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DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL STATION
L'ASSOMPTION
QUE.

R. BORDELEAU, B.S.A., SUPERINTENDENT

PROGRESS REPORT
1937 - 1946

YOUNG TOBACCO PLANTS ON THE DOMINION EXPERIMENTAL STATION, L'ASSOMPTION, QUEBEC.

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INTRODUCTION

The Dominion Experimental Station, l'Assomption, Quebec, was established in 1928 to serve primarily the commercial tobacco growers of the province. Its particular field of activity lies on both sides of the St. Lawrence river; from l'Assomption county in the west as far east as Portneuf county north of the river, and including the area drained by the Yamaska and Richelieu rivers, to the south of the St. Lawrence.

A progress report was printed in 1937, covering the work at the l'Assomption Station during the years 1930-1936. Since then, new lines of activity have been added and new developments have taken place which have widened the responsibility of the Station. Investigations are now made at l'Assomption and on ten Illustration Stations in western Quebec on various phases of agriculture.

During all but three months of the ten-year period covered by this report, 1937-1946, J. E. Montreuil was Superintendent of the Dominion Experimental Station at l'Assomption. Mr. Montreuil retired on October 1, 1946, and was succeeded by R. Bordeleau, who had been Associate Superintendent since August 15, 1940. This report has been compiled by Mr. Bordeleau and the other members of the technical staff.

METEOROLOGICAL RECORDS

The importance of temperature, precipitation, hours of sunshine, etc., can scarcely be overemphasized in agriculture. Meteorological records have been kept since 1930 at the Station. The longer the period, the more valuable is the information obtained which is the reason why the records in the following tables cover the whole period 1930 to 1946 inclusive.

Monthly meteorological data for the past 17 years are summarized in the following table.

TABLE 1.—MONTHLY AND ANNUAL RECORDS OF TEMPERATURE, PRECIPITATION AND SUNSHINE AT THE DOMINION EXPERIMENTAL STATION, L'ASSOMPTION, QUE.

1930-1946 (17 years)*

Month	Temperature °F			Precipitation			Bright sunshine
	Highest	Lowest	Mean	Rain	Snow	Total	
				in.	in.	in.	hrs.
January	55	−36	10·7	1·07	19·39	3·01	104
February	44	−46	11·9	0·57	18·47	2·42	120
March	74	−41	24·5	1·28	15·31	2·81	146
April	85	3	40·2	2·57	5·27	3·09	173
May	91	20	54·3	3·00	.....	3·00	227
June	97	29	63·8	3·47	.....	3·47	262
July	95	39	68·4	3·69	–	3·69	271
August	99	35	66·4	3·33	–	3·33	251
September	98	23	58·1	3·58	–	3·58	173
October	85	10	45·8	2·96	1·10	3·07	134
November	71	−13	32·7	2·27	6·88	2·96	81
December	50	−45	15·3	1·17	18·67	3·04	75
Annual	99	−46	41·0	28·96	85·09	37·47	2,017

* Meteorological records taken in co-operation with the Meteorological Division of the Department of Transport.

The above table shows that, at l'Assomption, temperatures have varied over a range of 145° F. during the past 17 years. The mean monthly temperature has a wide range, from 10·7° F. in January to 68·4° F. in July.

Rainfall was recorded each month while snow was recorded for seven consecutive months from October to April inclusive. Total precipitation was slightly heavier during summer than winter months, while July and September were the months with highest precipitation.

Of the total hours of bright sunshine 50 per cent occurred during May, June, July and August.

Monthly precipitation during the past 17 years is shown in Table 2.

TABLE 2.—MONTHLY PRECIPITATION AT THE DOMINION EXPERIMENTAL STATION, L'ASSOMPTION, QUE.

1930-46 (17 years)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1930	3·96	1·36	1·61	2·14	3·71	2·95	4·51	2·16	3·05	1·10	1·93	1·85	30·34
1931	2·61	0·85	1·28	2·14	2·66	2·59	3·01	1·88	3·75	2·01	1·81	1·80	26·39
1932	4·09	2·62	5·94	3·44	1·17	4·85	2·34	3·37	2·16	4·79	4·20	2·98	41·95
1933	2·09	1·98	3·62	3·77	5·90	2·28	4·64	4·88	1·32	3·24	3·38	2·00	39·10
1934	2·71	3·20	3·80	2·43	1·17	6·10	2·40	2·38	4·63	1·77	3·16	3·98	37·73
1935	4·57	3·12	1·05	3·01	1·36	4·21	7·28	3·97	5·14	1·81	3·14	0·75	39·41
1936	3·09	2·12	4·60	3·58	2·99	2·14	3·27	4·67	2·09	6·27	3·59	2·88	41·29
1937	4·21	2·87	2·75	2·70	2·63	3·06	4·08	5·37	2·84	3·73	2·91	3·60	40·75
1938	3·35	1·76	2·79	3·32	2·78	3·53	2·62	6·02	5·76	0·90	1·65	3·95	38·44
1939	2·14	4·25	1·77	3·33	1·89	4·10	3·85	2·00	3·98	3·16	1·57	3·54	35·58
1940	1·80	1·37	3·46	3·58	2·40	3·28	4·41	2·28	2·24	1·37	4·08	3·71	33·99
1941	2·04	1·53	1·19	1·41	2·75	1·60	4·15	2·35	1·90	4·94	3·73	3·08	30·67
1942	3·62	3·05	3·55	2·72	3·61	2·13	3·16	2·95	4·54	2·91	3·08	4·22	39·54
1943	1·97	2·75	3·61	3·83	3·61	7·15	4·40	2·96	1·39	4·36	2·87	2·41	41·28
1944	2·16	2·47	2·91	2·65	1·67	4·14	2·15	1·75	4·90	1·73	2·34	3·55	32·42
1945	3·12	2·66	2·53	5·47	6·98	2·95	4·13	4·23	6·02	4·69	3·53	2·56	48·87
1946	3·60	3·12	1·31	3·09	3·65	1·98	2·40	3·38	5·21	3·41	3·36	4·76	39·27
Av.	3·01	2·42	2·81	3·09	3·00	3·47	3·69	3·33	3·58	3·07	2·96	3·04	37·47

The lowest monthly precipitation occurred in December, 1935, with 0·75 inches and the highest in July, 1935, with 7·28 inches.

For the monthly average, September had the highest precipitation with 3·58 inches and February the lowest with 2·42 inches.

The average annual total precipitation for the period is 37·47 inches. The highest annual total precipitation occurred in 1945 with 48·87 inches and the lowest in 1931 with 26·39 inches.

Considering the precipitation during the months of May, June, July, August and September, the period of crop growth, it can be seen that the years 1933, 1935, 1938, 1943 and 1945 might be considered as wet years and the years 1931, 1932 and 1941 as dry. Regarding other years, precipitation during the same period was considered normal, although it is possible short dry spells did occur.

Data regarding frost-free periods are recorded in the following table.

TABLE 3.—THE OCCURRENCE OF FROST AND FROST-FREE PERIODS AT THE DOMINION EXPERIMENTAL STATION, L'ASSOMPTION, QUE. 1930-46 (17 YEARS) (FREEZING TEMPERATURE 32°F. OR LOWER)

Year	Spring Frost	Fall Frost	Length of frost-free period Days
	Date of last spring frost	Date of first fall frost	
1930	May 18	Oct. 2	136
1931	May 18	Sept. 19	124
1932	May 24	Sept. 19	118
1933	May 17	Sept. 11	117
1934	May 19	Oct. 1	134
1935	May 24	Sept. 14	113
1936	May 22	Sept. 26	126
1937	May 16	Sept. 21	128
1938	May 25	Sept. 6	103
1939	May 20	Sept. 19	121
1940	May 15	Sept. 26	134
1941	May 13	Sept. 13	122
1942	April 17	Sept. 29	164
1943	May 14	Sept. 18	126
1944	May 21	Sept. 24	125
1945	June 3	Sept. 17	106
1946	May 9	Sept. 12	126
Average	May 17	Sept. 20	124

Date of the latest spring frost on record: June 3, 1945
Date of the earliest fall frost on record: Sept. 6, 1938
Shortest frost-free period on record: 103 days
Longest frost-free period on record: 164 days

The frost-free period ranged between 103 and 164 days with an average of 124 days without frost. The earliest fall frost was recorded on September 6, 1938, and the latest on October 2, 1930. The latest date of last spring frost occurred on June 3, 1945, and the earliest date on April 17, 1942. This shows considerable variation; and indicates that great care should be exercised as to the date of planting and harvesting crops that are likely to be damaged by frost.

The following table shows the dates of farm operations according to the variation in seasons.

TABLE 4.—DATES OF FARM OPERATIONS AT THE DOMINION EXPERIMENTAL STATION, L'ASSOMPTION, QUE.

1930-1946 (17 years)

Farm operations	Earliest	Latest	Average
Seeding oats	April 14	May 9	May 2
Seeding corn	May 7	June 10	May 27
Livestock put out on pasture	May 10	June 7	May 24
Cutting alfalfa and clover (1st cut)	June 13	July 3	June 23
Cutting alfalfa and clover (2nd cut)	July 31	Aug. 29	Aug. 12
Cutting oats	July 16	Aug. 2	July 25
Cutting corn	Aug. 28	Sept. 19	Sept. 8
Livestock taken off pasture	Sept. 30	Nov. 3	Oct. 18
Date of freeze-up	Oct. 24	Dec. 3	Nov. 20

The range of seeding dates for oats is narrow enough. The same is true for hay cutting. This might be attributed to the fact that the land at the Station is underdrained.

Wider ranges exist as to the dates of putting livestock out to pasture and also in taking them off it. The same situation applies to the date of land freeze-up, the earliest happening on October 24 and the latest on December 3.

TOBACCO

R. Bordeleau

SEED-BED MANAGEMENT

TYPES OF SASHES

A glass substitute, Windolite, was compared with ordinary glass for tobacco seedling production. A three-year test showed that as good tobacco seedlings could be grown under this material as under ordinary glass, although it lasts only about four years. The temperature under Windolite was a few degrees lower and growth was not so rapid as under glass, although the danger of sunburn was minimized due to the light being more diffused.

RATES OF SEEDING

Four different rates of seeding were tested over a four-year period. The results are shown in the table below.

TABLE 5.—EFFECTS OF THE RATES OF SEEDING ON THE QUANTITY AND WEIGHT OF TOBACCO SEEDLINGS

4-year average

Rates of seeding per 100 sq. feet of bed	Number of plants per sq. foot	Weight of hundred plants in grams
1/12 of an ounce	123	498
1/14 of an ounce	115	603
1/16 of an ounce	106	620
1/18 of an ounce	105	666

The lower the rate of seeding the higher the weight of seedlings, while the reverse happens when the number of seedlings per square foot of bed is increased. When the seed germinates 80 per cent and over, the best rate of seeding in greenhouses and A-shaped beds appears to be 1/18 ounce per 100 square feet. However, when regular semi-cold beds with glass sashes are used, such a rate is too low; 1/12 ounce per 100 square feet of bed being recommended.

SEED-BED INSULATION

Tobacco seed-beds are frequently built on frozen soil and too often on poorly drained spots. Insulating material between soil and mould was tested and proved to be beneficial.

Straw and strawy manure both gave very good results for that purpose. Seedlings, it was found, grew faster and better in such beds, excess moisture being eliminated and the mould keeping warmer.

DEPTH OF MOULD IN SEED-BED

The regular depth of mould used in seed-beds is 5 or 6 inches. Another practice followed is the use of 1 to 1½ inches of mould over 4 inches of pure sand. Both methods were tested and the results showed that better rooted and stronger seedlings could be raised on 5 inches of mould than on 1½ inches.

DATES OF SEEDING

From results obtained with two different dates of seeding, six days apart, it seems that the character of the season is more important than the date. When the season is backward, seeding may be delayed without inconvenience. The most favourable date of seeding for cigar and pipe tobaccos lies between April 15-25.

METHODS OF SEEDING

Dry seed was compared with sprouted seed in this test. Results obtained show that it is preferable to sow dry seed. However, if for some reason sowing is much delayed, it may be advantageous to sow sprouted seed, thereby gaining a few days. When sprouted seed is sown early and weather conditions are not favourable, more damage is liable to result than with dry seed.

MOULD STERILIZATION

In small A-shaped beds steam sterilization with the inverted pan method is difficult. To overcome this, galvanized pipes perforated crosswise at 6-inch intervals, were laid out on the bottom of the bed and covered with mould. Steam sent through the pipes secured a perfect sterilization, 150 square feet of bed being sterilized at one time. A good precaution is to cover the mould with wood panels to ensure a more rapid sterilization and prevent loss of steam.

Steam sterilization of tobacco seed-beds by the inverted pan method.

Such pipes are long wearing, some having been 15 years in operation at the Station are still in very good condition. While the initial cost of the pipes is higher than the inverted pan, it would appear in the long run, that the pipes would be more economical.

MOULD TYPES

Black muck was tried in different combinations as follows:

(a) Virgin muck: Natural muck as hauled from mucky land. Thickness used in bed, 5 inches.

(b) Virgin muck on sand: Same muck as *(a)*, but the thickness used was $1\frac{1}{2}$ inches over 4 inches of sand.

(c) New mould: Virgin muck mixed with rotted manure the preceding fall, thickness used, 5 inches.

(d) Old mould: Six-year mould made up of muck soil and manure, used every year, but rejuvenated yearly with manure. Thickness used in bed, 5 inches.

The following table shows the results:

TABLE 6.—EFFECT OF THE TYPES OF MOULD ON WEIGHT OF SEEDLINGS

4-year average

Mould types	Weight of 100 plants	Weight of 100 roots	Average height of plants
	grams	grams	in.
Virgin muck	385	77	4·52
Virgin muck on sand	318	64	4·28
New mould	625	84	7·32
Old mould	658	90	7·03

Results show that virgin muck is a poor mould type by itself, but when used in conjunction with manure as in the new and old mould, good results are obtained. A light depth of mould, $1\frac{1}{2}$ inches, as in the virgin muck on sand is not too favourable, better results being obtained with the 5-inch depth recommended.

Effect of fertilization on tobacco seedlings grown on virgin muck. (5) No fertilization; (7) $1\frac{1}{2}$ lb. 2-12-10 per 100 sq. ft.; (9) 3 lb. 2-12-10 per 100 sq. ft.; (11) 6 lb. 2-12-10 per 100 sq. ft.

MOULD FERTILIZATION

It is a common practice to fertilize seed-beds with commercial fertilizers. Two chemical fertilizer formulas for tobacco were tested at different rates in tobacco seedling production, the results being shown in the following table:

TABLE 7.—EFFECT OF THE RATE OF FERTILIZATION ON THE GROWTH OF SEEDLINGS INDEPENDENTLY OF THE FORMULAS TESTED AND THE TYPE OF MOULD

4-year average

Treatment	Weight of 100 plants	Weight of 100 roots	Average height of seedlings
	grams	grams	in.
Check—No fertilizers	492	86	5·7
1½ lb. fert. per 100 sq. ft.	564	97	6·6
3 lb. fert. per 100 sq. ft.	619	109	6·9
6 lb. fert. per 100 sq. ft.	617	111	6·9
10 lb. fert. per 100 sq. ft.	596	108	6·6

From these results it appears to be advantageous to fertilize the mould in seedling production; however, damage may occur if an excessive rate is used as with the 10-pound quantity.

These quantities were tested with different mould types. The quantity of fertilizer proved to be in direct relation to the fertility level of the mould. With moulds made up of black muck mixed with manure, the optium rate lies around the 3-pound quantity, while with virgin muck without manure, 6 to 10 pounds might be necessary.

As to formulas, results show that either the 2-12-10 or 5-8-10 might be used, according to the type of tobacco grown. The 2-12-10 is generally used by the flue-cured tobacco grower and the 5-8-10 by the cigar tobacco grower.

GROWTH PROMOTING MATERIALS

A certain number of growth promoting materials were tested for tobacco seedling production.

The following table shows the results:

TABLE 8.—EFFECT OF GROWTH PROMOTING MATERIALS ON THE DRY MATTER, WEIGHT OF SEEDLINGS AND ROOTS AND ON THEIR HEIGHT

2-year average

Treatments	Dry matter	Weight of 25 plants	Weight of 25 roots	Average height of seedlings
	%	grams	grams	in.
Check	7·88	157	32	6·1
Auxan	8·79	154	32	6·2
Bact Vita	7·90	166	37	6·0
Thiamine	7·90	180	41	6·3
Hormodin	7·75	185	44	6·9
Preplant Thompson	8·13	142	29	6·1

According to results, these growth promoting materials had little effect on the growth of seedlings. However with Bact Victa, Thiamine and Hormodin, the weight of plants and roots was slightly higher than in the check. These materials had no effect whatsoever on the earliness; seedlings treated showing no advantage over the check outside of their heavier weights.

Rotations and Cover Crops

FLUE-CURED TOBACCO

Flue-cured tobacco rotations were studied in conjunction with different fertilizations of the fall rye cover crop used in two-year rotation studies.

The following table shows the results.

TABLE 9.—EFFECT OF COVER CROP FERTILIZATION ON THE YIELD, QUALITY AND MATURITY INDEX OF FLUE-CURED TOBACCO

3-year average

Treatments	Yield per acre	Quality index	Maturity index
	lb.	cts. per lb.	%
Continuous tobacco	996	18·9	46·1
Unfertilized rye	1,003	19·6	46·3
Fertilized rye—			
With nitrate of soda 20 lb. N. per acre	921	19·4	47·4
With sulphate of ammonia 20 lb. N. per aere	965	20·5	46·9
With cyanamid 20 lb. N. per acre	1,004	19·8	44·0
With 1,000 lb. per acre -1-16-16-	1,043	20·2	47·5

The practice of growing tobacco continuously is not to be recommended, since the yield and quality of flue-cured tobacco decreases gradually the longer it is grown in this manner. Moreover, mosaic disease increases gradually, its percentage after the third year being 3 to 4 times higher than with tobacco grown in the two-year rotation, rye, tobacco.

With the exception of nitrate of soda, the other fertilizers—sulphate of ammonia, cyanamid and a complete formula 1-16-16—improved the yield and quality. When sulphate of ammonia was used with the rye the best quality tobacco crop was secured. The best yield, however, was obtained when the rye was fertilized with 1,000 lb. of 1-16-16 while the quality was close to that of sulphate of ammonia.

CIGAR TOBACCO

Crop rotations for cigar tobacco were studied on different soil types of the district as follows:

A two-year rotation on alluvial soil,
A four-year rotation on a sandy soil, and
A four-year rotation on sandy clay loam.

2-Year Rotation

1st year —Cereal seeded down to red clover.
2nd year —Tobacco.
Check —Continuous tobacco.

The following table shows the results.

TABLE 10.—TWO-YEAR ROTATION ON ALLUVIAL SOIL COMPARED TO CONTINUOUS TOBACCO

Treatment	Yield per acre	Quality index
	lb.	cts. per lb.
Tobacco in rotation	1,722	23·0
Continuous tobacco	1,635	22·5

Alluvial soils, on which tobacco generally is grown continuously, are among the richest types from the standpoint of fertility.

The general fertilization followed is 12 to 15 tons of manure and 900 lb. per acre of a 5-8-7 fertilizer mixture.

The fertilization adopted in the two-year rotation was 500 lb. per acre of 5-8-7 and no manure, but the clover growth was ploughed under. This method, besides being more economical than the one generally followed, gave better results from year to year. A chemical analysis of the plots revealed no lessening of soil fertility and indicated that organic matter was well maintained.

4-Year Rotation on Sandy Soil

1st year —Cereal.
2nd year —Clover hay.
3rd year —Tobacco.
4th year —Tobacco.

TABLE 11.—FOUR-YEAR ROTATION ON SANDY SOIL SHOWING EFFECT ON YIELD AND QUALITY OF TOBACCO

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
1st year in tobacco	1,012	12·7
2nd year in tobacco	1,309	16·6

The soil type used was a coarse sand, subject to drought, and its fertility level was low, especially in phosphorous and organic matter. Ten tons of manure and 1,000 lb. of 5-8-10 were applied to the tobacco crop.

The increased yield in 2nd year tobacco is noticeable, showing the residual effect of the fertilizer applied to the previous crop. Apparently it would be logical to assume that this soil type would require a heavy application of fertilizer on the cereal rotation so that a good hay crop might be encouraged. Manure should be raised to 15 to 20 tons per acre, it was found, to improve the organic content of the soil.

4-Year Rotation on Sandy Clay Loam

1st year —Cereal
2nd year —Clover hay.
3rd year —Tobacco.
4th year —Tobacco.

Different fertilizers were tested in this rotation the results from which are compiled in the following table:

TABLE 12.—FOUR-YEAR ROTATION ON SANDY CLAY LOAM SHOWING EFFECT ON YIELD AND QUALITY OF CIGAR TOBACCO

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
1st year in tobacco—		
No manure—		
1,000 lb. 5-8-7	1,562	24·0
750 lb. 5-8-7	1,514	23·5
5 tons manure—		
1,000 lb. 5-8-7	1,632	23·8
750 lb. 5-8-7	1,552	23·0
10 tons manure—		
1,000 lb. 5-8-7	1,481	22·1
750 lb. 5-8-7	1,531	23·0

The best treatment of all was 5 tons of manure with 1,000 lb. of 5-8-7 per acre.

On the average, the 1,000 lb. quantity of 5-8-7 gave best results except when the 10 tons manure was used. During the two years of the experiment, certain tendencies were somewhat concealed by two years of almost continuous drought. The test is being continued to obtain results over a longer range of years.

This soil type was found to have a fair fertility level while the relatively low results obtained with the 10-ton quantity of manure should indicate the level of organic matter.

Field Cultural Experiments

METHODS OF HARVESTING TOBACCO

In studying the harvesting of tobacco at different stages of maturity, one lot of tobacco was harvested 11 days after topping and the second lot 16 days after topping. The quality index for the first lot was 11·9c. per lb and 12·4c. for the second lot.

In allowing the tobacco to over-mature the yield was found to increase slightly but to the detriment of quality. Under-ripe tobacco, on the other hand, gave a lower yield of thin and papery tobacco most difficult to cure.

STUDIES ON THE STAND AND NUMBER OF REPLANTINGS

The first experiment consisted of testing one, two and three replantings at 5-day intervals and comparing these treatments with a check where no replanting took place.

The following table shows the results.

TABLE 13.—EFFECT OF THE NUMBER OF REPLANTINGS ON THE YIELD AND QUALITY INDEX OF CIGAR TOBACCO

3-year average

Treatments	Yield per acre.	Quality index
	lb.	cts. per lb.
Check	1,436	14·8
One replanting	1,436	14·8
Two replantings	1,352	14·8
Three replantings	1,420	14·9

These results are not very significant because just a few plants were missing in the plots and the number replaced was not sufficient to affect either yield or quality.

A second experiment, started later with a determined number of plants pulled and replaced with new seedlings, gave the following results.

TABLE 14.—EFFECT OF NUMBER AND PERCENTAGE OF REPLANTINGS ON YIELD AND QUALITY OF CIGAR TOBACCO

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
Check, no replanting	1,602	21·8
One replanting, 5 days after planting—		
10% replanted	1,663	22·1
25% replanted	1,651	20·8
50% replanted	1,557	20·7
Average	1,624	21·2
Two replantings, 5-day interval—		
10% replanted	1,644	20·5
25% replanted	1,598	20·1
50% replanted	1,662	23·4
Average	1,635	21·3
Three replantings, 5-day interval—		
10% replanted	1,697	22·4
25% replanted	1,629	21·6
50% replanted	1,578	22·7
Average	1,635	22·2

Results show that there is advantage in replacing missing plants, one, two or three times, according to need. But care should be exercised at planting time to use the best of seedlings because, with over 25 per cent of replanted seedlings, the yield has a tendency to decrease. Moreover, replanting is a costly operation due to the labour involved.

