DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SWIFT CURRENT, SASK.

REPORT OF THE SUPERINTENDENT

J. G. TAGGART, B.S.A.

FOR THE YEAR 1922

First year growth of Brome and Western Rye grass, (seeded without a nurse crop).

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EXPERIMENTAL STATION, SWIFT CURRENT, SASK.

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THE SEASON

The spring of 1922 was unusually late. The heavy snowfall of the winter disappeared slowly. The early part of April was cold and cloudy with showers and snow flurries. Discing started on April 24 but proceeded rather slowly at first on account of the wet condition of the land. Seeding of wheat was begun on May 3. From May 8 to May 16 work on the land was stopped by wet weather. Rain fell on seven of the nine days of this period. From May 16 on, however, the weather was fine and warm with the exception of one or two days, and work proceeded rapidly. Seeding was finished by June 3.

During the month of June rain and high temperatures alternated in such a way as to make almost ideal growing conditions. There was one adverse factor, however. On June 16, between 1.15 and 1.25 p.m., there occurred an extremely heavy hailstorm. The total precipitation in that short period of ten minutes was 2.17 inches. The fall rye, which had headed about ten days earlier, was damaged more seriously than any other crop. Spring sown cereals, owing to the late season, were not far enough advanced to be permanently injured. All crops were cut to the ground, but so favourable were moisture and temperature conditions that, within a week after the storm, crops had so far recovered that little evidence of hail damage could be observed. Of all the field crops, sunflowers suffered more permanent damage than any of the others. On the whole, the hailstorm was beneficial because it furnished a large amount of moisture which was soon utilized to good effect by the crops.

The July rainfall was light and mostly in the form of scattered, ineffective showers. Temperatures were fairly high, the mean maximum being 78.3°F. However, crops were carried along very well by rain which had fallen in June Early in August the drouth was relieved by several good rains. The last heavy rain fell on August 16. From this on, the weather was dry and hot. Conditions were ideal for ripening and harvesting. Wheat cutting began on August 26; the cutting of late oats was finished on September 8. Harvesting of corn and sunflowers for ensilage began on September 13 and was finished on September 19. The first frost occurred on the night of September 13.

Threshing was started immediately after silo filling and was completed early in October. From the middle of August to the end of the year, precipitation was very scanty and the weather was almost continuously fine. The land was so dry that very little ploughing could be done in the district. This dry weather was, in general, of great advantage to the farmers of the district because it enabled them to thresh and haul to the elevators an unusually heavy crop.

Altogether, the season of 1922 was the most favourable this district has experienced for some years. Yields of forty bushels of wheat per acre were fairly common. On the Station the greater part of the Marquis wheat yielded 39 bushels per acre, and the Banner oats ran from 70 to 100 bushels per acre.

ANIMAL HUSBANDRY

HORSES

The horses now owned by the Station number eleven; five mares and six geldings. Two of the geldings are not yet broken, and one has passed his period of greatest usefulness. This leaves eight effective work-horses. Of the eleven horses, five were transferred to this Station from the Indian Head Farm, and six were purchased locally. No horse breeding and no experimental work with horses have yet been attempted. It may be interesting to note that, at the end of December, all but two of the horses are still running in the stubble fields getting only what feed they pick up. These horses are all in excellent condition.

CATTLE

The herd of cattle consists of fifteen pure-bred Shorthorns and two grade Shorthorns. All of the pure-breds, excepting the herd bull and the three calves which have been dropped since June 1, were transferred to this Station from Indian Head in May, 1922. The herd bull was purchased from G. K. Allonby, of Crossfield, Alberta. He is a very good individual of beef type and both his dam and granddam have excellent R. O. P. milk records. The cattle are now in good, thrifty condition and show every indication of being good foundation stock from which to develop a herd of dual-purpose Shorthorns. Such a development will necessarily require some years of effort. It is hoped, however, that substantial progress will be made each year and that, ultimately, stock of considerable value to the country will be available for sale to the farmers. The wintering ration for the cattle consists of corn and sunflower ensilage, oat straw, cut oat sheaves, rye hay and a mixture of oat, barley and rye chop.

FIELD HUSBANDRY

The field husbandry experiments which have been laid down in 1922 are designed to secure information on a number of important farm problems. In a general way, the problems being studied may be grouped as follows:—

1. *Soil cultivation for, and methods of seeding, cereals.*—This includes experiments on methods of summer-fallowing, stubble treatment, the use of packers, and comparative values of different types of seed drill.

2. *Methods of harvesting cereals;* the comparison of the combine with methods commonly in use.

3. *Crop rotations.*—Rotations which are designed to lessen the danger of complete failure and to prevent soil drifting and depletion of the organic matter of the soil, are being compared with straight grain-growing rotations, particularly with a view to seeing whether the introduction of other crops will make it possible for farmers to maintain wheat yields at a profitable level.

4. *Methods of seeding grasses and clovers.*—The efforts of farmers in this part of Saskatchewan to grow grasses have not been particularly successful. Our experiments will, it is hoped, determine whether failures have been due to faulty methods of culture, unusually dry seasons, or, as some claim, to the fact that the country is not adapted to the production of tame grasses.

5. *The culture of winter rye and winter wheat.*—These being autumn sown crops, require different preparation and must occupy a different place in the rotation from spring-sown cereals, consequently experiments to determine the best place in the rotation and the best cultural treatment for these crops have been started.

