DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

KAPUSKASING, ONTARIO

RESULTS OF EXPERIMENTS

1931-1936

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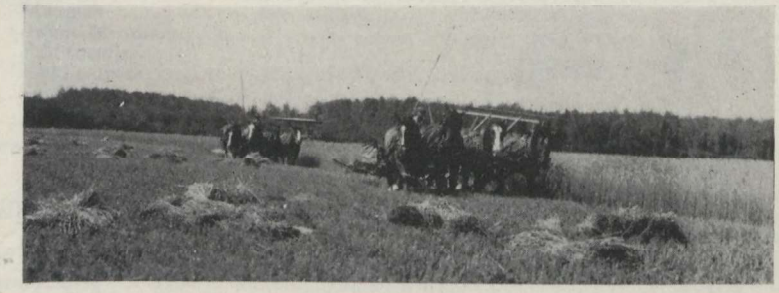
Superintendent



Cutting Reward wheat.

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INTRODUCTION

The area for which this station is carrying on experimental and research work covers the eleven agricultural districts of Northern Ontario. These include Muskoka, Parry Sound, Nipissing, Sudbury, Manitoulin Island, Algoma, Thunder Bay, Rainy River, Kenora, Temiskaming, and Cochrane.

In these eleven districts there are approximately 22,000 farmers. The climate is somewhat similar over the entire area, with naturally the lowest temperatures and the most snow in the more northerly located districts. There is, however, a marked variation in the soil and also in the type of farming followed. For example, some sections are carrying all the live stock that the land will grow feed for, while others are featuring more the selling of cash crops, such as grain and small seeds, including alfalfa, red clover, alsike clover, timothy and mixtures thereof.

Settlement

The actual settlement and the agricultural developement in some of the newer portions of Northern Ontario during the past few years have been somewhat disappointing. No doubt, there are several factors which have been more or less responsible for this situation. One unfortunate feature has been the low price paid for pulpwood and other marketable timber which must be removed from the land, by the settler, before any farming can be done, and on the returns from which he must mainly depend for a living until such time as he has sufficient land cleared to grow crops and keep live stock. Then, again, the expenditure of money on the building of roads was cut down to a minimum. With these two sources of revenue largely cut off or at least seriously reduced, many of the settlers in the more recently opened up sections were forced to accept relief and for some reason under this arrangement little or no tangible progress was accomplished in bona fide settlement.

Agriculture in Northern Ontario, and more particularly in the newer sections, should be in a more thriving and prosperous condition than it is. The area is large and the land is good. All the common field and garden crops may be grown in abundance. In almost every district there is plenty of timber with which to build buildings. There is also an ample supply of shelter, grass, and water for live stock. In addition to these, the large mining and timber centres create excellent markets for the products produced. In fact it is very doubtful if there are any other parts of Canada that offer the same opportunity and inducement as do the newer sections of Northern Ontario to those who wish to carve out a home for themselves under pioneer conditions.

Housing and Buildings

In a climate such as that of Northern Ontario, where the temperature in certain sections occasionally drops to 50 degrees or more below zero, warm buildings should be constructed. Fortunately, in the newer sections at least, there is plenty of timber for this purpose. For those in the settler stage, log structures may be built which are both warm and cheap. These will serve a useful purpose for many years.

After the areas of cleared land become larger and the fire hazard is thereby lessened, permanent frame buildings can then be erected. The timber for these too can, in most cases, be obtained from the spruce or pine that grows in the immediate locality. In all buildings for a cold climate, insulation is of para-

mount importance. At the experimental station here, it has been found that well dried planer shavings make one of the cheapest and best insulating materials for use in frame buildings.

Ventilation is an important factor and is easily controlled where proper insulation is used.

In dwelling houses, one is amply repaid for this extra precaution, in comfort derived and in ease of heating, while in stables, hog pens, poultry houses, etc., the stock will require less feed when they do not suffer from the cold.

Land Clearing

During the past five years, there have been some fairly dry seasons, particularly in certain districts. Dry weather creates the most opportune and the mose economical time for the clearing of new land. This has been taken advantage of by some of those who still had land to clear and as a result, many acres of land have been cleared and brought under cultivation. In addition to that which has been completely cleared, many other areas have been seeded out after burning, with tame grasses and clovers, in accordance with the recommendations of this station, thus creating an abundance of pasture for live stock and at the same time enriching the soil for the future, when it will finally be cleared and ploughed.

It is indeed a pleasing and encouraging sight to drive along the highways of this section and observe the large fields of luxuriantly growing hay, or the equally extensive areas of golden-hued grain, where only a comparatively few years ago the virgin forest was standing supreme and unmolested. Truly the changing of Northern Ontario from a vast and desolate forest to a region of farm homes for thousands of men, women, and children, with its extensive and yet ever expanding areas of cleared fertile fields has been a great and marvelous transformation.

Land Drainage

The soil of Northern Ontario being in the main a heavy clay with an impervious subsoil, it is essential for crop production that some form of artificial drainage be developed.

Two systems have been tried out at this station—namely, tile or underdrainage and the Richard system of "rounded lands" as developed by M. l'abbé Joseph Richard in the province of Quebec.

The tile drainage system has not proved advantageous, and while it has effected some drainage, the resulting increases in yield were not large enough to pay the cost of installation. This system has the serious disadvantage of requiring a considerable capital outlay.

The "rounded lands" system has proved quite satisfactory when suitably established. This is done by dividing each field into a number of permanent lands which are gradually rounded up with normal ploughing operations. After three ploughings the lands usually assume the shape desired. The system requires no capital outlay. The only work additional to that of ploughing may lie in cleaning out the dead furrows, which should be run up and down the slope and not across it, so as to allow the water to get away without hindrance, to the creek or ditch which forms the drainage outlet.

An experiment conducted over a number of years in which the yields of crops grown on lands of different widths could be compared, has shown that these rounded lands need not be so narrow as was advocated at first, but that widths of up to 60 feet have given excellent results, and it is believed that even greater widths than this would be satisfactory.

The fields at this station are all laid down to this system and a great improvement in drainage has been effected. All farmers who have adopted this system report satisfactory results, some using widths up to 80 feet.

ANIMAL HUSBANDRY

Horses, dairy and beef cattle, and swine make up the live stock at this station.

Horses are kept only for draft purposes and no breeding work has been carried on.

With the other live stock an active breeding program has been under way, as well as other lines of experimental work.

Surplus live stock has been disposed of to farmers throughout the district and much improvement has resulted from this distribution of good quality pure-bred breeding stock.

Dairy Cattle

The pure-bred herd of Ayrshires is accredited as being free from tuberculosis and contagious abortion. All animals are entered in R.O.P. and steady improvement has been made in increasing production of milk and butterfat. The average annual production per cow during the last five years was 10,480 pounds of milk containing 4·16 per cent butterfat.

Kapuskasing Supreme Ena 2nd-113465—bred at this station, has produced 65,865 pounds of milk in six lactations.

During the past five years 28 cows entered in R.O.P. successfully completed 46 records between them, one animal having made five, another four, and four others three official records each.

Beef Cattle

The Shorthorns which make up the beef herd have been bred strictly to beef type, but attention has been paid to the milking ability of the females, and all were entered in R.O.P. Splendid progress has been made in increasing milk production since the herd was established. The average annual production per animal during the past five years has been 7,287 pounds of milk containing 4·04 per cent butterfat.

This herd is accredited as being free from tuberculosis and contagious abortion.

In the R.O.P. tests, during the past five years, 44 records have been completed. These were made by 21 cows, two animals having completed five and one four official records each.