When a high percentage of plants has been replaced, judgment should be exercised as to harvest time. It should be done when the majority of the plants have attained the right degree of maturity.

To ensure best results in such case, topping should not spread over too long a period as the late replaced plants topped last will be too green at harvest time and if harvest is delayed, the first planted tobacco will be over-ripe.

PLOUGHING VS. DISKING FLUE-CURED TOBACCO LAND

In this experiment four factors were studied, namely: should flue-cured tobacco land be ploughed under or just disked and should the operation be done in the fall or spring?

The following table gives the results obtained.

TABLE 15.—PLOUGHING VERSUS DISKING FLUE-CURED SOIL, FALL AND SPRING

2-year average

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
Fall operations—		
Disking	1,055	30·0
Ploughing	1,059	30·5
Spring operations—		
Disking	1,019	29·9
Ploughing	1,080	30·1
Average of fall operations	1,057	30·3
Average of spring operations	1,049	30·0
Average of ploughings	1,069	30·3
Average of diskings	1,037	29·9

Comparing the results, it will be noted (1) that slightly better results were obtained with ploughing than with disking, regardless of the time the operations were done, and (2) that fall operations gave slightly better results, while (3) the quality was not appreciably affected by the various operations.

MANURE, FERTILIZERS AND GROWTH PROMOTING MATERIALS

Methods of Applying Fertilizers

Cigar tobacco

Fertilizers, applied at the rate of 1,000 lb. per acre, were drilled in the row and in two bands each side of the row. There was a very slight increase in yield and quality in favour of the band method of application. The fact that the piece of land chosen had a high fertility level and that a high rate of application was used, 1,000 lb. per acre, is probably responsible for the small difference observed.

Flue-cured tobacco

The row application of fertilizer a few days before planting was compared with the band application method at planting time.

Two rates were tested, 1,200 and 800 lb. per acre.

The results are shown in the table below.

TABLE 16.—ROW APPLICATION OF FERTILIZERS A FEW DAYS BEFORE PLANTING VERSUS BAND APPLICATION AT PLANTING TIME

3-year average

Treatment	Yield per acre	Quality index
	lb.	cts. per lb.
Band application—		
1,200 lb. per acre	1,227	23·4
800 lb. per acre*	1,157	22·6
Row application—		
1,200 lb. per acre	1,346	23·9
800 lb. per acre*	1,170	24·3

* 2-year average.

Results have been somewhat variable from year to year and differences shown were relatively small. Apparently one method of application is as good as the other. Band application is somewhat more economical, being done at planting time, while with the other method, the fertilizer spreading is one operation and planting is another.

USE OF BARNYARD MANURE

Barnyard manure was tested in flue-cured fertilization. An application of five tons of manure was compared with no manure. Results were as follows:

TABLE 17.—EFFECT OF MANURE ON YIELD AND QUALITY OF FLUE-CURED TOBACCO

2-year average

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
5 tons manure per acre	1,103	30·5
No manure	1,020	29·6

The application of 5 tons of manure to flue-cured tobacco proved to be beneficial, both yield and quality increasing appreciably. The manure was worked into the soil by disking and ploughing. Results showed that ploughing manure under was slightly more beneficial than disking it.

QUANTITIES OF NITRATE NITROGEN

In this test a 5-8-10 formula was used at the rate of 1,000 lb. per acre. The nitrogen was supplied by nitrate of soda and sulphate of ammonia. The test was made to find out the optimum quantity of nitrate nitrogen most favourable to cigar tobacco production.

The following table shows the results.

TABLE 18.—EFFECT OF THE QUANTITY OF NITRATE NITROGEN ON THE YIELD AND QUALITY OF CIGAR TOBACCO

3-year average

Quantities of nitrate nitrogen in the formula	Yield per acre	Quality index
	lb.	cts. per lb.
20%	1,869	13·7
50%	1,833	14·3
80%	1,797	13·7

The highest yield was obtained with 20 per cent of nitrate nitrogen in the formula. However with 50 per cent the quality was better.

The results seem to indicate that, both yield and quality factors considered, 50 per cent of nitrate in the form of nitrate of soda can be used safely.

QUANTITIES OF NITROGEN, PHOSPHORIC ACID AND POTASH

Cigar tobacco

The following levels of nitrogen, 3, 5 and 7 per cent were tested concurrently with three levels of phosphoric acid, 6, 8 and 10 per cent, and three levels of potash, 7, 10 and 13 per cent. Ten tons of manure per acre were applied to all plots plus 1,000 lb. of chemical fertilizer per acre.

The following table shows the results.

TABLE 19.—STRAIGHT EFFECT OF THE QUANTITY OF NITROGEN ON THE YIELD AND QUALITY OF CIGAR TOBACCO

6-year average

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
3% Nitrogen	1,924	14·8
5% Nitrogen	2,010	15·5
7% Nitrogen	1,959	15·4

Results indicate that the optimum quantity of nitrogen is 5 per cent. It is with that quantity that best results were secured from the standpoint of yield and quality.

TABLE 20.—STRAIGHT EFFECT OF THE QUANTITY OF PHOSPHORIC ACID ON THE YIELD AND QUALITY OF CIGAR TOBACCO

6-year average

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
6% P_2O_5	1,916	15·0
8% P_2O_5	1,988	15·4
10% P_2O_5	1,988	15·3

Optimum results as to yield and quality were obtained with 8 per cent phosphoric acid. No gain was observed when larger quantities were used.

TABLE 21.—STRAIGHT EFFECT OF THE QUANTITY OF POTASH ON THE YIELD AND QUALITY OF CIGAR TOBACCO

6-year average

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
7% K_2O	1,924	15·0
10% K_2O	1,995	15·4
13% K_2O	1,974	15·3

Optimum results were obtained with the 10 per cent quantity of potash in the formula.

The following table shows the best formulas in relation to individual factors considered in the production of cigar tobacco.

TABLE 22.—EFFECT OF THE FERTILIZER FORMULAS ON FACTORS INFLUENCING THE CIGAR TOBACCO CROP

Factors involved	Maximum results	Formula
Highest percentage of binders	25·1%	5–8–7
Highest fire-holding capacity	7·3 sec.	7–6–13
Highest quality index	15·9 cts.	5–8–7
Highest yield per acre	2,077 lb.	5–8–10
Highest gross return	$327.57	5–8–10

All factors considered, it seems that with an application of 1,000 lb. per acre, the best formula would be a 5-8-10, which gave 21·6 per cent of binder, 6 seconds fire-holding capacity, 15·6c. per pound for quality, 2,077 lb. per acre for yield and a gross return of $327.57 per acre.

Where the soil is sufficiently supplied with potassium the second best formula would be the 5-8-7.

Both formulas are well adapted to the average soil type of this district.

Flue-cured tobacco

The following levels of nitrogen, 1, 2 and 3 per cent, were studied along with three levels of phosphoric acid, 8, 10 and 12 per cent, and three levels of potash, 6, 8 and 10 per cent.

The following tables show the results.

TABLE 23.—STRAIGHT EFFECT OF THE QUANTITY OF NITROGEN ON THE YIELD, QUALITY AND MATURITY OF FLUE-CURED TOBACCO

5-year average

Quantities of Nitrogen	Yield per acre	Quality index	Maturity index
	lb.	cts. per lb.	%
1% Nitrogen	1,042	22·2	45·0
2% Nitrogen	1,185	21·8	42·6
3% Nitrogen	1,275	21·4	39·2

The yield increases gradually with higher quantities of nitrogen, but both quality and maturity index decrease steadily.

TABLE 24.—STRAIGHT EFFECT OF THE QUANTITY OF PHOSPHORIC ACID ON THE YIELD, QUALITY AND MATURITY OF FLUE-CURED TOBACCO

Quantities of phosphoric acid	Yield per acre	Quality index	Maturity index
	lb.	cts. per lb.	%
8% P_2O_5	1,156	21·6	42·2
10% P_2O_5	1,165	21·8	42·4
12% P_2O_5	1,183	21·9	42·3

An increasing quantity of phosphoric acid increases slightly both the yield and quality while the maturity index is practically unchanged.

TABLE 25.—STRAIGHT EFFECT OF THE QUANTITY OF POTASH ON THE YIELD, QUALITY AND MATURITY INDEX OF FLUE-CURED TOBACCO

Quantities of potash	Yield per acre	Quality index	Maturity index
	lb.	cts. per lb.	%
6% K_2O	1,160	21·8	42·8
8% K_2O	1,164	21·7	42·8
10% K_2O	1,180	21·9	41·3

The yield increased gradually with higher quantities of potash, the quality was practically unchanged and the maturity index showed a tendency to decrease with the highest quantity of potash.

The following table shows the best formulas in relation to individual factors considered in the production of flue-cured tobacco.

TABLE 26.—EFFECT OF THE FORMULAS ON FACTORS INFLUENCING THE FLUE-CURED TOBACCO CROP

Factors involved	Maximum results	Formula
Highest maturity index	46·5%	1–10–6
Highest yield per acre	1,329 lb.	3–12–8
Highest quality index	23·2 cts.	1–10–10
Highest gross return	$287.06	3–12–8

After considering all factors including the climatic conditions of the district concerned, the 2-12-10 formula was found to be the best to recommend and should be used at the rate of 1,200 lb. per acre. Such a formula at the rate indicated above has assured, over a period of five years, a maturity index of 41·5 per cent, a yield per acre of 1,233 lb., a quality index of 22·6 cts. and a gross return of $278.65 per acre. The frost-free period in the district is too short to recommend 3 per cent of nitrogen in the formula.

QUANTITIES OF MAGNESIA

A 5-8-10 formula plus 10 tons manure was applied at the rate of 1,000 lb. per acre. Different percentages of magnesia were tested and results are shown in the table below.

TABLE 27.—EFFECT OF MAGNESIA ON THE YIELD AND QUALITY OF CIGAR TOBACCO

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
No MgO	2,154	15·0
2% MgO	2,089	15·7
4% MgO	2,093	15·3
8% MgO	2,234	15·8

Increased quantities of MgO seem to have but little effect on the yield, while the quality is slightly improved.

QUANTITIES OF SULPHUR

A 5-8-10 formula was applied at the rate of 1,000 lb. per acre plus 10 tons manure. The formula was so built up as to contain, none, 50 lb. and 100 lb. of SO_3 per acre.

Results are shown in the following table.

TABLE 28.—EFFECT OF SULPHUR ON THE YIELD AND QUALITY OF CIGAR TOBACCO

Treatments	Yield per acre	Quality index
	lb.	cts. per lb.
No sulphur	2,131	15·5
50 lb. SO_3 per acre	2,131	15·0
100 lb. SO_3 per acre	2,097	15·7

Increased quantities of sulphur up to 100 lb. per acre have practically no effect on the yield. There was a slight decrease in yield with the largest quantity but the quality was the highest.

GROWTH PROMOTING MATERIALS IN CIGAR TOBACCO PRODUCTION

Test No. 1

In this test, seedlings were treated in seed-beds with Bact Vita, Auxan, Hormodin, Thiamine and Pre-plant Thompson. Seedlings were transferred into the field without any other treatment.

Results are shown in the following table.

TABLE 28.—EFFECT OF GROWTH PROMOTING MATERIALS ON CIGAR TOBACCO WITH SEEDLINGS TREATED IN SEED-BEDS ONLY

(2-year average)

Treatments	Yield per acre	Quality index	Crop index
	lb.	cts. per lb.	$
Check (No treatment)	1,750	24·5	430
Auxan	1,729	24·8	426
Pre-plant Thompson	1,743	26·0	453
Hormodin	1,752	25·4	447
Bact Vita	1,781	24·2	433
Thiamine	1,785	24·9	445

Of all the materials tested, only Auxan proved to be inferior to the check. All other materials tested, especially Bact Vita and Thiamine, secured higher yields than the check but the increases were small. Pre-plant Thompson and Hormodin secured the best qualities and likewise the best crop indexes.

Test No. 2

In test No. 2, seedlings treated in seed-beds were used, but received a second treatment at transplanting time.

The following table shows the results.

TABLE 29.—EFFECT OF GROWTH PROMOTING MATERIALS ON CIGAR TOBACCO WITH SEEDLINGS TREATED IN SEED-BEDS AND TREATED AGAIN AT PLANTING TIME

(2-year average)

Treatments	Yield per acre	Grade index	Crop index
	lb.	cts. per lb.	$
Check (No treatment)	1,726	23·8	409
Pre-plant Thompson	1,700	24·6	416
Auxan	1,775	24·4	433
Hormodin	1,795	24·7	437
Thiamine	1,855	24·1	447
Bact Vita—			
10 lb. per acre	1,838	24·6	453
20 lb. per acre	1,777	25·8	459
30 lb. per acre	1,810	25·2	455

Seedlings treated in seed-beds and again at transplanting time showed a reasonable increase in yield, with the exception of those treated with Pre-plant Thompson. Of all the materials tested, Thiamine and Bact Vita were the best. Considering the crop index, Bact Vita was slightly superior to all other materials tested.

Test No. 3

In test No. 3, seedlings were shown treated only at time of planting in the field.

Results are shown in the following table.

TABLE 30.—EFFECT OF GROWTH PROMOTING MATERIALS ON CIGAR TOBACCO WITH UNTREATED SEEDLINGS IN SEED-BEDS BUT TREATED AT PLANTING TIME

(2-year average)

Treatments	Yield per acre	Grade index	Crop index
	lb.	cts. per lb.	$
Check (No treatment)	1,735	24·4	422
Pre-plant Thompson	1,694	24·8	414
Auxan	1,720	25·9	446
Hormodin	1,730	23·8	409
Thiamine	1,791	24·6	437
Bact Vita—			
10 lb. per acre	1,664	24·0	396
20 lb. per acre	1,768	23·7	414
30 lb. per acre	1,794	24·1	426

In this test the check was surpassed only by Thiamine, and Bact Vita at the higher rates of application. Differences were not great.

As a conclusion to be drawn from the results of the various tests, these so-called growth-promoting materials do not seem economical to use on the tobacco crop. The slight increase either in yield or quality, it was found, in most cases would not cover the cost of material and application.

Varietal Tests

FLUE-CURED VARIETIES

During the period covered by this report some 12 varieties and strains of flue-cured tobacco were tested, the results of which appear in the following table.

TABLE 31.—VARIETAL TEST OF FLUE-CURED TOBACCO

Varieties	Years tested	Yield per acre	Quality index	Maturity index
		lb.	cts. per lb.	%
White Mammoth	1939 to 1946	1,178	23·4	50·5
Gold Dollar	1939 to 1946	1,168	24·2	51·1
Yellow Mammoth	1939 to 1942	1,144	20·4	46·3
Bonanza	1939 to 1942	1,021	20·5	46·9
White Stem Orinoco	1939 to 1942	1,058	19·2	47·1
Gold Dollar (American strain)	1943 to 1946	1,215	25·8	53·2
Strain 400	1943 to 1946	1,146	25·8	52·6
Mammoth Gold	1943 to 1946	1,203	25·1	52·9
Terrel's Cash	1943 to 1945	1,074	23·6	53·0
Big Cash	1943 to 1945	1,088	21·0	48·4
Duquesne	1946	1,214	31·4	47·8
Delray	1946	1,270	31·5	48·3

Mammoth Gold, Gold Dollar and White Mammoth are among the best yielders, having satisfactory quality as well. The maturity index is also very good and apparently these three varieties are best suited to the district. Duquesne and Delray, two new varieties, introduced in the 1946 test only, appear most promising, although their maturity index is slightly lower than that of the varieties recognized as suitable for the district. These two varieties will be tested over a longer period and might possibly prove satisfactory for the district.

CIGAR VARIETIES *(binder and filler types)*

Some 19 varieties were tested during the period and results are shown in the table below.

TABLE 32.—VARIETAL TEST OF CIGAR TOBACCO

Varieties	Years tested	Yield per acre	Grade index
		lb.	cts. per lb.
Connecticut Havana 142 C3X	1938 to 1946	1,926	16·4
Havana 211	1938 to 1946	1,920	17·9
Comstock Spanish Pomeroy	1938 to 1946	1,636	17·8
Zimmer Spanish	1938 to 1946	1,751	15·4
Yamaska 8	1940 to 1946	1,696	17·1
Yamaska 9	1940 to 1946	1,528	18·5
No. 39102	1940 to 1946	1,750	16·1
No. 39094	1940 to 1946	1,597	15·5
No. 39090	1940 to 1946	1,600	17·0
No. 39089	1940 to 1946	1,744	17·3
Connecticut Broadleaf Williams	1940 to 1946	1,750	18·1
Res. Havana x C. H. 38	1938 to 1940	1,569	14·9
No. 37337	1939 to 1941	1,347	13·2
Connecticut Havana 38	1938 and 1946	1,542	19·1
Res. Havana x C.S. Pomeroy	1939 and 1940	1,652	12·7
Comstock Spanish	1938	1,469	14·4
Havana 236	1938	1,533	13·3
Smith Seed	1938	1,554	15·0
Pennsylvania Havana	1938	1,446	14·3
Connecticut Broadleaf Williams x Resistant Havana	1946	1,983	22·0
Conn. Broadleaf Williams x Connecticut Havana 38	1946	1,995	24·0
Conn. Broad. Williams x Comstock Spanish Pomeroy	1946	1,966	26·5

The favourite varieties in the district are the Havana 211, Comstock Spanish Pomeroy, Zimmer Spanish and Connecticut Broadleaf Williams. The Havana 211 and Comstock Spanish Pomeroy are considered binder types and Zimmer and Broadleaf are filler types.

Zimmer and C. S. Pomeroy, being earlier than either Havana 211 or Broadleaf, were found to be the most suitable when late planting took place. However, when early planting is possible Havana 211 and Broadleaf are recommended.

Some crosses between C. B. Williams and C.H. 38, Resistant Havana and C. S. Pomeroy, proved to be quite outstanding and selection is being continued. Yamaska No. 8 and No. 9 and No. 39089 show also some promise.

PIPE VARIETIES

The pipe tobacco varieties grown in Quebec are divided into three classes—large, medium and aromatic. The following table gives the results of variety tests during the periods concerned.

TABLE 33.—VARIETAL TEST OF QUEBEC PIPE TOBACCOS

Varieties	Years tested	Yield per acre	Quality index
		lb.	cts. per lb.
Large Type—			
Grand Rouge	1938 to 1946	1,688	11·4
Conn. Broadleaf	1939 to 1941	1,555	11·6
No. 39173	1942 to 1945	1,608	13·3
No. 39172	1942 to 1945	1,519	13·7
No. 39167	1942 to 1945	1,389	13·3
No. 39166	1942 to 1945	1,495	13·5
Grand Bleu	1946	2,220	14·6
Richmond	1946	2,032	13·4
Grand General	1946	2,319	13·1
General Grant	1946	2,150	13·3

TABLE 33.—VARIETAL TEST OF QUEBEC PIPE TOBACCOS—*Concluded*

Varieties	Years tested	Yield per acre	Quality index
		lb.	cts. per lb.
Medium Type—			
Belge	1938 to 1945	1,293	13·7
Rose Canelle	1938 to 1946	1,235	13·1
Parfum d'Italie	1938 to 1946	1,095	13·1
Obourg Vincent	1938 to 1941	994	12·0
Aromatic Type—			
Havana l'Assomption	1938 to 1946	1,027	20·2
Petit Havane	1938 to 1946	795	19·2
Canelle	1938 to 1945	667	17·8

In the large type class, the Grand Rouge and Connecticut Broadleaf are the favourites, while Grand Rouge has poor curing qualities, but Connecticut Broadleaf is much easier to cure.

In the new varieties tested in 1946, a large percentage of off-types were found. After selection, however, these varieties may prove suitable on account of their high yield and good quality.

Of the Belge type hybrids tested, all proved to be of good quality, while No. 39172 proved especially worthwhile. In the medium class, Belge, Parfum d'Italie and Rose Canelle were grown extensively, thereby fulfilling the needs of a good market that exists for these varieties of which the Parfum d'Italie is most in demand.

In the aromatic class, Havana L'Assomption was the best yielder. However, with Canelle and Petit Havane being more aromatic, these were more in demand than Havana L'Assomption.

Also tested during the 10-year period were Harrow Velvet, a burley variety; One Sucker and Blue Pryor, dark type varieties. While these varieties are adapted to conditions at the Station, there is no demand for such types in Quebec.

Tobacco Soil Investigations

In 1941, a survey of the cigar tobacco soils of the district was started and a program of soil analysis, using rapid soil tests, inaugurated to obtain more knowledge of the tobacco soil fertility levels of both northern and southern districts. The present work represents a five-year period and covers over 300 tobacco fields in both districts. In Tables 34 to 40, inclusive, there will be observed the expression "Yield per arpent". As used in Quebec the term "arpent" means an area of roughly five-sixths of an acre, namely, 0·8448 acre.

Typical alluvial soil of the Yamaska Valley best suited for tobacco growing.

SOIL TYPES

The following table gives the results obtained as to soil types:—

TABLE 34.—EFFECT OF SOIL TYPES ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Soil types	Percentage of soil in each class	Yield per arpent	Quality index	Burn
	%	lb.	cts. per lb.	sec.
Alluvial	12·2	1,299	20·3	13·1
Loamy	66·3	1,037	16·5	6·4
Clayey	18·1	965	16·0	6·2
Sandy	3·4	777	14·3	8·4

Physically, the most suitable soil types for growing cigar tobacco are the alluvial and loamy soils. They can be worked easily almost at any time. Chemically, they are the richest of the soil types studied.

Clayey soils are generally too compact for cigar tobacco growing as they have a tendency to suffer from lack of drainage. In the majority of cases the chlorine content is too high and the fire-holding capacity of the leaf is impaired.

The main trouble with sandy soils is their low fertility level, and the fact that they suffer readily from drought. A very high rate of fertilization would be needed on such soils, probably to an uneconomical level.

PRECEDING CROPS

TABLE 35.—EFFECT OF PRECEDING CROPS ON YIELD AND QUALITY OF CIGAR TOBACCO

Preceding crops	Percentage of growers	Yield per arpent	Quality index
	%	lb.	cts. per lb.
Continuous tobacco	11·8	1,290	20·9
Two to three years in tobacco	40·4	1,052	17·3
Tobacco after pasture	16·1	1,027	15·5
Tobacco after cereals	4·6	1,005	17·6
Tobacco after hay	22·1	976	15·4
Tobacco after hoed crops other than tobacco	5·0	922	15·5

Apparently the continuous tobacco practice gives the best results, but it should be kept in mind that this practice is followed mostly on the alluvial soil type. On other soil types there is an advantage in growing tobacco two to three years consecutively. Tobacco after pasture yields better than after cereals, hay or hoed crops other than tobacco.

SOIL REACTION

Soil reaction influences the tobacco crop. Tobacco generally thrives best on slightly acid soils as shown in the following table:

TABLE 36.—THE SOIL REACTION AND ITS EFFECT ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Classes by pH values	Percentage of growers	Yield per arpent	Quality index	Burn
pH	%	lb.	cts. per lb.	sec.
4·5 to 5·0	12	979	17	7·0
5·1 to 5·6	57	1,088	17	6·9
5·7 to 6·2	24	1,032	15	7·1
6·3 and over	7	1,018	16	8·5

With soils having pH values above or below 5·1 to 5·6, the yield had a tendency to decrease, although the quality and burn were not appreciably affected. Past experience proves the difficulty of controlling a well known disease of tobacco, the black root-rot, on neutral and alkaline soils. If lime is necessary for other crops in the rotation, it should be applied right after the tobacco crop.

SOIL NUTRIENT LEVELS

The three main elements, nitrogen, phosphorus and potassium, received special attention when analyses of the soils were made. The following table shows the influence of nitrogen on the yield, quality and burn of cigar tobacco.