6. *Methods of cultivation for corn, sunflowers, and other intertilled crops* and the influence of these crops on succeeding grain crops, are being studied by means of a series of suitable experiments.

BOTH FIELD AND PLOT EXPERIMENTS

While extensive investigation at other stations has established the fact that small plots (1/40 to 1/20 acre) when replicated three or more times produce more accurate results than larger areas unrepeated, it has been decided to conduct a number of the experiments outlined above on both plots and fields. This method will answer the objection frequently raised by farmers and others that results obtained on small plots do not apply under farm conditions.

Results from both fields and plots will be obtained simultaneously on a number of important problems. The chief experiments which are being conducted on both plots and fields are those dealing with summer-fallow methods, stubble treatment, seed drill tests, packer comparisons and several of the rotations.

STUBBLE TREATMENT

The purpose of this experiment is to determine the influence of each of eight different cultural treatments of stubble land on the yield of spring wheat.

For this purpose a field of seventy-two acres (exclusive of roads and paths) has been laid out on the northwest corner of the farm. This area was first divided into three fields of twenty-four acres each, separated by suitable roads and paths. A three-year rotation of fallow, wheat, wheat was laid down on these fields. Each of the twenty-four acre fields was again divided into eight plots of three acres each. In the summer-fallow year, a uniform treatment is given to the eight plots. For the first crop after the fallow, Marquis wheat is seeded at a uniform rate of one bushel per acre on all of the plots. Care is exercised to keep all controllable conditions as uniform as possible. The plots are harvested, threshed and weighed separately. In preparation for the second wheat crop, each of the eight plots receives one of the eight treatments described below. All other conditions as far as possible are kept uniform. If the various treatments have different values, this fact will be shown by the yields obtained.

The stubble treatments are:—

1. Plough in autumn, harrow. In spring harrow, seed.
2. Disc after binder, spring plough, harrow, seed.
3. Spring plough, harrow, seed.
4. Discstubble in spring, seed.
5. Burn stubble in spring, plough, harrow, seed.
6. Burn stubble in spring, disc, seed.
7. Burn stubble in spring, Disc, seed.
8. Burn stubble, seed without other treatment.

All crops on plots one to six are cut with the binder, leaving a short stubble. Plots seven and eight are cut with a header or with the combine, leaving as long a stubble as possible. In 1923, these experiments will be duplicated on small plots one-fortieth acre in size.

SUMMER-FALLOW TREATMENT EXPERIMENT

The purpose of this experiment is to determine the influence of the method of fallowing on the yield and economy of production of wheat.

Plots of two acres each are used. A three-year rotation of fallow, wheat, wheat is followed. Each field of the rotation is divided into six plots and each plot receives a different treatment in the summer-fallow year. All other treatments are uniform.

The summer-fallow treatments are as follow:—

1. Plough six inches before June 15 and cultivate as required.
2. Fall plough after second year wheat is removed and cultivate only during summer-fallow year.
3. Cultivate in spring until July 15, then plough and leave untouched.
4. Light disc after second year wheat is removed and cultivate throughout the summer-fallow year. (Do not plough.)
5. Cultivate only throughout summer-fallow year.
6. Seed with second wheat crop five pounds of sweet clover. Plough down the following year and cultivate as in No. 1 treatment.

A study of the details of these six methods of summer-fallowing will indicate that an effort is being made to work out a cheaper method than the one now commonly used and, at the same time, overcome some of the disadvantages usually associated with the bare fallow.

All experiments on fallow treatment and stubble treatment were started in 1922. No yields can be given for this year because in all cases the outcome of the experiment depends upon the cultural work of the preceding year.

In 1923, yields resulting from various stubble treatments will be available and, in 1924, complete data will be secured.

PACKER EXPERIMENTS

Object.—To determine the influence of different packers used at different times on the yield of wheat.

The method in general is the same as that described for stubble treatment, excepting, of course, that the use of the packer is the varying factor. All other conditions are as far as possible uniform on all plots. A three-year rotation of fallow, wheat, wheat is used. The plots are two acres each and three general treatments are given. These are:—

(a) *Cultipacker.*

1. Harrow and pack summer-fallow after ploughing.
2. Cultivate, seed first year wheat and pack.
3. For second crop of wheat spring plough, harrow, pack, seed, and pack.

(b) *Subsurface Packer.*

1. Harrow and pack summer-fallow after ploughing.
2. Cultivate, seed first year wheat and pack.
3. For second crop of wheat spring plough, harrow, pack, seed, and pack.

(c) *No Packer.*

1. Harrow summer-fallow after ploughing.
2. Cultivate, seed first year wheat.
3. For second crop of wheat spring plough, harrow, and seed.

In 1922 all plots were seeded on uniformly prepared land which had been broken and worked down in the previous year. Where packers were used, the packing was done immediately after seeding. The yields for 1922 from packed and unpacked fields are shown in the following table:—

PACKER EXPERIMENT YIELDS, 1922

Field No.	Treatment		Wheat yield per acre	
			bush.	lbs.
1	Cultipacker			
4	Cultipacker	average...	33	20
2	Not packed			
5	Not packed	average...	32	50
3	Surface packer			
6	Surface packer	average...	34	10

SEED DRILL EXPERIMENT

To compare the yields of wheat and oats from fields seeded with drills of different types.

