DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT

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FOR THE YEAR 1923

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DOMINION EXPERIMENTAL STATION, CAP ROUGE, QUE.

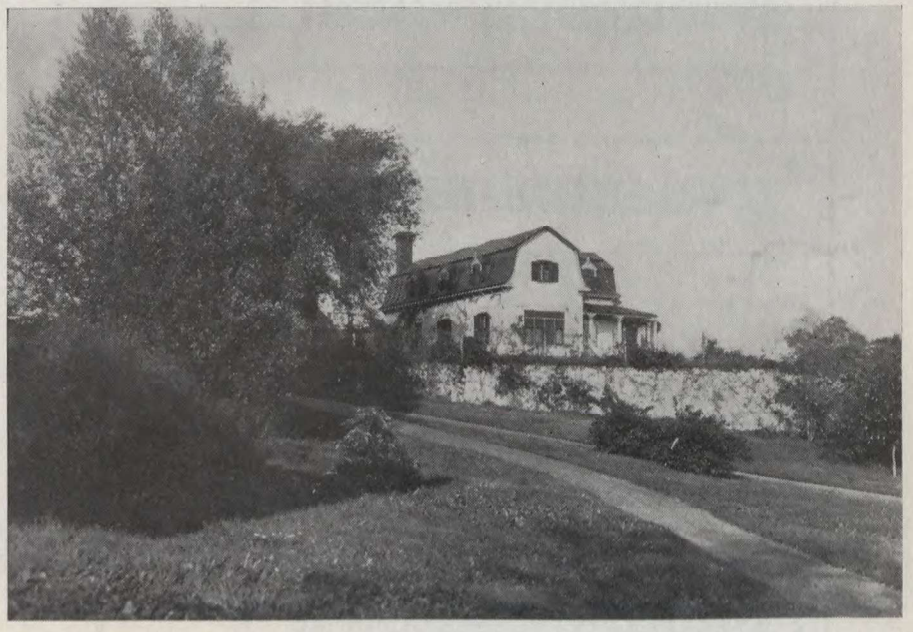
REPORT OF THE SUPERINTENDENT, GUS. LANGELIER

THE SEASON

The five months, May to September inclusive, during which plants grow in central Quebec, were colder, drier and duller than the average of the last eleven years for the corresponding period. The figures were respectively 58·56° F. and 58·99° F. for mean temperature, 16·44 and 20·27 inches for precipitation, 971·1 and 1014·5 hours for sunshine. The frost-free season extended 145 days, from May 15 to October 8, which is seven more than usual. The following figures give details:—

METEOROLOGICAL RECORDS, 1923

Month	Temperature °F.			Precipitation—Inches			Total sunshine Hours
	Highest	Lowest	Mean	Rainfall	Snowfall	Total	
January	37·0	−21·0	8·53	0·80	29·00	3·70	81·6
February	33·0	−29·0	5·87	.....	19·00	1·90	134·6
March	51·0	−13·0	15·16	0·47	32·00	3·67	130·4
April	60·0	− 1·0	31·73	3·45	14·00	4·85	182·6
May	76·0	28·0	49·68	5·46	.....	5·46	219·9
June	88·0	36·0	61·32	1·60	.....	1·60	192·9
July	87·0	42·0	64·08	1·16	.....	1·16	199·9
August	85·0	41·0	62·03	6·16	.....	6·16	207·6
September	76·0	35·0	55·68	2·06	.....	2·06	150·8
October	70·0	23·0	46·58	5·86	.....	5·86	143·4
November	51·0	10·0	33·00	3·67	7·00	4·37	62·2
December	49·0	− 5·0	26·42	2·71	28·80	5·59	52·9
Total	.....	.....	.....	33·40	129·80	46·38	1,758·8



Residence of the Superintendent, Dominion Experimental Station, Cap Rouge, Quebec.

ANIMAL HUSBANDRY

DAIRY CATTLE

At the end of 1923, there were in the Cap Rouge herd seventy-seven head, all registered French Canadians, an increase of ten over the preceding year and of eighteen over two years ago. Every cow and all heifers having completed two lactation periods have qualified for Record of Performance. For the first time, an exhibit was made at the Quebec Provincial Exposition, where seven of the very best herds competed, and both the aged and the young herd of the Station won first prize. Other prizes captured were the get of sire, all first prizes on young stock of both sexes under six and under twelve months. The special prize for best exhibit also came to Cap Rouge. During the past twelve years the aim has been to improve the milk yield, but now that practically all the heifers qualify for Record of Performance at the first asking, with an average of over 25 per cent of milk to spare, selection can be made for outside characters, for beauty of form. If it is found out that this cannot be done without lowering production, milk will have to come first and beauty of form last. But it is hoped that, to a certain extent at least, the two can work together.

The accompanying table gives details on the cows and heifers which finished a lactation period during the year ending December 31, 1923.

HERD RECORD

ANIMALS FINISHING A LACTATION PERIOD DURING THE YEAR ENDING DECEMBER 31, 1923

Name of Cow	Registration No.	Age at beginning of lactation period	Date of dropping calf	Number of days in lactation period	Total pounds of milk for lactation period	Daily average yield of milk	Average per cent fat in milk	Pounds of butter produced during lactation period
					Lbs.	Lbs.	%	Lbs.
Aromas	2870	9	March 20, 1922	316	4,825·00	15·27	4·5	257·40
Bruna Reine	3228	8	April 17, 1922	375	10,068·00	26·85	4·1	489·40
Canoberte	5289	3	Aug. 31, 1922	360	5,793·50	16·09	4·7	323·74
Colombelle	1775	12	March 22, 1922	420	12,192·00	29·03	4·5	642·49
Eglantine de Cap Rouge	4159	5	March 25, 1922	321	5,866·00	18·27	5·2	357·46
Fortune "	4161	5	March 20, 1922	316	5,407·50	17·11	4·4	278·69
Ginette "	4801	3	March 20, 1922	316	5,377·75	17·02	4·4	275·60
Gougou "	4724	4	Nov. 19, 1922	365	7,571·25	20·74	4·2	369·94
Hébé "	5298	2	March 23, 1922	399	9,077·50	22·75	4·7	497·28
Héloise "	5297	3	Aug. 4, 1922	382	4,375·25	11·45	5·0	259·27
Henedine "	5280	3	Oct. 11, 1922	423	7,122·50	16·84	4·2	352·09
Hermine "	5294	2	Dec. 30, 1921	381	8,708·75	22·86	4·6	467·72
Herodiade "	5299	2	Jan. 13, 1922	380	7,536·00	19·83	4·6	411·93
Honorine "	5278	2	Oct. 31 1921	573	6,609·50	11·53	4·9	378·53
Hyacinthe "	5295	3	Feb. 7, 1923	318	4,216·75	13·26	4·7	231·11
Ida "	5596	2	Aug. 16, 1922	388	6,825·50	17·59	4·8	382·06
Idylle "	5588	2	Aug. 21, 1922	373	6,096·50	16·34	4·8	347·78
Iliade "	5593	2	Aug. 24, 1922	370	6,207·25	16·78	4·9	354·35
Indienne "	5584	2	Aug. 28, 1922	365	6,338·25	17·37	4·8	358·88
Iola "	5594	2	Sept. 24, 1922	429	6,613·00	15·42	4·7	366·13
Iolande "	5587	2	Aug. 9, 1922	470	8,271·00	17·60	4·5	436·96
Irénée "	5585	2	Aug. 25, 1922	368	6,190·50	16·82	5·0	362·48
Iroquoise "	5633	2	July 5, 1922	439	7,271·50	16·56	4·6	390·46
Isabelle "	5591	2	July 16, 1922	387	6,453·50	16·68	5·0	380·92
Pauline 3	2482	11	June 24, 1922	373	7,739·00	20·75	4·4	399·73
Sylvestre D	2859	9	June 17, 1922	284	4,949·75	17·43	4·6	265·80
Average for 26 head		4		380	6,834·73	17·99	4·6	370·70

In the performance table there are twenty-six head, twenty of which were bred at Cap Rouge where, in many cases, the dam, and in some cases, the grand dam were also bred.

Taking into consideration the fact that thirteen out of the twenty-six head were two-year-old heifers, the average of 6,834 pounds of milk and 370 pounds of fat is very good.

The herd has now grown to a point where a limited number of females can be sold each year, together with some twenty high-class bulls.

IMPROVEMENT OF A DAIRY HERD WITH SIRES OF KNOWN PRODUCTIVE ANCESTRY

It now seems fairly certain that, generally, a bull from an ancestry of low producers will sire average to low producing cows, while one from an ancestry of high producers will sire average to high-producing cows. Though the opinion is not shared by some of the best live stock men of the country, the writer believes that the sire has more influence than the dam on the milking propensity of the heifers and the following examples, from the Cap Rouge herd of French Canadians, seem to bear this out.

Orange Blossom—886—qualified for Record of Performance under No. 13, as a three-year-old, with 6,192 pounds milk, testing 4·98, or 309 pounds fat. To the service of Denis Lord—1539—she gave Henriette de Cap Rouge—3578, and when bred to Elégant de Cap Rouge—4157, she dropped Irénée de Cap Rouge—5585. As a two-year-old, Henriette gave, in 373 days, 4,162 pounds of milk equal to 193 pounds of fat and was not in calf during this period, whilst at the same age, Irénée qualified for Record of Performance with 6,162 pounds of milk equal to 311 pounds of fat and, of course, calved inside of the fifteen months. Nothing was known about the dam of Denis Lord, while Elégant is a R.O.P. bull and his dam, Fanchette F, qualified three times, in the Cap Rouge herd, under Nos. 57, 99, 104, with 8,733, 10,657, and 10,465 pounds of milk, and 374, 480, and 453 pounds of fat. Here is a case where a R.O.P. cow failed to produce good offspring when bred to a poor bull and gave something of worth when bred to a R.O.P. bull out of a R.O.P. cow.

Princesse du Sable—2261—qualified for Record of Performance under No. 37, as a three-year-old, with 7,000 pounds milk testing 4·13, or 289 pounds fat. To the service of Denis Lord—1539—she gave Corneille de Cap Rouge—3159, and when bred to Delphis de Cap Rouge—3283—she dropped Fortune de Cap Rouge—4161. Corneille dropped her first calf as a three-year-old and gave, in 330 days, 3,039 pounds of milk equal to 159 pounds of fat, while as a 2-year-old, Fortune qualified for Record of Performance with 6,373 pounds of milk equal to 293 pounds of fat. In the first case, nothing was known about the dam of Denis Lord, whilst Delphis is a R.O.P. bull and his dam, Nanette de St. Denis—2413, qualified four times in the Cap Rouge herd, under Nos. 28, 75, 93, 103, with 5,943 pounds milk and 259 pounds fat as a three-year-old, and 7,544, 9,215, 10,081 pounds milk containing 353, 409, and 470 pounds fat as a mature cow. Here is another case where a R.O.P. cow failed to produce anything good when bred to a bad bull and gave something fine when bred to a R.O.P. bull out of a R.O.P. cow.

Finette 2—218—qualified for Record of Performance under No. 41, as a mature cow, with 9,747 pounds milk testing 4·13, or 403 pounds fat. To the service of Prince de St. Denis—1829—she gave Annette de Cap Rouge—2517—and when bred to Delphis de Cap Rouge—3283—she dropped Brunette de Cap Rouge—4171—. As a two-year-old, Annette gave, in 389 days, 4,253 pounds of milk equal to 218 pounds of fat, while at the same age Brunette qualified for Record of Performance in 365 days, with 5,867 pounds of milk equal to 285 pounds of fat; as a three-year-old she qualified again with 8,016 pounds of

milk equal to 358 pounds fat; and as a four-year-old she qualified again with 8,388 pounds of milk equal to 392 pounds of fat. Nothing was known about the dam of Prince de St. Denis, while Victor is a R.O.P. bull and his dam also qualified for R.O.P. in the Cap Rouge herd. Here is still another case where a R.O.P. cow failed to produce good offspring when bred to a poor bull and gave a good daughter when bred to a R.O.P. bull out of a R.O.P. cow.

It will be noted that the three good heifers were sired by three different bulls, the ones in service at the Cap Rouge Station. These examples were chosen to show that it is not only one very preponent sire which is responsible for the good milkers, but each one of the three bulls used at Cap Rouge. Each of these, however, is out of a very good milker.

If there is anything to learn from this, it is that a dairy herd may be graded down with registered bulls of unknown (probably low) productive ancestry, while it will be graded up with registered bulls of known productive ancestry.

Part of the herd of French Canadian cattle at Cap Rouge. This herd is the largest of the breed in the world, and has the greatest number of Record of Performance cows and heifers.

METHODS OF BREEDING DAIRY CATTLE

The fear of close breeding has kept down the large majority of herds to the magnetic centre of average mediocrity in central Quebec.

In last year's report, it was shown how a world champion two-year-old French-Canadian heifer, Gougou de Cap Rouge—4728—was inbred, being sired by the son of her mother. We will now give a couple of instances to see what line breeding can do.

Finette 2—218—to the service of Delphis de Cap Rouge—3283—gave Brunette de Cap Rouge—4171—that qualified for Record of Performance as a two-year-old with 5,867 pounds milk testing 4·85, equal to 285 pounds fat. Brunette

was bred to Elégant de Cap Rouge—4157—a son of Delphis, and gave Isabelle de Cap Rouge—5591—that qualified for Record of Performance as a two-year-old with 6,233 pounds milk testing 5.17, equal to 322 pounds fat.

Columbelle—1775—to the service of Delphis de Cap Rouge—3283—gave Albertine de Cap Rouge—4162—that qualified for Record of Performance as a two-year-old with 4,789 pounds milk testing 4.76, equal to 228 pounds fat. Albertine was bred to Elégant de Cap Rouge—4157—a son of Delphis and gave Hérodiade de Cap Rouge—5299—which qualified for Record of Performance as a two-year-old with 7,369 pounds milk testing 4.39, equal to 354 pounds fat.

The three herd bulls in service at Cap Rouge now are Delphis de Cap Rouge, Elégant de Cap Rouge, his son, and Ottawa Champion 2, his grandson. If new blood is introduced, it will not be through buying a bull, but rather in breeding one by the above-mentioned sires out of an outside cow, after the latter has shown in the herd that she is a strong constitutioned animal, a hearty feeder, and a high producer.

Of course, it must be born in mind that close breeding accentuates defects as well as good qualities, so that one must be careful in choosing the animals from which to breed.

HOUSING DAIRY CATTLE

It is a question whether it pays to build elaborate barns to house anything except cows in milk, and it has been clearly shown at Cap Rouge, for a number of years, that bulls, cows not milking, and young stock, over six months of age at the beginning of November, may be wintered under single-boarded sheds, with doors, always open, facing to the south. But as cows in milk do require a good barn and as, under certain circumstances, it might prove advisable and cheaper to house the young stock, information regarding a good dairy cattle barn must be forthcoming to farmers and this is one of the reasons why an up-to-date building, possibly the best of its kind in the territory covered by the Cap Rouge Station, was erected. It also assists in conducting experimental work in the breeding, feeding, housing and management of dairy cattle.

This barn comprises: (*a*) the cattle barn proper, with storage room above for hay and straw; (*b*) a shed for wintering heifers; (*c*) the calf pens; (*d*) a feed room, with root cellar underneath, bins for concentrates on the second floor, and a silo on each side. Water, electric light and telephone service are furnished by the private systems of the Station. The capacity is from eighty to ninety head of cattle, old and young.

Among the many items of interest to dairymen are (1) the plank frame, without cross-beams, with the hay fork track at the peak of the roof; (2) the large window area permitting the entrance of plenty of sunlight, the cheapest germicide known; (3) the Rutherford system of ventilation; (4) the concrete floors, with gutters, mangers, and rounded alley in the middle; (5) the two stave silos, one of which may be used for summer feeding; (6) the root cellar with concrete chute in which loads are easily emptied; (7) the water tanks with floats permitting cattle to drink at will from bowls near them; (8) the electric light wires in metal tubing to minimize danger of fire; (9) the private telephone system connecting barn with office and all other buildings on the Station; (10) the milking machine; (11) the cow stanchions, with the device to line up animals near gutter, so as to keep them cleaner; (12) the calf stanchions to hold the youngsters in place after feeding, so as to prevent sucking; (13) the manure carriers running through the stables, especially over box stalls, to save time in cleaning; (14) the feed trucks for roots, ensilage, meal, with scales overhanging them, to be used for experimental work where individual records are kept; (15) the chutes to bring down into the feed trucks the concentrates from bins above; (16) the steel pipe box-stalls, for calving cows, with stanchions shut from the alley, to permit milking or attending to calf, when dam is cross; (17) the single-boarded shed, with doors facing to the south and always open, to winter heifers.

There are bulletins and catalogues describing all these special features, but a farmer who comes to Cap Rouge can actually see how each operates, and with the good common sense which characterizes most of the tillers of the soil, can choose what is adaptable to local conditions and needs.