TABLE 37.—CLASSIFICATION OF SOILS ACCORDING TO THEIR CONTENT OF AVAILABLE NITROGEN AND ITS EFFECT ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Classes by pounds of available nitrogen per acre	Percentage of growers	Yield per arpent	Quality index	Burn
lb. N avail.	%	lb.	cts. per lb.	sec.
Up to 150 lb	6·6	953	16·5	4·2
151 to 200 lb	28·6	936	20·5	5·5
201 to 250 lb	36·5	1,036	17·6	7·9
251 to 300 lb	18·7	1,067	16·1	9·0
301 lb. and over	9·6	1,176	16·8	9·6

The yield was found to rise gradually as the amount of available nitrogen in the soil increased. The fire-holding capacity or burn followed the same trend. For optimum quality, however, the amount of nitrogen needed was not so high as for optimum yield and burn. Too large a percentage of the soils were actually low in nitrogen.

TABLE 38.—CLASSIFICATION OF SOILS ACCORDING TO THEIR CONTENT OF AVAILABLE PHOSPHORUS AND ITS EFFECT ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Classes by pounds of available phosphorus per acre	Percentage of growers	Yield per arpent	Quality index	Burn
lb. P avail.	%	lb.	cts. per lb.	sec.
Up to 20 lb	21·8	954	15·0	7·4
21 to 40 lb	35·7	1,043	17·5	7·1
41 to 60 lb	20·5	1,048	17·5	5·9
61 to 80 lb	10·3	1,113	16·5	8·5
81 lb. and over	11·7	1,163	17·5	7·0

Phosphorus had an appreciable influence on yield, the higher the phosphorus content of the soil, the higher the yield. It seems that for quality, the optimum level is lower than for yield. Phosphorus hardly affected the burn.

TABLE 39.—CLASSIFICATION OF SOILS ACCORDING TO THEIR CONTENT OF AVAILABLE POTASSIUM AND ITS EFFECT ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Classes by pounds of available potassium per acre	Percentage of growers	Yield per arpent	Quality index	Burn
lb. K avail.	%	lb.	cts. per lb.	sec.
Up to 200 lb	27·5	1,011	14·1	5·8
201 to 300 lb	42·7	1,054	17·2	6·3
301 to 400 lb	24·5	1,072	18·4	9·8
401 lb. and over	5·3	1,205	15·6	10·1

The higher the content of available potassium in the soil the higher the yield. Comparatively, the quality was affected to a greater extent than yield, but the optimum quantity of potash rated higher for yield than for quality. The burn of tobacco was considerably affected by the potassium content of the soil, the higher the quantity of potassium, the longer the burn duration.

ORGANIC MATTER

As a general rule, cigar tobacco growers use farm manure to quite an extent in the fertilization of their tobacco land. However, the organic-matter content of the soils tested in too many instances seemed rather low.

TABLE 40.—CLASSIFICATION OF SOILS ACCORDING TO THEIR CONTENT IN ORGANIC MATTER AND EFFECT ON YIELD, QUALITY AND BURN OF CIGAR TOBACCO

Classes by per cent of organic matter in soils	Percentage of growers	Yield per arpent	Quality index	Burn
%	%	lb.	cts. per lb.	sec.
Up to 4%	27·4	993	18·8	6·7
4·1 to 6%	59·3	1,022	18·0	7·4
6·1 to 8%	11·2	1,065	18·0	9·0
8·1% and over	2·1	1,150	14·6	9·1

The yield increased gradually with a higher content of organic matter in the soils. The same trend showed for burn but for quality there was apparently no great effect.

Organic matter is important not only as a provider of nutrient elements but also in favourably affecting the physical composition of the soil and promoting the development of desirable micro-organisms.

The survey revealed deficiencies in many of the tobacco soils. Much improvement should result from the use of larger quantities of chemical fertilizer and manure per acre, but the main problem to study was the method of increasing the deficient elements in the soil so as to obtain a proper balance of all the elements.

Tobacco Curing

With regard to cigar tobacco curing, studies were made on evaporation, temperature and relative humidity in the curing barns and their relation to proper curing conditions.

EVAPORATION STUDIES

In this experiment Piche evaporimeters were tested in different types of curing barns to observe if there was a possible relationship between the rate of evaporation and curing. The evaporimeters were placed in the centres of barns on the second tier.

The following table shows the results from year to year.

TABLE 41.—RELATION OF EVAPORATION TO THE CURING PROCESS OF TOBACCO WITH PICHE EVAPORIMETER

Year	Length of the curing period	Average daily evaporation in c.c.				
		Outside the barns	Inside curing barns			
		Stevenson screen	Station	Grower A	Grower B	Grower C
		c.c.	c.c.	c.c.	c.c.	c.c.
1940	Sept. 11 to Oct. 11	1·79	1·08	–	–	–
1941	Aug. 12 to Oct. 27	2·67	1·56	–	–	–
1942	Aug. 22 to Oct. 31	2·11	1·30	–	–	–
1943	Aug. 30 to Oct. 31	1·60	1·00	–	–	–
1944	Aug. 19 to Oct. 31	1·85	1·22	–	–	–
1945	Aug. 27 to Oct. 27	1·59	1·06	0·81	1·33	1·18
1946	Aug. 27 to Oct. 12	2·32	1·20	1·26	1·35	2·21

The evaporimeters proved satisfactory, being easy to operate and low in cost. It is believed they should render reliable service to tobacco growers during the curing period. In the course of the experiment, it was learned that if less than 1·0 c.c. of water was evaporated daily, there was danger of shed burn or pole sweat, at which time ventilation should be introduced. For instance, damage occurred in 1945 at the curing barn of "grower A", where pole sweat commonly occurred due to there being only 0·81 c.c. daily evaporation. At the Station curing barn, no trouble occurred, except for a light touch of pole sweat in 1943 when the average evaporation was 1·0 c.c. although it went lower for a few days during the curing period.

TEMPERATURE AND RELATIVE HUMIDITY STUDIES

Thermo-hygrographs were kept in the curing barn at the Station and outside so as to study the relationship of temperature and humidity in the curing of tobacco.

The following table gives the results from year to year.

TABLE 42.—TEMPERATURE AND RELATIVE HUMIDITY IN RELATION TO CURING OF CIGAR TOBACCO

Year	Length of curing period	Temperature and Relative Humidity							
		Outside		Station barn		Grower A		Grower B	
		Mean Temp.	Mean R.H.	Mean Temp.	Mean R.H.	Mean Temp.	Mean R.H.	Mean Temp.	Mean R.H.
		°F	%	°F	%	°F	%	°F	%
1940	Sept. 7 to Nov. 3	48·0	70·3	50·9	65·4	49·7	68·9	52·2	69·2
1941	Aug. 11 to Oct. 26	55·5	64·9	58·7	65·7	–	–	53·6	62·2
1942	Aug. 20 to Oct. 31	55·3	65·8	58·1	75·3	–	–	–	–
1943	Aug. 30 to Oct. 31	49·2	68·4	49·1	78·8	–	–	–	–
1944	Aug. 19 to Oct. 27	53·3	65·9	57·5	71·5	–	–	–	–
1945	Aug. 27 to Oct. 21	54·0	78·7	57·1	79·2	–	–	–	–
1946	Aug. 27 to Oct. 12	57·3	70·4	60·1	77·0	–	–	–	–

The mean temperature inside and outside the barns showed little variance. In tightly-built barns like those at the Station the temperatures have a tendency to remain slightly higher than outside and show less fluctuation.

Relative humidity is generally higher in the barn than outside, except where loosely-built barns are concerned. In 1940 and 1943, the average temperature was lower than usual and the crop was difficult to cure because the danger

of pole sweat is greater under conditions of low temperature and high humidity. The lower the temperature, the lower the humidity should be, but since the opposite generally happens special care should be given to ventilation in such cases. Of all seasons under review, 1943 was the most difficult year for curing tobacco, when the temperature was low and humidity relatively high.

Apparently the important factor with good curing is the degree of evaporation; in which case, evaporimeters would be more useful in a curing barn than thermo-hygrographs.

VENTILATION OF CURING BARNS

From tests made on the flow of air currents in curing barns, results were such as to suggest changes in the construction of certain barns and also adjustments in the usual method of ventilation.

If the barn is on a full foundation, a large size horizontal ventilator should be provided just over the sills and should work independently of the horizontal ventilators higher up. If the barn is on piers, some 18 inches above ground, panels on hinges should be fixed from pier to pier that could be worked independently.

Top ventilators running throughout the length of the roof are not recommended as snow drifts in easily on the tobacco during heavy snow storms. A series of independent round metal ventilators gives as good results and prevents the danger of wetting the tobacco with snow.

High wind damages the tobacco easily when curing. A good ventilation can be secured if needed, by opening the bottom ventilators on the windward side and closing them on the opposite side. The air current will then find its way through the mass of tobacco and escape through the top ventilators, while other side ventilators are closed to prevent wind damage.

LABORATORY AND TECHNICAL EXPERIMENTS

Under this heading, studies were made on the fire-holding capacity of cigar tobacco, fertilized various ways. A test on the properties of magnesium to increase the fire-holding capacity of tobacco was made with results that are shown in the following table:

TABLE 43.—EFFECT OF MAGNESIUM ON THE FIRE-HOLDING CAPACITY OF CIGAR TOBACCO

Treatments	Burn duration in seconds
No MgO	10·7
2% MgO	12·0
4% MgO	12·6
8% MgO	17·2

This test corroborates results obtained prior to the period beginning in 1937; that is, MgO increases the duration of burn of cigar tobacco and improves ash colour. Chemical fertilizer manufacturers are now selling a cigar tobacco fertilizer formula containing 2 per cent of MgO.

Burn tests were also made during fertilizer trials with variable quantities of nitrogen, phosphoric acid and potash. The chemical fertilizers were applied at the rate of 1,000 lb. per acre plus 10 tons manure.

TABLE 44.—EFFECT OF VARIOUS PERCENTAGES OF NITROGEN, PHOSPHORIC ACID AND POTASH ON THE BURN OF CIGAR TOBACCO

6-year average

Treatments	Fire-holding capacity in seconds
Nitrogen—	
3%	4·6
5%	5·3
7%	5·7
Phosphoric acid—	
6%	5·6
8%	5·2
10%	4·8
Potash—	
7%	4·7
10%	5·3
13%	5·6

High quantities of nitrogen and potash proved to be beneficial to the burn of tobacco. The burn had a tendency to decrease slightly with higher quantities of phosphoric acid, a decrease that is not important enough to suggest a departure from the use of heavy phosphoric acid applications in cases where the soil is deficient in that element.

Sulphur is supposed to have a detrimental influence on the burn of tobacco. Results obtained in a test made for the purpose are shown in the following table.

Three 5-8-10 formulas were so built up as to contain no sulphur, 50 lb. and 100 lb. of sulphur per acre.

TABLE 45.—EFFECT OF SULPHUR ON THE BURN OF CIGAR TOBACCO

Treatments	Fire-holding capacity in seconds
No sulphur	10·8
50 lb. sulphur per acre	7·2
100 lb. sulphur per acre	8·4

Sulphur apparently had an adverse effect on burn but no appreciable difference was found in between the 50 lb. and 100 lb. quantities. Cigar tobacco tolerates sulphur to a fair degree and the quantities of that element found in the cigar tobacco formulas, sold by manufacturers of chemical fertilizers, apparently do not affect the burn of tobacco to any undesirable extent.

Control of Tobacco Diseases

Black Root-Rot

Black root-rot is a disease of economic importance, being easily enough controlled if proper precautions are taken by the grower.

Diseased seedlings should not be used in the field. Black root-rot rarely develops on well-drained soils which are the preferred type for tobacco growing. The organism of the disease does not develop so easily on acid or slightly acid soil as on neutral or alkaline soils. Even on neutral soil the disease will not develop if it is well drained and tobacco is not grown continuously. On soil apt to develop the disease, just one crop of tobacco should be taken. In case of susceptible soil, the grower should plant resistant varieties of which there is a

good choice Havana 211 and Resistant Havana in the cigar class and Grand Rouge and Belge in the pipe class are the most resistant varieties, although they might be affected by the disease under severe conditions.

Effect of early mosaic infection on growth of tobacco plants.
Centre row, 100% mosaic, left and right rows, free from mosaic.

MOSAIC

Mosaic disease also is of great economic importance in the district. In the course of the period covered by this report, tests were made to find out the possible agents of dissemination of the disease and overwintering studies of the virus in the soil were undertaken.

The best methods of control known are preventive rather than repressive in nature. Hereunder is a list of possible sources and preventive measures:

(1) Smokers of raw leaf or manufactured tobacco can transmit the disease when their hands come in contact with the tobacco seedlings either at weeding time in seed-beds, at pulling time, or again at planting time. Hands that have touched mosaic tobacco easily infect other plants during those various operations. A preventive measure is to refrain from using tobacco in any form when performing these operations and wash the hands thoroughly before performing such operations.

(2) Cultural practices such as replanting, cultivating and hoeing tobacco are another source of possible infection if some mosaic is present in the field. In such case, rogueing of diseased plants should take place before such operations are performed. Another good preventive measure is to perform the operations of hoeing and cultivating when the tobacco is dry, taking care not to carry out these operations after a rain or when tobacco is still laden with dew. Moisture, coupled with light imperceptible bruising of the leaf, will transfer mosaic from diseased to healthy plants.

(3) At topping time healthy plants should be topped first and mosaic plants last, otherwise the disease will spread rapidly all over the field.

(4) Apparently the disease does not overwinter in the soil proper, but rather in the tobacco debris left on or in the soil after the harvest of the crop. The danger is minimized when such debris has time to decompose well before the next crop is put in. Tobacco should not follow tobacco, in case of infestation, but the land should have a rest for at least two years. A good deep ploughing of the tobacco trash is important in soil where there is enough moisture to decompose the debris, especially on heavy soil. On light sandy soil, where flue-cured tobacco is grown, due to slow decomposition of debris, a rotation of

at least two years is preferred. Mosaic in this latter case increases rapidly when tobacco follows tobacco year after year.

(5) As to seed from mosaic plants it has been impossible to secure infestation through its use so far. Such seed, when sown in seed-beds, always gives seedlings free from the disease.

Control of Insect Pests of Tobacco

CUTWORMS

Cutworms and wireworms are two important insects to take care of in tobacco production. The following mixtures were tested for poisoning cutworms and results obtained are shown in the table below.

TABLE 46.—TEST OF DIFFERENT MATERIALS IN POISONED MIXTURES FOR CUTWORMS AND EFFECT ON THE NUMBER OF PLANTS ATTACKED

Materials tested	Percentage of plants cut by cutworms
	%
Mixture No. 1— 35% molasses, 15% bran, 50% beet pulp	8·1
Mixture No. 2— 10% molasses, 15% bran, 75% beet pulp	9·7
Mixture No. 3— 10% molasses, 40% sawdust, 50% beet pulp	56·0
Mixture No. 4— 15% molasses, 85% beet pulp	30·0
Regular mixture— 22% molasses, 78% bran	10·1

To each of the above mixtures were added 2 lb. of paris green per 100 lb. of material. All mixtures containing bran gave excellent results. Mixture No. 3 with 40 per cent sawdust proved to be quite inferior. Mixture No. 4 with beet pulp only was slightly better than mixture No. 3, but still inferior to the mixtures containing bran. Bran is superior to beet pulp in bait mixtures for cutworms.

Later on, due to a shortage of molasses, the regular formula, 100 lb. of bran and 2 lb. of paris green, was tested without molasses. Results indicated that molasses is not absolutely necessary because as good a control of cutworms was secured without molasses in the mixture as with molasses.

WIREWORMS

The control of wireworms presents an economic problem in tobacco production second only to that of the cutworm. To date no effective wireworm control method has been offered except to advise the growers to follow a short rotation and to avoid using land that has been in pasture or hay for many years. Such advice is based on the discovery that wireworm infestations were heavier in long rotations than where short rotations were followed.

In the first trial, arsenate of lead, sulforon and rotenone were tested in the water barrel of the tobacco transplanter. As the rotation followed at the Station is a short one, the population of wireworms was too low to permit

advantageous study of the value of the ingredients tested as killing or repelling agents. It was found out, however, that arsenate of lead had a toxic effect on the growth of tobacco.

Arsenate of lead was used at the rate of 2 lb. per 40 gallons of water; rotenone, 1 part in 100 parts of water; and sulforon, 3 lb. in 40 gallons of water.

Transplanting seedlings treated with DDT in wireworm control experiment.

In 1946, the project started on another basis. Boxes that contained 20 seedlings received 20 wireworms each. The ingredients tested were DDT (D 50 Dust, inert ingredient 50 per cent), sulforon (microfine wettable sulphur), and rotenone dust 1 per cent. Prior to planting, the roots of the seedlings were shaken, wetted and powdered with the ingredients.

The following table shows the results obtained.

TABLE 47.—EFFECT OF VARIOUS CHEMICALS ON WIREWORMS

Treatment	Percentage of plants attacked by wireworms
	%
Check	77
Rotenone 1%	47
Sulforon	35
DDT 50%	12

All the materials proved to be of some value in the control of wireworms but DDT was the most satisfactory of all. Further tests are needed before drawing definite conclusions.

Miscellaneous

SEED PRODUCTION

The district produces seed of all cigar and pipe tobacco varieties grown in the region. Some 925 lb. of seed of the best varieties were produced during the 10-year period covered by this report.

The Tobacco Co-operatives of St. Jacques and St. Césaire bring their seed to the Station for cleaning on account of special equipment necessary, and it is also tested for germination.

Some tests were carried out two years consecutively that proved the possibility of also growing seed of flue-cured tobacco varieties in the Joliette district.

EXTENSION WORK

Through the medium of field days, press articles, radio talks and weekly communiques sent to agricultural broadcasts, information is given out to the public. Farmers, today, seem more aware than ever before of the benefit they can derive from the use of their district Experimental Station.

Extension work is carried out in the district on rotations for cigar tobacco and also on soil fertility levels. At St. Thomas, a substation for the culture of flue-cured tobacco has been operated since 1938. Results on these special lines of work are reported elsewhere in this report.

With flue-cured tobacco curing, one of the great difficulties is the holding of proper heat and humidity in the present type of curing kilns. The use of vapour barrier paper "Sisalation", in the flue-cured kiln at the St. Thomas substation, effected a 30 to 40 per cent saving in fuel, and a much better control of the relative humidity.

Although the crop was inferior, the average quality, due to better curing, was appreciably improved. This may be attributed to the more efficient insulation of the kiln, whereby heat and humidity could be controlled much more easily.

HORTICULTURE

C. E. Sainte-Marie

CANNING CROPS

The testing of varieties of the more important vegetables and small fruits has been considered as a rather important phase of work at this Station, being located not far from the important vegetable growing districts in the province and the Montreal market, largest consuming centre of the whole country. Data on the behaviour of varieties and hybrids included in these tests have enabled the Station to render invaluable service to growers at large, as well as to fieldmen of co-operatives or private companies and above all, to specialists in the employ of the Provincial Department of Agriculture, who are always anxious to have the latest information at hand.

Of the thirty-eight named tomato varieties and hybrids tested so far, five, according to the list below, could be considered profitable for canning purposes.

LEADING TOMATO VARIETIES FOR CANNING PURPOSES

Marketable fruit per acre, 1941-42-46

Name of Variety	*3-year Ave. Yield*
	Tons
John Baer	26·59
Stokesdale No. 4	25·13
Bonny Best	25·02
Nystate	24·18
Asgrow	24·05

Among the early maturing varieties the best yielders so far have been Bounty, Victor and Early Chatham.

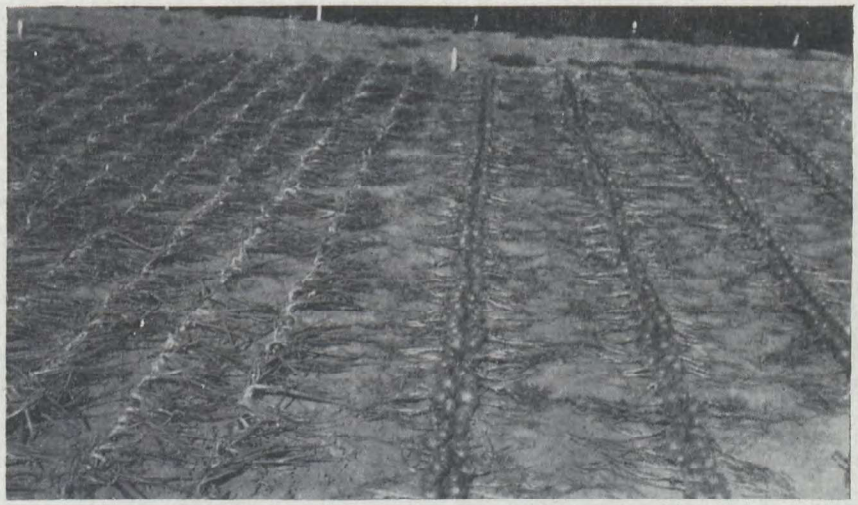
During the past six years, thirty-seven pea varieties and hybrids were included in the trial plots. From data recorded, leaders among the very early varieties were: Alaska, Wisconsin Early Sweet and Surprise. In the mid-season group Tomish, Pride, Little Marvel, Thomas Laxton, and in the late sorts Stratagem, Giant Stride and Prince of Wales were best.

With bush beans, the highest yields of pods were harvested from the following varieties: Masterpiece, Strider, Stringless Green Pod and Round Pod Kidney Wax.

Sweet corn varieties which proved to be the best yielders under conditions at the station were in the early group, Seneca Dawn, Spancross and Dorinny. Late varieties, listed in order of production, were Carmelcross, Lee, Marcross and Lincoln.

Transplanted versus Seeded Onions

Apart from those growing onions on a fairly large scale in the metropolitan area, hundreds of acres are grown every year by smaller growers in surrounding districts. Since yields of these smaller growers were rather low and a great many had doubts as to the keeping quality of transplanted onions, this experiment was set out to obtain some reliable data. Table 48 gives the yield of both



Seeded vs. transplanted onions.

transplanted and seeded onions for the two most popular varieties grown. The transplanted onions were started by sowing the seed in flats in the greenhouse, the first fortnight in March, then transplanted outdoors as soon as the land was ready for sowing the seeded onions. While seeding dates changed from year to year, such operations were generally carried out in early May. The plots were located on a silty loam fertilized at the rate of 1,000 pounds of 2-12-10 prior to seeding or transplanting.

TABLE 48.—ONIONS TRANSPLANTED VS. SEEDED

Bushels per acre

Cropping years	Southport Red Globe				Yellow Globe Danvers			
	Transplanted		Seeded		Transplanted		Seeded	
	Grades		Grades		Grades		Grades	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
1941	–	–	–	–	741·00	23·00	420·00	155·00
1942	483·00	39·20	388·30	52·50	679·50	33·40	413·80	55·10
1943	388·36	51·98	–	–	387·20	44·14	–	–
1944	696·96	3·63	329·12	41·14	474·35	29·04	304·92	36·30
1945	646·14	36·30	166·98	44·72	346·06	53·24	145·20	59·24
1946	310·73	57·35	142·29	60·98	328·15	92·93	155·36	67·51
4-year average 1942-44-45-46 both varieties	534·21	34·12	256·67	49·83	457·01	52·15	254·82	54·54
5-year average 1942-43-44-45-46, Red and Yellow Transplanted	505·04	37·69	.....	.....	443·05	50·55	.....	.....

NOTE:—The above yields are based on three 20-foot rows replicated 4 times. Rows 18″ apart and plants thinned 3″ apart.

