 181 | May 2.. | " 22.. | 122 | 11 55 | ..... | |
| White Alberta (Edmonton) | April 27.. | " 22.. | 122 | 9 2 | 25 25 | |
| Common Vetch | May 2.. | ..... | ..... | 3 18 | ..... | |

*The figures in this column are not the result of a sufficiently close observation and are only roughly approximate.

## FLAX

Premost, the only variety grown. Seeded May 17, alongside the barley plots, this crop felt the full brunt of the summer drouth, growing a small stem and yielding lightly. Its turn-out was at the rate of 6 bushels 46 pounds per acre, with a five-year average of 12 bushels 23 pounds, this covering one season of complete failure due to frost. In the average season, flax can be grown with fair success on well-situated land, if seeded, say, the 10th to 15th of May on a firm, well-prepared seed bed, preferably *not* breaking of the same season.

## WINTER GRAINS

Winter grain does surprisingly well considering the latitude. Owing to lack of any snow covering worth mentioning until the latter part of January, the winter of 1921-22, though not severe as to temperatures, was exceptionally hard on winter crops, yet rye came through, as usual, with almost a perfect stand, while Turkey Red wheat emerged with fully half a stand, when at the University of Alberta, Edmonton, it had been killed out completely according to advices received from Professor Cutler.

The main drawback with winter grain is that it takes a round twelve months to mature, making it impracticable to seed the grain in the season in which it is produced. It is true that rye is sometimes so seeded and in certain cases does well enough, a good deal depending upon preparation and season.

Failure to obtain a renewal of the supply of O.A.C. No. 104 winter wheat made it necessary to omit this kind from the 1921 seeding, hence there was only the one variety to harvest in 1922.

The average of four cultural test plots of rye in 1922 was 24 bushels 54 pounds and of two plots of Turkey Red wheat 18 bushels and 8 pounds. Seeding rye from three to five inches in depth and wheat at seven and eight pecks per acre respectively made no very appreciable difference in the yield. It is interesting to note that while the Turkey Red winter wheat headed out two days earlier than the Ruby, it was cut four days later. It may have been somewhat riper when harvested, for experience has shown that the Turkey Red may be left with little fear of shattering, while Ruby must be garnered betimes.

The five-year average yield of 29 bushels 25 pounds per acre of Turkey Red winter wheat is the more creditable considering that the winter grain plots have not always had first-class treatment. The crop has been grown both on breaking and summer-fallow with no well-marked difference in results, so long as the breaking was done early.

WINTER GRAINS

| Variety | Date of seeding, 1921 | Date of cutting, 1922 | Est. days to mature fully | Yield per acre, 1922 | Average yield, five years, 1918-22 |
|---|---|---|---|---|---|
| | | | | bush. lbs. | bush. lbs. |
| *Rye* (Winter) | | | | | |
| At 6 pecks, 3 inches deep | Aug. 16 | Aug. 12 | 361 | 23 15 | |
| At 6 " 4 inches deep | " 16 | " 12 | 361 | 25 52 | |
| At 6 " 5 inches deep | " 16 | " 12 | 361 | 25 27 | |
| At 7 " 4 inches deep | " 16 | " 12 | 361 | 25 10 | |
| Average of four plots | | | 361 | 24 54 | 43 27 |
| *Winter Wheat* | | | | | |
| Turkey Red at 7 pks., 3 inches deep | Aug. 16 | Aug. 19 | 368 | 18 25 | |
| Turkey Red at 8 pks. 3 inches deep | " 16 | " 19 | 368 | 17 52 | |
| Average of both plots | | | 368 | 18 8 | 29 25 |

## SEED SELECTION

A very little work in seed selection has been done with Winter wheat and Eureka barley.

## SOILS AND FERTILIZERS

### (NITRATE OF SODA APPLICATIONS)

Of the five projects of experimental work under way, the only one which has progressed to a point calling for public report at this date is one to determine the effect of nitrate-of-soda applications to meadow, to grain, and to rape. Let it be clearly understood in this connection that in making these tests there is no thought of demonstrating a profit from the application. Freight rates make the cost of fertilizer too high and the value of the crop increase too low to leave any hope of profit from applications to staple crops at present. Besides, the soil is naturally so rich that artificial fertilizing with chemicals is superfluous.

The purpose of the tests with nitrate is to ask certain questions of the soil in order to ascertain to what extent, if any, crop growth may be limited at times by lack of nitrogen in the soluble form.

With this question in view it was arranged to apply one hundred and eighty pounds per acre of nitrate of soda in the spring of 1922 to duplicated plots of oats after oats, of oats after sunflowers, of rape after oats and sunflowers and to old meadow. In addition, casual applications were made in narrow strips to new stands of grasses and clovers, which had been seeded with nurse crops in 1921. The nitrate was applied to the meadow on May 6th. A snowfall furnished the moisture to carry it down promptly and in two weeks one could see a marked difference in amount and colour of verdure between the treated and the untreated plots on the three-year-old mixed-grass meadow. Every visitor unhesitatingly picked out the two treated from the two check plots. The improvement in growth and colour continued to increase until the average height of the grass on the treated plots was fully six inches as against four on the untreated. Drouth then set in, browning the leaves of the more vigorous-growing treated plots and retarding their development. Similar symptons were exhibited by certain unfertilized areas in other parts of the grounds where conditions had been such as to promote an unusually strong early growth. Notwithstanding this retardation, the results at haying averaged one hundred and thirty-two pounds per acre from the two treated against forty pounds per acre from the two untreated plots, an increase of 230 per cent.

After haying, samples of the surface soil representing treated and untreated areas were collected by R. E. Elliott, an under-graduate of Alberta University, and analyzed during the winter under direction of Dr. F. A. Wyatt, Professor of soils, who computed that the nitric nitrogen remaining in the treated area was equivalent to 384 pounds of sodium nitrate per acre, while the nitric nitrogen remaining in the untreated plots was equivalent to only 128 pounds nitrate of soda per acre. It may be noted that the difference was slightly greater than the total average application. This may have been due to soil variation, to irregularities in the spreading of the nitrate, or to experimental error. Taken in conjunction with the data of hay yields the analyses are certainly suggestive.

From the areas whereon nitrate of soda was applied to new seedings no yield computations were made as the strips were too narrow for reliable tests, but observation revealed a striking effect on the grasses, which effect was reduced in percentage when the drouth set in, but was still quite marked at haying.

It seems quite reasonable to suppose that when grass is seeded with a heavy-growing nurse crop which is not taken off until autumn, the soil is probably left so depleted of soluble nitrogen as to interfere greatly with the development of the grass plants in the ensuing spring unless growing conditions be exceptionally favourable.

From the application of nitrate to oats no positive results were obtained. Two possible reasons suggest themselves. In the first place, the land had been manured in the spring before the preceding crop and had been prepared for the grain crop by good autumn and spring cultivation, which probably had the effect of liberating all the plant food there was moisture to utilize.

A very interesting nitrate test with rape was spoiled by failure of the rape seed to germinate.

## HORTICULTURE

Though it was an off year for horticulture on Grande Prairie, the Station garden scored a good average success. It is admitted that the situation confers some natural advantage in frost protection over certain parts of the prairie, but on the other hand there are a good many neighbourhoods more favoured than the Station, conditions on which, in this respect, are representative or medium. The fact is that fairly successful gardens can be raised almost anywhere in the

Northern settlements by those who will learn and fulfil the somewhat exacting conditions. One of these is to have the soil in good heart, with a stock of manure frequently applied and well worked in so as to promote its continued decay. This maintains an ample supply of humus. A great mass of coarse manure worked in at one time is very liable to prove detrimental, especially in a dry year. The crops will probably derive their chief benefit from the manure applied two or three years previously. One should, therefore, aim to build up the fertility of his garden soil by repeated applications, with never an excessive quantity put on at one time. The amateur, especially, will be well advised to summerfallow half his garden area each year, ploughing under a dressing of manure, preferably rotted stuff, in June and perhaps topdressing lightly after ploughing. Let him work this land thoroughly throughout the summer and the portion where he expects to sow fine-seeded vegetables the next season he should aim to leave nearly level so that in spring all he need do is to harrow lightly or rake the surface. Deep spring working is very liable, in a dry season, to result in a drying out of the upper soil to a depth greater than that at which small seeds are planted, resulting in a tardy germination of the crop seeds with a good chance of their being obscured or smothered out by weeds, of which there seem always a proportion able to brave the most adverse conditions.

Having the land thus prepared, with a good stock of moisture and soluble plant food in readiness and a good seed bed, moist close up to the surface of the ground, one should sow his seeds in straight rows so indicated by stakes or otherwise that he can scuffle, if necessary, before the crop is up high enough to mark the rows. Let him take the precaution never to sow all his seeds of any crop at one date. Experiments show that sometimes the early-May and sometimes the medium and sometimes the late-May or early-June seeding does best. Therefore, while many kinds of vegetables, even to squash and corn, may have a proportion of their seeds planted around the first of May, it is well to reserve about two-thirds the supply for a couple of successive sowings. This latter suggestion may be take as applying in principle to all the garden crops, even peas and potatoes. The advice to have a firm seed bed, which merely needs light surface working in spring, applies only to the finer-seeded vegetables of which it is sometimes difficult to insure prompt germination in dry years.

In many seasons, a hotbed proves of great advantage in starting tender plants like cabbage and tomatoes. One bed may suffice for a number of settlers.

After planting the garden, a watch for insect pests is in order, together with diligent weeding and cultivating. Growth is usually slow in May and part of June but if one can have two or three months' patience and "hustle while he waits" he will generally be surprised and delighted with the results to be attained in the latter part of the season, and a well-stocked cellar will result. Such is the experience not only of the Station but of conspicuously successful gardeners throughout the North country. There is no legerdemain—no occult secret of success. It is a matter of intelligent understanding, common sense, experience, judgment, close attention, patience and hard work. These bring their ample reward.

## POTATOES

Nearly two acres of land were devoted to experiments with "apples of earth," as the literal translation of the French name would have it. Triplicate tests were made of twenty-five named varieties and of a good many important points in cultural practice, besides which there were hill-row comparisons of some fifty-one field selections made during past seasons at the Station.

From the date-of-planting test on manured garden land, very fair yields were secured. From unmanured summer-fallow under field conditions the yields and sample were small. During the hot and extremely dry weather of August a good many of the tubers began to sprout—a condition not infrequently met in regions where such weather is prevalent. In this case the sprouting did not go the length of actually spoiling the potatoes, even those left in the ground until October, though the quality of badly sprouted tubers was rather impaired. Apart from this blemish, the quality was generally good and extremely little red discoloration showed in the flesh of such sorts as Early Rose. In nearly all the potatoes there was, however, near the skin, a layer of corky tissue slightly darker than the normal flesh. It was more pronounced near the stem end.

While the potato crop generally over the district was very poor, being inadequate to supply the home demand, there were instances of conspicuous exception. On the top of Saskatoon Mountain, a central elevation estimated to be five or six hundred feet higher than the surrounding region, is a settler who had a magnificent crop of potatoes, untouched by frost until well into October. Several sound, well-formed potatoes weighed over two pounds apiece and the whole crop was of splendid sample and quality. Good care, good seed, perhaps a little more precipitation than other farms were favoured with, capillary moisture from a damp, sandy subsoil and prolonged growth due to frost immunity afforded by the elevation, are the probable factors accounting for his outstanding results this past year with potatoes, carrots, turnips and other vegetables.

### 1922 YIELDS CALCULATED WITHOUT DEDUCTION FOR TARE

In connection with the report of the 1922 experiments, the Superintendent wishes to explain that, contrary to custom, no allowance was made for tare. The potatoes were quite clean and dry when picked up and while there was a considerable percentage of small, unmarketable ones, this proportion could not well be judged, except at digging time, for it varied much with varieties and conditions, hence yields have been of necessity calculated from the weights recorded at harvest, except in the case of the date-of-planting experiment, where a uniform deduction of five per cent had been made for dirt, moisture and small potatoes.

### VARIETIES

A little knowledge is a confident thing. A wide-angled study often leaves one less certain of his conclusions. This is nicely illustrated in the variety test with potatoes, for the kind which heads the list on the five-year average stands near the foot in 1922. Quite a number of similar inconsistencies could be cited. The season was not a good one for a normal try-out.

The varieties were all compared in a triplicate test, except those introductions of which there was seed for but one plot each. These were the Agassiz Special and the Manitoba Wonder, both received from the Experimental Farm at Agassiz, B.C., and the Gold Nugget from Dr. Seager Wheeler. There was also a small quantity of an elongated tuber grown in the High Prairie district where it is known as the "Cow Horn" potato. It resembles very closely a variety received two years earlier from another source and supposed to be a hybrid of the Irish and Sweet potatoes—a claim that is no doubt quite erroneous.

### A DUPLICATE COOKING TEST

A sample of every variety was subjected to a cooking test in two different households, that of the Superintendent and that of the gardener. The table

presents an abstract of notes made at digging time, together with a percentage rating of the varieties as judged in peeling, cooking and eating. These percentage figures are an average of two estimates, but it is fully recognized that there is room for quite an element of experimental error. In the first place, it is difficult to be sure that the sample is a fair composite of the bin lot and, when the crop is grown on rolling or uneven ground, a good deal depends upon the part of the row where the sample may have grown.

Again, the respective ratings of the varieties are liable to vary with the seasons.

The kind of water in which they are boiled is a very important factor, and important also is the culinary skill with which the sample is cooked—a factor that varies more or less in most households. It is not presumed, therefore, that the percentage rating of cooking quality represents anything more than an initial effort to systematize experimental records of the important attributes involved.

POTATOES—STANDING OF VARIETIES

(Varieties grown for five years arranged in order of their five-year averages)

| Variety | Yield, 1922 | | Two-year Average | | Five-year average | |
|---|---|---|---|---|---|---|
| | bush. | lbs. | bush. | lbs. | bush. | lbs. |
| Early Northern | 93 | 36 | 183 | 26 | 286 | 56 |
| Country Gentleman | 118 | 20 | 169 | 39 | 264 | 48 |
| Gold Coin | 85 | 0 | 165 | 42 | 255 | 34 |
| Early Rose | 111 | 40 | 146 | 46 | 246 | 30 |
| Irish Cobbler | 93 | 53 | 182 | 21 | 240 | 5 |
| Table Talk | 98 | 20 | 191 | 40 | 233 | 42 |
| Wee McGregor | 88 | 53 | 153 | 27 | 222 | 37 |
| Empire State (Lacombe) | 116 | 6 | 195 | 55 | | |
| Empire State (Scott) | 120 | 0 | 192 | 0 | | |
| Houlton Rose (Lacombe) | 120 | 33 | 193 | 44 | | |
| American Wonder | 102 | 46 | 177 | 45 | | |
| Early Ohio (Edmonton) | 96 | 6 | 161 | 21 | | |
| Early Hebron (Lacombe) | 119 | 10 | 171 | 47 | | |
| Bovee (Scott) | 108 | 53 | 163 | 42 | | |
| Morgan Seedling (Scott) | 106 | 6 | 162 | 19 | | |
| Green Mountain (Lacombe) | 111 | 6 | 159 | 41 | | |
| Carman No. 1 (Scott) | 100 | 33 | 145 | 36 | | |
| Extra Early Eureka (Lacombe) | 86 | 40 | 132 | 48 | | |
| Epicure (Lacombe) | 102 | 13 | 140 | 34 | | |
| Early Bermuda (Scott) | 85 | 33 | 119 | 46 | | |
| Everitt Rose (Scott) | 109 | 26 | 163 | 59 | | |
| Iron Chief | 83 | 20 | ..... | | | |
| British Queen (Watson) | 98 | 53 | ..... | | | |
| Agassiz Special (Agassiz) | 108 | 20 | ..... | | | |
| Alleged hybrid Sweet Potato | 55 | 00 | ..... | | | |
| Gold Nugget (Wheeler) | 106 | 40 | ..... | | | |
| Manitoba Wonder (Agassiz) | 115 | . | ..... | | | |

NOTE.—Agassiz Special, Manitoba Wonder and Gold Nugget are single plots.

## POTATOES—COOKING TEST AND NOTES ON VARIETIES

*On basis of 100 for Perfection*

| Variety | Remarks or Notes | Colour flesh | Cooking quality | Mealiness | Texture | Flavour |
|---|---|---|---|---|---|---|
| Alleged Sweet Potato | Like the Cow Horn. Smooth, clean, white, but very small | 97 | 97 | 93 | 97 | 97 |
| Table Talk | Late maturing. Great number very small. Many in a hill | 91 | 92 | 92 | 97 | 95 |
| British Queen | Clean, white but small. Very little scab | 94 | 92 | 92 | 97 | 95 |
| American Wonder | Late maturing. Not as late as Table Talk. Very little scab | 95 | 97 | 95 | 96 | 95 |
| Everitt Rose | Pink. Not so shapely as Country Gentleman | 99 | 97 | 97 | 99 | 99 |
| Wee McGregor | Some tops yet green at digging. Only a few scabby | 99 | 99 | 99 | 99 | 99 |
| Early Northern | Not shapely. Very red. No scab | 91 | 97 | 97 | 91 | 97 |
| Gold Coin | Not great yield. No scab | 94 | 97 | 97 | 97 | 97 |
| Epicure | Dirt adheres more than to others. Many very small | 98 | 100 | 100 | 100 | 100 |
| Carman No. 1 | Clean, white. Fairly uniform. Scarcely any scab | 94 | 99 | 99 | 99 | 99 |
| Empire State (Lac.) | Best of all white potatoes. Few very small. No scab | 97 | 99 | 99 | 99 | 99 |
| Empire State (Scott) | Best of all white potatoes. Fairly uniform. A little scab | 96 | 99 | 99 | 99 | 99 |
| Country Gentleman | Good sample for the year. Free from scab | 100 | 99 | 99 | 99 | 99 |
| Houlton Rose | Good potato. Not as shapely as Country Gent. A few scabby | 93 | 99 | 99 | 99 | 97 |
| Green Mountain | Good clean white. A few very small. About 10% slight scab | 94 | 96 | 96 | 96 | 94 |
| Extra Ey. Eureka | Nice. White, early. Rather uniform size. Some scab | 100 | 97 | 99 | 99 | 98 |
| Early Ohio | Rough skinned. Not shapely. Some scab | 95 | 99 | 99 | 99 | 97 |
| Iron Chief | White. Very small. Roundish. Possibly 50% have scab | 96 | 96 | 95 | 95 | 95 |
| Early Bermuda | Very red potato. Red eyes. Fairly round and uniform | 100 | 98 | 98 | 100 | 100 |
| Gold Nugget (Wheeler) | Smaller than most whites. Roundish | 99 | 100 | 100 | 100 | 99 |
| Bovee | Good number in hill but small and red | 95 | 95 | 95 | 94 | 97 |
| Agassiz Special | White. Very small | 99 | 99 | 99 | 99 | 98 |
| Manitoba Wonder | Red. Nothing wonderful | 99 | 99 | 99 | 99 | 99 |
| Early Rose | Fairly good. Not equal of Country Gentleman. No scab | 94 | 97 | 97 | 97 | 93 |
| Early Hebron | Good. Pink. Good yield for year. Rough skin. Little scab | 96 | 99 | 99 | 99 | 99 |
| Morgan Seedling | White. Among the better whites. Some scab | 100 | 100 | 100 | 100 | 95 |
| Irish Cobbler | About poorest of whites. Many very small ones | 91 | 93 | 93 | 97 | 95 |

POTATOES DATE-OF-PLANTING TEST

The fifth year's work in this project was conducted on the expanded lines adopted in 1921. That is to say, it was supplemented by a sprouting test.

On April 26, the day when the first planting was made, a quantity of Country Gentlemen potatoes was put upstairs in the experimental building to form green sprouts. Thereafter, to the conclusion of the planting, one row each week would be planted with seed taken direct from the dark, cool root cellar and a corresponding or companion row with sets cut from tubers that had been sprouting since the first planting was made. The soil was a good piece of summer-fallow and stood the drouth remarkably well.

From the harvest a sample representing each plot was sent as usual to the Dominion Chemist, Dr. Frank T. Shutt, whose analyses are incorporated with the table of yields. The crop results agree substantially with those of 1921, bringing out the fact that while early planting was of distinct advantage in the case of unsprouted seed, yet substantially as good results were obtained by having the seed in a place where it could form tough, green sprouts awaiting a convenient season for planting. It remains to be proven whether still better results might be secured by accomplishing the sprouting in April and planting early in May. In a northern climate some means must be taken either by early planting, by sprouting or by both together to forward development, thus taking full advantage of the growing season.

PRESENTING TOTAL YIELDS AND WEIGHT OF DRY MATTER FROM THE DATE-OF-PLANTING TEST, 1922

(Variety—Country Gentleman)

| Date Planting | Condition of seed | Yield per acre | Yield per acre | | Per cent dry matter | Pounds dry matter per acre |
|---|---|---|---|---|---|---|
| | | lbs. | bush | lbs. | | |
| 1st—April 26 | Sprouted | 11,362 | 189 | 22 | 23·49 | 2,669 |
| April 26 | Not sprouted | 11,527 | 192 | 7 | 23·64 | 2,726 |
| 2nd—May 3 | Sprouted 1 week | 12,103 | 201 | 43 | 21·99 | 2,661 |
| Nay 3 | Not sprouted | 9,551 | 159 | 11 | 20·75 | 1,982 |
| 3rd—May 12 | Sprouted 2 weeks | 10,621 | 177 | 1 | 19·95 | 2,117 |
| May 12 | Not sprouted | 10,210 | 170 | 10 | 22·83 | 2,331 |
| 4th—May 19 | Sprouted 3 weeks | 10,292 | 171 | 32 | 22·69 | 2,334 |
| May 19 | Not sprouted | 8,810 | 146 | 50 | 19·16 | 1,688 |
| 5th—May 25 | Sprouted 4 weeks | 13,338 | 222 | 18 | 21·60 | 2,882 |
| May 25 | Not sprouted | 10,045 | 167 | 25 | 20·71 | 2,081 |
| 6th—June 1 | Sprouted 5 weeks | 11,939 | 198 | 59 | 21·86 | 2,610 |
| June 1 | Not sprouted | 7,657 | 127 | 37 | 20·93 | 1,603 |

POTATOES—SIZE OF SET

The fourth year's results agree with previous findings that the yield of potatoes varies rather directly with the weight of seed planted, at least within the limits of this experiment. Analysis of the resultant crop in 1921 indicated, however, that the best average sample was obtained from large potatoes cut to one-eye sets and the poorest sample from small potatoes planted whole. Sets cut to one eye produce a fine sample but a very moderate yield. Larger pieces are recommended.

SIZE OF SET TEST—PRESENTING RESULTS FROM FOUR YEARS' WORK
(Variety Early Rose)

| Designation | Yield 1922 average three ranges | Aggregate three years | Average three years | Aggregate four years | Average four years |
|---|---|---|---|---|---|
| Very small whole potatoes | 5,800 | 35,808 | 11,936 | 56,474 | 14,118 |
| *Medium small whole potatoes | 6,200 | 40,496 | 13,498 | 62,684 | 15,671 |
| Large potatoes cut to one eye | 5,733 | 31,275 | 10,425 | 48,071 | 12,017 |
| Large potatoes cut to two eyes | 6,166 | 35,294 | 11,764 | 57,305 | 14,326 |
| Large potatoes cut to three eyes | 5,933 | 34,287 | 11,429 | ..... | ..... |

*Only two ranges of this grade in 1922.

LEAVING EYES VERSUS REMOVING ALL BUT ONE PER SET

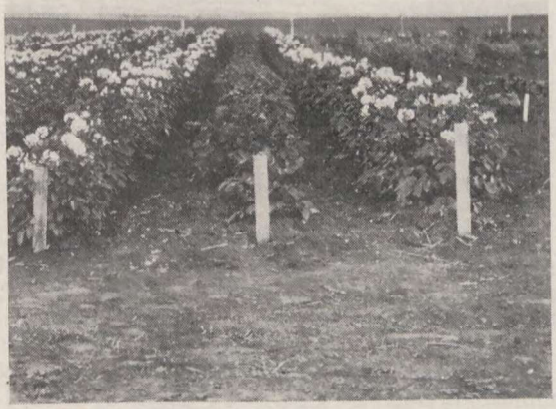
Against a thirty per cent increase of yield obtained in 1919 by removing all eyes but one per set from whole potatoes that had been sprouted before planting, must now be set three consecutive reverses of this result.

| | Per cent |
|---|---|
| Gain in 1919 by removing all eyes but one | 30 |
| Loss in 1920 by removing all eyes but one | 14·75 |
| " 1921 " " " | 1·80 |
| " 1922 " " " | 28·6 |
| Average net loss four years' work | 3·78 |

POTATO SPROUTS

In addition to the incidental tests with sprouting reported above, there were a number of interesting experiments repeating lines of work initiated in 1915.

Higher yield from sprouted seed.



Effect of sprouting seed potatoes. Ignoring the flanking row, the comparison lies between the last one planted with unsprouted seed and not in bloom and the second last planted same day with seed that had been sprouted in an upstairs room for six or seven weeks and in full bloom. Yield sprouted seed 202 bushels per acre. Unsprouted 129 bushels.

## THE DISADVANTAGE OF BREAKING WHITE SPROUTS OFF POTATO SETS AT TIME OF PLANTING

A triplicate test under this head yielded uniform results entirely consistent with previous findings. An interesting variation consisted in planting the white sprouts broken off the potatoes. In 1920 these white sprouts, without any flesh attached, gave about half or two-third a full crop. Drouth made a different story in 1922, the three rows of white sprouts producing only about a sixth as much crop as the three rows planted with cut potatoes having the white sprouts attached. Breaking off the white sprouts and throwing them away resulted in diminuation of 27·8 per cent in the yield.

BREAKING OFF, VERSUS LEAVING CELLAR SPROUTS WHEN PLANTING, 1922 RESULTS

Variety—Early Rose

| Designation | Yield per acre 1922 |
|---|---|
| | lbs. |
| White sprouts left on at planting | 6,833 |
| White sprouts rubbed off at planting | 4,933 |
| White sprouts only—no flesh | 1,150 |
| Advantage of leaving white sprouts on over rubbing off | 1,900 |
| Advantage of white sprouts left on over sprouts only | 5,683 |
| Per cent disadvantage of breaking off white sprouts | 27·8 p.c. |
| Percentage of a full crop produced by white sprouts only | 16·8 p.c. |

Chronologically the record now stands:—

LOSS IN YIELD FROM BREAKING OFF WHITE SPROUTS AT PLANTING TIME

| | Per cent |
|---|---|
| 1915 | 15·0 |
| 1919 | 18·0 |
| 1920 | 33·8 |
| 1921 | 21·0 |
| 1922 | 27·8 |
| Average loss five years' results | 23·1 |

NOTE.—If the percentage were expressed the other way, viz: as the advantage from leaving white sprouts on, the figures would be still larger.