Silage versus No Silage for Milking Cows

The problem of supplying a succulent feed for milking cows during the winter has led to the study of whether a feed such as oats and pea silage is necessary and economical.

A feeding test was conducted in which cows were fed rations with and without silage as part of the roughage.

The results of five years show that when silage was fed the average daily production per cow was 23.3 pounds of milk and 0.92 pounds butterfat, while, when silage was not included in the ration, production was 23·2 pounds of milk and 0·93 pounds of butterfat.

As these differences are too small to be of practical significance, the question resolves itself into whether or not the production of silage is economical. It was found that if silage cost one-third as much as hay, it could be fed without increasing the costs of the milk or butterfat.

Data gathered at this station show that the production of oats and pea silage has cost almost two-thirds as much as hay, the figures, over a ten-year period, being silage $7.13 per ton and hay $11.36.

The building of silos and the making of ensilage cannot therefor be recommended in Northern Ontario at the present time, nor until a less costly silage crop is available.

Rations Composed of Home-grown Grains

An experiment is under way in which rations balanced with home-grown proteins from crops such as wheat and peas are being compared with rations balanced with purchased proteins such as bran and oilcake. While this work has not progressed to the point where definite conclusions may be drawn, it appears that satisfactory rations can be made up when balanced with home-grown protein-rich concentrates as long as the hay being fed is of good quality and contains a considerable proportion of legumes.

Cost of Producing Milk

In this study all feeds were charged at current market prices for those produced at the station, and at the actual cost price for those such as oilcake and bran which were purchased.

During the past five years the feed costs of producing milk have varied from $1.01 to $1.37 with Ayrshires and from $1.10 to $1.37 with Shorthorns. The average cost per hundred has been $1.17 with Ayrshires and $1.21 with Shorthorns.

Butterfat also varied somewhat in cost of production but the average for the last five years was 28 cents per pound with Ayrshires and 30 with Shorthorns.

For the farmer with a market for fluid milk, the Ayrshire breed will undoubtedly be the more profitable, but for the one who has a market for cream or cheese milk, and with whom the disposal value of young males and aged females assumes a position of considerable importance, the Shorthorn breed should not be overlooked, as the beef value of the animals is greatly superior to that of the Ayrshire breed.

Swine

Progress has been made with the herd of Yorkshires bred at this station. The type has been improved and the size of litters has increased to a marked degree.

For the five-year period preceding 1931, the average number of pigs per litter was 10·6, while for the last five years it was 13·2, an increase of over 24 per cent.

COST OF RAISING BROOD SOWS TO BREEDING AGE

Over several years, in which 154 sows were raised from spring and fall litters, the cost of raising a sow, when all feed items charged at current market prices, and the cost of the weanling pigs are included, has been $18.86 for spring farrowed sows and $17.81 for fall farrowed sows, an average of $18.33 per sow.

COST OF FEEDING BROOD SOWS

The average cost of the past five years was $44.27 per sow per year. This takes in all items of feed, including pasture during the summer months.

COST OF PORK PRODUCTION

All items being included, such as meal, milk, cod liver oil, salt, and the cost of the pigs at weaning, the cost of producing pork at this station has been $7.13 per 100 pounds live weight during the last five years.

FIELD HUSBANDRY

Meteorological Records

Meteorological records have been kept at this station for the past 18 years. A summary of these follows:—

SUMMARY OF METEOROLOGICAL RECORDS AT KAPUSKASING—1918-1936

Month	Eighteen Year Average				Seventeen Year Ave.
	Temperature Degrees Fah.	Precipitation[1]			Sunshine Hours
		Snow	Rain	Total	
		inches	inches	inches	
January	− 1·4	17·8	0·04	1·82	78·4
February	2·4	9·8	0·06	1·04	102·6
March	13·6	14·0	0·36	1·76	124·4
April	31·1	9·7	1·01	1·98	168·2
May	45·8	2·6	1·63	1·89	217·4
June	57·8	.....	2·26	2·26	221·5
July	62·1	.....	3·24	3·24	228·2
August	59·7	.....	3·14	3·14	202·6
September	51·2	0·4	3·54	3·58	135·6
October	39·3	2·7	2·06	2·33	85·5
November	22·5	14·3	0·97	2·40	48·8
December	6·4	16·4	0·29	1·93	54·0
Annual Total	[2]32·5	87·7	18·60	27·37	1,667·2

[1] In arriving at the total precipitation, ten inches of snow are considered equal to one inch of rain.
[2] Average.

Cost of Producing Farm Crops

In arriving at the cost of producing farm crops, comprehensive records are kept. All items are charged, such as rent of land, use of machinery, man and horse labour, seed and twine, etc., at the current rates in the district. Return values are credited at market prices.

While the cost will vary with seasonal production, and the profit with production and prices, the average figures for ten years are a guide to what can be expected.

COST OF PRODUCING CROPS FOR THE PERIOD 1926-1935

Crop	Ten Year Average				
	Cost per Acre	Yield per Acre	Value of Crop per Acre	Cost per bush.	Profit or Loss (−) per Acre
	$ cts.	bush.	$ cts.	cts.	$ cts.
Spring Wheat (Garnet)	22 68	24·2	30 21	83·2	7 53
Oats (Alaska)	23 44	30·8	21 25	65·0	− 2 19
Barley (O.A.C. 21)	22 69	24·9	22 93	78·9	0 24
Potatoes (Irish Cobbler)	85 53	199·3 tons	178 83	42·6 per ton $ cts.	93 30
Hay (Clover and Timothy)	13 52	1·19	16 13	11 36	2 61
Sunflowers (for silage)	43 18	8·61	30 90	5 02	−12 28
Oats and Peas (for silage)	29 55	4·15	18 50	7 13	−11 05

The large amount of work involved and the comparatively low yields make sunflowers and oats and peas show losses in place of profits.

Had alfalfa been included in the hay mixtures, the yields would have been increased considerably without proportional increases in cost, rendering this crop more profitable.

Rotations of Crops

In order to obtain definite information regarding suitable rotations for Northern Ontario, a number were laid down 11 years ago, consisting of the following, with the crops grown in the order listed.

Three-year cycle—sunflowers, oats, clover hay.
Four-year cycle—sunflowers, oats, clover hay, timothy hay.
Five-year cycle—oats, sunflowers, barley, clover hay, timothy hay.
Five-year cycle—oats, barley, alfalfa and clover hay, alfalfa and timothy hay, alfalfa and timothy hay.
Six year cycle—potatoes, wheat, barley, clover hay, timothy hay, timothy hay.

Record of all expenditures and returns were kept so that the profitableness of the rotations and of the crops in the rotations was arrived at.

The three-year rotation was not found profitable, sunflowers not only being an unprofitable crop, but reducing the yields of subsequent crops. Furthermore, the proportion of hoed crops is so large as to make this rotation impracticable, except under very specialized circumstances, even if the hoed crop were profitable.

In the four-year rotation, the sunflowers were again unprofitable. Apart from this, it is a sound rotation, but it involves considerable ploughing each year.

The five-year rotations were very good, especially the one including alfalfa. Sunflowers once more were a losing crop, but if potatoes or some other crop could be substituted, the rotation would be profitable.

The five-year rotation including alfalfa was among the best, although the absence of a hoed crop was a serious handicap in the control of weeds.

In the six-year rotation potatoes proved to be a very paying crop. However, as only a limited acreage of this crop can be handled, except on specialized farms, some other crop may have to be brought in to take up part of the land in place of potatoes, where the total acreage is extensive.