TABLE 49.—BEHAVIOUR OF TRANSPLANTED VS. SEEDED ONIONS IN COMMON STORAGE

L'Assomption Experimental Station

Cropping year	Quantity stored	Date of storing	Percentage of onions removed as unmarketable† (By weight)							
			Southport Red Globe				Yellow Globe Danvers			
			Transplanted		Seeded		Transplanted		Seeded	
			Months		Months		Months		Months	
			Three	Six	Three	Six	Three	Six	Three	Six
	lb.		%	%	%	%	%	%	%	%
1942	75	Oct. 19	13·33	28·66	4·00	33·33	10·66	17·33	1·33	2·66
1943	75	Oct. 10	2·33	48·80	† –	† –	2·00	19·60	† –	† –
1944	75	Oct. 25	1·66	2·66	2·33	1·00	3·00	1·33	1·66	0·66
1945	75	Oct. 17	0·00	0·00	0·40	0·60	1·41	1·41	0·40	3·20
1946	75	Oct. 21	0·00	3·73	2·26	8·13	1·73	3·86	6·00	11·20
Five-year average			3·46	16·77	*2·21	10·71	3·76	8·71	2·35	4·43

†Unmarketable = onions which are soft, sprouting or beginning to decay.

* NOTE:—Results on seeded onions are for 4 years only.

The percentage of loss in storage is less with seeded than with transplanted onions both at three and six months for both varieties. Losses are less also with transplanted Yellow Globe than with Southport Red Globe at six months. Transplanted. At 3 months hardly no difference. With seeded onions, losses are slightly less with Southport Red at 3 months but greater at 6 months more than twice that recorded with Yellow Globe.

As to keeping quality in common storage, records show that both transplanted and seeded onions kept well for the first three months, although the loss was less on seeded than on transplanted onions and further, the Yellow Globe Danvers revealed itself a better keeper than Southport Red Globe. The same was true after six months storage.

While on one hand, the Yellow Globe Danvers whether seeded or transplanted kept better in storage than Southport Red Globe, the latter gave higher yields, particularly on the transplanted plots, and the yield of grade 2 bulbs was less than with the Yellow Globe Danvers variety.

On account of the tremendous differences in yield of transplanted over seeded onions, small growers particularly, would be well advised to give some consideration to this method under their own conditions. Furthermore, the control of weeds is greatly facilitated when onions are transplanted, because cultural operations prior to transplanting can be done rapidly and at low cost, and a very high percentage of the most common weeds completely destroyed. Such is not the case with seeded onions.

Vegetable Seed Production

Two important projects carried on by the horticultural section of this Station, particularly during the war years, were those of vegetable seed production and the selection of several stocks for Foundation Stock seed. Despite weather conditions which were far from being advantageous three years out of six, the results obtained at the Station so far are considered satisfactory. The table which follows gives the kinds and quantities of each seed grown.

TABLE 50.—VEGETABLE FOUNDATION STOCK SEED

Kinds	Varieties	Quantities
		lb.
Peas	Director, Kootenay Engress, Wisconsin Early Sweet, Prince of Wales, Tall Telephone, Little Marvel	3,400
Bush Beans	Round Pod Kidney Wax	995
Soybeans	Early Black Eye	6,077
Sweet Corn	Dorking	232
Radish	Saxa	121
Spinach	King of Denmark	1,869
Carrot	Nantes	38
Cucumber	Snow's Pickling	13
Onion	Sweet Spanish	9
Vegetable Marrow	Long White Bush	15
Tomato	Bounty	6

Apart from the seed grown at the Station, full support was given to the provincial vegetable seed specialist in charge of the production campaign carried out in the surrounding districts during the war years. The three main crops grown were radish, spinach and beans. As to the quantities produced, radish seed was the leader with approximately ten tons, and half this quantity of wax beans and spinach.

Soil Investigations and Fertilizer Practice

A rapid survey of the most important canning crop districts in the Montreal area was started in the fall of 1940 and continued the following year. In the light of the information obtained from growers and from canning firms, it was agreed that soil fertility studies should be undertaken immediately in connection with the most important canning crops with a view to helping growers obtain more profitable yields. Since tomatoes and peas were the two crops covering the largest acreage, first consideration was given to them.

During the years 1942-46 inclusive, soil samples were gathered from a number of tomato and pea growers. A fairly thorough study of the different soil types encountered was made taking into consideration several factors influencing yields. From the analysis of these soil samples together with other data recorded, recommendations were made to these growers as to the fertilizers and rates of application to use which would be most likely to correct certain deficiencies and assure better yields.

While it is evident that the data concerning these two crops are based on a rather limited number of growers, nevertheless the information presented further indicates that there is a certain correlation between the type, condition and fertility of these different soils and the yields recorded.

TABLE 51.—SOIL FERTILITY DATA ON TOMATO CROPS —1942 TO 1946 INCLUSIVE-COVERING PHOSPHORUS, POTASH, ORGANIC MATTER AND pH VALUE

Number of growers or per cent of total	Groups	Average yield per acre	Average P		Average K		Average per cent Org. Matter		Average pH Value	P: K Ratio	
			Before	After	Before	After	Before	After	After	Before	After
	tons	tons									
165 or 64·20%..	0–10	5·91	17·93	23·91	154·30	184·85	5·27	5·06	5·61	1:9	1:8
64 or 24·90%..	10·1 to 15	12·86	17·62	29·30	142·14	178·68	5·34	5·85	5·69	1:8	1:6
28 or 10·90%..	15·1+	17·92	22·96	34·78	160·21	198·86	6·88	7·12	5·33	1:7	1:6
257											

P—phosphorus.
K—potash.
Org. M.—Organic Matter.

NOTE:—Acknowledgment of assistance in this project is made to provincial fieldmen in horticulture of the districts covered by this project in collecting soil samples and data on both tomato and pea crops, as well as to the growers who supplied the information.

As the phosphorus: potash ratio becomes narrower, provided the phosphorus content is sufficiently high, the yields increase. It is not possible to state at this time, how close this ratio should be, although figures in table 51 support the contention that growers have all to gain in using fertilizers which are high in phosphorus, because analysis reveals that the majority of their soils are deficient in this element. Tomatoes and peas, in order to yield heavily require soils rich in both phosphorus and potash.

Tomatoes can be grown on a very wide range of soils but according to data presented in table 52 over sixty per cent of the growers visited grew their crop on loams and clay loam types. With few exceptions, as soils became lighter, yields did likewise.

TABLE 52.—YIELD OF MARKETABLE TOMATOES HARVESTED FROM DIFFERENT SOIL TYPES—1943-46 INCL.

Tons per acre

(No. of growers shown in brackets)

Years	Silty Loam	Org.	Loam	Clay Loam	Clay	Grav. Loam	Sandy Loam	Sandy	
1943.....	–	(1) 0·69	(6) 5·36	(15) 3·59	(2) 2·02	(9) 3·40	(3) 3·34	– –	– –
1944.....	–	–	(9) 11·65	(20) 10·22	(2) 18·87	(6) 11·81	(5) 7·73	– –	– –
1945.....	–	(1) 10·75	(25) 7·64	(19) 9·25	(4) 7·05	(6) 5·86	(15) 6·53	– –	– –
1946.....	(1) 15·75	(2) 16·17	(11) 11·29	(25) 12·10	(4) 7·15	(12) 12·06	(9) 9·30	(4) 6·30	–
Total number of growers or per cent.....	(1) 0·46	(4) 1·85	(51) 23·62	(79) 36·57	(12) 5·55	(33) 15·28	(32) 14·82	(4) 1·85	(216) –
4-year average yield, tons per acre.....	15·75	9·20	8·98	8·79	8·77	8·28	6·72	6·30	Av. all growers 8·63

While tomatoes may be grown on a wide range of soil, loams and clay loams are the two most important types on which the crop is produced. It is true that higher yields were recorded on silty loams and organic soils but these accounted for only two per cent of the growers and might be considered as exceptions. The differences in yield reported between the four main types, namely loams to gravelly loams, were rather small, considering the number of growers on each type. It can be said, however, that loams and clay loams were the two types best adapted and gave the best average yields over a period of years.

Growers are urged to plant as soon as danger of frost is passed. A high percentage, however, plant too late either because their plants were started too late or the land, lacking drainage in many cases, did not permit early planting. Table 53 bears this out. While the highest percentage of growers planted during the first ten days in June, those who planted a week earlier had average yields of three tons more per acre.

Growers are urged to plant early for better yields. The following table presented in connection with date of planting and its influence on yield shows clearly that such is the case. It is true, that a few growers planted in early May or late June and the yields obtained were outstanding. These, however, were exceptions to the general rule. The planting period which seems the most favourable and during which a greater number of growers should plant is without any doubt the latter part of May or early June as based on the data presented.

TABLE 53.—DATES OF PLANTING AND YIELD OF MARKETABLE TOMATOES: 1944-46 INCL.

Tons per acre

(No. of growers shown in brackets)

Year	May 12-19	May 20-26	May 27 to June 2	June 3-9	June 10-16	June 17-23	June 24 on	Total number of growers
1944	(2) 19·21	(6) 10·32	(15) 12·42	(12) 8·46	(1) 3·87	(1) 13·64	(2) 9·79	(39) –
1945	–	(2) 5·73	(4) 11·84	(33) 8·42	(28) 6·77	(6) 4·73	(1) 4·03	(74) –
1946	–	(6) 11·26	(17) 12·95	(29) 11·61	(15) 8·88	(1) 4·97	–	(68) –
Number of growers or per cent...	(2) or 1·10	(14) or 7·73	(36) or 19·89	(74) or 40·88	(44) or 24·32	(8) or 4·42	(3) or 1·66	(181)
Average yield tons	19·21	9·10	12·40	9·50	6·51	7·78	6·91	–

Since growers followed different methods in applying chemical fertilizers to their tomato plants, data were recorded which are presented in table 54.

Where and when fertilizers should be applied to give maximum yields seems a problem which is not yet solved to the satisfaction of everyone concerned. Records indicate that, all other factors being equal, the method adopted in applying fertilizers has some influence on yield since there is an average of close to one and a half tons less fruit per acre when fertilizer is broadcast before planting, instead of being applied in bands alongside the plants at planting time.

That the wise use of chemical fertilizers has increased yields of marketable tomatoes is well established. Where and when these chemical fertilizers should be applied to the plants to be most profitable is not definitely certain. There

are several methods which have been adopted by growers. Table 54 gives data covering four years relative to the most popular methods followed. As time goes on, experiments under way may reveal that it might be more profitable to apply only part of the fertilizers at planting time and the balance after a few weeks interval, thus feeding the plants gradually as their requirements become greater. It is not claimed that the band placement which has given the highest average yield so far is the best method. However, growers might be well advised to continue to apply chemical fertilizer to their tomato plants in this manner until a new method capable of further increasing their yields economically can be recommended.

TABLE 54.—YIELD OF MARKETABLE TOMATOES: FERTILIZER PLACEMENT—1943 TO 1946 INCL.

Tons per acre

(No. of growers shown in brackets)

Year	In Bands	Around Plants	Bottom of Furrow	Broadcast	Total number of Growers
1943 yield tons per acre	(11) 4·54	(9) 3·33	(3) 2·91	(13) 3·28	36 –
1944	(5) 10·56	(13) 11·98	(12) 11·39	(12) 9·28	42 –
1945	(19) 8·68	(24) 7·56	(11) 6·54	(16) 7·90	70 –
1946	(32) 12·22	(6) 9·69	(13) 10·96	(16) 10·05	67 –
Total number of growers or per cent	67 or 31·16	52 or 24·19	39 or 18·14	57 or 26·51	215 100/100
Av. yield tons per acre for each method of placement	9·00	8·14	7·95	7·63	8·18

In the light of the above records, it is believed that until a more profitable method can be advocated, growers who so far have been broadcasting their fertilizers should give the band method a fair trial.

CANNING PEAS

Of the numerous factors involved in assuring a profitable yield of canning peas, some are beyond the control of the grower. This report, nevertheless, presents four tables, illustrating to some extent, how yields may be affected by soil fertility, soil type, soil moisture and, finally, time of seeding.

Table 55 shows that as the phosphorous: potash ratio becomes narrower, the yields increase considerably. Roughly forty per cent of the growers were in the first group with poor yields and a rather wide phosphorous: potash ratio, whereas close to sixty per cent of the growers recorded yields twice and three times greater than the first group with correspondingly richer soils or soils better provided with these essential elements.

As with tomatoes, it will be noticed that the largest group of growers is the one with the lowest yields and the widest phosphorous: potash ratio. Here again, there is a very marked difference in phosphorous, potash and organic matter of soils giving high and low yields as indicated by table 55. As the contents of these minerals increase so do the yields.

TABLE 55.—SOIL FERTILITY DATA RE: YIELD OF SHELLED PEAS. 1943-46 INCL.

Number of growers in each class or per cent	Group according to yield	Average yield per acre Shelled Peas	Average P		Average K		Average % Org. Matter		Average pH Value	P:K Ratio	
			Before	After	Before	After	Before	After	After	Before	After
	lb.	lb.									
72 or 41·86%..	0–1499	923	14·11	16·55	150·14	161·12	5·51	5·31	5·63	1:11	1:10
36 or 20·93%..	1500–2000	1,779	10·93	14·15	143·44	158·28	7·29	7·25	5·60	1:13	1:11
64 or 37·21%..	†2001	2,833	19·79	20·50	162·04	187·28	6·40	5·75	5·73	1:8	1:9
172											

Conversion factor 1 ton of peas and vines=400 lb. shelled peas.

While good yields may occasionally be recorded on other types of soil, table 56, shows clearly that clay loams, sandy loams and loams were the three types on which the greatest number of growers grew their peas and where profitable yields were recorded.

The most suitable soil for growing canning peas is without doubt a fertile, well drained clay loam. Figures given in table 56 give a clear picture of this point. Close to two-thirds of the growers had soils of this type and, while heavy yields were recorded on clay or sandy loam, these were exceptions and one might say that the best all-round yield was recorded on clay loam.

TABLE 56.—SOIL TYPES AS AFFECTING YIELDS OF SHELLED PEAS.—1943 TO 1946 INCL.

Lb. per acre

(No. of growers shown in brackets)

Year	Clay	Clay Loam	Gravelly Loam	Sandy Loam	Loam	Sandy	Gravelly	Organic	Total No. of Growers
1943	* –	(20) 1,429	(1) 676	(5) 1,750	(5) 1,285	(1) 2,652	* –	(2) 1,688	34 –
1944	(1) 3,960	(32) 2,702	(2) 2,328	(6) 2,311	(4) 1,727	– *	– *	(2) 1,170	47 –
1945	– *	(24) 1,570	(2) 820	(1) 2,840	(8) 1,916	– *	– *	– *	35 –
1946	(2) 3,324	(35) 1,763	(3) 1,483	– *	(14) 1,383	(1) 680	(1) 1,162	– *	56 –
4-year average lb. per acre	†3,642	1,866	1,327	‡2,300	1,578	†1,666	*1,162	†1,429	–
Number of growers or per cent of	(3)	(111)	(8)	(12)	(31)	(2)	(1)	(4)	172
Total	1·74	64·54	4·66	6·98	18·02	1·16	0·58	2·32	100/100

NOTE:—*=One year only. † Two years only. ‡ Three years only.

During the past four years canning pea growers had most adverse weather conditions in early spring or during the growing season. Excessive precipitation either retarded seeding operations or compelled many growers who were on rather flat land with inadequate drainage, to sow their peas on other fields where soil was lighter but also less fertile. Such seasonal conditions point to the importance of proper drainage.

Table 57 shows the number of growers located on what was considered as well or poorly drained soils with corresponding yields.

These results show clearly that more than any other crops perhaps, peas in order to yield heavily must be sown on well-drained soil. The distinctions made between the first and second group of pea growers are the same as for tomato growers. Quite often only small sections of the fields lacked proper drainage, therefore yields remain fairly high even with a few low spots. The differences in yield between growers on good or on poorly drained soil speak for themselves.

TABLE 57.—YIELD OF SHELLED PEAS AS AFFECTED BY DRAINAGE
1944-46 INCL.

Lb. per acre

(Number of growers shown in brackets)

Year	Good	Fair	Poor	Total Number of Growers
1944	(47) 2,371	(9) 2,190	(7) 2,085	63 –
1945	(16) 1,579	– –	(3) 1,568	19 –
1946	(36) 1,770	(15) 1,551	(5) 1,204	56 –
3-year average yield lb. per acre	1,906	1,870	1,619	–
Number of growers	99	24	15	138
or per cent of Total	71·74	17·39	10·87	100/100

All other factors being equal, early seeding of peas generally produces high yields. A certain number of rather important factors such as rate of seeding, varieties used, seed treatment, drainage conditions, etc. would no doubt explain why late seedings, on or after June 1, gave a slight increase in yield over fields sown in April or the latter part of May.

According to table 58, the most favourable period would be early May. These findings are pretty well in line with the adopted practice of the best growers.

Table 58 gives some information on yield as affected by time of seeding. While it is generally agreed that canning peas should be sown early, this does not imply that growers should seed before the seed-bed is ready. Very early seedings did not, on the whole, yield as well as those made during the first fortnight in May. On account of exceedingly wet springs or rather severe droughts in June, the growing of canning peas during the period in question obliged many growers to change their plans and oftentimes seed their peas on land other than that which they had prepared. Thus yields in certain cases were lowered and in others, rather late sowings of early varieties gave surprisingly heavy yields.

TABLE 58.—YIELD OF SHELLED PEAS AS AFFECTED BY TIME OF SEEDING 1944-46 INCL.

Lb. per acre

(Number of growers shown in brackets)

Year	April	May 1 to 15	May 16 to 31	June 1 on	Total Number of Growers
1944	(6) 1,798	(34) 2,572	(15) 2,078	(8) 2,040	63 –
1945	(7) 1,500	– –	(1) 1,344	(11) 1,647	19 –
1946	(1) 1,972	(11) 1,521	(28) 1,711	(16) 1,713	56 –
Average yield lb. per acre	1,757	2,046	1,711	1,800	–
No. of growers	14	45	44	35	138
or per cent of Total	10·14	32·62	31·88	25·36	100/100

Although growers are urged to seed their peas early, it is no less important that the soil be sufficiently warmed up before seeding to assure quick germination. Otherwise, if the soil is on the cool side, and heavy rains follow seeding operations, a high percentage of the seed may rot, leaving a rather poor stand and weeds soon cover the bare spots thus reducing yields materially.

Strawberry and Raspberry Varietal Tests

Small fruit varietal tests so far have enabled a check to be made on the relative merits of a number of varieties, particularly of strawberries and raspberries. Tables 59 and 60 show the strawberry varieties which are leaders either as early yielders or from the standpoint of total production.

Contrary to recommended practice, due to factors beyond control, two crops of strawberries were taken from the same plantation. Certain varieties, which had not developed as good a stand of plants due to drought after planting the first year, seem to have benefited by such a practice but, on the whole, it would seem desirable to plant every spring to obtain high yields, larger fruit and to facilitate weed control as well as to avoid insect injury and reduce possible losses due to diseases.

Certain early-bearing varieties are not as heavy yielders as others, but in many cases are more profitable, on account of the high prices paid for early fruit. The same is true for late-bearing sorts. An increasing number of growers are on the watch for such varieties and already, from records on hand, several growers where these comparative tests are carried out are multiplying varieties which under their soil and climatic conditions are proving to be most profitable. Among these varieties are Valentine, King and Tupper.

While table 59 shows Premier and 0-294 as leaders in early production on a four-year average, it should be noted that Valentine has taken the lead for the 1945 and 1946 crops.

STRAWBERRY VARIETAL TEST

Since the price of berries is generally high, both at the beginning and at the end of the season, growers are becoming more and more interested in varieties which produce very early or late fruit. Table 59 gives the early yields obtained with a dozen or more varieties. Two early varieties, Valentine and Geneva 7225, tested only for the last two years of the period, were outstanding as producers of early fruit. Valentine was particularly noteworthy. In 1945 this variety was in second place but the following year its yield of early berries was

double that of Premier which was in first place on the four-year average. It should be stated also that the 1946 crop was the second one from the same plantation. If Valentine maintains its high production of early berries in the next few years, there is every reason to believe that its popularity among growers will be greatly enhanced.

TABLE 59—STRAWBERRY VARIETAL TEST—EARLY YIELD

MARKETABLE FRUIT ON 100' ROWS

Varieties	1946	1945	1944	1943	Four-year average 100' rows	
					Varieties in order of Production	
	lb.	lb.	lb.	lb.		lb.
Valentine	26·25	14·87	–	–	Premier	41·28
Geneva 7225	24·69	11·06	–	–	0-294	33·89
Premier	13·87	14·81	58·75	77·68	Mackenzie	30·04
0-294	13·87	14·50	38·75	68·44	King	27·45
Dresden	13·62	9·37	38·25	47·00	Dresden	27·06
Pathfinder	11·37	1·12	–	–	Senator Dunlap	26·78
Mackenzie	10·81	7·50	33·25	68·62	Lemieux	20·93
Lemieux	5·31	17·62	25·50	35·31	*Valentine	20·56
Culver	5·12	5·12	20·93	43·62	Culver	18·69
Dorsett	5·00	6·75	12·68	39·37	*Geneva 7225	17·87
King	4·50	7·18	30·75	67·37	Dorsett	15·95
Senator Dunlap	4·37	10·12	47·50	45·12	Borden	11·09
Borden	0·93	1·25	10·12	32·06	*Pathfinder	6·25

NOTE: Early yield means first ten days in production.
1943 Crop began on June 25th 1942 Plantation.
1944 Crop began on June 19th 1942 Plantation.
1945 Crop began on June 20th 1944 Plantation.
1946 Crop began on June 21st 1944 Plantation.

*= Two years only.

The best producer on a four-year average was Tupper as indicated in table 60. King which is a mid-season variety has proved to be a much better yielder than Senator Dunlap which is the most widely planted variety of the same season. Louise is slightly less productive but of much better quality than Claribel which holds second place.

TABLE 60.—STRAWBERRY VARIETAL TEST—TOTAL YIELD MARKETABLE FRUIT 100' ROW

Varieties	1946	1945	1944	1943	Four-year average	
					Varieties in order of production	
	lb.	lb.	lb.	lb.		
Tupper	61·25	64·37	101·00	162·94	Tupper	97·39
King	56·68	38·25	78·12	132·31	Claribel	77·26
Elgin	47·68	22·37	59·50	125·75	King	76·34
Valentine	47·31	24·06	–	–	Louise	71·53
Claribel	46·12	37·62	104·38	120·94	Premier	65·52
0-294	45·31	37·31	55·19	92·00	Carl	65·09
Sen. Dunlap	42·18	41·68	71·44	70·00	Elgin	63·82
Carl	39·68	38·94	86·75	95·00	Lavergne	60·91
Dresden	37·25	29·56	63·63	83·88	0-294	57·45
Louise	34·12	23·12	82·00	146·88	Sen. Dunlap	56·33
Premier	33·25	41·56	78·63	108·63	Mackenzie	54·56
Mackenzie	32·81	37·18	53·88	94·38	Dresden	53·58
Geneva 7225	31·81	17·18	–	–	Culver	42·31
Pathfinder	28·56	9·18	–	–	Lemieux	38·55
Lavergne	28·00	17·00	51·56	147·06	Borden	37·16
Lemieux	26·68	43·87	38·44	45·19	Valentine	35·68*
Borden	26·56	16·87	27·38	77·81	Fairfax	35·67
Culver	25·87	22·00	37·50	83·88	Howe	33·23
Dorsett	25·31	25·31	17·50	46·56	Dorsett	28·67
Howe	18·12	24·56	30·06	60·19	Geneva 7225	25·00*
Fairfax	16·37	29·81	44·19	52·31	Pathfinder	18·87*

* Two years only.

Since strawberries are grown on a wide range of soil under varied climatic conditions, collections of promising varieties were supplied to a number of growers scattered throughout the surrounding districts to obtain information as to yield, hardiness, and disease resistance. Table 61 gives the four-year average yield, including both early and total for eleven varieties at the co-operators' as well as at the Experimental Station. On the whole, early yields for all varieties reported on were higher at co-operators' than at the Station.

The same was true for the total yield although to a lesser extent. Early and mid-season varieties, on the average, gave better yields at co-operators' than at the Station. Late varieties, however, were better yielders at the Station than at co-operators'.