A three-year rotation of wheat, oats, fallow is used. Standard treatments are followed throughout, with the exception of the method of seeding. Each field to be seeded is divided into four plots. One is seeded with a double disc drill, the second with a single disc drill, the third with a single disc press drill, and the fourth with a hoe drill. These experiments are being conducted on both light and heavy land, to discover to what extent the results obtained from different drills are influenced by the soil on which they are used.

ROTATIONS

In addition to the cultural experiments described, several rotations have been laid down on a field scale. The most important of these is a seven-year rotation covering sixty-three acres (exclusive of roadways). This rotation, while not directly adaptable to farmers' conditions at the present time, combines features which, according to present knowledge, should produce a high degree of drouth resistance, prevent soil drifting and the depletion of soil organic matter.

The rotation is as follows:—

First year.—Corn.

Second year.—Wheat. Seeded one-third to brome, one-third to western rye, and one-third to sweet clover.

Third year.—Hay.

Fourth year.—Early pasture and fallow.

Fifth year.—Wheat.

Sixth year.—Fallow. Fall rye seeded.

Seventh year.—Fall rye.

In adjoining fields and on the same kind of soil, three dry land grain growing rotations have been laid down. These are:—

1. Fallow, wheat, oats.
2. Fallow, wheat.
3. Fallow, fall rye.

The fallow wheat and fallow fall rye rotations are the most extreme forms of dry farming practice. It will be interesting to note the cost of growing crops in these various rotations and to watch the effect of each on the soil.

No data on yields from these various rotations are available for 1922 because the work was only started this year, so that previous treatments called for by the rotation plans could not be given. The rotations will be fully established in 1923.

EXPERIMENTS ON FORTIETH-ACRE PLOTS

In the spring of 1922, an area of twenty acres of the most uniform land on the Station was set aside for plot experiments. Provision was also made for increasing the area devoted to plot work from year to year. A brief description of the method of laying out the plots might be of interest. The field is first divided into ranges 118 links in width and separated by rod roadways. Ranges are then divided into blocks, each block 425 links in length. Roadways between blocks are one rod in width. Each block contains seventeen plots. One plot, and one path which is used to separate plots, are twenty-five links in width. When plots are seeded with a sixteen-run seed drill two extra rows are seeded on each side. These rows are removed and discarded before harvest, thus leaving the net width of the plot 21·2 links or 14 feet. When crops are planted in rows, four rows spaced at 42-inch intervals are put on each plot.

In laying down all experiments, the plan of using every fifth plot in each block as a check is followed. Thus, in each block, plots 1-5-9-13-17 are checks, given a uniform treatment or planted to the same variety, as the case may be. The other twelve plots in each block are the test plots.

Experimental work in plots includes a duplication of all work being done on larger areas in the fields. There is also a great deal of work conducted on plots which cannot be laid out in fields because of lack of space.

FALL RYE PLOTS

In one experiment to determine the best date of seeding, fall rye is sown at ten different dates from July 1 to October 1. Fall rye and summer-fallow alternate in this experiment. In another experiment, fall rye is seeded on four different dates from July 15 to September 1 at four different rates, varying from two to five pecks per acre.

The question as to what place rye should occupy in a rotation with other crops, is being investigated by means of five different combinations of fall rye and other crops. The place of rye in each rotation is indicated below:—

1. Plough barley stubble, seed rye.
2. Plough grass sod, seed rye.
3. Seed rye in wheat stubble after binder.
4. Seed rye with oat crop in late spring.
5. Seed rye in sunflower stubble.

A suitable three-year rotation is followed in each case. In three adjoining plots rye follows rye continuously.

CULTURAL METHODS—CORN AND SUNFLOWERS

To determine the best spacing in the row and to compare hills and rows, parallel experiments with corn and sunflowers have been started on four blocks of two adjacent ranges. A two-year rotation of corn or sunflowers alternating with wheat is used. The distance between all rows is 42 inches. Spacing of plants in the row is from 3 to 18 inches. All hills are 42 inches apart each way and in different plots. Hills contain 1, 2, 3, and 4 plants. An excess of seed is planted in all cases and the crop is thinned to the required condition. Corn yields in this experiment for 1922 are given in Table 2. The sunflowers were so badly damaged by hail that it was impossible to get any accurate idea of the influence of the different methods of planting.

CORN CULTURAL EXPERIMENT

Method of seeding	Date of seeding	Height before cutting	Date of cutting	Yield in pounds per acre green weight
		feet		
Rows 12" x 42"	May 25	6½	Sept. 13	20,200
Rows 12" x 42"	" 25	6½	" 13	19,200
Rows 12" x 42"	" 25	6½	" 13	18,680
Rows 18" x 42"	" 25	6½	" 13	20,200
Rows 6" x 42"	" 25	6½	" 13	18,760
Rows 3" x 42"	" 25	6½	" 13	23,200
Rows 12" x 42"	" 25	6½	" 13	21,080
Hills 42" x 4" 1 plant	" 25	6½	" 13	8,920
Hills 42" x 42" 2 plants	" 25	6½	" 13	13,720
Hills 42" x 42" 3 plants	" 25	6½	" 13	16,440
Rows 12" x 42"	" 25	7	" 13	17,160
Hills 42" x 42" 4 plants	" 25	7	" 13	18,040
Rows 12" x 42"	" 25	7	" 13	18,000 (weeds allowed to grow)
Rows 12" x 42"	" 25	7	" 13	21,200 (weeds clipped-not cultivated)
Rows 12" x 42"	" 25	7	" 13	21,800 (cultivated twice-hoed once)
Rows 12" x 42"	" 25	7	" 13	20,880 (Cultivated once)

FALLOW SUBSTITUTES

To compare various intertilled crops with summer-fallow as to their effect on the succeeding wheat crop, an experiment was arranged, to run in a two-year rotation, consisting of fallow substitutes alternating with wheat. There was also included in this experiment a number of oat plots alternating with wheat, to get a comparison of continuous grain cropping with wheat and fallow substitutes. Corn, being the only established fallow substitute, is used as a check. All rows are 42 inches from centre to centre. The 1922 yields are given in the following table. The real test of the value of this method of cropping will come in 1923 when wheat follows the various crops listed in this table.

