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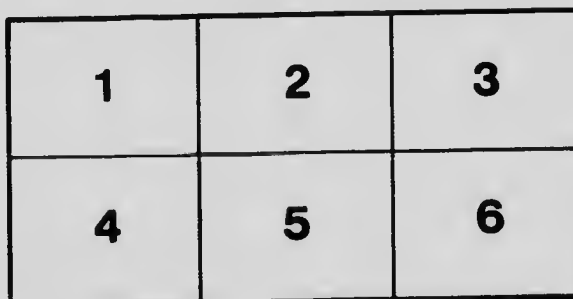
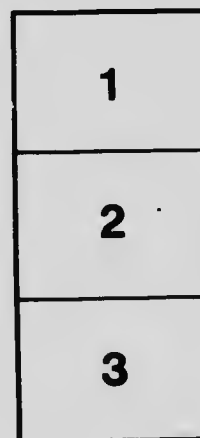
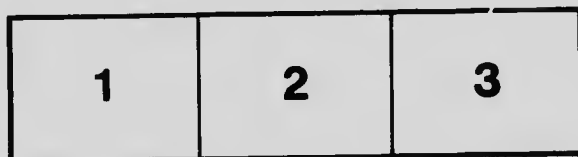
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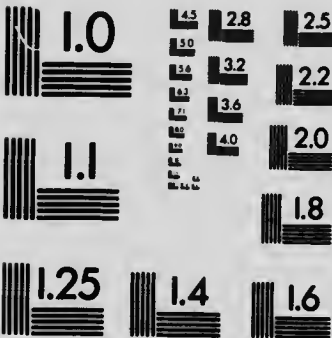
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# Ontario Department of Agriculture

ONTARIO AGRICULTURAL COLLEGE

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## Results of Co-Operative Experiments with Farm Crops, Sources of Seed and Production of Food Materials

C. A. Zavitz, W. J. Squirrell and A. W. Mason.

### INTRODUCTION.

The farm at the Ontario Agricultural College, Guelph, consists of seven hundred and seventeen acres. Of this area, seventy-five acres are used for experiments in Field Husbandry. This is divided into about 2,500 plots, from which definite yields are determined. In addition to these plots, certain areas are devoted to plant breeding work, where thousands of plants are studied individually. Experiments are being conducted with varieties of grain, root, tuber, grass, clover, fodder, silage and other crops, with artificial, green, and barnyard manures; with methods of cultivation, selection of seed, dates of seeding, mixtures of grains, pasture grasses, etc. All experiments are conducted under as near average farm conditions as possible, in regard to rotation of crops, manuring, etc., and are repeated for at least five years before they are dropped, and many of them are continued for a much longer period of time.

Based on the work of the field experiments at the Ontario Agricultural College, a system of co-operative experiments has been inaugurated throughout Ontario. This work has been carried out through the medium of the Ontario Agricultural and Experimental Union. Thirty-nine years ago the Experimental Union was organized by the students, ex-students and officers of the Ontario Agricultural College. From that time to the present, a meeting has been held each year, for the discussion of the questions which come before the Association. Very shortly after the Union was established, co-operative experiments were started in a small way. In 1886, however, the co-operative work was started under the present plan, but with only twelve experimenters the first year. From that small beginning, it has gradually developed, until it has become one of the most influential forces in the organized agriculture of Ontario. Many of the farm crops, which are now the most extensively grown throughout the Province, were introduced to the public through the medium of the Experimental Union. The work has included not only those who have been directly associated with the Agricultural College, but thousands of other practical farmers located throughout the Province.

The increase in the number of experimenters in agriculture can be seen from the following figures, which show the average yearly number actually engaged in the work in each of four eight-year periods:

Periods.	Years.	Average number of Experimenters per Annum.
1886-1893.....	8	315
1894-1901.....	8	2,608
1902-1909.....	8	3,882
1910-1917.....	8	4,282

The total number of distinct tests made throughout the Province, in agriculture alone, during the past thirty-two years has been 88,604. The number of experimenters in the past year was 4,299. Even though labor is exceptionally scarce at the present time, the number of experimenters in the past year was greater than that of the previous year. The farmers seem particularly anxious to secure pure seed of the best varieties of farm crops as foundation material, and to keep in touch with the most improved methods of crop production.

Since our last meeting, co-operative experiments have been conducted throughout Ontario with varieties of farm crops, quantities of seed per acre, mixed grains for grain production and for fodder, the application of commercial fertilizers, the eradication of weeds, the testing of cattle for tuberculosis, the re-forestation of waste places, etc.

The past three years have been abnormal for crop production in Ontario. There was an exceptionally large amount of rainfall in July and August, 1915, May and June, 1916, and June and July, 1917; in fact, in June and July of the past year there was no less than 13.94 inches of rain on the level, which is a larger amount than that of any two consecutive months in the last eighteen years, according to the records made in the Department of Agricultural Physics at the College.

The farmers of Ontario, to the number of over four thousand, who conducted co-operative experiments upon their own farms in the past year, not only did work of real service for themselves, but also furnished most valuable object lessons and practical results of special importance to the other farmers of the Province. We believe that the influence of this Association will be even greater in the future than it has been in the past. With the present urgent demands of the agriculture of the Province, the Experimental Union will fill an important place. New lines of enquiry are sure to develop, and will undoubtedly receive the close attention of the various committees appointed to carry forward the active work of the Association in the months and the years which are to follow.

This bulletin contains the report for the past year of the co-operative experiments in agriculture, including certain references to results of experiments conducted at the Ontario Agricultural College, and also of co-operative experiments carried out in former years. It also includes information on Sources of Farm Seed Supply for Ontario, and Practical Suggestions in the Production of Food Materials for the Coming Year, the greater part of which was presented at the annual meeting of the Experimental Union, held at the Agricultural College in January, 1918. This information is issued at an early date, that it might be in time to be of real service to the farmers for the coming season's cropping. The Annual Report of the Experimental Union cannot be printed until a later date.

## RESULTS OF CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

DR. C. A. ZAVITZ, PROFESSOR OF FIELD HUSBANDRY, O.A.C., GUELPH.

Although co-operative experiments in agriculture have been conducted through the medium of the Experimental Union in each of the past thirty-two years, there was probably never a time when there was a greater interest taken in the work than at present. Even in spite of the fact that labor is exceptionally scarce at the present time, there was fully one thousand more experimenters in 1917 than in the year previous. The farmers of Ontario are very deeply interested in their work, and are endeavoring to do their utmost in increasing essential food materials. They realize, more than ever before, that for increased crop production, one of the first essentials is the use of seed of the highest quality. It is now generally recognized that the Experimental Union uses nothing but pure seed of high quality of a few of the very best varieties. The co-operative work with farm crops is exerting an increasing influence on the agriculture of the Province as time advances.

The committee appointed last year to look after the co-operative work in agriculture for 1917 was as follows: C. A. Zavitz (Director), W. J. Squirell, A. W. Mason, C. R. Klinek, and A. E. Whiteside. As Director of this branch of the work, it rests with me to present the report of the co-operative experiments with field crops, as conducted throughout the Province during the past year. We had in all thirty-seven distinct and separate tests, six being with autumn and thirty-one with spring-sown crops. To furnish definite information and an outline of the work, a copy of the list of experiments, which was forwarded to ex-students and other farmers, is here presented.

## WINTER CROPS, 1916-1917.

Material for any one of the six experiments here mentioned will be sent, free, to any Ontario farmer applying for it, if he will conduct an experiment with great care and report the results after harvest next year. The seed will be sent out in the order in which applications are received, as long as the supply lasts.

	Plots.
1. Testing three leading varieties of Winter Wheat .....	3
2. Testing one leading variety of Winter Rye and one of Winter Wheat.....	2
3. Testing Spring Applications of five Fertilizers with Winter Wheat.....	6
4. Testing Autumn and Spring Applications of Nitrate of Soda and Common Salt with Winter Wheat .....	5
5. Testing Winter Emmer and Winter Barley .....	2
6. Testing Hairy Vetches and Winter Rye as Fodder Crops .....	2

The exact size of each plot is to be one rod wide by two rods long. The material for Experiment Nos. 1, 2, 3, 5 and 6 will be forwarded by mail, and for the other one by express. Each person wishing to conduct one of these experiments should apply as soon as possible, mentioning which test he desires, and the material, with instructions for testing and the blank form on which to report, will be furnished, free of cost, until the supply of experimental material is exhausted.

## SPRING CROPS, 1917.

The members of the Ontario Agricultural and Experimental Union are pleased to state that for 1917 they are prepared to distribute into every Township of Ontario, material for experiments with fodder crops, roots, grains, grasses, clovers and fertilizers. Fully 2,500 varieties of farm crops have been tested in the Experimental Department of the Ontario Agricultural College, Guelph, for at least five



years. These consist of nearly all the Canadian sorts, and several hundred new varieties and new strains, a few of which have done exceedingly well in the carefully conducted experiments at the College, and will be used for the co-operative experiments throughout Ontario in 1917.

Each person in Ontario who wishes to join in the work may choose any one of the experiments for 1917, fill out the accompanying form of application, and return the same to the Director of the Co-operative Experiments in Agriculture, at as early a date as possible. The material will be furnished in the order in which the applications are received, until the supply is exhausted. A sheet containing the instructions for conducting the chosen experiment, and the blank form on which to report the results of the work, will be sent to each experimenter at the time the fertilizers or seeds are forwarded. All material will be furnished entirely free of charge to each applicant, and the produce of the plots will, of course, become the property of the person who conducts the experiment. In return, the Committee on Agricultural Experiments desires to ask that each experimenter will sow all the plots belonging to the particular experiment which he has chosen for 1917, and that he will be very careful and accurate in his work, and forward to the Director a complete report of the results obtained from the test, as soon as possible after the plots are harvested.

All seeds and fertilizers will be sent in good time for spring seeding, providing the applications are received at an early date. The supply of material being limited, those who apply first will be surest of obtaining the desired outfit. Each applicant should make a second choice, for fear the first could not be granted. The Experiment selected should be indicated by using its number as given in the left hand column in the list of Experiments. Further information is given on the application form which is attached.

## LIST OF EXPERIMENTS FOR 1917.

### GRAIN CROPS.

	Plots.
1. Testing two varieties of Oats .....	2
2a. Testing O. A. C. No. 21 Barley and Emmer .....	2
2b. Testing two varieties of Two-rowed Barley .....	2
3. Testing two varieties of Hulless Barley .....	2
4. Testing two varieties of Spring Wheat .....	2
5. Testing two varieties of Buckwheat .....	2
6. Testing three varieties of Field Peas .....	3
7. Testing two varieties of Spring Rye .....	2
8. Testing three varieties of Soy, Soja, or Japanese Beans .....	3
9. Testing seven varieties of Hushing Corn .....	7

### ROOT CROPS.

10. Testing three varieties of Mangels .....	3
11. Testing two varieties of Sugar Beets for feeding purposes .....	2
12. Testing three varieties of Swedish Turnips .....	3
13. Testing two varieties of Fall Turnips .....	2
14. Testing two varieties of Carrots .....	2

### FORAGE, FODDER, SILAGE AND HAY CROPS.

15. Testing the planting of Corn at six distances in the row .....	6
16. Testing three varieties of Millet .....	3
17. Testing two varieties of Sorghum .....	2
18. Testing Grass Peas and two varieties of Vetches .....	3
19. Testing Rape, Kale and Field Cabbage .....	3
20. Testing three varieties of Clover .....	3
21. Testing two varieties of Alfalfa .....	2
22. Testing four varieties of Grasses .....	4



## CULINARY CROPS.

23. Testing three varieties of Field Beans .....	3
24. Testing two varieties of Sweet Corn .....	3

## FERTILIZER EXPERIMENTS.

25. Testing Barley on potato plots fertilized in 1916 .....	6
26. Testing fertilizers with Mangels .....	10
27. Testing fertilizers with Rape .....	6

## MISCELLANEOUS EXPERIMENTS.

28. Testing two varieties of Potatoes .....	2
29. Testing three grain mixtures for Grain production .....	3
30. Testing three grain mixtures for Fodder production .....	3

The size of each plot in each of the first twenty-seven experiments and in Nos. 29 and 30 is to be two rods long by one rod wide; in No. 28 one rod square.

If you wish to conduct one of the thirty agricultural experiments named on the accompanying circular, kindly fill out this blank form and return it as soon as possible.

The distribution will be confined to the choice varieties included in the various experiments. In filling out the blank form, therefore, it is neither necessary, nor advisable, to mention any particular variety or varieties.

Materials for experiments numbered 26 and 27 will be sent by express, and that for each of the others by mail.

## APPLICATION FOR MATERIAL FOR AN EXPERIMENT.

I would like to conduct experiment number ....., but if all the material for that experiment has been applied for before my application is received I select experiment number ..... as my second choice. If the material for one of these experiments is forwarded to me, I will endeavor to

1. Carry on the test according to the instructions received with the seed.
2. Exercise care and accuracy in the work, and
3. Report the result of the experiment as soon as possible after harvest, whether successful or not.

The past three years have been abnormal for crop production in Ontario. The following information has been secured from the Department of Agricultural Physics, and gives the amount of rainfall for each month from April to September for each of the past three years, and for the average of the past eighteen years:

Months.	1915.	1916.	1917.	Average 18 years.
April.....	2.23	3.53	3.36	2.86
May.....	2.24	4.41	3.29	2.83
June.....	2.27	4.46	6.40	2.72
July.....	5.87	1.21	7.54	3.66
August.....	6.16	1.68	3.28	2.90
September.....	3.92	1.83	1.41	2.32
Total, 6 months.....	22.69	17.12	25.28	16.79

At the Ontario Agricultural College, within the past eighteen years, the total amount of rainfall for the six growing months did not surpass 20 inches, except in 1915, when there were 22.69, and in 1917, when there were 25.28 inches. It will, therefore, be seen that out of the past three years, we have had two exceptionally wet seasons. The tabulated results here presented show that the rainfall was exceptionally heavy in July and August, 1915, May and June, 1916, and June and

July, 1917. The total amount of rainfall in June and July of the past year was greater than that of any two consecutive months in the eighteen-year period. The average total amount of rainfall for the six growing months, from April to September, inclusive, as determined at ten different localities throughout the Province, amounted to 18.53 inches in 1917, and 17.34 inches in 1916. The amount of rainfall between Fort William and Manitoba was exceptionally light during the past year. The results of experiments in 1917 have peculiar interest, but care is necessary in order to avoid drawing wrong conclusions from any single abnormal year.

The co-operative work of the Experimental Union is entirely voluntary, and this is probably one of the greatest reasons for its development and for its success. The various experimenters conduct the tests, according to instructions which are furnished them, and report the results of their individual experiments on blank forms, which are sent at the same time as the seed.

The reports of the co-operative experiments for 1917, which were received at the College, were submitted as usual to a very critical examination. For the summary report, which is presented at this time, only those reports which showed carefulness and reliability throughout were used. All reports, whether successful or not, are here on the platform for the inspection of any member who wishes to examine them. Many of these reports have been furnished by men who have had a large amount of practical experience on the farm, have had the advantage of a good education, and have had a careful training in experimental work, as they have conducted successful tests on their own farms in each of a number of years. It should be clearly understood that, while only the good reports of carefully conducted experiments have been used for publication, many of those not included in the summary report show that the individual experimenters must have obtained a considerable amount of valuable information from their work and, in each of a number of cases, a start with choice seed of varieties particularly suited to their own local conditions. It occasionally happens that, owing to some accident, an experiment may have been injured so that the results could not be used in the summary report, but the experiment may have given useful lessons to the farmer conducting the test, and sometimes to other farmers in the vicinity. It is certainly true that experimenters obtain much more information from the experiments which they conduct in addition to that included in the summary report such as the one here submitted.

Every experimenter who received instructions for conducting the co-operative work was asked to give his decision on the relative standing of the different varieties, mixtures, quantities of seed, fertilizers, manures, etc., after everything had been taken into consideration. The report here presented includes a summary of the answers to this enquiry, and is presented in the tabulated results, under the heading of "Comparative Value."

#### VARIETIES OF FARM CROPS.

The number of varieties distributed for co-operative work is very small, as only those are used which have been thoroughly tested for a series of years in the trial grounds at the Ontario Agricultural College, and which have made high records. There are too many varieties of nearly all classes of farm crops grown in Ontario. Many of these are brought into the country by agents, and are frequently purchased by farmers who are attracted by means of beautiful illustrations and the extravagant claims made by the travelling salesmen, who go from house to house, selling small amounts of seed at high prices. Some of these are

old varieties under new names, and some are new varieties which are not as good as those which are already grown in general cultivation. It is the aim of the Experimental Union to furnish the highest quality of seed of a few of the best varieties, in order that the farmers may increase crop production in the most economical way and at the same time glean valuable information through the medium of their experimental work.

The Experimental Union is actively engaged with those crops which are now used on fully ninety per cent. of the cultivated land of the province. Some of the varieties which are now being extensively used in cultivation are those which were introduced by or originated at the College, and, after proving worthy, were distributed and used for the co-operative experimental work on different farms throughout the province. Some varieties do particularly well over nearly the whole of Ontario, while others do the best on certain soils or in special localities. The barley crop is now confined almost entirely to either the Mandsehuri or the O.A.C. No. 21 varieties. The last-named barley has increased so substantially that it is the only kind grown in many of the localities throughout the province. Other varieties are also increasing very rapidly, such as the O.A.C. No. 72 oats and the Marquis spring wheat. These are becoming great favorites pretty generally throughout the province.

We are pleased to submit the tabulated returns of the different varieties of grain crops tested throughout Ontario in 1917, and, even though the tests were made in an abnormal year, the results, if studied with good judgment, should prove of special service.