A few of the most important factors, which have had more or less influence on the strawberry yields recorded and which might in several cases explain the differences in yield for the same variety at growers' and at the Station might be listed as follows: different soil types, degree of fertility, location, drainage, precipitation, drought, diseases, fertilizer applications, winter-killing due to lack of mulch, size of plots, labour available, freedom from weeds, damage caused either by diseases or insect injury.

TABLE 61.—COMPARATIVE EARLY AND TOTAL YIELD OF MARKETABLE STRAWBERRIES AT CO-OPERATORS' AND EXPERIMENTAL STATION
YIELDS ARE BASED ON 100' ROWS

Average Early Yields

4-year average

Varieties	Premier	Sen. Dunlap	King	Tupper	Louise	Mackenzie	Valentine	Geneva 7225	Culver	0-294	Elgin
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Number of Crops at Co-operators'	20	20	18	9	16	9	7	3	4	7	3
Average Yields at Co-operators'	48·61	38·08	45·41	10·39	20·49	25·91	39·31	25·75	51·89	40·96	7·33
Number of Crops at Exp. Station	4	4	4	3	3	4	2	2	4	4	–
Average Yields at Exp. Station	41·29	26·78	27·48	3·38	15·12	30·03	20·20	17·84	18·72	33·89	–

Average Total Yields

Number of Crops, at Co-operators'	20	21	18	11	19	9	7	4	4	7	8
Average Yields at Co-operators'	64·32	61·01	80·68	54·06	54·65	39·45	56·34	31·69	81·38	56·79	17·43
Number of Crops at Exp. Station	4	4	4	4	4	4	2	2	4	4	4
Average Yields at Exp. Station	65·50	56·34	76·34	97·39	71·53	46·38	32·17	24·50	39·42	57·45	63·81

RASPBERRY VARIETAL TEST

Raspberry varieties behave very differently according to whether they are planted on light or heavy soils. Varieties reported on in tables 62 and 63 were planted on a well drained clay soil. Early and total yields as well as the three-year average yields of marketable fruit give the standing of these varieties.

Early yielding varieties are often more profitable than mid-season ones, on account of high prices. The same is true for late bearing sorts. In table 62, it is to be noted that Madawaska and 0-263 are leaders, as early yielders, for the 1946 crop as well as for the three-year average.

TABLE 62.—EARLY YIELD* OF RASPBERRY VARIETIES FOR 1946 AND 3-YEAR AVERAGE

MARKETABLE FRUIT

Varieties in order of production	Pints per 100′ rows 1946 crop	Varieties in order of production	Pints per 100′ rows 3-year av.	Av. yield per acre pints
Madawaska	156·25	Madawaska	64·58	2,783·40
0-263	108·33	0-263	60·27	2,597·64
0-273	99·17	Trent	49·30	2,124·83
Herbert	95·00	Herbert	47·22	2,035·18
Count	76·66	Newburgh	43·61	1,879·59
Munroe	73·33	Count	42·22	1,819·68
Ottawa	72·50	0-273	39·72	1,711·93
Viking	65·83	Ottawa	35·83	1,544·27
Taylor	64·17	Munroe	33·47	1,442·58
Trent	60·83	Viking	32·91	1,418·42
Newburgh	52·93	Latham	31·11	1,340·94
Latham	50·00	Gatineau	28·33	1,221·02
Gatineau	47·50	Taylor	28·33	1,221·02
Newman 309	33·33	Newman 309	22·78	981·82
0-271	30·00	0-271	20·97	903·81
Washington	6·66	Rideau	16·24	699·94
Marcy	6·25	Washington	6·66	287·05
Milton	5·42	Marcy	6·25	269·37
Rideau	4·16	Milton	5·42	233·60

* Early yield = first fifteen days in production.
1944—July 13 to 27th inclusive.
1945—July 11th to 25th inclusive.
1946—July 12th to 26th inclusive.

Ordinarily, varieties which are heavy early yielders are not expected to be leaders in total production. Such is not the case however for Madawaska, as records in table 63 below indicate. Latham which comes in second place for the 1946 crop takes the lead in the three-year average, The margin between it and Madawaska is so small however that these two varieties may be considered to be on a par from the standpoint of yield.

TABLE 63.—TOTAL YIELD OF RASPBERRY VARIETIES FOR 1946 AND 3-YEAR AVERAGE

MARKETABLE FRUIT

Varieties in order of production	1946 Crop Pints per 100′ row	1945 Crop Pints per 100′ row	1944 Crop Pints per 100′ row	Varieties in order of Production	3-year average Pints per 100′ row
Madawaska	224·58	67·91	8·33	Latham	101·94
Latham	157·50	119·58	28·75	Madawaska	100·27
Herbert	156·66	87·08	16·25	Newburgh	94·86
0-273	138·33	36·25	3·33	Herbert	86·66
Taylor	135·83	54·16	0·83	Trent	71·94
0-263	116·66	80·41	13·33	0-271	70·97
Ottawa	114·58	84·16	11·66	Ottawa	70·13
Newman 309	99·58	70·83	5·00	0-263	70·13
Newburgh	98·33	158·75	27·50	Viking	64·72
Munroe	95·83	29·58	16·66	Taylor	63·61
Count	94·16	50·41	12·50	0-273	59·30
Viking	93·33	89·16	11·66	Newman 309	58·47
0-271	90·00	116·66	6·25	Count	52·36
Trent	79·58	113·33	22·91	Munroe	47·36
Gatineau	54·20	40·00	5·41	Gatineau	33·20
Picking season	July 12th to Aug. 21st	July 11th to Aug. 18th		July 13th to Aug. 10th	
in days	40	38		28	

While the above varieties have been in production only for three years a certain number have proved to be shy yielders and lacking in hardiness. Among these are Milton, Marcy, Washington and Rideau. Growers having similar conditions to those prevailing at the Station, might be well advised to not plant these varieties.

Collections of the most promising varieties have been distributed to growers as in the case of strawberries. The first reports on these raspberry varieties under test at outside points, however, were not available at the time of writing. While there is some information on the behaviour of the raspberry varieties under test at the Station, it has not been possible as yet to compare results with those of co-operators as in the case of strawberries. Meanwhile, raspberry growers who have not already done so, would be well advised to give a fair trial to such varieties as Madawaska, Trent, 0-263, Ottawa, Newburgh, Latham and Viking.

ANIMAL HUSBANDRY

R. Bordeleau

The Dairy Herd

The herd of Holstein cattle kept at the Station is too small to permit any fundamental research in animal husbandry. However, the herd is under test for contagious abortion and tuberculosis. No reactors to these diseases have been found during the ten-year period covered by this report.

In December, 1946, the herd totalled 38 head, of which 17 cows were in lactation. The present herd sire is Ottawa Pabst Anthony, Reg. No. 192876—X.

Born February 23, 1946.

Sire: Montvic Abbekerk Posh Pabst—113931—XX—Extra.

Dam: Ottawa Rag Apple Ann—No. 358525.

Continuous efforts were made to increase milk production through selection of best producing cows and culling of poor milkers.

The following table shows the average yearly milk production per cow (farm records) for the period involved.

TABLE 64.—YEARLY MILK PRODUCTION PER COW

Completed Lactations

Year	Number of completed lactations	Average age at beginning of lactation		Number of days in milk	Total milk for period	Fat	Total fat
		Years	Months	Days	lb.	%	lb.
1937	12	5	1	333	11,104	3·58	397
1938	9	3	9	348	10,134	3·75	380
1939	14	4	3	342	11,618	3·49	405
1940	13	3	4	360	12,273	3·60	442
1941	11	3	2	334	11,857	3·64	432
1942	12	3	0	353	10,998	3,52	388
1943	10	3	7	358	12,260	3·53	433
1944	10	3	8	362	12,372	3·66	453
1945	11	3	0	353	11,741	3·89	456
1946	12	3	10	352	12,431	3·88	482
Average	11·4	3	8	349·5	11,679	3·65	426·8

The milk and fat production of the herd is increasing slowly but steadily as a result of culling out the cows of poor type and poor milking ability. A total of 92 cows during the 10-year period qualified in the R.O.P., representing 80·7 per cent of the total cows in milk.

Pasture

During the five years, 1942-1946 inclusive, the system of pasturing at the Station was somewhat changed. The farm rotation was a four-year one of hoed crop, grain, hay, followed by one year in pasture. The grazing system adopted was greatly facilitated by the use of electric fencing. The cows were given the best of the pasture and the heifers the remainder. Towards the end of the season, especially if the summer drought was too long, it was necessary to resort to the hay aftermath as supplementary pasture. At the beginning of the season, when pasture was flush, a smaller acreage was required, with the possibility that a portion of the pasture might be cut for hay. On the whole, the system of grazing used eased the problem of pasturing some 25 head on 25 acres of pasture.

Feed Cost of Milk and Fat Production

A study of the feed cost of milk and fat production has been under way since the herd was established. In the following table, the feed cost of producing milk and fat is given month by month for the ten-year period, 1937-46.

TABLE 65.—STUDY OF THE FEED COST OF MILK AND FAT PRODUCTION

10-year average, 1937-46

Month	Feed Cost	
	Per 100 lb. of milk	Per 1 lb. butterfat
	$ cts.	cts.
January	0 90	24·5
February	0 93	24·9
March	0 90	24·3
April	0 88	23·8
May	0 67	18·0
June	0 28	7·8
July	0 33	9·0
August	0 35	9·8
September	0 38	10·8
October	0 62	16·7
November	0 86	23·4
December	0 88	23·7
Average	0 66	18·0

There is a close relationship between the cost of feed and cost of milk production. The feed cost of producing milk during winter months more than doubles as compared with the cost when cows are on pasture.

Disposal of Cattle

During the 10-year period, some 28 males and 8 females were sold for breeding purposes, 101 were sold for beef and one bull was on loan.

FIELD HUSBANDRY

R. Bordeleau

Cost of Producing Crops

Production costs on grain, silage corn and hay were kept from 1931 to 1944. The results are given below for the 14-year period. Labour costs per hour were low during the first 12 years of the period.

COST OF PRODUCING OATS

14-year average

(One-acre basis)

Use of land	$	5.65
Rent of machinery		2.85
Threshing		1.29
Manure, chemical fertilizers and lime		4.43
Seed, 3·5 bushels		2·98
Twine, 2·2 lb		0·22
Manual labour, 22·4 hours		4·56
Horse labour, 14·7 hours		1·37
Tractor, 4·8 hours		2.99
Total cost	$	26.34
Yield per acre:		
Grain, 49·6 bushels	$	21.73
Straw, 1·23 tons		5.01
Cost per bushel	$	0.43

The cost of production was calculated on an average of 28·5 acres annually.

The cost of production per bushel varied from 20·3 cents to 67·5 cents, the average being 43 cents. The cost of production, it will be noted, is in direct relationship with the yield, the higher the yield the lower the cost per bushel. This is a factor which emphasizes the importance of taking every precaution to get the highest yield by proper cultural methods, best method and time of sowing and proper fertilization.

COST OF PRODUCING HAY

14-year average

One-acre basis

Use of land	$	5.65
Rent of machinery		2.85
Manure, fertilizers and lime		1.67
Seed		2.13
Manual labour, 12·9 hours		2.62
Horse labour, 9·1 hours		0·84
Total Cost	$	15.76
Yield per acre, 2·16 tons	$	20.21
Cost per ton	$	7.30

The cost of production was calculated on an average of 43·7 acres annually. During the 14-year period yields varied from 1·6 tons per acre and 2·86 tons. The cost of production ranged between $5.75 and $10.55 per ton.

COST OF PRODUCING SILAGE CORN

14-year average

One-acre basis

Use of land	5.65
Rent of machinery	2.85
Ensiling outfit	5.18
Manure, fertilizers and lime	11.85
Seed, 0·6 bushel	1.33
Twine, 4.9 lb	0.50
Manual labour, 115·8 hours	24.20
Horse labour, 51·9 hours	4·82
Tractor, 7·6 hours	4·65
Total cost	$ 61.04
Yield per acre, 18·5 tons	$ 55.85
Cost per ton	$ 3.30

The cost of production of corn was derived from an annual average of 4·1 acres. During the 14-year period yields varied from 10·1 tons per acre, to 24·7 tons. Cost of production varied from $2.30 to $5.64 per ton.

Cost of Operating Tractor

Two sizes of tractor have been used at this Station. From 1930 to 1938 inclusive, a 2-plough tractor was used and from 1939 to 1946, a 3-plough one.

The following table gives the cost of operating these two tractors for the periods cited.

TABLE 66.—YEARLY COST OF OPERATING TRACTOR

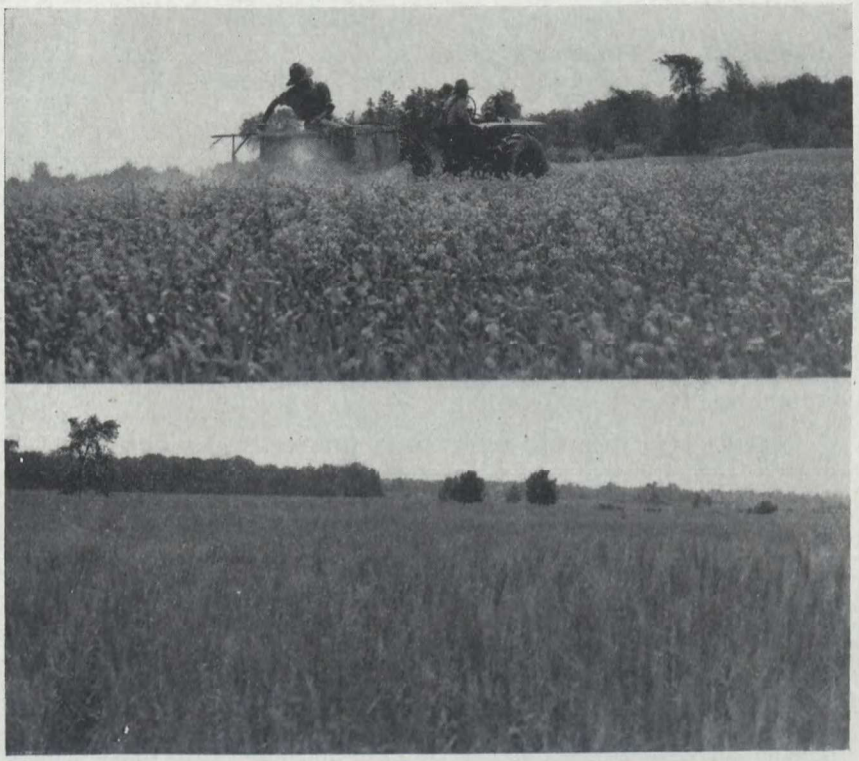
Details of cost	2-plough 1930 to 1938		3-plough 1939 to 1946	
		$ cts.		$ cts.
Depreciation, 10% of initial cost		58 40		112 25
Interest, 6% on ½ initial cost		17 52		33 67
Repairs, parts		26 63		7 76
Repairs, labour		25 08		26 59
Servicing, labour	24·8 hrs.	5 93	49·1 hrs.	19 73
Gasoline	769·9 gal.	136 88	651·6 gal.	132 50
Oil	82·9 qts.	13 79	64·5 qts.	11 52
Operator, labour	580·0 hrs.	140 53	518·3 hrs.	174 70
Total Operating Cost		424 76		518 72
Total number of working hours	614·8 hrs.		518·3 hrs.	
Daily fixed cost		2 18		3 86
Daily fuel and oil		2 45		2 78
Daily operator cost		2 28		3 37
Average Daily Operating Cost		6 91		10 01

With the scarcity of labour, tractors are becoming standard farm equipment even on many farms that are relatively small. Since the two tractors at the Station had been in use for different periods, the figures given do not show so much the difference in cost between a 2- and 3-plough tractor, but rather the difference in cost due to the increased price of tractors, fuel and labour between the two periods.

Wild Mustard Eradication

EFFECT OF WILD MUSTARD ON YIELD OF OATS

To determine to what extent mustard could affect the yield of oats, an experiment was made in which some oat plots were seeded down with mustard and compared with plots free from this weed. The experiment covered six years, commencing in 1933 and terminating in 1938. There were variations from year to year in the results but on the whole a heavy mustard infestation was found to reduce the yield from 4 to 10 bushels per acre.



Upper: Spraying a barley field heavily infested with Wild Mustard.
Lower: Same field of barley a week after treatment.

EFFECT OF SPRAYING ON WILD MUSTARD

After different trials, it was found that spraying mustard with a 3 per cent solution of copper sulphate, at the rate of 60 to 70 gallons per acre, with a pressure of 175 to 200 lb., assured a fair control. Mustard can be killed in oats, mostly 100 per cent, when it is in the early bloom stage and the temperature at 75° F. or higher. It was found, in certain years, that scorching, due to spraying under unfavourable conditions, reduced the yield of oats to about the same level as if mustard had not been sprayed. On the whole, when spraying was done under normal conditions, it not only reduced mustard population but also secured a slight increase in yield due to the absence of weed competition. Spraying mustard in oats is but one step in mustard control. The use of clean seed and keeping cultivated crops free from mustard are other measures that should not be overlooked.

The use of copper sulphate has a corrosive effect on the spraying machinery so the boom line and pipes of the machine should be of non-corrosive metal such as copper. While copper sulphate does not destroy mustard it is not effective against other weeds which may be present in sufficient numbers to reduce the yield. With new chemicals now available which will kill a wide variety of weeds, spraying grain crops may soon become a very interesting proposition.

COST OF SPRAYING MUSTARD WITH COPPER SULPHATE IN OATS

	Cost per acre (Average for years 1932 to 1938)
Manual labour, 43 minutes	$ 0.13
Horse labour, 85 minutes	0.13
Copper sulphate, 21 lb	0.96
Use of sprayer	1.29
TOTAL	$ 2.51

The sprayer used in this test was drawn by horses and had a capacity of 150 gallons. The spraying boom covered a strip 21 feet wide at a time.

EFFECT ON OAT YIELDS OF DUSTING PULVERIZED CYANAMID IN WILD MUSTARD CONTROL

The results of a two-year experiment, 1937-38, are summarized in the following table.

TABLE 67.—CYANAMID DUSTING IN WILD MUSTARD CONTROL

Treatments	Yield of oats per acre	Mustard plants killed
	bus.	%
Dusting, 125 lb. cyanamid per acre mustard seeded down	35·2	48·4
Dusting, 100 lb. cyanamid per acre mustard seeded down	45·9	47·7
Dusting, 75 lb. cyanamid per acre mustard seeded down	48·0	45·4
Dusting, 50 lb. cyanamid per acre mustard seeded down	50·2	38·3
No dusting, mustard seeded down	49·1	–
Check, no mustard, no dusting	57·7	–

Cyanamid showed a certain ability to kill mustard but it had a tendency to reduce the yield. The higher the application, the higher the killing capacity but yields of oats decreased accordingly. Apparently, results are not good enough to warrant the use of cyanamid in wild mustard control in grain crops.

In this 1937-1946 report no data are given that show results of experiments on weed control using 2, 4-D treatments. This effective means of controlling most weeds has come into widespread use since 1946, and unpublished data are available at l'Assomption Station that deal with its use.

FORAGE CROPS

R. Bordeleau

SOYBEAN VARIETAL TEST

Some thirty-five varieties and strains of soybeans were tested from 1938 to 1943.

The following table shows results obtained as to yield, percentage of protein, oil and number of days to mature.

TABLE 68.—TESTS OF SOYBEANS FOR SEED PRODUCTION

Results for years 1938 to 1943

Variety	Years tested	Yield per acre	Per cent Composition on Dry Matter Basis		Days to mature
		Dry seed	Protein**	Oil**	
		Bu.	%	%	
Mandarin	1938–43	43·9	40·9	20·0	130
Acc. No. 1483	1938–43	36·7	44·8	17·5	122
Acc. No. 1485	1938–43	36·7	41·8	18·8	122
Acc. No. 1556	1938–43	31·3	41·4	18·7	117
Padoga	1938–43	30·5	41·2	19·3	112
Acc. No. 1557	1938–43	29·1	42·4	18·5	119
Acc. No. 1358	1938–43	28·3	41·0	19·2	118
Manitoba Brown	1938–43	23·7	43·2	17·4	109
Acc. No. 1551	1938–42	34·9	39·8	19·2	121
Acc. No. 1941–7	1938–42	33·7	41·9	19·4	122
Acc. No. 1555	1938–42	33·6	42·1	18·4	121
Acc. No. 1941–4	1938–42	33·2	41·3	19·0	118
Acc. No. 1487	1938–42	32·6	43·7	17·6	116
Acc. No. 1489	1938–42	32·2	43·2	16·9	124
Acc. No. 1553	1938–42	31·3	41·9	19·1	117
Acc. No. 1941–5	1938–42	26·2	42·8	18·4	114
*Goldsoy	1938–43	43·2	41·9	19·2	129
*Kabott	1938–43	39·7	41·7	19·2	123
Acc. No. 1941–48	1941–43	28·2	43·1	18·8	114
Acc. No. 1941–51	1942–43	27·4	43·9	17·3	119
Acc. No. 1941–64	1942–43	26·7	42·7	18·3	125
Acc. No. 1941–55	1942–43	24·8	43·6	17·0	113
Acc. No. 1941–57	1942–43	24·3	46·8	16·9	113
Acc. No. 1941–63	1942–43	24·3	43·9	17·5	113
Acc. No. 1941–61	1942–43	23·9	42·3	17·0	107
Acc. No. 1941–62	1942–43	22·3	44·2	17·2	107
Acc. No. 1941–52	1942–43	22·1	46·1	16·7	114
Acc. No. 1941–53	1942–43	21·9	46·7	16·6	113
Acc. No. 1941–56	1942–43	20·9	47·1	16·5	110
Acc. No. 1941–54	1942–43	20·0	45·8	16·2	111
Acc. No. 1941–59	1942	41·1	39·9	19·3	124
Acc. No. 1941–58	1942	28·8	46·5	17·1	123
Acc. No. 1941–49	1942	23·2	44·6	17·6	117
Acc. No. 1941–50	1942	21·7	46·2	18·0	114
Acc. No. 1941–60	1942	17·2	45·2	13·7	110

*= No results for 1942. **= No results for 1943.

Soybeans varietal test.
Left: Mandarin. *Right:* Manitoba Brown.

In general all the early varieties did not yield as well as the late maturing ones. Generally, also, varieties and strains rich in protein had a lower percentage of oil than those of a lower protein content. Manitoba Brown and Pagoda are considered early varieties for this district while Kabott might be considered a semi-early variety. Mandarin and Goldsoy might be classed as late varieties.

Considering the average frost-free period in this district, early and semi-early varieties will have time under normal conditions to mature their seeds, while late varieties might not, when the frost-free period happens to be short.

Silage Corn Varietal Test

Some thirty-nine varieties, strains and hybrids of corn have been under test for silage.

A good silage corn field at the Station.
Variety: Wisconsin No. 7.

Results of the tests are shown in the table that follows. (Results of seven varieties tested only one year are not included.)