HORSES

COMPARING METHODS OF BREEDING HORSES

For the ordinary farmer, the purpose of breeding is to improve the working stock, using a sound, virile stallion of the breed which will suit his conditions best. For the man who raises pure-breds, the aim is to mate the largest possible number of animals having most of the characteristics of the breed. How to do this is the point. There are three main ways: outcrossing families, line-breeding, and in-breeding. The man who continues outcrossing families, changing sires so that they will not be related to the young stock, is lucky indeed if he can ever build up a fine, uniform herd; the fact is that he generally finishes about where he started, with, perhaps, a bunch of pure-breds which may look uniform to the majority of people, but which are a motley lot to the good judge. Not so with the real breeder who uses either in-breeding to concentrate good blood, or line-breeding to purify the pedigree, to sift out the bad characteristics, and to exclude what is outside of the ideal which he has in mind. This man knows that when he has succeeded in producing what he is looking for, he has a better chance to hold it because it is backed with strong hereditary influence.

Concrete examples from the Cap Rouge stud can be given to show that in-breeding does not necessarily immediately bring loss of size.

The French-Canadian mare Hélène weighs less than 1,100 pounds, and when bred to her son, Albert de Cap Rouge, weight about 1,300 pounds, she produced Gem de Cap Rouge, of about 1,300 pounds at four years, that won the diploma, in strong competition, at Three Rivers in 1922 as the best French-Canadian mare of any age.

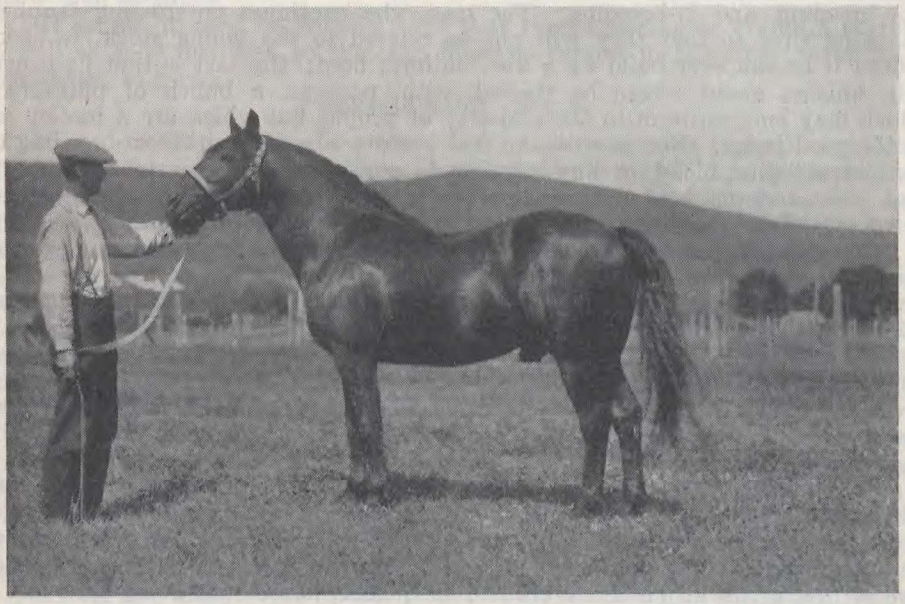
The French-Canadian mare Sébastienne weighs about 1,250 pounds, and when bred to her son, Daniel de Cap Rouge, weight about 1,300 pounds, she produced Honoré de Cap Rouge, over 1,300 pounds before he was four years, and that won as a weanling, a yearling, a two-year-old, and a three-year-old, twelve first prizes at Three Rivers and at Quebec, never once being defeated.

The French-Canadian mare Delphine de Cap Rouge is by Albert de Cap Rouge and was bred to her sire when she gave the colt Jeff de Cap Rouge that has been a consistent winner as a foal and as a yearling. Delphine is out of Black Princess, which has extraordinary action for a French-Canadian, and as she herself inherited this action when Albert was used as a sire, it was thought best to breed her back to him. The result was Jeff, that has by far the best action of any French-Canadian young stallion known to the writer. Jeff, inheriting as he does this action through his dam and grand-dam, will be used on other lines, with which he has no defect in common, to improve this character, action, and he will no doubt have more chance of working a betterment with his line breeding, than if he had been a chance animal having this fine action, but no breeding behind him.

WORK AT ST. JOACHIM

At the beginning of 1924, there were eighty-one pure-bred French-Canadian horses at the St. Joachim Station, which is under the same superintendent as Cap Rouge Station. This Horse-Breeding Farm is the largest east of Manitoba and was started by the united efforts of the Dominion Department of Agri-

culture, the Quebec Department of Agriculture and the French-Canadian Horse Breeders' Association. The aim is to improve the French-Canadian breed of horses, but at the same time to do experimental work in regard to the breeding, feeding, housing and management of this class of live stock. Out of thirty mares bought for this purpose, only fourteen have been found good enough to keep for breeding purposes; the others, though good individually, being rejected because they did not produce offspring as good as, or better than, themselves. The proportion of rejected mares seems large, but it would be fairly large in any breed if the culling was as rigorously done as was the case at St. Joachim. The aim is to produce a horse of about 1,200 pounds, in ordinary breeding or working condition, sound, strong, healthy, good looking, hardy, endurant, full of life but still docile, a fast walker, and with good action. This is a large contract, but as the breed possesses some of these qualities in a fairly large number of animals, and all of them in a few, it is possible of achievement. All



French Canadian stallion, "Albert de Cap Rouge" 1489. He has won more prizes and sired more prize winners than any other stallion of the breed.

the mares are sound, strong, healthy, hardy, endurant, fast walkers. What is lacking in most is size and good action. But two families have already been isolated; one, of animals weighing over 1,300 pounds, and the other, of very flashy action. These two strains will be line-bred so as to concentrate the blood which produces the characteristic looked for, and to be more certain that they will transmit the special quality which they possess. Then, stallions from each of the two families will be used to give either more weight or better action to the strains which lack it. The improvement will no doubt be gradual and perhaps not very noticeable at first, but it is hoped to make of the French-Canadian breed of horses a heavier counterpart of what was justly called, fifty years ago, the " Little Horse of Iron."

WORK VERSUS NO WORK FOR THE BROOD MARE

It is impossible to succeed in raising strong foals unless the mare gets exercise. This is required to maintain the balance between bodily waste and repair, to quicken the circulation of the blood, and to promote the development

of tissue. But a mare can take exercise without being worked, and experiments both at Cap Rouge and at St. Joachim have proved that though exercise is essential, the manner of exercising is not of importance. This was shown by a mare that raised strong, healthy foals six years running after receiving different kinds of exercise. Two winters, she was worked reasonably until foaling. Two others she was kept outside with only a single boarded shed for a shelter; and two others, she was in a box-stall, without work, but turned out often for exercise. At the St. Joachim horse farm, eight, seven, and nine in-foal mares were kept inside and worked moderately in 1920-21, 1921-22, and 1922-23, whilst eleven, sixteen and ten were kept outside under single-boarded open-front sheds. A mare kept inside one year is, as much as possible, kept outside the next. Practically no difference could be seen in the appearance and viability of the foals, the only one lost being from a young mare kept inside.

RAISING HORSES IN SINGLE-BOARDED, OPEN-FRONT SHEDS

Since 1913, 209 horses of both sexes and of all ages, from weanlings to sixteen-year-olds, have been wintered outside, having for shelter only single-boarded open-front sheds facing south. Not one of the lot suffered from this, and only mares foaling early or an occasional colt accidentally hurt had to be taken indoors. At Cap Rouge, the sheds were on the side of a wind-swept hill, and at St. Joachim, the east wind is exceedingly cold, coming directly from the widening St. Lawrence river. This means that there is absolutely no cause to fear that horses, if left or turned out early in September, will catch cold or suffer from exposure when thus wintered. The fact is that there were more colds among the stabled horses than among those outside. Another thing which was remarked is that the outside horses generally commenced to shed their hair earlier than those inside, just as if nature, which provides them with a heavy coat for winter, saw that they were not too heavily clad for spring.

The great objection to outside wintering has been that it takes more feed. Theoretically, it should be necessary to provide extra feed to heat up the body and also to make up for the exercise taken. But nobody is sure yet that the feed is not better digested and assimilated out of doors than in the general run of badly ventilated stables where animals are tied for weeks and months at a time. For young horses which must be pushed and whose development must be forced, it is risky to feed heavily indoors, as the body generally gets too heavy for the legs. At St. Joachim, early in 1924, out of eighty-one pure-bred French-Canadians, only one was not sound and was sold as a cull.

RAISING AUTUMN COLTS

The price of horses is low, compared to that of other live stock, so that cost of production must be cut down. Feed should not be stinted if growthy stuff is to be developed, and breeding stock must be good if the offspring is to command a reasonable price, so that one of the few means of paring expenses is to have mares foal in the fall at such a time that the foals may be weaned by spring, having the dams available for work on the farm. Of course many mares are hard to "settle" in the autumn and when they do foal at that time of the year they often miss and run until spring before they are again safely in foal. But autumn foals have been dropped, so that it is not an impossibility. The four which were raised at Cap Rouge and at St. Joachim started rather poorly, but from the spring after their birth, they forged right ahead; in fact, three of them have grown to a larger size and weight than their full brothers and sisters dropped in the spring. When the mares are heavy milkers care should be taken to give a roomy box-stall and to turn them out occasionally for a short while on fine days during the winter, or to cut down feed, as the youngsters are liable to get too fat and top heavy. Hoofs grow fast on moist bedding and should be attended to closely.

FIELD HUSBANDRY

FIELD CROP AREAS AND YIELDS

Since, and including 1912, every load of corn for silage, swede turnips, oats and hay has been weighed at the Cap Rouge Station, so as to get at the average yield per acre during a long number of years. Most of the land on which these crops were grown is a sandy loam of better than average fertility and in good tilth. The accompanying table gives details.

FIELD CROP AREAS AND YIELDS—TWELVE YEARS

Year	Longfellow Corn		Good Luck Swedes		Banner Oats		Timothy Hay		Clover Hay	
	Area	Yield per acre	Area	Yield per acre	Area	Yield per acre	Area	Yield per acre	Area	Yield per acre
	Acres	Lbs.	Acres	Lbs.	Acres	Lbs.	Acres	Lbs.	Acres	Lbs.
1912	4·88	25,189	3·00	29,640	34·36	1,246	51·00	2,529	7·00	4,000
1913	7·31	5,497	3·00	11,263	25·46	889	21·75	3,000	27·15	4,000
1914	9·92	14,524	7·67	39,290	10·89	2,659	37·13	4,145	4·00	4,951
1915	17·35	20,153	10·80	28,671	14·68	2,150	12·03	2,886	19·37	2,840
1916	17·84	17,264	5·00	36,545	15·00	2,420	14·20	2,923	15·00	3,085
1917	9·38	18,235	4·00	16,782	21·19	1,377	14·07	4,650	22·22	5,387
1918	8·60	9,452	4·00	15,189	10·23	1,695	17·65	5,440	29·01	4,609
1919	18·99	20,929	4·00	11,410	20·79	1,175	16·00	4,530	14·36	4,256
1920	14·13	14,391	4·00	27,833	21·48	1,504	17·00	4,233	20·00	4,191
1921	21·07	20,774	4·00	22,296	23·00	1,545	19·39	3,191	17·14	2,163
1922	21·56	17,913	1·76	20,352	29·00	2,008	4·00	6,620	22·37	4,455
1923	19·80	24,210	0·70	27,529	26·80	1,238	14·10	4,277	22·60	3,648
Total	170·83	.....	51·93	.....	252·88	.....	238·32	.....	220·22	.....
Average	14·24	18,266	4·33	25,896	21·07	1,557	19·86	3,688	18·35	3,975

Tonnage is not the most important thing, so that figures are herewith given showing also dry matter and digestible nutrients per acre. These were calculated from figures obtained in the 18th edition of "Feeds and Feeding" by Henry and Morrison:—

DRY MATTER AND DIGESTIBLE NUTRIENTS IN FIVE IMPORTANT CROPS

Twelve Years

Crop	Yield of raw material per acre	Dry matter per acre	Digestible nutrients per acre
	Lbs.	Lbs.	Lbs.
Corn for silage	18,266	4,000	2,685
Swede turnips	25,896	2,823	2,434
Oats (grain only)	1,557	1,414	1,096
Timothy hay	3,688	3,260	1,789
Cover hay	3,975	3,462	2,023

It is clear that the hoed crops, such as corn and roots, produce more dry matter and digestible nutrients per acre than hay, but the cost per ton must be looked into and the reader is referred to the next project.

COST OF PRODUCTION OF FIELD CROPS

The main aim for a farmer or dairyman is not to grow the crop which will produce the largest quantity of dry matter per acre, but rather to grow the one which will produce a ton of dry matter at the lowest cost. To get at this, manual and horse labour, cost of manure, seed, and twine, besides interest on the land and depreciation of machinery were recorded during eight years for 170·86 acres of ensilage corn, swede turnips, oats, timothy and clover hay, all ready to feed; the corn in the silo, the roots sliced, and the hay cured. The accompanying table gives results:—

YIELD PER ACRE AND COST PER TON, READY TO FEED, OF RAW MATERIAL AND OF DRY MATTER IN FOUR IMPORTANT CROPS

	Average number of pounds per acre		Average Cost per ton	
	Twelve years		Eight years	
	Raw Material	Dry Matter	Raw Material	Dry Matter
			$ cts.	$ cts.
Corn for silage (Longfellow)	18,266	4,000	5 64	25 75
Swede turnips (Good Luck)	25,898	2,823	3 85	35 32
Oats (Banner), straw neglected	1,557	1,414	25 53	26 26
Clover and timothy hay	3,831	3,361	6 28	7 33

Feeding experiments, according to the Dominion Field Husbandman, have shown that the dry matter in hay is worth about 11 per cent less than the dry matter in roots, corn silage or grain. Even then it is obvious that hay furnishes a ton of dry matter at a much lower cost than ensilage corn or roots. The question is whether the succulence is worth the difference for milk production. Here is what Henry and Morrison say in Feeds and Feeding: "Numerous scientific trials and common experience on farms have abundantly demonstrated the value of adding succulent feeds to the rations of farm animals."

However, in closely studying the results of experiments given in the last-mentioned book, one comes to the conclusion that there has not been very much done to find out the value of succulence in rations for farm animals.

The clearest cases are those of the Vermont and Wisconsin Stations which compared corn silage and field-cured corn fodder for milk production. Here are instances where the same plant was fed, with and without succulence. The average of these trials showed that 7·4 pounds more milk was produced from 100 pounds of dry matter in the corn silage rations than in the rations containing fodder corn. When it is remembered that it must have taken from 400 to 500 pounds of corn silage to furnish the 100 pounds of dry matter necessary to increase the yield of milk by 7·4 pounds, the difference does not seem very large and might have been due either to experimental error or to the individuality of the animals used for the test.

Moreover, Henry and Morrison add that, "the higher value of the silage is not due to any increased digestibility of the silage over well-cured dry fodder, for we have seen that ensiling tends to decrease the digestibility of forage rather than to increase it. The superiority of silage must be largely due to the fact that while good quality silage is eaten with little or no waste, a considerable part of the corn fodder is usually left uneaten. Various trials show that the dry matter of that part of the corn fodder which is actually consumed may have just as high a nutritive value as an equal weight of dry matter in corn silage . . . ."

Thus, corn silage gave slightly better results than corn fodder because more of it was eaten and less wasted by the cows. If the much higher costs of digest-

ible nutrients in succulent feeds have only such reasons or data to defend them, it is certain that more light should be thrown on this rather nebulous matter of succulence before farmers are advised to spend large sums for silos and machinery, or for labour when they grow roots. This may be contrary to general opinion, but the question is too important to decide without closely looking into it, especially from the point of view of dollars and cents. The profit, after expenses are paid, is what farmers are after, and not merely large and showy revenues obtained at high costs.