FALLOW SUBSTITUTES

Crop	Date seeded	Spacing, etc.	Yield of grain in lbs. per acre	Yield of grain in bushels per acre	Yield of straw in pounds per acre	Yield in lbs. per acre green weight	Yield in lbs. per acre dry matter
Corn	May 25	12" x 42"				16,400	2,788
Sunflowers	" 25	12" x 42"				24,600	3,690
Potatoes	" 25	12" x 42				8,520	
Corn	" 25	12" x 42"				21,400	3,638
Oats	June 6	6" 2 bu	2,000	58 28	2,680		
Oats	May 25	Double rows	1,720	50 20	2,280		
Oats	" 25	6" ½ bu	2,120	62 12	2,440		
Corn	" 25	12" x 42"				17,440	2,958
Oats	" 25	Triple rows	2,000	58 28	1,880		
Oats	" 25	6" 2 bu	2,400	70 20	2,480		
Wheat	" 25	Double rows	1,120	18 40	1,760		
Corn	" 25	12" x 42"				18,520	3,145
Wheat	" 25	Triple rows	1,280	21 20	1,840		
Barley	" 25	Double rows	1,120	23 16	1,520		
Sudan grass		Db. row 36"				7,120	1,908
Corn	May 25	12" x 42"				9,800	1,960

SEEDING TO GRASS AND CLOVER

Six different methods of seeding down to grass are being tried. The grass used is a mixtur of bone and Western rye, six pounds of each per acre. The same six methods are being tried, using sweet clover at the rate of ten pounds per acre instead of the grass mixture. Grasses and clovers were seeded in 1922 and will be seeded each year henceforth. It will be impossible to get complete data from these experiments until 1924 The six methods are as follow:—

1. Seed with first year wheat.
2. Seed between rows of corn.
3. Seed alone on summer-fallow.
4. Seed alone on spring ploughed stubble land.
5. Seed in the spring on fall rye.
6. Seed with second year wheat crop.

The following rotations are used to locate the methods of seeding described:—

METHODS OF SEEDING DOWN

Methods	1st year	2nd year	3rd year	4th year	5th year
1	Wheat	Fallow	Wheat (seeded)	Hay	Fallow.
2	Wheat	Wheat	Corn (seeded)	Hay	Fallow.
3	Wheat	Fallow	Grass (seeded alone)	Hay	Wheat.
4	Fallow	Wheat	Grass (seeded alone)	Hay	Wheat.
5	Wheat	Fallow	Rye, (grass seeded)	Hay	Fallow.
6	Fallow	Wheat	Wheat (seeded)	Hay	Wheat...

THE USE OF THE COMBINED REAPER-THRESHER

ARRANGEMENTS FOR THE TEST

The fact that a combination reaper-thresher has been used in various arid and semi-arid wheat-growing regions for many years with a high degree of success has suggested the idea that this machine might be used in parts of Western Canada to reduce the cost of harvesting and threshing the wheat crop.

Arrangements were made with the Massey-Harris Company of Toronto by which their machine should be used and a part of the cost of the test borne by them and part by the Experimental Farms Branch.

THE MACHINE

The machine, as its name implies, cuts and threshes the grain in one trip over the field. It is really a combination of a binder minus the binding attachment and a small separator without the usual feeder and blower. A twelve-foot swath of grain is cut at whatever height is necessary to get all of the heads. The cutting arrangement is perhaps more comparable to a header than to a binder. The cut grain is carried directly to the separator, from which the threshed grain is deposited in a wagon box attached to the left side of the combine. The straw and chaff are dropped at the rear in a windrow. All of the cutting and separating mechanism is operated by an engine mounted on the frame of the combine. The machine may be drawn by a tractor or by horses. With the former at least 12 horse-power on the drawbar is necessary. When horses furnish the traction at least eight should be used. The combine will cover from 30 to 35 acres per day. Combines of various widths up to 30 feet are in use. The acreage harvested by the combine depends, of course, upon the width of cut and the rate of speed at which it is drawn.

Reaper-thresher. View showing width of cut, 12 feet. Grain to right cut with binder.

Reaper thresher; rear view.

THE CROP

The crop selected for the first part of the test was a thirty-acre field of Marquis wheat seeded on May 8 at the rate of one bushel per acre, on breaking. The straw, which averaged 36 inches in length, stood up well until the time of cutting. with the exception of a small percentage damaged by sawfly. The yield of grain was thirty-nine bushels per acre.

DATE OF CUTTING

An adjoining field which had received identical treatment, excepting that it was seeded one week later, was cut with the binder on August 25. The field which was harvested with the combine was in good condition for cutting with the binder on August 21. It could have been cut, if necessary, on August 17.