TABLE 69.—VARIETAL TEST OF SILAGE CORN

Results for years 1934 to 1946

Varieties	Years tested	Yield per acre (green weight)	Dry matter	Yield per acre dry matter basis
		Tons	%	Tons
Compton's Early	1934–46	27·82	19·17	5·33
Wisconsin No. 7	1934–46	33·50	21·71	7·27
Canada Golden Glow	1934–45	30·09	21·30	6·41
Algonquin	1935–46	24·21	19·40	4·70
Canada Leaming	1934–44	32·69	19·05	6·23
Ont. Golden Glow	1937–44	27·41	22·12	6·06
Kingscrost Reids (Hybrid FB)	1939–44	30·60	20·13	6·16
Burr Leaming	1934–38	33·55	19·59	6·57
Yellow Dent	1934–38	39·61	19·73	7·81
Kingscrost Reids (Hybrid M)	1939–43	29·49	20·79	6·13
Twitchell's Pride x Can. Golden Glow	1938–42	27·32	18·09	4·94
Iowa No. 942	1941–44	27·58	22·31	6·15
*Wisconsin No. 531	1941–44	25·76	20·11	5·18
*Wisconsin No. 625	1941–44	22·87	21·96	5·02
*Wisconsin No. 606	1941–44	24·36	20·37	4·96
Michigan Hybrid No. 561	1937–40	33·54	21·27	7·13
Longfellow	1937–40	30·29	17·93	5·43

TABLE 69.—VARIETAL TEST OF SILAGE CORN—*Concluded*

Varieties	Years tested	Yield per acre (green weight)	Dry matter	Yield per acre dry matter basis
		Tons	%	Tons
Twitchell's Pride x Lancaster	1938–41	28·88	17·76	5·13
North Western Dent	1937–40	23·43	19·14	4·48
Iroquois	1935–37	26·42	16·64	4·40
Medium Golden Glow (Harrow)	1944–46	20·10	19·86	3·99
Kingscrost Early Minn. (Hybrid A 2)	1941–43	23·49	17·99	4·22
Kingscrost Extra Early Minn. 13	1940–42	20·21	19·24	3·89
*Wisconsin No. 645	1943–44	20·30	20·15	4·09
Wisconsin No. 455	1943–44	20·54	18·39	3·78
Wisconsin No. 460	1942–43	25·86	19·70	5·09
Kingscrost Early Minn. (Hybrid A 3)	1939–40	24·04	19·26	4·63
Medium Golden Glow	1945–46	23·38	19·12	4·47
Canada 645	1945–46	24·12	18·12	4·37
Canada 531	1945–46	21·05	18·27	3·84
Canada 606	1945–46	23·76	18·23	4·33
Canada 625	1945–46	23·32	18·26	4·26

* Now designated as Canadian varieties of the same numbers.

The highest yielders in green weight proved to be the Yellow Dent, Burr Leaming, Michigan Hybrid, Wisconsin No. 7, Longfellow, Canada Golden Glow and Kingscrost Reids (Hybrid FB).

Considering the percentage of dry matter, the highest yield was obtained with Iowa No. 942 followed by Ont. Golden Glow, Wisconsin No. 7, Canada Golden Glow, Kingscrost Reids M and FB, Wisconsin 525, Michigan Hybrid No. 561 and Wisconsin No. 645.

When yield per acre of dry matter is considered, the highest was obtained with Yellow Dent, followed by Wisconsin No. 7, Michigan Hybrid No. 561, Burr Leaming, Canada Golden Glow and Canada Leaming.

Some of the high yielders, however, are too late for the season in this district.

Varieties well adapted to the district are as follows: early varieties, Longfellow and Algonquin; medium early, Wisconsin 531 and Wisconsin 606; late varieties reaching maturity, Wisconsin No. 7 and Canada Golden Glow.

Early Grain Corn Varietal Test

Some eight varieties and strains of early grain corn have been under test. The following table shows the results.

TABLE 70.—EARLY GRAIN CORN VARIETAL TEST

Varieties	Years tested	Yield of shelled corn per acre
		Bu.
Assiniboine	1936–37	78·8
Sask. White Flint	1936–37	65·2
Gehu (Swift Current)	1936–37	61·8
Manalta	1936–37	57·3
Sask. Selection	1936–37	56·9
Improved Yellow Flint	1936–37	56·5
Howe's Alberta	1936–37	46·0
Gehu (Maple Creek)	1937	79·3

Assiniboine, Sask. White Flint and Gehu (Swift Current) were the highest yielders. Gehu (Maple Creek) gave a very high yield, but it was tested in 1937 only. For that year, 1937, Assiniboine and Sask. White Flint were superior in yield of shelled corn to Gehu (Maple Creek).

Grain Corn Varietal Test

Some twenty-one varieties and strains of grain corn were under test. Results are shown in the following table.

TABLE 71.—GRAIN CORN VARIETAL TEST

Varieties	Years tested	Yield of shelled corn per acre
		Bu.
Quebec No. 28	1934–39	79·7
Falconer	1934–39	76·6
Minnesota No. 13	1934–39	76·5
Twitchell's Pride	1935–39	72·4
Kingscrost Extra Early Minn. No. 13 H E	1939	64·2
B–16	1939	62·5
Kingscrost Minn. No. 13 E_2	1939	62·3
B–17	1939	61·1
Improved Yellow Dent	1939	60·4
North Western Dent	1939	53·9
Wisconsin No. 275	1944–46	65·7
Quebec No. 28	1944–46	43·1
Ottawa D 28	1944	63·3
Wisconsin 279	1944	67·4
Wisconsin 255	1944	67·9
Quebec 28 × North Western Dent	1944	61·9
Ottawa D 16	1944	58·3
Wisconsin 240	1944	55·0
Canada 275	1946	59·9
Canada 240	1946	56·8
Canbred 150	1946	54·3
Canada 255	1946	52·3

During the first years of the test the Quebec No. 28 ranked first, but in later tests, 1944 to 1946, when compared with new varieties or hybrids, Quebec No. 28 was outclassed completely.

Sugar Beets

Under this section varieties and strains of sugar beets, cultural practices and fertilizers were studied.

SUGAR BEET VARIETAL TEST

Some forty-two varieties and strains were under test at two different periods. The following table shows the results for the years 1935-36.

TABLE 72.—SUGAR BEET VARIETAL TEST

Varieties	Years tested	Yield of roots per acre	Sugar	Yield of sugar per acre
		Tons	%	Lb.
Eagle Hill No. 472	1935–36	20·8	15·6	6,440
R & G Normal	1935–36	19·4	16·0	6,127
Dippe "E"	1935–36	19·2	15·3	5,823
Zapotil	1935–36	19·1	17·0	6,435
R & G "N" Type	1935–36	18·3	16·8	6,130
Eagle Hill No. 360	1935–36	18·1	15·5	5,555
Great Western Cerc. Res	1935–36	17·7	16·2	5,653
U.S. No. 1	1935–36	17·5	15·9	5,514
Swedish Improved	1935–36	16·8	17·3	5,812
Stokes A–1	1935–36	16·3	16·7	5,402
R & G "Z" Type	1935–36	15·8	17·6	5,516
Home Grown A	1935–36	14·8	16·9	5,008
Kuhn	1936	14·2	17·9	5,096
Udycz	1936	14·1	18·4	5,206

The best yielder as to tons of roots per acre was the variety Eagle Hill No. 472, followed closely by R & G Normal, Dippe "E" and Zapotil.

There were some variations in the sugar content, Udycz, Kuhn, R & G "Z" type, Swedish Improved and Zapotil being the varieties showing the highest percentages of sugar, all containing at least 17 per cent sugar.

When the yield of sugar per acre is considered, Eagle Hill No. 472 came first, followed by Zapotil, R & G "N" type, R & G Normal, Dippe "E" and Swedish Improved.

The following table shows results of the varieties tested from 1944 to 1946.

TABLE 73.—SUGAR BEETS VARIETAL TEST

Varieties and Strains	Years tested	Yield of roots per acre	Sugar	Yield of sugar per acre
		Tons	%	Lb.
2–1–00	1944–45	17·1	13·2	4,404
3–1834–00	1944–45	18·2	13·3	4,918
U.S. 200 × 215	1944–45	16·9	13·5	4,294
Imperial (segmented)	1944–45	17·0	13·3	4,559
S.K.E. 34413	1945–46	18·9	13·6	5,042
4–5–0	1945–46	16·4	14·5	4,696
H. G. Imperial	1945–46	18·9	13·1	5,038
Home Grown "R"	1945–46	17·7	13·9	4,950
4–6–00	1945–46	17·4	13·0	4,503
4–7–00	1945–46	16·0	14·2	4,649
Kuhn 34308	1944–46	15·7	15·1	4,698
1–8–00	1944	17·8	15·3	5,444
3–6–0	1944	17·9	15·1	5,403
3–7–00	1944	16·8	15·5	5,196
3–1802–00	1944	17·3	15·7	5,459
3–3011–00	1944	16·9	15·9	5,393
European Check	1944	18·0	16·0	5,776
"R" Type	1944	15·7	15·8	5,641
Imperial B.C	1944	18·8	15·0	5,653
S.K.E. 34206	1944	18·5	14·1	5,223
4–8–0	1945	16·5	11·8	3,914
4–1836–00	1945	15·8	11·5	3,633
4510–00	1946	18·4	16·1	5,925
U.S. 215 × 216	1946	18·2	15·3	5,560
457–0	1946	18·0	16·6	5,996
451832–00	1946	17·4	15·9	5,540
456–0	1946	16·7	15·8	5,287
U.S. 215 × 216 (Scarified)	1946	14·8	15·5	4,604

When the yield of roots per acre is considered, H. G. Imperial and S.K.E. 34413 were highest, followed by Imperial B.C., S.K.E. 34206, 4510-00, U.S. 215 × 216, 3-1834-00, European Check and 457-0.

In 1945, the percentage of sugar in the beets was generally below normal, and while very high in 1946, it was normal in 1944. Kuhn 34308, 4-7-00, 4-5-0, European Check, 4510-00, Home Grown "R", 3-3011-00 and 3-1802-00 are the varieties and strains having greater sugar percentages.

When the yield of sugar per acre is taken into consideration, 4510-00, 457-0, U.S. 215 × 216, European Check, Imperial B.C., "R" type, S.K.E. 34413, H.G. Imperial, 3-1834-00 and Home Grown "R" are considered the best yielders.

CULTURAL PRACTICES

Germinated versus non-germinated seed.—To ascertain the value of germination of sugar beet seed, the seed was pregerminated before sowing and compared with the usual practice of sowing dry seed. The pregerminated seed was sown when the germ was just ready to emerge. Whole seed was used for the test.

The results are shown in the following table.

TABLE 74.—EFFECT OF GERMINATION OF SUGAR BEET SEED ON YIELD OF ROOTS, PERCENTAGE AND YIELD OF SUGAR

Three-year average: 1944-46 Incl.

Treatment	Yield of roots per acre	Sugar*	Yield of sugar per acre*
	Tons	%	lb.
Germinated	16·2	15·1	5,236
Non germinated	15·4	15·3	4,980

*=Two-year average.

Germinated seed will appear 4 to 8 days earlier than non-germinated seed. The yield of roots per acre has been slightly improved by germinating the seed prior to sowing. The yield of sugar is also slightly higher. However, in regular field practice it does not seem practical to have the seed pregerminated, considering the slight advantages that result.

Whole seed versus germinated seed.—Under this test two types of seed were tested, whole and segmented.

The results are given in the following table.

TABLE 75.—WHOLE SEED VERSUS SEGMENTED SEED

Three-year average: 1944-46 Incl.

Type of seed	Yield of roots per acre	Sugar*	Yield of sugar per acre*
	Tons	%	Lb.
Segmented seed	19·3	15·4	6,082
Whole seed	18·8	15·3	6,037

*=Two-year average.

Segmented seed showed a slight increase, in yield over whole seed. The advantage of segmented seed over whole seed lies in the fact that the thinning process is facilitated and that considerable seed is saved at sowing time.

Dates of seeding.—In this test seedings took place on three different dates, the first, as early as possible; the second, 10 days later, the third, 20 days later. The harvest took place on the same date for all treatments.

The following table shows the results.

TABLE 76.—EFFECT OF DATES OF SEEDING SUGAR BEETS ON SUBSEQUENT YIELD OF ROOTS AND PERCENTAGE AND YIELD OF SUGAR

Two-year average: 1944-45 Incl.

Dates of sowing	Yield of roots per acre	Sugar*	Yield of sugar per acre*
	Tons	%	Lb.
Earliest date	18·8	16·7	6,132
10 days later	13·6	15·1	4,290
20 days later	10·1	14·7	3,260

*= Year 1944 only.

The date of sowing proved to have a great influence on yield and sugar content. The earlier the sowing, the better the yield. During both years of the test, the differences in yield were considerable and constant.

Dates of harvest.—Under this test harvest was made at three different dates; 10 days before normal, normal, and 10 days later than normal. Sowings had taken place the same date for all plots.

The following table shows the results.

TABLE 77.—EFFECT OF THE DATE OF HARVEST ON YIELD OF ROOTS, PERCENTAGE AND YIELD OF SUGAR IN SUGAR BEET PRODUCTION

Two-year average, 1944-45 Incl.

Dates of harvest	Yield of roots per acre	Sugar	Yield of sugar per acre
	Tons	%	Lb.
10 days before normal	18·6	12·8	4,835
Normal	17·5	13·2	4,684
10 days after normal	18·2	13·8	5,072

With twenty days difference between the first and last harvest, the yield apparently was not influenced to an appreciable extent. However, there was a tendency towards a slight increase in the sugar content of the beets. The percentage of sugar increases slightly but steadily with later dates of harvest.

Transplanting tests.—The development of sugar beet production in Quebec and the scarcity of experienced labour for thinning operations drew attention to the feasibility of transplanting sugar beets instead of the common practice of sowing the seed.

In conjunction with the transplanting tests, this method necessitated studies on seedling production in seed-beds. Seed was sown in hotbeds on March 25 and in coldbeds on April 4 and 14. When seedlings started to grow it was realized that the rate of seeding used was too high. However, a sufficient number of good seedlings were secured for the transplanting tests.

TABLE 78.—EFFECT OF TRANSPLANTING SUGAR BEETS ON THE YIELD OF ROOTS PER ACRE

Dates of transplanting	Seedlings of March 25	Seedlings of April 4	Seedlings of April 14	Sowing
	Tons	Tons	Tons	Tons
May 11	32·8	28·1	*	22·8
May 23	30·9	29·2	27·0	16·3
June 3	28·6	29·0	27·9	17·4
Average	30·7	28·8	27·4	18·8

* On May 11 seedlings of April 14 were too small for transplanting.

Transplanting sugar beets produced much superior results to ordinary sowings, especially at the later date. Thinning was eliminated in the trans-

Effect of transplantation on sugar beet roots.
Left: Transplanted. *Right:* Seeded.

planted beets and weeding operations facilitated. However, transplanted beets have a tendency to develop malformed beets with two to four prongs and do not penetrate so deep in the soil.

TABLE 79.—EFFECT OF TRANSPLANTING ON THE PERCENTAGE OF SUGAR IN BEETS

Dates of transplanting	Seedlings of March 25	Seedlings of April 4	Seedlings of April 14	Sowings
	%	%	%	%
May 11	15·0	15·8	–	15·2
May 23	16·2	14·7	15·5	16·5
June 3	14·9	15·1	15·1	16·2
Average	15·4	15·2	15·3	16·0

Transplanted beets generally contain a lower percentage of sugar than when sowings are made. However, considering the much higher yields in roots obtained, the final tonnage of sugar per acre is much larger.

The test is to be continued in view of the promising results when special attention will be paid to seedling production.

FERTILIZER TESTS

In 1944 a large-scale fertilizer test was made. Six treatments were used on plots of 0·61 acres each.

The results are shown in the following table.

TABLE 80.—EFFECT OF VARIOUS FERTILIZATION ON SUGAR BEETS

Treatments	Yield of roots per acre	Sugar	Yield of sugar per acre
	Tons	%	Lb.
1—Manure, 14 tons per acre (no borax applied)	10·3	15·4	3,175
2—Manure, 14 tons per acre (25 lb. borax per acre)	15·0	14·6	4,371
3—Manure 14 tons + 1,000 lb. 0–12–6 (25 lb. borax per acre)	15·1	16·0	4,835
4—Manure 14 tons + 1,000 lb. 2–12–6 (25 lb. borax per acre)	13·6	16·0	4,371
5—Manure 14 tons + 300 lb. Superphosphate 20% (25 lb. borax per acre)	15·8	15·5	4,898
6—Manure 14 tons + 600 lb. Superphosphate 20% (25 lb. borax per acre)	15·1	16·0	4,835

In treatment 1 where no borax was applied, the yield was lowered considerably due to the presence of brown-heart disease.

In treatments 4, 5 and 6, the stand was from 8 to 12 per cent lower than with treatments 1, 2 and 3 explaining somewhat the low yield obtained with a rather heavy fertilization.

In 1946 a fertilizer trial containing 16 different treatments was inaugurated. The results might be summarized as follows:

(1) When the check (no fertilization) was compared to the 10 ton manure application, it was found that manure alone raised the yield of beets, 2·8 tons per acre. Sugar percentage in beets was also slightly lower in the check than in the manured plots.

(2) That, all other factors being equal, the plots fertilized with chemical fertilizers plus manure gave better results than plots fertilized at the same rates without manure as shown in the following table:

TABLE 81.—EFFECT OF MANURE ON SUGAR BEETS

Treatment	Yield of roots per acre	Sugar	Yield of sugar per acre
	Tons	%	Lb.
Manure	24·3	15·3	7,454
No manure	23·3	14·6	6,809

(3) Plots which received chemical fertilizers when compared with the check and manure alone had a higher percentage of sugar.

(4) The 2-16-6 formula gave slightly better results than the 2-12-10 formula on the clay loam type of soil where the experiment took place, as shown in the following table:

TABLE 82.—EFFECT OF THE CHEMICAL FERTILIZER FORMULA ON SUGAR BEETS

Average of 24 plots

Formula	Yield of roots per acre	Sugar	Yield of sugar per acre
	Tons	%	Lb.
2–12–10	23·1	14·6	6,751
2–16–6	24·1	15·3	7,393

(5) That, independently of the formula and other factors equally considered, the 450 lb. quantity of chemical fertilizer gave results superior to any other quantity tested as shown in the following table:

TABLE 83.—EFFECT OF THE QUANTITY OF CHEMICAL FERTILIZER IN SUGAR BEET FERTILIZATION

Average of 16 plots

Quantities of fertilizers	Yield of roots per acre	Sugar	Yield of sugar per acre
	Tons	%	Lb.
700 lb. per acre	23·8	14·8	7,066
450 lb. per acre	24·4	15·4	7,537
200 lb. per acre	23·2	14·8	6,864
Check (No fertilizers)	20·4	12·7	5,184

FIBRE

R. Bordeleau

Under this section, tests were made on varieties and sources of seed in flax fibre production.

The following table shows yields obtained in the varietal test.

TABLE 84.—VARIETAL TEST OF FLAX

Varieties	Years tested	Yield per acre			
		Line fibre	Tow	Total fibre	Seed
		Lb.	Lb.	Lb.	Bu.
Stormont Cirrus	1943 to 1946	341	200	541	5·52
Liral Dominion	1943 to 1946	237	187	424	3·21
Liral Prince	1944 to 1946	331	116	447	3·57
Stormont Gossamer	1943	315	235	550	7·11

As to line fibre and total fibre, Stormont Cirrus and Liral Prince were superior to the other varieties. Stormont Gossamer, with a total fibre yield of 550 lb. per acre, seems quite good but it was tested one year only in 1943. The yields obtained that same year with Stormont Cirrus and Liral Dominion were much superior to that of the Stormont Gossamer.

Different sources of seed were tested in 1946. The variety used for the purpose was Stormont Cirrus. Seed secured from Sainte-Anne-de-la-Pocatière and Sainte-Martine was compared with seed from l'Assomption Station.

The following table shows the results.

TABLE 85.—SOURCES OF FLAX SEED AND INFLUENCE ON YIELD OF FIBRE, TOW AND SEED

Sources	Yield per acre		
	Tow	Line fibre	Seed
	Lb.	Lb.	Bu.
L'Assomption	112·5	250·0	13·0
Ste-Martine	70·8	170·8	17·9
Ste-Anne de la Pocatière	100·0	300·0	11·4

This experiment has not been of sufficient duration to draw any conclusion. The differences obtained with various sources of seed might be due not only to the sources of seed but also to seasonal factors. Further testing is to be done in that respect.

CEREALS

R. Bordeleau

Under this section varieties and strains of oats, barley and spring wheat were tested.

Varietal Tests of Oats

Some eighteen varieties and strains of oats were tested from 1941 to 1946 inclusive.

The following table gives the results.

TABLE 86.—VARIETAL TESTS OF OATS

Varieties and Strains	Years tested	Average		
		Days to mature	Yield per acre	Hull*
		Days	Bu.	%
R. L. 1114	1941	87	73·5	27·9
Gopher	1941	84	75·8	28·1
Ott. 2797–69	1944	80	60·8	29·0
Ott. 2806–K	1946	89	80·9	–
Ott. 2797–B16	1946	81	59·7	–
Beacon	1946	86	83·4	–
Lasalle	1941–42	88	80·6	22·1
M.C. 3428	1943–44	75	47·7	25·5
Ripon	1941 to 43	80	66·3	22·0
Lenn. 51–2	1941 to 43	82	68·3	27·8
Erban	1941 to 44	85	68·2	29·5
Ajax	1942 to 46	78	65·9	32·0
Beaver	1942 to 46	83	71·5	28·0
Mabel	1941 to 46	78	69·5	25·1
Roxton	1941 to 46	89	80·7	24·9
Banner 44	1941 to 46	86	67·8	29·5
Vanguard	1941 to 46	83	67·7	28·2
Cartier	1941 to 46	77	61·8	24·9

*—% of hull for years 1941 and 1944 only.

Cartier, Mabel and Ajax were the three earliest varieties. Ajax, however, was comparatively a lower yielder than Cartier and Mabel, the latter being the best yielder in that class of early maturing oats. The percentage of hull was also much higher with Ajax than with Mabel and Cartier which were about the same in that regard. Vanguard, Beaver and Erban could be considered as medium, maturing varieties with Beaver giving a better yield with the lowest percentage of hull. In the late maturing class, Roxton was far ahead of the old standard Banner variety, not only as to yield but also as to the percentage of hull.

In the varieties under test for one year only, two are particularly promising, Beacon and Ott. 2806-K. They are late enough maturing and very high yielders.

Variety Tests of Barley

Some 31 varieties and strains of barley have been under test since 1942. The following table shows the results.

TABLE 87.—VARIETAL TESTS OF BARLEY

Varieties and Strains	Years tested	Days to mature	Yield per acre
		Days	Bu.
Byng	1942 to 46	82	59·1
Velvet	1942 to 46	83	57·8
M.C. 2222 (Montcalm)	1942 to 46	83	59·1
O.A.C. 21	1942 to 46	81	54·0
1559 A	1942 to 44	82	53·4
M.C. 5026	1942 to 44	81	50·6
M.C. 7524	1942 to 44	82	57·5
O.A.C. 35-2-0	1942 to 44	90	54·9
Plush	1942-43	86	55·0
2509 E	1942-43	80	55·5
M.C. 4525	1142-43	82	52·3
Nobarb 30-1-4	1942-43	80	47·8
O.A.C. 34-1-0	1942-43	86	54·4
M.C. 8129	1944-46	83	63·9
Nobarb II	1944-46	82	50·2
Galore	1944-46	90	52·0
Lenn. 16-1-11	1944-46	81	58·6
Peatland	1944-46	81	57·2
M.C. 8229	1944-46	84	63·9
Titan	1944	81	52·2
Prospect	1944	84	44·2
Ott. 3637 C	1946	77	40·2
Ott. 3637 D	1946	78	54·1
Ott. 3650 B	1946	79	51·4
Ott. 2206 B	1946	86	59·5
Ott. 2526 A	1946	87	60·3
Brandon 112	1946	85	67·7
Brandon 1136	1946	88	65·9
Brandon 1283	1946	88	67·9
O.A.C. 39-1-0	1946	84	45·0
Ott. 3643 B	1946	77	49·9

Of the varieties tested Byng and Montcalm proved to be outstanding as to yield with a similar degree of maturity. In the three-year period test, the strain M.C. 7524 proved to be quite a good yielder and matured early enough.

Other interesting varieties that need further testing are Lennoxville 16, Peatland (particularly resistant to lodging), M.C. 8229 and 8129, the Brandon strains and Ott. 2526 A.

All the early strains have a tendency to be low in yield.

Varietal Tests of Spring Wheat

Eight varieties and strains have been tested to date and the following table shows the results.