AUTUMN VERSUS SPRING PLOUGHING FOR ENSILAGE CORN

The usual recommendation is to plough in the spring for ensilage corn. Some of the reasons given for this are that the sod which is usually turned under for this crop, in rotting, warms the soil and furnishes easily available food to the rootlets of the young plant. But in districts where the season during which all farming operations must be done is short, it is quite an advantage, and sometimes a necessity, to do as much work as possible in the autumn. This is why the present project was started in 1917 and continued each year since. The accompanying table gives details:—

Comparison of Autumn and Spring Ploughing for Ensilage Corn

Autumn Ploughing

Year	Area	Yield per acre	Hours and value of labour per acre										Total cost
			Man		One horse		Two horses		Three horses		Tractor		
			Hours	At 25c.	Hours	At 10c.	Hours	At 20c.	Hours	At 30c.	Hours	At $1	
	Acres	Pounds											
1917	4·67	18,620	77·5	19·37	0·75	0·07	21·5	4·30	3·5	1·05	.....	.....	24·79
1918	3·80	10,176	72·0	18·00	0·75	0·07	18·0	3·60	3·0	0·90	.....	.....	22·57
1919	4·21	16,543	81·5	20·37	.....	.....	29·5	5·90	3·5	1·05	.....	.....	27·32
1920	4·20	12,579	83·5	20·87	.....	.....	32·5	6·50	2·5	0·75	15·0	15·00	43·12
1921	4·68	24,095	79·0	19·75	.....	.....	27·5	5·50	3·0	0·90	9·5	9·50	35·65
1922	3·25	14,489	53·3	13·32	0·62	0·06	22·8	4·56	2·1	0·63	4·1	4·10	22·67
1923	2·77	28,740	38·3	9·57	2·17	0·22	17·8	3·56	1·6	0·48	1·6	1·60	15·43
Average	3·94	17,678	69·3	17·32	0·61	0·06	24·2	4·85	2·7	0·82	4·3	4·31	27·36

Spring Ploughing

Year	Area	Yield per acre	Hours and value of labour per acre										Total cost
			Man		One horse		Two horses		Three horses		Tractor		
			Hours	At 25c.	Hours	At 10c.	Hours	At 20c.	Hours	At 30c.	Hours	At $1	
	Acres	Pounds											
1917	4·71	17,854	93·5	23·37	0·75	0·07	10·5	2·10	3·5	1·05	.....	.....	26·59
1918	4·80	8,879	91·0	22·75	0·75	0·07	8·5	1·70	3·0	0·90	.....	.....	25·42
1919	4·21	12,140	104·5	26·12	.....	.....	17·0	3·40	3·5	1·05	.....	.....	30·57
1920	3·90	18,026	107·0	26·75	.....	.....	23·5	4·70	2·5	0·75	15·0	15·00	47·20
1921	4·68	23,131	94·5	23·62	.....	.....	16·5	3·30	3·0	0·90	9·5	9·50	37·32
1922	3·25	16,437	38·2	9·55	0·62	0·06	14·4	2·88	1·2	0·36	2·8	2·80	15·65
1923	2·77	30,123	47·0	11·75	2·17	0·22	20·3	4·06	3·1	0·93	1·6	1·60	18·56
Average	4·05	17,398	82·2	20·56	0·61	0·06	15·8	3·16	2·8	0·85	4·1	4·13	28·76

Average cost per ton, Spring ploughing $3.31.

Average cost per ton, Autumn ploughing, $3.10

From the above it is seen that the yield and cost of producing corn has been practically the same whether the land, when a sandy loam, is ploughed in the autumn or in the spring.

COMPARISON OF CORN, SUNFLOWERS, PEAS AND OATS FOR SILAGE

During two seasons, 1922 and 1923, three plots of 0·7 acre each, on a very uniform-looking sandy loam of better than average fertility, were sown respectively to Longfellow corn, Giant Russian sunflowers, Arthur peas and Banner oats. This project will continue during five years to find out the relative yield per acre, and cost per ton, of raw material, dry matter and digestible nutrients in the three above-mentioned silage crops. The average yield of raw material per acre, for two years, was 24,521 pounds for corn, 24,550 for sunflowers, and 11,536 for peas and oats. The cost of seed, also of manual and horse labour, was accurately kept for each crop separately, and samples were sent to the Dominion Chemist for analysis. As the report of this analysis for 1923 is not yet received, no details are offered.

Before this experiment is finished, it would be well to regard sunflowers, also peas and oats, not as substitutes for corn where the latter comes well, but rather as to be used where corn cannot be grown profitably.

HORTICULTURE

TREE FRUITS

APPLE VARIETIES

An idea of the scale on which variety testing of apples has been done at Cap Rouge will be had when it is known that notes have been taken on 205 different varieties or seedlings since 1911. Though this is not a long time, it is already quite clear that many of the varieties and seedlings will not be suitable, for one or more reasons. It is worse than useless for a farmer to plant apple trees, in a district like central Quebec, unless these are hardy and will produce large, fine-looking fruit of very good quality. Any other kind will lose money, and even the best will not bring much profit until growers decide to spray well and carefully pack only high-class apples.

The old varieties which are doing well here are Yellow Transparent (summer), Duchess (early autumn), Wealthy (early winter), Fameuse and McIntosh (winter). Quite a number of seedlings, from the Central Experimental Farm, Ottawa, are now known to be superior to some of the old sorts and may well replace them. Thus, Rupert is earlier and of better quality than Yellow Transparent, whilst Melba and Lobo, other C.E.F. seedlings, with Wealthy, Fameuse and McIntosh make a good combination. About 50 per cent of the two latter should be planted, and only about 5 per cent of Rupert as there is little profit in early apples, unless a grower is close to a city and has special customers.

APPLE COVER CROP EXPERIMENT

Should an apple orchard have a cover crop or be left in sod? Should the cover crop be a leguminous one continuously or be rotated? If left in sod, can the hay be taken away; or is it better to use it as a mulch around the trees? It is to help answer some of these questions that the experiment was started in 1913 with a fairly large block of McIntosh and Wealthy. The first mentioned have not yet given much fruit, so that they will not be included in the following notes. Two lots of Wealthys were planted, one in 1913 and one in 1914, so that figures are offered for each in the following table:—

COVER CROP EXPERIMENT WITH WEALTHY APPLES

Cover Crop	Planted in 1913			Planted in 1914		
	Number of trees in experiment	Average circumference of trees autumn 1923	Average yield per tree up to autumn 1923	Number of trees in experiment	Average circumference of trees autumn 1923	Average yield per tree up to autumn 1923
		Inches	Gal.		Inches	Gal.
Red clover sown every year	12	10·96	23·60	11	10·07	13·34
Vetches, sown every year..	8	10·31	29·53	10	10·40	26·95
Rape, sown every year.....	16	11·09	31·08	10	10·07	13·80
Clover followed by rape in a two year rotation.....	14	10·89	31·01	10	10·22	14·97
Permanent sod, hay taken away.....	4	7·81	0·56	3	8·42	0
Permanent sod, hay used as a mulch around trees.....	3	9·83	7·67	4	7·31	1·56

Whatever the results may be in five or more seasons, it is clear that under conditions such as have existed at Cap Rouge, some kind of a cover crop is better than sod for an apple orchard during the first ten years. Rape or vetches seem to have given respectively the largest increase in size of tree and the biggest crop of fruit, but the difference over red clover, and over clover followed by rape, is not large.

The main deduction to be made is that some kind of a cover crop, in the early life of an apple orchard, is better than sod, and if the land must, for some reason or other, remain in sod, the hay should be cut and used as a mulch around the trees, instead of being taken away.

Two great disadvantages of sod are that the plants forming it are too often largely weeds which are left to ripen their seeds, to the usual detriment of the rest of the farm, and that the sod is a harbour for pests of all kinds.

CHERRY VARIETY EXPERIMENT

Sweet cherries will not thrive in central Quebec. Two trees of Empress Eugénie, planted in 1917, died after having had fruit buds, but never produced cherries. Since 1911, 168 sour cherry trees were planted, of which only 56 were living in 1923, but as the plantation was moved twice, during the first six years, it must be expected that many trees died from this moving rather than from other causes.

There are practically only half a dozen varieties which may be planted in central Quebec. Possibly the best all round one is Montmorency Large, for commercial purposes, but Griotte Morello and Griotte d'Ostheim follow it closely. If hardiness and yield are required, rather than size and quality of fruit, there is no doubt that Fouche Morello is the best. If, on the other hand, quality of fruit is the prime requisite, Vladimir is the thing, but the fruit is rather small and very dark, something like some of the choke cherries. Early Richmond has been a disappointment, as it does not seem to do well here.

Farmers of the district should go in very lightly for cherries, as the sweet ones from southern Ontario will naturally always be in much better demand than the sour ones which can be grown here.

PEAR—VARIETY EXPERIMENT

Out of the fifty pear trees planted between 1911 and 1922, only four were living in 1923. Most of these trees died during winter, and not one merchantable fruit was produced. It was thought that the dwarfs might do better, but

the eleven planted in 1920 all died. One tree of Flemish Beauty has lived from 1911, bloomed in 1917, but produced only one fruit, which did not mature. The only other tree to produce one pear, also unmarketable, was another Flemish Beauty, in 1916, but it died in 1921. In 1923, fourteen Clapp Favorites were planted, seven standard trees and seven dwarfs. It is evident that pear culture is not to be encouraged in central Quebec.

PLUM—VARIETY EXPERIMENT

It is difficult to recommend plums for central Quebec because, in general, European varieties will do best within a short distance—15 to 30 miles—of the humid atmosphere of the St. Lawrence river, but will not be hardy enough further inland. The Dominion Horticulturist, in Bulletin No. 43, recommends Aitkin, Bixby, Brackett, Cheney, Mankato, Omaha for inland parts of this district, whilst at Cap Rouge, near the river, Bonne Ste. Anne, Montmorency and Quackenboss have no doubt given the best satisfaction, from the standpoints of hardiness, yield, and quality. Here the Americana group has not been satisfactory, because the wood breaks too easily.

Determining the choice of a variety of fruit tree, by yield only, would indeed be misleading from more than one point of view, as appearance and quality must not be forgotten. A factor that seems to have been often forgotten in determining the production of different varieties is orchard environment. For tests of cereals and forage crops, it is well known that the methods used in the past can be much improved and it is probably the same for fruit tree tests. For instance, in 1911, two varieties of plums, Brackett and Yellow European, were planted and the respective yield per tree to the end of 1923 was 5·75 and 7·00 gallons, showing Yellow European to be the best yielder. But it happens that trees of the two same varieties were planted in 1912 and the respective yield per tree, to the end of 1923, was 13·79 gallons for Brackett and 2·10 for Yellow European, showing Brackett as the best yielder.

It is thus possible that in trying to determine the production of varieties of fruit trees, we will, in the future, look more carefully into orchard environment, besides the inherent qualities of the trees themselves. A plan will be made of each orchard with the name of each tree, the year planted, the production to date, and if low or high yields are found for blocks including two or three varieties, it may help to show that the soil, drainage and fertilization have had something to do, in fact have played the important part, in bringing the yield up or down.

SMALL FRUITS

GRAPE—VARIETY EXPERIMENT

After careful tests for many years, running back to 1912 in some instances, it has been found that the following varieties should not be grown in central Quebec, because they are either too late, or because others of the same date of maturity are of much better quality: Brighton, Campbell Early, Canada, Champion, Colerain, Cottage, Delaware, Early Victor, Florence X Potter, Hartford, Jamesville, Lindley, Manito, McTavish, Merrimac, Moore Early, Moyer, Pattison, Peabody, Starr Early, Telegraph, Wilkins, Worden.

All the above have been pulled out and most of them replaced by Early Daisy (black), Winchell—sometimes called Green Mountain—(green), and Wyoming Red (red). Of all these, Winchell is the earliest and of the best quality, but does not yield as heavily as the other two. The following table gives details about these three varieties:—

GOOD VARIETIES OF GRAPES FOR CENTRAL QUEBEC

Variety	Year planted	Year when it first produced fruit which ripened	Average pounds of ripe fruit per vine per year (6 years)	Size	Colour	Remarks
Daisy.....	1916	1918	1·74	Medium	Black	One of the earliest; quality good to very good.
Winchell.....	1916	1920	1·00	"	Green	The earliest of the greens; quality very good.
Wyoming....	1916	1918	1·28	"	Red	The earliest of the reds; quality good.

Of the varieties tested, besides the above three, only Beta, Brant and Early Ohio are left, and the first two will be pulled out soon, as their quality is not equal to Daisy, which is also a black, and they are no earlier.

There will then be left in the variety tests, besides the three recommended above, only Early Ohio, of the old ones, and Green Early, Jessica, Lutie and Ontario, which have a reputation for earliness and quality combined, and which were planted in 1923.

VARIETY TEST OF BLACK CURRANTS

Eleven varieties of black currants are left out of the sixteen which have been tested for eleven years. Black Champion, Clipper, Collins Prolific, Kerry and Success have been put aside because they were low yielders or had smaller fruit than others which produced practically as much.

RASPBERRY—VARIETY EXPERIMENT

Among the varieties of raspberries which have been tested during the last twelve years, Heebner, Loudon and Sarah have been discontinued because they were low yielders and did not have any important quality missing in the ones which produced more.

It was determined at Cap Rouge that one of the main factors in regard to yield is freedom from disease. Of course, the fact that certain varieties have shown less resistance than others may be due to infected canes having been used in making the plantation, and it is the intention to set out a new plantation with perfectly healthy stock.

Brighton has now conclusively come to the top. It is a high yielder, very early, firm for shipping, and has the advantage of remaining on the cane for some time after it is ready to pick.

Columbian is not in the red raspberry class, as it is of the hybrid type, or purple-cane family. It is exceedingly productive and is liked for canning; the fruit remains long on the cane after it is ready to pick.

Newman Seedling No. 23 is one of the highest yielders, fairly firm for shipping, but the fruit falls off a couple of days after it is ripe, which is quite a disadvantage for the commercial grower.

Eaton is in the second category, as far as yield is concerned; it is not very firm for shipping and can only be picked when quite ripe.

King has been recommended as the standard early raspberry, but has two disadvantages: the fruit falls off a couple of days after it is ripe, and in dry seasons is badly formed.

Marlboro is not a very good yielder and has the two disadvantages just mentioned for King.

Herbert has been recommended for the district, but Brighton is now giving better results. Herbert has the advantages of being fairly firm for shipping and of holding its fruit on the cane many days after it is ripe.

Cuthbert has the same good points as Herbert, but it has been such a consistently low yielder that it should not be planted where conditions are the same as at Cap Rouge.

St. Regis is a so-called "ever-bearer," but if it does bear during a longer time, each season, than the ordinary varieties, it bears so little at any time that it should never be included in a commercial plantation, and only be used for the home garden. Customers are now accustomed to get different kinds of fruit at regular seasons, and raspberries out of season find very little sale.

Golden Queen is a yellow variety, which detracts from its general popularity; like St. Regis, it should only be grown in small quantities for home use or for special customers.

VARIETY AND STRAIN TESTS OF STRAWBERRIES

Forty-one varieties and strains of strawberries have been tested since 1914 and twenty-five of these were discarded because they were poor yielders, too small, not coloured enough, or imperfect; the latter cause, however, never constituted the sole grounds for elimination. The accompanying table gives details on ten varieties which have been tested for nine years:—

VARIETIES OF STRAWBERRIES TESTED AT CAP ROUGE FOR NINE YEARS

Variety or Strain	Perfect or Imperfect	Source	Season	Shipping qualities	Size	Colour	Eating qualities	Resistance to diseases	Plant producing qualities	Notes for 1923				1915-1923 Yield per acre
										First bloom	First ripe fruit	First picking	Yield per acre 1922	
													Lbs.	Lbs.
Cassandra	Imperfect	C.E.F.	Midseason to late	Medium	Medium to large	Deep red	Sub-acid	Good	Strong	June 7	July 1	July 5	1,531	7,161
Greenville	"	Com.	Midseason	"	" "	"	"	Medium	"	" 6	" 2	" 5	2,636	6,844
Valeria	Perfect	C.E.F.	"	"	Medium	Deep rose	"	Good	"	" 6	" 2	" 5	2,307	6,815
Bisel	Imperfect	Com.	"	"	Medium to large	Deep red	"	Medium	"	" 5	" 1	" 5	2,355	6,791
Dunlap	Perfect	"	Early to mid-season.	"	" "	"	"	"	"	" 4	June 29	" 4	3,227	6,687
Sample	Imperfect	"	Midseason to late	"	Large	Red	"	Good	"	" 7	July 3	" 7	2,099	6,540
Portia	"	C.E.F.	Late	Firm	Medium to large	Deep rose	"	"	"	" 8	" 4	" 7	1,653	6,289
Glen Mary	Perfect	Com.	Midseason to late	Medium	Large	Deep red	"	"	"	" 8	" 4	" 6	2,445	6,185
Uncle Jim	"	"	" "	"	"	Deep rose	Sweet	"	Medium	" 8	" 4	" 6	939	5,046
Excelsior	"	"	Early	Firm	Medium to small	Deep red	Acid	Medium	Strong	" 2	June 27	" 3	2,631	4,647

Beder Wood was left aside because Dunlap has all its qualities and in addition a higher yield, more colour and greater size. Nettie is imperfect, not well enough coloured and rather a poor plant producer, but it has a large fruit, and, being late, may lengthen the season. Cordelia, Marianna, 3 W's, Warfield, Pocomoke, and Williams are all perfect varieties but with nothing to recommend them above Dunlap, and they yield less. New Globe has soft fruit and cannot stand shipment. Wm. Belt is at the top for quality, but is poor in colour and right at the bottom of the list for yield.