On the whole the five- and six-year rotations proved to be the most suitable. A variation of the six-year one in which some acreage is sown to peas and oats for hay or ensilage in place of potatoes, and where possible, alfalfa is introduced into the hay mixture, will be very suitable and meet the needs of this district.

Soil Fertility Investigations

LIME

A four-year rotation was limed at the rate of two tons of ground limestone per acre. This rotation consisted of oats, barley, clover hay, and timothy hay, manured at the rate of eight tons per acre, on both the clover hay stubble and barley crops. A similar rotation was treated in exactly the same way, except that no lime was applied. Over a period of 11 years yields on these rotations differed very little, lime producing an increase of 2·7 bushels of barley and 0·14 ton of timothy hay, and a decrease of 1·4 bushels of oats and 0·01 ton of clover hay.

It is obvious therefore, that the application of ground limestone did not increase the yields and would not be profitable.

FARMYARD MANURE COMPARED WITH COMMERCIAL FERTILIZERS AND NO MANURE OR FERTILIZERS

Two four-year rotations were established 11 years ago on an equal basis with oats, barley, clover, and timothy hay. One rotation received eight tons of manure per acre on the clover hay aftermath and on the barley, while the other did not.

Results to date show marked increases from the application of manure amounting to 53 per cent on oats, 48 per cent on barley, 88 per cent on clover hay and 117 per cent on timothy hay.

Another rotation was added to the above five years ago, and the following applications of commercial fertilizers made: oats nothing; barley 100 pounds of nitrate of soda and 300 pounds of superphosphate; clover 100 pounds of nitrate of soda and 75 pounds of muriate of potash; and timothy 100 pounds of nitrate of soda per acre. These applications were also effective, results showing increases of 16 per cent on oats, 85 per cent on barley, 60 per cent on clover hay and 31 per cent on timothy hay over the check rotation.

While not detracting from the value of commercial fertilizers, the results of this work emphasize the great value of farmyard manure, and stress the necessity for producing, conserving, and using manure on the farm if soil fertility is to be built up and profitable returns obtained.

COMMERCIAL FERTILIZERS ON FIELD CROPS

Covering periods of four to five years, certain commercial fertilizers were applied to selected areas in the fields at this station, on which grain and roughages are being produced for live stock feeding. The treatments were applications of ammonium sulphate (20 per cent) 100 pounds per acre, nitrophoska (15-30-15) 100 pounds, diammonium phosphate (21-53-0) 100 pounds, muriate of potash (48 per cent) 75 pounds and triple superphosphate (45 per cent) 100 pounds per acre. With each crop an untreated check plot was harvested.

Results with the various crops follow.

Sunflowers.—Increases were very slight, not being over half a ton for the largest. This would not be profitable.

Oats and Peas.—Fertilizers produced increases ranging from one to one and three-quarters tons per acre over the non-fertilized area.

The largest increase was from nitrophoska when drilled into the soil, and drilling-in produced half a ton more than the same fertilizer applied broadcast.

Superphosphate, while producing an increase of a ton per acre, assisted materially in strengthening the straw, prevented as serious lodging and rendered harvesting operations a great deal easier.

Hay.—Diammonium phosphate and nitrophoska increased the yield of clover and timothy hay about half a ton per acre, while ammonium phosphate produced an increase of about one-quarter ton. The price of hay would determine whether the use of these fertilizers would be a profitable practice.

Oats.—All fertilizers produced increased yields ranging from 5·4 bushels for triple superphosphate to 15·2 bushels from diammonium phosphate. Ammonium sulphate gave an increase of 12·5 bushels and nitrophoska drilled in 13·8 bushels and broadcast 11·4 bushels. Potash gave an increase of 5·5 bushels.

Barley.—As with oats, increases were obtained from the application of all fertilizers. Diammonium phosphate again produced the largest increase amounting to 11·5 bushels per acre.

Drilling-in nitrophoska gave 6·9 bushels more than broadcasting, which again points to the value of working the fertilizer into the soil.

Rate of Seeding Oats, Peas, and Vetches

The commonly used mixtures of oats and peas with and without vetches were experimented with to determine the most suitable varieties and the most productive combinations and rates of seeding per acre.

Alaska oats with station buildings in the distance.

Banner oats and Golden Vine peas were the late varieties used, while Alaska oats and Chancellor peas were the early sorts. Common vetches were used throughout.

In mixtures where late maturing varieties were used, the yields ranged from eight and one-half to ten and one-quarter tons of green material per acre, or from a little less than two and one-half to a little over three tons of dry material per acre. The highest yields were obtained from a mixture of two and one-half bushels of oats, one bushel of peas and one-half bushel of vetches.

With mixtures in which early maturing varieties were used, yields ran just under eight tons of green or two and a quarter tons of dry material per acre.

The largest yields were obtained from the mixture of three bushels of oats, one bushel of peas and no vetches per acre.

It was found that with early varieties, the oats should be increased by a bushel per acre over late oats. While the yields from early varieties were a little lower, yet when it is considered that seed of early varieties can be produced at home whereas the late must be purchased, and that the harvest of the early mixtures comes while weather conditions are more favourable for saving the crop, it is doubtful whether the increase from the use of late varieties will overcome the advantages of the early ones.

Dates of Seeding Autumn Sown Cereals

Winter wheat and winter rye were sown at six weekly intervals beginning the first week in August. Results show that the most satisfactory dates were the second and third weeks in August.

Neither of these two crops has proved very reliable at this station, particularly in recent years, when severe winter-killing has occurred.

CEREALS

Tests of Varieties

Spring Wheat.—Marquis, Garnet, Ottawa 929 B and two strains of Reward wheat were tested at this station each year during this five-year period. In addition, eight other strains and varieties have been under test for a lesser number of seasons.

Marquis has been outyielded by Garnet and Reward, the former producing an average of 2·9 bushels more, and the latter ·4 bushels. In maturity moreover these varieties are six and five days respectively earlier, which is extremely important.

Of the strains and varieties tested for a shorter period one or two are very promising.

Oats.—Six varieties have been tested during each of the last five years, namely Gopher, Alaska, Legacy, Cartier and Banner. Gopher, Legacy and Banner have been the highest yielders, in the order named, but are eight, seven and eighteen days later in maturing than the Alaska which is also three days earlier than Cartier.

As earliness of maturity is an exceedingly important factor, Alaska and Cartier are the only varieties that can be used with assurance of ripening the crop. Although not the highest yielders, the crops obtained have been very good.

Barley.—O.A.C. 21 has been, and still is, the standard variety in this district. In comparative trials at this station over a five-year period, it has only been outyielded by Pontiac M.C. and then only by six bushels, but at the same time, it is two days earlier. Velvet and Gordon A have not proved as good.

A considerable number of other varieties have been tested for a shorter period, and while results are not conclusive as yet, several give good promise. Bying and Nobarb, both smooth awned sorts, have outyielded the O.A.C. 21 in

the last three years, but are five and seven days respectively, later in ripening. Olli, a variety eleven days earlier than O.A.C. 21 has outyielded it by 2·3 bushels in the past three years, and while six inches shorter in the straw, is considered to be of possible value, if not for itself, at least, for breeding purposes.

Field Peas.—While the Chancellor pea has been the standard variety in the district it requires 108 days to ripen. This makes the variety too late for the district. Variety tests at this station have shown Early Blue to be eleven days earlier and as good a yielder during the last five years. This variety is, however, short in the vine and is difficult to harvest. Conqueror another sort equally as early as Early Blue has not yielded within 12 bushels of either of the others.

Thursday, a newer variety has outyielded them all in the last three years, but is later than the Chancellor. Arthur has yielded well, but is the latest variety tested.