## GREEN SPROUTS VERSUS WHITE SPROUTS VERSUS NO SPROUTS

To compare the value of white sprouts, formed in a rather warm cellar with tough green sprouts formed in a warm, light upstairs room and each of these methods of treatment with results of the orthodox plan of keeping the seed tubers dormant in a cool root cellar, an experiment was planned in 1920 and has now run three years, the 1922 trial being in triplicate. Results have been fairly consistent, with two exceptions. In 1921 one of the plots planted with sets that had formed white sprouts produced an unaccountably large yield, throwing the balance of advantage in that year in favour of white as against green sprouts. A correspondingly abnormal out-turn of one plot planted in 1922 with seed direct from the root cellar resulted in the first contradictory outcome that the plan of experiment has yet afforded, the no-sprout plot exceeding the plot planted with sets having white sprouts. However, the net result of three years' work comprehending, in all twenty-one plots, harmonizes fully with all other Beaverlodge tests relating to this matter, going to establish that while green sprouts are preferable to cellar sprouts, either is liable to prove much better than none in climates where it is necessary to take special precautions to promote early maturity.

No Sprouts versus White Sprouts versus Green Sprouts

Varieties used: 1920 Early Northern, 1921 Early Rose, 1922 C. Gent.

| Designation | Yields in pounds per acre | | | |
|---|---|---|---|---|
| | 1920 crop | 1921 crop | 1922 crop | Average, three years |
| No sprouts. Tubers kept in cool dark storage until planting | 16,700 | 12,012 | 6,066 | 11,592 |
| Sets with white sprouts formed in cellar storage | 18,800 | 16,104 | 5,433 | 13,445 |
| Sets with green sprouts formed in a light upstairs room | 20,500 | 14,652 | 6,133 | 13,761 |
| Advantage white sprouts over no sprouts | 2,100 | 4,092 | −633 | 1,853 |
| Advantage green sprouts over no sprouts | 3,800 | 2,640 | 67 | 2,169 |
| Per cent advantage white over no sprouts | 12·5% | 34% | −10·4% | 15·9% |
| Per cent advantage green over no sprouts | 22·7% | 21·9% | 1·1% | 18·7% |

## BREAKING OFF VERSUS LEAVING CELLAR SPROUTS WHEN PUTTING UPSTAIRS TO FORM GREEN SPROUTS

Corollary to the previous test with no sprouts versus green sprouts versus white sprouts is another, also carried through its third year in triplicate. The object of this latter is to determine whether, in case the tubers have white sprouts already started and it is desired to form green sprouts, the white sprouts should be broken off or left on at the time of exposing to the light. In 1920 there was a 7·2 per cent disadvantage in thus breaking off the embryo cellar sprouts. In 1921 the sprouts were short and the disadvantage of sacrificing them was accordingly small, while in 1922 they were again but very little started and the three plots representing one method of treatment produced exactly the same yield as the three plots representing the other. The average of three years' work shows a 3·7 per cent disadvantage from breaking the cellar sprouts off but suggests that the degree of loss depends upon how much substance and energy of the tuber has gone into the initial sprout or, in other words, how well developed the cellar sprouts have been. The stronger they are the more there is gained by leaving them.

Breaking Off versus Leaving Cellar Sprouts when Putting Upstairs to Sprout

Varieties used: 1920 Early Rose, 1921 Early Northern, 1922 Country Gentleman.

| Designation | Yield in pounds per acre | | | |
|---|---|---|---|---|
| | 1920 crop | 1921 crop | 1922 crop | Average three years |
| Cellar sprouts left on when tubers put upstairs to form green sprouts | 20,375 | 18,040 | 5,540 | 14,651 |
| Cellar sprouts broken off when tubers put upstairs to form green sprouts | 18,900 | 17,864 | 5,540 | 14,101 |
| Disadvantage of breaking off sprouts | 1,475 | 176 | 0 | 550 |
| Per cent | 7·2% | 1% | ..... | 3·7% |

## TREATING WITH FUNGICIDE BEFORE VERSUS AFTER SPROUTING

In the experiment to determine whether it is better to treat seed potatoes with formaldehyde before versus after putting out to form green sprouts, three years' work have given alternately varying results, with a slight percentage in favour of treating before sprouting, so far as yield is concerned. One advantage is that any tubers badly injured by the treatment will show the effect at planting time and may be rejected. There has been little opportunity to compare the two systems from the standpoint of efficacy in fungus control.

RESULTS OF TREATING WITH FORMALDEHYDE BEFORE VERSUS AFTER SPROUTING

Varieties used: 1920, Early Northern; 1921, Early Rose; 1922, Country Gentleman.

| Designation | Yield in pounds per acre | | | |
|---|---|---|---|---|
| | 1920 crop | 1921 crop | 1922 crop | Average, three crops |
| Treated before sprouting | 22,525 | 13,434 | 4,933 | 13,630 |
| Treated after sprouting | 20,825 | 14,696 | 4,400 | 13,307 |
| Advantage (+) or disadvantage (−) of treating before sprouting | +1,700 | −1,262 | + 533 | + 323 |
| Percent advantage or disadvantage of treating before sprouting | + 8·1% | − 8·6% | +12·1% | + 2·4% |

HEEL EYES VS. SEED END SETS

A repetition in duplicate of the 1921 experiment to compare the sets cut from the seed ends of the tubers with those cut from the heel ends, resulted in a confirmation of the initial trial. It is but right to add that precise record was not kept of the weight of seed planted in either case and this may have a bearing on the matter, though its effect would likely be to favour the heel-end eyes, thereby reducing, rather than increasing, the lead of the seed-end sets.

HEEL EYES VERSUS SEED-END SETS

Variety used: Country Gentleman

| Designation | Yield in pounds per acre | | |
|---|---|---|---|
| | 1921 crop | 1922 crop | Average, two crops |
| Seed-end eyes | 17,424 | 4,150 | 10,787 |
| Heel-end eyes | 15,576 | 3,600 | 9,588 |
| Difference in favour of seed-end eyes | 1,848 | 550 | 1,199 |
| Per cent difference | 11·8% | 15·2% | 12·5% |

FRESH-CUT VERSUS DRIED SETS

It might be supposed that this old bone of contention had long since been entombed by experimental work, but error is hydra-headed and has to be met in many forms in many lands. It has been argued, for instance, that, in dry districts, the cut surfaces of the sets should be dried to a tough skin so that the sets would not so easily lose their moisture after planting. The work at Beaverlodge has never borne out such a view. The plan of experiment has been to expose the cut potatoes to the sun, spread out in a tray, until they have lost about half their weight. No drier has ever been applied. A quintuplicate test in 1921 confirmed, in every instance, the duplicate test of 1920, while in 1922 a quadruplicate comparison, involving three different varieties, agreed unvaryingly with the outcome of previous trials, the average of the three harvests showing a loss of 16.9 per cent in yield as a reward for the pains of drying the sets.

COMPARING FRESH-CUT WITH SUN-DRIED SETS

Varieties used: 1920, Early Northern, American Wonder.
1921, Early Rose, Gold Coin, Country Gentleman.
1922, Early Rose, Iron Chief, Green Mountain.

| Designation | Yield in pounds per acre | | | |
|---|---|---|---|---|
| | 1920 crop | 1921 crop | 1922 crop | Average three crops |
| Frech-cut sets | 20,400 | 18,304 | 5,275 | 14,659 |
| Sun-dried sets | 16,500 | 15,840 | 4,175 | 12,171 |
| Disadvantage of drying | 3,900 | 2,464 | 1,100 | 2,488 |
| Per cent of difference | 19·1% | 13·4% | 26·3% | 16·9% |

## HILLING VERSUS LEVEL CULTURE

Though moderate hilling is practised with the general potato crop as well as with practically all the experimental plots at Beaverlodge, a number of rows are set aside annually to compare the effect of hilling versus level culture. Three years' results agree fairly uniformly that hilling somewhat curtails the yield. It is practised because it reduces sunburn, protects from frost at digging time and is thought rather to improve the quality.

EFFECT OF HILLING VERSUS LEVEL CULTURE

Varieties used: 1919, Country Gentleman and Early Rose; 1921, Early Rose; 1922, Gold Coin and Wee McGregor.

| Designation | Yield in pounds per acre | | | |
|---|---|---|---|---|
| | 1919 crop | 1921 crop | 1922 crop | Average three crops |
| Level culture | 21,746 | 13,596 | 5,516 | 13,619 |
| Hilled | 20,265 | 12,584 | 5,200 | 12,683 |
| Loss in yield by hilling | 1,481 | 1,012 | 316 | 936 |
| Per cent loss | 6·8 | 7·4 | 5·7 | 6·8 |

## DEEP VERSUS SHALLOW PLANTING

Deep planting was again compared with shallow, the respective depths in 1922 being about five and three inches, the furrow in each case being opened with a scuffler having its side arms removed. Running water having marred this test in 1920 prevented comparing yields for that year on an acreage basis, so that only two years' data are available for the computation of averages. It will be noticed that even the dry summer of 1922 favoured shallow, or perhaps one should pay medium, planting, so far as the matter of yield is concerned.

DEEP VERSUS SHALLOW PLANTING

Varieties used: 1920, Early Northern.
1921, Early Northern.
1922, Green Mountain, Houlton Rose, Iron Chief.

| Designation | Results from an equal number of hills, 1920. (Not calculated to ac. basis) | Yield per acre, 1921 | Yield per acre, 1922 | Average, two years |
|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. |
| Shallow planting | 310 | 17,811 | 4,666 | 11,238 |
| Deep planting | 270 | 15,312 | 4,283 | 9,797 |
| Advantage shallow over deep | 40 | 2,499 | 383 | 1,441 |
| Per cent advantage | 14·8 | 16·3 | 8·9 | 14·7 |

### DEEP PLANTING WITH SHALLOW VERSUS DEEP COVERING

A surprising result has been obtained from a comparison of the practice of planting in a five-or six-inch trench and covering lightly at first, against burying the sets full depth at once. In both the single test of 1921 and each series of the duplicate test in 1922, the deep covering proved better. This seems in conflict with the test that favours shallow planting and needs further trial ere conclusions are warranted.

SHALLOW VERSUS DEEP COVERING

| Designation | Yield in pounds per acre | | |
|---|---|---|---|
| | 1921 crop | 1922 crop | Average two crops |
| Shallow cover | 16,852 | 3,650 | 10,251 |
| Deep cover | 18,524 | 5,100 | 11,812 |
| Advantage of deep over shallow cover | 1,672 | 1,450 | 1,561 |
| Per cent advantage deep over shallow cover | 9·9 | 39·7 | 15·2 |

### HILL SELECTION

Fifty-one strains representing hill selection in the field at digging time during several previous years are all under test at the Station, with records of yield being kept, as well as results of cooking trials. No good object would be served by reporting publicly on these at present.

## VEGETABLES

### GENERAL NOTES

On April 14 very little frost was out of the ground and there were snow banks in the orchard one and a half feet deep. On April 15 the ground was frozen hard and a cold north wind was blowing. Severe frosts occurred on the 17th and 18th so that the soil in window boxes inside the office, with a variety of flowers and vegetables, was frozen hard over Sunday. Because of these frosts there was little result from early sowing in the window boxes. However, on April 24th it was possible to sow the hotbed and planting in the open began on April 26. Then followed the driest season experienced, the main supply of moisture coming in the form of snow; but the ground was in good heart through a liberal supply of manure each year and by careful cultivation, a good mulch was maintained so that the drouth did not cause the serious damage one might expect. The only set-back was the frost on June 6th, and this was serious, several sowings being almost entirely destroyed, while nearly everything received a severe check.

*Artichoke.*—Sample far better than in 1921. The white variety again proved superior to the red.

*Asparagus.*—The results were not great but sufficient to give encouragement in growing this desirable vegetable.

*Beans.*—Four varieties were sown on May 19: Round Pod Kidney Wax (McDonald), Early Red Valentine, Refugee and Stringless Green Pod. These were sown in hills two and one-half feet apart. The yields were almost even, as the later varieties were able to develop their pods. The earliest used was on August 10 from Round Pod Kidney Wax. The Refugee was the latest. The Round Pod Kidney Wax was used in a test of drills versus hills, the result from the drills being nearly double that from hills in the same space of ground.

An inoculation test with beans was also attempted but results were not such as to warrant conclusions.

All were frozen on September 2.

*Beets.*—Eight varieties were sown on May 5. The frost of June 6 killed some and checked all. The rows were left patchy. In some rows the stand was very poor, yet fine roots of excellent quality were produced. The results of thirty-foot rows are given:

GARDEN BEETS—TEST OF VARIETIES

| Variety | Yield per acre | |
|---|---|---|
| | Tons | lbs. |
| Cardinal Globe (Graham) | 13 | 136 |
| Black Red Ball (Burpee) | 7 | 1,730 |
| Early Model (Dupuy & Ferguson) | 8 | 940 |
| Crosby Egyptian (Harris) | 9 | 876 |
| Extra Early (McKenzie) | 9 | 1,844 |
| Crimson Globe (Graham) | 7 | 1,972 |
| Early Wonder (Graham) | 10 | 812 |
| Eclipse (McDonald) | 7 | 1,004 |

The Crimson Globe is a good, clean, well-shaped beet. The Eclipse takes a foremost place for earliness and fineness of form. Extra Early was not of so good a shape. Crosby Egyptian is excellent; Black Red Ball is rough and hairy holding the dirt. The Detroit Dark Red used in the date of planting experiment was also of good quality.

*Brussels Sprouts.*—Three varieties, transplanted to the open on June 16. Amager Market, Dalkeith and Paris Market. Quite a number of plants matured, Paris Market being rather the best.

*Carrots.*—Soil deep and mellow. On May 5th, seven varieties were sown in rows eighty-eight feet long. They were nicely up before the June frost and were injured somewhat. The yields are as follows:—

CARROTS—TEST OF VARIETIES

| Variety | Yield per acre | |
|---|---|---|
| | Tons | lbs. |
| Chantenay (O. 206-9) | 8 | 1,160 |
| Oxheart (Steele Briggs) | 12 | 90 |
| Improved Danvers (Dupuy & Ferguson) | 11 | 440 |
| Early Scarlet Horn (Dupuy & Ferguson) | 4 | 910 |
| Nantes Half Long..... (Langdon) | 8 | 1,655 |
| Danvers (Rennie) | 7 | 1,180 |
| Intermediate (McDonald) | 6 | 1,695 |

Carrots in the surrounding neighbourhood were almost an entire failure. The above results must be considered good for a dry year. The early Scarlet Horn shows the lowest yield but this row happened not to be thinned as well as others and the roots were smaller, though for table use no others were better, if as good.

*Celery.*—Two varieties were sown in the hotbed on April 24, viz.: French Success and Golden Self-Blanching. On May 5 these sowings were repeated

and from old seed was sown Giant Pascal, White Plume, Evans Triumph and Winter Queen. These all came out fairly well. For French Success and Golden Self-Blanching a trench was made thirteen inches deep, filled to within five inches of the top with old manure and earth. Twenty-six plants of each of these varieties were planted at eight inches apart and well watered. The remaining varieties were set in a shallower trench. All these were watered only a couple of times, as the water supply ran short. It was something of a surprise to see the growth as good as it was. As the growth developed, the trenches were filled and plants banked up with earth. The whole was taken up on November 4. The plants were not as good as the previous year. French Success and Golden Self-Blanching attaining one foot in average height, the first being the better. All the other varieties were much smaller. Put in the root cellar with the earth well packed about the roots, the blanching was completed.

*Citron* (Colorado O. 1746).—On May 20 the first row was sown and another row on the 22nd. These were destroyed by frost on June 6. They were resown and then produced a number of specimens averaging about three inches in diameter.

*Cucumber.*—On May 22 the following varieties were sown in one row in fourteen-foot sections:—

Early Russian (Burpee).
Davis Perfect (McDonald).
Improved Long Green (McDonald).
West India Gherkin (Burpee).

These also were destroyed on June 6th and resown, producing considerable fruit, the first being picked on August 28 from the Early Russian. This variety is good in yield as well as early.

The Davis Perfect did not yield so many as the former, but one specimen was eight inches long. Improved Long Green gave some good specimens. From the West India gherkin a considerable number were produced suitable for pickling.

*Corn.*—Ten varieties were sown on May 15. These were well up when the frost came, which, while inflicting on all a severe check, did not destroy the greater part. Some rows were rendered poor in stand.

The following notes on these varieties will give an idea of the result:—

GARDEN CORN—TEST OF VARIETIES

| Variety | Hills or Drills | Average height of stalk | Highest stalk | Remarks |
|---|---|---|---|---|
| | | in. | in. | |
| Malakoff | Hills | ..... | ..... | Entire failure through frost. |
| Malakoff | Drill | 38 | 46·0 | A few ears in silk. Not usable. |
| Early Sweet Malcolm | Hills | 39 | 46 | Ears forming. |
| Early Sweet Malcolm | Drill | 39 | 49 | Ears in silk. Not as good as former. |
| Sweet Squaw | Hills | 37 | 51·5 | A few ears formed. |
| Sweet Squaw | Drill | 31 | 42·5 | Scarcely any ears formed. |
| Assiniboine | Drill | 20 | 30·5 | Poor stand, yet 15 usable ears, though very small. |
| Indian Sweet | Hills | 29 | 41 | A few ears almost usable. |
| Indian Sweet | Drill | 26 | 34·5 | Twelve usable ears. |
| Imp'd. Early Dakota | Hills | 31 | 39·5 | Almost failure from frost. Two or three ears forming. |
| Imp'd. Early Dakota | Drill | 27 | 36 | Poor stand. Only a few ears forming. |
| Pocahontas | Drill | 28 | 42 | Late. Ears scarcely forming. |
| Golden Bantam | Drill | 26 | 42 | Late. No ears. |
| Evergreen Bantam | Drill | 32·5 | 50 | Scarcely an ear. Not all in tassel. |
| Early June | Drill | 31 | 47 | Ears forming. Two usable. |
| Early June | Hill | 33 | 47 | Ears forming. None usable |

The Pickaninny is not in this list but was used in the date-of-planting test, where, on a patch twenty by forty-two feet, there were one hundred and seventy-two usable ears, but these were very small. The stalks, also, were short, scarcely any over two feet high.

*Cabbage.*—Fourteen varieties were sown in the hotbed on April 24. Many of these were transplanted to the cold frame on May 29, leaving those in hotbed well thinned. On June 15 the transplanting to the open took place. The soil was in good condition and in spite of lack of rainfall, there was moisture below. They were planted deeply after the holes were filled with water. No watering was done afterwards. Some five hundred of the cabbage family were thus planted and all lived with but three or four exceptions. They also steadily grew to good, solid heads. The size generally was not equal to normal but the quality was fully equal. Many visitors, on looking over the thrifty patch, said, "You must water the cabbages well," and were astonished when told that no watering had been done since transplanting.

Insects did little damage. A few plants succumbed to the root maggots. Corrosive sublimate again was used in two treatments (1 ounce to 10 gallons water), a half cupful poured about the roots, the first after setting out and one later.

Again the first to be used was the Jersey Wakefield on August 14, but, although the earliest it was the lowest in yield. The Enkhuizen Glory exceeded Copenhagen Market this time, the latter having led for the last four years. Fottler's Improved, a late variety, yielded about the same weight as the first named. Flat Swedish another late variety was among the foremost. Autumn King was equally good. The Perfection Savoy was superior in well-developed heads to any we have raised previously. As usual, Marblehead Mammoth was about the poorest, although some fine heads were produced.

*Cauliflower.*—Three varieties were sown in hotbed on April 24 and were transplanted on June 15: two old favourites, Early Snowball and Early Dwarf Erfurt, together with the Late Autumn King, a new one. The latter is what its name implies, late-autumn, but the heads were much larger. It certainly gave a good account of itself, the weight of heads being more than equal to all the earlier varieties put together. Root maggots destroyed a few of the latter. Of the two former, Early Snowball yielded the best heads but these two varieties were equally early.

*Horse Radish* continues to flourish.

*Kohl Rabi.*—Two varieties, Early Purple (D. & F.) and White Vienna (D. & F.) gave excellent results.

*Musk Melon.*—Here some advance was made on previous years. Whereas in former seasons no bloom appeared, this time there was not only bloom but some fruit formed.

*Lettuce.*—Five varieties sown May 6. Salamander (McD.), a complete failure the previous two years, was a complete success. The Wayahead was away behind for quite a time but it eventually caught up. Both in the variety and date-of-planting tests, the heads of lettuce were never better, if as good. All varieties were excellent.

*Peas.*—Fifteen varieties were sown on May 3. Cars was taken to secure uniformity of rate and of depth in seeding. An inoculation test was attempted, fifty feet of the row being inoculated. The results show no benefit from inoculation, for the yield from the two parts was practically the same. It may be that the inoculation did not take, or the cultivation may have released nitrogen to the uninoculated sufficiently for the small growth there was moisture to support.

The yield of the varieties was as follows:—

GARDEN PEAS—TEST OF VARIETIES

Yield per Acre

| Variety | Lbs. per acre |
|---|---|
| Lincoln (Invermere) | 6,080 |
| Harrison Glory (Invermere) | 5,789 |
| Manifold (McKenzie) | 5,752 |
| McLean Advancer (Harris) | 5,490 |
| Thomas Laxton (O. 1646-63) | 4,610 |
| Pioneer (Gregory) | 4,283 |
| English Wonder (O. 1644) | 3,847 |
| American Wonder (Carter) | 4,081 |
| Laxtonian (Graham) | 3,139 |
| Gregory Surprise (Gregory) | 3,104 |
| Danby Stratagem (Carter) | 2,422 |
| Sutton Excelsior (Harris) | 2,341 |
| Little Marvel (Rennie) | 2,033 |
| Gradus (Carter) | 1,978 |
| Eight Weeks (Carter) | 1,932 |

It may be noted that 1922 was an extra good year for late varieties and enabled them to head the list. The first two, which are new here, have fine large well-filled pods. The Manifold is early and there was a continuous yield throughout the season. The Eight Weeks was earliest of all, the first picking being on July 17, yet it was lowest in yield. In earliness for table use Gregory Surprise and Little Marvel come next on July 20, then English Wonder, Laxtonian and Manifold on 22nd. For some reason (frost or otherwise), Laxtonian and Little Marvel were not good stands. Gradus and American Wonder suffered to a lesser extent.

*Onions.*—In a test between yellow and red sets, the yield of the red was nearly double that of the yellow. All were well ripened but not large, not at all equal to size of 1921.

SEED ONIONS—TEST OF VARIETIES

Rows 45 feet long, 18 inches apart

| | lbs. | ozs. |
|---|---|---|
| Yellow Globe Danvers (Steele Briggs) | 6 | 10 |
| Yellow Globe Danvers (O. 931-2) | 7 | 12 |
| Yellow Globe Danvers (Graham) | 7 | 7 |
| Southport Yellow Globe (Ewing) | 5 | 6 |
| Southport Red Globe (Steele Briggs) | 7 | 13 |
| Southport White Globe (Steele Briggs) | 7 | 12 |
| Ailsa Craig (Graham) | 9 | 4 |
| White Barletta (McDonald) | 9 | 7 |
| Australian Brown (McDonald) | 8 | 15 |
| Giant Prizetaker (Steele Briggs) | 11 | 5 |
| Large Red Wethersfield (O. 988) | 11 | 7 |
| Extra Early Flat Red (McDonald) | 8 | 8 |

White Barletta and Australian Brown were first to mature. It will be seen that Large Red Wethersfield and Giant Prizetaker were about even in yield. The Yellow Globe Danvers in former years was a keen rival of the Large Red Wethersfield but these last two seasons has fallen off comparatively. The latter, with Giant Prizetaker, did not mature as early as Australian Brown or White Barletta. However, the season proved satisfactory for ripening all, which is not usual here. The size was not equal, in any case, to that of 1921.

*Parsley.*—Though tardy in germinating, is a persistent, hardy vegetable. Ordinary frosts have no effect on it.

*Parsnip.*—On May 5, Hollow Crown (O. 1046) was sown and on October 18 was taken up, yielding 4 tons 134 pounds per acre, about half the yield of previous year.

*Peppers.*—The Neapolitan and Harris Early were sown in the hotbed on April 24. Some were transplanted to the open and failed. A second transplanting did better, producing some usable fruit, while those left in the hotbed developed a good supply, some of the fruit being finally ripened indoors.

*Radish.*—Some early radish were obtained by sowing White Icicle (D. & F.) in the hotbed. But generally it was a poor year for radish. The red turnip beetle was greatly in evidence.

*Pumpkin.*—Frost and drouth destroyed the test of varieties. However, from the Connecticut Field were ripened two good specimens, one weighing 10½ lbs. and the other 20½ lbs.

*Spinach.*—The Victoria, sown on April 28, as usual was excellent. The New Zealand, sown the same date, was tardy in germination, has an odd appearance, but grows vigorously when started. We have not found much use for it yet.

*Salisfy.*—Probably the best to date. The Long White produced sixty per cent better in quantity than Mammoth Sandwich Island.

*Squash.*—The crop was not at all to be compared to that of 1921, yet the English vegetable marrow and Long White Bush marrow yielded fine fruit. The Golden Hubbard was better than usual.

*Swiss Chard.*—A fine row of the Lucullus greeted the eye and gratified the taste.

*Tomato.*—The season proved more favourable than usual for tomatoes. Nine varieties were sown in the hotbed on May 2: Burbank Early, Alacrity (O. 1815-23), Crimson Canner (O. 707), Langdon Earliana, Chalk's Jewel (O. 710), Burbank (Bruce), Earlibell (O. 1705), Bonny Best (Stokes), Red Head (Langdon).

Eight plants of each variety were transplanted to the open; soil in mellow condition though somewhat dry at the surface. They were put in six inches deep, on the slant and well watered, but not watered afterward. These were trained half of each variety to one stalk and half to two stalks. The writer has never seen loaded tomato vines in Grande Prairie but these vines were the nearest approach up to date at the Station. A number were about ripe on the vines when the fall frosts came and some were ripened inside. The Alacrity furnished the most ripe specimens.

In the test of training to one stalk versus two stalks it will be seen that in each variety those trained to two stalks gave much the larger yield, while, taking the totals, the yield of those trained to two stalks was forty-six per cent better than that of those trained to one stalk.

TOMATOES—TRAINING TO ONE VS. TWO STALKS

| Variety | Trained to one stalk | | Trained to two stalks | |
|---|---|---|---|---|
| | lbs. | ozs. | lbs. | ozs. |
| Alacrity | 2 | 12 | 3 | 5 |
| Bonny Best | 3 | 4 | 4 | 6 |
| Red Head | 2 | 5 | 4 | 13 |
| Burbank (Bruce) | 3 | 5 | 4 | 5 |
| Burbank Early | 2 | 10 | 4 | 13 |
| Earliana | 3 | 6 | 5 | 5 |
| Earlibell | 3 | 3 | 4 | 4 |
| Crimson Canner | 3 | 3 | 3 | 10 |
| Chalk's Jewel | 2 | 6 | 3 | 11 |
| Totals | 28 | 6 | 38 | 8 |

*Turnips,* Swede, Monarch.—These were sown in mid-summer as a fill-up after everything else had been sown. Expectations were not high on account of lateness and continued drouth. However, the seed all germinated, making a perfect stand. They were taken up on November 1, out of the snow. In size, the roots averaged about two inches in diameter. They made the choicest turnips for table use.