Summary.—(1) Leaving aside the imperfect varieties, which are not generally to be recommended, Valeria is the highest yielder, but the fruit is not coloured enough and too small for a commercial variety. (2) The second highest yielder amongst the perfect varieties is Dunlap, which is recommended for central Quebec. (3) When earliness is the prime requisite, Excelsior is the best, but it is not of high quality, and should only be planted to a moderate extent.

IMPROVEMENT OF THE STRAWBERRY BY SELECTION

After careful testing for many seasons with the best-known varieties of strawberries, it was decided to find out if from these special strains could be isolated which would be an improvement on the parents. To this effect, about five hundred seedlings and one hundred runners from individual plants have been grown during the past few years. Thirty of the seedlings looked promising at first, but the number was later cut down to five which were put in the trial plots with the 1920 plantation. The accompanying table compares these five seedlings with the parent varieties.

FIVE STRAWBERRY SEEDLINGS COMPARED WITH PARENT VARIETIES

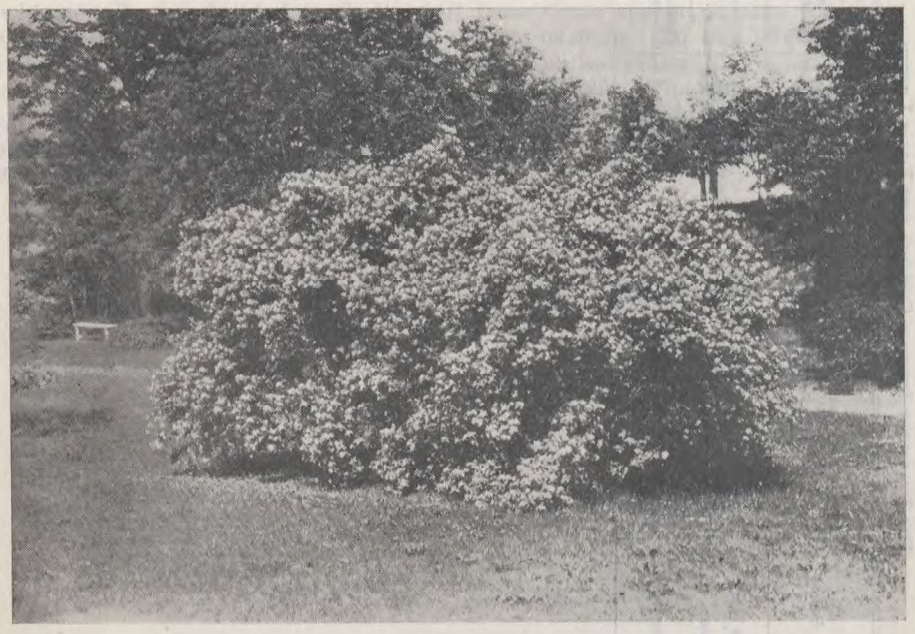
Seedling No. or Variety	Perfect or Imperfect	Source	Season	Shipping qualities	Size	Colour	Eating qualities	Resistance to diseases	Plant producing qualities	Yield per acre—Pounds			
										1921	1922	1923	Average for three years
408	Perfect	Glen Mary	Early	Poor	Large	Pale red	Sub-acid	Medium	Medium	4,204	6,554	2,374	4,377
410	"	"	Midseason	Good	Medium to large	Deep red	"	"	"	4,446	7,441	3,665	5,184
119	"	Dunlap	Midseason to late	"	" "	Bright red	"	"	Strong	3,085	3,085	2,859	3,010
120	"	"	" " "	"	" "	"	"	"	"	4,174	2,722	2,714	3,203
121	"	"	" " "	"	" "	"	Sweet	"	"	5,445	3,630	3,248	4,108
Dunlap	"	Commercial	Early to midseason	Medium	" "	Deep red	Sub-acid	"	"	5,203	5,880	3,227	4,770
Glen Mary	"	"	Midseason to late	"	Large	"	"	Good	"	5,481	5,502	2,445	4,476

From the table it is seen that none of the seedlings combine in a high degree the main desiderata of earliness, size, quality, and yield. No. 48 is early, has a large fruit, but has poor shipping qualities, and low colour. No. 410 seems to be the best tried, and has outyielded the parent variety, Glen Mary. Nos. 419 and 420 are low yielders, with nothing much to recommend them. No. 421 has very high quality, but not much else. These seedlings will be continued in the trial plots for three more years before deciding which, if any, will be kept.

ORNAMENTAL GARDENING

ANNUALS—VARIETY EXPERIMENT

In the report for 1921, a long list of annuals was published giving details about 66 varieties of annual ornamental plants and there is no space to publish such a list each year. The ones which, in general, will give best satisfaction are China asters, clarkias, coreopsis, cosmos, gladioli, salpiglossis, snapdragons, stocks, sweet peas, and zinnias.



A fine honeysuckle in full bloom at Cap Rouge.

SIDNEY, B.C., VS. HOLLAND-GROWN TULIP BULBS

Tulip bulbs have been imported from Holland for so long a time that the opinion now generally prevails that they can only profitably be grown in that country. That there is no secret process, as sometimes thought, needed to grow bulbs is conclusively shown by the fact that these have been grown with success in Cayuga county, Long Island, New York, also at Whatcom in the State of Washington. It is more probable that the right kind of soil and temperature are the important factors, a moist but well-drained sandy loam, with cool nights, being important requisites. Dutch labour, it is true, is cheaper than Canadian, but land used to grow bulbs over there is worth all the way from $3,000 to $5,000 an acre while it can easily be had for ten times less here.

During the autumn of 1922, bulbs of the variety of tulip, Duchesse de Parma, grown at Sidney, B.C., were put in alongside others which came from Holland. No difference could be seen in the size or appearance of the bulbs themselves when they arrived, nor in the number, height, or vigour of plants grown in 1923. The intensity of colour of the flowers was about the same, but the size of those from the British Columbia bulbs was fully 25 per cent larger than from the Holland bulbs.

NARCISSI AS A COMMERCIAL PROPOSITION

The amount of money spent for flowers in cities is much greater than imagined, and it seems possible for at least a limited number of farmers, especially those living nearby, to add to their income by growing some of the kinds which do not require special treatment. Among these are certain varieties of narcissi which have the advantage of blooming at a season when flowers are rather scarce. To find out if this would be a paying proposition, one hundred bulbs of Victoria were planted on October 20, 1920, on a piece of ground about 12 feet by 18, an area of approximately $\frac{1}{200}$ acre. The following is a rough statement of expenses and revenues from this small plot:—

NARCISSI AS A COMMERCIAL PROPOSITION

Expenses		
1920—Spading of ground, 2 hours at 30 cents	$ 0 60	
800 pounds of rotten manure at $8 per ton	3 20	
100 bulbs	4 00	
1921—Keeping plot clean, 1 hour at 30 cents	0 30	
Cutting and packing flowers, 1 hour at 30 cents	0 30	
1922—Keeping plot clean, 1 hour at 30 cents	0 30	
Cutting and packing flowers, 1 hour at 30 cents	0 30	
1923—Keeping plot clean, 1 hour at 30 cents	0 30	
Spading in manure, 2 hours at 30 cents	0 60	
400 pounds of rotten manure at $8 per ton	1 60	
Total expenses		$12 10
Revenue		
1921—150 flowers at 3 cents	$ 4 50	
1922—170 " 3 "	5 10	
1923—335 " 3 "	10 05	
		$19 65

The above figures show that Victoria narcissi grown on a small scale near Quebec city are a paying proposition.

Experiments made from 1917 to 1919 at the Queen Victoria Park, Toronto, have shown the increase of saleable bulbs to be 60 per cent for the Victoria narcissus during two years, which would be a source of revenue for men who understand the business.

A few such plots of other flowering plants will be grown at Cap Rouge from which to gather information on the commercial side of growing flowering plants. But farmers intending to try this should first find out from florists what kinds and varieties they will buy, and should always remember that long stems are a prime requisite in nearly all varieties.

HEDGES—VARIETY EXPERIMENT

Amongst the conifers, American Arbor Vitæ, Colorado Blue Spruce, and Norway Spruce have done well, the second mentioned being the prettiest when trees true to name can be had. In the deciduous kinds, Siberian Pea Tree, Thunberg Barberry, and Wayfaring Tree have been found very good, while Alder Buckthorn, Josika Lilac, Amur Lilac, Cockspur Thorn have not enough growth at the bottom.

ROSES—VARIETY EXPERIMENT

A list was published, in the report for 1922, giving details about fifty-seven varieties of roses and it is impossible to give such lengthy details each year. It was pointed out then that, leaving aside the rugosas, only about 10 per cent of the others had been found hardy enough to plant outside. The ones giving the most satisfaction are the following:— Hybrid Perpetuals: Hugh Dickson, red, the prettiest of all; Frau Karl Drushki, white; Jules Margottin; Baroness Rothschild; Magna Charta; Mrs. John Laing, rose. Gruss an Teplitz is the one which suffered the least from winter, in the Hybrid Teas. The Hybrid Japanese gave smaller flowers than the Hybrid Perpetuals but are, as a rule, hardier; the best of those tested are Mrs. Anthony Waterer, red; Madame Geo. Bruant, white; Conrad F. Meyer, rose. If beauty is required, Hugh Dickson will fill the bill, while for quantity of flowers, Frau Karl Druschki, Jules Margottin and Baroness Rothschild are hard to beat.

VEGETABLES

PRELIMINARY TESTING OF VARIETIES AND STRAINS

The object of this experiment is to try out in a preliminary way varieties or strains either new, widely advertised, or of probable merit. Small numbers of plants are grown with one or two of the recommended varieties or strains for the district, for purpose of comparison. Anything with obvious defects, such as inclination to disease, poor quality, bad appearance, very late maturity, evident low production, or any variety which is clearly no improvement on a well-known variety, is discarded the first year. Others about which the observer may be in doubt are grown in the nursery another year, either to be discarded definitely or sent to the trial plots. These preliminary tests were started when it was decided that once a variety or strain went in the trial plots, it should remain there for at least five seasons. If all the new things were placed in the variety tests, it would mean an expenditure of too much time and money. Before planting a new variety, it would be well for the grower to write for information as to its merits from the Station.

VARIETY AND STRAIN TEST OF ASPARAGUS

In 1913, seed of eleven varieties and strains of asparagus was sown and forty plants of each were put in during the next spring. Eclipse did not do well and was dropped in 1920, whilst the same thing happened to Philadelphia Mammoth (also named Barr's Philadelphia Mammoth), in 1922. It has now been decided to discard Conover Colossal and Palmetto because they are at the bottom of the list as yielders, for an average of seven years. A table gives details for 1923.

VARIETY AND STRAIN TEST OF ASPARAGUS—1923

Name of variety or strain	Number of clumps planted spring 1914	Number of clumps living in spring	Number of clumps died winter 1922-1923	Number of spikes cut	Number of spikes per clump	Weight of crop	Weight of crop per clump	Weight of crop per spikes	Date of first cutting	Date of last cutting	Number of cuttings made	Yield per acre	Average yield per acre for seven years
						Oz.	Oz.	Oz.	May	June		Lb.	Lb.
Donald Elmira "Dreer"	40	34	0	763	22	269	8	0·35	23	22	20	2,394	1,954
Mammoth Emperor	40	27	1	415	15	187	7	0·45	23	22	19	2,096	1,710
Donald Elmira "Johnson"	40	24	2	457	19	219	9	0·48	23	23	19	2,759	1,543
Reading Giant	40	19	8	295	16	118	6	0·40	26	23	18	1,878	1,514
Argenteuil	40	33	2	570	17	210	6	0·37	23	22	18	1,925	1,434
Batavian	40	31	1	434	14	201	6	0·46	23	22	19	1,961	1,412
Columbian Mammoth White	40	25	3	433	17	152	6	0·35	23	21	18	1,839	1,297
Palmetto	40	26	2	394	15	171	7	0·43	23	23	19	1,990	1,282
Conover Colossal	40	20	2	365	18	162	8	0·44	26	23	18	2,450	1,097

A time was when only very large white asparagus could be sold, but consumers are beginning to discriminate between appearance and quality, so that the average-size green asparagus is now coming to its own. Samples were sent to a few of the best retailers in Quebec city and the green medium-size shoots were preferred by about half of them. On May 27, 1923, these growers offered to buy at from $1.75 to $2 per dozen of bunches of twelve spikes.

Summary. (1) Asparagus is a paying crop for the specialist who lives near a good market. (2) Donald Elmira (Dreer) is the best of the eleven tried during the past seven years. (3) Seed and year-old plants of a specially selected strain of this variety are for sale by the Experimental Station, Cap Rouge, Que.

IMPROVEMENT OF THE DONALD ELMIRA ASPARAGUS BY SELECTION

Eleven varieties and strains of asparagus were sown in 1913 and forty plants of each were put in uniform soil the next season. Donald Elmira, from Dreer, of Philadelphia, proved to be the heaviest yielder so that it was chosen for improvement. Cuttings from each plant, whose sex was noted were weighed separately to see which male and which female would produce the most. The weights ranged all the way from 0.5 to 17.0 ounces, showing the importance of having found out the two best, male No. 36, and female No. 37. The following seasons, spears from all the other plants of asparagus were cut and marketed so that none could produce seed except No. 37 fertilized by No. 36. These were five years old when used for selection work, yet only the largest, plumpest, and best matured seed is chosen from them. These two clumps will be divided so that a larger number of plants may be had for seed production, but the number of stalks growing from a root will be limited, to produce stronger plants.

Both seed and year-old plants of this selection are for sale by the Cap Rouge Experimental Station.

VARIETY AND STRAIN TEST OF GARDEN BEANS

Since 1911, sixty-six varieties and strains of garden beans have been tested, with the result that only four have been kept as worthy of further consideration under conditions such as exist at Cap Rouge. All the "limas" were found too late, while the "poles" generally cost too much for staking, so that only the "bush" are profitable, from a commercial point of view. Freedom from disease is the greatest factor influencing yield in garden beans and the utmost care should be taken that, not only all seed be itself free from blotches, but also the pods.

Summary.—If an early green-podded sort is required, Stringless is just the thing and is no doubt the best quality bean of the lot. Refugee is a standard among late green-podded kinds; Pencil Pod is an early wax-podded one which is the most popular with consumers in Central Quebec; Hodson Long Pod is a late well known wax-podded variety which is the heaviest yielder of all, but its pods are so large that they are not liked.

IMPROVEMENT OF THE PENCIL POD GARDEN BEAN BY SELECTION

Ever since 1911, work has been done in selecting garden beans, especially for higher production. The foundation stock was generally obtained from well-known seedsmen and, as far as possible, from the originator or introducer. Only those varieties were used which could be profitable to the farmer or market gardener of central Quebec and which showed, in the trial plots, special merit as to precocity or yield. Selections were made from Refugee, Davis Wax,

Challenge Black Wax, Stringless Green Pod, Old Homestead, Early Refugee, Keeney Rustless Wax, Valentine, Wardell Kidney Wax, Hodson Long Pod Wax, Pencil Pod. At first, Challenge Black Wax promised much, as it was the earliest tried, but it fell such an easy prey to fungous diseases that it was dropped. During that time, Pencil Pod had shown such merit in the variety tests, that plants were selected in 1919 with which to start work. The number of beans per plant varied from 152 to 270. In 1921, the number of beans per plant varied from 92.1 to 140.5, the plant with the largest number of beans in 1920 giving the plant with the smallest yield. This shows that, for plants, as with live stock, it is not always the heaviest yielder which reproduces the heaviest yielder. In 1922, the number of quarts of beans varied between 2.5 and 3.25 per row of four feet, the heaviest yielder of 1920 being again at the bottom of the list. In 1923, the rows were 10.5 feet in length and the two highest strains respectively have 7.25 and 8.75 quarts of beans. The best, to-date, is No. 12 which stood seventh in 1920.

Summary.—(1) In isolating special strains of plants, it is not always the highest yielder which reproduces the highest yielder. (2) The strain of Pencil Pod which was seventh, for yield, in 1920, worked to the top in 1923.

BEET—BREEDING FOR TRUENESS TO TYPE

In last year's report, details were given about this project which was started in 1915 with Black Red Ball. In 1923, roots were grown from seed produced in 1922 and about fifty of the best were placed in the cellar of the Horticultural Building for seed production in 1924; at the same time, roots grown in 1922 from 1919 seed were planted, and some two pounds of seed harvested for use in 1924.

CABBAGE—VARIETY EXPERIMENT

Leaving aside the Savoy group and the Red cabbages for which there is only a limited demand in the district, the others are generally divided by growers into different classes according to the time when they are ready for use, that is, very early, midseason and late. After thirteen years of careful testing of thirty-five of the best known varieties and strains, it was found out that the best, for the different seasons, were Jersey Wakefield for very early, Copenhagen Market for early, Succession for midseason, and Danish Roundhead for winter.