The Early Blue has the disadvantage of being blue in colour and somewhat wrinkled which lessens its saleability.

Field Beans.—This crop has not proved entirely successful owing to its being damaged some years by summer frosts. Of the varieties tested, the Brown Norwegian has been the best yielder and though brown in colour, is of good quality and excellent flavour.

Buckwheat.—Two varieties have been tested. They have both required 102 days in which to mature, but the Black has outyielded the Silverhull by three bushels per acre.

Buckwheat is little grown in this district and owing to its susceptibility to frost damage, is not likely to increase in importance or acreage.

Vetch.—Common spring vetch has been tested for eight years. While it has yielded an average of 37·5 bushels per acre, it required 130 days in which to mature. This factor makes it an impractical crop for the district, as it comes in so late that on the average its harvest would be almost impossible because of wet weather.

Spring Rye.—Over a period of 12 years, common spring rye has yielded 26 bushels per acre, but has required 118 days in which to mature. This makes it too late a crop for the district.

Winter Wheat.—Although the hardiest of varieties have been tested, this crop has failed to survive the winter in three of the last five years. Its use cannot be recommended, therefore, in this district.

Of the varieties tested, Kharkov M.C. 22 appears to have the greatest chance of succeeding.

Winter Rye.—Dakold winter rye has been found to give fairly satisfactory results, although not a certain crop, as it has been winter-killed in three of the past five years. Previous to that, however, a reasonably good crop was obtained on the average.

FORAGE CROPS

Ensilage Crops

In this district where long periods of stable feeding are the rule, an ensilage crop is desired which will give good yields and at the same time may be handled without too much difficulty. To attain this end, several crops have been tested.

INDIAN CORN

Average yields of six to ten tons of ensilage corn have been harvested at this station. The quality of the silage depends on the maturity of the crop, the riper the better, and for this reason the Falconer variety is considered superior

to Golden Glow though it yielded half a ton per acre less. After Falconer, Northwestern Dent is the next best variety, though followed closely by Minnesota 13, and Quebec 28, while Minnesota 23 is a poor last. Even in the best seasons, however, none of these varieties ripens sufficiently for the best ensilage and some years the kernels do not reach even the dough stage. This together with the low yields obtained makes it doubtful if corn can be grown for ensilage with profit.

SUNFLOWERS

Yields of sunflowers have been very consistent and very good. Of the four varieties tested the Mammoth Russian has been outstanding in yielding ability and although the latest of the varietites tested, it matures sufficiently for silage purposes. The following average yields have been obained over a period of ten years: Mammoth Russian 17·7; Ottawa 76, 14·5; Manchurian 13·8 and Mennonite 10·3 tons per acre.

Field Roots

MANGELS

The type of mangel which has proved most satisfactory is the Globe. It is the easiest to pull, cleans readily, and at the same time has given the largest yields of all the types tested. Yellow Globe, the variety representing this class, has outyielded the Danish Sludstrup, intermediate type, by 2 tons, the Long Red by 4·3 tons, and the Yellow Intermediate by 5 tons per acre over the last five years.

Two other types, the tankard and half-sugar, have been tested for only two years, but did not equal the yield of the Globe type in either year.

SWEDE TURNIPS

Yields of swede turnips at this station have averaged between 16·25 and 20 tons per acre. These yields are not particularly attractive considering the work involved in producing the crop.

Taking into account yield of roots and proportion of dry matter as well, Hall's Westbury is probably the best variety that has been grown here. It is followed very closely by the Bangholm, Corning's Green Top, Ditmars Bronze Top and Purple Top varieties.

FALL TURNIPS

Mammoth Improved Greystone has outyielded the Aberdeen Purple Top, both in green weight and in dry matter. This crop can be stored for a short period in the fall, but will not keep more than two or three months. Yields have averaged about 29 tons per acre for the Mammoth Improved Greystone and 20 tons for the Aberdeen Purple Top.

FIELD CARROTS

Two varieties have been tested for three years. Yields have not been high, Improved Short White yielding 11·7 tons and White Belgian 11·1 tons. Not only has the former yielded over half a ton more per acre, but it is much less difficult to harvest because of its shorter length.

SUGAR BEETS

Four varieties have been tested for three years and ten others for two years. Yields have not been high, ranging from six to a little less than nine tons per acre. Of the varieties tested, R & G Normal, Dippe E and Zapotil appear to be the best.

DATES OF SEEDING FIELD ROOTS

Heaviest yields were obtained from seedings made on or about May 18, while seedings made at weekly intervals until June 22 produced progressively decreasing yields. The falling-off in yield was particularly marked after the beginning of June. This points to the necessity of sowing swede turnips, fall turnips, and carrots as early as possible if maximum yields are to be obtained.

Perennial and Biennial Hay Crops

TIMOTHY

Variety tests with timothy have failed to show any consistent superiority of one variety over another or over commercial seed, when grown for several years. Differences which appeared in the yields of first-year meadows were equalized in the returns from succeeding years.

ALFALFA

Repeated trials have shown that where reasonable drainage exists and proper inoculation of the soil is effected, alfalfa can be grown in Northern Ontario with great success.

Variety tests have shown the hardy varieties to yield in the following order: Ladak, Ontario Variegated, Grimm and Cossack, though there is very little difference between them. There is certainly no advantage in paying a premium for the seed of any one of them.

In the short seasons prevalent in this district, usually only one crop can be cut each year, although sometimes it is possible to take two. There is some evidence to show that taking the second crop is harmful to the stand and that increased winter-killing follows. The value of this crop in the district lies in increasing both the yield and quality of the hay crop, and it can be sown to cut but once a season with great advantage.

Methods of Seeding Alfalfa for Hay Production

Over a period of seven years, alfalfa was seeded with and without a nurse crop, in rows 12 inches apart and broadcast, in order to ascertain the most advantageous method of seeding.

The results show that a small increase is obtained by broadcasting the seed when sown either with or without a nurse crop, and that the quality of hay is superior as the plants are finer in the stem. Sown in rows, the land tends to become infested with weeds, the control of which, by cultivation, would materially increase the cost of producing the crop.

Seeding alone gave yields of less than one-third of a ton greater than seeding with a nurse crop. It is very doubtful, however, if the additional tonnage of hay would compensate for the loss of the nurse crop of grain.

The most practical method was shown to be the seeding of alfalfa broadcast with a nurse crop.

NITRO-CULTURE FOR ALFALFA

An experiment to determine the necessity for inoculation of alfalfa and its effectiveness through the use of nitro-cultures was conducted for seven years. At the beginning of the test large differences were obtained in favour of the use of nitro-cultures. Later this difference was less marked, the non-inoculated plots increasing in productiveness.

Undoubtedly, implements used in working the land spread the inoculation by carrying bacteria from treated to untreated plots, which would account for the decreasing difference produced by the use of nitro-cultures.

This test clearly showed the value of nitro-cultures, and demonstrated their necessity in growing alfalfa on new land.

Red Clover and Alsike for Hay

Two types of red clover have been tested. These are the early, two-cut type commonly used, and the late, one-cut type. Two varieties of each type were grown. It was found that the variety of late clover Altaswede has outyielded all the others. In one cut it outyielded both cuts obtained from the two-cut varieties and also the other single-cut one, namely Mammoth.

The advantages of Altaswede are that it is somewhat perennial in habit, lasting several years in the hay field; that it reaches the hay stage of maturity at the same time as does timothy and therefore makes a more compatible mixture; and that it produces a high yield from one cutting. This is important in a region where other work and inclement weather hinder the taking of a second hay crop.