The first attempt to use the combine was made on August 30, but it was abandoned on account of too high a percentage of green kernels and too high a moisture content. Although the field looked uniformly ripe, it developed upon cutting that there were enough green heads to make the possibility of storing the grain doubtful. By September 1 the moisture content of the wheat had fallen to eleven per cent and, although green kernels were still in evidence, they were fewer in number and the wheat, as a whole, seemed quite hard. The greater part of the field was cut on September 1 and 2. The balance was finished on Monday, September 4.

STORING THE GRAIN

The bulk of the grain was harvested in two days and stored in a bin as it came from the combine. A thermometer was kept in the bin and at no time did the temperature go above 95°F. The daily maximum temperatures of the air outside the granary were running between 85° and 90° at this time. While the wheat was not offered for sale directly from the combine, it is doubtful if it would have been acceptable to the trade on account of a percentage of soft kernels. After having been stored in the bin for four months the wheat does not show any signs of deterioration.

SHATTERING OF STANDING GRAIN

While there was some shattering of the standing crop while it was approaching the degree of ripeness essential to the satisfactory use of the combine, the loss from this cause was very little more than in the field which was cut with the binder. After threshing of the adjoining field was completed, an estimate of the relative amounts of wheat left on the ground by the two methods of harvesting was made. While definite amounts cannot be stated with any assurance of accuracy, it was quite evident that there was less wheat lost where the combine was used. This is a point of great importance, but it is by no means certain that the same result would be found every year.

THE WEATHER AT THE TIME OF THE TEST

From the time when cutting could have been done with the binder until the test of the combine was completed, i.e. August 17 to September 4, almost ideal harvest weather prevailed. There was only one light shower of rain and not hail. There were no high winds; the highest was on August 24 when the maximum wind velocity was 20 miles per hour and the total for the day was 244 miles. Temperatures were almost uniformly high. On all but one day the maximum temperatures ran between 80°F. and 90°F. It does not require much knowledge of the weather conditions of this territory to know that conditions might have been different than those described above.

THE COST OF OPERATING THE COMBINE

Apart from possible loss, or damage to the crop, the cost of harvesting by means of the combine is the consideration which will be of greatest interest to farmers. Nothing more than rough estimates of the relative cost of the two methods of harvesting can be given. From the following facts, farmers may make estimates for themselves. The combine costs about $2,000. It will harvest and thresh from 30 to 35 acres per day. It is operated by two men plus one 12-20, or larger, tractor or eight horses. In our test, a Massey-Harris 12-20 tractor was used to draw the combine. The fuel consumption of the tractor and the engine which operated the mechanism was forty-two gallons of gasoline for thirty acres, or 1.4 gals. per pacre. Fuel would cost at this rate less than 60 cents per acre, and oil and grease should not exceed 10 cents per acre. Wages of the operators would not amount to more than 75 cents per acre. Exclusive of depreciation on any of the machinery, the cost of cutting and threshing an acre would not exceed $1.50. Depending on the crop, the saving would amount to anything up to 15 cents per bushel.

ADVANTAGES IN USING THE COMBINE

The advantages of the combine have been fairly well set forth in the discussion of the cost of the work. If conditions prove to be satisfactory for the use of the combine, undoubtedly its use will reduce the cost of harvesting and eliminate a great part of the trouble now experienced in securing harvest help.

Leaving a long stubble and depositing the straw on the ground may be regarded as a doubtful advantage by some. It is significant, however, that almost invariably this is the first point to be observed by experienced farmers. They believe that the straw and stubble left by the combine would hold snow during the winter and also enable them to get a clean burn the next spring, thus destroying large numbers of weeds. The influence of clean burning on Russian thistle may be a matter of conjecture, but it probably would not do any harm.

DISADVANTAGE

Certain obvious disadvantages of the combine must be recognized; these are:—

1. Loss by shattering due to the necessity of allowing the crop to stand until it is hard in the head.
2. The possibility of complete loss of the crop by hail, snow, or heavy wind-driven rainstorms.
3. The danger of spoilage after grain has been binned.
4. Possible refusal of the grain trade to accept wheat direct from the combine or to accept it at a discounted price, due to the opinion that it would not be properly ripened and hardened to make first-quality flour.
5. Even if there were no other objection to the combine, the cost of making a complete change in the type of harvesting machinery would be very considerable.

TEST TO BE CONTINUED

While the objections and disadvantages mentioned here did not appear to be material this year, it must not be forgotten that some of them would certainly have an important bearing on the usefulness of the machine in some years.

Only continued testing under the varying conditions which prevail from year to year can settle definitely whether it will be safe and economical for farmers to use the combine to harvest their grain crops. Therefore the machine has been purchased by the Station, to be further tested in succeeding years.

GENERAL FARM CROPS

In addition to the areas devoted to rotations and other experiments there is some land which is not suitable for experimental purposes which is being used to produce feed crops, such as oats, barley, rye, corn fodder, and sunflowers. Highly satisfactory yields of all these crops were obtained this year. Oats yielded from 70 to 100 bushels; barley, 41 bushels; and rye, 30 bushels, per acre. Corn yielded over 10 tons, and sunflowers over 16 tons, green weight, per acre. As mentioned in the discussion of the season, both of these crops suffered somewhat from the hailstorm on June 16. The yields indicated above were obtained from fields which did not suffer the same degree of hail damage as some other fields. Two fields, one of corn and one of sunflowers, were so badly damaged by hail that yields were reduced to less than 4 tons per acre. In general, damage to the sunflowers were more severe than to the corn. Corn in all cases seemed to make the better recovery.