The yields get higher as the time required to be ready for use lengthens. Unless market demands a pointed cabbage, it seems better to leave aside Jersey Wakefield and only grow Copenhagen Market for early use. If Danish Roundhead is added to it, the two can very well meet most requirements and are certainly the best combination under average circumstances. Danish Roundhead, like all the Ballheads, is a splendid keeper until late spring.

CABBAGE—BREEDING FOR TRUENESS TO TYPE

In last year's report, details were given about this project. In 1923, plants grown in 1922 produced seed which will be grown in 1924; while from seed produced in 1922, plants were grown which will be used for seed production next year, after having been rigorously culled both in the autumn and in the spring.

In 1923, the Cap Rouge selection of Danish Roundhead was the third highest yielder amongst nine varieties and strains tested, so that the very important point of high productiveness has not been lost, in this case, in breeding for trueness to type.

CAULIFLOWER—VARIETY EXPERIMENT

Ten varieties and strains of cauliflower have been tested since 1911 and they fall into two main groups, the early and the late. This vegetable is one of the hardest to grow for market, as lack of moisture and high temperatures will cause heads to "bolt" or "button," in which case they are practically worthless. This explanation is given, as the late varieties, which have by far been the heaviest yielders at Cap Rouge, may not prove as advantageous as the early ones where climatic conditions are not the same, that is, where there is not usually a long summer drought with very warm weather. The four so-called varieties which have given best satisfaction are Erfurt and Snowball, amongst the earlies, and Autumn Giant and Algiers, amongst the late ones. Figures were given in last year's report showing that Algiers yielded, for an average of five years, a great deal more than Erfurt.

Of course, early cauliflowers will be grown in the district, but it is a question whether it is profitable to do so: the time given to them could probably be employed in a more remunerative way by growing late cauliflower or other vegetables.

CAULIFLOWER—PROTECTION FROM WEATHER

Vegetables no doubt will some day sell by weight in the district of Quebec as they do in a great number of places elsewhere. In the meantime, however, it is the question of appearance which is the greatest factor in influencing price. For cauliflower, the whiter the head is, the better, and to obtain this, protection from the weather is needed.

PROTECTING CAULIFLOWER HEADS FROM THE WEATHER

Year	Variety	Head not protected		Leaves broken over head		Leaves tied over head with twine		Leaves held over head with tooth picks	
		Per cent marketable heads	Marketable heads per acre	Per cent marketable heads	Marketable heads per acre	Per cent marketable heads	Marketable heads per acre	Per cent marketable heads	Marketable heads per acre
			Lb.		Lb.		Lb.		Lb
1916	Early Snowball	20	4,646	30	7,550	20	3,194	30	4,937
1919	" "	100	52,852	80	41,236	80	36,590	60	31,363
1920	" "	40	20,183	50	23,813	30	10,600	50	27,733
1921	" "	10	16,553	.....	.....	.....	.....	35	35,138
1922	" "	15	4,501	30	7,115	10	2,178	20	5,518
1923	" "	65	30,202	80	43,850	80	21,925	70	28,314
	Average	42	21,489	45	20,594	37	12,414	44	22,167

In 1923, representative samples from each of the four lots were sent to three of the best retailers in Quebec city, and every one of them gave the preference to the heads which had the leaves simply broken over them. As it happens that the largest percentage of marketable heads came from this method of protection, which is the easiest and the least costly, it would be well, until more light is thrown upon the subject, for growers to adopt this method.

A remarkable thing is the comparatively small yield in pounds of marketable cauliflowers per acre of the lot where the leaves were tied over the head with twine. It is possible that this may have checked growth.

CELERY—VARIETY EXPERIMENT

Testing varieties or strains of celery furnishes information in a general, way, but the weight of the crop per acre does not mean much, in certain districts.

Where consumers are willing to pay more for a variety, there is nothing to do but to grow it, no matter where it stands in yield or quality. But for

the man who wishes to have celery for his own table, about 20 per cent of White Plume for early use, 30 per cent of Golden Self Blanching to keep the supply until the beginning of January, and 50 per cent of Giant Pascal for winter, would be a good combination.

CORN—VARIETY EXPERIMENT

Earliness is one of the main considerations for sweet corn in central Quebec. But the number of ears produced is also very important, as a variety giving only one ear per stalk, on an average, would certainly not pay as well as another one giving two. The accompanying table gives details on the four best varieties which have been tested and compared for several years.

The points of colour, and perhaps more of reputation, are the only ones which keep Golden Bantam more popular than Early Malcolm as the latter is of as good quality, is ready for use a couple of weeks earlier, and produces more ears per acre.

VARIETY AND STRAIN TESTS OF SWEET CORN—NUMBER OF EARS PER ACRE

Variety	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Average	Days ready to use
Early Malcolm.....	13,068	23,232	18,876	30,492	16,456	28,072	29,040	20,812	35,816	26,136	28,556	24,596	90
Golden Bantam.....	11,616	7,260	20,328	24,200	15,246	28,072	28,314	30,972	19,360	27,588	30,492	22,132	104
Black Mexican.....	8,712	.....	23,474	33,880	9,680	23,716	26,136	17,424	38,236	26,620	29,040	21,538	113
Country Gentleman.	2,904	10,164	18,392	25,652	7,502	.....	23,474	20,812	14,520	13,552	14,520	13,776	122

NOTE.—The years when "0" is entered for yield, the variety did not produce any marketable ears.

CORN—BREEDING FOR YIELD

Notes are here offered only for 1923, because details were given about this project in last year's report. Cap Rouge strain No. 18, of Early Malakoff, was again at the head, for quantity of ears, compared with the same number of plants of eight well-known varieties, as follows: Early Malakoff C.R. 18, 170; Golden Bantam, 126; Black Mexican, 120; Early Malcolm, 118; Whipple Early, 104; Pickaninny, 94; Extra Early Adams, 84; Howling Mob, 82; Country Gentleman, 60. The Cap Rouge strain of Malakoff was also the earliest of the lot, with the exception of Pickaninny.

PEA—VARIETY EXPERIMENT

Out of some seventy varieties and strains tested since 1911, four have been found superior to the others. The tables are given separately because early and late peas cannot very well be compared.

For the market gardener, earliness counts, and it might be wise to use a very early variety such as Gregory Surprise to catch the high prices, and then sow Sutton Excelsior at intervals of about a week or ten days to keep a continuous supply coming on. For canning, early sorts do not yield enough and it would be better to put in, at the one sowing, varieties such as Juno or Stratagem.

GARDEN PEAS COMPARED FOR EARLINESS

Name	Plant	Pea			Season: Number of days after sowing when ready for use							Quarts of green shelled peas per acre average six years
	Character	Surface	Colour	Size	1911	1912	1913	1915	1919	1923	Average six years	
Gregory Surprise	Semi-dwarf	Wrinkled	Greenish	Medium	43	56	50	63	54	60	54	890
Sutton Excelsior	Semi-dwarf	Wrinkeld	Whitish	Large	48	61	59	63	62	62	59	1,203

GARDEN PEAS COMPARED FOR YIELD

Name	Plant	Pea			Yield: Quarts of Green Shelled Peas per acre												Days after sowing When ready for use
	Character	Surface	Colour	Size	1911	1912	1913	1914	1915	1916	1917	1918	1920	1921	1922	1923	Average twelve years	Average twelve years
Juno	Semi-dwarf	Wrinkled	Greenish	Large	1,089	847	2,178	847	1,331	2,662	2,178	2,420	1,815	1,815	1,815	1,028	1,669	73
Stratagem	Climbing	Wrinkled	Greenish	Large	1,452	605	1,815	726	1,331	2,662	2,904	2,178	1,815	1,452	1,452	987	1,615	73

IMPROVEMENT OF THE JUNO GARDEN PEA BY SELECTION

Out of sixty-four varieties of garden peas tested since 1911, Juno has proved to be the highest yielder. From 360 plants examined individually, four selections were grown in 1923, and notes are given in the following table about them.

COMPARISON OF FOUR SELECTIONS OF THE JUNO GARDEN PEA

Strain Number	Date sown 1923	Date ready for use 1923	Ounces of shelled green peas for same number of plants of each selection			
			1921	1922	1923	Average for three years
4	May 11	July 18	8·00	8·00	5·00	7·00
6	" 11	" 18	8·00	8·00	4·50	6·83
8	" 11	" 19	4·00	9·00	5·00	6·00
12	" 11	" 19	8·00	8·50	4·00	6·83

The difference in yielding power between the four strains is not great, but amongst the plants eliminated there were some which produced less than half the yield of the strains. As the selection is continued with the progeny of only four plants out of three hundred and sixty, it seems more than probable that when one strain is finally kept, it will be more productive than the average of those which will have been discarded.

Summary. (1) The Juno garden pea has shown itself the highest yielder amongst the sixty-four varieties and strains tested at Cap Rouge. (2) The selection of plants made of this variety will ultimately bring out a more productive strain than the others, and it will then be propagated.

POTATO—VARIETY EXPERIMENT

Nearly eighty varieties and strains of potatoes have been tested since 1911 and six of these have outyielded the others for an average of seven years. Details are given in the accompanying table.

VARIETY AND STRAIN TEST OF POTATOES, 1917 TO 1923

Variety	Size	Form	Colour	Season	Average yield per acre, pounds		
					Marketable	Unmarketable	Total
Green Mountain	Large	Oblong	White	Late	14,845	3,107	17,952
Dreer Standard	"	Oval	"	"	11,446	1,844	13,290
Irish Cobbler	Medium	Round	"	Early	11,404	1,164	12,568
Table Talk	"	Oval	"	Late	9,631	2,320	11,951
Morgan Seedling	Large	"	"	Medium	10,230	1,541	11,771
Warrior	Medium	"	"	Late	8,759	2,113	10,872

Dooley has only been tried three years, but has done exceedingly well, and if it continues to do so for two more seasons, it will be placed on the list of recommended varieties.

The best thing for farmers of central Quebec to do is to cut down the number of varieties grown to a couple, such as Irish Cobbler for early and Green Mountain for main crop, and thus encourage buyers to come here with the assurance that they can find standard sorts in large lots.

POTATO—HILL SELECTION FOR SEED

A few years ago it was thought that productive potato plants were superior strains which might be isolated by careful selection, but it now appears that these plants are rather healthy ones whilst the inferior plants are those which are affected by one or more of the many diseases to which potatoes are subject. This is why, for breeding work, strains of Green Mountain were kept which had little or no disease. That other factors come in to lower yield is probably certain, but strain No. 613, which has shown disease resistance right through, has been chosen as the best of hundreds of selections made since 1915, and will be sent for multiplication down the St. Lawrence river where conditions are better for potato seed production. In 1923, this Green Mountain C.R. 613 produced 102.75 pounds of marketable potatoes on a row 150 feet in length, while the Green Mountain from which the selection was made a few years ago only gave 49.25 pounds of marketable potatoes on a row of the same length. It is not intended to infer from this that the difference would be as large every year. The writer is of the opinion that improving varieties of potatoes by selection is a thing which can and should be done by each grower, thus keeping down diseases, which is, after all, perhaps the most important point.

RHUBARB FORCING

The object is to compare methods of forcing rhubarb in a warm, dark cellar. Roots are brought in before the ground freezes, while others are dug and left out to be thoroughly frozen before being brought in. Each lot is divided in two, one part is planted in soil and the other placed between layers of straw.

The results of three tests show that for every pound of crop produced from the roots brought in early, 15.61 pounds were produced from the roots left to freeze thoroughly before being brought in. The difference between the lots planted in soil and those placed between layers of straw was not large.

VARIETY TEST OF RHUBARB

That there is a great difference in the yield of different varieties of rhubarb is shown by the following figures which give the average for five years, from 1915 to 1919 inclusive.

St. Martin	36,463 pounds per acre
Hobday Giant	28,868 " "
Prima Donna	19,929 " "
Victoria	19,791 " "
Linnaeus	14,729 " "
Monarque	11,815 " "

Monarque and Linnaeus were dropped after five years, Prima Donna after six, and Victoria seven, leaving only Hobday Giant and St. Martin to compete for supremacy, but the latter very easily leads.

The table which follows shows that St. Martin not only has a greater number of stalks per clump, but also that the stalks are larger:—

TWO GOOD VARIETIES OF RHUBARB COMPARED, 1923

Variety	Size of stalks	Colour of stalks	Propensity to come to seed	Number of clumps	Number of stalks	Number of stalks per clump	Weight of crop	Weight of crop per clump	Weight of crop per stalk	Date of first cutting	Date of last cutting	Number of cuttings	Yield per acre
							Oz.	Oz.	Oz.				Lb.
St. Martin	Medium	Red	Small	34	949	28	4,964	146	5·2	May 25	June 11	4	24,843
Hobday Giant	Small	Green	Strong	34	797	23	2,534	75	3·2	" 25	May 30	2	12,682

Summary.—(1) There is a large difference in yield between different varieties of rhubarb. (2) Of the six tested at Cap Rouge, St. Martin has shown decided superiority.

TOMATO—VARIETY EXPERIMENT

Some eighty varieties and strains of tomatoes have been tested for thirteen years, and four of them stand out above the rest. In central Quebec, earliness is the main consideration, so that well-known standard sorts in more southern parts of the country are practically of no use here. The accompanying table gives details about those which have done best at Cap Rouge.

The average number of days to come to maturity is practically the same for the four, but Capiana is the highest yielder of ripe fruit. This Cap Rouge selection is now offered for sale and is sure to give satisfaction wherever the season is short.

YIELD OF RIPE FRUIT AND TIME TO MATURE FOR FOUR LEADING VARIETIES AND STRAINS OF TOMATOES

Year	Capiana (a)		Prosperity		Burbank Early		Alacrity	
	Pounds of ripe fruit per acre	Days to come to maturity	Pounds of ripe fruit per acre	Days to come to maturity	Pounds of ripe fruit per acre	Days to come to maturity	Pounds of ripe fruit per acre	Days to come to maturity
1917	15,110	160	9,120	157	12,523	158	5,173	165
1918	8,372	147	8,508	150	10,550	150	9,529	150
1919	44,104	133	58,874	136	45,942	141	35,392	133
1920	42,199	144	24,298	146	17,832	145	18,989	146
1921	49,549	146	48,188	149	46,691	149	3 ,084	149
1922	25,728	151	31,717	146	23,073	146	30,220	141
1923	11,843	172	9,393	172	19,466	154	18,921	161
Average	28,129	150	27,157	151	25,154	149	21,187	149

(a) A Cap Rouge selection of Earliana.

TOMATO—METHODS OF ARTIFICIAL RIPENING

In a district with a short season such as central Quebec, it often happens that a large quantity of half ripe and green tomatoes must be thrown away, which, could it be artificially ripened, would find a ready sale, as the supply from Ontario and the United States has then ceased. An experiment was commenced in 1915 with three methods of ripening green and half ripe tomatoes, putting the fruit in tightly closed boxes, boxes covered with glass, and on open shelves. The open shelf method has the highest average for ripened fruit, but as it has only been tried for three years and the others for five, accurate comparisons cannot be made. Open shelves in a warm building are, however, so easily to be had, that this method can be recommended.

CEREALS

As a general proposition, it does not pay to grow cereals in central Quebec, either for sale or for live stock feeding, at present prices of grains and milling by-products. But some of them will always be required as a cover crop for grass and clover seedlings and, for this purpose, everything considered, oats will continue to be the best choice. They should, however, only be sown to precede hay and practically never twice in succession. Barley and wheat yield so much less digestible nutrients per acre that they cannot compete with oats; under ordinary conditions, of course. Field peas are the best paying proposition from the standpoint of feeding live stock, and farmers are urged to grow more of them after trying them in a small way to see if the varieties grown are adapted to local conditions.

IMPORTATION AND TESTING OF FOREIGN VARIETIES OF CEREALS

The object of this work is to obtain varieties better adapted for central Quebec than those which have hitherto been recommended. Varieties or strains which are new, widely advertised, or of probable merit are compared with the latter, and those possessing obvious defects are discarded the first year. Others about which the observer may be in doubt are further tested.

TEST OF VARIETIES OR STRAINS

Our present varieties of barley are not profitable to grow in central Quebec except for special purposes such as for malting or pearling or for sale as seed, as they do not yield enough digestible nutrients per acre, compared with oats or peas. For eleven years Banner oats, Arthur peas, Huron wheat and Manchurian barley were compared in trial plots at Cap Rouge. The results of this test show that the oats and peas each outyielded the barley, ten out of eleven years. But yield of grain per acre, for live stock feeding, does not by any means tell all the story as may here be seen.