*Herbs.*—A bed of herbs was sown this year of sage, thyme, summer savory, catnip, hyssop and pennyroyal. The last three failed to put in an appearance but sage, thyme and summer savory each gave good stands, showing they can easily be produced in the locality.

### Vegetables—Date of Planting Test

This is now the fifth year this test has been conducted to learn the best average date for planting the various vegetables. The land was summer-fallowed with a top dressing of fine manure; soil in nice condition, though rendered somewhat light on top by loose manure. The test was put in in duplicate. Fourteen kinds of vegetables were used. The frost of June 6 made havoc of most of the sowings. While some things were permanently injured others recovered and proved better than usual. There were six dates of sowing.

The following table gives average of original and duplicate tests, 100 being regarded as the best yield, others in proportion:—

Vegetables—Date of Planting Test

| Kind | 1st Date April 26 | 2nd Date May 3 | 3rd Date May 12 | 4th Date May 19 | 5th Date May 25 | 6th Date June 1 | |
|---|---|---|---|---|---|---|---|
| Beans | ..... | ..... | ..... | ..... | ..... | 100 | |
| Beets | ..... | ..... | ..... | ..... | ..... | 100 | |
| Cabbage | ..... | ..... | ..... | ..... | ..... | ..... | Destroyed by frost and drouth. |
| Cauliflower | ..... | ..... | ..... | ..... | ..... | ..... | Destroyed by frost and drouth |
| Carrots | 70 | 55 | 100 | 23 | 85 | 69 | |
| Corn | 70 | 100 | 100 | 27 | 40 | 7 | |
| Lettuce | 90 | 100 | 90 | 86 | 50 | 60 | Estimated. |
| Onion | 52 | 100 | 44 | 47 | 40 | 31 | Early sowings more mature. |
| Parsley | 85 | 100 | 90 | 95 | 60 | 60 | Estimated. |
| Pumpkin | 100 | ..... | 50 | 100 | 100 | 50 | Not good test |
| Parsnip | 100 | 87 | 72 | 33 | 56 | 26 | |
| Peas | 100 | 67 | 65 | 50 | 65 | 50 | Not 5% failed to ripen. |
| Radish | ..... | ..... | ..... | ..... | ..... | ..... | Not good test. |
| Squash | 50 | 100 | ..... | ..... | ..... | ..... | Not good test. |

In beans and beets, some results show from the last sowing on June 1, as they were scarcely up when frost came on the 6th. Cabbage and cauliflower suffered from drouth as well as frost. Outdoor sowing is poor in a dry season. The first or second sowing is seen to be the best in 1922 in corn, lettuce, onions, parsley, pumpkin, parsnips, peas and squash.

## FLOWERS

*Sweet Peas.*—A trench was dug two feet deep and filled with manure and earth to within three inches of the top. In the trench were sown fourteen varieties on April 29. Owing to dry weather conditions they were slow in germination and growth, yet the bloom all the summer amply repaid the pains taken.

*Gladioli.*—A liberal supply of manure from last year's hotbed was dug in and the earth finely raked. In this were planted, on May 2, eight inches apart, bulbs of the following varieties: Peace, War, Maiden's Blush, Flora, Orange Brilliant, Mrs. Francis King, Mrs. Frank Pendleton, Baron Hulet, Loveliness and Prince of Wales.

Two weeks later a bulb of each of these varieties was planted in tin cans and transplanted to the above bed on June 17. These proved more vigorous than those in the open, but it was mainly a question of water. The Prince of Wales gave the first bloom on August 8, followed by Maiden's Blush on August 15. On August 25 Orange Brilliant was blooming. Bloom appeared on Loveliness and Mrs. Frank Pendleton about the same time. Then followed Flora and Baron Hulet September 23. Finally the Peace came on September 27 with a purple bloom. On October 12 all varieties were taken up, the leaves being still green. The Prince of Wales was the earliest, the most vigorous and the most beautiful variety.

*Tulips.*—The tulip bed was planted in the fall of 1921, south half mulched, the north unmulched. The first blades appeared in the unmulched part, also this part was first to bloom. However, the mulched part overtook it and showed a better stand. The Artus was the first to bloom, on May 30, followed closely by the Duchesse de Parma; then Cottage Maid on June 3. These three varieties were in full bloom when the frost came on June 6. While potatoes and corn were frozen black and all vegetables suffered severely it was a delight to see these full-orbed flowers but little affected. On June 25 the bloom was all gone from Artus, Duchesse de Parma, Keizerskroon and Tom Moore, while William Pitt, La Tulipe Noire, Sultan, Inglescombe Yellow, La Marveille, Pride of Haarlem, Baronne de la Tonnaye, Ges. Spathulata, Caledonia, Madame Krelege and Clara Butt were in full bloom. On July 3 the glory was over, only a few lingering blooms being left.

*Narcissus* and *Hyacinth.*—These were planted at the same time in the Autumn and in the same bed as the tulips. It was thought they were all winter killed. However, on July 3, twenty narcissus out of twenty-five planted were up and three of Gigantea variety of Hyacinth. Both these kinds failed to bloom.

Many of the annuals were started in the hotbed and transplanted beginning June 17 to a well-prepared bed. The plants were well watered when set out. They thus made a good start and would have done better with more moisture. It was surprising under the circumstances to see the growth and bloom displayed. There were the Asters, Antirrhinum, Clarkia, Gaillardia, Salpiglossis, Calendula, Phlox, Candytuft, Pansy, Jacobea, Leptosiphon and Sweet Alyssum, all presenting such a variety of form and colour.

Asters, Salpiglossis, Sweet Sultan, Schizanthus and Cosmea sown in June in the open gave very encouraging results. The ground was quite dry when sown. Water was poured on the seed after sowing before being covered. Most grew rapidly and bloomed abundantly.

A bunch of Linaria at the corner of the hotbed, seeds itself every year and makes a beautiful appearance. The Larkspurs early attained a splendid height and sent up their blue spikes. This year, however, the bloom was destroyed largely by insects. They make the flowers black. Spraying with emulsion failed to arrest the ravages. The delicate Baby's Breath enriched the bouquets of Sweet Peas when tastefully interspersed. In another bed Balsams and Zinnias bloomed for the first time at the Station. There was also the Cornflower, but most of all to be admired in this bed was the garden sunflower. The stems were about two feet in height surmounted by flowers like large daisies.

### BULB PLANTING

In the autumn, supplies of bulbs for fall planting were received almost too late. Snow to a depth of three inches was on the ground but the ground was not frozen.

On October 28, one hundred crocus were planted four inches deep and three inches apart and ninety-eight of scilla five inches deep and four inches apart. On October 30, one thousand tulip bulbs were planted. Five varieties: Pottebakker, Cottage Maid, Chrysolora, Duchesse de Parma and Artus. On October 31, fourteen varieties of Darwin tulips and ten varieties of daffodils were planted, followed by five varieties of hyacinth and two rows of paeony on November 2 and finally nine varieties of iris on November 3. Frost was in the air at the last planting.

## FRUITS

*Currants.*—The fifty-three bushes of red, white and black currants set out in 1916 are still hardy and thriving. In looking over the table of results for previous years it will be seen that the yields mostly ran in increasing ratio until 1922. The last yield, though good, is considerably behind 1921. This is mainly accounted for by the June 6 frost when the bushes were just in blossom. The outside blossoms were hit hard while those inside the bush escaped. During the last two years the leaves have been attacked by the sucking insect, the Aphis. The bushes were sprayed on the underside of the leaves three times with kerosene emulsion with, it is thought, good results. The table below shows for Fay's Prolific and Wilder varieties of red currants, negative results. In other words, from the experience of the last four years at this Station one would be ill advised to set out either of those two varieties.

RED CURRANTS

| — | New Red Dutch | Cumberland Red 0·492 | Victorian Red | Fay's Prolific | Wilder |
|---|---|---|---|---|---|
| Aggregate yield 1917-19 | 30·5 | 39·0 | 27·5 | 0·2 | .... |
| Yield—1920 | 42·0 | 29·0 | 37·0 | 1·5 | ..... |
| Yield—1921 | 72·25 | 55·25 | 62·75 | 13·2 | 3·5 |
| Yield—1922 | 56·5 | 29·25 | 31·87 | 8·93 | 0·87 |
| Totals | 201·25 | 152·5 | 159·12 | 23·83 | 4·37 |

BLACK CURRANTS

| | Topsy O. 568 | Collins Prolific O. 565 |
|---|---|---|
| Aggregate yield 1917-19 | 18·4 | 14·3 |
| Yield—1920 | 38·0 | 26·0 |
| Yield—1921 | 37·3 | 33·4 |
| Yield—1922 | 7·43 | 1·71 |
| Totals | 101·13 | 75·41 |

WHITE CURRANTS

| — | Large White O. 551 | White Cherry O. 550 |
|---|---|---|
| Aggregate yield 1917-19 | 7·75 | 4·4 |
| Yield—1920 | 1·0 | 5·0 |
| Yield—1921 | 5·25 | 12·5 |
| Yield—1922 | 9·75 | 9·0 |
| Totals | 23·75 | 30·9 |

*Raspberries.*—A contrast of the results in early and late planting of raspberry bushes was furnished. Of a large number of seedlings set out in early spring only four died and out of an equal number set out in late spring only eleven survived. Of course, the drouth may be taken into consideration. Others in the locality report failure through late planting.

Raspberries and strawberries, though producing a quantity of good fruit, have been a comparative failure. This was due to some extent to the frost, some of the blossoms being caught. The main cause of failure, however, was the drouth. One or two good showers at the opportune time would have made a wonderful difference.

The apple trees reported on in 1921 are still living, though little progress can be reported.

In 1921, seeds of the Manitoba wild grape, the Sand cherry and the Nigra wild plum were sown and all produced fine seedlings. The grapes were caught in the early frost, but the Sand cherries and Nigra plums resisted frost till late, and in the spring of 1922 there were a large number transplanted. These two fruits have shown themselves hardy and easy to transplant successfully. Though 1922 was the driest year, not one seedling died. Of the rooted plants of Sand cherry planted in 1921, one at least bloomed in 1922. The grapes, though frozen down early, appeared again in the spring, but no great success can be reported.

A new supply of nursery stock was received from Brookings, South Dakota, and set out on May 24. These consisted of Siberian crabs, a Magna crab, Beauty crab, Pembina plum, Ojibwa plum, a Tom Thumb cherry and Champa Sand cherries. Most of these survived.

## ORNAMENTALS AND SHELTER BELTS

To the extensive plantings of previous years, 1922 saw an addition of fifty Scotch pine, fifty white spruce and also jackpine. Three new hedges were set out of laurel and red willow. These made fine growth during the season.

While this report is being prepared, havoc is being made with the trees and bushes. The winter of 1922-23 will be known as the winter of the rabbits. The first to be attacked were the Scotch pines, then the spruces. Before much damage was done they were protected with wire netting round them, or with boxes. A considerable part of the orchard windbreak was enclosed with chicken wire. The apple and other fruit trees were wrapped with building paper, which was a complete protection as far as it went but many were nipped off above, among the branches. All the balm of Gilead were wrapped and so far are saved. Poisoning was attempted with no great success. Many have been killed but still the depredation goes on. Great numbers of Russian Poplar, caragana, ash and willow, which had had a fine growth in the past three years, while possibly not killed outright are thrown back to where they started. The willow hedges reported above were all nipped off before the attack was recognized. The Sand cherries and Nigra plums have suffered considerably. The raspberry canes had been turned down for the winter, but any left upright were all nipped off. Wild gooseberries are being stripped. Thus orchards and windbreaks will show a mutilated appearance.

## EXPERIMENTS WITH SWINE

During the summer of 1922, two experiments were conducted, a breed test and a feed test.

The breed test included fifty-five shoats (after one casualty) representing Yorkshires, Duroc-Jerseys, Hampshires, Poland-Chinas, Berkshires, Tamworths and Cross-breds. These last were the progeny of a Yorkshire Berkshire and a Yorkshire Poland cross. The four first-named pens of hogs were somewhat older than the other when placed on the test and were finished in 84 days. In this period the Yorkshires gained 102 pounds per head; the Duroc Jerseys, 126 pounds; the Hampshires 97 pounds, and the Poland-Chinas 105 pounds. The Tamworths were fed for 123 days and showed an average gain of 114 pounds while the Berkshires and cross-breds were fed for 137 days and gained 136 and 135 pounds respectively.

The hogs were housed in portable enclosures, each measuring 12 by 14 feet, about a quarter of this area being roofed.

For the greater part of the test the hogs were trough-fed. During the initial stages, self-feeders were used and this method of feeding was again adopted for the three lots which were carried in November and December. The meal ration included oats, wheat and barley, this last feed being increased in successive steps during the finishing period. About 4 per cent of digester tankage was added to this meal ration.

The results obtained from this test show that the meal required to produce a pound of gain in live weight for the different lots was as follows: Yorkshires, 4·2 pounds; Durocs, 3·71 pounds; Hampshires, 4·07 pounds; Polands, 3·79 pounds; Tamworths, 4·01 pounds; Berkshires, 4·33 pounds; and Cross-Breds, 4·14 pounds.

The Yorkshires dressed the most attractive carcasses and conformed most closely to the bacon type; the Durocs tended to run a little too thick but possessed almost enough length; the Hampshires did not possess anything approaching a sizeable Wiltshire in the lot; the Polands were smoother and possessed a more uniform distribution of fat but did not approach Wiltshire requirements; the Tamworths were inclined to run wide at the shoulder, none too well filled in the ham and lacking in length of side; the Berkshires were rather too thick for their length and the same criticism would apply to the cross-breds.

### FEEDING TEST

The feed test consisted of a comparison of hulless oats vs. ordinary oats and hulless barley vs. ordinary barley. Thirty-three pigs were fed and these were housed in the same manner as in the breed test. Lot I was fed two parts of hulless oats and one part of barley; lot II, ordinary oats and ordinary barley; lot III, ordinary oats and hulless barley. Four per cent of digester tankage was added to all rations and, in addition, a small quantity of skim milk, green alfalfa, boiled flax and minerals were supplied.

The hulless barley was exhausted after 120 days, and, as a result, only the other two lots were carried for the full period of 158 days.

In this period, lot I made an average daily gain of ·94 pounds per head with a meal consumption of 3·55 pounds per pound of gain, lot II, ·85 pounds with a meal consumption of 3·84 pounds, while lot III in 120 days made an average daily gain of ·73 pounds with a meal consumption of 3·16 pounds. The hogs on this lot averaged 100 pounds at the end of that period. Lots I and II averaged 162·8 pounds and 148·3 pounds, respectively, at the end of the test. The low gains are explained, in part at least, by the fact that the pigs averaged only twelve pounds per pig when placed on the test.

These results would indicate that for feeding pigs:—

1. Hulless oats is superior to ordinary oats.
2. Hulless barley is superior to ordinary barley.
3. The feeding value of hulless oats is more pronounced with young pigs than with older pigs.

## REPORT ON APICULTURE

A colony of somewhat hybrid Italian bees was received from Lacombe on July 15, 1922. On arrival the colony weighed 42 pounds. It built up rapidly in bees and gathered considerable honey until a weight of 72 pounds was attained in the latter part of August. Autumn consumption reduced this somewhat but feeding was resorted to.

The bees were put into the house cellar in early November.

Nectar seemed to be gathered in particular on alsike, white Dutch clover, sweet clover and fire weed. The bees also worked on sunflowers and other bloom.

## EXTENSION AND PUBLICITY

### CO-OPERATIVE EXPERIMENTS

On the principle that self help is the best help and in the belief that far more valuable development comes through doing something than through merely seeing, hearing, or reading of results worked out, the Beaverlodge Station, in conjunction with the Division of Forage Plants, instituted a co-operative experiment in the inoculation of alfalfa and clover. Some thirty experimenters were thus interested in 1921. Seed for one plot was inoculated with soil applied by the glue method, while seed for a check plot was left uninoculated.

As the plots were, in nearly all cases, sown on well-prepared land, few experimenters noticed any important contrast the first season. In the second season there were a few very striking ones, though in other instances no advantage appeared. While lack of opportunity for general inspection prevented the staff from ascertaining the causes in all cases it appears probable that in some instances the bacteria had lost their vitality before the seed was received by the co-operators, for in certain cases where the inoculated seed was sown promptly the results in nodule development and growth were all that could be desired. G. S. Moyer, of Elmworth, who had an opportunity of sowing his seed the day after it was treated, noticed some advantage from inoculation of his alfalfa plot in the autumn of the year of seeding, and found plenty of nodules on the roots of this plot but none on the roots of the check plot. In the summer of 1922 the contrast in growth became very pronounced, the inoculated plot yielding 3,230 pounds per acre against 920 pounds per acre from the uninoculated. If either plot had an advantage in location he considered that it was the check plot. Other co-operators reported advantages varying from 100 per cent down. The majority of those using alfalfa were pleased with the growth they obtained and convinced of the feasibility of raising this crop on their respective farms.

In 1922 the experimental work was enlarged by including a test of the Late Swedish red clover against either alfalfa or alsike, as chosen by the applicant. Forty-one men, situated at representative points all over the Upper Peace River country, chose alfalfa as the check and twenty-two chose alsike. Ten others undertook a straight experiment in the inoculation of alfalfa, while six combined this with an incidental test of Late Swedish, making seventy-nine co-operators altogether who were supplied with seed in 1922.

Drouth delayed germination and marred the test in many cases but arrangements were made to renew the seedings, where necessary, in 1923.

## LANTERN-SLIDE LECTURES, DEMONSTRATIONS

Through the good offices of the Division of Extension and Publicity, the Sub-Station was supplied with a Victor projection lantern. Slides were made of some half a hundred photographic negatives depicting various features of the work on the Station. During the year these were exhibited at nineteen points, from High Prairie, Alberta, to Rolla, B.C. Fully nine hundred people, nearly all of them being farmers and their families, witnessed these slides and listened to the accompanying explanations, which occupied anywhere from one and a half to three hours, depending upon the program and the endurance of audience. The slides proved an invaluable aid in explaining the work. To reach these nineteen points the Superintendent drove about four hundred miles by buggy and sleigh, and large areas of the territory supposed to be served by the Station could not be reached for lack of time.

In addition to the lantern-slide lectures the Superintendent assisted Mr. F. B. Hansen, of the Dominion Live Stock Branch at two short courses and seven subsequent bacon-hog demonstrations, to which there were taken sides of bacon cured from the carcasses of hogs fed experimentally at Beaverlodge during the preceding summer. These demonstrations were very effective.

Two field-day picnics were held at the Station in July and August, attended by perhaps two hundred persons. In addition many scores of people visited the Station from day to day and were, whenever possible, shown over the work.

Over three thousand miles were covered by motor car and railroad on various commissions, including inspection of seed grain for registration, and judging at three local exhibitions.

Several dozen articles, mostly for general distribution were prepared and typewritten in manifold for the press. The publicity accorded these offerings was much appreciated.

A timely pamphlet, dealing with the local economic and psychological conditions, met with widely expressed approval and found more or less general circulation throughout Canada, being extensively quoted by the press.

The opportunities for development of the publicity function, with the local experimental work as its centre and fountain of inspiration, are unlimited.

# EXPERIMENTAL SUB-STATION, FORT VERMILION, ALTA.

## REPORT OF THE SUPERINTENDENT, ROBERT JONES

### THE SEASON

The winter of 1921-22 was considered remarkably mild for this district. The growing season of 1922 was cool and there was an unusual amount of precipitation during May and June. However, the weather during July was ideal for the growing of all crops.

On November first there was only one inch of snow on the ground. With this extremely light snowfall, and no very cold weather, the stock were able to feed out on the range until about the eighth, and were in fine condition when rounded up and put into winter quarters. On the 9th there were five inches of snow on the ground, which made good sleighing for the hauling of feed and other work. On seventeen days during the month of November the temperature dropped to below zero, the lowest recorded being —33.0 degrees on the 22nd.

The month of December was quite cold, the temperature being well below zero on twenty-seven occasions. It was bright with an average amount of sunshine, and comparatively free from severe storms, and high winds. Precipitation was very light, totalling only one and a half inches of snow but it was sufficient to improve sleighing, there being eight and three-quarter inches on the ground at the end of the month. The lowest temperature reached during the month was on the morning of the 19th, when —43.9 degrees was recorded.

Though the thermometer registered below zero almost continuously during the month of January, it was considered fairly mild. Snow fell on only one occasion. Frequent chinook winds were experienced, which cut down the snow considerably, making it comparatively easy to get about. The lowest temperature recorded for the month was on the morning of the 22nd, when it dropped to —50.0 degrees. The amount of snow on the ground at the end of the month was ten inches.

Throughout the month of February, weather conditions were much more severe than during the previous month; with the exception of one morning, the temperature registered well below zero. The lowest recorded was on the seventh when it reached —48.0 degrees. There was a total precipitation of two and three-quarter inches of snow, and at the end of the month there was twelve and three-quarter inches of snow on the ground. Comparatively no wind was experienced, and with a fair amount of sunshine, February was considered a very pleasant month. All stock throughout the district was in good condition at the end of this month.

Weather throughout March was wintry, and, with the exception of six mornings, the temperature was well below zero, —43.0 degrees being recorded on the morning of the 26th. Snow fell on three separate occasions, total precipitation for the month being five inches of snow, making a total of seventeen and three-quarter inches on the ground at the end of the month. There was an unusual amount of sunshine and no severe storms.

Winter weather continued during the early part of April, with the result that no work could be done on the land. The hotbeds were made ready on the 25th, and the first vegetable seed sown on this date. The young stock were turned out on the range at the end of the month. No precipitation was recorded during April.

May opened rather cool. The first wheat was sown at this Station on the 2nd. Wheat seeding was general throughout the district on the 4th. Potatoes

were planted on the 5th, first sowing of oats on the 5th, and barley on the 12th. While the precipitation and moisture from the winter's snow were ample for rapid germination, it was slow until well towards the middle of the month, owing to the frequency of frosty nights. By the 22nd wheat that was sown on the 4th, was two and a half inches high, and on the 29th was four inches above the ground; total precipitation for May was 2¾ inches.

June, on the whole, was comparatively cool. As a result, growth of all vegetation was slow and backward. The large amount of precipitation considerably delayed field work. Hail storms occurred but no material damage was done. By the end of the month plots of wheat measured fully twenty-two inches high. The hay crop was doing well, and no crop suffered from lack of moisture.

The weather conditions during the month of July were ideal for the growing of all crops, especially after the abundance of precipitation in June. The root and garden crops made rapid growth during the month. All varieties of flowers came into bloom this season somewhat later than usual, the perennials on the 15th, and the annuals not until well toward the end of the month. All varieties made a good showing. Haying on the experimental area was started on the 24th, and a very satisfactory yield was obtained, and was cured and stacked in excellent condition. Most of the garden vegetables were in use during the latter part of the month. Potatoes came in use on the 18th, these being our latest variety (Rochester Rose), and were a fair size. No grains were cut in July. Precipitation was light, totalling only 0.88 in. No frost was experienced during the month.

August was warm, no frost being recorded. There was an unusual amount of precipitation, the heaviest rainfall at any one time being 2.50 inches. These heavy rains caused the grain to lodge, from which they never recovered until harvested, and also prolonged the growing season, some varieties of wheat not being fully matured until early in September. The plots of grain being quite free from second growth were able to mature more evenly. Barley was cut on the 5th, the first wheat on the 14th, and oats (Eighty Day) on the 5th. Both grain and straw gave quite heavy yields. The root and vegetable crops made good growth during the month. Potatoes were a fair size but the yield was much below average. All flowers bloomed profusely throughout the month.

September, on the whole, was a very unfavourable month, owing to heavy rains, and a snowfall on the 30th. Frost was also recorded during many nights. The root crop was harvested under very unfavourable weather conditions. All wheat not cut on September 3 showed the effect of frost, more especially in the outlying districts. This unfavourable weather made threshing very difficult. Thirty per cent of the wheat grown in this district this season will be of a poor milling quality, owing to excessive moisture and frost, and will be used as feed.

The unfavourable weather conditions of September continued throughout the month of October. Several snow storms occurred, and at the end of the month there was two inches of snow on the ground. During the early part of the month, manure was applied to grain crops, and ploughing was completed on the experimental area before the freeze-up, which occurred on the 20th. The acreage of fall ploughing done throughout the district was very small, only about 15 per cent of the total area broken. This will necessitate a smaller acreage of wheat being sown in 1923, with an increased acreage of oats and barley. Feeding of milch cows was started on the 26th, owing to severe weather conditions, and depth of snow on the ground, and all young stock were brought in from the range by the 30th. These conditions will make a long feeding period but no shortage of feed is anticipated.

No extremely low temperature was experienced during the early part of November. There was a fair amount of sunshine, which made the days fairly pleasant, and permitted finishing up autumn work. Preparations were made for a severe winter.