Alsike while valuable as a "bottom" plant in a mixture has been found to yield little more than half as much as Altaswede red clover.

Sweet Clover

Eight varieties have been tested. Common Biennial White which is the ordinary commercial variety, has been the heaviest yielder, but it is coarser in the stem and less leafy than the other varieties. Of the heavier yielding varieties, the Grundy County White and I.H.C. Yellow or Erector as it is now called, are the best, but Alpha No. 1 and Brandon Dwarf are finer and leafier, though they do not produce as high yields. The latter two sorts have the advantageous characteristic of being prostrate in growth the first year, and so do not grow up into the grain to the same extent, interfering less with harvesting the nurse crop.

Sweet clover has not proved entirely reliable as it has winter-killed considerably in some years. If this objection can be overcome, it may prove a valuable ensilage crop, as it matures early and is ready to cut before the haying season and thus would not interfere with other work.

Hay Mixtures

Mixtures of timothy, meadow fescue and orchard grass with red and alsike clovers have given comparatively good yields, and while differences between mixtures have not been large, they are worth considering.

Experiments first established that timothy in mixtures with clovers outyielded meadow fescue and orchard grass in similar mixtures. Another series of experiments showed that late red clover gave better yields than early red, and that alsike could well replace some of the red clover.

Further tests have shown that the proportions of the timothy, red clover and alsike can be varied considerably without markedly affecting the yield. The most productive mixture was, however, that of the three seeded at the following rates per acre: timothy eight pounds, red clover eight pounds and alsike two pounds.

An experiment is in progress at the present time in which other grasses and alfalfa have been added to the basic mixture of eight pounds timothy, eight pounds red clover and two pounds alsike. Results show that western rye and orchard grass do not increase the yields when included in the mixture, but that

alfalfa does so to a marked extent when added at the rate of five pounds per acre. While this test has only been conducted for two years, it emphasizes the value of alfalfa.

Annual Hay Crops

A mixture of oats and peas, at the rate of two bushels of oats to one of peas per acre, is the common annual hay crop of Northern Ontario. When suitable varieties of both are used such as Banner oats and Chancellor or Arthur peas, it is without question the most suitable and practical one for the region. Repeated trials at this station indicate that if Banner oats are no available, Alaska may be used instead with Chancellor peas, the reduction in yield being very slight. The advantage in using Alaska lies in the possibility of using home-grown seed of this variety every year, whereas Banner oats must be purchased. It has not been found that the inclusion of vetches in this mixture has given any material increase in yield.

Millet has been tried, the early maturing Siberian variety being used. Over a four-year period yields have averaged a little over two tons per acre of fair quality hay. As seed of this crop must be purchased each year and is not readily procurable and as the hay is said not to be very suitable for horse feed, millet cannot be recommended for use in the district.

Experiments in Seed Production

TIMOTHY

Results show that while seeding in rows 24 inches apart produced slightly higher yields than broadcasting, the increase would not begin to pay for eradicating the weeds which show up under this system of culture.

It has also been found that the timothy grown in a mixture with red clover and alsike gave as good seed returns as when sown alone. While the seed produced is a mixture, it can usually be separated with a fanning mill.

A corner of a field where there is a good stand of timothy, can be allowed to mature with advantage, for the production of seed for home and local use, where the admixture of other seeds will not be of disadvantage and can be corrected by the addition of other seeds in the proper proportions.

CLOVER SEED PRODUCTION

The value of a crop such as clover seed needs no discussion. With a view to ascertaining the possibilities along this line for the district, an extensive experiment has been under way for four years with red and alsike clovers.

RED CLOVER

Seed production investigations have been along three lines: first, the yielding ability of the two types, early or two-cut and late or single-cut; second, the harvesting at various stages of maturity both of hay and seed crops; and third, the best method of handling the crop at harvest.

Early versus Late Red Clover for Seed Production.—The late type has greatly outyielded the early, average yields per acre being 206 pounds as compared with 77 pounds. At average local prices for seed, the late type would pay whereas the early would not.

Harvesting at Various Stages of Maturity for Hay and Seed.—The first cut of early red clover appears to be the most reliable for producing a seed crop. If the crop is cut for hay at the usual stage—that is full bloom—the seed

crop is delayed so late that it cannot be saved before winter sets in. Cutting the hay crop at the beginning of blooming allowed the seed crop to mature, but did not increase the yield over that which was obtained from the first cut left to ripen.

Methods of Handling at Harvest.—The use of a buncher attachment did not cause less shattering than the use of a horse rake in gathering the seed crop, and was not more profitable.

ALSIKE CLOVER

Average yields of from five to seven bushels per acre show that alsike is a profitable seed crop in Northern Ontario. While in 1936 the crop was almost a complete failure owing to drought and heat, the usual crop is considerably above the average stated above which included this failure.

Dates of Seeding Alsike With and Without a Nurse Crop.—Three dates were tried, the first towards the end of May or as soon after as possible, and the others at intervals of two weeks. At each date, plots were seeded with and without a nurse crop.

The results show that seeding with a nurse crop gave slightly greater returns than seeding without a nurse crop, at each date, and that the later seeding produced greater yields than the early ones, the increase being about one bushel as between dates.

The effect of late seeding is disastrous on the nurse crop and it is very doubtful whether what would certainly be lost on the nurse crop could be regained the following year on the increase in the seed crop.

Rates of Seeding.—Three rates, namely, four, six and eight pounds per acre, were tried. While results have not always been consistent, on the average the heavier seeding was found to give the most certain as well as the best returns.

Methods of Handling at Harvest.—This experiment has not shown any great advantage in favour of any of the various methods tried. These involved the use of the hay mower and horse rake, and the hay mower with buncher attachment.

Cutting the crop two weeks after 75 per cent of the heads had turned brown gave the best return, although not very much better than when cut two weeks earlier. The best time will depend upon seasonal conditions. If the crop ripens early, the latter cutting would be preferable, but in seasons when the crop is late the earlier cutting would considerably facilitate saving crop.

Clipping the growth when the plants were six inches high and then allowing the plants to go to seed was detrimental to the yield.

WHITE CLOVER

Of the five types and strains which have been grown and kept under observation, the English Wild White and Morso have shown themselves to be the hardiest and most vigorous. Stryno, Commercial White Dutch, and Ladino were not so good.

HORTICULTURE

Tree Fruits

Apples.—Four crab apples varieties have borne crops in the past five years. These are Columbia, Osman, Dolgo and Mecca, of which the Columbia has been the heaviest yielder, though the quality of fruit of the Dolgo is considered superior.

Some 54 other varieties of both crab and large apples have been grown, but none of the trees have survived above the line of snow cover, and while not killed, they have borne fruit very seldom and then only in small quantities.

Prevalence of late frosts in many seasons has made the apple crop very uncertain and because of this it has not been possible to decide whether or not the trees are developing a biennial habit of fruiting. The extremely low temperature of —52° F. in January, 1935, does not appear to have affected the varieties named above, as all bore a fair crop the following summer.

Promise of a bountiful harvest. A Columbia crab apple tree in bloom.

In the spring of 1936, all trees which did not survive above the snow cover were removed, and new varieties were planted. These have all survived, in spite of unfavourably hot and dry weather, and entered the winter in excellent condition.

Plums.—Some 20 varieties have been tested. None has proved of any great value, though some fruit has been produced by the Mammoth, Compass and Sapa varieties. A plantation of sand cherries died out following the extreme cold experienced in January, 1935.

In the spring of 1936 new varieties were planted in the place of those trees which had died out, and a new block of selected sand cherry seedlings obtained from the Dominion Experimental Station at Morden, Manitoba, was set out. These entered the winter in good condition.