OATS, PEAS, SPRING WHEAT, BARLEY COMPARED FOR DIGESTIBLE NUTRIENTS

Crop	Pounds of grain per acre	Digestible nutrients							
		Crude protein		Carbohydrates		Fat		Total	
		In 100 lbs.	Per acre	In 100 lbs.	Per acre	In 100 lbs.	Per acre	In 100 lbs.	Per acre
Arthur peas	2, 79	19·0	395	55·8	1,160	0·6	16	76·2	1,584
Banner oats	2,224	9·7	216	52·1	1,159	3·8	85	70·4	1,566
Huron wheat	1,561	8·7	136	67·5	1,054	1·4	22	79·4	1,239
Manchurian barley	1,483	9·0	133	66·8	991	1·6	24	79·4	1,178

The above table shows that barley, compared either with oats or with peas, does not produce enough total digestible nutrients, and especially protein, to be grown for live stock feeding. If much higher-yielding varieties are found, it may be different, but in the meanwhile, oats and also peas are much to be preferred.

As will be seen under the next heading, a Cap Rouge selection of Manchurian heads the list, for an average of five years, and is the one which is recommended for central Quebec.

BARLEY—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION

The object of this project is to produce improved varieties or strains of barley for the various soils and climates of central Quebec. The work, in this case, was effected on a clay loam so that the new strain should, no doubt, be better adapted to this kind of soil than to a lighter or a heavier one. A time will probably come when varieties or strains will be recommended not only for a certain district but for a particular kind of soil of that district.

In the 1921-22 report of this Station, details were given about each step taken since 1913 in the selection of Manchurian barley. The source of seed was the Central Experimental Farm, Ottawa, and the fact that the Dominion Cerealist, in 1921, allowed the Cap Rouge selection to replace the Ottawa one shows the possibilities of such work, which, though rather long, is quite simple. A pure line, it is true, cannot very well be improved by selection, but there has possibly been more natural crossing in common small grains than is generally believed, so that the supposedly pure lines may be fewer than expected.

During the winter of 1921, the building in which the seed grain was stored burned down but, fortunately, a one pound sample of this selection was obtained from Ottawa. This loss explains why the year 1922 does not appear in the following table where are tabulated the only four varieties or strains which were compared in the same seasons.

WELL KNOWN VARIETIE OF BARLEY COMPARED WITH A CAP ROUGE SELECTION

Year	Manchurian Cap Rouge 14		O.A.C. No. 21		Early Chevalier		Stella	
	Lbs. per acre	Days to mature	Lbs. per acre	Days to mature	Lbs. per acre	Days to mature	Lbs. per acre	Days to mature
1918	1,890	84	1,710	86	1,740	83	1,530	85
1919	1,860	86	990	88	1,290	88	1,080	89
1920	2,370	84	2,160	79	2,010	77	1,710	85
1921	1,550	79	2,000	78	1,650	78	1,525	82
1923	1,582	94	1,775	93	1,800	91	1,425	88
Average	1,850	85	1,727	85	1,698	83	1,454	86

For those whose special conditions of soil or of market make it profitable to grow barley, Manchurian, Cap Rouge 14 is recommended for trial. By the autumn of 1924, it will be for sale at reasonable prices by the Superintendent of the Cap Rouge Experimental Station.

FIELD BEANS—TEST OF VARIETIES OR STRAINS

A general purpose field bean seems an impossibility and special types should be grown for special purposes. When used for human consumption, white varieties are generally baked, and coloured ones made into soup. Certain districts prefer a small bean, others a medium, and still others a large one.

Three varieties only have been compared the same seasons during the past four years and their average yield of dry seed per acre is as follows: Navy A, 1,570 pounds; Large White, 1,245; Beauty, 1,090. Norwegian was only tested during three of the above mentioned four years and averaged 1,467 pounds to Navy A's 1,477, so that they are about equal as producers.

It has been found that freedom from disease plays an important part in increasing yield and it is recommended that beans to be used for seed should not only themselves be free of disease, but also the pods from which they come. In general, authorities recommend using the smaller varieties on the poorer soils and the little pea bean would seem well adapted for this.

Ordinary field beans, that is the ones of the kidney type, do not produce enough digestible nutrients per acre, compared with field peas, to make their growing profitable for live stock feeding. Foreign countries have lately sold them to us at very low prices so that there is not now much money, except under special circumstances, in growing them for human consumption.

FIELD PEAS—TEST OF VARIETIES AND STRAINS

Field peas are here only considered from the point of view of grain production. For human consumption, the white sorts bring much more money; in fact, the very dark ones cannot oftentimes be sold at any price.

Amongst the white varieties tested for a long number of years, Arthur, Ottawa 18, has been the heaviest yielder, whilst Solo was at the head of the coloured ones.

During the winter of 1921, samples were procured from every province of the Dominion and every one of the United States where field peas had received attention, with the result that eighteen varieties and strains were tested in 1922 and 1923 besides the old well-known sorts.

No figures are offered for 1923, because no variety tried during that season has been tried more than three years, with the exception of Arthur and Solo which are the ones recommended for the district.

Farmers are urged to try in a small way and find out if field peas do well on their places; and if they do, to sow more and use them, ground, for live stock feeding, in conjunction, of course, with other grains or milling by-products.

FIELD PEAS—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION

Work was started with Arthur in 1914 but, unfortunately, during 1919, everything was lost. In 1921, a new start was made when ninety plants were chosen; these were grown in 1922, in as many rows, and the progeny was kept from the thirty best which were sown in thirty different rows in 1923. The ten best will be grown in 1924, and in 1925 the progeny of the best will be multiplied so that enough seed may be available in 1926 for the trial plots.

COOKING TESTS OF FIELD PEAS GROWN ON DIFFERENT SOILS

There are large quantities of field peas sold to make soup in the province of Quebec, and it is a well-known fact that some lots will positively not become edible by cooking, while others will cook in a rather short time. What is the cause of this? A great many reasons have been advanced, more or less plausible, but the exact cause is not yet known. Is there a difference between varieties? Has the preceding crop any influence, or does the quality depend upon the kind of soil on which the crop is grown? It will no doubt take a few years before a reasonable answer is given, but some experimenting was started in 1917 at Cap Rouge. That season, three different lots grown on a heavy clay were boiled separately and also three others from a sandy loam. There was a difference in the time it took to make soup with individual samples of each lot, but the average was the same for both. This would mean that the kind of soil would seem to have no influence on the cooking qualities of field peas. But this was only the result of one year and should not be considered conclusive.

FLAX—TEST OF VARIETIES OR STRAINS

The two best special purpose varieties tried at Cap Rouge to date have been Longstem for fibre and Novelty for seed. There has been a lot of money made and as much or more lost growing flax, during the last few years, and farmers of the district are urged to go in slowly for this crop.

OATS—TEST OF VARIETIES OR STRAINS

Twenty-two varieties and strains of oats have been tested during the past thirteen years. Of these the very early and early sorts tested could not compete for yield with later ones, neither were " side " oats able to equal the ordinary open-headed varieties.

With regard to the hullness variety Liberty which was compared with Banner for five years, the latter would have to be more than 50 per cent hull to be as low a yielder of " meat " as Liberty. As Banner averages only about 30 to 32 per cent hull, it is clear that this variety, with us, is the more productive.

There is not a great difference between the three varieties Banner, Victory and Gold Rain, but as Gold Rain is somewhat coloured, which sometimes decreases its value on the market, Banner is recommended to be grown practically everywhere in central Quebec until something better is found.

The question of percentage of hull is an important one, as it is the yield of digestible nutrients per acre which really counts, and it must be admitted that Banner fails somewhat in this regard; but most of the Banner of to-day can certainly be improved for yield, as was conclusively shown at Cap Rouge (see next experiment) and it may be possible to isolate certain strains of it with a lower percentage of hull.

It would be a mistake indeed, now that efforts seem to be towards the limitation of the number of varieties, to recommend anything except Banner for central Quebec until another one has conclusively proven, after many years of carefully conducted experiments, that it is quite superior to it.

OATS—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION FROM OLD SORTS

In 1916, work with Banner oats was started and by 1921, the Cap Rouge selection, No. 31, was in the large trial plots. During the winter of that year the granary burned and with it all the grain with the exception of one pound samples which had been sent to the Dominion Cerealist, who kindly sent them back in the spring of 1922, when they were sown. The Cap Rouge selection (No. 31) of Banner has yielded higher than Victory, Banner O. 49, Gold Rain, Longfellow or Liberty for the two years 1921 and 1923, and this selection will be kept in the trial plots three more years to be absolutely certain that it is better adapted to central Quebec than the other strains and varieties before it will be offered for sale as seed.

COMMON SPRING WHEAT—TEST OF VARIETIES AND STRAINS

Wheat cannot be grown profitably in central Quebec for feeding live stock and whether one should have it on his farm or not depends principally on the price it can command for milling purposes. Of course, there may be places where oats would lodge and a short, strong variety of wheat would be preferable as a cover crop for clover and timothy; and there may be a chance to grow this cereal to be sold as seed, but these are rather exceptions to the general rule.

After testing twenty varieties and strains of common spring wheat during the last thirteen years, only six have been kept for future comparison. Of these, Huron, Bishop and Marquis were in the trial plots together eleven years where results indicate that Huron is the best adapted of the three for central Quebec and it is strongly recommended, especially that Cap Rouge selection which, with us, yields more than the one from Ottawa. The varieties discarded were Alpha, Bobs, Early Red Fife, Early Russian, Pioneer, Prelude, Preston, Prospect, Red Fife, White Fife, Yellow Cross. The Fifes were poor producing sorts and their use should certainly not be encouraged in the district. Very early varieties, such as Pioneer and Prelude, have never yielded as much as later ones and should only be grown in parts of the country where the season is short. Marquis has been advocated but it certainly cannot compare with Huron in central Quebec and most of the farmers who have tried both have stuck to the latter, which, though not producing the quality that Marquis will give, yields a slightly higher per cent of flour.

DETERMINATION OF PERCENTAGE OF HULL IN OAT VARIETIES

Not very many years ago, yields were given in bulk, but now everybody seems to be looking for the production of digestible nutrients per acre. This is why it is important to find the proportion of hull to kernel in oats, as it may range from twenty to forty-five per cent. Determinations for percentage of hull have been made with the following varieties but since the results are for

one year only, the figures must not be taken as conclusive: Alaska, 25·2 per cent; Gold Rain, 28·2; Wisconsin No. 19, 30·9; Victory, 31·7; Banner, Ottawa 49, 32·4; Longfellow, Ottawa 478, 32·6; average percentage, 30·2. Though Banner has a relatively high percentage of hull, according to the above figures, yet when the total yield of kernels is considered, it has produced more pounds per acre than any other variety except Gold Rain. The latter being coloured, which detracts from its market value, Banner may be considered as the one best suited to central Quebec.

Many well-informed men admit that there is no necessary correlation between per cent of kernel, shape of grain or weight per bushel. If strains with a lower percentage of hull could be isolated in varieties which have shown themselves well adapted for certain regions, it might be preferable to introducing varieties from outside sources. With breeds of live stock, selections are made within the breed for certain special requirements, and few would think of trying to find another breed in foreign countries to meet these requirements. The breeders of Holstein cattle have increased the percentage of fat and the breeders of Jerseys have increased the quantity of milk. Why could not breeders of grain increase the percentage of kernel in Banner oats?

COMMON SPRING WHEAT—PRODUCTION OF SUPERIOR VARIETIES OR STRAINS BY SELECTION FROM OLD SORTS

This work was started in 1913 and persons who are interested in the details are referred to the report from this Station for 1921-22. In 1918, there was enough seed of Huron, all from one plant chosen eight years previously, to sow a trial plot of one-sixtieth acre, and since then this selection has been compared for five years with the varieties and strains which, after twelve years of careful testing, have been kept as the best suited to conditions of central Quebec. In the following table no figures are given for 1922 because all grain was burned in the autumn of 1921 with the exception of one pound samples.

VARIETY AND STRAIN TESTS OF COMMON SPRING WHEAT, AVERAGE OF FIVE YEARS

Variety or Strain	Average	Days to mature
	Lbs.	
Huron, Cap Rouge 7	1,624	100
Bishop, Ottawa 8	1,500	97
Marquis, Ottawa 15	1,496	100
Chelsea, Ottawa 10	1,424	98
Huron, Ottawa 3	1,411	101
Ruby, Ottawa 623	1,342	93

Huron, Cap Rouge 7, was the highest yielder three years out of five and has shown such decided superiority that it will be offered for sale as registered seed, from the autumn of 1924. It has been ahead of Huron Ottawa 3 each one of the five years and yielded, on an average, over 3½ bushels more.

TESTS OF PEAS AND OATS IN COMBINATION FOR GRAIN

The object of the experiment was to find out if mixtures of peas and oats would give better yields of grain than when each was grown separately. Banner oats and Arthur peas are at present the leaders for yield in their respective classes and have matured within one day of each other, according to eleven years' test at Cap Rouge. There would also probably be more difference in

their feed requirements and in the places at which they take their food, than with most other combinations of ordinary grains. The following table gives figures for the four years during which the mixture was grown:—

A MIXTURE OF ARTHUR PEAS AND BANNER OATS COMPARED WITH ARTHUR PEAS AND BANNER OATS ALONE

Crop	Pounds of grain per acre				
	1913	1918	1919	1920	Average
Banner oats alone	2,340	1,410	2,580	2,340	2,167
Arthur peas alone	2,820	2,160	1,230	2,280	2,122
Mixture of Arthur peas and Banner oats	2,010	1,680	1,500	2,040	1,807

Both Arthur peas and Banner oats yielded more than the mixture, three years out of four, and the mixture, in no instance, gave as much grain as either one or the other of its components.

It is freely admitted that of any of the mixtures tried for grain production, the superintendent at Cap Rouge would rather use peas and oats, on account of their comparatively high protein content. But it is nevertheless true that peas alone will be better than any mixture, if a large production of protein per acre is looked for.

TESTS OF BARLEYS AND OATS IN COMBINATION FOR GRAIN

The object of the experiment was to see if a mixture of barley and oats would produce more grain per acre than each grown separately. In the following table, mixtures of barley and oats are compared with Manchurian barley and with Banner oats, the two varieties recommended for central Quebec in their respective class.

MIXTURES OF BARLEY AND OATS COMPARED WITH OATS AND BARLEY ALONE FOR GRAIN PRODUCTION

Crop	Pounds of grain per acre			
	1915	1917	1918	Average
Banner oats alone	2,404	2,040	1,410	1,951
Manchurian barley alone	1,942	1,440	1,890	1,757
Mixture of Duckbill barley and Banner oats	1,140	1,920	1,890	1,650
Mixture of Success barley and Eighty Day oats	1,320	1,740	1,620	1,560
Mixture of Manchurian barley and Daubeney oats	1,140	1,740	1,680	1,520

The above mixtures were chosen because the two cereals which composed each of them were the nearest available as to time of maturing. One of the main troubles, in central Quebec, in chosing varieties of oats and of barley to sow together, is that of obtaining a variety of barley late enough to come in at the same time as Banner oats.

The yield of grain per acre is about 12 per cent more for Banner oats than for the best mixture of barley and oats, but it must be admitted that barley with its 12 per cent more total digestible nutrients, would bring up the mixture, weight for weight, to 6 per cent above the feeding value of oats alone, admitting that the grain of each be in equal quantities in the mixture. This would, however, still leave the advantage to oats alone, which crop also contains a little more protein than does the mixture.

As stated elsewhere, there are two disadvantages in growing mixtures: farmers are inclined to use the threshed grain as it comes from the machine,

even if the proportion of each is not what it should be for the kind and class of animals to which it is being fed, and they are also liable to sow the mixture as harvested without seeing that the proportion of each kind of grain is what it should be for best results.

For central Quebec, there would appear to be no advantage in growing mixtures of our present varieties of barley and oats instead of good Banner oats alone.

TESTS OF BARLEY, OATS, AND WHEAT IN COMBINATION FOR GRAIN

The object of this experiment was to find out if a mixture of barley, oats, and wheat would give better yields than when each was grown separately. As oats produce more grain per acre, in central Quebec, than either barley or wheat, the following table compares this cereal with the mixture, for the three years during which the latter was grown.

A MIXTURE OF DUCKBILL BARLEY, BANNER OATS, HURON WHEAT COMPARED WITH BANNER OATS ALONE

Crop	Pounds of grain per acre			
	1918	1919	1920	Average
Banner oats alone	1,410	2,580	2,340	2,110
Mixture of Duckbill barley, Banner oats, and Huron wheat	1,950	1,200	2,220	1,790

The above mixture was chosen because Banner oats and Huron wheat were the two heaviest yielders in their respective class and also because they ripened, on an average, in about the same number of days. There is a difference of seven or eight days between the time of ripening of Duckbill barley, and the two other grains grown with it, and it is possible that a later maturing barley might have been more suitable. Even with this help the large difference in yield in favour of Banner oats could not have been overcome. On the other hand, if earlier maturing varieties of oats and of wheat were chosen, it would bring down the yield of the mixture, as these earlier varieties never produce as much grain per acre here as do others which take a longer time to mature. This is shown in the following table:—

A MIXTURE OF EARLY OATS AND WHEAT COMPARED WITH ONE OF LATER OATS AND WHEAT

Crop	Pounds of grain per acre			
	1915	1917	1918	Average
Mixture of Banner oats and Huron wheat	1,140	2,160	2,100	1,800
Mixture of Daubeney oats and Prelude wheat	690	1,500	1,110	1,100

It seems reasonable to expect that the Banner oat, which yields more than either Duckbill barley or Huron wheat, would suffer, thus bringing down the average for the mixture, when competing for growing room with other grains producing less.