Experiments.	Varieties.	Com- parative Value.	Yield per Acre.		
			Straw (tons).	Grain (bus.).	Grain (lbs.).
Oats (53 tests).	O. A. C. No. 72 .....	100	1.74	45.86	1,559
	O. A. C. No. 3 .....	69	1.37	41.20	1,401
Six-rowed Barley and Emmer (20 tests).	O. A. C. No. 21 .....	100	1.34	37.38	1,794
	Common .....	73	1.08	42.63	1,705
Hulless Barley (11 tests).	Black Hull .....	98	1.28	23.88	1,433
	Guy Mayle .....	100	1.20	23.45	1,407
Spring Wheat (24 tests).	Wild Goose .....	100	1.53	20.80	1,248
	Marquis .....	91	1.46	20.09	1,206
Winter Wheat (25 tests).	O. A. C. No. 104 .....	100	1.78	23.69	1,421
	Improved Imperial Amber .....	94	1.78	22.91	1,375
	Improved Dawson's Golden Chaff .....	94	1.41	21.47	1,288
	Kharkov .....	48	1.72	19.34	1,160
	Yaroslaw .....	55	1.79	17.57	1,054
Spring Rye (5 tests).	O. A. C. No. 61 .....	100	2.17	22.50	1,260
	Common .....	56	2.05	20.36	1,140
Winter Rye and Winter Wheat (12 tests).	Petkus Winter Rye .....	100	1.11	27.89	1,562
	American Banner Winter Wheat .....	81	1.02	21.62	1,297
Field Peas (53 tests).	Early Britain .....	89	1.20	21.84	1,310
	Potter .....	96	1.32	21.36	1,281
	Canadian Beauty .....	100	1.49	21.24	1,274
Field Beans (27 tests).	Earce's Improved Tree .....	90	.86	18.75	1,125
	Elliott's Pea .....	100	.65	17.83	1,070
	O. A. C. No. 81 Soy Bean .....	51	.93	14.81	889

In the tabulated results of the grain crops here given, attention is called to the fact that the figures in the third column under "Comparative Value" are made up from the answers received from the experimenters after the farmers, who conducted the experiments, had taken everything into consideration. In the fourth column the yield of straw per acre represents the total crop, less the amount of grain and, therefore, includes the chaff with the straw. The yield of grain is given in pounds as well as in bushels per acre, in order that the results may be very clearly understood and that certain comparisons may be made between the different classes of crops as well as between the varieties of each class in a season such as we have had in 1917. Definite determinations can be made between the varieties of each class of farm crops, as they were grown on the same farms and under similar conditions. Caution should be exercised, however, in comparing one class of farm crops with another, as it should be understood that these have been grown on different farms. In cases where there are a considerable number of tests of each class, however, certain comparisons might be made regarding the yields of different classes. Owing to the great variation in the weight per measured bushel in different crops, it is easier to compare the results in pounds than in bushels per acre. In working out the number of bushels per acre, the standard weights per measured bushel have been used for each class of crop.

*Varieties of Oats.*—The market value of the oat crop in Ontario is about equal to the combined values of the winter wheat, spring wheat, barley, rye and buckwheat. It is about one-quarter of the value of all the field crops grown in the Province, about one-half of the value of the horses, cattle, sheep, lambs, swine and poultry of all classes which are sold or slaughtered annually, and practically double the value of the cheese and butter manufactured in the factories and in the creameries of Ontario each year.

About three hundred varieties of oats have been carefully tested under uniform conditions in the experimental grounds at the College. These include the different varieties obtained in Ontario as well as a large number of the leading kinds which have been imported from other countries which possess climatic conditions somewhat similar to those of this Province. Efforts have been made to improve the best varieties by means of plant selection and by cross-fertilization. One of the great difficulties in oat production in Ontario is the fact that too many varieties are grown, and there are so many kinds under cultivation that it is practically impossible to get large shipments of any one variety grown in the same locality. It has been the aim of the Agricultural College and of the Experimental Union to eliminate as many of the varieties as possible and to concentrate on a few of the very best. With this object in view, much attention has been given to the improvement of a few of the very best varieties. Two varieties started at the College have made excellent records, both in our own trial grounds and in the co-operative experiments throughout the Province. It is believed that the O.A.C. No. 72 variety of oats, which requires the same length of time to mature as the Banner, will soon supplant practically all of the varieties of late oats in the Province.

The O.A.C. No. 72 variety of oats was started from a single seed in 1903, and the O.A.C. No. 3 variety from a single seed in 1904. These two varieties have been carefully tested at the College with other varieties of oats in each of the past eleven years. In ten out of eleven years the O.A.C. No. 72 surpassed the Banner, and in nine out of eleven years the O.A.C. No. 3 surpassed the Daubeney in yield of grain per acre, the average annual yield of increase being about sixteen bushels for the former and seven bushels for the latter.

In the year 1911, the O.A.C. No. 72 variety of oats was first distributed for co-operative experiments throughout Ontario. One pound lots were sent in that year to three hundred Ontario farmers who applied for the co-operative experiments with oats, through the medium of the Experimental Union. The one pound lots of the O.A.C. No. 72 oats were compared with equal quantities of two or three other leading varieties on plots one rod wide by two rods long. The new variety did so well in the first year that a large number of farmers saved their seed very carefully and sowed it on larger plots in 1912.

In 1913, one farmer had sufficient seed of the O.A.C. No. 72 oats to enter in the Field Crop Competition, in which he received first prize. From that time forward the number of first prizes for this new variety has been rapidly increasing as is seen by the following table, which gives the first prizes in the Ontario Field Crop Competitions for both Banner and O.A.C. No. 72 oats, according to the reports which have been issued:

Year.	O. A. C. No. 72.	Banner.
1913.....	1	41
1914.....	20	34
1915.....	48	33
1916.....	76	26

In connection with the Provincial Winter Fair, held annually at Guelph, the O.A.C. No. 72 oats had six per cent. of the entries in 1913, twenty-eight per cent. in 1914, forty-three per cent. in 1915, and fifty-two per cent. in each of the past two years.

The O.A.C. No. 72 and the O.A.C. No. 3 varieties of oats have been tested over Ontario in each of the past five years, the average in bushels of grain per acre being 50.1 for the former and 45.7 for the latter. In each of the five years the O.A.C. No. 72 surpassed the O.A.C. No. 3 in yield of grain. The latter named variety, however, is thinner in the hull and is usually about ten days earlier in maturing than the former. In 1917, according to the co-operative experimenters, the O.A.C. No. 3 matured on an average twelve days earlier than the O.A.C. No. 72. The former is exceptionally well adapted for mixing with barley when it is desired to grow the two in combination. The yield of straw per acre of the O.A.C. No. 72 usually surpasses the O.A.C. No. 3 by an average of about two-fifths of a ton. In 1917, both varieties were exceptionally free from smut and from rust, there being scarcely a trace of either in the early variety.

O.A.C. No. 21 Barley and Common Emmer. In each of five years we have distributed throughout Ontario, for co-operative experiments, the O.A.C. No. 21 barley and the Common emmer, in order that these might be tested under uniform conditions for crop production. We had previously found that the emmer was a close rival of barley in yield of grain per acre. In the co-operative experiments, however, the Common emmer has been surpassed in yield per acre by the O.A.C. No. 21 barley in each of the five years, the average for 1917 being 89 pounds of grain per acre.

The O.A.C. No. 21 variety of barley was started in the Field Husbandry Department at our College from a single seed in 1903. This barley possesses a good length of straw which is particularly strong in comparison with most other



varieties. The heads possess six rows of grain and are bearded. The grain is white on the outside, but is of a bluish color immediately under the hull. So far the crop has been comparatively free from rust. The weight of the grain per measured bushel has been somewhat over the standard and the yield per acre has been heavy. According to the experimenters in 1917, the O.A.C. No. 21 barley matured on the average eleven days earlier than the Common emmer.

For ten years in succession, the O.A.C. No. 21 barley has been distributed throughout Ontario for co-operative experiments. In each of four years in which it was compared with the Mandscheuri in the co-operative experiments throughout the Province, it surpassed the latter in yield of grain per acre, in freedom from rust, and in both length and strength of straw. From the one-pound lots of the O.A.C. No. 21 barley, which have been distributed through the medium of the Experimental Union, this variety has increased very rapidly over the Province. It has been increasing so rapidly that it has practically supplanted all other varieties in Ontario. At the Provincial Winter Fair, in each of the past three years, there has been no other entry of a named barley than the O.A.C. No. 21 except in 1917, when there was one entry of the Mandscheuri.

From an enquiry made in 1917, of practical farmers throughout Ontario, as to the most extensively grown barley in their respective counties, sixty-five per cent. of the farmers mentioned O.A.C. No. 21, thirty per cent. Mandscheuri, and five per cent. Common Six-rowed.

*Hulless Barley.*—Even though the Bureau of Industries report gives no special record of the production of Hulless barley in Ontario, it is known that it is grown to a limited extent. In some sections of the Province there is much more interest taken in this crop than in others. At the College we have had under experiment some fifteen different varieties of Hulless barley. The most of them, however, have not proven very satisfactory over Ontario. In each of the past fourteen years we have distributed the Guy Mayle and the Black Hulless varieties for co-operative tests. In the average of the whole period of thirteen years previous to 1917, in which there were 168 separate tests, we find that the Guy Mayle gave 24.1 and the Black Hulless 23.1 bushels per acre. In 1917, it will be seen that the Black Hulless gave 23.9 and the Guy Mayle 23.5 bushels per acre. The Guy Mayle, on the whole, has been superior to the Black Hulless, both in yield per acre and in popularity.

*Spring Wheat.*—In each of the past three years increased interest has been aroused in spring wheat production owing to the high price of wheat brought about through the European war and through the partial failure of the winter wheat crop in some of the countries. It is interesting to note that in the Province of Ontario the number of acres of spring wheat amounted to 144,305 in 1916, and 182,957 in 1917. As the acreage sown to fall wheat was not large in the autumn of 1917, and as there is a big demand for wheat to supply the world's market, it is very probable that the acreage of spring wheat, which will be sown next spring, will be unusually high, providing the weather conditions are at all favorable.

In each of five years, the Marquis and the Wild Goose varieties have been distributed over Ontario for co-operative experiments. In four of these years the Wild Goose surpassed the Marquis in yield per acre, the average for the five years being 20.2 bushels for the Wild Goose and 19 bushels for the Marquis. The Marquis spring wheat is of excellent quality for bread production, and was originated at the Central Experimental Farm, Ottawa. There is probably no other spring wheat which will meet the present demand so well as the Marquis.

*Winter Wheat.*—Five varieties of winter wheat were again distributed in the fall of 1916. The results of this experiment, as well as those of other autumn sown crops, were prepared for publication in August of the present year, and were sent to about four hundred of the newspapers and agricultural journals of Ontario. This enabled the farmers to learn the results of the tests conducted both at the College and throughout Ontario with the autumn sown crops before the time for seeding in the latter part of August and in early September. As the season was very late, however, a full report could not be prepared until more recently.

In each of three years the same varieties of winter wheats were distributed for co-operative experiments, and the one which gave the highest average yield per acre was Imperial Amber. In 1917, the five varieties used for the co-operative experiments were the O.A.C. No. 104, Improved Imperial Amber, Improved Dawson's Golden Chaff, Kharkov and Yaroslaf. The first and the third are white and the other three are red wheats. The last two named varieties are exceedingly hard and are of superior quality for bread production. It will be seen that in the average of twenty-five experiments the O.A.C. No. 104 came at the top of the list in yield of grain per acre and in popularity. The O.A.C. No. 104 was a cross made at our College between the Dawson's Golden Chaff and the Bulgarian. This cross has furnished a new variety which, in the experiments at the College during the last five years, has surpassed both its parents in average yield per acre and is about equal to the Bulgarian in bread production. This variety was distributed over Ontario through the medium of the Experimental Union in the autumn of 1916, for the first time. Its record, so far, is very encouraging.

*Buckwheat.*—Two varieties of buckwheat were distributed in the spring of 1917 for co-operative experiments, but owing to the abnormal weather conditions, there were not enough reports received for including the yields in the tabulated statement. The two or three reports which were received showed a higher yield per acre for the Rye buckwheat than for the Silver Hull in each instance. In the average of seven years' results, which we previously reported, the Rye buckwheat gave 25.3 and the Silver Hull 20.5 bushels per acre per annum. The latter-named variety is the most extensively grown in Ontario, and the former variety in Nova Scotia.

*Spring Rye.*—For seven years in succession two varieties of spring rye have been distributed over Ontario for co-operative experiments. The average yield in bushels of grain per acre for 1917, and for the average of the seven-year period are, respectively: O.A.C. No. 61, 22.5, 24.7; and Common, 20.4, 21.6. It is interesting to note that in each of the seven years the O.A.C. No. 61 surpassed the Common variety in yield per acre. In the experiments at the College, the O.A.C. No. 61 variety has made the highest record. This variety of spring rye was originated at the College.

*Winter Rye and Winter Wheat.*—In the autumn of 1914, and again in 1915, the Petkus winter rye and the Imperial Amber winter wheat were distributed for co-operative tests. The average results show that the Petkus rye surpassed the Imperial Amber winter wheat by an average of 380 pounds per acre in 1915 and by 344 pounds in 1916. In the average of twelve co-operative tests made in 1917, the Petkus winter rye surpassed the American Banner winter wheat by an average of 265 pounds per acre. The Petkus variety has surpassed all other kinds of winter rye in the average results of the experiments conducted at the College during the past six years.



*Field Peas.*—In each of the past three years there has been an unusual demand for the experiment with field peas. This was brought about, undoubtedly, by the high price of peas, the demand for concentrated food for home use and for export, and by the encouragement given to the growth of field peas in Ontario. According to the annual report of the Bureau of Industries for 1916, the average market value per acre of the pea crop of Ontario was \$27.41, while that of oats was \$17.50, and that of barley was \$23.91.

In each of the past two years three varieties, viz., the Canadian Beauty, a large white smooth pea; the Early Britain, a brown dented variety; and the Potter, a smooth pea of large size, were used for the co-operative experiments. The results in bushels of grain per acre, for 1917, are shown in the table, and those for the last two years combined, including eighty-two separate tests, are as follows: Potter, 21.9; Canadian Beauty, 21.8; and Early Britain, 21.3. In sixteen years, in which the Canadian Beauty and the Early Britain have been grown in competition throughout Ontario, the former took the lead in ten, and the latter in six separate years, but in average yield of grain per acre per annum they produced an equal number of bushels, viz., 23.9. Both the Canadian Beauty and the Potter were quite popular with the experimenters throughout Ontario in the past season. These are both choice varieties.

*Field Beans.*—The demand for field beans for co-operative experiments has also been large in each of the past three years. The average price paid for beans in Ontario for the thirty-two years previous to 1914 was \$1.25 per bushel, and for the average of the years 1911, 1912 and 1913 it was \$1.84 per bushel. In January, 1915, the Government of Ontario paid approximately \$2.50 per bushel for several car loads of beans for shipment to the Belgians. In March, 1915, the Commercial beans of Ontario were selling for about \$3.00 per bushel. In the latter part of 1916, the price of beans advanced to upwards of \$6 per bushel, and in the latter part of 1917 to about \$7.50 per bushel in the trade of the Province. In the spring of 1917, good seed beans were exceedingly scarce, and sold readily from \$9 to \$12 per bushel.

In the spring of 1917, two varieties of field beans and one variety of soy beans were distributed for co-operative experiments. This was the first time that the soy beans were tested in this way. The interest in the soy beans has been quite keen recently owing to the scarcity of concentrated materials for domestic purposes and as feed for farm stock. It will be seen, from the tabulated results, that the Pearce's Improved Tree bean gave the highest yield per acre, viz., 18.75 bushels, which was followed by the Elliott's pea bean with 17.83 bushels and the O.A.C. No. 81 soy bean with 14.81 bushels. The Pearce's Improved Tree bean has been used in the co-operative experiments in each of the past five years. In comparison with the pea bean for the four years previous to 1917, the former gave 25.4 and the latter 23.5 bushels per acre. In the average of the co-operative experiments over Ontario for three years, the Pearce's Improved Tree gave 26.6 bushels and the Marrowfat, for the same period, an average of 24.5 bushels per acre. In 1917, the Pearce's Improved Tree bean was sent out in comparison with the Elliott pea bean, the latter being a special strain of this commercial bean grown for a number of years in the southern part of Wellington county. In the average of twenty-seven separate tests, it was surpassed by the Pearce's Improved Tree bean by nearly one bushel per acre.

A bulletin on "Field Beans" was published in the spring of 1915, and copies can be obtained from the Department of Agriculture, Parliament Buildings, Toronto.

In this bulletin the results are given of each of ten varieties of field beans for a period of ten years which show that the Pearce's Improved Tree bean stands at the head of the list with 23.4 bushels per acre, being 5.3 bushels per acre per annum higher than the yield of any other variety. The Pearce's Improved Tree is a white bean of excellent quality, medium to large in size, but it requires a fairly long season to ripen, and for this reason was not quite so popular with the experimenters in 1917 as the pea bean which was slightly earlier.

*Winter Emmer and Winter Barley.*—In the co-operative experiments over Ontario in the past year, Black winter emmer surpassed winter barley in yield of grain per acre by 493 pounds in the average of six tests. The difference in favor of the emmer in 1916 was 360 pounds per acre. The winter emmer at the College has given an average of about 2,500 pounds of grain per acre in the results of the past ten years. Winter barley usually gives a large yield per acre when it survives the winter, but it is somewhat more tender than winter wheat. We have not yet secured a winter barley which can be relied on for general cultivation in many parts of Ontario, although there are some sections in which winter barley might be used with a good deal of satisfaction.

*Soy Beans.*—The past two seasons have been particularly unfavorable for the production of soy beans in Ontario. Two varieties were distributed for co-operative experiments each year, but owing to the abnormal weather conditions, few complete reports were received. In both years the results were slightly in favor of the Brown variety which is the earliest kind of soy beans tested at the College. In normal seasons the O.A.C. No. 81 has surpassed the Brown soy bean in the College tests.

*Corn for Grain Production.*—The seven varieties of corn which are specially recommended by the Ontario Corn Growers' Association were distributed in the spring of 1917 for co-operative experiments. The season being very abnormal, we have only the complete results of three carefully conducted experiments with the seven varieties of corn for the past season. One of these was conducted in York, one in Norfolk and one in Huron county. The highest yields of grain per acre were obtained by the Golden Glow in York county, by the Wisconsin No. 7 in Norfolk county, and by the Longfellow in Huron county. The following gives the average yield in bushels of grain per acre as shown by the experiments conducted in the three counties: Golden Glow, 48.6 bushels; Longfellow, 46.2; White Cap Yellow Dent and Wisconsin No. 7, each 41.4; Compton's Early and Salzer's North Dakota, each 39.0; and Bailey, 33.3. In the average yields per acre for the past two years of the seven varieties of corn under test the number of bushels for each is as follows: White Cap Yellow Dent, 53.2; Golden Glow, 51.6; Wisconsin No. 7, 51.1; Longfellow, 44.9; Compton's Early, 43.1; Bailey, 42.6; and Salzer's North Dakota, 39.7. In amount of stover per acre, the Golden Glow came the highest in 1917 with 7.4 tons, the Wisconsin No. 7 second with 7 tons, and the Longfellow lowest with 5.3 tons.

## GRAINS GROWN IN COMBINATION FOR GRAIN PRODUCTION.

Experimental work has been conducted in a systematic way at the Ontario Agricultural College for a number of years in succession in testing various combinations of grain for green fodder, for hay and for grain production. The results of these experiments have been both interesting and important, and have been reported from time to time in the College publications. It was found that the combination of varieties of the same class of grain gave no appreciable advantage in increase in yield per acre. It was also found that certain combinations of different classes of grain gave practically no advantage, while others furnished considerable increase. One of the most important results obtained was from the combination of oats and barley grown in the proper proportions of the right varieties which gave a yield of slightly over two hundred pounds of grain per acre over either grain grown separately in the tests which were carefully conducted over a series of years.