Small Fruits

Raspberries.—Excellent crops of raspberries have been produced nearly every year. Of the varieties tested to date, the Latham has been outstanding in heavy yields of good fruit, and in winter hardiness. It has also the advantage of being without thorns.

Other varieties that have done well are Newman, Viking and Herbert in the order named. So far there have been no pests to contend with, and only in 1934 was the crop a failure owing to the occurrence of a late spring frost.

Strawberries.—Strawberries have produced good crops, the Senator Dunlap being the standard of quality in varieties. Considerable heaving has occurred some years when the snow cover has disappeared early, but this can be overcome by locating the strawberry bed where snow protection will remain till late in the spring.

Gooseberries.—Seven varieties were under test for several years, but never produced yields of any account. In several of the years, late frosts destroyed the bloom and no fruit at all was produced. The best varieties are apparently Keepsake and Downing.

Black Currants.—This crop does exceedingly well at this station, large yields having been obtained in all but one year when a very late frost destroyed the fruit. Of the 14 varieties which have been grown, Topsy, Saunders, Collins Prolific and Climax have given the heaviest yields. Saunders is the variety recommended as it produces fruit of a little superior quality than the others.

Red Currants.—Fruitful as this crop usually is, occasionally it is destroyed by late spring frosts. The heaviest yielders among the varieties tested have been Long Bunch Holland, Red Cross and Red Grape in the order named, though the latter two are larger fruited than the first. The Red Grape has been the variety recommended when all factors are considered.

White Currants.—The White Cherry variety has produced larger fruit than the White Grape, but has not yielded any greater quantity. Both have done well, though occasionally late frosts catch the bloom.

Vegetables

Many vegetables have done very well at this station, the quality of the produce being first class. Frost-tender kinds have suffered in some years from summer frosts, cucumbers and citron rarely being a success, while peppers and egg plant have always been a complete failure.

Beans.—Bean crops have always been good at this station. Of the wax varieties, the Interloper Black Wax, Davis White Wax and Pencil Pod Kidney Wax have given the best returns. Stringless Green Pod has been the best green variety.

Broad Windsor is the best variety of broad beans, a very popular crop in this district.

Beets.—Considering market demands and quality, the Detroit Dark Red is the best variety which can be grown here. The Long Dark Smooth has been the heaviest yielder but is difficult to harvest owing to its long shape. The Crosby's Egyptian has also done well, but has not yielded with the others.

Borecole or Kale.—Several varieties have been tested, the best of which is Curled Scotch. This crop thrives well, being resistant to summer frosts and not being affected by insects.

Broccoli.—Seasonal conditions have materially affected the production and quality of this vegetable, but on the whole it is quite satisfactory. The best variety has been the Green Sprouting.

Brussels Sprouts.—As a rule this crop does not yield heavily at this station, though in 1935 an excellent crop was harvested, and a total failure has not yet been experienced. The Improved Dwarf and Long Island Improved have proved about equal in productiveness. This crop must be started in a greenhouse or hot bed, as the season is too short for outdoor planting of seed.

Cabbage.—Normally cabbage does very well at this station, though a great deal of trouble is experienced with cabbage root maggot and green cabbage worm. Both of these can be controlled if the proper precautions are used. For the cabbage root maggot, the corrosive sublimate treatment has been entirely satisfactory, while with the green cabbage worm, dusting the plants with paris green or an arsenical has effected control.

The most satisfactory varieties have proved to be as follows:—

GREEN: Early—Golden Acre.
Midseason—Copenhagen Market.
Late—Danish Ballhead.

RED: Red Stonehead.

SAVOY: Giant Aubervilliers.

Chinese cabbage has been tried but to date has not been satisfactory, as it has bolted to seed, no matter when and how sown.

The cabbage crop must be started under glass in a greenhouse or hot bed if satisfactory crops are to be obtained, as the season is too short to allow for sowing the seed outside.

Cauliflower.—As with cabbage, this plant must be started in a greenhouse or hot bed so as to lengthen the season; and it also is subject to the ravages of the root maggot and the green cabbage worm.

In some years reasonably good crops have been produced, but on the whole the results have been mediocre, as the curds fail to develop to any size before breaking up.

The varieties which have given the best production are Dwarf Erfurt and Danish Dry Weather. While the colour of the former is yellowish and not attractive, it has been found to cook white and to be of good flavour.

Carrots.—Of the varieties tested to date, the Chantenay Half Long and Oxheart have given the best yields and are of excellent quality. This crop is entirely reliable and as yet is not attacked by any insects.

Celery.—When started in a greenhouse or hot bed and planted out on black muck soil such as may be found in all sections of the district, celery does excellently, producing a quality of product that is hard to excel.

The best varieties have been the Winter Queen and Golden Self Blanching. These have been free from rust infection, whereas other varieties have not.

A cultural experiment in blanching has shown that the earth method is a little more satisfactory than the use of boards, and both are superior to the use of paper. The use of 6-inch drain tile has proved satisfactory, but owing to the high cost of tile in this district, is not practical.

Sweet Corn.—This might be termed a sub-marginal crop at this station. Only twice in the last five years has any crop been harvested. The comparatively cool nights characteristic of the district prevent adequate growth and hinder the development of ears before the fall frosts kill the plants.

The varieties having the best chance of producing edible ears are Dorinny and Pickaninny. The former is preferred as it is a day or two earlier and is yellow in colour of grain, thus being more attractive for table use than its black rival.

Starting the plants in a greenhouse or hot bed has not proved to be of any advantage. In the seasons when corn plants sown outside failed to mature edible ears the transplanted ones also failed.

Cucumbers.—This crop, except in one season, has always been a failure. Cold nights and summer frosts have hindered growth and destroyed the plants. For home use, it is possible to produce a fair crop by planting in the hot bed after other plants have been set out. In this way the plants can be covered on cold nights and protected from frost.

Egg Plant.—This crop has been an unqualified failure at this station. During the last five seasons the plants failed to set any fruit, except once, and then they were not of edible size.

Endive.—Green Curled has been the only variety grown and has been found entirely satisfactory.

Kohl Rabi.—Early White Vienna and Early Purple Vienna are the varieties that have been tested. While little difference has been found in most years, the purple variety appears to be more subject to the attack of the turnip flea beetle, which in one season reduced its yield considerably and in another destroyed it altogether, whereas in the same seasons the white variety was not affected. This beetle can be controlled by the use of an arsenical spray applied as soon as it is seen.

Leeks.—The quality of this vegetable as produced at this station is very good, and satisfactory yields have been obtained. The Giant Carentan has proved to be the higher yielding variety.

Lettuce.—Tests with types of lettuce have shown that leaf, head and cos types can all be grown with success. The varieties that are considered best for yield and quality are: Leaf—Grand Rapids; Head—New York No. 12; and Cos—Salad Ice.

Onions.—Red, white and yellow varieties have been grown with varying success from year to year. When quality and yield are considered, the variety which is recommended is Yellow Globe Danvers, although Large Red Weathersfield has run it a close second.

Parsnips.—Of the varieties tested, Hollow Crown is still the best, being a high yielder of good quality roots. This crop may be left in the ground over winter and will come through in excellent condition for table use.

Peas.—Many varieties have been tested and nearly all have done well. By sowing varieties which mature in succession, the green pea season can be lengthened considerably, and this system has been found more reliable and productive than successive seedings of any one variety. Those that have done best at this station during the last three years listed in order of their maturing are: Alaska, Little Marvel, Peter Pan, Laxton Progress and Stratagem.