TABLE OF METEOROLOGICAL OBSERVATIONS taken at Fort Vermilion, Peace River District, Alberta, from April 1 to December 31, 1922, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence, also rainfall, snowfall, and total precipitation.

| Months | Maximum | Minimum | Range | Mean | Highest | Date | Lowest | Date | Rainfall | Snowfall | Total precipitation | Number of days precipitation | Heaviest in 24 hours | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ° | ° | ° | ° | | ° | | in. | in. | in. | | | |
| April | 41·52 | 13·90 | 27·95 | 27·87 | 69·0 | 28th | −23·0 | 9th | ..... | ..... | ..... | ..... | ..... | ..... |
| May | 60·65 | 36·76 | 23·88 | 48·70 | 84·0 | 31st | 29·5 | 3rd | 2·43 | ..... | 2·43 | 10 | 0·64 | 19th |
| June | 68·42 | 42·33 | 26·09 | 55·37 | 86·5 | 1st | 33·5 | 5th & 29th | 2·53 | ..... | 2·53 | 14 | 0·98 | 4th |
| July | 74·01 | 47·06 | 26·94 | 60·53 | 87·8 | 28th | 30·8 | 20th | 0·88 | ..... | 0·88 | 10 | 0·20 | 14th |
| August | 72·15 | 46·32 | 25·83 | 59·23 | 83·5 | 1st | 38·0 | 22nd | 3·03 | ..... | 3·03 | 7 | 2·50 | 11th |
| September | 57·51 | 34·84 | 22·67 | 46·17 | 71·0 | 26th | 25·5 | 4th | 2·13 | ..... | 2·13 | 8 | 0·54 | 28th |
| October | 41·03 | 24·83 | 16·19 | 32·92 | 64·3 | 7th | 13·0 | 16th | ..... | 2·00 | 0·54 | 7 | 0·24 | 23rd |
| November | 22·65 | −0·80 | 23·45 | 10·92 | 43·2 | 14th | −36·2 | 18th | ..... | 11·00 | 1·10 | 4 | 0·50 | 16th |
| December | −0·13 | −16·69 | 16·55 | −8·42 | 13·5 | 7th | −43·8 | 10th | ..... | 6·00 | 0·60 | 6 | 0·15 | 6th & 16th |
| | | | | | | | | | 11·00 | 19·00 | 13·24 | 66 | | |

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

| —— | Mean temperature | Highest temperature | Lowest temperature | Total precipitation | Heaviest in 24 hours | Total hours sunshine | Average sunshine per day |
|---|---|---|---|---|---|---|---|
| | ° | ° | ° | in. | in: | hours | hours |
| April— | | | | | | | |
| Ottawa | 43·02 | 72·4 | 23·4 | 3·85 | 1·05 | 158·3 | 5·27 |
| Fort Vermilion | 27·87 | 69·0 | −23·0 | ..... | ..... | 218·7 | 7·29 |
| May— | | | | | | | |
| Ottawa | 59·95 | 85·0 | 29·8 | 1·87 | 0·87 | 199·4 | 6·43 |
| Fort Vermilion | 48·70 | 84·0 | 29·5 | 2·43 | 0·64 | 277·7 | 8·95 |
| June— | | | | | | | |
| Ottawa | 65·05 | 91·4 | 40·6 | 5·22 | 1·58 | 212·4 | 7·08 |
| Fort Vermilion | 55·37 | 86·5 | 33·5 | 2·53 | 0·98 | 259·3 | 8·64 |
| July— | | | | | | | |
| Ottawa | 69·73 | 90·4 | 48·0 | 1·98 | 0·98 | 325·0 | 10·48 |
| Fort Vermilion | 60·53 | 87·8 | 30·8 | 0·88 | 0·20 | 313·7 | 10·11 |
| August— | | | | | | | |
| Ottawa | 66·46 | 94·0 | 42·2 | 2·24 | 0·82 | 259·5 | 8·37 |
| Fort Vermilion | 59·23 | 83·5 | 38·0 | 3·03 | 2·50 | 255·3 | 8·23 |
| September— | | | | | | | |
| Ottawa | 61·78 | 90·0 | 29·9 | 1·68 | 0·73 | 253·8 | 8·46 |
| Fort Vermilion | 46·17 | 71·0 | 25·5 | 2·13 | 0·54 | 145·4 | 4·84 |
| October— | | | | | | | |
| Ottawa | 44·55 | 82·0 | 16·2 | 3·49 | 0·90 | 149·5 | 4·82 |
| Fort Vermilion | 32·92 | 64·3 | 13·0 | 0·54 | 0·24 | 104·1 | 3·35 |
| November— | | | | | | | |
| Ottawa | 34·64 | 55·2 | 16·0 | 1·78 | 0·32 | 59·2 | 1·97 |
| Fort Vermilion | 10·92 | 43·2 | −34·2 | 1·10 | 0·50 | 81·5 | 2·71 |
| December— | | | | | | | |
| Ottawa | 17·19 | 54·0 | −12·4 | 1·84 | 0·38 | 88·9 | 2·86 |
| Fort Vermilion | −8·42 | 13·5 | −43·8 | 0·60 | 0·15 | 41·3 | 1·33 |

Record on Sunshine Fort Vermilion, Peace River District, Alberta, from April 1st to December 31, 1922

| Months | Number of days with sunshine | Number of days without sunshine | Total hours sunshine | Average sunshine per day |
|---|---|---|---|---|
| April | 29 | 1 | 218·7 | 7·29 |
| May | 27 | 4 | 277·7 | 8·95 |
| June | 28 | 2 | 259·3 | 8·64 |
| July | 31 | 0 | 313·7 | 10·11 |
| August | 29 | 2 | 255·3 | 8·23 |
| September | 25 | 5 | 145·4 | 4·84 |
| October | 20 | 11 | 104·1 | 3·35 |
| November | 20 | 10 | 81·5 | 2·71 |
| December | 15 | 16 | 41·3 | 1·33 |

## FORAGE CROPS

### ENSILAGE CROPS

#### VARIETY TESTS WITH INDIAN CORN

Indian corn has been tested for a number of years at this Station. The reasons for failure to produce profitable ensilage from Indian corn are the liability to late spring frosts, short growing season, and cool nights. Variety tests were again conducted this year.

The corn for fodder was planted in duplicate plots, one-thirtieth of an acre each, in drills twenty-four and thirty inches apart. For field and garden varieties, one-sixtieth acre plots were used. The land used in these tests had a crop of cereals the previous season; barnyard manure was applied in the fall previous to ploughing. In the spring of 1922 the plot was put in readiness for the seed with spring tooth and smoothing harrows. All cultivation was done by hand in these plots.

The results obtained are as follows:—

| Variety | Sown | Harvested | Length of Stalk | Yield from Plots | Yield per Acre | Distance apart | Condition when cut |
|---|---|---|---|---|---|---|---|
| | | | in. | lbs. | tons lbs. | in. | |
| Wisconsin No. 7 | May 18 | Aug. 28 | 82 | 1,049 | 15 1,370 | 30 | Well tasseled out, silk just appearing when cut. |
| Mixed | May 15 | Aug. 28 | 84 | 1,145 | 17 370 | 34 | Stalks quite large, very leafy, fully tasseled, some silk. |
| Mixed Garden | May 16 | Aug. 31 | 64 | 949 | 14 470 | 20 | This plot had been tasseled out some considerable time previous to being cut, many small cobs formed in early milk. No thinning out was done. |
| North Western Dent | May 15 | Aug. 31 | 89 | 515 | 15 900 | 3′ by 3′ | Very green when cut, fully tasseled, some silk, stalks large. |
| Leaming | May 15 | Aug. 31 | ..... | 727 | 21 1,620 | 3′ by 3′ | Quite green when cut, fully tasseled, had been in silk for some time, some cobs formed, stalks very large. |
| White Cap Yellow Dent | May 15 | Sept. 4 | 78 | 650 | 19 1,000 | ..... | Slightly touched by frost. Very green just in tassel, no silk, stalks of a fair size. |
| Longfellow | May 15 | Sept. 11 | 92 | 819 | 24 1,140 | ..... | Cut after considerable frost, quite green stalks very large with an abundance of leaf, fully tasseled out, no silks. |
| Canada Yellow | May 15 | Sept. 11 | 72 | 622 | 18 1,320 | ..... | In full tassel, silk just appearing. The stalk large. |
| North Dakota | May 15 | Sept. 1 | 78 | 815 | 22 900 | ..... | Fully tasseled out, fully silked out, a fair amount of very large cobs formed, the stalks very large an l a fair amount of leaf. |
| Compton's Early | May 15 | Sept. 4 | 88 | 799 | 23 1,940 | ..... | In full tassel, no silk, the stalks very large with an abundance of leaf. |
| Quebec No. 28 | May 18 | Sept. 4 | 72 | 557 | 16 1,420 | ..... | Quite green, well tasseled out, fully silked, some cobs, stalks of a medium size. |
| Wisconsin No. 7 | May 18 | Sept. 4 | 94 | 695 | 20 1,700 | ..... | In tassel, no silk, the stalks quite large. |
| Bailey | May 18 | Sept. 4 | 96 | 710 | 21 600 | ..... | Just in tassel, no silk, the stalks very large; the yields from these different plots made excellent fodder. |

## SUNFLOWERS

Further variety tests with sunflowers were conducted this year, the land selected for this experiment was in potatoes the previous season, and was comparatively free from weeds. At the first cultivation of the plots the thinning out was done; this caused the stalks to increase in size but no particular difference in maturity was noticed. It will be seen in the table, that with eight-inch spacing, the stalks became quite large.

After cutting and weighing the sunflowers in each plot were stooked, and left standing until hauled away and fed out to the stock in November. The fodder in stooks apparently underwent a slight process of fermentation and was readily eaten by all classes of stock.

The following table gives yields obtained from sunflower plots:—

VARIETY TESTS WITH SUNFLOWERS

| Variety | Sown | Harvested | Length of Plant | Yield of Plot | Yield per Acre | Distance between Rows | Spacing |
|---|---|---|---|---|---|---|---|
| | | | Inches | | Tons lbs. | Inches | |
| Mammoth Russian.. | May 16 | Sept. 7 | 111 | 1,560 | 23 800 | 30 | 6 |
| Mammoth Russian.. | May 18 | Sept. 7 | 96 | 1,175 | 17 1,250 | 40 | 4 |
| Mammoth Russian.. | May 18 | Sept. 7 | 108 | 1,310 | 18 1,300 | 36 | 8 |
| Early O. 76..... | May 17 | Sept. 6 | 88 | 1,039 | 15 420 | 30 | 4 |
| Early O. 76..... | May 18 | Sept. 6 | 84 | 895 | 13 850 | 26 | This plot was not thinned out, just left as sown. This made a finer stalk. |
| Lethbridge Seed..... | May 22 | Sept. 4 | 84 | 915 | 13 145 | 28 | |
| Lethbridge Seed..... | May 22 | Sept. 4 | 86 | 977 | 14 1,310 | 30 | |

### *A further Test with Mammoth Russian Sunflowers*

This plot was sown on May 16 in rows 20 inches apart, the seed sown quite thick. No thinning out was done, and only one cultivation given, this being on June 14.

When harvested on September 6 the sunflowers were stooked and left in this condition until November, when they were hauled to the stable and fed, with good results.

Sown—May 16.
Harvested—September 6.
Length of plant—108 inches.
Weight of plot—1,560 pounds.
Yield per acre—23 tons 800 pounds.
Distance between rows—20 inches.

## ANNUAL HAY CROPS

The past season, with its ample precipitation and freedom from late spring frosts, was very favourable to the growth of millets and hay mixtures. A fair yield was harvested and stacked under extremely good weather conditions. This was later fed out to the stock, and was readily eaten with little or no loss. The land used in these tests had been in potatoes the previous season. It was ploughed in the fall, and thoroughly cultivated in the spring in preparation for the seed, which was sown in drills 7 inches apart. The plots were one-thirtieth of an acre each.

The following were the varieties sown, with dates of seeding, dates harvested and yields per acre obtained:—

VARIETY TESTS WITH MILLET

| Variety | Sown | Harvested | Length of plant | Yield from plot | Yield per acre | Remarks |
|---|---|---|---|---|---|---|
| | | | | lbs. | tons lbs. | |
| Siberian..... | May 18 | Aug. 14 | 53 | 216 | 3 1,830 | The growth very heavy, plots lodged was well headed out when cut. |
| Japanese..... | May 18 | Aug. 14 | 55 | 286 | 4 580 | Growth very rank, badly lodged when cut. The plants were well headed out. |
| Hungarian..... | May 18 | Aug. 14 | 54 | 240 | 3 1,200 | Growth very heavy, fully headed out, badly lodged when cut. |
| Early Fortune.. | May 18 | Aug. 14 | 57 | 255 | 3 1,650 | A very heavy yield, plants fully headed out, seed well formed when cut. |
| Common..... | May 18 | Aug. 14 | 49 | 200 | 3 0 | A very good growth, just coming into head when cut. |
| Hog..... | May 22 | Aug. 15 | 58 | 296 | 4 880 | The growth very rank. Fully headed out, some seed formed, very badly lodged when cut. |

VARIETY TESTS WITH GRAIN MIXTURES FOR HAY

| Variety | Sown | Harvested | Length when cut | Yield from plot | Yield per acre | Remarks |
|---|---|---|---|---|---|---|
| | | | in. | lbs. | tons lbs. | |
| Banner Oats and Arthur Field Peas..... | May 22 | Aug. 2 | Oats 40, Peas 28 | 305 | 4 1,150 | Oats just changing colour. Peas well formed. |
| Victory Oats and Prussian Blue Field Peas.... | May 22 | July 30 | Oats 42, Peas 24 | 300 | 4 1,000 | Oats in early dough. Peas just formed. |
| Spring Rye and Empire Field Peas..... | May 22 | July 31 | Rye 52, Peas 24 | 250 | 3 1,500 | Rye fairly green, some pods. Just formed considerable shrinkage in drying. |
| Champion Barley and Alberly Blue Field Peas | May 22 | Aug. 3 | Barley 38, Peas 32 | 310 | 4 1,300 | Barley in late dough. Peas in pods, well formed, only a slight shrinkage. |
| Success Barley, Leaser Oats, and Common Vetch. | May 24 | Aug. 12 | Barley 40, Oats 51, Vetch 43 | 315 | 4 1,450 | Oats in late dough. Barley in early dough. Pods in the Vetch just forming. Little or no shrinkage in this mixture. Made a very fair class of fodder. |
| Gold Rain Oats and Sand Vetch..... | May 24 | Aug. 12 | Oats 54, Vetch 42 | 301 | 4 1,030 | Oats in firm dough. The vetch have some pods formed. Growth very rank, some shrinkage was noticed in the curing. This mixture made excellent fodder. |

COMMON VETCH

Some difficulty was experienced in curing this fodder as it was sown alone. However, it was fed out to hogs and eaten quite readily.

Sown—May 26.
Harvested—August 15.
Yield from the plot—180 pounds.
Total weight per acre—5,400 pounds or 2 tons 1,400 pounds.

SAND VETCH

Sown—May 26.
Harvested—August 9 to 20.
Yield from the plot—198 pounds.
Total weight per acre, cut green—5,940 pounds, or 2 tons 1,940 pounds.
Size of the plot—One-thirtieth of an acre.
Length of Vine—50 inches.
Fed out as harvested.

SOUDAN GRASS

Sown—May 22.
Harvested—August 14.
Length of plant—48 inches.
Yield from the plot—264 pounds.
Total weight per acre—7,920 pounds, or 3 tons 1,920 pounds.
Size of the plot—One-thirtieth of an acre.
Very heavy crop, plants thick on plot.

CANARY BIRD SEED GRASS

Sown—May 23.
Harvested—August 12.
Length of plant—51 inches.
Yield from the plot—289 pounds.
Total weight per acre—8,670 pounds, or 4 tons 670 pounds.

The growth very heavy, plants well headed out, and the seed fairly matured when cut, but rather an inferior fodder.

SORGHUM OR SUGAR CANE

Sown—May 20.
Harvested—September 1.
Length of stalk—52 inches.
Yield from the plot—370 pounds.
Total weight per acre—10,100 pounds, or 5 tons 100 pounds.
Size of the plot—One-thirtieth acre.

Of a very rank growth, and made excellent fodder was just coming to tassel when cut.

FIELD ROOTS

Further variety tests with mangels, sunflowers, beets, carrots and swede turnips were conducted this season. The land on which these experiments were conducted had grown cereal crops the previous season. After the crops were removed in the fall, and twenty wagon loads of manure per acre applied, the land was thoroughly ploughed, and left in that condition until the spring of 1922, when it was put into condition for seeding.

All plots were one-sixtieth of an acre each. Thinning out of plots was carried on, the distance apart for mangels, sunflowers, beets and turnips being thirteen inches and for carrots seven inches. Frequent cultivation was given to encourage growth. The abundance of precipitation and other favourable conditions helped the yields, which were very good. Results are shown in the following tables:—

VARIETY TESTS WITH MANGELS

| Variety | Sown | Harvested | Germination of Seed | Yield from plots | Yield per acre | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | % | lbs. | tons | lbs. | |
| Giant Yellow Globe | May 17 | Sept. 11 | 100 | 1,146 | 34 | 760 | Roots very large. |
| Giant White Sugar | May 17 | Sept. 2 | 100 | 879 | 26 | 740 | Roots of a fair size. Very smooth. |
| Yellow Intermediate | May 17 | Sept. 9 | 85 | 1,125 | 32 | 1,500 | Roots large, of a very fine quality. |
| Selected Yellow Globe | June 11 | Sept. 6 | 95 | 617 | 18 | 1,020 | Roots of a medium size. |
| Mammoth Long Red | May 17 | Sept. 9 | 100 | 1,125 | 33 | 1,750 | Roots very long and large, of excellent quality. |
| Giant Yellow Oval | May 17 | Sept. 9 | 90 | 1,052 | 31 | 1,120 | Roots quite large, very smooth. |
| VARIETY TESTS WITH SUGAR BEETS | | | | | | | |
| Kitchener | May 17 | Sept. 24 | 95 | 355 | 10 | 1,300 | Roots of medium size. |
| Klein Wanzleben | May 17 | Sept. 24 | 100 | 395 | 11 | 1,700 | Roots of fair size, quite smooth. |
| British Columbia | May 17 | Sept. 26 | 90 | 328 | 9 | 1,680 | Roots small and rooty. |
| Denmark | May 17 | Sept. 26 | 75 | 295 | 8 | 1,700 | Roots fair size, smooth, plants thin. |
| Waterloo | May 17 | Sept. 24 | 90 | 340 | 10 | 400 | Roots of medium size, rather rooty. |
| Chatham | May 17 | Sept. 24 | 85 | 375 | 11 | 500 | Roots of a fair size, quite free from rootlets. |
| VARIETY TESTS WITH CARROTS | | | | | | | |
| Danish Champion | May 17 | Sept. 23 | 100 | 880 | 26 | 800 | Roots of a good size. |
| Guerand, or Oxheart | May 17 | Sept. 23 | 100 | 766 | 22 | 1,960 | Roots fine and large and of good quality. |
| Improved Short White | May 17 | Sept. 23 | 100 | 1,028 | 30 | 1,680 | Roots very large and smooth. |
| White Belgian | May 17 | Sept. 23 | 100 | 1,020 | 30 | 1,200 | Roots very large. |
| VARIETY TESTS WITH SWEDE TURNIPS | | | | | | | |
| Canadian Gem | May 23 | Sept. 16 | 100 | 924 | 27 | 1,440 | Roots large and smooth, a very good keeper. |
| Sutton's Champion | May 23 | Sept. 13 | 100 | 912 | 27 | 720 | Roots large, somewhat rooty, only a fair keeper. |
| Monarch (Nappan Seed) | May 23 | Sept. 8 | 100 | 880 | 26 | 800 | Roots fairly large slightly rooty, uniform in size. |
| Ditmens | May 23 | Sept. 8 | 100 | 1,020 | 30 | 1,200 | Roots unusually large, very smooth, even and uniform, a good keeper and a fair table turnip. |
| Hasyards | May 23 | Sept. 14 | 90 | 870 | 26 | 200 | Roots fair size, free from rootlets. |
| Jumbo | May 23 | Sept. 11 | 85 | 830 | 24 | 1,800 | Roots good size and fairly smooth. |
| Bangholm | May 23 | Sept. 16 | 90 | 816 | 24 | 960 | Roots fairly large, smooth, quite uniform in size. |
| Good Luck | May 23 | Sept. 16 | 95 | 470 | 14 | 200 | Roots of a medium size, slightly rooty. |
| Perfection Green Top | May 23 | Aug. 28 | 100 | 804 | 24 | 240 | Roots very large and very smooth. |
| Pomperanian | May 23 | Aug. 26 | 100 | 770 | 23 | 200 | Roots fair size smooth. |
| Hardy Green (round) | May 25 | Aug. 24 | 90 | 620 | 18 | 1,200 | Roots medium size, fairly uniform and smooth. |
| Red Paragon | May 25 | Aug. 19 | 100 | 750 | 23 | 1,000 | Roots large, very smooth, uniform in size. |
| Early Six Weeks | May 25 | Sept. 2 | 100 | 714 | 21 | 840 | Roots large, fine, smooth. |
| Red Top Strap Leaf | May 25 | Sept. 5 | 100 | 750 | 22 | 100 | Roots fine, large, very smooth, uniform in size. |

TEST OF GRASSES AND LEGUMINOUS MIXTURES FOR HAY

The season of 1922, with its ample precipitation and other favourable conditions, was very favourable to the growing of hay crops. In the reports of the yields, it will be noted that in the winter killing of the leguminous plants, the Red clover suffered to a greater extent than any of the others. From some of the plots, the Red clover was almost entirely killed out, although a percentage of alfalfa was noticed in all the mixtures. It was also observed that better results were obtained where the alfalfa was sown alone. It will be remarked that under the heading "Spring Comment" the word "good" was used for any of the varieties that seemed to be the strongest and the most numerous on the plots and which condition still held good when the crop was cut, and this word was also used in the mixtures that gave the highest yield for the variety so designated.

Experiments Nos. 1, 2, and 3 were in plots of one-sixtieth of an acre each. The crops from these experiments were cut on July 24, and were cured and stacked in fine condition. The mixtures showing the largest percentage of timothy were stacked and fed to the horses on the Station during November and December and were greatly relished. The other mixtures, showing a smaller percentage of timothy, were fed to the other stock, and were readily eaten, with little or no waste. With the unfavourable weather conditions of the late summer and early autumn, no second cutting was given any of the plots, so that this second growth, with the early autumn snow, should afford good protection for the winter.

Timothy, brome and western rye grasses were fully 3 feet high when cut and on some of the plots became lodged by the rank growth. This was especially so with the brome grass.

The following were the results obtained from the different varieties of grasses, clovers and alfalfa:—

TEST OF VARIETIES, SEASON 1922, HAY MIXTURES

*Experiment No. 1*—Banner Oats as Nurse Crop, 1921, Alfalfa as Basic Leguminous Plant

| Plot Number | Varieties | Spring Comment | Yield per acre |
|---|---|---|---|
| No. 1 | Alfalfa | Good | 6,144 lbs., or 3 ton, 144 lbs. |
| No. 2 | Alfalfa | Very thin. | |
| | Timothy | Fair | 5,140 lbs., or 2 ton, 1,140 lbs. |
| No. 3 | Alfalfa | Poor, very thin. | |
| | Western rye | Very good | 6,464 lbs., or 3 ton, 464 lbs. |
| No. 4 | Alfalfa | Fair. | |
| | Meadow fescue | Good | 2,944 lbs., or 1 ton, 944 lbs. |
| No. 5 | Alfalfa | Fair. | |
| | Timothy | Poor. | |
| | Western rye | Good. | |
| | Meadow fescue | Fair | 4,048 lbs., or 2 ton, 48 lbs. |
| No. 6 | Alfalfa | Fair. | |
| | Timothy | Very good. | |
| | Western rye | Fair. | |
| | Meadow fescue | Poor. | |
| | Kentucky blue | Very thin. | |
| | Red Top | Thin | 4,352 lbs., or 2 ton, 352 lbs. |

*Experiment No. 2*—Banner Oats as Nurse Crop, 1921, Red Clover as Basic Leguminous Plant

| Plot number | Varieties | Spring Comment | Yield per acre |
|---|---|---|---|
| No. 1 | Red clover | Very poor | 3,264 lbs., or 1 ton, 1,264 lbs. |
| No. 2 | Red clover | Poor. | |
| | Timothy | Very good | 5,248 lbs., or 2 ton, 1,248 lbs. |
| No. 3 | Red clover | Poor. | |
| | Western rye | Very good | 5,888 lbs., or 2 ton, 1,888 lbs. |
| No. 4 | Red clover | Poor. | |
| | Meadow fescue | Good | 4,736 lbs., or 2 ton, 736 lbs. |
| No. 5 | Red clover | Poor. | |
| | Timothy | Good. | |
| | Western rye | Very good. | |
| | Meadow fescue | Fair | 5,760 lbs., or 2 ton, 1,760 lbs. |
| No. 6 | Red clover | Very poor. | |
| | Timothy | Good. | |
| | Western rye | Good. | |
| | Meadow fescue | Fair. | |
| | Kentucky blue | Fair. | |
| | Red top | Fair | 6,720 lbs., or 3 ton, 720 lbs. |

*Experiment No. 3*—Success Barley as Nurse Crop, 1921, Red Clover and Alsike Clover as Basic Luguminous Plants

| Plot Number | Varieties | Spring Comment | Yield per acre |
|---|---|---|---|
| No. 1 | Red clover | Medium. | |
| | Alsike | Fair | 4,480 lbs., or 2 ton, 480 lbs. |
| No. 2 | Red clover | Medium. | |
| | Alsike | Fair.. | |
| | Timothy | Very good | 8,704 lbs., or 4 ton, 704 lbs. |
| No. 3 | Red clover | Medium. | |
| | Alsike | Fair. | |
| | Western rye | Very good | 6,400 lbs., or 3 ton, 400 lbs. |
| No. 4 | Red clover | Fair. | |
| | Alsike | Fairly good. | |
| | Meadow fescue | Very good | 8,320 lbs., or 4 ton, 320 lbs. |
| No. 5 | Red clover | Medium. | |
| | Alsike | Fair. | |
| | Timothy | Fair. | |
| | Western rye | Fair. | |
| | Meadow fescue | Very good | 6,720 lbs., or 3 ton, 720 lbs. |
| No. 6 | Red clover | Poor. | |
| | Alsike | Medium. | |
| | Timothy | Fair. | |
| | Western rye | Good. | |
| | Meadow fescue | Fair. | |
| | Kentucky blue | Fair. | |
| | Red top | Fair | 3,592 lbs., or 3 ton, 592 lbs. |

*Experiment No. 4*—Alfalfa, Size of Plots One-sixtieth of an Acre

| Plot number | Method of seeding and distances apart | Rate of seeding | Yield per acre | Length of plant |
|---|---|---|---|---|
| | | lbs. | | inches |
| No. 1 | Broadcast | 20 | 6,090 lbs., or 3 ton, 90 lbs. | 22 |
| No. 2 | Broadcast | 15 | 6,600 lbs., or 3 ton, 600 lbs. | 22 |
| No. 3 | Broadcast | 10 | 6,000 lbs., or 3 ton | 20 |
| No. 4 | Broadcast | 5 | 5,700 lbs., or 2 ton, 1,700 lbs. | 20 |
| No. 5 | In drills 6" apart | 20 | 7,500 lbs., or 3 ton, 1,500 lbs. | 22 |
| No. 6 | In drills 6" apart | 15 | 7,800 lbs., or 3 ton, 1,800 lbs. | 24 |
| No. 7 | In drills 6" apart | 10 | 7,680 lbs., or 3 ton, 1,680 lbs. | 24 |
| No. 8 | In drills 6" apart | 5 | 7,200 lbs. or 3 ton, 1,200 lbs. | 24 |
| No. 9 | In drills 24" apart | 5 | 6,960, or 3 ton, 900 lbs. | 26 |
| No. 10 | In drills 24" apart | 2·5 | 6,900 lbs., or 3 ton, 900 lbs. | 26 |
| No. 11 | In drills 30" apart | 4 | 7,320 lbs., or 3 ton, 1,320 lbs. | 28 |
| No. 12 | In drills 30" apart | 2 | 6,360 lbs., or 3 ton, 360 lbs. | 27 |
| No. 13 | In drills 36" apart | 3·3 | 6,000 lbs., or 3 ton | 25 |
| No. 14 | In drills 36" apart | 1·67 | 5,760 lbs., or 2 ton, 1,760 lbs. | 25 |

*Experiment No. 5*—Alfalfa and Clover sown in Spring, 1921, Plots of One-thirtieth of an acre, without a Nurse Crop. All cut on July 24

| Plot number | Variety | Spring Comment | Yield per acre |
|---|---|---|---|
| No. 1 | Alfalfa | Very good | 6,600 lbs., or 3 ton, 600 lbs. |
| No. 2 | Alsike clover | Quite good | 4,500 lbs., or 2 ton, 500 lbs. |
| No. 3 | Red clover | Very good | 7,380 lbs., or 3 ton, 1,380 lbs. |
| No. 4 | Sweet clover | Very good | 7,560 lbs., or 3 ton, 1,560 lbs. |
| No. 5 | White Dutch clover | Very medium | 2,550 lbs., or 1 ton, 550 lbs. |
| No. 6 | Western rye | Good | 6,300 lbs., or 3 ton, 300 lbs. |
| No. 7 | Timothy | Very good | 7,200 lbs., or 3 ton, 1,200 lbs. |
| No. 8 | Meadow fescue | Good | 5,850 lbs., or 2 ton, 1,850 lbs. |
| No. 9 | Broome grass | Very good | 8,400 lbs., or 4 ton, 400 lbs. |
| No. 10 | Kentucky blue | Fairly good | 3,420 lbs., or 1 ton, 1,420 lbs. |
| No. 11 | Red top | Medium | 2,460 lbs., or 1 ton, 460 lbs. |

*Experiment No. 6*—Clover and Grasses sown in Spring of 1921 Without Nurse Crop

| Size of Plot | Variety | Spring Comment | Yield per acre |
|---|---|---|---|
| One-thirtieth acre | Altaswede red clover | Poor | 3,900 lbs., or 1 ton, 1,900 lbs. |
| One-thirtieth acre | Arctic sweet clover | Good | 12,000 lbs., or 6 ton. |
| One-quarter acre | Sweet clover | Very good | 6,800 lbs., or 3 ton, 800 lbs. |

The Arctic variety of sweet clover stood five feet high and the plants were very large when cut on July 24. The weight of the plot was taken after the crop had been in bunches for four days, but was then quite green.