From information gleaned in the experimental work at the College, co-operative tests were arranged for having different combinations tested throughout the Province. In an experiment which was conducted for five years, and which was completed in 1909, different varieties of oats, barley and spring wheat were grown in combinations of two and three kinds of grain together. The average results of the five years' co-operative experiment show that one bushel of the Daubeney oats and one bushel of the Mandscheuri barley gave a higher yield of grain per acre than any of the other mixtures used in the experiment. In 1910, a co-operative experiment was started for the testing of three different proportions of oats and barley in order to find out which ones would give the highest yields on the average and on the different soils throughout the Province. In 1910, the varieties used were the Daubeney oats and the Mandscheuri barley; in 1911, the Alaska oats and the O.A.C. No. 21 barley; in 1912, in 1913 and in 1914, the Daubeney oats and the O.A.C. No. 21 barley; in 1915, in 1916 and in 1917, the O.A.C. No. 2 oats and the O.A.C. No. 21 barley.

The experiment has been conducted for eight years, but in 1912 the reports were not of sufficient value to be tabulated. The average results of the experiment for each of the seven years and for the whole period during which this experiment has been satisfactorily conducted are as follows:

Pounds of Seed per acre in combination.	Yield per Acre.															
	Tons of Straw.								Pounds of Grain.							
	1910	1911	1913	1914	1915	1916	1917	Ave.	1910	1911	1913	1914	1915	1916	1917	Ave.
Oats 17..... Barley 24.....	1.32	.75	.97	.68	1.28	.77	1.12	.98	1528	1420	1260	1136	1880	900	1377	1357
Oats 34..... Barley 48.....	1.47	.93	1.25	.68	1.72	1.08	1.34	1.21	2104	1820	1510	1296	2270	1320	1514	1691
Oats 51..... Barley 72.....	1.61	1.29	1.63	.65	1.86	1.26	1.35	1.38	2096	1594	1700	1488	1980	1320	1477	1665

In yield of threshed grain per acre, one bushel of oats and one bushel of barley, making a combination of two bushels per acre, gave on the average a

greater yield per acre than either the lighter or the heavier seeding. In the seven years' test, the light seeding did not give the highest yield in any one year, and the heavy seeding gave the highest returns in only two years. In the production of straw, however, the heaviest seeding gave the highest yield in each of six out of the seven years. In the average of the whole period, the medium seeding gave 26 pounds of grain per acre more and 340 pounds of straw per acre less than the heavier seeding. It can be seen that the heaviest seeding required 41 pounds of grain per acre more than the medium seeding. It will, therefore, be seen that the results of this experiment throughout Ontario have shown that one bushel of oats and one bushel of barley by weight, when mixed together, gives more satisfactory returns than either one-half bushel of each or one and one-half bushels of each when sown in combination.

In the results of more extensive experiments carried on at the College, extending over a period of more than a dozen years, a combination of one bushel of oats and one bushel of barley by weight has produced the largest yield of grain per acre.

#### FIELD ROOTS, FODDER CROPS, GRASSES, CLOVERS AND ALFALFA.

In 1917, co-operative experiments were conducted throughout Ontario with mangels, sugar mangels, swede turnips, fall turnips, field carrots, fodder corn, millet, grass peas, vetches, rape, kale, field cabbage, mixed grains, grasses, clovers and alfalfa. We never have as many applications for this class of farm crops as we do for the cereals. Owing to the abnormal season, experimenters found it exceedingly difficult to carry on satisfactory tests with such crops as corn, sorghum and millet in the past year. We always find it difficult to get full and satisfactory reports of grasses, clovers and alfalfa in a manner suitable for presentation in tabulated form. These different crops are not ready for cutting at the same time, and the weather conditions frequently make it very difficult, indeed, to secure uniformity in the weights of either the green crop or the hay. Some of the crops produce one, some two and some even three cuttings in the one season, hence the difficulty in presenting definite information. In some of the crops belonging to this class, however, we have received satisfactory reports of carefully conducted experiments, a summary of which is here presented:

Experiments.	Varieties.	Comparative Value.	Yield per Acre (tons).
Mangels (10 tests) .....	Yellow Leviathan (Ferry).....	100	24.86
	Sutton's Mammoth Long Red.....	85	24.78
	Ideal (Ontario Seed Co any).....	91	24.16
Sugar Mangels (8 tests).....	Bruce's Giant White Fling.....	100	20.72
	Carter's Improved White Sugar .....	71	16.80
Swede Turnips (4 tests) ....	Garton's Model.....	85	20.09
	Steele Briggs' Good Luck.....	100	19.89
	American Purple Top .....	85	19.06
Carrots (4 tests) .....	Bruce's Mammoth Intermediate		
	Smooth White .....	100	15.32
	Rennie's Mammoth Short White.....	100	14.18
Rape, Kale and Cabbage.... (2 tests)	Sutton's Earliest Drumhead Cabbage.	100	11.76
	Thousand Headed Kale.....	93	8.17
	Dwarf Essex Rape .....	90	7.11

*Varieties of Mangels.*—Mangel cultivation in Ontario includes four distinct types of roots, viz., long, intermediate, globe and tankard, but very few of the globe varieties, however, are now used for field work. Varieties of each of the four classes have been tested over a series of years at the Ontario Agricultural College. It has been the general opinion in past years that the long red type of mangel was the most prolific in root production. More recently, however, the majority of experiments at the College and throughout Ontario have shown that the highest yields have been obtained from some of the intermediate and the tankard types.

In 1917, three varieties of mangels were distributed for co-operative experiments throughout the Province. The long red type was represented by Sutton's Mammoth Long Red, the intermediate by the Yellow Leviathan, and the tankard by the Ideal. In the average of the co-operative tests conducted on ten farms, the Yellow Leviathan came at the top of the list both in popularity and in yield per acre. It will be noticed, however, that the average yields of the three varieties were not very different. The least popular of the three varieties of mangels was the Sutton's Mammoth Long Red. These three varieties have been included in the co-operative tests in each of the past eight years. The average results for the eight-year period, in which there were sixty-seven distinct tests, show the following yields in tons per acre per annum: Yellow Leviathan, 27.4; Ideal, 26.8; and Sutton's Mammoth Long Red, 26.7. The seed of the Yellow Leviathan was first obtained by the Ontario Agricultural College from D. M. Ferry and Company, Windsor, Ontario, in the spring of 1893. The name "Yellow Leviathan" was entered in the catalogues of some of our Ontario seedsmen as follows: Steele, Briggs' Seed Company, Toronto, in 1896; Jas. Hewer, Guelph, in 1908; The Wm. Rennie Seed Company, Toronto, J. A. Simmers, Toronto, and Jno. A. Bruce, Hamilton, in 1909; and Geo. Keith, Toronto, in 1910. We have found that the seed under the name of Yellow Leviathan, obtained from different seedsmen in Ontario, has varied considerably in germinating power of the seed and in shape, size and color of the roots in 1917, as well as in other years. We realize, however, that under the abnormal conditions, it is almost impossible for the seedsmen to get a sufficient supply of good seed of true stalks of some of the best varieties of mangels at the present time.

*Sugar Mangels.*—This class of roots is frequently called sugar beets, but they are usually varieties which are not grown for sugar production but as food for farm stock. They are sometimes called sugar beets for feeding purposes, but a less confusing name is sugar mangels. They occupy an intermediate place between sugar beets and mangels in the percentage of sugar which they contain. As a rule they grow more out of the ground than the sugar beets, and are more easily harvested, but do not yield quite as much as the leading varieties of mangels.

A large number of varieties of sugar mangels have been grown at the Ontario Agricultural College and, from these, two varieties have been selected for co-operative experiments. Previous to 1917, the same two varieties have been grown for nine years, viz.: Bruce's Giant White Feeding and Rennie's Tankard Cream, and the former gave an average annual increase over the latter of four-fifths of a ton per acre. In the spring of 1917, the Bruce's Giant White Feeding was again distributed, and Carter's Improved White Sugar was used instead of the Rennie's Tankard Cream. In the average results of eight experiments, the Bruce's Giant White Feeding gave practically four tons per acre more than the Carter's Improved White Sugar. It will also be seen that the Bruce's Giant White Feeding was much more popular with the experimenters than the Carter's Improved White Sugar variety.



**Swede Turnips.**—Much interest has been taken in the production of swede turnips during the past couple of years, owing to the fact that swede turnips sold at high prices, frequently bringing fifty cents per bushel, the standard for which is fifty pounds. The swede turnips are still used quite extensively in Ontario for stock feed, and to a limited extent for table use. Although certain sections of Ontario have for years exported to the United States many car loads of turnips, the demand was quite large and high prices paid in 1916. The price dropped somewhat, however, in the past year. In each of the past three years the same three varieties of swede turnips were used for the co-operative experiments. The following gives the yields in tons per acre for 1917, and for the average of the three years: Steele, Briggs' Good Luck, 19.9 and 27.0; American Purple Top, 19.1 and 25.8; and Garton's Model, 20.1 and 25.7. The roots of each of these varieties are of good shape and of good quality.

**Fall Turnips.**—But little interest has been taken in the cultivation of fall turnips in Ontario. The roots of this class usually yield well, but do not keep late into the winter. The two varieties which have given comparatively good results at Guelph and in the co-operative experiments are the Purple Top Mammoth and the Red Top White Globe. No satisfactory reports were received from the co-operative experimenters with the fall turnips in the past year.

**Field Carrots.**—Within the past few years the Intermediate White field carrots have been used almost exclusively throughout Ontario. Several of the seedsmen sell seed of this type which produce carrots which are very similar in characteristics. The following gives the yield in tons of roots per acre for 1917 and for the average of the past two years of the varieties used in the co-operative experiments: Bruce's Mammoth Intermediate Smooth White, 15.2 and 15.7; and Rennie's Mammoth Short White, 14.2 and 14.9.

**Rape, Kale and Field Cabbage.**—Experiments have been conducted at Guelph for a number of years in testing different varieties of rape, kale, field cabbage, etc., for the production of crops which can be used for soiling purposes or for pasture. In the experiments at Guelph, particularly good results have been obtained from some of the varieties of field cabbage when sown the same as rape by using one and one-half pounds of seed per acre and by leaving the crop unthinned. The following gives the yields in tons per acre of green crop of each of the varieties included in this co-operative experiment for 1917, and for the average of five years: Sutton's Earliest Drumhead cabbage, 11.8 and 16.3; Thousand Headed Kale, 8.2 and 12.8; and Dwarf Essex Rape, 7.1 and 11.9. These results are very interesting and show the possibilities in the use of field cabbage as a fall pasture in Ontario.

**Millet.**—In each of the past four years O.A.C. No. 71, Japanese Panicle and Hungarian varieties of millet have been distributed for co-operative experiments. No satisfactory reports, however, were obtained in 1915 or in 1917. The average yields in tons of green crop of millet per acre of the different varieties for 1914 and 1916 were as follows: Japanese Panicle, 9.8; O.A.C. No. 71, 8.5; and Hungarian Grass, 7.3.

**Sorghum.**—About thirty varieties of sorghum, including sugar canes, broom corns, kaffir corns, milo maize and Jerusalem corn have been under experiment at the Ontario Agricultural College. Only two of these, viz., the Early Amber Sugar Cane and the Early Minnesota have been included in the co-operative experiments during the past few years. Owing to the abnormal weather conditions of 1917,

no satisfactory reports were received. Each of these varieties may be used for fodder purposes, for the production of seed or for the production of sorghum molasses. The Early Amber Sugar Cane is used to a limited extent for pasture purposes, and is included in a mixture which is as follows: Thirty pounds of sugar cane, fifty-one pounds of oats and seven pounds of red clover seed per acre. If this mixture is sown in the first week in May it is usually ready for pasturing about the 20th of June, and forms a natural rotation of pasture throughout the season. Cattle of all kinds do particularly well on this pasture. As a rule there is an excellent catch of clover, and when desired the clover can be left over the winter for cropping in the year following.

*Grass Peas and Vetches.*—For nineteen years in succession experiments have been conducted throughout Ontario in the testing of grass peas, hairy vetches and common vetches. The hairy vetches in particular have been highly recommended in Ontario, and they are used perhaps rather more extensively as a cover crop in orchards than as a fodder crop on the farms. The grass peas have been grown at a farm crop in some sections of the Province, and the common vetches for mixing with oats as a green fodder. In the average of sixteen years the following yields in tons per acre have been obtained throughout the Province: Hairy vetches, 8.5; grass peas, 6.9; common vetches, 6.3. No complete reports, however, were obtained in 1917.

*Hairy Vetches and Winter Rye.*—Hairy vetches are sown either in the winter or in the spring. Experiments at the College have shown that the best results are obtained from the autumn sowing. In the co-operative tests over Ontario, in comparing hairy vetches and winter rye, the reports have been very few and the results are not of sufficient value for placing in tabulated form. Both have given fairly good satisfaction for fodder purposes. The hairy vetches were a little higher in yield in 1915 and the winter rye in 1917.

*Fodder Corn.*—In 1917, fodder or silage corn was grown on 511,329 acres in Ontario. The area devoted to this crop has been increasing quite rapidly in recent years. This increase is likely to continue as the corn furnishes such a large amount of valuable stock food and is pre-eminently the silage crop of Ontario. Corn serves the purpose not only of furnishing a large amount of food, but, with thorough cultivation, cleans the land and fills in an important place in the rotation.

In each of the past two years the seven varieties of corn specially recommended by the Ontario Corn Growers' Association were used in the co-operative experiments for fodder production. There were five full reports received in 1916 and fifteen in 1917. The average results for the two years, in tons of fodder and also in freshly husked ears, are as follows:

Variety.	Tons Freshly Husked Ears per Acre.	Tons Whole Crop per Acre.
Wisconsin No. 7.....	3.4	13.0
Compton's Early.....	3.4	12.5
Golden Glow.....	3.3	12.2
Longfellow.....	3.2	11.8
White Cap Yellow Dent.....	3.1	11.7
Bailey.....	2.8	11.1
Salzer's North Dakota.....	3.2	10.7



It must be remembered that the last two years have been very abnormal, also that these results are from different soils and from various parts of the province; as for instance, in 1917 the experiment was conducted in fourteen separate counties. This test will likely be repeated for several years when more detailed information will be secured regarding the value of the different corns for the separate localities.

*Grasses, Clovers and Alfalfa.*—It is difficult to obtain full and accurate information of the experiments with different varieties of grasses and of clovers, as the different varieties produce a varying number of crops which are ready for cutting at different dates. Although no tabulated results are available, some most interesting and valuable co-operative experimental work is being carried on throughout the Province, especially with alfalfa. This relates to the testing of the hardiness of different varieties, the suitability of the row method for seed production, the value of the application of lime, the influence of inoculation, the different amounts of seed, the best method of handling the crop for seed production, etc. It might be mentioned that it has been found to be an excellent practice, in a number of instances, to sow a very hardy variety of alfalfa, such as the Grimm or the Ontario Variegated, in rows thirty inches apart, by using only three pounds of seed per acre. The crop can be cultivated occasionally, and so far this method of sowing has usually withstood the winter well, and has furnished a very good supply of seed in normal years. An acre of alfalfa, sown in this way, makes an excellent source of home-grown seed of a hardy strain, which can be kept comparatively free of weeds and of weed seeds.

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#### VARIETIES OF SWEET CORN FOR TABLE USE.

Sweet corn is grown in Ontario for table use at home, for supplying the canning factories, and for use as a green or dry fodder for farm stock. It is scarcely ever used for making silage. For home use it is important to secure those varieties which are ready for use at different dates and which produce corn of the highest quality. Some people prefer using one variety of sweet corn and planting at different dates, so as to prolong the season in which the corn is in the best condition for domestic purposes. As a fodder crop, it is important to grow varieties which produce a large amount of stalks and of ears which are most suitable for feeding in the autumn to farm stock.

The main object in the co-operative experiments with sweet corn has been to secure the variety for table use at home that will furnish the green ears which are sweet, juicy and tender, which are comparatively small, and have but few rows, eight being the most desirable number.

No less than fifty varieties of sweet corn have been under test at the Ontario Agricultural College. These different varieties have all been studied in the field, and many of them have been tested for table use. In the co-operative experiments, the varieties which have been used most extensively have been the Golden Bantam, the Mammoth White Cory and the Malakhoff. Of these varieties, the Golden Bantam has proven the best, the Mammoth White Cory the second best, and the Malakhoff came lowest in the list. In each of the past five years only two varieties were selected for distribution, one being the kind which has proven most desirable and the other being a standard late variety. The two kinds used were the Golden Bantam of the early, and the Stowell's Evergreen of the late varieties. The follow-

ing table gives the average results of twenty successfully conducted tests of these two varieties, under similar conditions, in the past year:

Experiment.	Varieties.	Comparative Value.	Number of Ears.	Number of days until ready for table use.	Table quality.	
					Flavor.	Juiciness.
Sweet Corn (20 tests.)	Golden Bantam....	100	123	94	100	100
	Stowell's					
	Evergreen.....	67	103	104	74	88

In each of the past five years the Golden Bantam was the most popular with the experimenters, the comparative value being represented by one hundred (100), while that of the Stowell's Evergreen was represented by seventy-three (73) in 1913, eighty-three (83) in 1914, seventy-seven (77) in 1915, sixty-nine (69) in 1916, and sixty-seven (67) in 1917. In comparative number of ears, the Golden Bantam was the highest throughout, and was ready for table use about two weeks earlier than the Stowell's Evergreen. In both flavor and juiciness, the Golden Bantam surpassed the Evergreen in each year of the comparative tests. It is evident that there is no sweet corn throughout Ontario which is as popular for table use as the Golden Bantam variety, which is increasing very rapidly in the farm homes throughout the Province.

#### VARIETIES OF POTATOES.

Within the past twenty-five years a large amount of experimental work with the potato crop has been conducted at the Ontario Agricultural College. The results of these experiments were embodied in Bulletin No. 239, under the title of "Potatoes," and copies can be secured by writing to the Department of Agriculture, Parliament Buildings, Toronto. The bulletin comprises eighty-five pages and gives the results of upwards of fifty definite experiments, practically all of which were conducted in each of five years or more.

The average annual yield of potatoes per acre in 1912, 1913 and 1914, was the highest, and in 1915, 1916 and 1917, the lowest, in Ontario, of any period of three consecutive seasons in the last thirty-five years. You are all aware that the past three years have been abnormal seasons. These abnormal conditions have placed the seed potato problem in a perplexing position in Ontario. Much work has been done during the past year in investigating potato problems, with the idea of formulating definite plans for potato improvement in this Province.

Most of the soils of Ontario are very well adapted to potato production, providing they are properly underdrained, either naturally or artificially. Some sections of the Province are particularly well suited to potato growing on a large commercial basis. Experimental evidence, however, goes to show that particularly high yields are likely to result from the use, in southern Ontario, of seed potatoes obtained from the northern sections of the Province. In each of five years an experiment has been conducted at the College in testing, under uniform conditions, potatoes obtained from different sources, including New Brunswick, Northern Ontario, and Southern Ontario. Without an exception, the highest returns were secured from the

seed obtained in a northerly part of this Province, about 150 miles north of Toronto, in the Muskoka district. In the past year seed was obtained from Thunder Bay district, near Fort William, and the returns were very satisfactory.

As the result of experimental work conducted at Guelph over a series of years, immature seed potatoes gave higher returns than those which were allowed to mature before they were dug. The fact that the northern grown seed potatoes have been produced in a comparatively cool climate, and without a severe drought, and that the vines have been immature at the time of digging, seems to give an explanation of the value of northern grown seed.