TABLE 88.—VARIETAL TESTS OF SPRING WHEAT

Varieties or Strains	Years tested	Days to mature	Yield per acre
		Days	Bu.
Coronation	1944–46	90	26·9
C.D. 3285	1944–46	90	30·9
Regent 975–11	1944–46	87	27·6
Huron Ott. 3	1944–46	90	25·8
N.S. 2489 B	1944	89	22·1
40–90	1944	87	20·7
2780, A	1946	91	36·0
40–85	1946	91	38·9

Further testing is needed before definite information is obtained. However the promising strains to date are C.D. 3285, 2780 A and 40-85.

ILLUSTRATION STATIONS

Western Quebec

L. Bellefleur

On the Illustration Stations farm problems are studied in their local environment representing an extension of the comprehensive work carried on at the Experimental Farms and Stations. Illustration Stations are operated on privately-owned farms on the basis of a co-operative agreement entered into between the owner and the Dominion Experimental Farms Service. In Quebec the present organization comprises 45 Illustration Stations serving the outlying areas surrounding the Dominion Experimental Stations located at L'Assomption, Lennoxville, Normandin and Sainte-Anne-de-la-Pocatière. The work conducted on Illustration Stations has been consistently broadened in scope and has progressed from the original purpose of disseminating experimental data by field and cultural demonstrations to include crop testing and experiments of a fact finding nature.

The production of adapted varieties of cereals and forage crops is promoted on Illustration Stations in order that these farms may serve as sources of pure seed for farmers in surrounding districts. Livestock policies which are designed to encourage the development of improved herds of cattle and swine as well as flocks of sheep and poultry from which neighbouring farmers may procure breeding stock are an integral part of Illustration Station activities. Farm management studies, including farm planning and organization as well as farm home beautification, are other projects designed to acquire information on the most economical methods of production and promote those features which contribute to financial effectiveness and also those which enhance the comfort and attractiveness of farm living.

The ten Illustration Stations which constitute the L'Assomption supervisory district are located in the areas north and south of the St. Lawrence river extending from Montreal in the west to the county of Portneuf in the east. Soil types in this district range from the fertile heavy clays and clay loams of the St. Lawrence lowlands to the light infertile sands of the outwash plains on the outer edges of the valley in the approaches to the foothills' region of the Laurentians.

In the L'Assomption supervisory district, work is conducted on the following farms and throughout this report reference will be made to certain districts and where this is done it will relate to the work being developed at that point in co-operation with the farmer listed as operator of the Illustration Station.

Station	County	Operator
Batiscan	Champlain	Antonio Brunelle
L'Acadie	Saint-Jean	Charles Deland
Lachevrotière	Portneuf	Rosaire Mayrand
Maskinongé	Maskinongé	Antonio Caron
Mont Rolland	Terrebonne	Paul Latour
Saint-Célestin	Nicolet	Ludger Ellyson
Saint-Constant	Laprairie	Roch Boulé
Saint-Etienne-des-Grès	Saint-Maurice	Roger Bournival
Saint-Jacques	Montclam	Paul Marsolais
Saint-Simon	Bagot	Donat Rivard

Description and Organization of Station Farms

Batiscan:—This station is located on the North Shore of the St. Lawrence River on No. 2 highway twenty miles east of Three Rivers. Total area of the farm comprises 94·4 acres of which 91·4 are under cultivation. Two cropping systems are followed; a three-year rotation of hoed crops, grain and hay for the production of roots and corn close to the buildings, and a four-year grain, grain hay, hay, rotation for grain and hay production. These cropping systems are supplemented by a 17-acre permanent pasture which provides early spring and summer grazing for livestock as well as in the late fall. Both cropping systems on this farm are devised to provide feed for dairy cattle which contributed 51·0 per cent of the total farm revenue in 1946.

L'Acadie:—The farm at L'Acadie is situated three miles south of St. Johns and comprises a total area of 177 acres. The soil on this farm is classified as Saint-Blaise clay and Grande Ligne sandy loam of reasonably high fertility. The main farm area is under a five-year crop rotation and in view of the fact that alfalfa grows readily in all fields provision is made in the farm plan for the maintenance of permanent stands of this crop. This farm is located in an area where the production of canning crops is an important enterprise. In recent years flax for fibre has also made a substantial contribution to farm income. Revenue derived from these cash crops constituted 57·9 per cent of total farm income in 1946.

Lachevrotière:—The most easterly point in this district of supervision the Lachevrotière station is situated forty miles west of Quebec city and three miles north of No. 2 highway on the secondary road leading to Saint-Marc-des-Carrières. Two crop rotations are followed on this 68·5-acre farm one of a five-year duration for hoed crops, grain and hay, and a four-year grain-hay rotation on areas distant from the farm buildings and not so well suited for corn, turnips or potatoes. A restricted area in permanent pasture provides part of the early grazing for the dairy herd which is the most important enterprise 87·5 per cent of total revenue in 1946 being derived from sales of cattle and dairy products.

Maskinongé:—Illustration Station work was instituted on this 124-acre farm in 1944. The tillable area of 97 acres is divided into eight fields which permit the operation of two four-year rotations one on four fields close to the buildings suited for the production of hoed crops; the other a grain-hay rotation on four fields at greater distance from the farmstead. Sales of cattle and dairy products contribute 32·8 per cent of total income, cash crops, mainly sugar beets and fibre flax 22·3 per cent, and hogs 36·4 per cent.

MONT-ROLLAND:—The topography of this station is typical of the foothills area of the Laurentian Region. Rolling land with steep sloping hillsides creates conditions where erosion control becomes an important factor in the development of a cropping program and the seeding of the steeper slopes to permanent pasture is an integral part of farm operations. The total area of this farm is 173 acres of which 117 are under cultivation, the balance comprising a 53-acre woodlot and the farmstead. Work was undertaken on this farm in 1943 and studies on crop production including fertility maintenance and erosion control have been instituted. The greater part of the farm income is derived from sales of livestock and dairy products, hogs, field crops, and poultry. The greater proportion of field crop sales is derived from potatoes which grow particularly well on this sandy loam soil.

SAINT-CÉLESTIN:—General farm productivity in the county of Nicolet where this station is located is somewhat below average but where the station is located the soil type is classified as Sainte-Rosalie clay which is normally reasonably fertile. The farm comprises a total of 51·2 acres with 48·7 acres under cultivation. Initial work on the station has centred in the establishment of a suitable cropping system. Two rotations, one of a three-year duration for hoed crops and a five-year rotation for the production of grain and hay are in progress. Dairy cattle, hogs, and poultry are the main enterprises and contribute 93·9 per cent of total farm income.

SAINT-CONSTANT:—The station at Saint-Constant is situated 16 miles from the city of Montreal hence the great bulk of farm production including dairy products is sold on this market. The main cash crops are fibre flax, also beans and peas for canning. A herd of 24 grade Ayrshires contributes 76·3 per cent of farm income in the form of fluid milk sold on the Montreal market. This operator owns a total of 334 acres of land with Illustration Station work being conducted on the home farm which comprises 110 acres. The cropping system on this farm will be discussed more fully under "Systematic Layout and Farm Improvement".

SAINT-ETIENNE-DES-GRÈS:—The soil type on this station which is located 18 miles north of the city of Three Rivers is a light sand, deficient in organic matter and low in natural fertility. Total area of the farm comprises 104·5 acres of which 35 acres are under a six-year rotation of cereals and hay and 18 acres under a three-year rotation of cereals, clover and timothy. Pasturage for livestock is provided by a large area of unimproved land which is some distance from the buildings. Cash crops are canning corn and table turnips but 90 per cent of the farm income is derived from sales of dairy products, hogs, and poultry. The main problem on this farm is soil improvement and the choice of suitable crops.

SAINT-JACQUES:—Work was instituted on this station in 1945 for the purpose of conducting special studies on the production of cigar tobacco. Three rotations are in progress on this 67-acre farm. A special tobacco rotation of four years, duration where two successive crops of tobacco re grown followed by cereals and clover forms the basis upon which fertility work is conducted on this crop. A five-year rotation of hoed crops, cereals, hay, hay and pasture is conducted for the production of sugar beets, corn and potatoes and to provide feed for the livestock kept. A third rotation for the production of grain and hay is established on four fields at the back of the farm. Cash crops are tobacco, sugar beets, and maple syrup. Other sources of revenue are a grade Ayrshire herd and a small poultry flock.

SAINT-SIMON.—Illustration Station work was instituted on this farm in 1921. The area of the farm comprises 76·0 acres of which 70·9 acres are under cultivation. The tillable area is under a five-field system of cropping with the exception of 11·0 acres in permanent pasture. The prevailing soil type is

Sainte-Rosalie clay loam, high in fertility and particularly adapted to the growth of alfalfa. Cash crops grown consist of seed grain, alfalfa hay, sugar beets, and field peas. Field crops now contribute 55·8 per cent of farm income. A pure-bred Ayrshire herd is maintained on this farm but was considerably reduced in number during the war years due to shortage of labour. Revenue from this latter source constitutes 39 per cent of farm income.

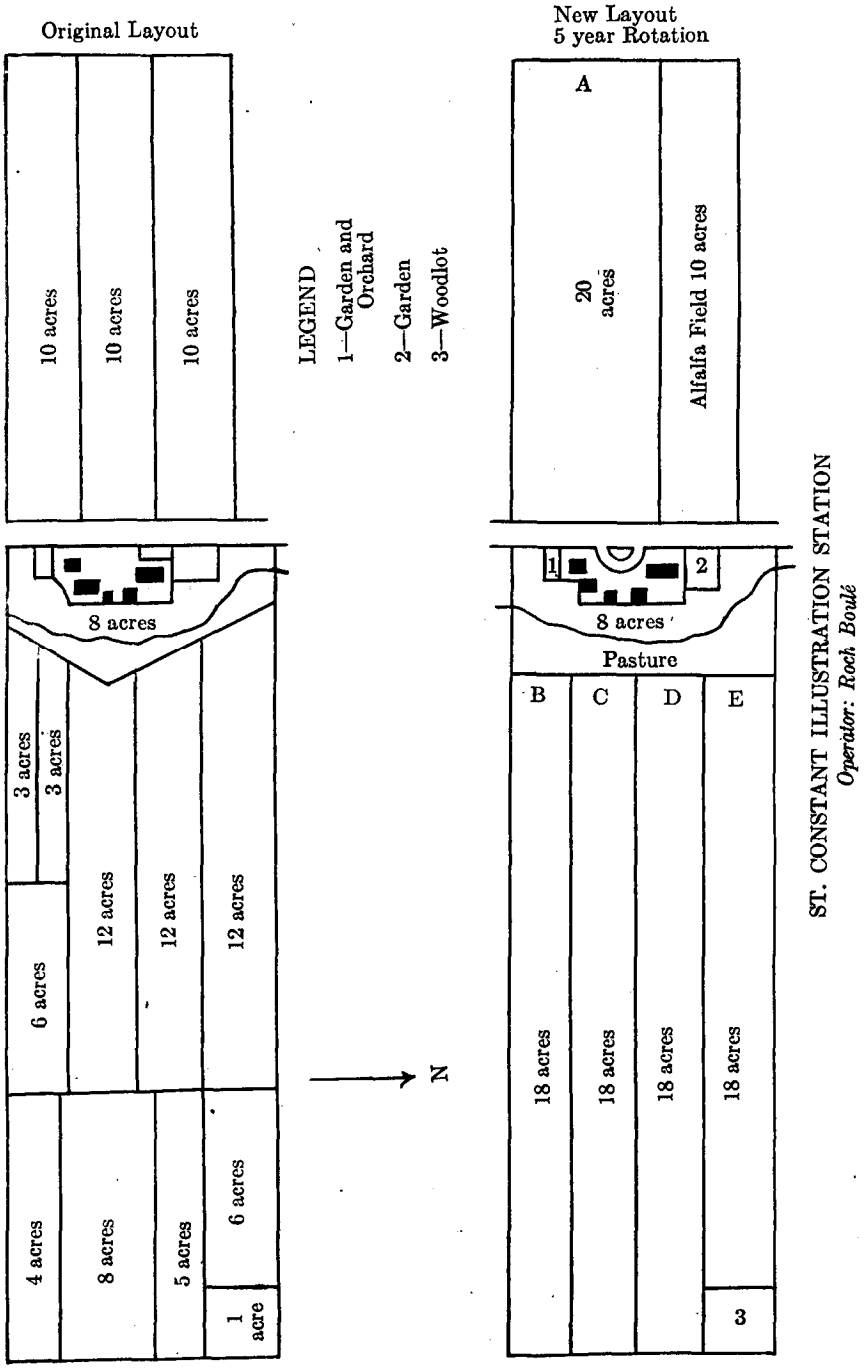
Systematic Layout, the Basis of Illustration Station work

Experiments and practical experience on the Experimental Farms and Illustration Stations have indicated the advantages of a systematic cropping system or rotation. One of the first undertakings when a farm is selected for Illustration Station work is to study the complete organization from the standpoints of soil type, natural drainage, the kind of crops that can be grown and the type of production desired to maintain the herds and permit the growing of cash crops which provide a greater diversity of sources of income. The farm is then measured, a suitable rotation or cropping system is decided upon, and a plan made as a guide for future use showing the area and location of the field divisions in relation to the farmstead. The accompanying diagrams illustrate the procedure followed in the case of the station at Saint-Constant.

In the original layout it will be observed that the farm was divided into a number of small fields of different size some of which were difficult to cultivate with tractor power and hindered the effective distribution of areas under different crops. In view of the location of this farm which is close to the city of Montreal it was essentially a dairy enterprise where a herd consisting of 24 cows contributed 76·3 per cent of total fram revenue in the form of fluid milk sales. In the revised plan of this farm and adjustment in the field divisions to provide the necessary areas for a five-year rotation the succession of crops is as follows: first year hoed crop, second year grain, third year clover hay, fourth year mixed hay and fifth year pasture which is now established on fields A, B, C, D and E, the provision of adequate feed for livestock being of first consideration. These fields were of equal area, except for a slight difference in field A, and the farm plan is now so organized that the same relative quantities of grain and forage are produced each year. The advantages of such a cropping system are that the normal carrying capacity of the farm in terms of livestock can be determined and that all fields on the farm will receive identical manurial treatment at regular intervals thus ensuring that none will be neglected and hence become unproductive. An additional ten-acre field adjacent to field A has been set aside as a permanent alfalfa area which is ploughed and reseeded when the condition of the stand of alfalfa renders this procedure necessary.

In the main farm rotation silage corn is the principal hoed crop grown. Manure is applied at the rate of 10 to 12 tons per acre, prior to seeding the hoed crop, the whole field receiving a uniform application. Beans and peas for canning, and fibre flax are seeded on that part of the hoed crop field which is not required for corn. In the case of the area seeded to flax no manure is applied until after the crop is removed in the fall. Supplemental applications of chemical fertilizer are made according to the requirement of the particular crop being grown. In the second year of the rotation Roxton oats and O.A.C. No. 21 barley are the cereals seeded along with a grass and clover mixture made up of timothy 5 lb., red clover 8 lb., alsike clover 2 lb., and alfalfa 5 lb. giving a total of 20 pounds of small seeds per acre. When conditions and the stand are suitable, red clover seed is harvested from the first-year hay field and a part of the second-year hay area is selected for the production of timothy seed.

Near the buildings an eight-acre area has been reserved for permanent pasture. This field is divided by a brook running through a deep gully which provides water during the summer for the dairy herd. This area is kept in



permanent grass to prevent erosion on the steep slopes along the edge of the stream. Adjacent to the home, area number 1, which was formerly a vegetable garden, has been planted to apple trees and small fruit with the vegetable

garden now being located on area number 2. Area number 3 at the other end of the farm is a one-acre woodlot which provides a limited quantity of lumber and fuel.

Soil Fertility Studies

Tests with chemical fertilizers have been conducted on all stations in this district of supervision and studies have been made as to their use on general farm crops, permanent pastures, as well as special crops such as fibre flax, sugar beets, and tobacco. In view of the fact that with few exceptions the stations in this district are largely livestock farms the supplementing of farm manure with chemical fertilizers for the production of field crops has been an important project. Work on permanent pastures is largely a study of the effect of nitrogen, phosphorous and potash in chemical form on the productivity of permanent pasture areas while experimental studies of fertilizer formulas and rates of application have been the basis for work on special crops. The salient points of experimental work on fertilizers on these stations follow.

FIELD CROPS

The fertilization of field crops in this district is largely a question of supplementing farm manure with chemical fertilizers. The importance of farm manure is emphasized particularly on light soils low in organic matter. At Saint-Etienne des-Grès, where the soil is a light sand low in organic matter, an application of 10 tons of manure increased the yield of turnips from 5·93 tons to 19·11 tons per acre in 1946. In this same experiment manure increased the yield of clover hay from less than one-half ton per acre to 1·57 tons. The results from fertilizer experiments on this soil indicate that farm manure supplemented by chemical fertilizers carrying both phosphorous and potash gives the most favourable results. However, on the stations at Saint-Simon, L'Acadie, Saint-Célestin, Maskinongé, and Lachevrotière where relatively large numbers of cattle are carried and regular applications of farm manure have been made annually, the most economical returns come from the supplementing of farm manure with applications of superphosphate. Basic fertility on these farms is high as evidenced by the average yield of 26·32 tons of turnips derived from applications of manure alone at 10 tons per acre and where superphosphate 20 per cent was added at 480 pounds per acre yields were increased to 29·84 tons. At Batiscan the results are substantially the same as for the other heavy soil farms. Manure alone at 10 tons per acre produced 19·20 tons of turnips and when superphosphate 20 per cent was added at 400 pounds and 600 pounds per acre yields were increased to 21·7 tons and 25·7 tons per acre respectively.

THE EFFECT OF GROUND LIMESTONE ON YIELDS OF CLOVER

During the years 1939 to 1942 experiments were conducted on the Illustration Stations at L'Acadie, Batiscan, Lachevrotière, and Saint-Célestin to determine the effect of ground limestone on crop growth. Ground agricultural limestone was applied at rates of one, two and three tons per acre and compared with a check plot which received no lime. Records on six individual tests show that the application of one ton of lime increased hay yields by 0·26 tons, two tons of lime by 0·41 tons and three tons by 0·41 tons. The results from this experiment indicate that on these heavier soils, applications up to two tons per acre continue to give results but that rates above this amount do not appear to be required. At Saint-Etienne on sandy soil where manure at 10 tons per acre was supplemented by an application of ground limestone at three tons per acre, an increase of 0·46 tons of clover hay was recorded. It is pointed out that this increase was obtained where the supply of organic matter, which is the first essential in the fertilization of these sandy soils, was adequate.

A summary of the fertilizer work conducted on field crops indicates that on livestock farms where the soil is a clay to clay loam in texture, applications of

farmyard manure at from 10 to 15 tons per acre supplemented by superphosphate 20 per cent at from 400 to 600 pounds per acre have given very satisfactory results. On light sandy soils such as at Saint-Etienne where the need for organic matter is particularly great, the results show rather strongly that manure supplemented by chemical fertilizers carrying both phosphorus and potash is the most effective treatment. In cases where the quantity of manure is limited the use of a complete fertilizer such as 4-8-10 or 2-12-6 at rates of 400 to 600 pounds per acre would be advisable on such light soils.

FERTILIZER FOR PERMANENT PASTURES

The fertilization and management of permanent pastures is important in this district. As dairying is the main industry the provision of an adequate and constant supply of high quality pasture for dairy herds is a necessity. During the years 1939 to 1946 inclusive, experimental work on pasture improvement has been conducted at Batiscan, L'Acadie, Lachevrotière, Maskinongé, Mont-Rolland, Saint-Célestin, and Saint-Simon. The results derived from a standard experiment which was laid down on each of these farms during the three-year period 1944-1946 are summarized in table 89.

R.O.P. Accredited Ayrshires on the permanent pasture of the Illustration Station at St. Simon de Bagot.

In general it can be stated that the application of chemical fertilizers has given consistent increases in yields of green herbage and that a higher percentage of clover and nutritious grasses is found on the fertilized plots. At Batiscan where the soil is a clay loam, the application of 600 pounds of superphosphate per acre every three years on plot "3" has been somewhat more effective and less costly in stimulating yields than the other treatments. The results at L'Acadie show very little difference due to treatment. This is caused largely by the fact that this pasture area is susceptible to drought and is rather sparsely covered by herbage. The test at Lachevrotière was laid down on an old meadow and to date fertilizers carrying all three elements have given best results. The soil type is predominantly a clayey sand hence favourable results from applications of potash are not unusual.

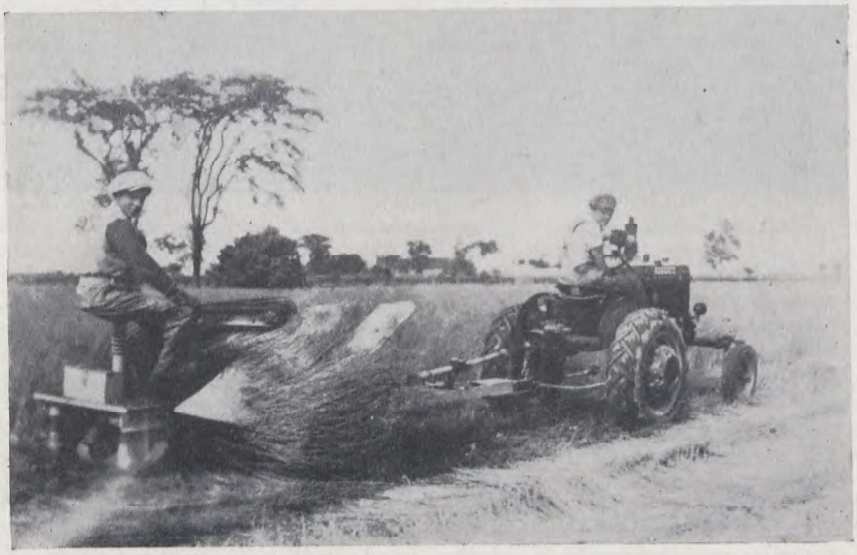
The pasture area at Maskinongé had been under grass for a considerable number of years prior to laying down the fertilizer test. The most effective treatment for pasture on this silty clay loam soil has been 600 pounds of superphosphate at three-year intervals. On the Mont-Rolland station the pasture area is located on sandy loam soil of medium fertility. The heavy annual application on plot "5" has given the greatest yield of high quality herbage. It is apparent from this record that nitrogen in the form of ammonium sulphate at 100 pounds per acre has been the most important element and until the organic matter or nitrogen content of this soil is built up it is doubtful if much response will be obtained from applications of phosphorus or potash.

At Saint-Célestin the area was seeded to a pasture mixture in 1938. Results on this clay soil indicate that on a seeded pasture the treatment on plot "1", where 600 pounds of superphosphate and 120 pounds of muriate of potash are applied every three years and supplemented each year with 100 pounds of ammonium sulphate, has given maximum returns in terms of yield of green herbage. The pasture field at Saint-Simon is on Saint-Rosalie clay and has been under grazing for a great number of years. The most favourable results have been obtained on plot "4" where 200 pounds of superphosphate, 40 pounds of muriate of potash and 100 pounds of ammonium sulphate have been applied each year. This treatment is equivalent to an annual application of 333 pounds of a 6-12-6 chemical fertilizer formula.

It will be observed from a study of these records that soil type, original condition of the sod and previous treatment of the area, are important factors influencing the productivity of pastures and determining factors as to chemical fertilizer formula and quantity to apply which will give the most economical returns in yields of pasture herbage.

Fibre Flax

The stations at L'Acadie, Saint-Constant and Maskinongé serve areas where fibre flax is an important cash crop. Experimental work was instituted at L'Acadie and Saint-Constant in 1945 to determine the most effective fertilizer formula and rate of application for the production of high quality line fibre.



Pulling Flax on the Illustration at L'Acadie with a modern flax pulling machine manufactured in Canada.