One-tenth of an acre of the following grass mixture was sown in the spring of 1921, on land that had been summer-fallowed during the year 1920. After ploughing, a liberal application of barnyard manure was applied, this being worked well into the soil by the spring-toothed harrows during the late summer and autumn of 1920. Owing to the unusual amount of moisture, the plot made remarkable growth and a heavy yield was obtained.

| Variety | Spring Comment | Yield per acre |
|---|---|---|
| Alfalfa | Fair. | |
| Alsike | Medium. | |
| White clover | Good. | |
| Timothy | Very good | 9,250 lbs., or 4 ton, 1,250 lbs. |

HUBAM ANNUAL CLOVER (HENRY FIELDS SEED)

*Plot No. 1*

Sown—May 18.
Size of plot—one thirtieth of an acre.
Harvested—October 4.
Yield from the plot—12,652 pounds, or 6 ton, 652 pounds.

The seed was sown in drills 14 inches apart. Growth was good, the plants reaching a height of 72 inches. Cutting was not done until October 4, as the bees were still working on the clover. Several severe frosts were experienced before cutting took place, somewhat lowering the feed value, but it was eaten quite readily when fed to the stock during the winter.

*Plot No. 11*

Sown—May 23.

Size of plot—one thirtieth of an acre.

This plot was sown in drills 12 inches apart and was cut green at intervals from July 25, and fed to the hogs. The land used for this experiment was sod land, and growth was not so rank as clover sown on land in a better stage of cultivation. However, this feed was greatly relished by the stock.

#### DWARF ESSEX RAPE

This was sown broadcast on May 16 in a plot of one-eighth of an acre. This plot was used as hog pasture, and was supplemented later in the summer with clover, and during the autumn with roots, which gave very good results.

## HORTICULTURE

The season of 1922 opened with rather a backward spring. No seed was sown in the vegetable garden until May 4, but, from that date, conditions were very favourable. The absence of late spring, and early summer frosts was very noticeable. With the abundance of precipitation, all seed sown germinated very quickly, and growth was rapid. All vegetables did well and the yields obtained at harvest time were very fair.

The freedom from late spring frosts made conditions very favourable to the setting of small fruit blossoms and also for the flower garden.

A large percentage of currant bushes showed some winter killing-back of the tops, which caused the yields to be considerably below the average, but the fruit picked was of a very fine quality and good size.

#### GARDEN PEAS

Fourteen varieties of garden peas were planted this season on May 9, two drills of 33 feet long of each variety. The seeds were sown 8 inches apart in these drills and a space of 4 feet between each variety was allowed so that no mixing could take place.

Results are given in the following table:—

| Variety | Seed | Fit for use | Ripe | Length of Vine | Length of Pod | Average Number of Peas in pod | Ripe and harvested | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | in. | in. | | lbs. | |
| Sutton's Excelsior | Harris | July 22 | Aug. 14 | 24 | 2½ | 6 large size | 4 | |
| Laxtonian | Graham | July 20 | Aug. 7 | 18 | 3 | 8 small size | 2 | |
| English Wonder | C.E.F. | July 22 | Aug. 16 | 30 | 2½ | 8 fair size | 3 | Fine quality and flavour. |
| American Wonder | Carters | July 19 | Aug. 14 | 28 | 3 | 8 medium size. | 2 | |
| Dandy Stratagen | Carters | July 23 | Aug. 16 | 48 | 4 | 8 large | 2 | Peas large, of a fine flavour and quality. |
| Early Morn | Gregory | July 18 | Aug. 14 | 38 | 3 | 6 very large | 4 | This variety very early, peas of an ecxellent quality. |
| Gradus | Carters | July 20 | Aug. 9 | 60 | 4 | 8 very large | 3 | A very fine pea. |
| Thos, Laxton | McDonald | July 21 | Aug. 10 | 36 | 2½ | 6 medium size. | 4½ | Peas of good quality. |
| McLean Advancer | C.E.F. | June 28 | Aug. 4 | 32 | 3 | 7 large | 5 | This variety was the first to come into use. Peas large and of a very fine quality. |
| McLean Advancer | Bruce | July 2 | Aug. 16 | 42 | 2½ | 6 medium size. | 3 | Comparatively early, peas of a very good quality. |
| Eight Weeks | Carters | July 16 | Aug. 5 | 16 | 3 | 8 medium size. | 3 | Of a fine quality. |
| Pioneer | Gregory | July 25 | Aug. 14 | 30 | 3 | 6 very large | 6 | Of an excellent quality. |
| Little Marvel | Graham | July 24 | Aug. 12 | 32 | 2½ | 4 very large | 2 | Very fine table pea. |
| Gregory Surprise | Harris | July 30 | Aug. 26 | 35 | 3 | 6 very large | 4 | A very good pea. |

A large plot of mixed garden varieties was sown on May 22 for autumn use. Growth was good, and they were ready for use on August 20, and continued to be used until the first September frosts. A fair amount of these peas were canned for winter.

### LETTUCE

Several varieties of lettuce were tested this year, Owing to the very late spring seeding was later than usual.

The following results were obtained:—

VARIETY TESTS WITH LETTUCE

| Variety | Seed | Sown | Fit for use | Quality |
|---|---|---|---|---|
| Grand Rapids | C. E. F. | May 4 | June 14 | Very good. |
| Crisp as Ice | Willis | " 5 | " 10 | Fair quality, large heads. |
| Suttons Early Paris Market | C. E. F. | " 4 | " 18 | Good quality heads. |
| Curled Simpson | Ewing | " 6 | " 24 | Medium quality. |
| Cos | Steele-Briggs | " 4 | " 16 | Fine, large heads, crisp. |
| **LATER SEEDING** | | | | |
| All Heart | Dreer's | May 23 | June 30 | Excellent quality, compact and crisp. |
| Grand Rapid | McDonald | " 20 | July 2 | Very good quality. |
| Iceberg | McDonald | " 16 | June 25 | Fair quality. |
| White Silver Cos | McDonald | " 18 | July 3 | Very fine and crisp. |
| May King | McDonald | " 18 | June 28 | Fair size, very crisp and tender. |

### SPINACH

Two varieties of spinach were under test this year. The New Zealand variety (McDonald seed) failed to germinate. Two drills 33 feet long of the Victoria variety were sown on May 16, germination being timely and growth rapid. This variety was fit for use June 20, and remained in use until late in August, and was of good quality.

### PARSLEY

Two varieties of parsley were sown on May 18. The season being favourable, growth was good. The following were the varieties grown and results obtained:—

Triple Curled. (Ewing & Co. seed).—Fit for use July 30.

Fourteen pounds picked for winter use.

Champion Moss Curled. (McDonald Seed).—Fit for use August 4.

Sixteen pounds picked in the autumn and distributed.

### LARGE RIBBED WHITE SWISS CHARD

This seed was sown on May 16 in two drills 33 feet long and 24 inches apart. The plants were of large size, good quality, very tender, and fit for use on July 19.

### SALSIFY

Two varieties of salsify were tested this year, two drills of each 33 feet long being sown. Germination was good and the plots thinned out on June 12 to about 4 inches apart in the drills. This enabled the roots to become large and when harvested on September 4 they were a fair size and free from rootlets.

The following were the varieties tested and the results obtained:—
Mammoth Sandwich Island, McDonald seed.—Date sown, May 16.
Fit for use August 7.
Fifty-three pounds of fine roots harvested.
Long White. (0.252, C.E.F. seed).—Date sown May 16.
Fit for use August 10.

### PARSNIPS

Two strains of the Hollow Crown variety and one strain of the variety Improved Guernsey (McDonald seed) were tested this season in plots one-twentieth of an acre each. Plots were sown on May 13 and 17th, the drills being 33 feet long and 24 inches apart. Thinning was done on July 10. The plants were harvested on September 16 and 18 with the following results:—

VARIETY TESTS WITH PARSNIPS

| Variety | Seed | Sown | Fit for use | Harvested | Yield from plot | Yield per acre | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | | lbs. | tons lbs. | |
| Hollow Crown — (E.R.O. 140 | C.E.F | May 13 | Aug. 15 | Sept. 18 | 276 | 16 1,120 | Roots fine and large, very smooth, of a very good quality |
| Hollow Crown— (O-104-105) | C.E.F | May 13 | Aug. 18 | Sept. 16 | 255 | 15 600 | Roots fine and large, quite smooth, of a good quality. |
| Improved Guernsey | McDonald | May 17 | Aug. 20 | Sept. 18 | 232 | 13 1,840 | Roots of a fine quality, very smooth, fair size. |

### TURNIPS

Four varieties of table turnips were tested this season, three drills 33 feet long, 24 inches apart of each variety being sown. Thinning out was done as the vegetables came into use. The following were the varieties tested, dates sown, dates ready for use and yield per acre when harvested on August 30:—

VARIETY TESTS WITH TABLE TURNIPS

| Variety | Seed | Fit for use | Yield per acre | Size |
|---|---|---|---|---|
| | | | tons lbs. | |
| Red Top Strap Leaf | McDonald | June 18 | 11 200 | Small. |
| Extra Early Purple Top Milan | McDonald | June 22 | 11 680 | Medium. |
| Golden Ball | McDonald | June 29 | 11 1,040 | Fair. |
| Early Snowball | McDonald | July 2 | 12 .. | Large. |

### PEPPERS

The following varieties of peppers were set out in the open ground on June 12 in drills 25 feet long and 3 feet apart, the space between each plant being 12 inches. One drill of each variety was sown. The plants being very small and growth slow throughtout the season, none came into bloom until July 24, this being the Harris' Earliest; the other varieties were much later. None became ripe but a fair amount of green peppers was picked, the Harris' Earliest giving the largest yield and being the nearest to maturity.

PEPPERS—TEST OF VARIETIES

*Neapolitan Summerland Peppers (No. 944 from 1921)*

Planted in the open—June 12.
Harvested—September 1.

*Harris' Earliest Peppers (Harris 878 seed)*

Planted in the open—June 12.
Harvested—September 1.

*Chili Peppers (McDonald Seed)*

Planted in the open—June 12.
Harvested—September 1.

CELERY

Six varieties of celery were tested this year. Transplanting took place on June 12. The celery was planted in trenches 15 feet long, 4½ feet apart and 1½ feet deep. Three inches of well-rotted manure was placed in the bottom of the trench and covered with three inches of soil, into which the plants were set. When placed in the ground the plants were quite small. Growth was slow for some considerable time but became more rapid during the early autumn. Some water was given the plants during the very dry periods of the season. The soil was hoed in and around the plants as they grew, to blanch the stalks.

None of the varieties was sufficiently large to use until the end of August. Early in September they were of a fair size, very crisp, tender, and well-blanched, and in each case the quality was good.

CELERY—TEST OF VARIETIES

*Golden Self-Blanching Celery (0-220-230 C.E.F. seed)*

Fit for use—August 29, small.
Total weight from 15-foot rows—12 pounds.
Quality very good.

*White Plume Celery (Graham seed)*

Fit for use—September 6, fair size then.
Total weight from 15-foot row—14 pounds.
Very fine, fully blanched, of a good quality.

*Golden Yellow Celery (Graham seed)*

Fit for use—September 2, medium size.
Total weight from 15-foot row—10 pounds.
Very good quality.

*French Success Celery (Harris seed)*

Fit for use—September 18, fair size.
Total weight from the 15-foot row—15 pounds.
Fairly large, fine quality.

*Sanfords Superb Celery (Graham seed)*

Fit for use—September 20, fair size.
Total weight from the 15-foot row—17 pounds.
Fairly large, quality very good.

*Evens Triumph Celery (McDonald seed)*

Fit for use—September 30.
Total weight from the 15-foot row—16 pounds.
Quite large when dug, and of a very fine quality.

## GARDEN BEETS

Eight varieties and strains of garden beets were tested this year. With fair weather conditions and ample moisture, this root crop made a remarkable growth. The beets when harvested were exceedingly large, yields were heavy and of very good quality.

The following table gives dates of seeding and harvesting, with the yields obtained:—

VARIETY TESTS WITH BEETS

| Variety | Seed | Sown | Fit for use | Harvested | Yield per acre | Yield from plot | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | | tons lbs. | | |
| Black Redball | C. E. F. | May 13 | July 25 | Sept. 13 | 18 1,200 | 310 | Roots large, very smooth. |
| Detroit Dark Red | " .... | " 13 | " 20 | " 8 | 17 1,760 | 298 | Roots very large, uniform in size. |
| Detroit Red | McDonald.. | " 17 | Aug. 1 | " 8 | 16 1,680 | 289 | Roots fair size, very good quality. |
| Crimson Globe | " .. | " 17 | July 30 | " 10 | 18 600 | 305 | Fine and large, very good quality. |
| Crosby's Egyptian | Harris..... | " 17 | " 18 | " 13 | 17 1,370 | 279 | Medium size, very smooth, an excellent variety. |
| Early Model | Ferguson.... | " 18 | " 15 | " 13 | 16 880 | 274 | Uniform in size, very smooth and of a very good quality. |
| Early Wonder | McDonald.. | " 18 | " 28 | " 17 | 17 800 | 290 | Roots of fair size, uniform, smooth, of a very good quality. |
| Eclipse | " .. | " 18 | Aug. 2 | " 17 | 16 400 | 170 | Roots very large, fairly smooth, of a fins quality as a table vegetable. |

## GARDEN BEANS

Thirteen varieties of garden beans were planted this season. A fair amount of green beans was harvested, but none of the varieties was sufficiently matured to be used as seed before being cut down by the September frosts. The following were the varieties under test, with dates fit for table use:—

VARIETY TESTS WITH GARDEN BEANS

| Variety | Seed | Fit for use | Remarks |
|---|---|---|---|
| Extra Early Red Valentine | Rennie. .... | July 22 | A good crop. |
| Plentiful French | C.E.F..... | Aug. 18 | A fair crop of green pods still in bloom, Sept. 4 when cut down by frost. |
| Refugee | Carter..... | " 1 | A plentiful supply of fine green beans. |
| Pilot | Willis..... | " 3 | The pods fine and large, very tender. |
| Hidatsa | Willis..... | " 25 | Fine large green pods. |
| Davis White Wax | McDonald.. | July 31 | A large amount of pods fine crisp. |
| Wardwell Kidney Wax | McDonald.. | " 30 | Pods fine and large. |
| Round Pod Kidney Wax | McDonald.. | Aug. 2 | Pods fine and tender large amount picked. |
| Stringless Green Pod | McDonald.. | July 31 | Pods long and crisp. |
| Hodson Long Pod | Rennie..... | Aug. 29 | A late variety of fair quality. |
| Bountiful Bush | Gregory.... | " 4 | A very fine table variety pods fine and tender. |
| Kentucky Wonder Wax | Rennie..... | July 31 | A very good yielder. |
| Pencil Pod Black Wax | McDonald.. | " 28 | A large amount picked for table use. |

*Broad Windsor Beans.*—Seventeen varieties of Broad Windsor beans were tested this season. One drill of each variety was planted. The drills were 33 feet long and 3 feet apart. The first beans came into use on July 19. A large amount was picked from that date until the September frosts. None of the varieties became fully matured.

The following were the varieties under test with dates when fit for table use:—

VARIETY TESTS WITH BROAD WINDSOR BEANS

| Variety | Planted | Fit for use |
|---|---|---|
| Early Mazagn | May 13.... | July 30 |
| Beck's Green Gem | May 13.... | Aug. 1 |
| Dwarf Fan | " 13.... | Aug. 3 |
| Long Pod Green | " 13.... | July 29 |
| Taylor's Windsor | " 13.... | " 24 |
| Long Pod Early | " 13.... | " 28 |
| Windsor Hartington | " 13.... | " 26 |
| Green Windsor | " 13.... | " 25 |
| Long Pod Johnson's Wonder | " 13.... | " 27 |
| Windsor Common | " 13.... | " 22 |
| Long Pod Bunyard's Exhibition | " 13.... | Aug. 6 |
| Long Pod Aqundatee | " 13.... | " 15 |
| Long Pod Conqueror | " 13.... | July 26 |
| Long Pod Seville | " 13.... | Aug. 20 |
| Long Pod Masterpiece | " 13.... | " 19 |
| Windsor Giant 4 Seeded | " 13.... | " 2 |
| McDonald Seed | " 13.... | July 30 |

## GARDEN CORN

Several varieties of garden corn were tested this season. The results, with dates when sown, dates harvested, length of stock, and yields per acre are given in the following table:—

| Variety | Seed | Sown | In tassel | In silk | Harvested | Length of Stalk | Yield from Plot | Yield per Acre | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Inches | lbs. | tons lbs. | |
| Sweet Squaw | C.E.F. | May 16 | July 30 | Aug. 14 | Sept. 7 | 44 | 313 | 9 780 | Did not become fit for use before cutting, as it was just in very early milk; cobs large; stalks fairly large. |
| Early Malcolm | C.E.F. | May 16 | Aug. 1 | Aug. 23 | Sept. 1 | 48 | 315 | 9 900 | Just coming into use when cut; early milk; stalks of a fair size. |
| Howling Mob | Burpee | May 17 | Aug. 12 | Aug. 31 | Sept. 1 | 68 | 140 | 4 400 | This variety did not become fit for table use. The germination of the seed was very poor, only about 50 p.c.; plants thin on the plot. |
| Early May Flower | Macdonald | May 17 | Aug. 5 | Aug. 26 | Sept. 7 | 62 | 250 | 7 1,000 | Cobs just formed; very early milk when cut; the stalks of a fair size. |
| Evergreen Bantam | Macdonald | May 17 | Aug. 22 | Just appearing when cut. | Sept. 6 | 72 | 205 | 6 300 | Cobs very small, not fit for use; much of the seed failed to germinate; many blank spots on the plot, cutting down the yield of fodder. |
| Extra Early Cory | C.E.F. | May 16 | Aug. 7 | Aug. 22 | Sept. 1 | 66 | 356 | 9 1,360 | The stalks of a medium size; cobs just nicely formed but not far enough advanced for table use. |
| Kloochman | C.E.F. | May 16 | July 31 | Aug. 18 | Sept. 7 | 48 | 235 | 7 100 | The stalks small; many small cobs unfit for table use; remained on the stalks when harvested, making fine fodder. |
| Early Fordhook | Burpee | May 16 | July 31 | Aug. 18 | Sept. 1 | 60 | 325 | 9 500 | The stalks quite large; no cobs on this variety became sufficiently advanced to be of use previous to being cut. |
| Golden Bantam | McDonald | May 16 | Aug. 6 | Aug. 15 | Sept. 7 | 50 | 248 | 7 880 | Fit for table use. The stalks of a medium size. |
| Pocahontas | McDonald | May 17 | Aug. 6 | Just appearing and no cobs when cut. | Sept. 1 | 60 | 175 | 5 500 | The germination of the seed of this variety very poor, plants quite thin. |
| Early Dakota | Willis | May 16 | Aug. 1 | Aug. 29 | Sept. 8 | 56 | 185 | 5 800 | Some small cobs in very early milk when cut; germination of the seed only fair, some thin spots on the plot. |
| Nuetta | Willis | May 17 | July 30 | Aug. 21 | Sept. 9 | 44 | 380 | 11 800 | Germination of the seed very good; plants fine and strong; cobs well formed, of a medium size, in early dough. |
| Assiniboine | Willis | May 17 | July 25 | July 30 | Sept. 1 | 36 | 302 | 9 120 | While the stalks were not so long as some of the other varieties, they were quite large and green; a fair amount of fodder. |
| Early June | Willis | May 17 | Aug. 2 | Aug. 25 | Sept. 7 | 38 | 248 | 7 880 | The stalks of a fair size, just coming into use when cut; cobs small, in late milk. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pickaninny | C.E.F. | May 16 | July 20 | July 22 | Sept. 8 | 41 | 252 | 7 1,120 | Fit for use. Was slightly glazed when cut Sept 8. On account severe frost early part September did not become sufficiently matured for seed, the frosts being so severe that the remaining corn on the stalks were rendered unfit for further use, so were fed to the stock while on the stalks; the germination of the seed was good, the stalks quite large and leafy. |
| Howe's Alberta Flint | University of Alberta. | May 16 | July 19 | July 21 | Sept. 8 | 40 | 254 | 7 1,240 | The germination of the seed was very good, stalks fairly large; very well advanced on Aug. 18, firm dough, and a large percentage well glazed, but not fully matured when cut. Fit for table use Aug. 8. |

### RADISH

Eight varieties of radish were sown this season, the first three varieties on May 6, for early use, the five later varieties on May 23.

The results are given in the following table:—

VARIETY TESTS WITH RADISH

| Variety | Seed | Fit for use | Remarks |
|---|---|---|---|
| White Icicle | McDonald | June 12 | Fair quality. |
| Rapid Forcing | C.E.F. | " 10 | Very fine. |
| French Breakfast | McDonald | " 20 | Very good. |
| Scarlet China Winter | D. M. Ferry | " 16 | Very fine, in use until late autumn. |
| Long Black Spanish | D. M. Ferry | " 22 | Fair quality, in use until late autumn. |
| Early French Breakfast | MacKenzie | " 14 | Good. |
| White Icicle | McDonald | " 18 | Very good. |
| Early Scarlet Ball | McDonald | " 24 | Very fair. |

### CONOVER'S, COLOSSAL ASPARAGUS

A fair amount of cuttings was made from the old bed of asparagus this season. Coming into use on June 10, the plot remained in use until the end of June.

### RHUBARB, VICTORIA

A large amount of cuttings was made from the plots of rhubarb this season, the plants reaching a very large size.

A considerable number of stalks were distributed to settlers, who, as yet, have none of their own, and many roots were given away.

### PEPPERGRASS

One drill 33 feet long of this salad plant was sown on May 4, and became sufficiently large to be used on June 10.

### TABLE CARROTS

Six varieties of table carrots were sown in uniform plots of one-sixtieth of an acre each. Germination of seed being timely and growth rapid, large yields were obtained.

The following were the varieties under test and the yields:—

VARIETY TESTS WITH CARROTS

| Variety | Seed | Sown | Fit for use | Harvested | Yield from plot | Yield per acre | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | | lbs. | tons lbs. | |
| Chantenay | C. E. F. | May 13 | July 11 | Sept. 11 | 641 | 19 460 | Roots large, fairly smooth. |
| Hutchinson | Gregory | " 18 | " 20 | " 11 | 530 | 15 1,800 | Roots large, very smooth, a very fine table variety. |
| Select Chantenay | McDonald | " 13 | " 15 | " 11 | 683 | 20 980 | An inferior table variety, the roots extraordinarily large with an unusual growth, a large percentage of the roots were cracked and very rough |
| Half Long Scarlet Nantes. | Ferguson | " 20 | " 22 | " 20 | 610 | 17 600 | A fair table variety, roots fine and large, very smooth, uniform in size. |
| Ox Heart | Steele-Briggs. | " 17 | " 26 | " 27 | 695 | 20 1,700 | A very good table variety, roots very large, very smooth, good quality. |
| Improved Danvers | Ferguson | " 18 | " 25 | " 27 | 571 | 17 260 | Roots fair size, fairly smooth. |

### CABBAGE

Several varieties of cabbage were under test this season. The seed was sown in hotbeds on April 25. Owing to cold weather conditions, during the latter part of April and early in May, germination was rather slow, and when transplanted on June 3 the plants were still small.

Some loss was sustained by cutworms until overcome by poisoned bran. The growth of the plants was somewhat slow throughout the season, and the results obtained from transplanted stock were much below average. As the late summer weather was more favourable, the later varieties made a better showing.

The following were the varieties under test, with dates of coming into use, and average weight of head when harvested on September 15:—

VARIETY TESTS WITH CABBAGE

| Variety | Seed | Fit for use | Average weight of head when harvested |
|---|---|---|---|
| | | | lbs. |
| *Early—* | | | |
| Early Paris market | Ferguson | July 30 | 5 |
| Jersey Wakefield | McDonald | Aug. 1 | 5¾ |
| *Medium—* | | | |
| Copenhagen Market | McDonald | Aug. 10 | 11 |
| Enkhinzan Glory | Ewing | " 15 | 12½ |
| *Autumn—* | | | |
| Marble Head Mammoth | Ewing | " 18 | 14 |
| Kildonan | Steele Briggs | " 14 | 15½ |
| Wong Bok | Burpee | July 15 | No heads |

### DWARF GREEN CURLED SCOTCH BORECOLE OR KALE (EWING SEED)

Fit for use July 20.

This variety was transplanted out on June 3, and became sufficiently large to use as greens on July 20, and was in use continually during the late summer, and early autumn. The plants became very large.

### PARIS MARKET BRUSSELS SPROUTS (EWING SEED)

Thirty plants were set out on June 3, the plants were of a medium size on this date, they made fair growth during the season, and a fair amount of very small sprouts were picked on September 18, after considerable frost.

### CAULIFLOWER

The cauliflowers were not transplanted until June 5, and at this date the plants were quite small. A large number of plants were destroyed by the cutworms. The remaining ones were only of medium size, and not fit for use until the end of August. When picked on September 15, none of the heads averaged over six pounds.

### TOMATOES

The following varieties of tomatoes were sown under glass on April 25, and transplanted in the open ground on May 5.