All of the sunflowers and the greater part of the corn were put into the crib and trench silos; 125 tons of ensilage were stored. Approximately ten tons of green corn were stooked in the field and cured into fodder. This corn fodder is readily consumed by both cattle and horses with very little waste.

While more than three thousand bushels of oats were threshed, a good part of the oat crop was cut for green feed. Forty-five acres were used in this way. About one-quarter of the sheaves was stored without cutting, and the balance was put through the cutting box and blown into the barn loft. This was found to be a convenient and efficient way of handling and storing the feed. It also had the advantage of reducing waste in feeding by causing the stock to eat the larger proportion of the straw.

FALL RYE, HAY AND GRAIN

Prior to the hailstorm on June 16 we had two very promising fields of fall rye; one of the Dakold variety, and the other, Rosen. The Rosen did not winter as well as the Dakold, was thinner and somewhat later. Nevertheless, it looked as if it should yield at least 30 bushels per acre. The Dakold had been in head for ten days, and the Rosen, four days, when the hail occurred. Apparently both fields were ruined by the hail. Accordingly all the broken, tangled mass of rye that could be cut was made into hay. The quality of the hay was not particularly good, partly on account of weathering that took place before it could be cut and partly because the rye was too far advanced to make a good quality of hay. However, both cattle and horses eat it fairly well. The Dakold rye showed little evidence of making a second growth. The field was ploughed and worked down as soon as possible after the removal of the hay. The Rosen rye, being later, made a considerable second growth, and it was left for seed production. The crop was cut on August 29. It yielded 23 bushels per acre. These facts give some idea of the productive power of fall rye under favourable conditions.

HORTICULTURE

The only horticultural work which could be designated as experimental was a test of seventeen varieties of potatoes. The seed for this test was obtained from the Lacombe Station. The growing potatoes and, later, the tubers were inspected for disease by an officer of the Botanical Division. Yields and percentages of marketable tubers for the seventeen varieties are shown in the following table:—

POTATOES—VARIETY TESTS

Variety	Colour	Per cent marketable	Yield per acre	
			bush.	lbs.
Carter Favourite	White	80	178	40
Duchess of Norfolk	White	83	216	0
American Wonder	White	80	147	20
Green Mountain	White	86	235	0
Country Gentlemen	Pink	88	84	0
Gold Coin	White	85	233	20
Irish Cobbler	White	92	164	0
Houlton Rose	Red	85	221	20
Extra Early Eureka	White	85	225	20
Early Hebron	Pink	90	170	0
Early Ohio	Red	80	134	40
King Edward	Pink-eyed	90	202	40
Burnaby Mammoth	Pink	85	134	40
Wee MacGregor	White	90	192	40
Ashleaf Kidney	White	84	170	40
Epicure	Pink	80	206	40
Duke of York	White	85	146	0

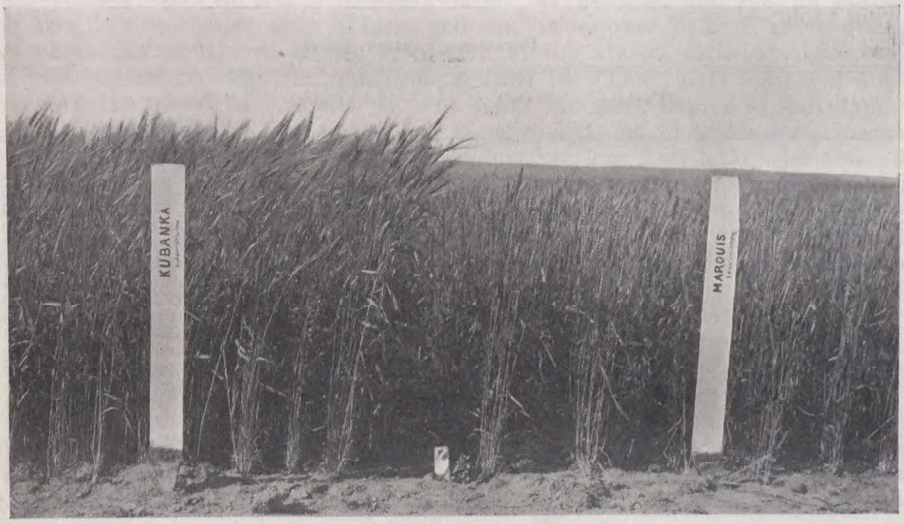
A small vegetable garden including most of the common vegetables was planted. Many of these did very well. Some were badly injured by the hail. Tomatoes and beans suffered particularly in this respect, or at least they failed to make the same recovery as some of the others. A very fine lot of different varieties of strawberry plants was received in the early spring from the Division of Horticulture of the Central Farm. These were planted and were doing very well, but they were almost completely destroyed by the hail.

In April we received 5,000 caragana shrubs and about 3,000 cuttings of Russian poplar, together with a number of year-old Manitoba maples from other western stations. A large part of the caragana was planted in permanent locations for hedges. The balance of the caragana and all the maples and poplars were planted in a nursery. All of these will be set in permanent locations in the spring of 1923. This plan was adopted because building operations and the grading of roads made it impossible to place these shrubs and trees in permanent locations without having them injured or destroyed by teams and implements.