In 1917, an enquiry was made from hundreds of experimenters with potatoes regarding the most extensively grown varieties in the separate counties of Ontario. In all sixty varieties were mentioned, one or more times, as being the most extensively grown. As the result of a similar enquiry, fifty-seven varieties were mentioned in 1916, thirty-nine in 1915, fifty-one in 1914, fifty-seven in 1913, and fifty-eight in 1912. The following gives the names and the order of the varieties which were mentioned the greatest number of times in 1917: Irish Cobbler, 114; Delaware, 47; Green Mountain, 42; Carman, 40; Rural New Yorker No. 2, 28; Extra Early Eureka, 23; Empire State, 19; Beauty of Hebron, 15; Dooley, 14; Carman No. 1 and Early Ohio, each 13; Early Rose and American Wonder, each 12; Davies' Warrior, 8; White Elephant and Gold Coin, each 7; Sir Walter Raleigh, 5; and Carman No. 3, 3. Each of twelve other varieties were mentioned twice, and the remaining thirty kinds only once. In the last five years the varieties mentioned the greatest number of times as being the most extensively grown in the different counties of Ontario, are as follows:

Varieties.	Average Five Years, 1913—1917.	Varieties.	Average Five Years, 1913—1917.
Irish Cobbler.....	48	Early Rose.....	12
Delaware.....	31	Carman No. 1.....	9
Rural New Yorker No. 2..	27	American Wonder.....	8
Carman.....	25	Dooley.....	8
Green Mountain.....	21	Beauty of Hebron.....	8
Empire State.....	14	Early Ohio.....	7
Extra Early Eureka.....	12	White Elephant.....	7

As some reports mention Carman, others Carman No. 1, and still others Carman No. 3, they have been classified exactly as reported. As the Delaware and the Green Mountain are frequently sold as one of the same variety, it will be seen that these two taken together would, along with the Irish Cobbler, form the two varieties mentioned the greatest number of times.

In the co-operative experiments conducted previous to 1913, it was found that the Davies' Warrior had made the highest record of the late potatoes, and the Extra Early Eureka of the early varieties. It might be mentioned that the Extra Early Eureka and the Irish Cobbler are both early potatoes which resemble each other closely, but in the experiments, extending over a series of years at the College, the Extra Early Eureka has somewhat surpassed the Irish Cobbler in both yield and quality. It was decided, in the spring of 1913, to use only the Davies' Warrior and the Extra Early Eureka for the co-operative tests. The same two varieties have now been used in each of the past five years, and in 1917 the Irish Cobbler was

also included. The following table gives the average results of the co-operative experiments with two varieties of potatoes, successfully tested on 263 farms in 1917:

Experiment.	Varieties.	Comparative Value.	Per Cent. of Small Tubers.	Mealiness When Cooked.	Bushels of Whole Crop per Acre.
Potatoes (263 tests)	Extra Early Eureka.....	100	11	100	167.8
	Davies' Warrior.....	91	9	98	147.8

In addition to the varieties here reported, there were ninety-three carefully conducted tests in which the Irish Cobbler was used. The seed potatoes of the Irish Cobbler variety came from New Brunswick, and were secured through two different sources. The average yield in bushels per acre of the three varieties, when brought to the same basis, would be as follows: Extra Early Eureka, 165.1; Irish Cobbler, 158.5; and Davies' Warrior, 145.5. The percentage of small potatoes was exactly 11 in both the Extra Early Eureka and the Irish Cobbler varieties.

A conference was called by the Commissioner of Agriculture, and held in the Parliament Buildings at Toronto on the 30th and 31st of October last, to discuss the best methods for improving the potato industry of the Province. A committee, of which the speaker was chairman, was appointed to make recommendations regarding the varieties of potatoes most suitable for growing for commercial purposes throughout Ontario. The Association finally adopted the following recommendation:

"That the Irish Cobbler be recommended as a standard early variety for commercial purposes, and the Early Ohio as an extra-early variety for market gardeners to meet the requirements of special markets. The Green Mountain was recommended as a standard late variety, with certain other late varieties as Carman No. 1, Dooley, Rural New Yorker No. 2, etc., recognized as standard varieties, and be recommended for those districts where conditions are peculiarly favorable to their growth. Where a variety was found especially suited to the conditions, farmers were advised to confine their attention to such variety."

The Extra Early Eureka is very similar to the Irish Cobbler, and if these two varieties were shipped in the same car for commercial purposes no serious results would follow. The same could be said in regard to the Davies' Warrior and the Green Mountain varieties. It will be seen from the earlier part of this report that both the Irish Cobbler and the Green Mountain varieties are well established in Ontario, and in many localities it is believed that either one or the other of these varieties might be grown to the exclusion of other varieties. By so doing more satisfactory results could be obtained from potato production in Ontario.

#### FERTILIZERS AND MANURES WITH FARM CROPS.

Interesting and valuable experiments with fertilizers and manures have been conducted throughout Ontario with farm crops during the past twenty-six years. In the beginning of this work the experiments were made as simple as possible in order that the people conducting them could furnish complete reports. As experience has been obtained the work has gradually become more complicated and is improving in value from year to year. The results which have been obtained are of general value. A number of the experimenters in connection with the Experimental

Union have been carrying on tests successfully for a number of years, and are now in a position to conduct fertilizer work with a large amount of satisfaction. We believe that the Experimental Union is carrying on co-operative experiments with fertilizers at the present time which are more comprehensive than those conducted at any other place. Information is being obtained that could not possibly be obtained in any other way. It is true the work is subject to criticism, but such is the case with any experiments with fertilizers which have been conducted at any time and at any place. The results of experiments conducted through the medium of the Experimental Union for a period of twenty-four years may be secured in printed form by writing to the Experimental Union Secretary, Agricultural College, Guelph.

In 1917, co-operative experiments with fertilizers and manures were conducted throughout Ontario with potatoes, mangels, rape and winter wheat. Owing to the abnormal weather conditions, no summary tabulated report has been issued except for the experiment in testing fertilizers with mangels.

#### NITRATE OF SODA AND COMMON SALT WITH MANGELS.

An experiment was conducted throughout Ontario for five years in succession in the testing of different fertilizers with mangels. The results were very interesting and showed that an application of 160 pounds of nitrate of soda per acre, applied to the land when the mangels were about three inches in height, increased the yield of roots per acre by fully six tons, according to the average of forty-one separate tests conducted within the five years.

In the spring of 1911 another experiment was started with fertilizers and mangels. For this experiment nitrate of soda was applied to the mangels at the rate of 100, 160 and 200 pounds per acre at the same time as the seed was sown and also on separate plots when the mangel plants were about three inches in height. In comparison with the six plots with nitrate of soda, common salt was applied at the rate of 200 pounds and 400 pounds per acre at the time of sowing the mangel seed. Two plots were left unfertilized in each experiment. In 1911 and in 1916 no really satisfactory reports were obtained which could be used in a tabulated form. In 1912 four, in 1913 two, in 1914 three, in 1915 two and in 1917 four complete reports were obtained.

Fertilizers.			Yield of Mangels per Acre (tons.)	
When Applied.	Kinds.	Quantity per Acre (lbs.)	*Approximate Cost per Acre.	Average Five Years. (15 tests)
When Plants were three inches tall.	1. Nothing.....	.....	\$ c.	24.08
	2. Nitrate of Soda.....	100	....	27.14
	3. " " ".....	160	4.80	28.36
	4. " " ".....	200	6.00	30.29
At the time Seed was sown.	5. Nitrate of Soda.....	100	3.00	27.19
	6. " " ".....	160	4.80	28.57
	7. " " ".....	200	6.00	30.15
	8. Common Salt.....	200	....	27.39
	9. " " ".....	400	....	27.03

\*The prices here given for the nitrate of soda were approximately correct in the earlier years of this experiment and under normal conditions.

In the former experiment, which was conducted throughout Ontario for a period of five years, and of which we obtained forty-one good reports, it will be remembered that the mangel crop was increased six tons per acre by an application of 160 pounds of nitrate of soda. In the results here presented it will be seen that 160 pounds of nitrate of soda, applied when the plants were three inches tall, increased the yield of mangels 4.3 tons per acre, and that the same quantity of nitrate of soda, applied at the time the seed was sown, increased the yield of mangels 4.5 tons per acre. The results presented in tabulated form furnish information regarding the increases from the other applications of nitrate of soda which are worthy of careful study. The yield of mangels per acre has been increased or decreased, according to the amount of nitrate of soda which has been applied. The highest average yield of roots per acre in the past five years was produced from 200 pounds of nitrate of soda per acre, applied when the plants were about three inches in height. This was an increase of 6.2 tons per acre over the unfertilized land.

## SOURCES OF FARM SEED SUPPLY FOR THE PROVINCE OF ONTARIO.

EXPERIMENTAL UNION—PROF. W. J. SQUIRRELL.

If any justification is required for including the Experimental Union on this programme as a source of good seed, it will be found in its past record in this regard. For thirty-two years this organization has been supplying farmers with good seed of the best varieties, and during this period of time 88,604 farmers, situated in every township and every county of Ontario, have received material.

The seed, distributed through the medium of the Experimental Union, was nearly all grown in the Experimental field at the College. This seed was carefully tested for a period of five years or more and must have shown some special merit to warrant its distribution. Some of these varieties distributed have been the product of importations from foreign countries, others of systematic selection, and still others of artificial cross-fertilization. The Experimental Union has realized, and realizes to-day, that one of the chief weaknesses in crop production in the province is the presence of too many varieties in the different classes of crops. Its aim, therefore, has been and is to send out a comparatively few varieties, and those only of the very best.

This organization has given to the farmers of Ontario such varieties as the Mandsehuri barley and the O.A.C. No. 21 barley, the latter now being practically the only barley grown; the O.A.C. No. 72 oats, one of the most grown oats in Ontario; the O.A.C. No. 3 oats, the Dawson's Golden Chaff and the O.A.C. No. 104 winter wheats, and several other varieties whose records speak for themselves.

It has provided the basis of seed supply for much of the work of the Canadian Seed Growers' Association, the Field Crop Competitions, School Fairs, and other organizations.

A large share of the prizes obtained by exhibitors in the past few years at the Provincial Winter Fair at Guelph, at the Eastern Winter Fair at Ottawa, and at the Canadian National Exhibition at Toronto, have gone to varieties which were first distributed by the Experimental Union.

Some of the largest seed houses in Canada have considered varieties of seed, which had their source in the work of the Experimental Union, of sufficient importance to feature them in their seed catalogues.



It is true that the Experimental Union deals only in small quantities, and it is also true that occasionally we have complaints from farmers because we do not send more seed. These men say, "We can't be bothered with these small quantities, but send us a bushel or two and we shall be glad to grow them." If it were possible for us to send these larger amounts—which it is not—we would be defeating the chief purpose for which the Experimental Union exists, that of enabling the farmer to find out for himself, and under his own conditions, which methods or varieties are best suited to his farm. The average farmer, I think, much overestimates the time it requires for these small quantities to increase to large amounts. It is possible for one seed of oats to increase to one hundred bushels in three years, and we have had experimenters who, from the third year's crop from seed supplied by the Experimental Union, have sold hundreds of dollars' worth of seed.

Sufficient seed is sent to each experimenter to sow 1-80th of an acre, excepting in the case of potatoes, when the amount is only enough to plant 1-160th of an acre. In addition to these amounts, it is possible for paid members of the Union to get one "Member's Special," which consists, generally, of five pounds of seed.

The farmer who obtains Experimental Union seed, though the quantity may not be large, is sure of getting, free of charge, seed of varieties true to name; the best seed of these varieties, as the seed is all handpicked, and material free from any fungus disease, where it is possible to make it so.

The Department of Field Husbandry keeps a list of men who have good seed for sale, and farmers who wish to obtain seed of those varieties which have been distributed for some time by the Experimental Union, in larger quantities than is regularly supplied for experiment, may do so by writing to the Director of Co-operative Experiments in Field Crops.

Perhaps the chief causes of the success, other than the supplying of good seed in the distribution work of the Experimental Union, lies in the fact that it is able to reach every farmer, even those the most remote from the chief seed centres, and that its method of operation is competitive.

The obtaining of the best seed of the best varieties cannot be too strongly emphasized when we consider, if we take the case of alfalfa alone, that it is possible to get seed of this crop which will vary in production from nothing to nearly five tons of hay per acre. No farmer could have better insurance on his crops than is provided by the sowing of the best seed.

#### ONTARIO SEED TRADE—WALTER STEELE.

The source of many varieties of seed and seed grain is visible to anyone travelling through Ontario during the summer and early fall, and it is only necessary to mention them briefly:

Practically all seed grain used in this Province is produced locally or secured in the Canadian West. Every indication points to a large demand for good, clean seed oats and Red Fyfe seed wheat, but, unfortunately, supplies of both are short. There is a good stock of Marquis seed wheat available, also a fair supply of barley, buckwheat and Canadian field peas.

The Ontario crop of red clover is short, and it will be necessary to import considerable quantities from the North-western States, which we find gives better results than seed produced farther south or from European countries. A limited quantity will be available from New Ontario.

Alsike is a full average crop, both in quality and quantity, and there will be ample stocks of good quality for home requirements.



The Ontario crop of alfalfa is again very short, and no European seed is available.

Timothy was a good crop in Ontario, and during the past two or three years considerable quantities of choice seed have been produced in Southern Alberta, which have given good results in Ontario and Eastern Canada. Unfortunately, Canada does not yet produce sufficient for requirements of the trade, and large quantities are imported each season from the United States.

We will also have to depend largely the present season on the country to the south for seed corn, as the Ontario yield is very short, though in favorable seasons considerable quantities of Flints and Early Dents are produced in the South-western Counties.

There is a large market each season for choice stocks of seed grain, and a greater number of farmers should specialize in producing pure stocks suitable for seed purposes, which can be disposed of at a premium over ordinary market prices, and would give a much larger financial return for their labor.

I would also like to emphasize the importance of removing weeds from growing crops of clover intended for seed purposes, as many varieties cannot be removed by milling, and it will pay the producer many times over for the labor expended.

The sources of vegetable and field root seeds are not so well known as those previously mentioned. I have frequently been asked if we grow all our seeds on our farm at Oakville.

The chief object in maintaining these grounds is to have a suitable place to test all the stocks we handle. Each season we make a field test of every variety of vegetable and root seed received, growing similar varieties received from various growers side by side, and including tests from new sources of supply offered. An accurate record has been kept in this manner by our company for many years.

For some years past there has been considerable agitation on the part of the Seed Branch at Ottawa to produce seeds in Ontario, or at least in Canada, and I am pleased to state that this is a matter that was looked into very carefully by our company. Many years ago our Mr. Briggs conceived the idea that we could supply more reliable and uniform strains if we selected our own plants and roots and produced our own seed stock, afterward sending it to more favored countries, where a crop would be more certain. Unfortunately, though the experiment was tried with both annuals and biennials, it was found impracticable, and our present method adopted. Each season we make from 900 to 1,200 comparative tests. Careful records are made and every variety is maintained at the highest possible standard of quality. In this manner a constant process of selection is maintained at a minimum expense.

I suppose the majority of those present believe that carefully selected, fully ripened seed, produced in a given locality, will produce a better crop in that locality than imported stocks, but this is far from being a universal rule.

To give a few illustrations: The United States, with possibly the most varied soil and climate in the world, cannot produce swede turnip or mangel seed to compare in results with importations from England and France. The same applies to garden beets and many other vegetables. California can produce a fair strain of certain varieties of celery, but to be dependable the seed stock must be imported from France, as, even with the most careful selection, locally grown seed rapidly deteriorates. Exactly the same conditions apply to the finer varieties of table carrot.

You have been assured that Ontario can successfully grow root crop seed in commercial quantities because conditions were so similar to the growing sections of Germany. Yet, our firm discontinued growing mangel seed in Central Europe

some years ago, as we found the quality compared unfavorably with English and French-grown stocks. Germany never was a factor in producing swede turnips.

Danish supplies of mangel were also heralded as being superior for Canadian use, and our firm secured supplies at considerably higher prices than from other sources for some years, until we found that the dangerously low vitality was a usual condition, when several large shipments were returned and importations discontinued.

To sum up the results of our experience, we have found, in common with seed merchants in every other country, that certain portions of the earth are especially adapted for growing certain crops, and that the results obtained from seed produced in these sections will be more uniform and generally satisfactory than from seed produced at home or in any other present known section. Some of these localities are in California, the Central and Eastern States, the British Isles, France, and Holland.

At the present time, when the world is crying for supplies that can be produced in Canada to better advantage than any other country in the world, it does not appear a wise diversion to experiment extensively in seed producing, particularly in Ontario, where the growers of practically the only garden seeds produced in Canada, viz., peas and beans, find it impossible to place contracts, even at prices previously unheard of.

The greatest service the Seed Branch has given to the people of Canada is in their educational work in convincing planters that it pays to sow the best seeds obtainable, and there is still an ample field for their efforts in this direction.

As a result, we presume, of the inducements offered to produce seed locally, we receive letters from time to time advising that a sample of seed is being forwarded; for example, turnip seed, and requesting our highest quotation. Variety names are rarely mentioned, and conditions under which it has been grown and source of seed stock—never.

We have also received lists of Canadian-grown supplies ~~the past~~ few seasons, with the information opposite a number of entries that they are possibly cross-fertilized. Instead of these supplies being offered to the public, they should be destroyed by the inspectors, unless facilities are provided for carrying the stock until a careful field test can be made.

The present season, if expected deliveries are received safely, there should be sufficient supplies for Canadian demands, though prices, in sympathy with all other agricultural products, will be much higher than usual. Any shortages will be due more to the extremely unfavorable season in Europe and the United States, than to conditions caused by the war. The season of 1919 will be more critical, owing to reduced surplus stocks, but every effort is being made to place contracts through the best available sources of supply, and much will depend on the season and export restrictions.

It is commonly believed by many, who have learned the prices paid to growers, that the seed merchant makes an exorbitant profit. Unfortunately, the spread between buying and selling price is largely absorbed by unavoidable expenses.

The first expense is for freight and insurance, both of which items the past three years, particularly, have been a heavy tax. On arrival, each bag is opened and inspected to see if it has arrived in good condition to be placed in storage, and a sample removed, part of which is used for germination test at once, and balance laid aside for a field test during the summer, which entails still further labor in planting, cultivating, and recording. When orders are received, the original shipment is measured or weighed up in smaller lots as required, and packed

for transportation. In addition to heavy charges for labor, the season is very short, and it is only possible to turn over your investment in stock once each year, at most, and a permanent lockup of a considerable sum is necessary for buildings and machinery. In addition to general cost of conducting business, an attractive catalogue is necessary, which still further reduces the gross profit.

It is doubtful if any enterprise in Canada during the past generation has demanded such close attention to meet the demands of a critical public, and yielded such small financial returns.