The plants being small, growth slow, and the dates of coming into bloom rather late in the season, only a limited amount of green fruit was picked on September 2.

The following were the varieties under test, with the mount of green fruit picked from 12 plants of each variety:

VARIETY TESTS WITH TOMATOES

| Variety | Seed | Green fruit harvested | Size |
|---|---|---|---|
| | | lbs. | |
| Alacrity | C. E. F. | 15 | Medium. |
| Alacrity X Earlibell | C. E. F. | 12 | Fair. |
| Alacrity X Hipper | C. E. F. | 16 | Large. |
| Earlibell | C. E. F. | 10 | Medium. |
| Bonny Best | C. E. F. | 11 | Fair. |
| Burbank Early | C. E. F. | 9 | Very large. |
| Chalk Jewel | C. E. F. | 10½ | Fine. |
| Crimson Canner | C. E. F. | 13 | Medium. |
| Red Head | Langdon | 10 | Fairly Large. |
| Wiboltts Danish Export | C. E. F. | 14 | Medium. |

In a further experiment, ten plants, one from each variety were set out. No special care was given them and a fair amount of green fruit was picked.

## ONIONS

Eleven varieties of onions were grown this season in drills 33 feet long and 24 inches apart. Owing to the moist condition of the land, the seeding was somewhat later than usual, but germination was timely. All plots were thinned out July 20. The balance of the season was quite favourable for the onion crop, and the yield was good with only a very small percentage of thick-necks. The crop was harvested in good condition before the severe autumn frosts set in and the bulbs being thoroughly dried before storing, kept excellently. The first three varieties were sown in one-sixtieth acre plots, the second three in one-twentieth acre plots.

The following table gives the varieties tested and yields:—

VARIETY TESTS WITH ONIONS

| Variety | Seed | Sown | Fit for use | Harvested | Yield per acre | Remarks |
|---|---|---|---|---|---|---|
| | | | | | bush. | |
| Large Red Wethersfield | McDonald | May 16 | June 10 | Sept. 1 | 238 | Fair size, fully matured. |
| Extra Early Flat Red | " | " 17 | " 17 | Aug. 30 | 212 | Large and fully matured, very good keepers. |
| Yellow Globe Danvers | Graham | " 18 | " 20 | Sept. 2 | 227 | Fair size, fully matured. |
| Large Red Wethersfield | C. E. F. | " 23 | " 1 | " 6 | 260 | Fair size and fine quality. |
| Southport Red Globe | Graham | " 23 | July 3 | " 6 | 295 | Quite large, very good quality, fair keeper. |
| Extra Early Flat Red | McDonald | " 23 | " 5 | " 6 | 254 | Fair size, excellent quality, good keeper. |
| Early Australian Brown | " | " 24 | " 16 | " 4 | 126 | Medium size of a fair quality. |
| | | | | | bush. lbs. | |
| Giant Prizetaker | Graham | " 24 | " 20 | " 4 | 137 20 | Of a fair size, good quality. |
| Southport Yellow Globe | Ewing | " 24 | " 25 | " 4 | 122 | Of a medium size, quality good. |
| Ailsa Craig | Graham | " 24 | " 26 | " 4 | 142 | Quite large, and of a fair quality. |

## ONION SETS

One drill 33 feet long of onion sets was planted on May 30, the sets being placed 3 inches apart in the drill. As the sets were delayed in transit and had grown considerably, they received a set-back when exposed to the bright sunshine, consequently some little time elapsed before they were fully rooted.

The following were the results obtained when harvested on September 6:—

*Yellow Globe Danvers Onion Sets (McDonald seed)*

Sown—May 13.
Harvested—September 6.
Yield from the one drill—26 pounds.
Bulbs of a fair size, quality fair.

*Large Red Wethersfield Onion Sets (Steel Briggs seed)*

Sown—May 13.
Harvested—September 6.
Yield from the one drill—28 pounds.
Bulbs of a medium size, quality good.

### POTATOES

Six varieties of potatoes were grown this season. The test was conducted on land that had a crop of cereals the previous season. After the cereal crop was harvested, it was given an application of twenty wagon loads of barnyard manure. The land was then ploughed and left in this condition until spring, when the usual preparation for seeding was given. The crop was cultivated by drag harrow and horse cultivator, with slight hilling up by hand during the early part of July. Owing to the late spring, the potato crop this season was somewhat below average and there was a greater percentage of unmarketable potatoes.

The following table gives the results obtained:—

POTATOES—TEST OF VARIETIES

| Variety | Fit for use | Yield per acre | | Marketable | | Unmarketable | | Shape | Size | Colour |
|---|---|---|---|---|---|---|---|---|---|---|
| | | bush. | lbs. | bush. | lbs. | bush. | lbs. | | | |
| Rochester Rose | July 18 | 317 | 20 | 267 | | 50 | | Oval | Large | Red |
| Early Rose | July 20 | 294 | 20 | 200 | | 94 | 20 | Oval | Small | Red |
| Carman No. 1 | July 22 | 319 | 28 | 259 | 28 | 60 | | Oblong | Large | White |
| Gold Coin | Aug. 2 | 278 | 40 | 200 | | 78 | 40 | Round | Medium | White |
| Irish Cobbler | Aug. 8 | 302 | 40 | 277 | 40 | 25 | | Round | Fairly large | White |
| King Edward | July 23 | 326 | 56 | 300 | 26 | 56 | | Round | Large | Russet |

### POTATOES IN FIELD LOTS

The two following varieties of potatoes were planted on May 16 and 17, in field lots of one-eighth of an acre each, the land being similar to the test plots and the same method of cultivation used. The plots were dug on September 13 and gave a fair yield with a smaller percentage of unmarketable potatoes.

The following yields were obtained:—

*Rochester Rose Potatoes*

Yield per acre—476 bushels 50 pounds.

*King Edward Potatoes*

Yield per acre—451 bushels 30 pounds.

Several varieties of the above were tested this season. As in previous years, the usual small frames were used, these being removed after all danger of late spring frosts had passed. The germination of all seed was timely. Plants came into bloom much earlier than usual. The growth being good throughout the season, the results obtained were very satisfactory, with the exception of musk and watermelons, these varieties having failed to mature.

The following were the varieties tested, number of hills of each variety, when harvested quality and results obtained:—

*Pumpkins, Squash and Vegetable Marrow*

Large Connecticut Field Pumpkins (McDonald Seed).—Number picked from the four hills, 22. Fine, large pumpkins, of a fair quality.

King of the Mammoths Pumpkins (McDonald seed).—Number picked from the four hills, 18 very large. Only partly matured, quality fair, this variety more suitable for stock.

Small Sugar Pumpkins (McDonald seed).—Number picked from the four hills, 24 medium size. Fully matured, of a very good quality.

Long White Bush Marrow Squash (McDonald seed).—Fit for use, August 25. Number picked from the four hills, 32, September 3. Very fine marrows, fully matured, very good quality.

English Vegetable Marrow (McDonald seed).—Fit for use, August 20. Number picked from the four hills, 29, very large. Very fine quality.

Hubbard Squash (McDonald seed).—Fit for use, August 24. Number picked from the two hills, 12. Average weight, very fine, good quality.

Golden Hubbard Squash (McDonald seed).—Fit for use, August 20. Number picked from the two hills, 14. Average weight 6½ pounds of a good quality.

Delicious Squash (McDonald seed).—Number picked from the two hills, 11 quite large. Not in use until picked on Sept. 3. Average weight 8 pounds, of a fair quality.

*Cucumbers*

The following varieties of cucumbers were under test this season.

Growth was good and all reached a good size; the first to come in use was the variety Giant Pera on August 22, Davis Perfect and Improved Long Green being ready on August 24.

Davis Perfect Cucumber (McDonald seed).—Number picked from four hills, 38 very large. Good quality.

Giant Pera Cucumber (McDonald seed).—Number picked from four hills. 41, large size. Good quality.

Improved Long Green Cucumber (McDonald seed).—Number picked from four hills, 39, very large. Very fine.

*Citron*

The following varieties of citron were under test this season.

The germination of the seed was timely and growth throughout the season was very good.

The results obtained when harvested on September 3 are as follows:—

Red Seeded Citron (0-826-C.E.F. seed).—Number picked from four hills. 38, very fine and large.

Red Seeded Citron (D. M. Ferry seed).—Number picked from four hills. 35, very large. Quality fine.

Red Seeded Citron (Rennie seed).—Number picked from four hills. 40 medium size. Quality good.

Green Seeded Citron (0-822-C.E.F. seed).—Number picked from four hills. 32, very large. Quality fine.

*Melons*

The two following varieties of melons were under test this year. Musk melon (Burpee seed), extra Early Hackensack, and Coles Early water melon (Burpee seed). The melons were quite small when harvested on September 3 and not sufficiently matured for use.

## BUSH FRUITS

### RASPBERRIES

The results obtained this season from two small plots of raspberries were very satisfactory. The canes wintered excellently and a large amount of fine fruit was obtained. Picking commenced on August 1 and continued until well into September.

The following were the varieties grown, yields obtained, estimated from one-thirtieth of an acre plots:—

| Variety | Amount of fruit picked |
|---|---|
| Herbert raspberries | 64 pints picked, the pint estimated as one pound, making a yield of 1,920 pounds per acre. |
| Heebner raspberries | 62 pints picked, making a yield of 1,840 pounds per acre. |

### STRAWBERRIES

A mixed bed of strawberries was very poor this season, the berries being very small and only a limited amount picked.

### CURRANTS

Currant bushes suffered considerably during the winter on account of severe frosts, the light snowfall affording no protection.

The following were the varieties grown and amount of fruit picked:—

| Variety | Amount of fruit picked |
|---|---|
| | pints |
| Eighteen red currant bushes | 34 |
| Sixteen black currant bushes | 20 |
| Six white currant bushes | 8 |

# ORNAMENTALS

## ANNUAL FLOWERS

Further variety tests with annual flowers were conducted, and excellent success was obtained this season. The more tender varieties were sown in hot beds from April 25, to the 29, and transplanted to the open ground the latter part of May, and the beginning of June. The hardier varieties were sown direct in the open borders from May 24 to 31.

The growth of the plants was rapid and strong. They came into bloom quickly and bloomed most profusely throughout the summer, many of the varieties being still in bloom, when cut down by the first autumn frosts on September 3.

The following were the varieties tested, with dates of first bloom:—

ANNUAL FLOWERS

| Name of Variety | Date in bloom | Remarks |
|---|---|---|
| *Asters*— | | |
| Victoria | July 28 | Very fine blooms. |
| Ostrich Plume | " 30 | Very good. |
| Daybreak | Aug. 20 | Good. |
| Giant Comet | " 12 | Very fine and large. |
| Giant Crego | " 20 | Very full blooms. |
| Eclipse | " 20 | Good. |
| King | " 12 | Very good, blooms large. |
| Crimson Perfection | " 15 | Fine. |
| Rose Mikado | " 20 | Very fine. |
| Late Branching Dark Violet | July 30 | Good. |
| Early Crimson Branching | Aug. 18 | Fine. |
| Imperial | " 21 | Very fine. |
| Blushing Beauty | " 14 | Very pretty. |
| King of the Belgians | " 19 | Very fine. |
| Giant White Ray | " 22 | Good, blooms large. |
| Primrose Queen | " 12 | Colour pink, very pretty. |
| Salmon Pink | " 12 | Fine, blooms large. |
| *Antirrhinum*— | | |
| Fire King | July 24 | Very fine showing. |
| Bright Crimson | Aug. 4 | Very good, blooms plentiful. |
| Superb | Aug. 12 | Very good showing. |
| Tom Thumb | " 8 | Very good. |
| Orange King | July 26 | Fair showing of blooms. |
| Amaranthus, Tricolour | " 20 | Very fine foliage. |
| Alonsoa | Aug. 8 | Very good. |
| Abronia | " 26 | Very pretty vine for rocks. |
| Adonis | July 22 | Very fine. |
| Alyssum | Aug. 12 | Very good. |
| Acroclinium | " 4 | Very fine, everlasting. |
| Balsam | July 25 | Potted and kept well in doors. |
| Bartonia | Aug. 7 | Plants quite large, few blooms. |
| Brachycome | " 10 | Very good. |
| Cosmos | June 28 | Very fine showing, our own. |
| Celosia | Aug. 4 | Very fine foliage. |
| Carnation | " 22 | Very fine showing of blooms. |
| Canary Bird Vine | July 29 | Fine growth, foliage, and bloom. |
| Clarkia | " 24 | Very good showing. |
| Chrysanthemum | " 28 | Very good. |
| Candytuft | " 26 | Very fine. |
| Dimorphotheca | " 30 | Good. |
| Eschscholtzia | " 30 | Good. |
| Gypsophila | " 18 | Very fine showing. |
| Godetia | Aug. 12 | Bloomed most profusely. |
| Globe Amaranth | " 15 | Very good. |
| Helichrysum | " 18 | Very good, everlasting. |
| Hibiscus | " 16 | Fair showing of bloom. |
| Impomoea | " 19 | Very pretty, potted and grew in office. |
| Jacobea | " 15 | Fair showing. |
| Kochia | " 15 | Quite large, foliage pretty. |
| Linaria | July 28 | Very good. |
| Lavatera | " 29 | Fine, a good showing. |
| Mignonette | July 28 | Good. |
| Malope | Aug. 2 | Good showing. |

ANNUAL FLOWERS—*Concluded*

| Name of Variety | Date in bloom | Remarks |
|---|---|---|
| *Antirrhinum*—Con. | | |
| Marigold, African | Aug. 2 | Fine. |
| Marigold, Single French | " 12 | Very fine. |
| Morning Glory | " 12 | Very fine showing. |
| Moonflower Bona Nox | " 18 | Very pretty. |
| Nemesia | " 3 | Very good. |
| Nicotiana | " 8 | Blooms well, plants medium size. |
| *Dwarf Nasturtiums*— | | |
| Salmon Pink | | |
| Bluish Rose | | |
| Empress of India, crimson scarlet | | |
| Cloth of Gold, pure yellow | | |
| Cyrstal Palace Gem, sulphur and maroon | | All nasturtiums were sown in the open ground, and on rock work, on May 25, they came into bloom from July 28, to August 12, when all were in full bloom, with the many different colours they made a very fine showing. |
| The King, deep scarlet | | |
| *Tall Nasturtiums*— | | |
| Fairy Queen | | |
| Ruby King | | |
| Scarlet | | |
| Salmon Queen | | |
| Primrose Pearl | | |
| *Petunia*— | | |
| Superb Delicate Shades | Aug. 1 | Very fine. |
| Superb Fringed | " 1 | Very fine showing. |
| *Portulaca*— | | |
| Mixed colours | July 24 | Very fine showing. |
| *Poppy*— | | |
| Shirley, mixed | " 31 | Very fine. |
| Double Snowdrift | " 29 | Very fine showing. |
| *Phlox Drummondii*— | | |
| Pure White | | These six varieties of phlox were sown under glass on April 26. When transplanted to the open, the plants were a fair size. Growth was good and they came into bloom on August 1 and made a very fine display with their many colours. |
| Carmine, White Eye | | |
| Deep Crimson | | |
| Mixed colours | | |
| Apricot | | |
| Deep Violet | | |
| *Stocks*— | | |
| Fresh coloured | | |
| Light blue | | |
| Terra Cotta | | |
| Brilliant Rose | | |
| Blood Red | | This collection of stocks was sown on April 29. On June 13 they were transplanted to the open. They commenced blooming on July 3 and continued to bloom until the September frosts. |
| Chamois Buff | | |
| Purple | | |
| Lilac | | |
| White | | |
| Violet | | |
| Carmine | | |
| Canary Yellow | | |
| Scabious | Aug. 12 | Good. |
| Scarlet Runner Beans | July 28 | Planted around office. Good growth, blooms fine. |
| Tagetes | " 28 | Fair showing. |
| Verbena Superb Bedding mixed | " 28 | Very fine. |
| White | " 30 | Good. |
| Wild Cucumber | ..... | A quick growing annual climber, this made a very fine showing, foliage dense, and remained green until the autumn frosts. |
| Zinnia, mixed colours | Aug. 1 | Very good showing. |
| Datura | " 8 | Very good. |
| Lobelia, blue | " 8 | Quite pretty. |
| Cobaea Scandens | July 24 | Very pretty. Transplanted to pots, and grew in the office. |
| Salvia | Aug. 3 | Fine. |
| Sweet Sultan | July 31 | Very fine showing. |
| Salpiglossis | Aug. 2 | Very good. |
| Stocks, Virginian | July 30 | Fine. |

## SWEET PEAS

Many varieties of sweet peas were sown this season, from May 29 to 31. In the growing of sweet peas at this Station, a group system is practised, by sowing the seed in small circles of about 20 inches. As soon as growth has commenced, stakes are put in, all slanting towards the centre of the bed and tied at the top.

The sweet peas, with their fragrance and delicate colouring, are very popular. The showing of blooms this season was remarkably good, being much admired by the various visitors to the Station. The following list comprises those varieties which were under test:—

SWEET PEAS TESTED, 1922

| Variety | Colour | Remarks |
|---|---|---|
| *Grandiflora Type—* | | |
| Bolton Pink Sweet Pea | Bright rosy pink | Blooms large, very fine. |
| Dorothy Eckford Pea | White self | Strong grower, fine blooms. |
| Lady Grisel Hamilton | Lavender | Very pretty, fine blooms. |
| Helen Pierce | Marbled blue | Beautiful colouring. |
| Miss Willmott | Salmon red | Very large blooms. |
| Queen Alexandra | Scarlet | Brilliant colouring. |
| Prince of Wales | Rich deep rose | An excellent variety. |
| Prima Donna | Blush pink | Very large blooms. |
| Mrs. Walter Wright | Rich rose mauve | Very vigorous grower. |
| Mrs. Collier | Primrose | Large blooms, fine form. |
| *Good Waved Type—* | | |
| Constance Hinton | Creamy white | Very distinct colouring. |
| Alfred Watkins | Pale lavender | Fine large blooms. |
| Countess Spencer | Pink | Very pretty. |
| Elsie Herbert | White and pink edges | Excellent colouring. |
| Doris Usher | Rich coral pink | Very good, large blooms. |
| Helen Lewis | Bright orange and rose | Brilliant colours. |
| Thomas Stevenson | Glowing orange and scarlet | Strong and free flowering. |
| Rosina | Bright rosy heliotrope | Very fine, good blooms. |
| Nora Unwin | White | Strong grower, fine blooms. |
| Lilian | Pale pink | Very free bloomer. |
| King Manoel | Maroon | Very strong, large blooms. |
| John Ingram | Rosy Carmine | Very good. |
| *Best Waved Type—* | | |
| Edith Taylor | Distinct rosy | Very fine, large bloom. |
| Florence Nightingale | Lavender | Stems long, flowers large. |
| Hercules | Rose pink | Very good. |
| Helen Stapylton | Pale pink and cream | Very full flowering. |
| Margaret Atlee | Salmon pink on cream ground | Very fine, large. |
| Princess Mary | Medium blue, slightly pink | Very pretty. |
| The President | Orange scarlet | Brilliant colours. |
| Rosabella | Rose | Very good. |
| Maud Holmes | Crimson | Good growth, blooms fine. |
| King White | Pure white | Very pretty. |
| Clara Curtis | Primrose | Excellent variety. |
| Royal Purple | Deep purple | Very good. |
| *Newer Waved Type—* | | |
| Brocade | Satin rose | Very good, flowers large. |
| Barbara | Salmon orange | Good. |
| Jean Ireland | Creamy buff and carmine rose edge | Large and fine form. |
| Hawlmark Pink | Bright rose pink | Very large and fine. |
| Mrs. G. W. Bishop | Rich salmon | Strong grower, large blooms. |
| Mrs. A. G. Gentle | White edged and flushed bright rose | Very good. |
| Mrs. Tom Jones | Medium blue | Fine, large flower. |
| Daisybud | Soft rose pink | Good. |
| Elegance | Soft silvery pink | Very fine. |
| Constance Hinton | Snowy white | Very pretty. |
| *A Collection of Sweet Peas from Burpee—* | | |
| Vermilion Brilliant | Pure scarlet | Very brilliant colours. |
| Mrs. Routzahn | Buff apricot | Very fine. |
| Wedgewood | Blue | Good. |
| Prince George | Dark rose blotch | Very pretty. |
| Early Daintiness Burpees | Pure white, rose margin | Very fine flowers. |
| Early Pink Beauty | Rose pink, white ground | Very good. |
| Phantom blue | Blue | Fine. |

SWEET PEAS TESTED, 1922—*Concluded*

| Variety | Colour | Remarks |
|---|---|---|
| *A Collection of Sweet Peas from Burpee*—Con. | | |
| Stirling Stent | Deep salmon | Very fine, large blooms. |
| Isobel Malcolm | Creamy tuffed | Good. |
| Mrs. Cuthbertson | Rose pink | Very fine colours. |
| Mrs. Townsend | Picotee edge white | Very pretty. |
| Loyalty | Violet, blue on white | Very fine blooms. |
| Queen Victoria | Deep primrose | Very good. |
| Elfrida Pearson | Pink | Very fine. |
| Dainty Spencer | Pink edged | Good. |
| Illuminator | Orange salmon | Very fine. |
| Fiery cross | Brilliant fiery scarlet | Very good. |
| Cherub | Creamy edged rose | Very pretty. |

## PERENNIALS

Perennials made a good showing this year, as weather conditions were very favourable and precipitation ample. Many of the varieties have multiplied greatly.

Below are the names of varieties, with dates when coming into bloom:—

PERENNIALS

| Variety | In bloom | Remarks |
|---|---|---|
| Aquilegia, Columbine | June 15 | Large collection, with many colours. |
| Achillea, the Pearl | June 20 | A goodly number. |
| Arabis, Rock Cress | June 18 | Good. |
| Cerastium, Snow in summer | June 24 | Fine rockwork plant. |
| Dahlia, 1921 roots, set out May 15th | Aug. 2 | Blooms very large, made a fine display. |
| Dahlia, sown under glass April 29th, set out June 13 | Aug. 12 | Blooms very fine, medium size when set out. |
| Dianthus, Heddewigii | July 20 | Very good. |
| " Chinensis | July 22 | Fine. |
| " Imperialis | July 23 | Very good showing. |
| Delphinium, Larkspur, Seedling Blue | July 15 | Bloomed freely. |
| Delphinium, Larkspur, Large White | July 17 | Good. |
| Delphinium, Larkspur, Hybridum | July 17 | Good. |
| Gaillardia, Crimson and Gold | June 25 | Fine. |
| Gaillardia, Dark Red centre | June 28 | Good. |
| Gaillardia, dwarf | June 30 | Very fine. |
| Dictamnus, Gas Plant | June 25 | Strong grower, blooms very freely. |
| Hesperis Matronalis | July 2 | Very fine, plants large. |
| Lychnis | June 30 | Blooms of a most fiery red, and mixed with other colours makes a fine display. |
| Paeony, White | July 6 | Blooms quite large. |
| Pansies, older plants | May 8 | Blooms fine and large. |
| Pansies, seedlings | July 4 | Many of these were in bloom in October. |
| Poppy, Bright Yellow Mudicaule | May 15 | Very fine. |
| Poppy, Oriental Hybrids | June 10 | Large deep crimson flowers, a fine show. |

## GLADIOLUS AND OTHER BULBS

Out of a collection of gladiolus forwarded to this Station by the Horticultural Division during the spring of 1922, the following varieties came into bloom this season.

Many of the other varieties would have done likewise but they were removed and stored away for winter, owing to the approach of frosty nights. The gladiolus being somewhat new for this northland, they were greatly admired by the many visitors to the Station.

GLADIOLUS AND OTHER BULBS

| Variety | In bloom | Remarks |
|---|---|---|
| Gladiolus, Mrs. Frank Pendleton | Aug. 22 | Pink with deep red blotch, very fine. |
| Gladiolus, Peace | Aug. 9 | White with violet blotches, excellent. |
| Gladiolus, Primulinus, Maiden's Blush | Aug. 13 | Pink, with cream throat, very pretty. |
| Gladiolus, Orange Brilliant | Aug. 11 | Brilliant colour, very good. |
| Gladiolus, Willy Wigman | Aug. 15 | Soft rose, with a blood red blotch, very good. |
| Cannas, King Humbert | July 6 | The flowers of a fair size, of a brilliant orange scarlet, with light red markings, foliage rich coppery bronze, which made a very pretty display. |

ROSES

The roses in the following table are the original plants sent to this Station some years ago. They have increased rapidly, have become thoroughly acclimatized, and with ordinary protection withstand the severe winters with little or no killing back.

| Variety | In bloom | Colour | Remarks |
|---|---|---|---|
| Delicate Double Rose | June 19 | Light pink | Bloomed most profusely from June 19 to October. |
| Rugosa, Double Rose | July 1 | Dark red | Blooms very plentiful and large, making a very fine showing. |
| Rugosa, Single Rose | June 22 | Light red | Blooms very fine, of a fair size, making a good display. |
| Japanese Single Rose | June 24 | Light red | Blooms very fine, of a fair size, making a good showing. |

The roses in the following table were set out this spring. They took root quickly, and made rapid growth.

| Variety | In bloom | Remarks |
|---|---|---|
| Killarney Rose | July 30 | Colour of an exquisite shade of deep shell pink; blooms fair size. Very pretty. |
| Kaiserin Augusta Victoria | Aug. 10 | Very fair showing. |
| Mrs. R. G. Sharman Crawford | Aug. 2 | Colour rose pink, outer petals shaded with flesh pink, large blooms. Fairly hardy variety. |

TREES AND SHRUBS

The shrubs on the older part of the ornamental grounds continued to make good growth. With the added collection of the spring of 1921, this part of the experimental area has become a source of pleasure to the many visitors. The following were the different shrubs that came into bloom during the summer of 1922, with dates of blooming.

| Variety | In bloom | Remarks |
|---|---|---|
| Amelancher vulgaris, Saskatoon Berries | May 30 | Large numbers. |
| Caragana arborescens | June 6 | Become quite large. |
| Caragana grandiflora | June 10 | |
| Caragana frutescens | June 8 | |
| Caragana pygmaea | June 9 | |
| Coloneaster tomentosa | June 10 | A number of large shrubs, with many smaller ones. |
| Eunonymus linearis | July 10 | |
| Japanese Tree Lilac | July 6 | Blooms white, very pretty. |
| Lilac, Emile Lemoine | June 20 | |
| Lilac, Charles Joly | June 21 | |
| Lilac, Congo | June 22 | |
| Lilac, Michel Buchner | June 22 | |
| Lonicera alpina | June 12 | |
| Lonicera, Mundeniensis | June 14 | |
| Lonicera tatarica virginialis | June 6 | |
| Lonicera Sullivantii | June 18 | |
| Ribes aureum, Missouri Yellow or Flowering Currant | June 20 | |
| Spiraea, Billardii | July 6 | |
| Spiraea sorbifolia | July 8 | |
| Spiraea arguta | July 10 | |

Of the newer collection of shrubs the following were in bloom this season, the growth of all the 1921 collection being good:—

| Variety | In bloom | Remarks |
|---|---|---|
| Caragana pygmaea | June 16 | |
| Lonicera Morrowi | July 2 | |
| Lonicera Sullivantii | July 8 | |
| Lonicera punicea | July 24 | |
| Spiraea oblongifolia | May 30 | |
| Spiraea media | July 5 | |
| Potentilla Friedrichseni | June 23 | and again Aug. 6. |

## CEREALS

### WHEAT

Thirteen varieties of spring wheat were under test during the season of 1922, each variety being sown in duplicate plots of one-sixtieth of an acre each.