Claims are made that individuals of different crops have a stimulating effect upon each other, but there is not much to prove this. There is, of course, a difference in feed requirements between different cereals, and especially a difference in the depth at which they take their food, but in this case at least, these differences were not large enough to offset the natural propensity of Banner oats alone to outyield the mixture in which it played only a secondary rôle.

MULTIPLICATION OF CEREALS

Variety tests of cereals are very important as they show which are the best for certain districts. But the good work should not stop there, as farmers will derive no direct benefit if they do not grow the ones which are the best yielders. This is why varieties, after showing their superiority in the trial plots, are multiplied and grown on larger areas which are free from weeds and other grains. The crop is thoroughly rogued on the field, carefully harvested, and what is offered for sale is put in sealed bags, after having been inspected officially by a representative of the Dominion Seed Branch. The number of farmers who consider the possibilities contained in well-bred seeds is yet too small. If the seeds be without potential possibilities, a part of the labour and money spent on the preparation of the land, the sowing, the harvesting and the threshing is wasted, because there lacked something vital to give a maximum crop. If a dairyman wrote to a breeder of Guernseys and asked him for his lowest-priced bull to head his herd, everybody would say that he was taking the right way to lose money. And still, many people only look at the price, and seem to care nothing about what is back of the seeds which they are buying.

As a general proposition, it can be said that too much labour and money are spent in raising unprofitable crops of grain, and a time is bound to come when farmers will look a great deal more carefully into the breeding of the seeds which they use.

SEED SELECTION—COMPARISON OF SELECTED AND UNSELECTED SEED

Seed may be of a good variety and still be below the average for yield, if it has not been kept pure or reselected after becoming mixed. It is as it would be with dairy cattle; a man might have a herd of Ayrshires, but if he did not use animals from heavy milkers, it is probable that less money would be made from them than from a lot of grades. This fact led to an experiment started in 1923, comparing good No. 1 feed oats with well-known varieties and strains. The results are only for one year and should by no means be taken as conclusive. They have a tendency to show, however, that seed must not only be of a certain variety, but must be from a well-selected line; as an Ayrshire bull must not only be of that pure breed, but must be from selected stock. This is a very important question, and one which has received much attention in Canada during the past twenty years. As a result farmers are now able to buy pure Registered seed of approved strains instead of the mixtures which formerly were the rule.

INVESTIGATION OF METHODS OF OBTAINING ACCURATE DATA IN VARIETY TESTING

The object of this experiment is to determine a method of plot testing that will reduce experimental error. In 1923, the two outside rows, also the two rows next to the outside ones, were cut separately and the weight of grain and of straw taken, for the six varieties and strains of spring wheat grown in the trial plots.

The results of one year, at one place, on one kind of soil, with one cereal, show that the respective yields would not have been the same if only the seven inside rows had been taken instead of the full eleven of the seeder. The results may or may not be the same after five years, due to seasonal changes of temperature, precipitation and sunshine; they may or may not be the same elsewhere, or even on the Cap Rouge Station on a different kind of soil; they may or may not be the same with another cereal, or with plots of different shapes, or with alleys of different widths, or with cultivation in the alleys between the plots. All this requires further investigation.

FORAGE CROPS

INDIAN CORN—VARIETY TESTS FOR ENSILAGE PURPOSES

For ten years, thirty-seven varieties and strains of Indian corn have been tested for ensilage purposes. It was soon found out that, for central Quebec, the small early maturing varieties did not give enough tonnage and the following were dropped: Canada Yellow, Ninety Day, Free Press, Gehu, Quebec Yellow, Early Malcolm, Twitchell's Pride, Yellow Flint. It is a question if any of these will be profitable anywhere for ensilage purposes, as when they are the only varieties of corn which can be grown in a district, it is better to use either sunflowers or a mixture of oats and peas, or of oats, peas and vetches.

After testing a few years more, the question arose as to the digestible nutrients per acre rather than tonnage alone. There are still a few controversial questions about corn: some contend that a variety which will produce ears in the glazed stage in a district may be made, by thick planting, not to produce any ears, and thereby yield more dry matter per acre than if the tonnage were reduced and ears grown; others think that the larger and later varieties will produce so much more tonnage than early varieties, that the total dry matter per acre will be greater. This is why dents are compared with flints and an analysis is made of a composite sample of each variety tested each year.

Though a table giving details for the varieties and strains tested during 1923 would be interesting, it might possibly be misleading, as in this year, the season was unusually backward. The following table, however, gives information with regard to the seven varieties which have proved the best over a long period of years.

VARIETY TESTS OF CORN FOR SILAGE AT CAP ROUGE—SEVEN YEARS

Variety	Class	Pounds of Corn per Acre, just before ensiling								Per cent Dry Matter	Dry Matter per acre
		1915	1917	1919	1920	1921	1922	1923	Average		
											Lb.
Wisconsin No. 7.....	Dent	18,750	33,896	24,900	26,721	55,452	37,857	24,279	31,694	23·88	7,569
Leaming.....	"	15,250	30,688	21,975	26,130	70,553	33,762	20,749	31,301	22·54	7,055
Longfellow.....	Flint	14,150	20,654	23,325	28,813	50,205	36,579	36,872	30,085	22·81	6,868
White Cap Yellow Dent.....	Dent	15,300	26,035	21,750	24,436	62,277	36,377	20,101	29,468	23·28	6,860
North Dakota.....	Flint	15,750	21,860	25,875	22,322	49,944	33,845	34,404	29,143	23·28	6,785
Bailey.....	Dent	18,300	37,521	26,625	33,382	52,301	35,168	19,452	31,821	20·70	6,587
Compton Early.....	Flint	14,750	22,297	18,075	20,605	50,070	36,612	34,229	28,091	20·98	5,893

The last analysis of which figures were available at the time of writing this report was made by Dr. Shutt, Dominion Chemist, on samples grown at Cap Rouge in 1922, and it was used in the above table. It will be remarked that the different varieties do not hold the same position for yield of green corn and of dry matter per acre and this is a very important point indeed. A few more years will no doubt bring interesting information, especially if feeding trials show a difference of digestibility in the dry matter between the flints and the dents.

Pending this, it is safer to grow Longfellow in central Quebec, especially in the northern part, and if a dent variety is to be tried, Leaming would be a good one. Possibly, in the more southern districts, the two might be grown and give good results, especially if a couple of loads of each is alternately cut into the silo.

INDIAN CORN—VARIETY TESTS FOR THE PRODUCTION OF SEED

Is it possible and profitable to grow Indian corn for grain production in central Quebec? This is the problem on which the project is to throw light. In testing corn for ensilage purposes, since 1913, it was found that certain varieties did not yield enough forage, though they matured grain practically each year. These were taken out of tests for ensilage purposes and are now used in the tests for grain production. The following table gives details for two years only, so that the results must certainly not be taken as conclusive:—

VARIETY TESTS OF INDIAN CORN FOR GRAIN PRODUCTION—1922 AND 1923

Variety or Strain	1922			1923			Two years
	Date sown	Date cut	Pounds of grain per acre	Date sown	Date cut	Pounds of grain per acre	Pounds of grain per acre
Twitchell's Pride Fredericton	May 16...	Sept. 16..	3,417	May 19...	Oct. 26...	1,452	2,434
Twitchell's Pride, Cap Rouge	" 16...	" 15..	3,311	" 19...	" 26...	1,379	2,345
Yellow Flint, Ste. Anne	" 16...	" 19..	3,387	" 19...	" 26...	1,236	2,311
Wisconsin No. 25	" 16...	" 21..	3,464	" 19...	" 26...	1,002	2,233
Quebec Yellow 12, Cap Rouge	" 16...	" 19..	3,004	" 19...	" 26...	1,210	2,157
Quebec No. 28	" 16...	" 19..	2,452	" 19...	" 26...	1,010	1,731

It seems only a few years since Quebec No. 28 was supposed to be the right thing for grain production in this district, and now it is at the bottom of the list. There is no doubt that corn could be bred to yield fifty bushels per acre for an average of five or more years, and it would then be a profitable crop in many cases.

INDIAN CORN—ACCLIMATIZATION EXPERIMENTS

Early in 1923, the Wisconsin Station kindly sent us their cold-resistant Golden Glow corn which had been obtained by germinating in an ice box. This corn, according to Prof. B. D. Leith, can be planted from ten days to two weeks earlier than ordinary corn. It was sown nearly a month before the usual time in this district, alongside of a Cap Rouge selection of Longfellow, and the accompanying table gives details.

Variety and Origin	First seeding									Second seeding									Number of ears well filled
	Date of seeding	Number of kernels sown	Number of hills	Date of germination	Number of kernels germinated	Per cent of germination	Number of plants after thinning	Number of suckers at harvest	Number of ears	Date of seeding	Number of kernels sown	Number of hills	Date of germination	Number of kernels germinated	Per cent of germination	Number of plants after thinning	Number of suckers at harvest	Number of ears	
Golden Glow—Wisconsin....	May 2	32	8	May 16	21	66	18	3	22	May 12	40	10	May 23	30	75	26	2	30	3
Longfellow—Cap Rouge.....	"	32	8	"	30	94	23	13	41	"	36	9	"	36	100	27	14	49	36

The spring of 1923, though very late, was fine after the season finally opened and it is possible that the cold-resistant Golden Glow will show up better under usual (adverse) circumstances, that is, a cold, raw, early May.

It would no doubt be a great boon to dairymen of central Quebec if they could sow corn for silage two or three weeks earlier than they now do, as larger, more productive varieties might be used.

SUNFLOWERS—VARIETY TESTS FOR YIELD AND PURITY

There are districts where corn will not yield enough and where sunflowers do well, so that it is important to find out what variety or strain of sunflower will produce most. Unfortunately, there are no pure varieties of sunflowers, but as they are sold under different names, information will be furnished according to these names. The accompanying table gives details for 1923, the year when this project was started at Cap Rouge.

The consensus of opinion, to date, is that sunflowers, though valuable for ensilage purposes where corn is not successful, are not as desirable as the latter for districts where both do well.

VARIETY AND STRAIN TEST OF SUNFLOWERS, 1923

Variety or strain	Source	Type of Growth		Date cut	Per cent in blossom when cut	Yield per acre
		Per cent single stem	Per cent multi-branching			Pounds
Mammoth Russian	McDonald	92	8	Sept. 25	79	28,713
Giant Russian	Disco	95	5	" 25	79	27,068
Giant Russian	Can. Pacific Ry.	81	19	" 4	7	21,074
Mixed	"	88	12	Aug. 24	70	20,989
Black	"	95	5	" 24	70	18,834
Ottawa 76	C. E. F.	93	7	Sept. 4	71	17,187
Mantica	Can. Pacific Ry.	86	14	Aug. 24	74	14,561
Manchurian 87/352	McKenzie	92	8	" 24	62	14,139
Mixed Mennonite	Rosthern	87	13	" 23	99	13,617

MANGELS—VARIETY TESTS FOR YIELD AND PURITY

Mangels do not come well in central Quebec except on very limited areas of naturally-drained, rich, alluvial soils, and data carefully gathered at Cap Rouge show that a ton of dry matter costs considerably more than in swede turnips. Nevertheless, forty-four varieties and strains have been tested since 1911, and the following table compares one of each class, for a seven-year period.

VARIETY TEST OF MANGELS AT CAP ROUGE—SEVEN YEARS

Variety	Type	Pounds of mangels per acre								Per cent dry matter	Dry matter per acre
		1913	1914	1915	1920	1921	1922	1923	Average		
											Lb.
Giant Yellow Intermediate	Intermediate	4,890	24,550	475	40,679	38,580	21,563	23,695	22,062	11·87	2,619
Half Sugar White	Sugar	5,894	20,500	100	31,100	44,221	30,254	17,490	21,366	10·70	2,286
Long Red Mammoth	Long	3,434	18,100	250	44,917	40,432	24,613	28,297	22,863	9·74	2,227
Golden Tankard	Tankard	2,700	12,550	500	29,731	40,332	21,692	24,010	18,788	10·54	1,980
Giant Yellow Globe	Globe	4,140	7,700	450	35,235	42,126	20,274	23,940	19,124	7·02	1,343

The per cent of dry matter is from the Dominion Chemist, but samples are now taken of each variety and strain tested, so that figures will hereafter be available for roots grown at Cap Rouge. There is a wide variation in the

dry matter content of Giant Yellow Globe and Giant Yellow Intermediate, which shows that taking tonnage alone is rather misleading from the feeder's point of view.

In 1923, a large amount of work was done to find out, by actual measurements and by careful examination, how true to name the different varieties were. The average for the twenty tested was about 70 per cent, and the range, between 34 per cent and 94 per cent. This is not enough and the sooner there is improvement, the better. If a farmer, according to reports of the Experimental Farms, buys seed of Yellow Intermediate because it yields nearly twice as much dry matter per acre as Yellow Globe, and if he gets 66 per cent of Yellow Globes instead of about 100 per cent of Yellow Intermediates, he is not much further advanced than had he never read a report from the Experimental Farms.

CARROTS—VARIETY TESTS FOR YIELD AND PURITY

Over twenty-five varieties and strains of field carrots have been tested during the last thirteen years. A large proportion were not true to name so that the results have not as much weight as had the contrary been true. For instance, if over 50 per cent of the roots of a variety bought under the name of Short White are long instead of short, figures giving yields are not worth much. Out of the different types tested, long, intermediate, and short, the first mentioned did not seem as well adapted as the two others to the rather shallow, sandy loam where the trial plots were, and the whites yielded more, in general, than the coloured sorts.

The roots are now counted in each plot and the number of each type entered, which will help in finding out the best. The following table is offered to those who like to have details, but its limitations, as above mentioned, should be borne in mind.

VARIETY TEST OF FIELD CARROTS AT CAP ROUGE—ELEVEN YEARS

Variety	Type	11-year average per acre	Per cent dry matter	Average dry matter per acre
		Pounds		Pounds
Mammoth Short White	Short	23,917	10·37	2,480
White Belgian	Long	22,343	9·49	2,120
Mammoth White Intermediate	Intermediate	22,317	8·99	2,006

The per cent of dry matter was taken from a report of the Dominion Chemist, but, in future, samples of each variety or strain grown at Cap Rouge will be analysed so that figures will relate exactly to the roots grown here.

As mentioned in the two previous reports of this Station, field carrots have very little importance in central Quebec and farmers should only grow them in limited quantities, to be fed to horses, because a ton of dry matter from this source costs too much.

SWEDES—VARIETY TESTS FOR YIELD AND PURITY

Since 1911, some ninety varieties and strains of swede turnips have been tested of different types, such as purple top oval, purple top globe, bronze top oval, bronze top globe, green top oval. The purple top ovals have, in general, furnished the largest tonnage per acre, with Good Luck heading the lot. The following table gives information about four which have been tested together for nine seasons.

VARIETY TEST OF SWEDE TURNIPS AT CAP ROUGE—NINE YEARS

Variety	Type	Pounds of Swedes per acre										Per cent dry matter	Average dry matter per acre
		1911	1912	1913	1914	1917	1919	1921	1922	1923	Average		
													Lb.
Good Luck	Purple top oval	53,122	23,265	43,600	64,950	31,800	16,575	41,424	34,517	49,569	39,869	13·33	5,315
Bangholm	Purple top oval	43,639	24,585	33,750	49,525	27,000	18,525	58,654	45,102	52,370	39,239	13·45	5,278
Magnum Bonum	Purple top oval	49,344	19,965	46,400	62,725	27,800	14,820	38,069	40,571	30,261	37,773	12·69	4,793
Mammoth Clyde	Purple top round	44,949	22,440	40,900	60,275	31,900	16,380	34,425	41,002	27,822	35,566	12·26	4,360

The percentages of dry matter were taken from a report of Dr. Shutt, but, beginning with 1923, composite samples from the roots actually grown in the trial plots are to be sent to Ottawa.

Swede turnips, at Cap Rouge, on a none too fertile sandy loam, have produced more dry matter per acre than carrots, mangels, or turnips, and are certainly the best class of roots to grow, where and when it is advisable to grow roots.

ALFALFA—VARIETY TESTS FOR HARDINESS, YIELD AND SUITABILITY

This was not what might be called a variety test, but rather a question of eliminating, from a sample of Grimm, the plants which were not hardy enough to withstand the winters of central Quebec. There is really only one kind of alfalfa seed to buy, for farmers of any district, and it is the one produced in the locality where it is to be seeded, or a district with about an equal rainfall, distributed similarly throughout the season and with something like the same ranges of temperature. Testing seed for germination may be useful but, in this case, it means nothing if ninety per cent of the seeds produce plants and then seventy-five per cent of these plants die during the first winter.