CEREALS

In the cereal division the chief work at present consists of testing and comparing the most promising varieties of cereal grains. This work has been carried on so extensively at other Stations in past years that we do not expect to make it a very important feature of the work at this Station. New varieties are constantly being offered to farmers with the assurance that they are better than anything now being grown. So long as this is the case, it is necessary to be in a position to give as definite answers as possible to questions regarding the merits of new varieties. We are not at present in a position to engage in cereal breeding work. Our efforts are therefore limited to testing varieties

already in use. Corn may be used either as a cereal or as a fodder crop. Its chief value to this country at present, and possibly for the future as well, is as a fodder and ensilage crop. This, however, does not preclude the possibility of producing seed. The usefulness of a number of varieties of corn for grain production is being studied.



Wheat varieties. Kubanka, left; Marquis, right.

In 1922 it was possible to grow cereal varieties only on land which had been broken in the preceding year. In succeeding years they will be grown on both fallow and stubble land. The yields of wheat, oat, and barley varieties for 1922 are given in the following tables. In examining these figures the reader should remember that they show the results of only one year's tests and therefore cannot be used as an index of the relative merits of the different varieties. The wheats were all sown on 22nd, the oats on 24th and barleys on 26th May.

WHEAT—TEST OF VARIETIES

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Yield in bushels per acre	Pounds of straw per acre
			inch.	bush. lbs.	
Marquis, Ottawa 15 (check)	Aug. 26	96	33	32 0	3,280
Ruby, Ottawa 623	" 20	90	37	31 20	3,160
Pioneer, Ottawa 195	" 21	91	36	35 20	3,200
Early Red Fife, Ottawa 16	" 28	98	36	30 40	3,160
Marquis, Ottawa 15 (check)	" 26	96	36	32 40	3,240
Red Fife, Ottawa 17	Sept. 2	103	39	28 40	2,640
Red Bobs Supreme	Aug. 28	98	37	32 0	2,520
Red Bobs Triumph	" 25	95	36	27 20	2,280
Marquis, Ottawa 15 (check)	" 25	95	35	32 40	2,960
Kitchener	" 28	98	35	38 0	3,440
Emmer	" 25	95	34	29 20	2,320
Kubanka, Ottawa 37	Sept. 2	103	40	37 20	3,080
Marquis, Ottawa 15 (check)	Aug. 28	98	36	35 20	3,240

OATS—TEST OF VARIETIES

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Yield in bushels per acre	Pounds of straw per acre	Remarks
			inch	bush. lbs.		
Banner, Ottawa 49 (check)	Aug. 28	96	38	68 14	3,120	
O.A.C. No. 3	" 20	88	37	51 26	2,400	Small amount of smut.
Daubeney, Ottawa 47	" 21	89	36	68 8	2,160	
Alaska	" 21	89	37	55 10	2,320	Small amount of smut.
Banner, Ottawa 49 (check)	" 28	96	37	80 0	3,320	Small amount of smut.
Liberty, Ottawa 480	" 26	94	42	48 8	3,440	
O.A.C.* 72	Sept. 2	101	46	71 26	3,320	Small amount of smut.
Gold Rain	Aug. 28	96	41	70 20	3,360	
Banner, Ottawa 49 (check)	" 28	96	37	74 4	3,600	Small amount of smut.
Leader	" 28	96	36	63 18	2,680	

BARLEY—TEST OF VARIETIES

Variety	Date of ripening	Number of days maturing	Average length of straw including head	Yield in bushels per acre	Pounds of straw per acre	Remarks
			inch.	bush. lbs.		
O.A.C. 31 (check)	Aug. 20	86	36	48 16	2,320	
Chinese Ottawa 60	" 20	86	34	48 16	2,680	Heads breaking off Aug. 11.
Barks	" 28	94	30	61 32	2,720	
Trebi	" 18	84	30	63 16	2,840	
O.A.C. 21 (check)	" 20	86	36	50 0	2,520	
Hannchen	" 27	93	30	62 24	3,320	Lodged badly on Aug. 8.
Duckbill, Ottawa 57	" 28	94	30	56 32	2,800	
Albert, Ottawa 54	" 14	80	31	31 12	2,060	
O.A.C. 21 (check)	" 20	86	38	48 16	2,600	

FORAGE CROPS

The production of a sufficient supply of forage crops to enable farmers to increase their livestock holdings is a matter of great importance to the development of a system of permanent agriculture in this district. A number of lines of experimental work have been started with a view to obtaining information which will contribute to the solution of this problem.

All crops which show any promise of value for fodder or ensilage purposes are being tried out. These include a number of varieties of corn as well as sunflowers, millets, Sudan grass, sweet clover (annual and biennial), white and yellow oats, and various mixtures of oats with other crops, spring and fall rye, alfalfa and the standard perennial grasses such as Brome and western rye.

Not only is an effort being made to determine the value of these various crops, but the economical methods of producing them are being worked out. The work with corn is considered particularly important. Considerable success has attended the efforts of farmers who have grown corn in this district. The

corn crop looks more promising than any other fodder or ensilage crop now being grown on this Station. Special attention is being devoted to varieties and general methods of producing the corn crop.

For the present year, yields are available from the annual forage crop and the corn variety tests. In the following table are presented the yields in pounds per acre, green weight, and also pounds per acre, dry weight. The latter weight

First year growth of biennial Sweet clover seeded without a nurse crop.

was obtained by oven drying at 105° C. to a constant weight, a representative sample of each crop. Even after curing, there is ordinarily such a difference in the moisture content of different forage crops that the absolute dry weight is the only accurate basis of comparison.