One set of plots was sown on the older part of the experimental area, on land which had been under cultivation for a number of years, and brought up to a high state of fertility by frequent applications of barnyard manure. It had produced a root crop in 1921.

The duplicate plots were sown on land ploughed out of sod in 1919, planted to corn and beans in 1921; these crops having failed, it was re-ploughed in June, 1921, and an application of twenty wagon loads of barnyard manure applied. It was kept thoroughly cultivated for the balance of the season with the spring toothed harrow, this process thoroughly incorporating the manure with the soil. Germination was slow owing to the cool spring weather, but as there was ample moisture in the soil, when the weather became warmer growth was very rapid.

The following table gives dates of seeding and cutting with yields obtained:—

SPRING WHEAT—TEST OF VARIETIES

| Name of Variety | Date of Sowing | Date of Ripening | Number of days Maturing | Average Length of Straw Including Head | Strength of Straw on a scale of 10 points | Actual Yield of Grain per Acre | Actual Yield of Grain per Acre | Weight per Measured Bushel After Cleaning |
|---|---|---|---|---|---|---|---|---|
| | | | | Inches | | Pounds | Pounds | Pounds |
| Marquis Wheat 0·15 | May 2 | Aug. 28 | 118 | 44 | 8 | 3,720 | 6,660 | 65·0 |
| Red Fife Wheat 0·17 | May 2 | Sept. 2 | 123 | 51 | 6 | 3,180 | 5,400 | 62·8 |
| Bishop Wheat 0·8 | May 3 | Aug. 26 | 115 | 48 | 8 | 3,960 | 6,600 | 64·0 |
| Red Bobs Wheat | May 2 | May 24 | 114 | 48 | 10 | 3,420 | 5,700 | 64·8 |
| Huron Wheat 0·3 | May 2 | Aug. 26 | 116 | 43 | 7 | 3,840 | 5,880 | 65·0 |
| Ruby Wheat 0·623 | May 3 | Aug. 15 | 104 | 46 | 9 | 2,880 | 6,600 | 64·5 |
| Prelude Wheat 0·135 | May 3 | Aug. 14 | 103 | 42 | 10 | 2,760 | 5,760 | 64·2 |
| Club Wheat | May 4 | Aug. 24 | 112 | 48 | 8 | 3,420 | 6,780 | 64·5 |
| Kubanka Wheat | May 3 | Sept. 4 | 124 | 56 | 5 | 3,720 | 6,900 | |
| Egyptian Wheat | May 4 | Sept. 4 | 123 | 58 | 5 | 2,940 | 6,700 | 58·2 |
| Kitchener Wheat | May 15 | Sept. 4 | 112 | 48 | 10 | 2,340 | 3,600 | 59·4 |
| Red Bobs Supreme Wheat | May 15 | Sept. 1 | 109 | 44 | 10 | 2,280 | 3,480 | 63·2 |
| Reward Wheat 0·928 | May 15 | Aug. 24 | 101 | 45 | 10 | 1,920 | 3,600 | 65·4 |

## BARLEY

Eight varieties of barley were under test during the season of 1922. The land on which the barley was sown had a crop of potatoes the previous season. As barnyard manure had been applied to the potato crop, no further application was given. After the potatoes had been removed in the autumn of 1921, the land was thoroughly ploughed, and left in that condition for the winter. In the spring of 1922 the land was prepared for the seed with the spring tooth and smoothing harrows. The plots were of one-sixtieth of an acre each, and were seeded with the garden seeder in drills seven inches apart, the amount of seed sown being from one and a half to two bushels per acre, according to the size of seed.

The following were the varieties under test and the results obtained:—

BARLEY—TEST OF VARIETIES

| Name of Variety | Date of Sowing | Date of Ripening | Number of days Maturing | Average Length of Straw Including Head | Strength of Straw on a scale of 10 points | Actual Yield of Grain per Acre | Actual Yield of Straw per Acre | Weight per Measured Bushel After Cleaning |
|---|---|---|---|---|---|---|---|---|
| | | | | Inches | | Pounds | Pounds | Pounds |
| Manchurian Barley—6 rowed bearded. | May 12 | Aug. 9 | 89 | 48 | 7 | 3,000 | 4,200 | 50·0 |
| O.A.C. Barley 0·21—6 rowed bearded. | May 12 | Aug. 7 | 87 | 48 | 10 | 3,180 | 5,100 | 50·0 |
| Duckbill Barley 0·57—2 rowed bearded. | May 15 | Aug. 16 | 92 | 46 | 7 | 3,120 | 5,640 | 55·2 |
| Champion Barley—6 rowed beardless. | May 15 | Aug. 7 | 84 | 48 | 6 | 1,680 | 5,000 | 47·0 |
| Success Barley—6 rowed beardless. | May 15 | Aug. 7 | 84 | 49 | 7 | 1,440 | 5,280 | 46·0 |
| Albert Barley 0·54—6 rowed beardless. | May 15 | Aug. 5 | 82 | 44 | 9 | 1,860 | 4,920 | 49·8 |
| Barks Barley—6 rowed bearded. | May 12 | Aug. 14 | 94 | 38 | 10 | 2,940 | 4,200 | 49·0 |
| Hulless, White Barley—Hulless beardless. | May 12 | Aug. 7 | 87 | 35 | 6 | 3,000 | 6,900 | 64·0 |
| Speltz | Sept. 12 | Sept. 2 | 113 | 44 | 10 | 3,060 | 4,320 | 50·2 |

## OATS

Several varieties of oats were under test this season, on plots one-sixtieth of an acre each. With the ample moisture, growth was rank, and fair results were obtained, with the exception of the Eighty Day and Daubeney varieties. Some loss was sustained at harvest time owing to unfavourable weather conditions; the straw being quite green when cut added greatly to the weight.

The following were the varieties under test, with dates of seeding, dates harvested, and yields obtained:—

OATS—TEST OF VARIETIES

| Name of Variety | Date of Sowing | Date of Ripening | Number of days Maturing | Average Length of Straw Including Head | Strength of Straw on a scale of 10 points | Actual Yield of Grain per Acre | Actual Yield of Straw per Acre | Weight per Measured Bushel After Cleaning |
|---|---|---|---|---|---|---|---|---|
| | | | | Inches | | Pounds | Pounds | Pounds |
| Banner Oats 0·49 | May 5 | Aug. 21 | 108 | 46 | 7 | 2,340 | 6,960 | 37·0 |
| Gold Rain Oats | May 5 | Aug. 22 | 109 | 52 | 8 | 2,220 | 7,500 | 38·4 |
| Victory Oats | May 8 | Aug. 23 | 107 | 50 | 7 | 2,460 | 7,740 | 41·2 |
| Liberty Hulless Oats 0·480 | May 5 | Aug. 21 | 108 | 42 | 9 | 2,160 | 6,000 | 52·0 |
| Eighty Day Oats 0·42 | May 9 | Aug. 5 | 88 | 44 | 10 | 1,260 | 5,700 | 26·6 |
| Daubeney Oats 0·47 | May 5 | Aug. 7 | 90 | 46 | 10 | 1,140 | 5,820 | 23·2 |
| Leader Oats | May 5 | Aug. 22 | 109 | 50 | 9 | 3,120 | 6,000 | 39·2 |
| Improved Ligowo Oats | May 5 | Aug. 17 | 104 | 43 | 8 | 1,920 | 7,200 | 35·0 |
| Gartons Regenerated Abundance Oats | May 5 | Aug. 17 | 104 | 48 | 7 | 2,100 | 7,800 | 26·8 |
| Alaska Hulless Oats | May 15 | Aug. 16 | 93 | 48 | 10 | 1,200 | 5,400 | 23·0 |
| Laurel Oats 0·477 | May 15 | Aug. 23 | 100 | 40 | 10 | 1,920 | 4,800 | 55·0 |

## FLAX

Two varieties of flax were tested this season. They did unusually well, the yields of grain and straw being much above the average. The land for this test was summer-fallowed in 1921, and was in a fine stage of cultivation, and fertility. The frequent rains of the late summer prolonged the ripening period.

The following were the dates of seeding and ripening with the results obtained:—

FLAX—TEST OF VARIETIES

| Name of Variety | Date of Sowing | Date of Ripening | No. of Days Maturing | Average Length of Straw Including Head | Strength of Straw on a scale of 10 points | Actual Yield of Grain per acre | Actual Yield of Straw per acre |
|---|---|---|---|---|---|---|---|
| | | | | Inches | | Pounds | Pounds |
| Dakota Wild Resistant No. 52. | May 16 | Aug. 23 | 99 | 30 | 10 | 1,560 | 2,400 |
| New Premost No. 25 | May 16 | Aug. 21 | 97 | 32 | 10 | 1,680 | 2,520 |

## FIELD PEAS

Several varieties of field peas were under test this year in plots one-sixtieth of an acre each. The land had been summer-fallowed in the season of 1921. After the land was ploughed in 1921, twenty wagon loads of barnyard manure were applied, this fertilizer being thoroughly incorporated with the soil by frequent cultivations during the balance of the season. The preparation of this land in the spring of 1922 was similar to that given for the other cereals, with the same methods of seeding. The Chancellor pea, a new variety, was a distinct success and should be very suitable for this district.

The growth of the vines was very rank, the yield of grain very high and quality good, resulting, no doubt, from the moisture in the soil from 1921 and the precipitation of 1922. The results obtained are as follows:—

FIELD PEAS—PEAS OR BEANS—TEST OF VARIETIES

| Name of Variety | Date of Sowing | Date of Ripening | Number of Days Maturing | Average Length of Plant | Actual Yield of Seed per acre | Actual Yield of Straw per acre | Weight per Measured Bushel After Cleaning |
|---|---|---|---|---|---|---|---|
| | | | | Inches | Pounds | Pounds | Pounds |
| Arthur Field Peas 0·18..... | May 4 | Aug. 14 | 102 | 63 | 2,820 | 4,740 | 65·6 |
| Prussian Blue Field Peas..... | May 5 | Aug. 15 | 102 | 48 | 2,520 | 4,140 | 65·2 |
| Empire Field Peas..... | May 4 | Aug. 17 | 105 | 56 | 2,400 | 4,200 | 65·2 |
| Alberly Blue Field Peas..... | May 5 | Aug. 23 | 109 | 44 | 2,340 | 4,260 | 66·5 |
| Chancellor Field Peas, 0·26..... | May 15 | Aug. 23 | 100 | 53 | 3,000 | 4,800 | 67·0 |

SPRING RYE

The land used for this test was similar to that on which the barley was grown, with the same treatment of cultivation, and after treatment. The seed was sown at the rate of one and a half bushels per acre.

The results obtained are given in the following table:—

Sown—May 12.
Ripe, and cut—August 30.
No. of days maturing—110 days.
Length of straw including head—54 inches.
Length of head—2½ inches.
Strength of straw on points—10.
Total weight of grain per acre—2,520 pounds or 45 bushels.
Yield of straw per acre—4,800 pounds or 2 tons 800 pounds.
Yield of grain from this plot—42 pounds.
Yield of straw from this plot—80 pounds.

WINTER RYE

Two varieties of winter rye were sown during the autumn of 1921 in plots one-thirtieth of an acre each. The land used was broken out of brome grass sod in June, 1921, no fertilizer being applied for the rye crop. The land was thoroughly cultivated for the balance of the season of 1921, and previous to planting was gone over with the spring tooth and smoothing harrows. The seed was sown at the rate of one and a half bushels per acre. The growth of the Rosen rye during the autumn of 1921 was good, and that for the Common variety (our own seed) very good. No stock was allowed to run on these plots at any time, and both plots went into the winter in fine condition. On May 5, 1922, all plots were looking well; the first heads appeared on June 8. The growth of these cereals during the balance of the season was good, and an unusually long straw was obtained at harvest, and the yield of grain was good. These plots of rye were fully matured previous to cutting, the delay being caused by unfavourable weather conditions.

*Plot 1—Rosen Winter Rye*

Sown—August 17, 1921.
Ripe and cut—August 8, 1922.
Length of straw including head—72 inches.
Length of head—5 inches.
Strength of straw on points—10.
Total weight of grain per acre—3,540 pounds, or 63 bushels, 12 pounds.
Yield of straw per acre—6,750 pounds, or 3 tons 750 pounds.

*Plot 11—Winter Rye, Common*

Sown—August 17, 1921.
Ripe, and cut—August 7, 1922.
Length of straw including head—63 inches.
Length of head—3½ inches.
Strength of straw on points—10.
Total weight of grain per acre—3,300 pounds, or 58 bushel 52 pounds.
Yield of straw per acre—6,030 pounds, or 3 ton 30 pounds.

The seed used for this plot was seed that was grown by the Superintendent for a number of years. He notes that it is considerably hardier than some of the other varieties.

WINTER RYE, COMMON

A field plot of six acres of winter rye, common, was sown on August 20, 1921. The land for this experiment had raised a crop of wheat during the season of 1920. After the plot was ploughed in June, 1921, fifteen wagon loads of barnyard manure were applied. Frequent cultivation was given during the balance of the season, which thoroughly incorporated the manure with the soil, and also killed the weeds. The crop was pastured down quite closely during the autumn of 1921 by horses and cattle, very little material damage resulting, however, for on May 6, 1922, the field was making a good growth, and was well headed out on June 12:—

Sown—August 20, 1921.
Ripe and cut—August 17, 1922.
Length of straw—60.
Length of Head—3 inches.
Yield of grain per acre—41½ bushels.
Yield of straw per acre—2¾ tons.

The grain was of a very good quality, the weight of the measured bushel being well over 56 pounds.

BUCKWHEAT

Two varieties of buckwheat were under test this season. No duplicate plots were sown, owing to the shortage of seed. The chief reason for sowing these two plots was to provide blossoms for the bees during the late summer. In coming to maturity as they did these plots showed that the summer of 1922 was quite free from frost. The buckwheat was sown on land similar to that on which the peas were grown. Germination of the seed was good, and with ample moisture in the soil, the growth was quite rank. The plants were large, and still in bloom with a considerable number of partly matured kernels of grain, when the first severe frost occurred on September 3.

*Japanese Buckwheat*

Sown—May 16.
Ripe, and cut—September 4.
No. of days maturing—111 days.
Length of straw—42 inches.
Total weight of grain per acre—1,260 pounds, or 26 bushel 12 pounds.
Yield of straw per acre—3,000 pounds, or 1 ton 1,000 pounds.

*Silverhull Buckwheat*

Sown—May 16.
Ripe, and cut—September 4.
No. of days maturing—111 days.
Length of straw—43 inches.
Total weight of grain per acre—1,389 pounds, or 28 bushel 36 pounds.
Yield of straw per acre—3,240 pounds, or 1 ton, 1,240 pounds.

WINTER WHEAT, KHARKOV

One variety of winter wheat was sown on August 18, 1921, on the plot next the winter rye and on similar soil. The germination of the seed was one hundred per cent. Growth during the balance of the autumn was good and just previous to the first fall of snow the plots were looking fine and strong. When spring opened the plots showed the effects of winter killing. The weather during April was very unsettled causing many plants to die, fully fifty per cent of them being killed by May 1. The plot was fully matured by August 8, 1922 and was cut on this date, sufficient seed being threshed to reseed another plot.

Length of straw including head—47 inches.
Length of head—2½ inches.
Total weight of grain per acre—14 bushel.
Yield of straw per acre—1,200 pounds.

LIST OF FALL CEREALS SOWN AUTUMN OF 1922

Winter wheat—Kharkov.
Winter wheat—O.A.C. No. 104 Beaverlodge seed.
Winter rye—North Dakota No. 959.
Winter rye—Saskatoon.
Winter rye—Mammoth White.
Winter rye—Rosen.
Winter rye—Common.
A field of four acres of common rye was also sown.

The land was in perfect condition when the cereals were drilled in. A rain of 0·30 inches fell soon after seeding. These plots were covered with a good blanket of snow in October, making the prospects of a crop next season good.

## ANIMAL HUSBANDRY

CATTLE

The small herd of pure blooded Shorthorn cattle at this Station has decreased, until there are at the present only two head, one of the original heifers, Rose Bell, and her only progeny, a very fine fifteen-months-old bull calf, "Arctic Hero," who is giving promise of developing into an extremely good, blocky animal, and will no doubt be the means of improving the stock in this district in the future.

The results obtained from this herd have not been very satisfactory, but the cause of the loss was almost unavoidable.

SWINE

This herd now numbers fifteen head, the original three, with one yearling sow, one yearling boar, and ten pigs farrowed in August, 1922. The pigs have done remarkably well; while the demand for young stock has been small, almost all of the sows in the near vicinity of the station have been bred to the boar, and the stock in this neighbourhood has been very much improved by the use of this new blood.

## GENERAL

The Experimental area was increased to thirty acres, the fence on the east end having been removed to form the sides, barbed wire will be ordered in the spring for the purpose of fencing up the present end of the field.

# SALMON ARM, B. C.

The winter of 1921-22 was normal with no very severe weather and with plenty of snow to protect small fruits and shrubs. Snow disappeared much earlier than usual and everything indicated an early spring but the weather then changed with cold dry winds, which destroyed the young growth of early sown seed. Carrots, mangels, and other root crops were a complete failure. The season was one of the driest on record.

Fruit trees and bushes being deeper rooted did not suffer so much, but the berry crop was light and the fruit inferior. The June drop in the apple crop was quite heavy. This materially lessened the necessity for thinning operations on large trees, but in the small experimental orchard just coming into bearing, the drop was more serious as it removed most of the promised fruit and reduced the size of the few specimens left.

Two of the seedlings from Ottawa promise to be valuable for the Salmon Arm district. What is required is an apple of good size, appearance and quality to follow the McIntosh, with sufficient hardiness to stand the extremes of the climate.

During the spring an acre each of Wagener and Wealthy were planted and three and a half acres of Duchess. Careful records of cost of setting out and of cultivation until the beginning of bearing are being kept, and different cover crops will be tried in this orchard to increase the humus content of the soil.

To introduce the Scarlet Pippin in the district, a number of trees were budded and distributed to orchardists in the district. The same plan will be followed with any other sorts which prove especially desirable.

Last season, a number of varieties of Soya beans were tried and a very satisfactory crop of forage gathered, but only one plant ripened seed. This, however, may give a start with a variety suitable to this district, and several other untried varieties will be tested next season. Either the green plants or the cured product is relished by stock which do well on it, and if a variety can be secured which will ripen seed in the district, it should prove a valuable forage, not only to orchardists but to dairymen, since it not only furnishes good feed but leaves the land in excellent condition.

Potatoes grown on the upland were of excellent quality but considerable damage was done by wire worms, which are very difficult of control.

RECORD OF METEOROLOGICAL OBSERVATIONS TAKEN AT SALMON ARM, B.C., GIVING MAXIMUM, AND MINIMUM TEMPERATURE FOR EACH MONTH WITH DATE OF OCCURRENCE, ALSO RAINFALL, SNOWFALL, AND TOTAL PRECIPITATION, AND THE HOURS OF SUNSHINE, FROM APRIL 1ST TO DECEMBER 31ST, 1922.

| Months | Maximum | Date | Minimum | Date | Rainfall | Snowfall | Total Precipitation | Total Hours Sunshine | Average Sunshine per day |
|---|---|---|---|---|---|---|---|---|---|
| April | 74·0° | 30th | 26·0° | 16th | 0·84 | 3·00 | 1·14 | 172·48 | 5·74 |
| May | 86·0° | 31st | 29·0° | 8th | 0·71 | ..... | 0·71 | 290·42 | 9·36 |
| June | 89·0° | 2nd | 40·0° | 18th | 0·06 | ..... | 0·06 | 220·06 | 7·33 |
| July | 93·0° | 2nd & 3rd | 46·0° | 23rd | 0·29 | ..... | 0·29 | 328·18 | 10·58 |
| August | 92·0° | 1st | 48·0° | 22nd | 1·52 | ..... | 1·52 | 248·06 | 8·00 |
| September | 79·0° | 11th | 40·0° | 8th | 2·04 | ..... | 2·04 | 136·24 | 4·54 |
| October | 66·0° | 7th | 31·0° | 29th | 2·69 | ..... | 2·69 | 114·48 | 3·69 |
| November | 47·0° | 8th | 24·0° | 3rd | 0·39 | 2·00 | 0·59 | 40·36 | 1·34 |
| December | 43·0° | 27th | −10·0° | 12th | 1·44 | 15·50 | 2·99 | 53·24 | 1·71 |
| | | | | | 9·98 | 20·50 | 12·03 | | |

## BETSIAMITES, SAGUENAY COUNTY, QUE.

In 1922 five acres of land were prepared for experimental work. Of these five acres two had been ploughed the previous year; the other three had not been ploughed for some fifteen years, according to the best information available. None of the area had ever been manured. The preliminary work, such as fencing, ploughing, cultivating, could not be commenced until about the middle of May, the land remaining frozen until that time.

According to instructions received, the five acres were divided up as follows: (1) One acre in experiments in field husbandry. This was divided into four plots, the first to be sown to oats, second to barley, third and fourth to hay. (2) One acre for hoed crops. (3) One acre for tests of varieties of cereals. (4) Once acre for tests of varieties of grasses and clovers. (5) Half an acre for tests of varieties of forage plants. The other half acre is taken up by roads and paths between plots.

Almost the whole five acres was treated with commercial fertilizer, owing to the fact that very little barnyard manure was available. The lack of the latter, coupled with late seeding, which was only finished about the end of June, owing to the frost coming out of the land so late, and the great drought which prevailed during the whole summer, were very unfavourable, especially to the hoed crops, which gave no return. Almost everything sown germinated but the young plants were immediately burned up or destroyed by the cut worms. Only the peas gave a small yield.

On the half acre devoted to forage plants nothing germinated and the same occurred with the tests of grasses and clovers.

On the acre devoted to field husbandry experiments the two plots in hay gave no crop. The return of barley was extremely small. The crop of oats was better. The land sown to oats was divided into three small plots, one of which had been treated with barnyard manure, the other with commercial fertilizer, while the third was left untreated as a check plot. On the first plot the straw reached an average height of three feet, on the second two and one half and on the third, or untreated plot, two feet and a quarter.

On the acre devoted to tests of cereals those plots, numbering twelve in all, a crop of which was to be cut for hay, were sown like the others, on the 24th of May. The barley gave no return; the peas commenced well but soon were destroyed by the drought; the oats remained in good condition. The plots were cut for hay at the end of August. The returns from the other grain plots are given in the table below.

It might be added that on the acre devoted to hoed crops the plots in Indian corn were destroyed by the crows. A small quantity of Indian corn had been sown on a little plot near the buildings, which had been well manured. It succeeded very well, although it did not ripen, owing largely, no doubt, to the late seeding.

TEST OF VARIETIES—(SIZE OF PLOTS 22 x 33)

| Name of Variety | Date of Sowing | Date of Ripening | Number of Days Maturing | Average Length of Straw, Including Head | Strength of Straw on a scale of 10 points | Average length of head | Actual Yield of Grain per acre | Per cent Stand |
|---|---|---|---|---|---|---|---|---|
| | | | | In. | | In. | Pounds | |
| Longstem Flax | May 24 | Sept. 15 | 114 | 30 | 5 | ..... | ..... | 95 |
| Rostrona Flax | May 24 | Sept. 15 | 114 | 30 | 5 | ..... | ..... | 95 |
| Larrasin Rye | May 24 | Sept. 15 | 114 | 18 | 5 | ..... | ..... | 75 |
| Sarrasin Silverhull | May 24 | Sept. 15 | 114 | 18 | 5 | ..... | ..... | 75 |
| Seigle Select (buckwheat) | May 24 | Sept. 25 | 124 | 48 | 8 | 2·5 | ..... | 85 |
| Banniere (oats) | May 24 | Sept. 25 | 124 | 30 | 9 | 5 | 408 lbs. | 100 |
| Banniere (oats) | May 24 | Sept. 25 | 124 | 30 | 9 | 5 | 408 lbs. | 100 |
| Alaska (oats) | May 24 | Sept. 25 | 124 | 30 | 8 | 4 | 408 lbs. | 100 |
| Alaska (oats) | May 24 | Sept. 25 | 124 | 30 | 8 | 4 | 408 lbs. | 100 |
| Liberty (oats) | May 24 | Sept. 25 | 124 | 30 | 8 | 4 | 408 lbs. | 100 |
| Liberty (oats) | May 24 | Sept. 25 | 124 | 30 | 8 | 4 | 408 lbs. | 100 |
| Prelude (wheat) | May 24 | Sept. 25 | 124 | 12 | 10 | 0·75 | 30 lbs. | 10 |
| Prelude (wheat) | May 24 | Sept. 25 | 124 | 12 | 10 | 0·75 | 30 lbs. | 10 |
| Ruby (wheat) | May 24 | Sept. 25 | 124 | 12 | 10 | 0·75 | 30 lbs. | 10 |
| Ruby (wheat) | May 24 | Sept. 25 | 124 | 12 | 10 | 0·75 | 30 lbs. | 10 |
| Huron (wheat) | May 24 | Sept. 25 | 124 | 30 | 5 | 1·5 | 30 lbs. | 25 |
| Huron (wheat) | May 24 | Sept. 25 | 124 | 12 | 8 | 0·75 | 60 lbs. | 10 |

# EXPERIMENTAL SUB-STATION, FORT SMITH, N.W.T.

## CHARACTER OF THE SEASON

At the outset, the season of 1922 gave promise of great rigour and caused us to apprehend a complete failure in our experiments. However, as usual, the snow disappeared in late April and we were able to prepare the land early in May. On May 6, we had already 100 pounds of Marquis wheat and 100 pounds of Banner oats sown; about the 20th of the same month, we added 200 pounds of oats.

All vegetable seeds were sown about May 10, and potatoes were planted on the 26th.

At the St. Bruno farm, situated twenty miles west of Fort Smith, the land, comprising much clay and heavy black soil, took more time to dry off; it was only in the last days of May that we completed our seedings of wheat, oats and vegetables on this farm.

In general, germination was slow and difficult owing to cold weather which prevailed in May and part of June. Thus, wheat and oats, sown on May 6, germinated on the 27th only. Potatoes and all vegetables experienced the same difficulty. However, from June 1 to 15, the plants were all above ground. Unfortunately, about June 20, the thermometer fell disastrously to 22 degrees Fahrenheit, the potato sprouts, already strong, being destroyed, and wheat, oats and a few vegetables such as turnips, beets and beans, being injured to some extent.