#### DISTRICT REPRESENTATIVES—R. S. DUNCAN.

In view of the conditions that prevailed one year ago and the difficulty some farmers had in obtaining seed, a seed campaign was inaugurated by the Department of Agriculture, and carried out through their District Representatives. This scheme resulted in a great deal of pure seed being distributed to the farmers in the various counties. The campaign was carried on through the newspapers, inviting farmers to send samples of seed, together with the quantity they had for sale and the price, to the district representative, and these samples of seed were displayed in their office in small boxes, or placed in glass jars. Farmers coming into the office would inspect this seed, and in this way the district representative acted as a medium of exchange. The representative would suggest that the farmer write direct to the farmer who had seed for sale and make his own bargain; in other words, the district representative's office was simply used as a clearing house for good seed.

To give some idea of what was accomplished, I will give two concrete examples. In York County, 150 farmers received this information from the district representative's office, and were put in touch with farmers having this good seed, and we know from the records that 150 farmers actually got seed from farmers in the district who had it.

In Glengarry County over 2,000 bushels of good seed were actually distributed through this means to farmers who hadn't good seed from the 1916 crop.

We have been receiving crop reports, during the past year or so, each week from the district representatives, and there is a special paragraph set aside for products required by farmers or products offered for sale. Farmers in certain counties may, perhaps, have beans or good, pure seed potatoes; or alfalfa seed or clover seed; or good barley or oat seed, and the representative would simply list these in the weekly crop report. There is another paragraph devoted to the wants of the farmers in that district. Schedules would be prepared and sent to the district representative, and in turn to the various farmers' clubs. In this way a great deal of seed was exchanged between farmers, and it put the farmers in touch with good seed. That has been carried out through the district representatives during the past few years, in connection with their farmers' clubs and other agricultural organizations in their counties.

It would be possible for the district representatives to display samples of seed from the winning fields in the Field Crop Competitions, in their offices, and in this way a number of farmers can be put in touch with a source of good seed. This might also be true with the seed which won prizes at Guelph Winter Fair, and which will win prizes at the Kemptville Seed Fair, which will be held this month.

The district representatives in their travels during the season have been urged to keep their eyes open and look out for good fields of seed. In this way, they will be able to put farmers in touch with the actual conditions as they existed during

the growing season, and, understanding these conditions, would be able to impart that information to the farmers. Of course, the district representative would cooperate with all other organizations, Experimental Union, seed houses, etc., in getting an equitable distribution of pure seed.

The corn situation this year is a very acute one, and as a consequence I doubt very much whether the district representatives will be able to assist in the distribution of this seed, any more than perhaps to put farmers in touch with sources of good seed.

During the past few years, the district representatives have been conducting a variety test in corn, with certain standard varieties. The object of these variety tests is simply to find out what variety of corn will do best in a certain district, and, after they find out this information, they will advise the corn growers in the south-western peninsula to grow these special varieties for the farmers.

During last year there was an acute shortage in potato seed; forty cars of potatoes from New Brunswick and the Western Province were distributed through the medium of the district representatives; farmers' clubs would handle them, or some local merchants in the town. In some instances, the municipal council would handle the carload of potatoes. Very satisfactory results have been achieved in connection with the distribution of these carloads of potatoes, and particularly is this true with the potatoes from New Brunswick. Fairly satisfactory reports have been received of the potatoes which were planted and obtained from the Western Provinces.

In connection with the Field Crop Competitions, which have been conducted over the Province during the past few years, every contestant has secured good seed, and we are making an endeavor to get that seed as pure as we possibly can. This holds true in the case of potatoes, oats and barley, and in some cases, of wheat. The representatives are in touch with all these men, whose fields have been inspected in their counties. This forms a source of good seed, for which arrangements have been made for distribution.

Then, in a number of seed centres, there are organizations operating under the rules of the Canadian Seed Growers' Association, in various counties—in oats, wheat, barley, and potatoes. These organizations in the seed centres have been practically all organized through the district representatives. And, while some are producing registered seed, others again have only improved the seed, and that is a source of good seed. In two counties in Eastern Ontario, i.e., Carleton and Russell, we have boys' and girls' potato-growing contests. I have just forgotten the number of boys who have competed in these contests, but each boy has to put in one-tenth of an acre, and he naturally secures the best seed in his district. Certain varieties are grown in certain districts. The Green Mountain variety has been grown most extensively. The yield has varied from 200 to 400 and 450 bushels per acre—on the 1-10th acre basis. In many cases farmers are going to the young boys for their seed for the coming year.

In connection with the Rural School Fair, methods have been organized for the last seven or eight years. In 1917, 3,072 individual plots of barley were grown in the Province of Ontario; 4,392 individual plots of oats; 1,380 individual plots of wheat, and 14,532 individual plots of potatoes. Barley, oats and wheat were given out in one-pound lots, and the potatoes in five-pound lots. Altogether, these totalled 23,676 individual plots of oats, barley, wheat, and potatoes.

Practically all this seed was of the following varieties: Barley O.A.C. No. 21; oats, O.A.C. No. 72, and, in some cases, Banner; wheat, Marquis; and potatoes, I am sorry to say, there may have been 10 or 15 different varieties distributed last

year. Last year the potato situation was unfavorable, but this year, I may say, that all the potatoes for distribution in connection with the School Fair methods have been purchased from Northern Ontario, and the varieties that will be grown are Green Mountain and Irish Cobbler.

What effect will the distribution of these seeds have in connection with the source of supply of good seed? I can give instance after instance of where the farmer is growing a variety that was originally distributed to the pupils some few years ago, and he has nothing but that one variety on his farm to-day. That holds true in oats and barley. I know one district where the boys' potato contest was conducted, where 90 per cent. of the boys received Green Mountain potatoes. There are very few other varieties grown there but that one.

District representatives are at the command of the farmers, and they will only be too glad to co-operate with organized bodies and assist in the distribution of the seed supply we have for the Province of Ontario for 1918.

#### FIELD CROP COMPETITIONS—J. LOCKIE WILSON.

I am very glad to have the opportunity of going over very briefly some things that have happened in the last ten years with regard to the Standing Field Crop Competitions. The competitions have been a success, and it is due very largely to the foundation laid by you gentlemen who are here to-day. The Experimental Union in the past thirty years has done a splendid work in improving the field crops of this country. In addition to this, I may say that the successful prosecution of the work of the field crop competitions is very largely due to the splendid assistance given us by the officials of the Guelph Agricultural College and the Ottawa Experimental Farm. The farm journals have also assisted splendidly in advertising the work over all the Province.

In 1907, we got the first grant of \$1,000 from the Hon. Nelson Monteith, to start the work. Beginning with ten societies and 325 farmers in 1907, we had this past year 185 societies, 7,000 entries, and 7,000 fields were judged. The grant given by the Government then was \$1,000, while the grant to-day is \$25,500, including the spring Seed Fairs. Twenty thousand dollars was utilized for the work of the Standing Field Crop Competitions in 1917. From this you can form some idea of the opinion the Ontario Government has of the work in hand, and also the opinion of the farmers of this country in respect to the Standing Field Crop Competitions.

I don't believe there ever was a grant paid out by the Federal or the Provincial Governments that has proved of more value to the agriculturists of Ontario than has this amount of money paid out for Standing Field Crop Competitions. The first difficulty even the ten societies had, was to get competent field crop judges. The Federal Government kindly loaned men, and, with the help of some expert grain growers, the work was accomplished the first year. It developed fast. To have uniformity in judging, we established short courses for Department Field Crop Judges, and this has been of vital importance to all men who attended these classes. There has never been a farmer who has attended the short courses to fit himself as a judge of grain, but said he was well repaid for his time, in so far as he was personally concerned, and so far as the work was concerned on his own farm. We had 150 judges employed last year on the Standing Field Crop Competitions.

I hope suggestions will come from this Convention regarding important rules and regulations. You are after all bound to be, in the coming years as in the past, the real book-keepers along this line. I believe it is for you to assist in every



possible way, by making suggestions for the future, towards this splendid agricultural and educational work.

Score cards were prepared, short courses for judges were held, and the judges were sent out and the work has been well done. Last year over one hundred societies took up two crops, and eighty-five, one crop. Every agricultural society can conduct either one or two field crop competitions. Agricultural men must be members of an agricultural society to compete. We have had as many as forty and fifty men in these competitions in one society. So the work is progressing.

We have found that many good farmers wanted to know where to find good seed. How were they going to get it? We added an appendix to the report of the Agricultural Societies, and in that appendix the names and addresses of every farmer that entered the competition, the name of the variety of crop, the exact score taken in the field crop competition, the names of the members winning, and the names of the different men who did the judging, were entered. Thousands of copies of this appendix are issued every year, and the one for 1918 is now in the hands of the printer, and the farmers will have an opportunity of finding out the men who have been most successful in the Standing Field Crop Competitions. They will also know by this report which weeds, if any, have been in every field in the 70,000 acres judged this year, so I say, so far as the appendix is concerned, it will be of value to the farmers when it is issued, and it has been of value in the past.

The farmers are not the only ones who profit by the Standing Field Crop Competitions. The Ontario Vegetable Growers' Association has taken it up. For the past few years they have been offering prizes for the best kept market gardens or vegetable gardens entered by members of the Ontario Vegetable Growers' Association. Their crop competitions are on the same lines as the Standing Field Crop Competitions. So much has the country profited that the larger exhibitions are writing and asking that they have an opportunity of offering larger prizes. The Canadian National Exhibition, shortly after we started, realized that there was a forward movement in it, and offered \$100 in prizes for the members winning in the Standing Field Crop Competitions. Only prize-winners are allowed to compete at the large exhibitions. At the Provincial Winter Fair, Guelph; the Eastern Ontario Winter Fair, Ottawa; and the Canadian National Exhibition, Toronto, prizes are given to further the educational work that is being carried on.

#### CANADIAN SEED GROWERS' ASSOCIATION—J. H. NEWMAN.

The Canadian Seed Growers' Association has, scattered throughout Canada, over 1,500 farmers doing more or less work in producing seed of various kinds. Five hundred and eighty-three of this number are located in Ontario, and of these only a comparatively small percentage have any considerable quantity for sale. Up to the present date we have listed 45,040 bushels of oats, 2,220 bushels barley, 2,744 bushels potatoes, 30,420 bushels wheat, and 170 bushels of corn. In Ontario alone we have listed 1,450 bushels of wheat, 6,345 bushels oats, 1,390 bushels barley, 170 bushels corn, and 400 bushels potatoes. Many growers have not listed their offerings in view of the fact that these have found ready sale locally. A good deal of the seed that is being offered is quite suitable for foundation stock, and has been picked up readily at good prices. In fact, all seed which is suitable for registration is finding a ready market. The North Gower Banner Oat Centre, for instance, has an offer for its entire supply of Registered Banner oats at \$1.25 per bushel.

In years like this the value of Seed Centres, as a source of supply of good seed, is particularly apparent, and it is earnestly hoped that a greater number of these

will be organized and put on a good basis as soon as possible. In average years seed oats, particularly, have been brought into Ontario in considerable quantities from other provinces. This year, however, other provinces, notably Quebec, and to some extent the Maritime Provinces, are looking to Ontario for their supply.

The value of good seed is gradually impressing itself upon the minds of the farmers throughout the Province, as a result of which an increasing number are taking up systematic work under the direction of the Association on their own farms, while the demands for good seed on the part of others is likewise increasing. Unfortunately the present labor conditions mitigate against any *rapid* increase in membership, and therefore in the production of the class of seed that is wanted. What is clearly needed in the Province at the present time is a systematic effort to encourage a greater number of farmers to sow only pure seed and to operate so that when they harvest a crop of grain good enough for seed, they may offer this to the trade as such. In order to assist farmers in carrying this into effect, the C.S.G.A. was organized, and all who contemplate doing something along this line should at once apply for membership.

#### THE WESTERN ONTARIO SEED GROWERS' ASSOCIATION—A. MCKENNEY.

An Association incorporated under the Agricultural Association's Act, and known as the Western Ontario Seed Growers' Association, was formed in December, 1914.

The object of the Association is to encourage a general and constant improvement in the production and dissemination of all high-class field, root and vegetable seeds, including cereals, clovers, grasses, roots and vegetables.

1. By co-operating with the Department of Agriculture.
2. By holding meetings to discuss matters of importance to the seed-growing industry in the Province.
3. By co-operating with Exhibition and Seed Associations and Societies, firms or individuals, to advance the interests of the seed-growing industry generally.
4. By holding, and assisting to hold, competitive exhibitions and educational meetings.

All bona-fide seed growers and persons professionally interested in seed growing, who are willing to comply with the Constitution and By-laws of this Association, are eligible for membership in this Association upon payment of a membership fee of \$1.00.

All seed for sale by members of this Association must be described accurately as to variety, germination and purity and guaranteed as described.

Purity in this case shall mean the number and kind of all weed and other seed content.

Purchasers of seed must notify the Association of all complaints within ten days after receipt of seed. The Association may at any time in its discretion take action against any member should complaint arise.

It is the aim of this Association to encourage its members to greater production by means of—

- (a) More thorough and efficient methods of cultivation.
- (b) By careful application of suitable fertilizers,
- (c) By proper rotation of crops,
- (d) Using the best seed obtainable.



The members are expected, so far as possible, to secure their stock seed from the growers of registered seed and from the Dominion and Provincial Experiment Stations. This method is to be adopted for the purpose of securing not only the highest production, but an available quantity of first-class seed, which may be sold at a reasonable price. This seed would be only a few generations removed from the registered seed produced by the Canadian Seed Growers' Association, or from the seed sent out by the Experiment Stations.

This Association has a representation on the Executive Committee of the Ontario Provincial Winter Fair, and now all exhibitors in the general class of the Seed Exhibition in connection with this fair are members of this Association.

Each director of the Association is expected to keep the secretary advised, during the season, as to the probable production of crops in his locality.

#### ONTARIO CORN GROWERS' ASSOCIATION—P. L. FANCHER.

The corn crop for Ontario has been rapidly increasing, both in the number of acres grown in the older corn-growing areas and in the newer areas. This increased acreage has demanded a large seed supply. At no time has Ontario ever met this demand with Ontario-grown seed. In fact, the majority of the seed sown for ensilage purposes has been imported, while that grown for husking has been of Ontario varieties. Ontario has never had such a shortage of her own varieties fit for seed as she has at the present time. This is true for the United States as well, but to a lesser extent. The past season was so cold that corn did not come to maturity early in the fall; and the fall was so wet and cold that what got fairly well matured did not have a chance to get thoroughly dry before frost came. To put it briefly, Ontario has not enough good seed corn of her own varieties to reseed the seed-producing section of Ontario. The ensilage grower will have to be content this year with seed from the United States.

As to the supply of seed in the United States, much may be said, but it is sufficient to *emphasize* here the fact that the United States has met similar results as Ontario in seasonal reverses, and *we must not put too much faith in the United States corn for seed purposes.*

The latest reports show that the average germination test for good United States shell corn this year, and even much ear corn, does not run 70 per cent., much of it around 50 per cent. *Good seed corn is hard to obtain in the United States, and where it is found in any quantity it is being picked up fast. Nearly all of this corn is in the south, where frosts did not come before the corn got dried.* So the ensilage growers will have to be satisfied with southern-grown dent corn if they wish good strong germination.

Let me say here that there is some good seed corn *in the ear*, testing 90 per cent. and above. Every effort is being made to get this good corn into Ontario.

*I cannot emphasize too much the great importance of farmers demanding germination tests from those selling seed corn.*

One thing more, do not take anyone else's test as absolute. Test the seed you buy for yourself. I know that there is much corn that *seems* to be good seed that is *not*.

Test the seed for yourself before planting.

#### DOMINION SEED BRANCH—W. J. W. LENNOX.

The members of the Canadian Seed Growers' Association, whose organization receives a grant from the Federal Department of Agriculture, are in a position to

multiply the superior strains of seed bred and selected by Federal and Provincial Department Experiment Stations. From these the members of the Western Ontario Seed Growers' Association and successful competitors in Field Crop Competitions commonly obtain the required amount of seed. The product of these fields should materially help to create a supply of seed in every county. The Seed Branch provides \$50,000 a year to support Field Crop Competitions, Seed Fairs and Provincial Seed Exhibitions, more than \$14,000 of which come into the Province of Ontario. Considering the prospective shortage of field, root and garden vegetable seeds, as indicated by the unusually high prices, competitions in these crops should now be restricted to seed crops. It seems desirable that the number of varieties for which competitions may be held be reduced to a few approved, as has already been done with potatoes.

Should a further allotment of money by the Federal Department in support of competitions be considered advisable, the Seed Branch contemplates an advanced step in connection with these competitions, and may suggest that prizes be restricted to crops grown from registered seed.

In Ontario at the present time, it is impossible to secure from many districts a sufficient quantity of oats of any given variety to fill one car. It might be correct to suggest that a competition be held for one particular variety. In localities where this is practised, a large supply of uniform product would be available for shipment in car lots. If this latter state of affairs existed in Ontario at the present time, a large quantity could be used to ship east to supply the needs of localities requiring seed oats.

In *The Agricultural Gazette* of Canada for November, 1917, is printed a report of our Seed Purchasing Commission, as follows:

"The rapid increase in areas under cereal crop in the Prairie Provinces has not been followed with an equivalent development of business organizations of capacity sufficient to meet the full requirements of good seed grain in years of partial crop failure covering considerable areas. The Immigration Branch of the Department of Interior has for many years provided seed grain to homesteaders on the basis of deferred payments, and on occasions have extended that distribution to all farmers who have been in need.

"The condition of the wheat crop in southern Manitoba and south-eastern Saskatchewan, which had been severely attacked by rust during the summer of 1916, made it clear as early as the first of September that large quantities of seed wheat would have to be shipped into that area from the Province of Alberta, and a month later the Seed Purchasing Commission of the Seed Branch was established and at work in each of the three Prairie Provinces. The new plan for handling this difficult seed situation was authorized by the Honourable Arthur Meighen, then acting Minister of Agriculture, based on the recommendations of the Seed Commissioner. This arrangement provided that all farmers who were in need of financial support to procure their supplies of seed grain, should establish their claim to such support before the local governing body in the municipality where they lived, which governing body would be expected to assume the responsibility of financing their purchases, either directly or with the co-operation of their provincial governments. The Seed Purchasing Commission, with headquarters at Regina, Sask., proceeded in early October with the purchase of seed wheat, for which they were authorized to pay a premium over current market prices amounting to not more than five cents per bushel. All of the seed purchased by the Commission was subject to inspection on delivery at the Canadian Government interior terminal elevators at Saskatoon, Moose Jaw, or Calgary, in which all of the seed purchased was stored and cleaned for shipment. Standards of quality for seed wheat, seed oats and seed barley were fixed by Order in Council and administered by the Seed Inspection Division of the Seed Branch staff, which had two experienced inspectors at each elevator. All of the seed grain purchased was bought subject to being graded seed by these men over whom the Seed Purchasing Commission had no direct control. In addition to inspecting the seed grain purchased by the Seed Purchasing Commission, these seed inspectors issued certificates and caused to be separately binned all grain admitted to these elevators that was sufficiently clean and good to pass the seed grades. The Seed Pur-

chasing Commission did not have a monopoly of the purchase and sale of grain for which seed certificates were issued at these interior terminal elevators. The Commission did, however, handle a sufficient quantity of seed grain to ensure an abundant supply at fair prices.