Pumpkins.—This may be termed a marginal crop at this station. It has been possible to produce a few edible pumpkins in each of the last five years, but the yields have never been large. The variety which has proved most reliable is King of the Mammoths.

Potatoes.—The shortness of the growing season in this district puts a premium on earliness of maturity with all long season crops. For this reason, the Irish Cobbler has been the variety used at this station, and has been the one recommended for the district. Variety tests have shown that it reaches a more advanced stage of maturity at harvest than do either Green Mountain or Dooley and that because of this factor, keeps longer, and is of superior quality.

A new variety, the Warba, introduced this year, matured to even a greater degree than the Cobbler, but did not outyield it and has the disadvantage of being pink eyed.

Radish.—Many varieties have been tested, and all have produced a high quality product, the best of which have been French Breakfast and White Icicle. The latter variety, however, appears to be a little more susceptible to the attack of the root maggot.

Salsify.—The two varieties tested, namely Sandwich Island and Scorzonera, have both done well.

Spinach.—The varieties which have done best are King of Denmark and Bloomsdale Long Standing. New Zealand spinach has produced large yields, but the quality has not been nearly as good as that of the ordinary varieties.

Squash and Vegetable Marrow.—Like pumpkins these vegetables produce fruit in small quantities and are not reliable at this station. The English vegetable marrow has given the highest returns of edible fruit. Cocozelle, a bush type of squash, has done fairly well, and may be of value where the garden area is limited, as is does not require more than about four feet square per hill.

Swiss Chard.—This vegetable has given excellent yields at this station. The varieties grown were Common Green and Giant Luculus.

Tomato.—When started early in the greenhouse, ripe tomatoes have been produced each season in greater or lesser quantities depending upon the season. The amount of ripe fruit is always very small, but usually large yields of green tomatoes have been obtained. The best varieties have been found to be Earliana, Chalks Early Jewel and Bonnie Best.

Results of a cultural experiment, in which the plants were stopped at the second, fourth and sixth trusses, show that the largest yield of fruit both ripe and green was produced when the plants were stopped at the fourth truss.

Turnips.—Garden turnips have given good yields. Of the varieties tested the Early Purple Top Milan and the Golden Ball are best, the latter being particularly good as it is easy to harvest and free of side roots, thus easy to clean when grown in the heavy clay soil at this station.

Ornamental Plants

Many varieties and kinds of flowers have been found to do well in this locality. These may be divided into three categories, namely, annuals, perennials and bulbs.

Annuals.—Kinds that have been very satisfactory every year are: Antirrhinum, petunia, sweet pea, calendula, phlox, nasturtium, clarkia, salpiglossis, aster, poppy, marigold, lavatera, ageratum, alyssum, candytuft, Dianthus caryophyllus, gaillardia, eschscholtzia, godetia, lupins, Linum grandiflorum rubrum, scabiosa and kochia.

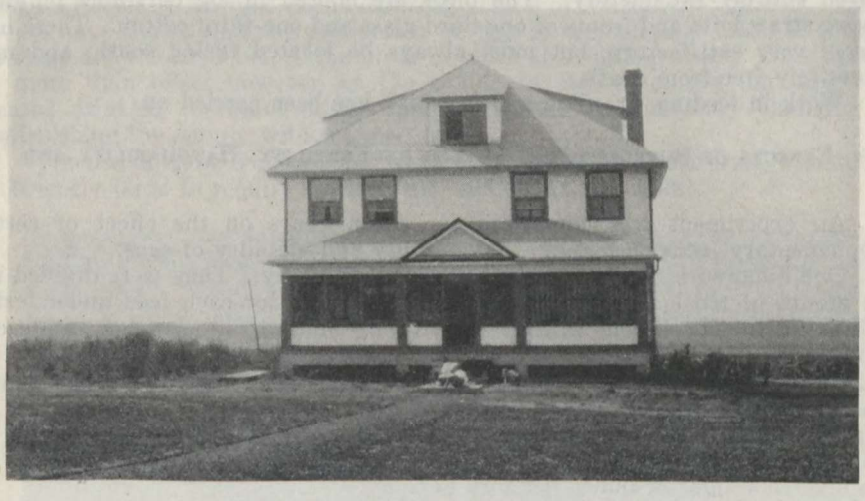
In 1936 summer frosts damaged the bloom to some extent, but as a rule a riot of bloom is produced right up to the early part of September when severe fall frosts occur.

Biennial and Perennial Flowers.—In the short summer season which prevails in this district, the value of perennial flowering plants is very great, as they produce an early show of bloom, and the early growth of the plants themselves is attractive. Kinds which have proved to be entirely hardy and which bloom freely are: delphinium, campanula, poppy, dianthus (pinks), peony, iris, gaillardia (perennial) rudbeckia, aquilegia, golden glow, hollyhocks, myosotis, pansy, viola and digitalis.

Bulbs.—Crocus, daffodil and tulip have given excellent results, with very little attention. An experiment has been carried on to see how long daffodil and tulip bulbs may be left untouched in the soil. At the end of five years, the tulips

had stopped blooming, but the daffodils, while producing small flowers, were still blooming freely. It would appear with both these bulbs that after four years the bloom quality starts to deteriorate.

Shrubs.—Hardy shrubs which are attractive and have been found valuable for ornamental planting in this district are: lilac, honeysuckle (Tartarian), golden currant, Japanese barberry, spiraea, caragana (several species) wayfaring tree, cotoneaster, rose (rugosa) and dogwood.



Superintendent's house in 1921.

Another view of the same house in 1936 showing fifteen years' growth of trees and shrubs.

Trees.—Spruce, birch, Manitoba maple, laurel leaved willow, Russian poplar, white and mountain ash and American elm, have all done well at this station.

Willow and poplar grow rapidly and are valuable for windbreaks, but should always be planted in conjunction with other trees such as spruce and birch which will outlive the quicker growing sorts.

Hedges.—Among the species tried out for hedges, the laurel leaved willow, caragana, dogwood and saskatoonberry have done best. Cedar and spruce have made fairly good hedges, but tend to winter burn rather severely.

POULTRY

The Barred Plymouth Rock is the only breed kept at this station, and has proved entirely satisfactory. The birds are housed in log or frame buildings having straw lofts and fronts of one-third glass and one-third cotton. These have proved very satisfactory, but must always be located facing south, and must be entirely free from drafts.

Work in feeding, breeding and hatching has been carried on.

Effects of Supplementary Feeds on Fertility, Hatchability and Viability of Eggs

An experiment was conducted for seven years on the effect of certain supplementary feeds on fertility, hatchability and viability of eggs.

One hundred birds were used in this test annually. They were divided into ten groups of ten hens each, making duplicate pens for each feed under test as well as for the check pens which received the standard ration without additional supplement.

The supplementary feeds were first cod liver oil at the rate of one quarter teaspoonful per bird per day, second raw liver at the rate of one half ounce per bird per day, third bonemeal at the rate of five per cent by weight of the dry mash, and fourth a combination of cod liver oil one eighth teaspoonful and raw liver one quarter ounce per bird per day.

The results show that under the conditions of this test, none of the supplementary feeds appeared to improve the fertility hatchability or viability of the eggs.

Skim-Milk Versus Beef Scrap for Winter Egg Production

An experiment comparing skim-milk and beef scrap as sources of animal protein has been conducted over a period of seven years. Two equal groups of 50 pullets each were housed, handled and fed the same ration except that one group received skim-milk to drink and no beef scrap and the other received beef scrap and no milk.

Egg production varied somewhat from year to year, but on the average the figures did not show that one feed was superior to the other. Mortality of birds did not enter the picture as only one bird died during the course of the seven years the experiment was running. This bird was in a pen receiving beef scrap.