Fortunately, this was the end of the season's bad period. From June 20 to the first days of September, the weather was very favourable; beneficial showers, although not abundant, were sufficient and regular; waves of great heat activated the delayed growth and largely improved the crops. Cool weather was felt early in September, but it was of short duration; the weather became fine again and we were able to harvest under good conditions. The first snow, which fell on October 18, was not injurious, as all our crops had been attended to.

## FIELDS UNDER CULTIVATION

### FORT SMITH

The greater part of the land here is sandy, with the admixture of a small superficial quantity of clay in certain lower places only, where, in the spring, the snow water remains longer than elsewhere. We have three acres forming an artificial meadow, seeded to a mixture of timothy, Western rye and Brome grasses. Three and one-half acres are devoted to wheat and oats experiments. Lastly, the vegetable garden and potato field require one and one-half acres. Therefore, our experiments are conducted on eight acres of land, of which three and one-half acres are under cultivation for the first year.

### ST. BRUNO FARM

(Twenty miles west of Fort Smith)

It is there that we concentrate all our efforts on cultivation trials: wheat, oats and tame hay. We own, on this farm, over thirty acres of good, heavy black land, cleared, little by little, each year, during the too short period avail-

able between the close of seeding operations (end of May) and the start of hay mowing (July 15). Up to these last few years, this time, valuable for clearing, was used for the transportation of merchandise, portaged, between Fitzgerald and Smith. Last July, despite great heat and hosts of mosquitoes and gadflies, we prepared a new field of six acres which we will sow, next spring, to timothy and Western rye grass.

## CEREALS AND FORAGE CROPS

*Hay.*—At Fort Smith, the three acres of land seeded to a mixture of timothy, western rye and brome grass yielded 4 tons of hay. The yield would easily have been double had we not made the mistake, the previous fall, of pasturing our horses and milch cows in the meadow. The new fall growth would have protected the hay roots, of which many perished during the severe winter colds.

Owing to the same imprudence on the St. Bruno farm, the fifteen acres of artificial meadow yielded only 7 tons of hay. About thirty calves, from six to twelve months old, had had the run of this meadow from August to October. But the superb summer weather allowed us to make up for this mistake; during the month of August we mowed, in the surrounding meadows, 250 tons of excellent hay. Our 90 head of cattle and 10 horses relish it, for this hay feels the effects of its proximity to salt marshes and is slightly salty.

*Wheat.*—We sowed 100 pounds of wheat (Marquis) on one acre of land, ploughed, manured and broken in the middle of the summer of 1921. Notwithstanding the coldness of the spring, which delayed germination and injured the first shoots, these 100 pounds of wheat yielded 1,000 pounds. This wheat, which germinated on May 27 and was headed out on July 14, was cut late in August. The heads were long, full and perfectly ripe.

At the St. Bruno farm, we also sowed 100 pounds of the same wheat, in one acre of land prepared during several years and which had been submitted to every cultural method. The yield was 900 pounds of grain, blemished and shrunken by the wet late September weather. The crop is equal in quantity to that of last year, but inferior in quality.

*Oats.*—At Fort Smith, we sowed 300 pounds of oats in two and one-half acres of land under first-year cultivation. Fearing the starlings, which have so often deprived us of the fruit of our labour, we resolved to cut these oats in the green state, as feed for our horses. The cutting was performed about August 10. The mature oats would have been very fine; the plants reached a height of three and one-half feet, especially in the portion of the field where we applied a dressing of about 50 pounds of nitrate, when the oats were from 6 to 8 inches high. We harvested four and one-half tons of succulent hay. On the St. Bruno farm, we sowed 1,600 pounds in 16 acres of land. As the summer was very favourable, the oats ripened well, except a small portion (about 3 tons) which we cut when still green; it would have been imprudent to leave it to ripen, the season being advanced at the time of cutting. The oats were cut about the first week of September and threshed about the middle of the month. The yield was 200 bags weighing 75 pounds each, a total of 15,000 pounds or 450 bushels in return for the 48 bushels sown, i.e., a rate of 28 bushels per acre. This figure is really inferior to the actual yield, since we left three tons of straw unthreshed.

## VEGETABLES

*Potatoes.*—At Fort Smith and on the St. Bruno farm, we obtained an average potato crop, much inferior to that of last year, when 20 bags were harvested for each one planted. This year, the yield was 12 bags for one planted.

The cold June weather was the primary cause. Another reason was the appearance of a disease through which the tops became yellow and, in the end, rotted on the surface of the soil; also, many potatoes rotted in the ground.

We have already taken measures to control this disease. We have made a good selection of apparently sound potatoes and, next spring, before planting, we intend to treat them with formalin and plant them in new land. We have acquired new seed; it is evidently the surest way of preventing the disease.

*Radish.*—One variety only was sown: French Breakfast. We sowed the seed on May 1, in a hotbed, and on May 22 we found the radish of excellent table quality.

*Lettuce.*—Toronto Gem and Big Boston are the two varieties sown for several years, for they have always given satisfaction, even in most severe weather. Sown on May 10, they were headed on June 20 and they remained thus all summer and until very late in the fall.

We also tried a variety of Cos Lettuce, attaining a height of 3 or 4 feet, but used it solely as poultry feed. This kind of lettuce, introduced here two years ago, has not given the results expected, the plants were not over 2 feet in height, and the stems were never very full.

*Turnips.*—"Purple Top" was the only variety sown. The cold spring greatly delayed its growth; a few specimens, however, reached an average size of 10 pounds, but they were scarce and deformed, and a large number seemed to bear large wounds. We do not know the cause of these deformities and wounds.

*Table Beets.*—Two varieties were sown: Crosby's Egyptian and Detroit Dark Red. Neither gave good results, spring frosts having delayed their growth; a few specimens, however, were 4 and 5 inches in diameter.

*Onions.*—Experiments were carried on with four varieties: White Barletta, Yellow Globe Danvers, Red Wethersfield and Prizetaker Yellow Globe. Each of these varieties gave excellent results. However, Prizetaker was of superior size, some specimens being 4 and 5 inches in diameter. We have much difficulty in keeping them during winter since the season is so short here that the onions cannot arrive to complete maturity; they are still in sap when harvested, and they dry out with difficulty.

*Beans.*—Of two varieties sown, May Queen and Kidney Wax, the first named only gave good results. Kidney Wax failed completely, the seed having rotted in the ground.

*Peas.*—Four varieties were sown, and two succeeded well: Thomas and Stratagem. Sown on May 10, they were fine about mid-July and could then be served at the table. The two other varieties, English Wonder and Gregory Surprise, failed through an unknown cause.

*Cabbage.*—We obtained 600 head of Copenhagen Market cabbage, the weight of each head varying between 8 and 15 pounds.

We also tried a variety of enormous cabbage, Glory of Enkhuizen. We got about ten heads weighing from 20 to 25 pounds each, but it is a very late variety.

*Red Table Carrots.*—As in past years, Chantenay and Oxheart gave excellent results, for this vegetable has never failed, at Fort Smith, since the inception of our experiments. The crop averages 18 to 20 tons per acre.

*White Carrots.*—We seeded ¼ acre to Improved Short White carrots for our stock. We harvested 5 tons of carrots, including a few specimens weighing over one pound each.

*Shrubs.*—We have six clumps of Japanese lilac which have bloomed two years. When younger we had to protect them against winter injury by applying a heavy dressing of manure at the foot, and surrounding the stems with straw. To-day, these lilacs are vigorous and they easily bear the cold of this region.

We also have 8 caraganas, three feet in height. The two first years after planting, these shrubs barely lived, but they resisted the cold and are now in good growing condition.

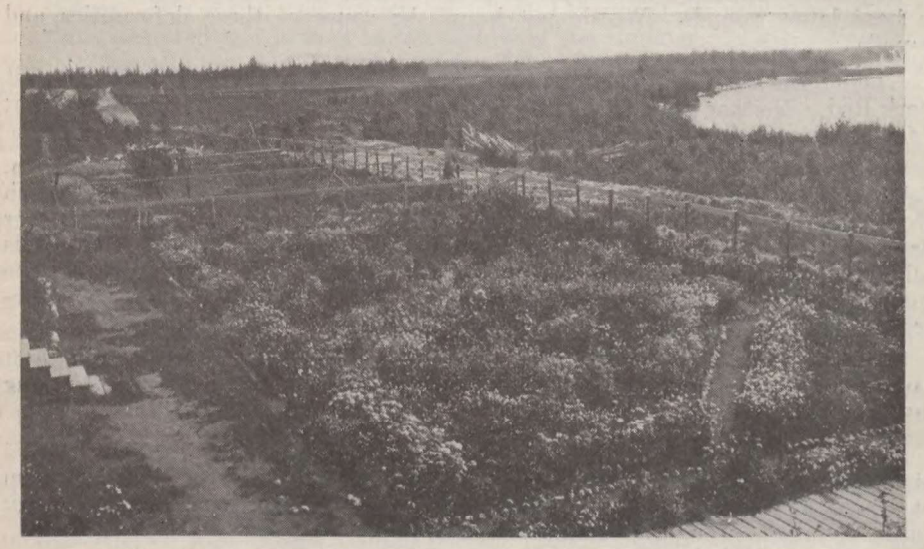
Also, we have two maple trees which are beginning to develop; one is 4 feet high.

We have finally succeeded, this year, after several failures, in growing a few flowers. Doubtless, we did not have the plants suitable for this northern climate.

In July and August, there was a continuous display of various hued poppies. California poppies in particular were in flower until October.

Chrysanthemums, white and yellow, either single or double, were very fine. Cornflowers, pansies and nasturtiums vied in beauty during the fine season. These different varieties of flowers are adapted to this climate and easily bear the cold. We have saved seed of each kind for next year.

Flower garden in Northern Canada



The garden at Roman Catholic Mission, Fort Resolution, a Sub-station for Northwest Territories.

# FORT RESOLUTION N.W.T.

GENERAL NOTES ON SEASON

The weather of 1921-22 was relatively mild at Fort Resolution so that an early spring was hoped for. However, almost continuous north and northeast winds during the month of April caused the cold weather to continue until May. Snow disappeared during the first week of the latter month and by the 15th seeding was possible. Towards the end of May several timely rains fell. From June 1 to 11 the weather was cold with white frosts and hail storms. This delayed germination. From June 15 to 26 favourable weather prevailed and growth was very rapid. On June 26, however, a violent tempest from the north suddenly arose and lasted the whole day followed by a heavy frost that night, which damaged all garden crops but owing to the earliness of the season a new growth sprung up vigorously.

July and August were favourable for growth. Drought was not excessive and nothing suffered materially therefrom. Early in September there was an abundant rainfall, which was very timely, but a heavy frost on September 9 stopped all growth and it was necessary to harvest the crops at once. When this work was done clearing of new land was recommenced. About ten acres were cleared, which will be devoted to hay production. Until about the middle of October fall work was continued.

The season in general was good and the harvest very satisfactory. The experiments with different varieties of vegetables gave good results with very few exceptions.

RESULTS OF TESTS OF VEGETABLES

| Variety | Sown | Germinated | Fit for use | Ripe | Remarks |
|---|---|---|---|---|---|
| *Peas* | | | | | |
| English Wonder, C. E. F. | May 19 | May 31 | Aug. 1 | Sept. 5 | Good. |
| Thomas Laxton, C. E. F. | " 19 | " 31 | July 25 | Aug. 20 | " |
| Gregory Surprise, C. E. F. | " 19 | June 2 | " 25 | " 20 | " |
| *Beans* | | | | | |
| May Queen | " 19 | June 6 | Aug. 8 | Nil | Good eating quality |
| Round pod | " 19 | " 13 | " 15 | " | " |
| *Corn* | | | | | |
| Early Malcolm | " 19 | " 10 | ..... | 3' high | Success. |
| Sweet Squaw | " 19 | " 10 | ..... | 3' " | In flower Aug. 20. |
| Pickaninny | " 19 | " 10 | ..... | 1' " | " |
| *Beets* | | | | | |
| Detroit Dark | " 19 | " 2 | Aug. 5 | ..... | Reached full maturity, very good. |
| *Parsnip* | | | | | |
| Hollow Crown | " 19 | " 4 | " 15 | ..... | Good. |
| *Carrots* | | | | | |
| Ontario Champ | " 19 | " 12 | " 12 | ..... | Good. |
| Chantenay | " 20 | " 12 | " 10 | ..... | Good. |
| *Turnips* | | | | | |
| Extra Early Purple Top | " 20 | " 4 | July 28 | ..... | Wormy. |
| Sweed Hartley Bronze | " 19 | " 2 | Aug. 10 | ..... | Good. |
| *Cabbage* | | | | | |
| Cauliflower, Extra Early | May 3 | May 10 | Transplant | June 28 | Destroyed by hail. |
| Jersey Wakefield | " 3 | " 10 | " | ..... | " |
| Danish Ballhead | " 3 | " 10 | " | ..... | " |
| Copenhagen Market | " 3 | " 10 | " | ..... | " |
| | " 12 | June 1 | Aug. 25 | ..... | No yield. |
| *Tomatoes* | | | | | |
| Lettuce | " 28 | " 8 | July 17 | ..... | Good. |
| Onion Yellow Globe | " 20 | May 31 | Size of finger | ..... | Good. |
| Avoine Liberty | " 30 | ..... | Well filled, July 29 | ..... | Sept. 16, Good. |

*Beans.*—This was the first season when success has been had with beans. This year the varieties mentioned above, although cut down temporarily by the frost on June 9, afterwards gave a satisfactory yield. It is the first time that garden beans have been produced in this district. A few feet of a row were left to see whether the beans would mature but the season was too short for this.

*Beets.*—The Detroit Dark Red gave a yield above the average, most specimens weighing about three pounds. Their table quality was excellent and they kept very well.

*Tomatoes.*—Success with tomatoes was no longer hoped for in this district but in 1922 they yielded well and arrived almost at maturity. This result was very encouraging and gives hope for the future.

*Potatoes.*—One hundred and thirty bags of one hundred pounds each of the Early Rose variety were planted the end of May. By August 15 the crop was sufficiently large for use. They were harvested the end of September and gave a yield of eight hundred and fifty bags of potatoes of excellent quality.

*Hay.*—At the Mission there are some twenty cattle which must be fed winter rations for some eight months. Up to the present the hay for these has been obtained some sixty miles south of Fort Smith for cutting and transportation. To avoid this every effort has been made to clear an area on the Mission farm and up to the present forty acres have been cleared and sown.

Various sorts of clovers and grasses have been tried, such as timothy, red top, brome grass, rye grass, western rye, alfalfa and sweet clover. After a number of experiments the first four have been retained as appearing most suitable to the climate and to the character of the soil. These sorts are sown as a mixture. About June 10 oats were sown with grass seed and the crop was cut at the end of August for forage. The oats had reached an average height of three and a half feet.

*Cereals.*—It is to be regretted that the wheats saved in 1921 for seed were entirely destroyed by mice, with the exception of a few handfuls of Liberty oats, which seems to succeed well in this district as it ripens well and seems resistant to frost.

Sweet clover and alfalfa do not appear to be yet acclimatized.

METEOROLOGICAL OBSERVATIONS, 1922

| Month | Maximum | Minimum | Snow | Rain |
|---|---|---|---|---|
| January | 8·0 | −17·3 | 6·5 | |
| February | 12·2 | −25·2 | 0·0 | |
| March | 7·5 | −15·3 | 0·9 | |
| April | 27·0 | −16·8 | 1·5 | |
| May | 47·4 | 30·2 | 3·0 | 0·89—Rain and melted snow. |
| June | 60·7 | 40·7 | ..... | 0·61 |
| July | 68·1 | 51·0 | ..... | 3·62 |
| August—Fahrenheit | 50·3 | ..... | ..... | 1·65 |
| September | 48·6 | 38·3 | ..... | 1·28 |
| October | 33·3 | 23·3 | 3¼ | 0·21 |
| November | 17·8 | 12·2 | 6·0 | |

## FORT PROVIDENCE, N.W.T.

The weather of the growing season of 1922 was exceptionally unfavourable at this point. Almost continual rains during the months of June, July and August prevented, or rendered useless, much of the work done in the fields and gardens. Old residents of this district say that for more than thirty years they do not remember such a rainy summer.

The soil in this district, especially near the MacKenzie river, is a clay. The experimental area, although it is ploughed every year, has a tendency to bake and when it becomes tried out a little needs a great deal of work to prepare a suitable seed bed. On account of the very frequent rains part of the fields were flooded and as a result seed potatoes and grains sown rotted without germinating.

| —— | Sown | Harvested | Date |
|---|---|---|---|
| Potatoes | May 22 | June 10 | Sept. 11 |
| Cabbage— | | | |
| Transplanted | June 2 | July 3 | " 15 |
| Hotbed | April 24 | May 7 | ..... |
| Carrots | June 5 | July 3 | Sept. 15 |
| Onions | " 5 | " 1 | " 30 |
| Green peas | " 5 | June 25 | " 15 |
| Lettuce | " 5 | " 12 | July 1 |
| Parsnip | " 5 | " 20 | Sept. 25 |
| Beets | " 5 | July 5 | " 25 |
| Turnips | " 5 | June 20 | " 25 |
| Pumpkins | April 24 | May 15 | " 15 |
| Tomatoes | Mar. 27 | April 17 | " 15 |
| Wheat and oats | May 20 | ..... | " 30 |

Owing to the flooding of meadows in the neighbourhood it was necessary to get hay from a considerable distance for winter feed for the thirty head of cattle kept.

# EXPERIMENTAL SUB-STATION, SWEDE CREEK, Y.T.

## SEASONAL NOTES

The season 1922 opened with a rather late spring, April being unusually cold. The bright sunshine, which usually averages about eight hours per day during that month, was reduced to 6.3 hours. May and June followed with the usual sunshine and warmth but in July and August the sunshine was far below the average, July being but 5.41 and August 6.08 hours per day.

The total precipitation for the year was 9.1 inches; of this 3.78 inches fell during the growing season, and, of this, only .15 inch fell between the time of seeding beginning May 8 and the 25th of June. Cloudy, damp weather followed during the latter part of June. July, usually clear and warm, was damp and cloudy; rain fell on 18 days. August gave a few warm days in the early part of the month, the thermometer reaching 80 degrees on the 7th, but the latter part was characterized by storm, rain and sleet.

The following meteorological report for 1922 gives temperature precipitation and sunshine:—

| Months | Temperature | | | | Precipitation | | | Bright sunshine | |
|---|---|---|---|---|---|---|---|---|---|
| | Maximum | Date | Minimum | Date | Rain | Snow | Total | Total hours | Average |
| | | | | | ins. | ins. | ins. | | |
| January | 27 | 3 | −52 | 28 | ..... | 11·5 | 1·15 | 5·0 | 0·16 |
| February | 6 | 28 | −60 | 10 | ..... | 2·5 | 0·25 | 7·73 | 0·27 |
| March | 31 | 31 | −45 | 16 | ..... | 3·5 | ·35 | 198·4 | 6·4 |
| April | 57 | 30 | −12 | 15 | ..... | 4·5 | ·45 | 189·0 | 6·3 |
| May | 81 | 29 | 16 | 7 | 0·28 | ..... | ·28 | 277·3 | 8·94 |
| June | 78 | 8 | 30 | 5 | 1·11 | ..... | 1·11 | 260·8 | 8·69 |
| July | 79 | 25 | 31 | 19 | 1·72 | ..... | 1·72 | 167·8 | 5·41 |
| August | 80 | 7 | 18 | 30 | ·67 | ..... | ·67 | 188·6 | 6·08 |
| September | 60 | 8 | 16 | 1 | ·68 | 9·0 | 1·58 | 102·0 | 3·4 |
| October | 46 | 3 | 27 | 11 | ·465 | 1·25 | ·59 | 60·8 | 1·96 |
| November | 34 | 2 | −24 | 17 | ..... | 4·25 | ·425 | 8·1 | ·27 |
| December | 12 | 1 | −46 | 16 | ..... | 5·25 | ·525 | ..... | ..... |
| | | | | | 4·925 | 41·75 | | | |

## CEREALS

On May 6, work was commenced preparing land for grain. The seeding was started on May 8 and finished on May 18, and included 3½ acres Banner oats, 2½ acres Victory oats, ½ acre Success barley, ½ acre Manchurian barley, 1¼ acre Prelude wheat, ¾ acre Ruby wheat.

Owing, no doubt, to the excessively dry weather during May and June, all grains except barley were slow in germinating, but after the rainfall in the latter part of June, the growth was very heavy, but the cloudy, damp weather of July greatly retarded the ripening of grains, all of which were subsequently cut before maturity.

The following were the results obtained:—

RESULTS WITH CEREALS

| Variety | Origin | Sown | Seeding rate per acre | Harvested | Yield per acre |
|---|---|---|---|---|---|
| Banner Oats | Imported | May 8 | 3 bush. | Aug. 15-16 | 73 61 |
| Banner Oats | " | " 12 | 3 " | Aug. 28 | 58 15 |
| Victory Oats | " | " 15 | 3 " | Sept. 1 | ..... |
| Success Barley | Local | " 9 | 2½ " | Aug. 10 | 33 8 |
| Manchurian Barley | " | " 9 | 2½ " | " 12 | 27 40 |
| Prelude Wheat | Imported | " 9 | 1½ " | " 24 | 24 31 |
| Prelude Wheat | Local | " 9 | 1¾ " | " 25 | 21 20 |
| Ruby Wheat | " | " 9 | 1¾ " | " 27 | 18 42 |

The Success barley was harvested on August 10 and yielded 33 bushels 8 pounds per acre, the Manchurian, harvested on August 12, yielded 27 bushels 40 pounds per acre. Both these varieties germinated early and had an enormous stand. The Success was the first grain to head and was struck by frost on July 19. Early in August both varieties began to lodge and consequently were cut when rather green.

One-half acre of Prelude wheat, seeded with imported seed on the 9th of May and harvested on August 24, yielded 24 bushels 31 pounds per acre. Although the yield was far below that of the preceeding year the quality of the grain was very good. A part of this crop was ground into whole wheat flour and, as far as baking tests can prove, it is far superior to the imported whole wheat flour obtained at the local markets, and is eagerly bought by those desiring that grade of flour.

On this date was also seeded three-quarters of an acre each of Ruby and Prelude wheats, using home-grown seed. The Ruby yielded 18 bushels 42 pounds and the Prelude 21 bushels 20 pounds per acre. The quality of the Prelude was very good, baking tests from flour milled equalled the above-mentioned flour milled from that grown from imported seed. The quality of the Ruby was below normal.

One plot of Banner oats of 1⅓ acres on hillside land was seeded on May 8. One acre was cut on August 15, the remaining one-third acre was on lower ground with a very rank growth, and very green; it was left to mature but was not matured on the 29th August when it was killed by a heavy frost and was not harvested. The one acre harvested yielded 2,488 pounds, or 73 bushels 6 pounds.

Another plot of one acre of Banner oats seeded on May 12 on bench land was not fully matured when the August frost came. This was harvested on August 28 and yielded 58 bushels 15 pounds.

On May 15, 2½ acres was seeded with Victory oats on low bench ground. This gave a very heavy and even growth, headed out well, but was too late a variety to mature in such damp weather and was quite green when cut after the August frost. It was cut with the intention of threshing, but was found to be too immature for that purpose.

On May 18 two plots of grain were sown on bottom land. This gave a heavy, rank growth but was not sufficiently matured to thresh.

## FORAGE CROPS

On May 10, 4½ acres were sown with a mixture of alsike, red clover and timothy.

On May 11 seeded 2 acres with sweet clover.

On May 15 seeded 3½ acres with a mixture of clovers.

On May 16 seeded 2 acres with oats, peas and red clover.
On May 23 seeded 2 acres with rye and buckwheat.
On May 23 seeded corn and sunflower seeds for fodder.

With the exception of the buckwheat, the growth of all forage crops was very satisfactory, although it was greatly retarded by the lack of moisture during the early summer, but it grew abundantly after the late June rain.

On the plots of alsike, red clover, and timothy, the clover mixtures, and one acre of the two acres of sweet clover, the young clover plants showed up well, but it is doubtful if they can withstand the winter. The growing season was practically finished on the last of August.

It does not seem advisable to grow clover with a nurse crop in this locality, as the season is too short to allow the clover the required growth after the nurse crop is cut. The Late Swedish clover was seeded on June 16 without a nurse crop and was in excellent condition when the frost came; much better than any other clover. This may possibly be due to its having been sown without a nurse crop.

One acre of sweet clover was ploughed under for green manure.

The two acres of oats and peas and red clover, gave a fine crop, yielding two tons of hay per acre.

The two acres of rye and buckwheat was ploughed under on July 29.

The corn and sunflowers were rather backward until the late June rains.

The Canadian variegated alfalfa, seeded in 1919, was left to seed. The growth of this was enormous, much heavier than any hitherto seen in this locality, but it was cut by the late August frost.

The one-acre plot of timothy, seeded in 1921, was cut on July 25; the yield was one ton of hay. The quality was fair.

The plot of red clover seeded in 1921 looked well in the spring, but it gradually died out during the summer.

## VEGETABLES AND ROOTS

On May 12 and 13 the following were sown:—
Mangels.
Carrots—Chantenay and Oxheart.
Beets—Detroit Dark Red.
Parsnips—Hollow Crown.
Onions—Yellow Globe Danvers and Large Red Wethersfield.
Peas—Thomas Laxton, English Wonder, Gregory Surprise.

Owing to the dryness of the early summer, the growth of these was poor until July, when all took a rapid growth especially the beets, some of which were ready for table use on July 20. Some of the mangels on August 15 weighed as high as 5 pounds. The carrot crop was fair but the parsnips and peas were rather poor.

In early June we transplanted from the hot-bed the following cabbage and cauliflower: cabbage—Copenhagen Market, ersey Wakefield, Danish Ballhead; cauliflower—Early Snowball. The yield of all varieties was very poor. On May 13, seeded one-third acre with imported Arthur peas and on the same date seeded one-third acre with local Arthur peas. The growth was very large but the crop was very green when killed by the late August frost.

On June 6 seeded the following varieties of fall turnips:—
Danish Champion.
Ostersunden.
Bort Felder.
Purple Top Mammoth, or Improved Greystone.

Aberdeen Yellow Purple Top.
Devonshire Greystone.
Pomeranian White Top.
Red Top Strop Leaf.
Yellow Lanlsard.

Like all other roots the fall turnips suffered by the dryness of the early season but there would, no doubt, have been a fair crop, had they not been frozen in at the end of August. The Red Top Strop Leaf was ready for table use on the 8th August and the Ostersunden seems to be the better keeper.

On May 13, 19 and 23, there were planted each of the following varieties of potatoes: Early Ohio, Sussex Rose, Early Rose and Agassiz Special. The potato crop was good, but so many were frozen in the ground before they could be dug that it was impossible to ascertain the exact yield. The Sussex Rose and the Agassix Special undoubtedly gave the largest yields. The quality of the Early Ohio is excellent although the yield is smaller.