ANNUAL FORAGE CROPS

Variety	Date of seeding	Date of cutting	Height before cutting	Yield in pounds per acre green weight	Dry matter pounds per acre
			inch		
Banner oats	May 24	Aug. 21	37	14,600	5,256
Spring rye	" 30	Jul. 21	42	9,200	2,160
Common millet	" 30	Aug. 21	33	11,200	2,464
Early Fortune millet	" 30	" 21	33	11,200	3,024
Banner oats	" 24	" 21	37	12,800	4,608
Golden millet	" 30	Sept. 9	33	16,720	3,674
Jap. millet	" 30	Sept. 9	33	15,320	3,567
Hungarian millet	" 30	Aug. 21	33	11,880	2,714
Banner oats	" 24	" 21	37	12,680	4,509
Early Amber sugar cane	" 30	Sept. 9	36	15,800	3,160
Kaffir corn	" 30	" 9	36	8,200	1,648
Sudan grass	" 30	" 9	46	10,320	2,781
Banner oats	" 24	Aug. 21	37	12,000	4,320
Sorghum	" 30	Sept. 9	37	14,720	3,086
Peas and oats	" 30	Aug. 21	Oats 37 Peas 24	12,360	4,305
Hubam	" 30	Sept. 9	34	11,120	1,998
Banner oats	" 30	Aug. 21	37	13,480	4,824

In the table below are shown the yields obtained from the different varieties of fodder corn. In this case it should also be noted that the dry weight per acre is the proper basis of comparison.

CORN VARIETIES

Variety.	Date of seeding	Height	Date of cutting	Degree of maturity	Yield in pounds per acre	
					Green weight	Dry weight
		feet				
N. W. Dent	May 26..	6½	Sept. 13..	Late milk.....	19,240	3,117
Minnesota 13	" 26..	6½	" 13..	Early milk...	21,520	3,658
Leaming	" 26..	7½	" 13..	Early milk...	21,240	3,350
N. D. White Flint	" 26..	4½	" 13..	Glazing.....	15,200	2,523
N. W. Dent	" 26..	6½	" 13..	Late milk.....	20,920	3,640
Improves Squaw	" 26..	5½	" 13..	Dough.....	18,080	3,195
Quebec 28	" 26..	6	" 13..	Dough.....	15,920	2,945
N. W. Dent	" 26..	6½	" 13..	Late milk.....	21,200	3,650

POULTRY

POULTRY HOUSE

A standard 100-hen poultry house was erected on the land which has been set aside for poultry husbandry. Since complete plans and specifications of this house have been published in bulletins issued by the department it will not be necessary to enter into any description of the building. It is sufficient to say that the poultry house has been found entirely satisfactory even though it is not sheltered in any way from the prevailing winds.

In October, 100 single-comb Rhode Island Red pullets were purchased from the C.P.R. Demonstration Farm at Strathmore, Alberta. Owing to delay in getting the poultry house built, the pullets were not shipped until November. Cold weather set in soon after their arrival, which delayed the time at which they started to lay. At the end of the year the pullets are all in good condition and are just beginning to lay. They now give every indication of producing well during the remainder of the winter.

BUILDINGS

During the year two houses were constructed at this Station. One of these is the superintendent's residence, and the other, the boarding-house. Attached to the superintendent's house is sufficient space for the Station office. A small laboratory, for use in connection with soil moisture studies by the Division of Field Husbandry, was constructed early in the year. Two structures of particular interest to stockmen were erected. These are the silo and a shelter for cattle. The silo is of 2 inches by 4 inches crib construction, 13 feet in diameter by 30 feet high. The crib work is lined on the inside with tar paper. 1 inch by 2 inch strips are nailed over the paper, and the whole interior is covered with a cheap grade of spruce flooring. This type of construction makes the walls tight and provides an air space to reduce the amount of freezing. The first three weeks of December were very cold, but the ensilage in the crib silo

showed no sign of frost. A roof and chute constructed of 2-inch by 4-inch material and shiplap complete the silo. The total cost, including labour, was under five hundred dollars.

The Crib silo without roof or chute.

TRENCH SILO

While a trench silo may not be regarded as a building, it will be convenient to describe it here. A trench silo, as the name implies, is simply a trench of any suitable dimensions dug in the ground. At this Station, the trench silo is thirty feet long, eight feet wide, and eight feet deep. All of the excavating was done with horses. The trench was filled with 20 tons of corn. A roof of poles and straw was placed over the trench to prevent it filling with snow when being emptied in winter. When the trench was opened in November a good quality of ensilage was taken out.

CATTLE SHELTER

Since we have no permanent cattle barn, it has been found necessary to devise some suitable shelter and feeding place for the breeding cows and young stock. This was accomplished by enclosing an area 16 feet by 40 feet with a woven-wire fence six feet high. At a distance of five feet outside the first fence a second one of the same kind was constructed. A row of eight-foot posts

was then set along the centre of the enclosure at a distance of eight feet from each other. A ridgepole was secured on top of these posts and more posts were used as rafters. The top of the inside enclosure was covered with woven wire. When this structure was completed straw from the threshing machine was blown and tramped in between the fences to form the walls. Straw to a depth of three feet was spread over the roof and a few wires fastened on the outside to prevent the straw from blowing away. A door of shiplap was hung on one of the side posts. Rough mangers and tie posts were constructed inside the shelter. Gutters were dug in the ground and framed with short pieces of lumber left from other buildings. By using plenty of straw for bedding the cattle are housed very comfortably and they can be cared for without excessive labour.