In 1915, a small quantity of Grimm was procured from the Dominion Agrostologist and sown in an unprotected spot where not much snow remains on the ground early in the season. In 1916 seed was gathered and on April 12, 1917, it was sown in flats which were placed in hotbeds. On June 7, 600 plants were set out, leaving enough space between them so that they could easily be examined. Since then seed has been gathered from the best plants—from a hay production point of view—from among those which were hardy enough to withstand the rigours of winter.

It is proposed to multiply the seed as fast as possible, and though, of course, it will not be genetically pure, it will be hardy and suitable to the requirements of most soils of the district. So-called varieties, and other strains, will, later on, be compared with this selection.

RED CLOVER—BROADCAST VERSUS ROW SEEDING FOR THE PRODUCTION OF SEED

This project was started in 1920, but unfortunately, the crop of 1921 was destroyed by fire before the different lots were threshed. Another seeding had been made, however, in 1921 so that figures are available for the crop of 1922 only, as no work was done in 1922 on this project.

BROADCAST VERSUS ROWS FOR RED CLOVER SEED PRODUCTION

How sown	How cut	Date of cutting for seed production	Yield of Seed, entering 100 for ordinary method of growing it
Broadcast	First crop for hay, second for seed	Sept. 2	100·0
Broadcast	First crop for seed	July 31	142·9
In rows 12 inches apart	First crop for seed	July 31	114·1
In rows 24 inches apart	First crop for seed	July 31	89·8

The above figures are only given as an interim report, for the result of one year's work on one kind of soil (rather poor, sandy loam) should by no means be taken as conclusive. The experiment will be continued for at least four years more, so that data may be had for five seasons. Results elsewhere seem to show that seeding in rows will give more seed per acre, but the quantity of straw will undoubtedly be less, and the seeding of clover will probably

have to be made with a separate machine, perhaps by hand, which will take more time and money. It would thus be advisable to keep on with whatever method has been used and has given satisfaction, until more light is thrown upon the subject.

RED CLOVER—SEED GROWING VERSUS HAY FOR PROFIT

That the red clover seed required in Canada should be grown in the country, in order to obtain the best crops of hay, is generally admitted, and it is to be hoped that means will soon be taken to colour foreign seed so that farmers may know exactly what they are buying. But all districts in Canada are not equally suitable for the production of red clover seed and the present project was started at Cap Rouge to see if this would be a profitable venture for farmers of central Quebec. The following table gives results for two years only and the conclusions reached should not be taken as final. In studying the results of this experiment, as usual, the reader should use his own judgment and adjust the figures in accord with his own circumstances and neighbourhood conditions. For instance, it seems clear that in 1921 and in 1922, a man near a city, who could have had hay to sell, would have lost money in growing clover seed.

Year	Two Crops for Hay									One Crop for Hay and One Crop for Seed											
	Date of first cutting	Weight per acre of cured hay from first cutting	Price of hay per ton	Value of first crop per acre	Date of second cutting	Weight per acre of cured hay from second cutting	Price of hay per ton	Value of second crop per acre	Value of the two crops per acre	Date of first cutting for hay	Weight per acre of cured hay from first cutting	Price of hay per ton	Value of first crop per acre	Date of second cutting for seed	Weight per acre of seed from second cutting	Price of seed per pound	Value of seed per acre	Weight per acre of straw from second cutting	Estimated price, after analysis, of straw per ton	Value of straw per acre	Value of three crops per acre
			$ cts.	$ cts.			$ cts.	$ cts.	$ cts.			$ cts.	$ cts.			$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1921.....	July 5	1,291	28 00	18 07	Sept 16	3,386	33 00	55 87	73 94	June 16	608	21 00	6 38	Sept.17	71·4	0 38	27 13	1,899	12 07	11 46	44 97
1922.....	July 3	3,000	23 00	34 50	Aug. 26	1,687	18 00	15 18	49 68	June 22	2,195	17 25	18 93	Sept. 2	60·0	0 28	16 80	1,645	9 92	8 15	42 40
Average for 2 years...	.....	2,145	25 50	26 28	.....	2,536	25 50	35 52	61 81	.....	1,401	19 12	12 65	.....	65·7	0 33	21 96	1,772	10 99	9 80	43 68

In the above table, actual prices were entered at which clover hay and clover seed sold in the district of Quebec at the time of harvest. The most difficult matter was to value the clover straw after the seed was threshed. Dr. Shutt, Dominion Chemist, took the matter in hand. Samples were sent to him of the hay of every crop, also of the straw, and complete analyses were made. The Dominion Chemist sums up the question as follows:—

"In any comparison of the feeding value of threshed and unthreshed clover hay it must be borne in mind that the figures given are approximations only; a number of factors enter into the calculation the value of which can only be regarded as estimations.

"For the purpose of this comparison we have averaged the results from the analysis of the 1921 and 1922 samples, threshed and unthreshed.

"Assuming the market value of unthreshed clover hay at $20 per ton, we conclude that the threshed clover hay would be worth about $11.50 per ton.

"This latter figure is perhaps somewhat higher than would have been arrived at if comparative digestibilities of the two classes of hay could have been accurately guaged—undoubtedly the higher fibre content of the more fully ripened threshed hay would depress the digestibility to a greater degree than we have recognized in our calculation—which has been made chiefly on the relative protein content.

"We are of the opinion that the great difference in feeding value between threshed and unthreshed clover hay is by no means entirely due to the removal of the seed; the threshed hay has no doubt lost in addition to its seed much leaf material particularly rich in protein and low in fibre. The threshed hay represents more fully ripened material and therefore material of lower digestibility."

The experiment will be continued for at least three years more, after which the data can be discussed more fully.

ANNUAL HAY CROPS—TEST OF GRAIN VARIETIES FOR YIELD AND SUITABILITY

During five seasons, 1915-18 and 1920 a comparison was made of three different varieties of oats, also of mixtures of peas and oats, and of vetches and oats, with clover and timothy hay, and the results are herewith summarized:—

Crop	Protein per acre	Digestible nutrients per acre
	Pounds	Pounds
Banner oats and Arthur peas	507·0	2,980·7
Banner oats and vetches	486·0	3,317·0
Victory oats	342·4	3,530·1
Gold Rain oats	332·6	3,429·9
Banner oats	280·3	2,889·8
Clover and timothy hay	87·2	2,162·2

It seems reasonable to admit that the mixture of Banner oats and Arthur peas is more valuable for live stock feeding, on account of its large yield of protein per acre, than Victory oats, though the latter produced more digestible nutrients. This is why the test of oat varieties for hay was continued and also why, beginning with 1924, a test of varieties of peas for hay will be commenced. After a few years, the two best varieties, one of oats and one of peas, will be grown in a mixture and compared with Banner and Arthur.

The following table shows how three well-known varieties of oats compare for hay production:—

OATS—TESTS OF VARIETIES FOR HAY—SEVEN YEARS

Variety of Oats	Yield of Cured Hay per acre, in pounds							
	1915	1916	1917	1918	1920	1922	1923	Average
Victory	6,120	7,920	7,560	8,820	7,620	9,000	3,075	7 159
Gold Rain	7,200	7,440	6,840	7,860	7,620	8,125	4,875	7,137
Banner	4,440	5,940	5,760	7,500	7,500	9,625	5,725	6,641

Sowing peas and oats, or oats alone, for hay production is not recommended as a general proposition, because the digestible nutrients will probably cost more per ton than in clover and timothy, but when meadows are winter-killed or are very poor for one reason or another, it is certainly advisable to grow a crop of annual hay.

Summary.—(1) From a live stock feeding point of view, a hay mixture of peas and oats is more valuable than oats alone; (2) Victory was the highest yielder of the three varieties of oats tried, but Banner gave very good results.

EXPERIMENTAL PROJECTS UNDER WAY AT THE EXPERIMENTAL STATION, CAP ROUGE, QUE.

ANIMAL HUSBANDRY

DAIRY CATTLE

PROJECT No.	TITLE
A. 36.	Iufluence of feeding concentrates at different rates to dairy cows.
A. 59.	Cost of rearing dairy-bred calves and heifers.
A. 261.	Whole milk vs. skim-milk and substitutes for calves.
A. 262.	Skim-milk vs. milk substitutes for calves.
A. 263.	Influence of sire on dairy herd.
A. 264.	Influence of feed on dairy-bred calves.
A. 265.	Studies in methods of breeding dairy cattle.
A. 266.	Influence of winter housing of dairy-bred heifers.

HORSES

A. 294.	Cost of rearing horses.
A. 299.	Wintering idle work horses.
A. 330.	Wintering colts in cheap sheds.
A. 331.	Feed cost of maintaining work horses.
A. 332.	Work vs. no work for pregnant mares.
A. 333.	Rearing fall foals.
A. 334.	Comparison of different breeding methods.

SHEEP

A. 311.	Cost of maintaining breeding ewes.
A. 319.	To determine if prolificacy is hereditary.
A. 320.	Rearing lambs in open-fronted sheds.

FIELD HUSBANDRY

ROTATION EXPERIMENTS

F. 3.	Three-year rotation—Roots; oats; clover.
F. 12.	Four-year rotation—Roots; oats; clover; timothy.
F. 32.	Five-year rotation—Roots; oats; clover; oats; clover.
F. 42.	Six-year rotation—Roots; oats; clover; timothy; timothy; timothy.

CULTURAL EXPERIMENTS

Project No.	Title
F. 49.	Preparation of land for silage crops.
F. 57.	Growing corn in drills vs. hills.
F. 58.	Rates of seeding grain crops.
F. 59.	Rates of seeding hay crops.
F. 61.	Rates of seeding and kind of nurse crop.

FARM MANAGEMENT EXPERIMENTS

F. 88.	Yield and profit from root and silage crops.
F. 90.	Cost of operating tractor.
F. 91.	Cost of producing farm crops.

HORTICULTURE

POMOLOGY

H. 3.	Currant, breeding
H. 4.	Currant, variety experiment.
H. 5.	Gooseberry, breeding.
H. 6.	Gooseberry, variety experiment.
H. 8.	Raspberry, breeding
H. 11.	Raspberry, variety experiment.
H. 13.	Strawberry, breeding.
H. 16.	Strawberry, hill system vs. matted row.
H. 21.	Strawberry, variety experiment.
H. 22.	Apple breeding.
H. 26.	Apple fertilizer and cover crop experiment.
H. 30.	Apple orchard, cost of establishing.
H. 33.	Apple, variety experiment.
H. 35.	Cherry, variety experiment.
H. 37.	Grape, breeding.
H. 40.	Grape, variety.
H. 44.	Pear, variety experiment.
H. 45.	Plum, breeding.
H. 48.	Plum, variety experiment.

VEGETABLE GARDENING

H. 52.	Asparagus, breeding.
H. 53.	Asparagus, distances of planting.
H. 54.	Asparagus, variety experiment.
H. 56.	Bean, breeding for yield.
H. 57.	Bean, of different seasons, vs. one variety planted at different dates.
H. 61.	Bean, variety experiment.
H. 64.	Beet, breeding for trueness to type.
H. 67.	Beet, thinning experiment.
H. 68.	Beet, variety experiment.
H. 71.	Cabbage, breeding for trueness to type.
H. 75.	Cabbage, protection from root maggot.
H. 77.	Cabbage, variety experiment.
H. 78.	Carrot, breeding for trueness to type.
H. 82.	Carrot, thinning experiment.
H. 83.	Carrot, variety experiment.
H. 86.	Cauliflower, protection from root maggot.
H. 87.	Cauliflower, protection from weather.
H. 88.	Cauliflower, variety experiment.
H. 90.	Celery, blanching experiment.
H. 89.	Celery, breeding for trueness to type.
H. 94.	Celery, variety experiment.
H. 96.	Corn, breeding for trueness to type.
H. 418.	Corn of different seasons, vs. one variety planted at different dates.
H. 102.	Cucumber, variety experiment.
H. 122.	Melon, Musk, variety experiment.
H. 125.	Melon, Water, variety experiment.
H. 128.	Onion, breeding for trueness to type.
H. 134.	Onion, seed vs. sets.
H. 136.	Onion, thinning experiment.
H. 135.	Onion, sets, best size for planting.
H. 138.	Onion, variety experiment.

Project No.	Title
H. 141.	Parsnip, breeding for trueness to type.
H. 144.	Parsnip, thinning experiment.
H. 147.	Pea, breeding for yield.
H. 150.	Pea, of different seasons, vs. one variety planted at different dates.
H. 153.	Pea, variety experiment.
H. 158.	Potato, beetle control.
H. 164.	Potato, different sizes of sets.
H. 171.	Potato, hill selection for seed.
H. 180.	Potato, seed treated with plaster vs. not treated.
H. 186.	Potato, variety experiment.
H. 188.	Pumpkin, variety experiment.
H. 194.	Rhubarb, forcing.
H. 195.	Rhubarb, variety experiment.
H. 201.	Squash, variety experiment.
H. 204.	Tomato, breeding for earliness.
H. 206.	Tomato, methods of ripening green fruit.
H. 207.	Tomato, methods of training.
H. 210.	Tomato, transplanting one or more times.
H. 211.	Tomato, variety experiment.
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H. 214.	Turnip, variety experiment.
H. 218.	Vegetable seed; autumn vs. spring seeding.

ORNAMENTAL GARDENING

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H. 274.	Herbaceous perennial, variety experiment.
H. 307.	Tree and shrubs, ornamental and shelter, variety experiment.
H. 298.	Hedges, variety experiment.
H. 302.	Roses, variety experiment.

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Ce. 5.	Oats. Test of varieties or strains.
Ce. 6.	Barley. Test of varieties or strains.
Ce. 7.	Field peas. Test of varieties or strains.
Ce. 8.	Field beans. Test of varieties or strains.
Ce. 9.	Flax. Test of varieties or strains.
Ce. 13.	Common spring wheat. Production of superior varieties or strains by selection from old sorts.
Ce. 17.	Oats. Production of superior varieties or strains by selection from old sorts.
Ce. 18.	Barley. Production of superior varieties or strains by selection from old sorts.
Ce. 19.	Field peas. Production of superior varieties or strains by selection from old sorts.
Ce. 50.	Multiplication of cereals.
Ce. 51.	Importation and testing of foreign varieties of cereals.
Ce. 52.	Determination of percentage hull in oat varieties.
Ce. 59.	Tests of peas and oats in combination for grain.
Ce. 60.	Tests of barleys and oats in combination for grain.
Ce. 61.	Tests of barley, oats and wheat in combination for grain.
Ce. 74.	Investigation of methods of obtaining accurate data in variety testing.
Ce. 76.	Seed selection. Comparison of selected and unselected seeds.
Ce. 77.	Cooking tests of varieties of peas.
Ce. 78.	Cooking tests of peas grown on different soils.

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Ag. 2.	Indian corn, variety tests for the production of grain.
Ag. 6.	Indian corn, acclimatization experiments.
Ag. 7.	Indian corn, breeding.
Ag. 16.	Mangels, variety tests for yield and purity.
Ag. 36.	Carrots, variety tests for yield and purity.
Ag. 46.	Turnips, variety tests for yield and purity.
Ag. 51.	Swedes, variety tests for yield and purity.
Ag. 52.	Swedes, breeding of pure strains.
Ag. 66.	Sugar beets, variety tests for yield and purity.
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Project No.	Title
Ag. 86.	Breeding improved strains of timothy.
Ag. 91.	Breeding improved strains of red top.
Ag. 114.	Breeding improved strains of red clover.
Ag. 115.	Breeding improved strains of alsike clover.
Ag. 126.	Alfalfa, variety tests, hardiness, yield, suitability.
Ag. 146.	Red clover, variety tests for yield and general suitability.
Ag. 148.	Red clover, rows vs. broadcast for seed production.
Ag. 150.	Red clover, cutting at different dates for seed.
Ag. 151.	Red clover, seed growing vs. hay for profit (Combination AG and F.H.)
Ag. 161.	Sweet clover, variety tests.
Ag. 178.	Alsike clover, variety tests.
Ag. 201.	Timothy, variety tests for yield and purity.
Ag. 206.	Timothy, rates of seeding.
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Ag. 241.	(a) Grain varieties, variety tests for yield and suitability.
Ag. 258E.	Hay and pasture mixtures experiment, mixed clover as a base.

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C. 40.	Basic slag experiment, 1923.
C. 10.	Sugar beet investigation.
C. 11.	Agricultural meteorology.

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P. 48.	Best date for marketing surplus stock.
	Exp. (a). Culled hens.
P. 56.	Pedigree breeding for egg production. (B.R.)
P. 60.	Pullets vs. hens for egg production.
P. 74.	Temperature of houses of different depths.
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