"The Commission purchased six hundred and twenty-nine thousand bushels of seed wheat, four hundred and eight thousand bushels of seed oats, and a small quantity of seed barley. This seed, which was selected because of being clean and free from wild oats and other noxious impurities, was carefully recleaned and sold at a price sufficient to cover the net cost of the recleaned seed. Special freight rates and arrangements for handling were provided by the railway companies. The Provincial Departments of Agriculture for Manitoba and Saskatchewan extended their hearty co-operation by providing the municipal governing bodies with financial assistance to enable them to purchase seed for needy farmers. Seed grain in any quantity was shipped either in sacks or in bulk to fill orders received from individual farmers, farmers' organizations, municipal governing bodies or seed merchants, in any part of Canada. One hundred and fifty-four thousand bushels of seed oats and a small quantity of seed wheat were shipped on orders from points in Ontario, Quebec and New Brunswick.

"All orders were filled subject to cash payment by bank draft and the moneys so collected were deposited to the credit of the Receiver-General. A total of one million four hundred thousand dollars was placed to the joint credit of the Chief Commissioner and the Accountant in Regina in installments of one hundred thousand dollars as required. The total amount returned to the Receiver-General up to the 30th of September, 1917, was one million four hundred and twenty-two thousand dollars, in addition to which there is in the Canadian Government elevator at Moose Jaw about twenty-four thousand bushels of seed oats, which were held in reserve and will be needed in Saskatchewan for next spring's seeding.

"The volume of the work entailed in handling seed grain of this amount, which has to be procured by picking out special cars of superior quality can be fully appreciated only by men who have had wide experience in this kind of business. All of this work, however, was managed throughout by the members of the Seed Branch staff who served on the Commission and who had had several years' experience in the work of seed inspection. That the seed sold and distributed was generally satisfactory would seem evident from the fact that no serious complaints and many letters of commendation have been received. The Commission is now purchasing seed oats in quantity for next year's supplies to meet the needs of northern areas in Saskatchewan, Manitoba, Ontario, Quebec and New Brunswick. In addition they will procure sufficient supplies of high quality Marquis seed wheat, grown from registered seed, to meet the needs of those farmers who may desire to procure a supply of fresh seed of superior quality. All orders for seed grain desired from this Commission should be addressed to Seed Purchasing Commission, Post Office Building, Regina, Sask."

The Seed Purchasing Commission has continued its operations again this year and is in a position to supply seed wheat, oats or barley from Government terminal elevators at Calgary, Moose Jaw, Saskatoon and the Harbour Elevator at Quebec. The Seed Purchasing Commission is not pushing the seed grain business, but has been pressed into taking care of a seed situation that resulted from extraordinary prices and a highly speculative condition of seed business that rendered it exceedingly risky for seed grain merchants to perform their normal functions. In consequence, the purpose of the Seed Purchasing Commission has been simply to provide large reserve supplies of good, sound grain that may safely be used for seeding, and to have this seed grain in storage in Canadian Government elevators at points convenient for distribution to meet any emergency that might arise. The business of the seed merchant or seed grower in the matter of production and distribution of named varieties of superior quality of seed grain does not form a part of the work of the Seed Purchasing Commission.

For information as to prices, applicants should communicate directly with the Seed Purchasing Commission, Post Office Building, Regina, Saskatchewan, or Quebec City. Supplies of seed oats are now being purchased in the Province of Ontario. It may here be announced that special arrangements have been made with private companies to guard against probable shortage of seed peas and seed beans.

## ROOT SEED GROWING IN CANADA.

DR. M. O. MALTE.

As you are aware, there was very little root seed grown in Canada before the war. Some swede turnip seed was grown in the Maritime Provinces, especially in Nova Scotia, and some mangel and beet seed was raised in Ontario, but the total amount produced in the Dominion was altogether too small to cut any figure in the supply required by the country as a whole. As a result, the bulk of the field root seed required yearly by Canadian farmers had to be imported.

Small quantities were imported to Canada from the United States, but the vast bulk came from European countries, principally the United Kingdom, France, Holland, Germany and Russia. It would be unnecessary, I think, in this connection, to give any detail figures on the imports for the years before the war, but just to give some idea of the quantities of root seed that came to Canada from some of the European countries now at war. I may say that in the year 1913-14, Canada imported 350,000 pounds of turnip seed from Holland and France only, about 900,000 pounds of mangel and beet seed, principally from France and Germany, and about 33,000 pounds of carrot seed from France.

There are several reasons why Canadian farmers were content to use imported European seed in preference to Canadian-grown before the war. In the first place, labor was cheaper and more plentiful in Europe than on this side of the Atlantic. As a consequence, the European grower could bring on the market seed crops at a much lower price than could the Canadian or American farmer. The fact that the rural districts of most European countries are comparatively thickly populated, has long ago brought home to the farmers of Europe the necessity of farming on an intensive scale that is unknown to this country. The necessity of utilizing every foot of tillable ground to the greatest possible advantage and with the smallest possible outlay of money, has resulted in more general employment in farm work of all the members of the family able to work, and as a result the cost of production of any kind of farm products was being kept as low as possible. Furthermore, as the cost of living was much lower than on this continent, the European farmer could afford to be satisfied with much smaller profits than the farmer in this country. As a result of such conditions, the European farmer could, before the war, supply Canada with root seed at very low prices.

Another reason why Canada, before the war, imported her supply of root seed, was due to a rather wide-spread, but surely false conception of the value, from a crop-producing standpoint, of European-grown seed in comparison with seed grown in Canada. It is quite generally supposed, both in Canada and in the United States, that European-grown seed of field roots, especially sugar beets, is of much greater value than any root seed grown in America, because it is thought capable of producing larger crops of better quality. The reason for such a supposition which, as I will show presently, is entirely without foundation, is vaguely attributed to certain climatic and soil conditions in the seed-producing countries of Europe, by which the quality of the root seed is supposed to be influenced. Under the circumstances, it is no wonder that the Canadian farmer has, so to speak, been brought up on the idea that it was good business to secure whatever seed he needed from Europe.

**ROOT SEED SUPPLY AND THE WAR.**—As long as conditions in Europe remained normal, there was no danger of Canadian farmers not being abundantly supplied

with seed of at least average quality, but with the outbreak of war conditions became different.

During the first year of the war there was really no actual danger of Canada suffering from seed shortage in the immediate future, because the Canadian seed houses were well stocked with all principal varieties; they also had contracts for the delivery of varieties actually available in allied European countries. But as time went by, with no signs pointing to an early peace, the danger of a seed shortage in Canada gradually increased. The danger began to be pronounced when it became known that the European seed-exporting countries, from which Canada still might hope to secure an adequate supply, *i.e.*, the United Kingdom, France and Holland, had restricted the export of seed for the duration of the war. The danger became intensified when it began to be realized, on this side of the Atlantic, that the warring nations in Europe gradually were being forced to concentrate, if not all, at least most of their activity in agriculture on production of food for the armies. Later still, the danger became extremely grave when, to the difficulty of buying the seed in Europe, was being added the difficulty of securing ocean transportation, and, if such could be secured, to bring the seed in safety across the Atlantic.

To sum up, the war has created a situation with regard to Canada's root seed supply that must be called extremely serious. I am sorry that I have to make such a statement, but there is no use to try to deceive ourselves when we have the actual facts staring us in the face.

As it is, something must be done to bring relief, and to bring it as quickly as possible. I shall briefly sketch what has been done by the Dominion Experimental Farms to relieve the root seed situation.

**DOMINION EXPERIMENTAL FARMS TAKE ACTION.**—Before I tell you what the Experimental Farms are doing now, I beg to call your attention to the fact that, from the very beginning of the war, the Experimental Farms have been warning the farmers of Canada repeatedly against the possibilities of a serious curtailment in the root seed supply, and have tried, I think, their best to prevent the creation of a situation such as exists at present.

The Central Experimental Farm, in Ottawa, realized, right from the beginning of the war that, on account of a very probable disorganization in the seed-exporting business of Europe, there was a certain danger of Canada's supply of seed being partially, or even wholly, cut off, should the war last any length of time. For this reason a bulletin was issued early in the spring of 1915, *i.e.* approximately half a year after the outbreak of the war. This bulletin, which is entitled "Growing Field Root, Vegetable and Flower Seeds in Canada," strongly urges the Canadian farmer to take up field root seed growing for the purpose of meeting a threatening shortage in the supply.

A year later, *i.e.* in March, 1916, the "Seasonable Hints," a publication issued by the Central Experimental Farm three times a year, and distributed to nearly 400,000 farmers, had an article on the root seed situation, saying in part:

*"Reports from Europe indicate that the growing of field-root seed in the countries at war has been neglected during the past season. As a result, the export of all kinds of seed from France and Germany, the chief root-seed producing countries of Europe, has been restricted for the duration of the war.*

*"In view of this it is evident that, even should the war be brought to an end in the nearest future, there is still a grave danger of Canada not being able to secure from Europe, for years to come, the quantity of root-seed necessary to fill its needs. You are, therefore, urged seriously to consider the situation and to help to lessen the danger*



of a possible shortage of a class of seed without which farming would suffer very materially.

*"Grow at least as much seed as you require for your own needs."*

And in July the same year, 1916, the "Seasonable Hints" again dealt with the subject and said:

*"At the present moment the outlook is far from bright with regard to the importation from Europe of root-seed sufficient for the needs of the Dominion. As a matter of fact, there are several varieties which even now cannot be obtained at all, and others that are available only in small quantities. As a result, it is very likely, not only that prices for root-seed will be comparatively high the next few years, but also that much of the seed finding its way to Canada will be of inferior quality. You are, therefore, sincerely advised to make arrangements to raise your own seed next year."*

I could quote much more along the same line from other issues of the "Seasonable Hints" and from press articles, but what I have quoted will, I hope, be sufficient to convince you that the Experimental Farms, through the Division of Forage Plants, have made a determined effort to make the farmers of Canada realize that there existed, right from the beginning of the war, a grave danger of the root seed supply becoming seriously affected, and that the Experimental Farms have not failed to impress upon the individual farmer the necessity of producing on the farm what quantities of seed may be needed for home use.

Just the same, when the seed situation was being more closely looked into in the early summer of last year, it was found that quick action of quite a drastic nature had to be taken by the Government in order to provide for an adequate seed supply for the next few years. The Dominion Experimental Farms were called upon to try to meet the emergency and act accordingly.

Quite a large acreage was secured last July and seeded to turnips, mangels, carrots and rape, with a view of producing stocklings to be used for seed production in 1918. How many acres will be employed in seed growing in 1918 is almost impossible to tell at present. The last season was a very unfavorable one, the harvesting conditions, in Eastern Canada at least, were about as unfavorable as could be imagined, and the winter has so far not proven very suitable for storing of roots, the more, as practically all of the seed roots harvested had to be pitted outside. However, if conditions during the rest of the winter and the early spring prove to be reasonably normal, the Experimental Farms expect to have a total of about 350 acres of roots for seed planted by next spring. Granting this, and assuming that a fair crop is realized, the Farms expect to be able to bring on the market a considerable quantity of seed next fall, and hope thus to be able to bring relief to a situation that, without prompt assistance, threatens to be anything short of disastrous.

You will understand that the seed-growing undertaken by the Dominion Experimental Farms is purely an emergency measure made necessary by the war. It is a Government intervention for the purpose of securing a supply of a class of seed that, without such intervention, would be available, it is feared, in altogether too small quantities to meet even the most moderate demand from the farmers.

**COMPARATIVE VALUE OF CANADIAN-GROWN AND IMPORTED SEED.**—I said, a few minutes ago, that it is a wide-spread idea, in Canada as well as in the United States, that European countries are better suited, on account of soil and climatic



conditions, to produce high-classed seeds, and that such a conception has been one of the obstacles preventing this continent from developing a root seed-growing industry of any importance to speak of. When I say that European countries have been considered able to produce more high-classed seed than Canada, I mean, that the prevalent idea has been that seed produced in Canada could not compete with European-grown seed because it would not be capable of producing root crops of such a good quality as the European-grown seed was supposed to produce.

I may say, as I have said before, that there is no foundation whatsoever for such a supposition. Canada can grow root seed of just as good quality, if not better, than Europe, and, if the quality of the seed is being judged from the quality and quantity of the root crops that it produces, I may say that there is no reason whatever why this country should rely on Europe for its seed supply, at least for the duration of the war and years thereafter.

I beg to lay before you some facts, results of experiments, in support of this statement.

As far back as 1891, the Bureau of Chemistry of the United States Department of Agriculture started some systematically planned experiments in Sugar Beet seed raising in Nebraska. The experiments were carried on for a few years, and the results were that when Nebraska seed was grown in comparison with imported seed, it was found to possess a higher vitality, and, what is of more importance, it was found that the sugar beets produced from the Nebraska-grown seed possessed a higher sugar content and gave a heavier yield than any of the imported varieties tested.

For a number of years, the United States Department of Agriculture also conducted experiments in sugar-beet seed growing in the State of Washington, the results obtained showing that the American-grown seed in all respects could compete successfully with imported seed.

As far as Canada is concerned, I must confess that we have not much data on the value of Canadian-grown sugar-beet seed as compared with imported seed, but the little data we have indicates that Canadian-grown sugar-beet seed is in all respects at least as good as imported seed. The year before last the Central Experimental Farm received, through the kindness of Mr. Henry Stokes, of the Dominion Sugar Company, some Ontario-grown sugar-beet seed. This was tested on most of our Experimental Farms and Stations, and, I am glad to say, it compared very favorably with imported seed tested in comparison with it.

With regard to mangels, I am in a position definitely to state that mangel seed can be produced in Canada that is at least as good as mangel seed produced in Europe. Canadian-grown mangel seed is capable of producing at least as large root crops as imported seed and crops that, to say the least, do not fall behind in feeding value or quality in general.

In support of this statement, I beg to refer briefly to some experiments with home-grown and imported seed, which were conducted by the Experimental Farms in 1916. The home-grown seed used in these experiments was raised in Canada in 1915. The varieties used were Mammoth Long Red, Yellow Intermediate, and Danish Sludstrup. Three lots of Mammoth Long Red seed were tested: one lot of seed produced at the Central Experimental Farm, Ottawa, another lot produced at the Experimental Station, Charlottetown, P.E.I., and the third at the Experimental Station at Kentville, N.S. Two lots of Yellow Intermediate seed were used in the experiment, viz., one originated at the Central Farm at Ottawa and the other at the Experimental Station at Charlottetown, P.E.I. Of three lots of home-grown Danish Sludstrup seed that also were tested, one came from Charlottetown,

P.E.I., another from Kentville, N.S., and the third from the Experimental Farm at Agassiz, B.C.

The Canadian-grown seed of these varieties was tested in comparison with imported seed of the same varieties on Experimental Farms and Stations in Eastern Canada and British Columbia, and in no single case did the Canadian-grown seed produce smaller yields than the imported seed of the same variety tested alongside with it. The Canadian-grown seed, on the contrary, gave higher yields than the imported seed.

I shall not trouble you with many detail figures, but would like to say that the Yellow Intermediate mangel seed from Ottawa yielded—it was tested at 7 Experimental Stations—on the average 3 tons 750 pounds to the acre more than the imported seed of the same variety. If the Ottawa seed had been brought on the market it would, I may add, from its very appearance have commanded much higher price than the imported one. It was plumper, of better color, more uniform and of a much stronger vitality. It germinated quicker and more evenly, and as a result the crop raised from it had a better start and was more vigorous from the beginning than the crop produced by the imported seed.

I would also like to say a few words about the experiment with Ottawa-grown seed of Mammoth Long Red mangel in comparison with commercial seed of the same variety.

The Ottawa-grown seed was raised from roots taken from the ordinary farm crop at Ottawa. The roots that produced the seed were taken practically without any selection at all; only such roots were culled that were too badly malformed or too prongy. The roots used were therefore far from ideal. In fact, if our object had been to raise seed of a high standard, we would have discarded at least fifty per cent. of the roots as unfit for seed raising. Under the circumstances you understand that the seed that we obtained from the Ottawa-grown roots could, under no circumstances, be considered to be of high quality from a selection standpoint. We could, therefore, hardly expect that it should produce as good a crop as seed of the same variety raised from well-selected roots. And yet, it did. And it did even better; it gave higher yields than imported seed of the same variety, which presumably was of a better-bred stock.

The Ottawa-grown and the imported seed were tested side by side at nine Experimental Farms and Stations and, on the average, the Ottawa-grown seed produced nearly 3 tons more roots to the acre than imported seed of the same variety. The seed was also tested at some fifty private farms in Eastern Canada with the result that, as an average, the Ottawa-grown seed produced about 10 per cent. heavier yield of roots than the imported seed.

In 1916, an experiment was also conducted with swede turnip seed raised at Fredericton, N.B., in comparison with imported seed. The variety used was Kangaroo. The New Brunswick-grown seed was tested in comparison with commercial Kangaroo seed at five Experimental Stations in Eastern Canada and yielded on the average about two and three-quarters tons more to the acre than the imported seed.

I think I am justified, from the experience we have so far on the subject of the comparative value of home-grown and imported seed, to conclude that from a crop-producing standpoint Canadian-grown root seed is at least equal to imported seed, *i.e.* European seed. And I beg to repeat what I said a few minutes ago: There is no foundation whatsoever for the conception that European-grown seed, because it is grown in Europe, is superior to Canadian-grown. On the contrary, what data

we have on the subject furnishes a very strong argument in favor of Canadian-grown seed being used in preference to imported seed, providing of course that the Canadian seed is being raised from reasonably well-selected roots.

**WHERE AND HOW TO GROW ROOT SEED.**—I have used the rather vague term, "Canadian-grown seed," in the discussion on the value of imported seed, in comparison with seed grown in Canada, and possibly some of you may be inclined to infer that when I have referred to "Canadian-grown seed," I was trying to convey the impression that seed of first-class quality of mangel, turnips and carrots can be grown to advantage anywhere in agricultural Canada. To convey such an impression on you is far from what I desire to do.

I regret very much that I am in a position to give you only very meagre and incomplete information as to what districts of Canada are suitable for the different varieties of field roots. From our experience I may say, however, that so far the best results with turnip seed growing have been obtained in Quebec and the Maritime Provinces, especially in Nova Scotia, and that success in mangel seed raising has been repeatedly reported from Eastern Ontario, British Columbia, and maybe to a lesser degree, from the Maritime Provinces and southern parts of Ontario. Carrot seed has been grown the last few years very successfully in Eastern Ontario, and, judging from what I saw last summer in British Columbia, the dry belts of the interior of British Columbia, and the Victoria district of Vancouver Island, seem to be admirably well adapted to carrot seed raising.

But remember that root seed growing is still in its infancy in Canada. It will take years before we are able definitely to say that such and such a province or such and such a district of a province is best suited to such and such a variety of roots for seed raising. We will, no doubt, find that while a certain part of, for instance Ontario, may be classed as very well suited for mangel seed raising, another part may be classed as either doubtful or altogether unsuitable. We need data on these matters, and before we have it I think it would be wise to be conservative in our expectations as to what Provinces or districts of Provinces can do with regard to production of the various classes of root seeds.