Where skim-milk is plentiful, it can be used with entire satisfaction, whereas under a scarcity of skim-milk, beef scrap can be substituted with equally good results.

Commercial Versus Home Mixed Mash

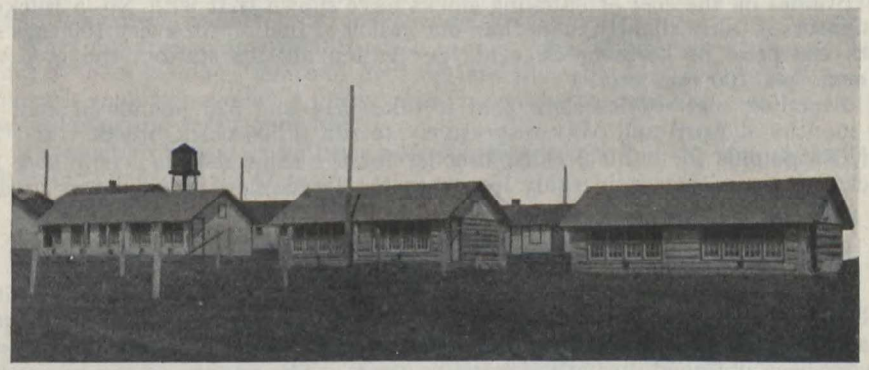
This experiment was started in 1931 and is still being carried on. One pen of 50 pullets has been fed a commercial mash while another equal pen receives a home mixed mash. The results to date show that where a mash can be mixed at home with a thorough understanding of requirements and an adequate supply and variety of ingredients with which to balance the ration correctly, it will be sufficiently more economical to pay well for the time spent in preparing it, provided that a fairly large quantity of feed is being prepared at one time. On the farm where poultry is only a sideline, and the flock is small, and where a

number of the ingredients must be purchased, commercial mashes are recommended as being well balanced and productive, and under such conditions as profitable as home mixed mashes.

Snow Versus Drinking Water

In a climate which produces the low temperatures experienced at this station, the problem of watering poultry is a serious one. Water freezes rapidly unless artificially warmed in the drinking vessels or constantly replaced. Experiments have shown that the production of eggs is very slightly lower if a supply of clean snow is kept before the birds in place of drinking water. This decrease is more than offset however by the saving in capital outlay and upkeep of heated drinking fountains or the labour involved in constantly changing and replenishing the supply with warmed water.

The use of snow is recommended especially with the farm flock which is not sufficiently large to require the constant care of an attendant.



This type of poultry house has given excellent satisfaction. (Note the frame and neat log construction.

Lights Versus No Lights

For the purpose of ascertaining the usefulness of lights in poultry houses, an experiment was conducted during several years in which lights were turned on in one pen of 50 birds, between the hours of four a.m. and daylight during the six winter months, while a duplicate pen received no light. Production of eggs and feed consumed during the winter and also for the whole year was recorded and is summarized in the following table:—

RESULTS OF EXPERIMENT—LIGHTS VS. NO LIGHTS—AVERAGE OF EIGHT YEARS

—	Period when lights were used 6 months in winter			Period when lights were not used 6 months in summer		Annual Production of Eggs Number
	Production of Eggs Number	Production of Eggs on Percentage Basis	Consumption of Feed on Percentage Basis	Production of Eggs Number	Production of Eggs on Percentage Basis	
		%	%		%	
No lights	3,958	100·0	100·0	4,426	100·0	8,384
Lights	4,402	111·2	103·3	4,176	94·4	8,578

It is easily seen that the use of lights raised the total egg production for the year, the egg production of the winter months and also the consumption of feed, but was followed by lower egg production during the summer. As winter eggs are higher priced, the gain of 11·2 per cent in egg production more than offsets the increased feed consumption of 3·3 per cent. The use of lights is profitable especially when high winter production is desired.

Breeding Work

This station has been hatching between four and five thousand chicks each season. Of these, about one thousand from registered and R.O.P. stock are kept for breeding work at the station and the remainder are distributed to farmers throughout Northern Ontario. A number of cockerels are also sold for breeding purposes.

Breeding work is being focussed on increasing the weight of eggs produced while maintaining and improving the numbers laid.

Studies on the cost of hatching chicks have shown that with No. 5 Buckeye incubators it takes slightly more than one gallon of fuel oil for every 100 eggs set. With the price of kerosene 29 cents per gallon at this station, the cost was 30 cents per 100 eggs set.

Brooding cost studies show that it takes 544 and 525 pounds of coal for the months of April and May respectively to run a 500 chick brooder, and 734 and 665 pounds for a 1,000 chick brooder for the same months. The cost per chick was therefore considerably less when the larger sized brooder was used.

APICULTURE

Work with bees, at this station, has proved beyond doubt the possibilities of beekeeping in the district. Honey production has been excellent, an average of a little over 200 pounds of extracted honey per overwintered colony per year, having been obtained during the last five years. The quality of the honey was very fine, the nectar having been gathered mainly from clover and fireweed, with other flowering plants playing a lesser part.

Queen Rearing

During the past five years, the major project in this division, has been the rearing of queens for experimental purposes. Most of these are distributed to the other experimental farms throughout the country, an average of 166 queens having been sent out each year.

Package Bees

The purchase of packages of bees has been a common practice of beekeepers throughout the country. Packages have been tested here for five years, with excellent results. The average annual colony production of extracted honey has been 145 pounds for two-pound packages and 162 pounds for three-pound packages. These results have been consistent and are so good that it would be profitable to buy new packages each season, if there were no way in which bees could be wintered over, but this can be done without difficulty. However, packages are very useful and profitable in starting an apiary and keeping it up to full strength.

Wintering

Several methods of wintering have been tested at this station with good results.

CELLAR WINTERING

Colonies have been placed in the cellar of the office building each winter. One corner was partitioned off with matched lumber to make a small room where the colonies would be undisturbed.

The temperature was fairly high in this room, and while the bees survived the winter, the colonies dwindled down very rapidly in the early summer. Several years ago, a ventilator was pierced through the outside wall, and since then the trouble has been overcome.

Wintering can therefore be done in a cellar that is well ventilated.

WINTERING IN CASES OUT OF DOORS

Colonies have been placed in quadruple, double and single wintering cases. Of the three types, the single cases have proved most satisfactory, in that they are easier to handle, do not entail the movement of colonies, and in the spring the hives are farther apart which cuts down the loss which may result from bees drifting from weaker to stronger colonies.

With quadruple and double cases, some colonies are so weakened each spring by bees leaving them and drifting into the adjacent hives where greater activity is manifested, that a heavy loss in honey production ensues, and often these colonies die out completely.

Anyone purchasing or building new equipment will find the single case very satisfactory in Northern Ontario.

Colonies of bees emerge strong and vigorous from these winter quarters (Fence at the rear is eight feet high.)

Swarm Control

Data recorded during the last five years show that all swarm preparations were made between the dates of July 4 and August 5. Thus in this district, precautions to prevent swarming need to be observed only during this period, virtually the month of July.

A METHOD OF DETECTING PREPARATIONS FOR SWARMING

The results of a number of years work show that when a second brood chamber is added to a colony and is incorporated into the brood nest, the first queen cells which are built as a preparation for swarming, are always found along the bottom bars of the frames in the upper brood chamber. These cells can be seen readily by tipping up the upper brood chamber and glancing along the bottoms of the frames. If queen cells are observed, the colony must be examined further for other cells, but if none are present, the hive can be left until the next periodic examination.

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