Flax is grown on turned down sod in the hoed crop year of the standard farm rotation, but no manure is applied to the area seeded to flax until after the crop is removed in the fall. On these two stations 2-12-6, 2-12-10, and 4-8-10 fertilizer formulas at rates of 300 and 600 pounds per acre are compared with single applications of superphosphate and muriate of potash. Present results are not conclusive and the experiment is continuing.

Variety tests have been conducted on all three stations during the years 1944 to 1946 inclusive. Present information is that the variety Liral Prince, which was imported from Ireland in 1944, gives the highest yield of fibre per acre with Stormont Cirrus and Liral Dominion following closely in the order named. The variety J.W.S. which was originally grown in these districts has been discarded in favour of these more productive introductions.

Sugar Beets

The construction of the refinery at Saint-Hilaire and the increased importance of sugar beets as a cash crop emphasized the necessity for experimental work on improved methods of production. Sugar beets are grown in the hoed crop year of the rotation and are manured and fertilized in much the same manner as other hoed crops such as turnips. An experiment on methods of seeding was established in 1946 on the stations at Maskinongé, Saint-Jacques, and Saint-Simon where ordinary or whole seed, segmented seed, and transplanted seedlings were compared. The yields per acre recorded for the three tests in 1946 were ordinary seed 9·55 tons, segmented seed 8·88 tons, and transplanted seedlings 17·39 tons. Other advantages of transplanting are that this method permits additional cultivation to control weeds prior to setting out the plants and dispenses with the costly and laborious thinning operation.

Tobacco

Experimental work on this crop was instituted in 1945 on the Illustration Station at Saint-Jacques. A special four-year rotation is under way where cigar tobacco is grown two years in succession on the same area followed by a cereal crop which is seeded down with 2 pounds of timothy, 10 pounds of red clover, 2 pounds of alsike clover, and 2 pounds of alfalfa per acre. The first crop of clover is cut for hay and manure is applied to the aftermath and ploughed under in preparation for tobacco the following year. Average yield of cured tobacco leaf through the two years 1945 and 1946 has been 1,545 pounds per acre. Experiments to determine the effect of manure and chemical fertilizers where a 5-8-7 formula is being tested at rates of 750 and 1,000 pounds alone and with manure at 5 and 10 tons per acre have been underway since 1945. Soil analyses are made each year to determine the amounts of nitrogen, phosphorus, potash, and calcium which are taken up by the tobacco crop at different levels of fertility.

Cereals

Small plot or rod-row tests of cereal varieties are conducted on the stations as an extension of the work carried on the Experimental Station. These tests are designed to provide information on the adaptability of new varieties in comparison to those already being grown. Nine varieties of oats were seeded in 1945 and 1946 and present indications are that Beacon, Beaver, Roxton and Ajax show great promise. At present Cartier is grown on field scale as the early variety, Vanguard and Beaver as medium early crops, and Roxton as the late variety. As further information is derived from small plot tests the most productive varieties are seeded on the station fields and thus provide a source from which farmers in the districts served may procure seed of new and adapted varieties. During the period 1937 to 1946 operators of Illustration Stations in this district distributed by sale a total of 12,600 bushels of registered and number one seed of improved varieties to neighbouring farmers.

TABLE 89.—FERTILIZER TRIALS ON PERMANENT PASTURE 1944-1946 INCL.

YIELDS AND PER CENT CLOVERS, GRASSES AND WEEDS IN FERTILIZED PASTURE TRIALS

Station	Plot 1 100 lb. Amm. Sulph. annually (600 lb. Super. 20% (120 lb. Mur. of Pot. every three years				Plot 2 600 lb. Super. 20% 120 lb. Mur. of Pot. every three years				Plot 3 600 lb. Super. 20% every three years				Plot 4 100 lb. Amm. Sulph. 200 lb. Super. 20% 40 lb. Mur. of Pot. annually				Plot 5 100 lb. Amm. Sulph. 600 lb. Super. 20% 120 lb. Mur. of Pot. annually				Plot 6 Check			
	Yield per acre	Clovers	Grasses	Weeds	Yield per acre	Clovers	Grasses	Weeds	Yield per acre	Clovers	Grasses	Weeds	Yield per acre	Clovers	Grasses	Weeds	Yield per acre	Clovers	Grasses	Weeds	Yield per acre	Clovers	Grasses	Weeds
	ton	%	%	%	ton	%	%	%	ton	%	%	%	ton	%	%	%	ton	%	%	%	ton	%	%	%
Batiscan	10·17	10·3	75·0	14·7	11·05	13·9	73·0	12·5	11·72	15·6	71·4	13·0	9·33	11·9	73·4	14·7	11·22	13·6	74·2	12·2	6·59	8·7	74·5	16·8
L'Acadie	5·96	10·3	73·5	16·2	5·24	12·2	63·4	24·4	4·55	13·0	67·8	19·2	4·62	15·7	58·2	26·1	6·94	15·2	64·3	20·5	4·66	6·4	62·7	30·9
Lachevrotière	8·98	18·0	66·4	15·6	8·21	20·0	63·9	16·1	6·57	9·2	76·4	14·4	9·72	10·9	70·0	19·1	9·15	8·7	70·8	20·5	5·05	8·9	70·6	20·5
Maskinongé	10·55	21·4	60·1	18·5	9·78	17·2	66·0	16·8	10·81	25·4	54·8	20·3	11·03	18·8	66·7	14·5	11·04	22·2	61·7	16·1	9·18	11·0	64·8	24·2
Mont-Rolland	7·09	16·9	72·1	11·0	4·62	26·5	63·2	10·3	5·40	22·8	65·8	12·4	5·99	12·4	75·9	11·7	8·42	28·1	61·1	10·8	5·48	19·1	62·3	18·6
Saint-Célestin	13·46	16·1	63·0	20·9	9·41	13·3	66·1	20·6	9·94	12·1	68·8	19·1	10·92	13·9	67·6	18·5	10·75	18·0	63·4	18·6	10·04	16·9	50·7	32·4
Saint-Simon	10·62	16·4	58·6	25·0	8·51	20·8	58·6	20·6	9·31	28·9	48·9	22·2	12·00	30·9	48·4	20·7	10·24	28·5	49·3	22·2	6·51	25·8	47·7	26·5

Silage Corn

Corn for silage and as a soiling crop is of great importance on the dairy farms of this district. During the years 1945 and 1946 a total of 13 tests were conducted in which Algonquin Hybrid, Canada Hybrid 606 and the standard varieties Longfellow and Silver King were compared. A summary of these tests shows that Algonquin Hybrid yielded 14·43 tons per acre, Canada Hybrid 606, 14·06 tons; Longfellow 12·23 tons; and Silver King 12·68 tons. In addition to recording higher yields, the hybrids are usually stronger in the stalk and hence do not lodge so readily as do the standard varieties.

Turnips and Mangels

Turnips succeed quite well on farms in this district. Average yields per acre for varying periods of years of 17·48 tons at Lachevrotière, 29·11 tons at Saint-Jacques, 19·82 tons at Saint-Simon, 15·33 tons at Saint-Etiénne, 23·01 tons at Batiscan, and 16·18 tons at Saint-Célestin are evidence of the wide adaptability and productivity of this crop. Three varieties have been grown on the station farms. Ditmars, Laurentian and Hall's Westbury are found satisfactory but Laurentian is preferred in areas where there is a market for table turnips. In regard to mangels the varieties Yellow Intermediate and Giant White Sugar have proved quite successful.

Turnips and mangels are grown in the hoed crop year of the rotation and the soil is manured and fertilized previous to seeding. The incidence of brown-heart in turnips has caused severe losses to farmers producing turnips for market as well as for livestock feed. Tests were conducted at Batiscan, Lachevrotière, Mont-Rolland, Saint-Célestin, Saint-Etiènne, Saint-Simon, and L'Acadie during the period 1936-1944 to determine a satisfactory method of control. Powdered borax at 20 pounds per acre was applied to the soil in addition to the regular manurial and fertilizer treatment just prior to seeding the crop and an adjacent area was left without this additional treatment to provide a check plot for comparison. At Batiscan over a period of five years turnips on the plot treated with borax were 88 per cent free from disease in comparison with 67 per cent on the check area. This result is comparable with those recorded at Lachevrotière, Saint-Célestin and Saint-Simon which are also on heavier soils. On the light sand at Saint-Etiènne turnips on the treated area were 93 per cent free from disease in comparison with the check plot where through five years only 23 per cent of the roots were fit for human consumption or for livestock. A summary of the records shows that on the light soils dealt with the prevalence of brown-heart is quite severe and even on heavier soils high in organic matter the application of powdered borax gives greater assurance of a disease-free crop.

Farm Business Studies

Crop rotations, soil management, and the inclusion of subsidiary enterprises have an important bearing on the financial effectiveness of the farm business. In 1937 preliminary studies were undertaken to determine sources of revenue on the farms operating as Illustration Stations in this part of Quebec. This work has been further expanded since 1937 and since 1940 a complete farm business study has been made covering annual operations of all stations in this supervisory district. Such basic information is of great value for the purpose of determining the relative productivity of the various farm enterprises in terms of money income. Farm revenues and expenditures are reported weekly by each operator and at the end of each year an inventory record is taken on each farm listing kind, acreage, and production of crops grown; capital investment in land and buildings, livestock, machinery and equipment; feeds and supplies; accounts receivable, and liabilities such as mortgage indebtedness, and a summary of sources of revenue derived from farm operations.

Land Utilization

A summary of 1946 inventory records shows that the ten operators in this district of supervision own and operate 1,397·8 acres of land of which 1,222·9 acres or 87·5 per cent is under cultivation and 174·9 acres or 12·5 per cent is classed as waste pasture, woods, roads and the area required for the farmstead. In 1946 these operators grew 23·5 acres of silage corn, 6·0 acres of potatoes, 9·9 acres of roots, 349·3 acres of oats and barley, 571·2 acres of hay, 17·3 acres of flax, 34·0 acres of canning crops such as beans, peas and corn, had 197·8 acres of improved permanent pasture, and grew 13·9 acres of special crops such as sugar beets and tobacco. The land use picture is typically that of a dairy farming district where the greatest emphasis is placed on grain and hay production which occupied 75·3 per cent of the tillable area. Special crops such as flax, sugar beets, tobacco and canning crops, were grown at Batiscan, L'Acadie, Maskinongé, Saint-Constant, Saint-Etiènne, Saint-Jacques and Saint-Simon. On the average each farm had 19·78 acres of permanent pasture which represented 16·2 per cent of the tillable land. In all cases the land use planes designed to attain maximum productivity on both tillable and untillable land.

Farm Capital

The 1946 inventory records for these farms show that, on the average 75·1 per cent of the capital invested is in land and buildings, 13·0 per cent in livestock and 11·9 per cent in machinery and equipment. This high building investment is a common occurrence on dairy farms where this class of livestock requires more comfortable housing to maintain production. The average investment per acre of crop land is $188.81. While these farms are all situated in livestock areas there is considerable variability in the proportion of the investment in livestock and machinery. During the last few years the shortage and cost of labour has had some influence in this connection. Effective use of capital is an important objective of station work and in livestock areas, the closer the relationship between land investment and livestock investment becomes, the greater has been the opportunity to maintain a high level of monetary income. A summary of capital investment in land and buildings, livestock and equipment, total capital invested, investment per acre crop land and gross revenue per acre crop land on Illustration Station Farms in the district is presented in table 90.

TABLE 90.—CAPITAL INVESTMENT AND GROSS REVENUE PER ACRE CROP LAND ILLUSTRATION STATION FARMS: WESTERN QUEBEC
1946

Stations	Land and Buildings		Livestock		Machinery and Equipment		Total Capital	Investment per acre Crop Land	Gross receipts per acre Crop Land
	Amount	Per cent of Total	Amount	Per cent of Total	Amount	Per cent of Total			
	$ cts.	%	$ cts.	%	$ cts.	%	$ cts.	$ cts.	$ cts.
Batiscan	11,592 55	75·0	2,600 00	16·8	1,271 25	8·2	15,463 80	174 14	43 35
L'Acadie	28,457 69	80·2	1,880 00	5·3	5,152 52	14·5	35,490 21	203 15	28 19
Lachevrotière	11,233 38	76·5	1,920 00	13·1	1,526 43	10·4	14,679 81	140 88	22 77
Maskinongé	12,607 68	70·5	1,855 00	10·4	3,409 73	19·1	17,872 41	185 21	47 83
Mont Rolland	10,662 32	70·1	2,572 00	16·9	1,977 89	13·0	15,212 21	129 69	49 34
Saint-Célestin	9,096 22	71·9	2,054 50	16·2	1,511 12	11·9	12,661 84	260 00	74 89
Saint-Constant	34,229 52	78·0	4,537 50	10·3	5,129 29	11·7	43,896 31	133 59	14 21
Saint-Etienne	8,886 02	72·2	2,307 50	18·7	1,119 31	9·1	12,312 83	214 88	58 93
Saint-Jacques	11,645 00	75·6	2,548 75	16·6	1,194 58	7·8	15,388 33	268 56	63 41
Saint-Simon	21,734 11	81·7	1,440 00	5·4	3,428 71	12·9	26,602 82	177 95	35 16
Total	160,144 49	–	23,715 25	–	25,720 83	–	209,580 57	–	–
Average	16,014 45	75·1	2,371 53	13·0	2,572 08	11·9	20,958 06	188 81	43 81

The Illustration Station at Batiscan is an average-sized productive dairy farm with hogs as a side-line and a minimum of capital invested in machinery. Gross receipts per acre of crop land at Batiscan totalled $43.35 in 1946. The operator at L'Acadie owns two farms, each with a complete set of buildings. Field crops such as seed grain, hay, fibre flax and canning crops constitute the main sources of revenue. Livestock investment is considerably lower than machinery and the gross revenue per acre of crop land amounts to $28.19. The station at Lachevrotière is medium in productivity and entirely a dairy farm with no sidelines. Gross revenue on this farm in 1946 was $22.77 per acre of crop land. At Maskinongé a considerable amount of capital is invested in equipment, the bulk of which is flax machinery. This is a productive dairy farm with hogs as a side-line and fibre flax and sugar beets as cash crops giving a gross revenue per acre of crop land of $47.83. The farm at Mont Rolland is rather hilly and only medium in productivity. Dairy cattle as the main enterprise, with hogs and poultry as side-lines, recorded gross receipts of $49.34 per acre of crop land. The station at Saint-Célestin is a small productive dairy farm with hogs and poultry as other livestock. In all enterprises of this kind the greater portion of the total investment is in buildings. The gross receipts per acre crop land are $74.89. At Saint-Constant the operator owns three separate farms. On two of these there is a complete set of buildings and a barn on the third one. This set-up is common in the district when a farmer has sons to establish. Most of the revenue is derived from dairy cattle with poultry, fibre flax and canning crops contributing the balance of the gross income which is $14.21 per acre crop land. Saint-Etienne is a poor soil station with a limited area under cultivation. Dairy cattle, hogs, poultry and canning crops all contribute in bringing in a gross revenue of $58.93 per acre crop land with dairy cattle contributing the greater part. The station at Saint-Jacques is a rather small but very productive farm specializing in cigar tobacco production with sugar beets as another cash crop. Field crops produce the greatest proportion of the $63.41 revenue per acre crop land followed by dairy cattle, hogs and poultry in that order. At Saint-Simon the operator owns two farms with two complete sets of buildings. This is mainly a seed grain and alfalfa hay producing station. The shortage of labour has forced the operator to reduce his livestock which in 1946 constituted only 5·4 per cent of the total investment. Field crops contribute the greater part towards the $35.16 gross revenue per acre crop land.

Sources of Revenue

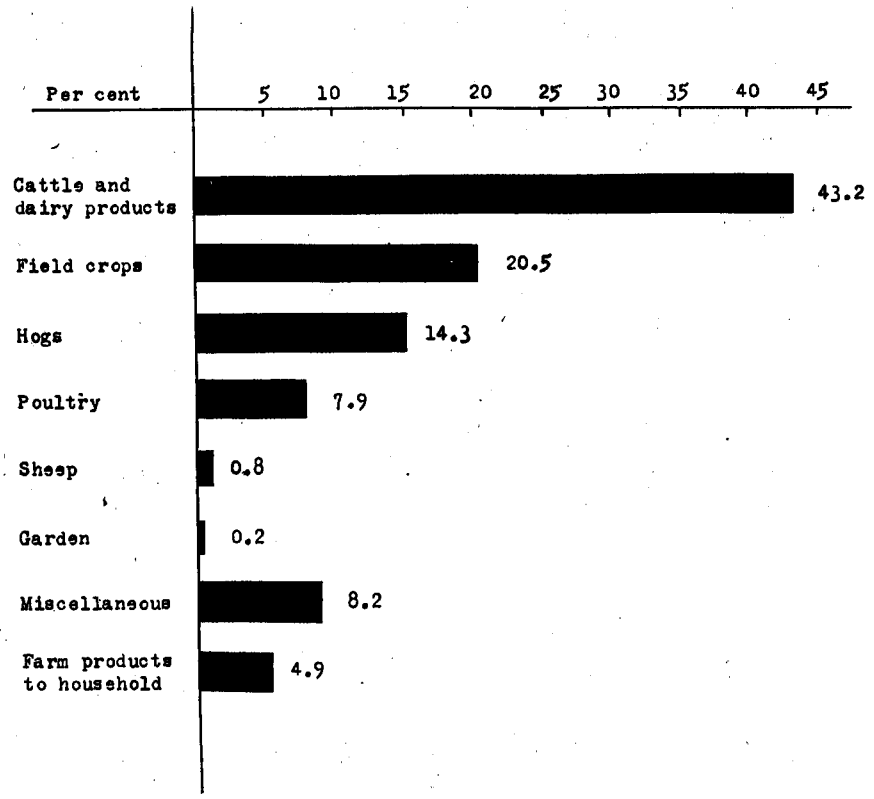
A summary of the fiscal year ending December 31, 1946, showed that 43·2 per cent of the total farm revenue was derived from sales of cattle and dairy products. Field crops, hogs and poultry contributed 20·5, 14·3 and 7·9 per cent respectively. In this study farm produce consumed in the household is considered as a source of revenue and during 1946 contributed 4·9 per cent to the total farm income. A summary of revenue records for 1946 is presented in chart 1. (See page 78)

Studies on labour income and labour earnings are also made to maintain an accurate check on the production potential of these farms in terms of their capacities to provide adequate returns to the farmer and permit the evaluation of the particular districts served by these station farms.

Field Days

During the ten-year period 1937 to 1946 eighty-one field days were held on the Illustration Stations with a total recorded attendance of 10,941 farmers. These meetings are organized for the purpose of displaying the experiments and tests which are in progress to farmers in each district served and provide a means of releasing information on improved methods of cultivation, processing and marketing of farm products.

CHART I: SOURCES OF REVENUE ON ILLUSTRATION STATIONS
WESTERN QUEBEC
1946



LIST OF ACTIVE PROJECTS
1937-1946

TOBACCO:

T–1	Construction and management of tobacco seed-beds
T–7	Relation of climate to the production of tobacco
T–11	Studies on the stand and number of replantings
T–14	Varietal test of flue-cured tobacco
T–16	Ploughing vs. disking land for flue-cured tobacco with and without manure
T–21	Methods of applying fertilizers for tobacco
T–22	Methods of harvesting tobacco
T–25	Studies on the insect pests of tobacco
T–26	Production, harvesting and storage of tobacco seed
T–27	Curing studies on tobacco
T–30	The use of barnyard manure in tobacco fertilization
T–32	Burning quality of cigar tobacco
T–35	Cover crops in tobacco culture
T–40	Tobacco fermentation, ageing and processing
T–42	Field survey of diseases and insect pests of tobacco
T–47	General varietal test
T–48	Varietal test of cigar tobacco
T–55	Tobacco extension work
T–57	Tobacco soil investigations
T–73	Crop rotations for tobacco
T–77	The mosaic disease of tobacco
T–78	The black root-rot disease of tobacco
T–80	Cost of production studies on tobacco
T–87	Sources of nitrogen in tobacco fertilization
T–88	Sources of potash in tobacco fertilization
T–91	Quantitative studies on the nitrogen requirements of tobacco
T–92	Quantitative studies on the potash requirements of tobacco
T–93	Quantitative studies on the phosphoric acid requirements of tobacco
T–94	The rare elements in tobacco fertilization
T–96	Quebec pipe variety test

ANIMAL HUSBANDRY:

A–93	Tuberculosis in cattle—Control of
A–660	Serum test for contagious abortion
A–58	Record of Performance (Dairy cattle)
A–502	Breeding Holstein cattle
A–813	Feed cost of milk and butterfat production

CEREALS:

CE–1	Common spring wheat—Test of varieties and strains
CE–5	Oats—Test of varieties and strains
CE–6	Barley—Test of varieties and strains

FIBRE:

E–3–2–2	Commercial fibre variety test
E–18–2	Source of seed experiment

FIELD HUSBANDRY:

F–86	Cost of producing grain crops
F–87	Cost of producing hay
F–88	Cost of producing root and silage crops
F–90	Cost of operating tractors
F–305	Meteorological records
F–333	Wild mustard eradication
F–477	Losses in ensiling various crops

FORAGE CROP:

Ag. 1	Varietal test of corn for silage purposes
Ag. 2	Varietal test of corn for grain production
Ag. 66	Sugar beets, varietal test and cultural methods
Ag. 181	Soybeans, varietal test for forage and seed

HORTICULTURE:

H–21	Strawberry varietal tests
H–388	Tomato fertilizer experiment
H–793	Bush fruits, varietal tests
H–806	Tomatoes, varietal tests
H–807B	Canning peas, rates of seeding
H–809A	Leguminous vegetables, wax beans
H–811	Onions, transplanted versus seeded
H–818	Vegetable seed production
H–929	Canning peas, fertilizers and cultural experiments
H–930	Bush lima beans
H–931	Weed control in asparagus plantations
H–932	Vegetables, soil investigations and fertilizer practices
H–935	Starter solutions on solanaceous crops

ILLUSTRATION STATIONS:

IS–El. 31: Three-Year Rotation (Hoed Crop, Cereal, Clover)
IS–El. 41: Four-Year Rotation (Cereal, Cereal, Clover, Timothy)
IS–El. 42: Four-Year Rotation (Hoed Crop, Cereals, Clover, Timothy)
IS–El. 45: Four-Year Rotation (Tobacco, Tobacco, Cereal, Clover Hay)
IS–El. 51: Five-Year Rotation (Hoed Crop, Cereal, Clover, Timothy, Timothy)
IS–El. 55: Five-Year Rotation (Hoed Crop, Flax, Cereal, Clover, Timothy)
IS–El. 65: Six-Year Rotation (Hoed Crop, Cereal, Clover, Cereal, Clover, Timothy)
IS–02.01: Plant Food Deficiency Study
IS–02.03: A, B and C: Chemical Fertilizer as a Supplement to Farm Manure
IS–02.14: The Effect of Farmyard Manure and Chemical Fertilizers in Tobacco Production
IS–03·01: Control of Weeds by Cultural Methods
IS–03.02: Control of Weeds by Chemicals
IS–06.05: Testing Cereal Varieties
IS–08.02: Chemical Fertilizers for Pastures—Study of Formulas
IS–09.02: Field Corn Varietal Test
IS–09.06: Methods of Controlling Brown Heart in Turnips
IS–09.12: Turnip Varietal Test
IS–11.02: Development of the Farm Garden
IS–11.03: The Establishment of a Farm Orchard
IS–11.17: Farm Home Beautification
IS–12.02: Flax Varietal Test
IS–12.03: Study of Flax Production
IS–12.09: Sugar Beet Production
IS–13.01: Dairy Cattle Production
IS–13·07: Swine Production
IS–13.08: Sheep Production
IS–14.01: Poultry Production
IS–17.03: Study of Farm Productivity and Progress
IS–17.04: Study of Farm Business

OTTAWA
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CONTROLLER OF STATIONERY
1949