Climatic conditions no doubt determine, in combination with soil and fertility conditions, to a large extent what success will be had in root seed raising. But on the other hand, much depends on the methods of planting, culture, and handling of the seed crop, especially if the seed is raised on a commercial scale.

I am not going to take up your time with a discussion on what methods are liable to bring the best results, simply because it is not possible to lay down any hard and fast rules for a country of such a diversified nature as Canada. It would be impossible, indeed, even to prescribe definite methods for Ontario, or even for Ontario west of Toronto, because the methods to be employed depend on so many things, for instance nature of soil, fertility, nature of season, labor conditions, etc.

Before I close, I would need more most earnestly impress upon you that there is an acute shortage of root seed in Canada at present. I would most sincerely advise everybody to grow some root seed this year, the more the better. Every farmer who grows what seed he needs for his own farm, is protecting himself from want, and every farmer who grows more than he can use for himself is doing a service to his country.

## HENRY STOKES.

Agricultural conditions in Ontario have been much disturbed by the war. Before the outbreak of hostilities, practically all of our supplies of root seed were procured in Europe. These supplies have been gradually cut down until we are forced to turn our attention to the production in Ontario of seed to meet our own requirements.

Seed growers will find that the shortage of labor is one of the real problems to meet. We are now facing the worst labor crisis which has ever confronted us. In the years 1912 and 1913, our labor was costing us \$1.50 per day for ten hours, while in 1917 we were compelled to pay from \$2.75 to \$3.00 per day. Compare these conditions with those of Europe for 1912, and we find that in Russia, Italy and Germany the average wage was 50 cents per day of twelve hours.

Planting usually starts about the 25th of April, and continues until the end of May. If the weather is warm the stecklinge will soon spoil, so planting must proceed as quickly as possible. If we are planting on clay land, and have heavy downpours of rain, such as we had last spring, then we are doubly handicapped. The cultivation of the crops must be done early in the season, before the plants are large enough to suffer from breaking down by the passing of the horse and cultivator in the rows.

From a sugar beet standpoint, we require 450,000 pounds of seed each year, to plant the acreage which is necessary to keep our three large factories running. In 1917, we grew one hundred acres of seed, which supplies only about one-fifth of our requirements. We expect to grow two hundred acres of seed this year, which, with favorable conditions, should produce 150,000 pounds, or about one-third of the total amount required. In 1919, or in 1920, we hope to be able to grow five hundred acres, which should produce all we need. We realize that if we are to have seed, we must produce it ourselves.

This year high prices are being paid in Canada for vegetable seeds. These prices will tend to encourage men to specialize in this work. From my six years' experience, I am satisfied that seed can be produced in Canada on a commercial basis. It would cost about fifty dollars per acre to produce stecklinge in the pit. An acre planted with stecklinge, including cost of planting, etc., would amount to from twenty to thirty-five dollars. The total cost, therefore, of producing an acre of seed would amount, approximately, from eighty to one hundred dollars.

A difficult part of the work is to produce proper storage for the stecklinge. This is especially so during the early part of the season, when planting is going on. I have had much difficulty and loss occur, while planting on a clay soil, during a rainy season. The rains caused delay in the planting, while the moisture and warmth started a growth of the stecklinge in the pit. To retard this growth, I aired the roots, and, although I was successful in stopping the growth, I greatly lessened their productive power.

Seed growing, in a commercial way, should not be attempted by every farmer. It should be carried on in localities where the soil and climatic conditions are favorable. The counties of Kent, Essex and Lambton produce good corn; Kent and Elgin, along the lake shore, good tomatoes; while Waterloo and Wellington can produce seed of mangels, sugar beets and turnips, yet other districts may prove by experiments to be suitable for this work as well.

As it is very easy to allow the stock to degenerate, the work must be undertaken by men of keen observation and foresight, and supervised by men of good technical ability. In growing beet seed, we test the mother roots for sugar con-

tent, and plant only those which have a high sugar content. By following this practice, we have increased the sugar content of our factory beets by about one-half per cent., while a common test for mangels and turnips is a specific gravity one.

The past two years have not been ideal for this work, because of the periods of excessive rainfalls and drouths. For two years now, I have had poor luck with my mangel seed, but this was my own fault, as I planted the stecklinge too late. We have ten farmers growing seed for us, but under my supervision. We are also going to attempt turnip seed production, three of us having purchased fifteen hundred bushels of roots for planting in the spring of this year.

I have received much valuable assistance in this work from Mr. George H. Clark, the Dominion Seed Commissioner, and his staff, Messrs. Lennox and McMeans; as well as from Dr. Malte and L. r. Brown, of the Central Experimental Farm; and also from the Ontario Agricultural College.

#### DR. C. A. ZAVITZ.

I wish to supplement very briefly what has already been stated. We are greatly indebted to Dr. Malte, for telling us what is being done throughout the Dominion in the endeavor to produce root seed in the different Provinces, and to overcome the crisis in regard to the scarcity of root seed in this country. We are also very grateful to Mr. Stokes for the information which he has given in regard to the production of sugar beet seed in this Province. Mr. Stokes has probably had more experience in the actual production of root seed in Canada than any other person.

We have been carrying on experimental work at the Agricultural College at Guelph during the past ten years in growing mangel, turnip and carrot seed, to obtain information as to the success of seed production of these classes of roots in this Province. Our results have not been very satisfactory in the production of turnip seed, but our success has been fair in the production of carrot seed. I am pleased to state that so far, with only two exceptions, we have had very decided success in the production of mangel seed at the College. Five years ago the mangel seed germinated only twenty-seven per cent. from the clusters. This was probably owing to the fact that we had a frost in the early part of September and the mangel seed was not harvested until the latter part of the month. In 1916 mangel seed production was a failure in this Province. The seed produced at the College only germinated about ten per cent. We had one acre of mangel seed which looked promising, but when the plants were in bloom we had an exceptionally hot, dry spell, which seemed to seriously affect the plants. At harvest time many of the clusters had a good appearance, but they contained no vital seed. Not only was this true in our mangel seed at the College, but the conditions were very similar throughout the Province. This was a great disappointment to us. We had been working on a special strain of the Yellow Leviathan mangel, which we had carefully selected. In July, 1915, we planted seed of this special strain, and produced about fifty thousand stecklinge. In the spring of the following year, not only did we plant about six thousand of these stecklinge ourselves, but we distributed about forty thousand to about twenty-five progressive farmers throughout Ontario. Had the season been favorable, we would probably have had from six to ten tons of seed of this special strain of the Yellow Leviathan mangel, which would have been of great service in using for the production of more stecklinge in 1917, but, as I stated before, mangel seed production was a failure throughout the Province in that year. In 1917 we planted at the College a little less than an acre of stecklinge of another selected strain of the Yellow Leviathan mangel.

This area gave us about sixteen hundred pounds of first-class mangel seed, which is giving a germination of about 213 per cent. from the mangel clusters. We expect to use this seed entirely in 1918 as foundation stock for producing stock-linge, to be re-planted in 1919 for seed production.

Generally speaking, we have had excellent results from home-grown mangel seed, and I think the outlook is very good, indeed, for the production of mangel seed in this country. In the average results for nine years at our College, very careful field tests show that our home-grown seed gave an average percentage of germination from the clusters of 113 per cent., while, in the average of the same nine years, imported seed, obtained through three of the leading Ontario seed houses, gave 78, 75 and 72 per cent. We have not obtained imported seed from any source which has given us as high a percentage of germination over a series of years as we have secured from the seed produced at Guelph.

I would also emphasize what Dr. Creelman suggested this morning, and what Dr. Malte mentioned this afternoon, that is the great importance of individual farmers throughout Ontario helping along in this movement. If farmers who have some good mangels stored in their root cellars would, in the spring when vegetation is starting to grow, plant these in a piece of well-tilled land, they would be able to grow seed for home use. The mangels might be placed about thirty inches apart each way. We have occasionally obtained as high as a pound of seed per plant, but this is very exceptional, and it would not be wise to count on more than from three to eight ounces of seed per plant on the average. By transplanting from fifty to one hundred plants in the spring, a nice quantity of seed could be obtained. This would greatly help out the situation in furnishing home-grown seed, and in showing what could be done in seed production in different localities throughout the whole Province. I would be pleased to receive word of the success of any farmers who will undertake to produce a small quantity of mangel seed in the coming year. In former years our mangel seed was nearly all imported from Europe, and, if we are going to avoid serious results from lack of seed, in the next few years, especially, we should do what we can to produce seed of our own, which might lead eventually to the development of a new industry in this country.

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## PRACTICAL SUGGESTIONS IN THE PRODUCTION OF FOOD MATERIALS FOR THE COMING YEAR.

### WHEAT AND BEANS—DR. C. A. ZAVITZ.

The world is calling loudly for food materials, and especially for wheat. The food situation is undoubtedly very critical at the present time. I ask this representative body of farmers to consider with me most seriously as to what Ontario can do to increase as quickly as possible essential food materials. In this connection, I wish to discuss with you the production of wheat and of beans, as I consider it is exceedingly important to increase these two crops to the greatest possible extent in 1918.

Wheat is used more extensively as human food than any other cereal. It is particularly rich in nutritive constituents, and no other grain except rye contains a gluten which is capable of expanding and forming light, porous bread. Wheat can be easily grown, economically transported, and readily stored when necessary. Canada has a wonderful opportunity of doing a tremendous service at the present time in the production of wheat for export.



**WHEAT FOR EXPORT.**—It is estimated that the shortage in the wheat crop of the allied countries in Western Europe for 1917 amounted to 570,000,000 bushels. Of this deficiency, only about one-third can be supplied from Canada and the United States. There was a normal surplus for the past year of about 23,000,000 bushels in the United States and of about 138,000,000 bushels in Canada. Although there were nearly three times as many bushels of wheat *produced* in the United States as in Canada, the normal *surplus* of the latter is about six times as great as that of the former. The amount of wheat available for export, and the ready transportation of the same to Western Europe, are the important features at present.

**ONTARIO WHEAT PRODUCTION.**—The acreage of fall wheat in Ontario was considerably below the average in 1917, and, owing to unfavorable weather conditions last autumn, the area of winter wheat is about the same this year. It will be necessary, therefore, to depend upon the spring wheat for any increase in acreage. It is interesting to note that in 1917 there was an increase of spring wheat over the previous year of, approximately, 38,000 acres.

According to recent estimates, the normal annual consumption of wheat in Ontario is about 13,000,000 bushels, and the production in 1917 was about 17,000,000 bushels. The amount of surplus wheat in Ontario in the past year was, therefore, approximately four million (4,000,000) bushels. It will be seen that, by increasing the wheat production 25 per cent., the amount of wheat available for export is thus increased by fully 100 per cent. An average yield of winter wheat in Ontario in 1918 should be sufficient to supply the people of Ontario under normal conditions. The amount of wheat available for export from this Province during the next year will, therefore, depend largely on, first, the economy on the part of the people in the use of winter wheat, and, second, on the coming season's production of spring wheat. The importance of increasing the spring wheat crop of Ontario in 1918 seems evident. In order to bring this about, I wish to emphasize four points, viz., (1) increase in acreage, (2) sowing the best variety, (3) using seed of high quality, and (4) sowing at the right time on a suitable seed bed.

**INCREASE IN ACREAGE.**—The average annual number of acres of spring wheat for the six years, from 1883 to 1888, inclusive, was 626,104, and for the six years, from 1912 to 1917, inclusive, was 141,279. The average yield per acre per annum for the first period was 15.5; and for the last period, 18.4 bushels. According to the reports of the Bureau of Industries, the acreage of spring wheat in this Province has decreased more or less gradually from 779,463 in 1885 to 182,957 in 1917. In connection with this, it is interesting to note the average annual yields of spring wheat per acre for Ontario for the past thirty-six years, when divided into periods of six years each, are as follows:

Periods of Six Years.	Average Bushels of Spring Wheat per acre per annum.
1882-1887.....	15.5
1888-1893.....	15.0
1894-1899.....	15.7
1900-1905.....	17.8
1906-1911.....	17.4
1912-1917.....	18.4

It will be seen that the highest average yield per acre was for the last six years. It may be a surprise to many of the farmers of the Province, who have had the impression that the production of spring wheat in Ontario has been a failure in recent years, to know that the average annual yield per acre of spring wheat for the past three years has been greater than that of any three consecutive years from 1882 to 1914. Some of the highest yields in spring wheats during the past five years have been made in some of the counties of both Eastern and Western Ontario, and in some of the districts in the northern part of the Province. Under the circumstances, it seems reasonable to conclude that the acreage of spring wheat in Ontario might be advantageously increased to a considerable extent.

**SOWING THE BEST VARIETY.**—According to the results of co-operative experiments and experience of farmers throughout Ontario, good returns have been made by both the Wild Goose and the Marquis varieties of spring wheat. The average yield in bushels per acre for the last five years has been 20.2 for the former, and 19.0 for the latter. As the Marquis variety of spring wheat is not only a good yielder, but is also a wheat of excellent quality for bread production, it will likely be used extensively for seed purposes in the coming spring.

**USING SEED OF HIGH QUALITY.**—Not only is it important to sow a good variety of spring wheat, but it is also exceedingly wise to use seed of the highest quality. In an experiment, which was conducted for eight years in sowing different selections of seed of spring wheat, some interesting results were obtained. The following shows the influence of one season's selection of seed repeated for eight years:

Selections.	Weight per Measured Bushel (pounds).	Average Yield per Acre per Annum.	
		Tons of Straw.	Bushels of Grain by Weight.
Large plump seed.....	59.1	1.4	21.7
Small plump seed.....	58.3	1.3	18.0
Shrunken seed.....	56.9	1.2	16.7

This shows that large plump seed gave an increase over small plump seed of about 20 per cent., and over shrunken seed of about 30 per cent. It is highly important to use sound seed of strong vitality in order to get the highest returns.

**SOWING AT THE RIGHT TIME.**—In an experiment, conducted at the Ontario Agricultural College in each of five years, spring wheats were sown at six different dates in the spring, starting as early as the land was in a suitable condition for cultivation, and allowing one week between each two dates of sowing. The experiment was conducted in duplicate each year. The average results of the ten tests conducted in the five years are as follows:

Seedings.	Weight per Measured Bushel (pounds).	Yield per Acre.	
		Straw (tons).	Grain (bush.)
First .....	60.1	1.2	21.9
Second .....	59.6	1.1	19.2
Third .....	59.0	1.0	15.4
Fourth .....	58.9	.9	13.0
Fifth.....	56.5	.6	8.4
Sixth .....	54.0	.8	3.7

It will be seen that for best results it is of great importance to sow spring wheat as early in the spring as the land is suitable for cultivation. According to the results of the experiment, a delay of one week made a decrease in the yield of 2.7 bushels per acre, or of fully 12 per cent.

By sowing at the right time, on well prepared land, the best seed obtainable of the Marquis wheat, the increase in production would be surprisingly great, and the available amount for export might be easily increased many fold.

**FIELD BEANS.**—According to the Bureau of Industries for Ontario for 1916, the market value per acre of some of the grain crops of Ontario are given as follows: Beans, \$58.95; Corn for Husking, \$36.57; Wheat, \$34.19; Peas, \$27.41; Spring Wheat, \$24.89; Barley, \$23.91; Rye, \$18.81; Oats, \$17.50; and Buckwheat, \$15.51. Beans occupy a high place in value per acre among the grain crops of Ontario.

Field beans approach animal foods in nutritive value. They contain a high percentage of protein and in this respect surpass the other grain crops frequently used as food. There is a higher percentage of protein in beans than in the best cuts of meat, but it is not quite so completely digested. Protein is a nutrient which serves to build and repair body tissues as well as to furnish energy. It performs essentially the same part in nutrition, whether it is from beans, peas, wheat, meat, milk or cheese.

The Province of Ontario, and the States of Michigan and of New York, have produced about one-half of the beans of the North American Continent within the last few years. In 1916, 83 per cent. of the acreage of beans in Canada was in Ontario. The number of acres of beans in this Province was 53,999 in 1916 and 114,785 in 1917. Beans are one of the most valuable crops which can be grown in Ontario for export. They can be transported readily, and, when well matured, can be stored without much danger of injury. It seems proper for Ontario to produce as large an acreage of beans in 1918 as the limited amount of labor will permit.

#### BEEF AND BACON—PROF. G. E. DAY.

In normal times it is counted good business to give our beef cattle a good degree of finish before sending them to market. The higher price obtained for well finished cattle has usually been profitable to the feeder.

At the present time, however, we are facing decidedly abnormal conditions. Statistics indicate that the world is facing a heavy shortage of wheat. If these statistics are correct, it looks as though it might be necessary to use grains heretofore employed almost exclusively for the feeding of animals, to help out the supply of wheat. As a matter of fact, investigations are in progress to determine the extent to which wheat flour may be adulterated with the flour of other cereals and still retain its palatability for human consumption.

If it becomes necessary, therefore, to utilize the coarser cereals for human food, it must mean a shortening up of concentrates for fattening animals, and the question arises whether, under present prospects, we should not make a special effort to use the smallest possible amount of concentrates, and utilize to the fullest extent bulky fodders in the fattening of our cattle.

Some years ago the Ontario Agricultural College secured a gain in weight of 2,180 lbs. in the case of fattening steers, from the use of 2,187 lbs. of ground barley and 729 lbs. of bran. This is very little more than one pound of concentrates used for each pound of gain in weight, the balance of the ration being made

up of hay, corn silage, and roots, in the proportion of 1, 2 and 3, respectively. The steers used in this experiment were cheap, common cattle, and the gains they made were not large, being approximately  $1\frac{1}{2}$  lbs. per steer, per day, for a period of 165 days. The cattle were not well finished when marketed, and dressed a little less than 57 per cent. of their live weight, but the beef from these cattle was much superior to a great deal of the beef we are forced to consume in these days, and, as has been pointed out, it was produced with the use of a very small quantity of material which was fit for human consumption.

One thing is certain, we cannot produce the maximum amount of highly finished beef and, at the same time, produce the maximum amount of cereals for human consumption. It would seem, therefore, the part of wisdom to economize on the use of cereal grains in the feeding of beef cattle, and to utilize to the fullest extent bulky fodders, even though we have to be content with smaller gains in weight and a poorer quality of beef. As previously stated, these are abnormal times, and methods which would have been severely condemned a few years ago may be the very best and safest methods we can follow at the present time. Our great effort must be to get human food from our bulky fodders by converting it into meat, with a minimum reduction of cereals for human consumption.

An objection in the mind of many may be the fact that in the College experiment roots were used very liberally, whereas on many farms roots are not largely grown, owing to the labor involved. This is a perfectly legitimate objection, but, judging from experience, silage can be made to take the place of roots, to a very large extent at least. In addition to this, the hay fed the College steers was mixed timothy and clover, and contained too much timothy to be really satisfactory for cattle feeding. With a good quality of clover hay, or, better still, alfalfa hay, and a liberal allowance of silage, there is every reason to believe that results quite equal to the College results can be obtained. The experiment emphasizes the great importance of clover, alfalfa and silage on the farms of this Province.

**BACON PRODUCTION.**—At the present time a strong plea is being made for increased bacon production. There are several reasons why hogs are especially important in times like these, and the following may be noted:

(1) Hogs multiply rapidly, and mature quickly, so that they offer the quickest means of increasing the world's supply of meat.

(2) Hogs produce more meat from a given amount of food than any other domestic animal.

(3) Hogs give a greater weight of dressed carcass in comparison to live weight than any other animal.

(4) The carcass of the hog contains more edible meat in proportion to bone than that of any other animal.

(5) Pork and bacon contain a large proportion of edible fat, which is vitally needed in the rations of soldiers.

(6) Bacon is perhaps the most compact form in which meat can be shipped.

It will be seen, therefore, that the hog is bound to play a very important part in rationing our armies and those of our allies.

A point which counts against the hog in the eyes of the farmer is the fact that in order to finish it it must be fed considerable quantities of concentrated feed, and when concentrates are high in price, as they are at present, the farmer is inclined to cut down on his hog production. Everything considered, therefore, it would seem that the present is an opportune time to study carefully the possibilities of reducing the amount of concentrates in the ration of the hog and still provide a fattening ration.

Roots are a somewhat expensive crop to handle, but the advisability of growing even a small patch of mangels or sugar beets for winter hog feeding is well worthy of consideration. Experience has demonstrated that roots can be used in such a way as to lessen very greatly the amount of meal necessary to fatten hogs. A plan which has been used successfully, both at the College and on farms throughout the Province, is to pulp the roots, moisten the pulped roots with hot water and mix them with about an equal bulk of dry meal. The moistened roots moisten the meal and cause it to adhere to the roots and the whole constitutes a palatable and satisfactory ration for winter feeding. Sugar beets are preferred by pigs, but mangels are more easily grown and pigs take them quite readily. Turnips are not quite so palatable, but pigs can be taught to eat them if accustomed to them from the start. When practicable, boiling turnips makes them quite palatable and enables one to greatly reduce the consumption of meal. Boiled potatoes have a higher value than roots, and when cheap fuel is available small potatoes should never be allowed to go to waste. Breeding sows can be maintained throughout the winter with a very light meal ration if they are supplied with roots and some fine quality clover or alfalfa hay, alfalfa being the best. The hay may be fed dry in a rack similar to a sheep rack, and is very much relished by pigs, even young pigs will take considerable hay of this kind, but they should not be expected to depend upon it to the same extent as older pigs.

For summer feeding, pasture crops seem to offer the most convenient means of reducing the meal ration. Alfalfa makes an ideal pasture when available, but red clover, especially young red clover, is greatly relished by pigs, and can be utilized in reducing the meal ration.

A thickly seeded mixture of grains such as oats and barley, or oats, wheat and barley, together with about 8 lbs. of red clover per acre, makes a capital pasture quite early in the season. If it is not desired to pasture the mixture during the early part of the season, it can be cut for hay and the clover will then come along and form an ideal pasture for any class of pigs. Rape may also be used as a later pasture crop, and by changing the pigs from one field to another, crops such as rape and clover may be pastured and repastured several times.

Another plan which has been tried in some places, and which is worthy of consideration, is to plant a few acres of corn which will mature in the district in which we live. In this district, and in similar northern localities, a very early maturing variety would need to be used. A crop such as this, however, will supply a large amount of feed for hogs and the corn may be husked, feeding the corn to the pigs and utilizing the stalks for the cattle, or hogs may be turned in to harvest the crop for themselves. If it is intended to pasture the corn, it is a good plan to sow rape between the rows at the last cultivation. A combination of rape and corn such as this will fatten hogs fairly satisfactorily, and in any half favorable season an acre of such pasture should carry ten to twelve hogs at least thirty days.

Pigs weighing 100 lbs. and upwards are best suited for pasturing.

Any ingenious farmer will be able, in all probability, to devise other means of economizing on the meal ration, and the present suggestions are thrown out as merely representative of steps which may be taken to keep down the cost of production.

## BUTTER AND CHEESE—PROF. H. H. DEAN.

The beginning of the year 1918 finds the world short on food and the people hungry as never before, because it is a peculiarity of humans that the shorter the supply of eatables in the cupboard, the more hungry they become. Particularly short is the supply of butter, more especially in Great Britain, where butter has been selling for as high as \$1 per pound during the past year. Fats of all kind are scarce, milk-fat more than all others, because of the slaughter of cows and lack of labor to milk and care for dairy cattle. There is no substitute for milk-butter. The nation that relies on vegetable and animal fats, other than milk-fat, especially for children, has taken the first serious step in physical and mental degeneracy.

However, I am to deal with "Practical Suggestions on the Production of Butter and Cheese for the Coming Season."

The first one is that old one of *Better Cows*, which is at the basis of all increased production of dairy products. In these times, farmers cannot afford to feed poor cows. While we may not be able to breed very many cows which produce 100 lbs. of milk or over in 24 hours, and 20,000 lbs. milk in a year; or make 4 to 5 lbs. of butter in a day, and 1,000 lbs. in a year, the fact that we have a number of such cows should stimulate breeders to greater efforts than ever to secure these phenomenal producers, thus increasing the world's supply of milk-fat without increasing the number of cows, and at the same time we shall be conserving the supply of feed.

The organizations which are doing most to improve the dairy cattle of Ontario are The Records of Performance and The Records of Merit for pure-bred stock, and the Cow-Testing Association for the owner of common cows or unregistered stock. These, coupled with private records, are making a gradual, though slow improvement in the milk cows of Canada.

The second suggestion which, like a good appetite, always remains with us, when in a healthful condition, is to secure more and cheaper feed for butter and cheese production. Cheap and abundant grass, soilage, silage and root crops, with a reasonable quantity of grain and by-products, such as bran, oil-cake and cotton-seed meal, are essential for increasing the production of butter and cheese. Liberal feeding of the right kind of feed is an essential for increased production. Unfortunately the feed problem is a serious one on dairy farms. With the present price of grain and mill-feeds, the temptation is to lessen the quantity of these to a point below what is required for profitable production in winter time, as a certain amount of concentrated feed is essential, along with roughage, to produce milk in large quantities. Large producers require about one pound of meal for three to five pounds of milk produced. The great importance of cheap feed is realized when we consider that approximately one-half the cost of producing milk is for feed.

The third practical suggestion relates to a very acute problem on dairy farms at the present time, namely, the Labor problem. No class of farmers have been hit so hard as have dairy farmers in the present condition of labor. Many have sold their herds of dairy cattle and gone into other lines of farming because of help shortage. This condition is likely to continue for some time. The remedies which have been suggested are, to buy more dairy machinery, such as tractors, milking machines and cream separators; import foreign labor; conscript labor; utilize women help; and grow more help on the farm.



Not only is there a shortage of skilled labor on dairy farms, but the creameries and cheeseries of Ontario are likely to be shorthanded for 1918. This latter is fully serious as the help problem on dairy farms. Without our factory system of manufacturing butter and cheese, milk would be a drug on the market. While it is true that a considerable quantity of butter is still made on Ontario farms, and also some cheese, the quantity is lessening each year and likely to be markedly so from now on, as poor dairy butter will have to compete with "oleo," and will have to be sold at imitation butter prices.

Labor demands may be summed up in six words: Short hours, easy work, big pay.

If we are to increase or even maintain our present cheese output, the price of cheese must advance over the prices allowed by the Cheese Commission of 1917, which was 21¾c. per pound for grade one cheese at the Port of Montreal. We have no hesitation in saying, this is not anywhere near its food value as compared with the prices paid for meat and other protein carrying foods. The competition from milk condenseries is driving the cheese factories to the wall. Both patrons and manufacturers of cheese are having a serious time, and something must be done to relieve the situation or our cheese trade, the result of over half a century of fostering care, will be out of existence in a few years. Some claim that the present condensed milk boom is only temporary. A leading American dairy journal recently said: "We have no food product to-day that is in such great demand for export as is condensed milk, and the manufacturers can afford to pay prices for it that will drive the creamery and the cheese factory, with which the condensery compete, out of business. . . One creamery has put in a part of a condensing outfit, and is selling the condensed product in bulk to another condensery which is canning it."

If the condenseries are allowed to pay the high prices which have prevailed during the season of 1917, then cheese manufacturers must receive at least 25c. a pound wholesale for number one quality of cheese. One of the powder-milk companies paid \$2.35 per 100 lbs. for milk testing 3.5 per cent. fat for the month of November, 1917, and \$2.50 per hundred for 4 per cent. milk. Milk testing 3.5 per cent. fat will make about 9½ pounds of marketable cheese per 100 lbs., and 4 per cent. milk about 10 1-3 lbs. cheese per 100. One hundred pounds of 3½ per cent. milk, made into cheese, which sells for 25c. per pound would be worth \$2.17½c., which means that 17½c. would have to be realized for the by-product, whey, which is practically impossible, if fed to calves or pigs. There is also the cost of manufacturing, which would amount to 19c., at 2c. per pound of cheese. We can readily see that the cheese patron and cheese manufacturer are heavily handicapped when competing with condenseries under present arrangements. It is not too much to say that number one cheese should sell for as high a price per pound as does number one beef or bacon.

The new slogan regarding prices to be paid for farm produce is, "*Cost of Production Plus a Fair Profit.*" Whether this is obtained by means of Government regulation, or through co-operation and organization among farmers, makes little difference, but this principle carried into farm practice means a new era in agriculture.

One other point, only, can be discussed at the present time—the manufacture of cheese from skim-milk and buttermilk. The following are brief directions for making cheese from these two dairy by-products:

**SKIM-MILK CHEESE.**—Pasteurize skim-milk, then cool to 60 degrees or 65 degrees F., and add from 1 to 2 ozs. of culture to each 10 lbs. of skim-milk. Next

morning the curd will be nicely coagulated and ready to make into cottage cheese.

Stir the curd to break it up, then place the can of milk in a vessel containing hot water. Stir gently until the curd and whey separate. This usually takes place between 85 degrees F. and 100 degrees F. If the separation is not complete at 100 degrees F., do not heat higher, but let the cans stand until the whey is clear. High temperatures give a dry, grainy curd.

Drain the curd by hanging it up in cotton bags or putting it on a draining rack covered with cheese cloth.

When sufficiently drained, add about 1 oz. cream to a pound of cheese, and salt at the rate of 1 oz. to 4 or 5 lbs. of cheese.

**BUTTERMILK CHEESE.**—Heat the buttermilk to 130 degrees F. or 140 degrees F. Let stand from half to one hour, then hang up in a cotton bag to drain or else place on a rack covered with cheese cloth.

When sufficiently drained, salt at the rate of 1 oz. to 4 or 5 lbs. of cheese. The addition of a small amount of cream is an improvement.

While live stock would no doubt suffer considerably if there were neither skim-milk nor buttermilk for calves and pigs, the fact that from 12 to 15 pounds of ed. food, highly protein in character, may be made from 100 lbs. of these by-products, and whereas it requires from 25 to 30 lbs. skim-milk or buttermilk to produce a pound of gain in pigs, we see that considerable human food is lost by feeding these to pigs instead of converting them directly into food for humans. Assuming that a pound of skim-milk cheese is equal in food value to a pound of gain in pigs, 100 lbs. of skim-milk or buttermilk converted into cheese would be thrice as economical in the production of human food as feeding hogs on these by-products, and by many, would be considered cleaner and pleasanter work. Whether or not the consuming public is of this opinion remains to be tested.

To sum up:—In order to increase the production of butter and cheese for 1918, more cows and better cows are needed, more and cheaper feed, more labor on dairy farms and in factories, or its equivalent in machinery, higher prices for the cheese produced in 1918 than was paid in 1917, and the manufacture of larger quantities of dairy by-products into palatable, digestible, merchantable food products for *direct* human consumption, rather than through the agency of animals by which latter process a large part of the energy-value and protein compounds of skim-milk and buttermilk are lost.

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#### POULTRY AND EGGS—PROF. W. R. GRAHAM.

Poultry and eggs can be of material assistance in winning the war if used as a substitute of meats such as pork and beef, which are so much in demand. We can each help a little by eating more eggs and more poultry. Last season we had a considerable number of eggs for export, and there was not the usual demand for dressed poultry. I take it that it is our duty to conserve meat for export, and as eggs never increase in food value from the time they are laid, we can not do better than eat them at home. It would, therefore, seem desirable that each and every one of us eat as many eggs and as much poultry as we can. To some this may not appear to be correct, as eggs and poultry are high-priced. There appears to be a feeling that both eggs and poultry are luxuries, and that during war-time they

should be avoided. No doubt by so doing you will assist in winning the war, but not by us. As compared with meats, the average householder will find the money spent on a dozen eggs will go about as far and prove to most people more appetizing than the same amount of money spent on any meat.

Poultry and eggs are good foods, are somewhat perishable; then why not consume them in large numbers at home? Again, if you will take the percentage increase in the price of eggs, poultry, pork, mutton, beef, cheese and butter since the beginning of the war, either week by week or year by year, you will find that poultry products are as cheap or cheaper to-day, relatively, than they were at the beginning of the war.

To the producers of poultry there is every reason why you should carry on, at least maintain, production, and, in some cases, increase production. It is true we may have to change our methods a little. We shall have to look after our supplies of wheat substitutes, and not feed as much good wheat. Wheat has been easy to get and fair in price, but hens will lay very well on a mixture of corn, barley, and oats. There is always a little wheat that is not suitable for milling, but try and forget wheat. Then we may be able, with a little patience, to get a substitute in the terminal elevator screenings. While the birds do not take kindly to this now, there is considerable hope that, if they receive it when young, they will eat it readily next winter. Many of us forget that the appetites of poultry vary largely with what they were fed when young. I have seen hens that would not eat corn or wheat, simply because they had never seen them before.

Many of us will have to learn to cull our flocks. In general, it can be said that never was a good laying hen more profitable, and it is equally true that never was a poor layer more unprofitable. Therefore, cull your flocks. Good laying hens lose the yellow color from their shanks; those having white ear lobes, like Leg-horns, lose the yellow tinge; the hen's plumage does not appear in perfect condition. The good layer is usually a hustler—goes to bed late and gets up early. She very seldom, when well fed, develops a mass of internal fat. The body cavity, or the space between the pin bones and end of the breast bone, is soft and flexible in good hens. A little practice will assist one to pick out nearly ninety per cent. of the poor producers. A laying hen's pin bones are very seldom close together.

To those who have not been keeping poultry—get enough to supply your own needs. Do not depend on the other fellow, but grow all you need of everything you can.

Hatch your chickens during April and early May. These are among the best winter producers. Market the surplus males and old hens when they are ready. Many keep the old hens and males months after they have outlived their profitable age.

Watch the leaks in your business. Study increased production and decrease the boarders. There is no place to-day for the non-producer.

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#### FRUIT AND HONEY—P. W. HODGETTS.

It has been the aim of our branch for the past two seasons, at least one season, to give just as little devotion as we possibly could to the fruit growers' farms, especially that which required additional skilled labor. Our plan has been to give attention to the saving of labor that was of value.

The situation of fruit growing is somewhat difficult and complicated by the

food problem in the countries of Europe. At the present time you can offer to the British Government 30,000 boxes of apples and several tons of jam, as our Government is doing, and to pay all charges—but they have refused to take them. I just got a letter from our agent in London, Eng., to whom we had been writing to get space for these goods, and he tells us that when he goes to the Admiralty for the space, the question is, "Are you going to feed the soldiers apples or bread?" So we cannot get the goods over except we have a little merchandise space occasionally.

This leads me to divide our fruit growers into two classes. The first, those engaged in the business entirely as fruit growers, making a living from it. These men occupy small acreages of land, and this land is covered with orchards and vineyards and small fruit plantations, and are located in the Niagara district and from Hamilton to Clarkson, near Toronto; and isolated sections in Essex, Kent, Lambton, and possibly large apple growers in Northumberland. These men cannot neglect the orchards even one season without causing ruin in the orchards—so they have got to continue in that business, and that alone.

Our advice to these men is that they should cut off all the labor possible that will not interfere with the labor necessary for the essential crops; to make it up with the old and the young, and especially family labor. Last year the family labor was very largely used in the harvesting of the crops in many sections of the Province. And this is working out very successfully. Girls are already making plans to begin work when school closes this summer, and fruit growers are making arrangements to use all this labor that is available. I would say to use this labor for harvesting the small fruits; these crops have paid well the past two seasons, and promise to do well again this year. Small fruits are in demand, not only by the cities, but by the factories, to be put into jam to be sent overseas.

Do not put more labor on the orchards than is absolutely essential to get a good crop. Do not spend any more time on the cultivation than is necessary, unless the season is a dull one. Look out for every bit of labor-saving machinery you can get. For instance, a spray gun was used extensively in the Niagara district last year, and was successful. If you haven't got modern labor-saving machinery and implements, get them as soon as possible, or borrow from the neighbors. Do everything possible to keep down the labor, on the orchards particularly.

Then, in the orchard, grow a crop that will be marketable. During the past season, many grew carrots and cabbage, because the previous season they had been a very high price, with the result, at the present time, these are not paying for the labor put on them. Surely, there are other crops; for instance, tomatoes. The growers are sure of a fair price from the canning factories for the coming season—go into that crop. Attend to the fertilization of the orchards in the winter, when there is more labor available.

And the other class make fruit growing a side line. These orchards can be let go for one, two or three years, and, unless there is a very bad pest in the neighborhood, very little harm will result. The need is so urgent for the essential crops, and beef and pork and the things that are necessary to produce beef and pork and milk, that I think we are quite within the mark in advising no unnecessary work on these orchards this coming season.

I would say to you men, to put in all the time necessary to make these crops a success. Then, if there is any time left, put it on the orchard, and, of course, you will have to put it on the essential operations as much as possible—on the harvesting and the marketing. Let the orchards go into grass or weeds. Cut out the summer pruning or anything of that kind, and, when you have some spare

time, do the rough pruning in the orchard, so the air can get through the trees and do that part of the work that spraying takes care of ordinarily.

Honey is in a different position to fruit. Fruit is tolerated simply because it can be used in this country to replace certain foodstuffs which are expensive and necessary, and which will later have to be exported. Honey is needed to replace sugar, which is scarce. Any increase in the production of honey must, of necessity, come from men already engaged commercially in the industry. Not the small bee-keeper with a few hives, but the man or woman who is engaged in the business as a business, and making money out of it. You can take 200 colonies of bees and divide them among fifty men or women who are not particularly skilled in work, and put the same number with a man who already has 200 to 300 colonies, and no doubt the man who has 200 additional can get twice as much honey as the first fifty would. That is because the small bee-keepers do not pay attention or put the time on the bees that they should, and do not get the results.

The high price of honey will undoubtedly stimulate those already in the industry to produce every pound of honey they can possibly get from the hives. The best bee-keeper in the United States at the convention last month told the bee-keepers there that he had every assurance that, so far as the United States was concerned, that the price would be even higher than for the past season. I can assure you those were very high prices.

What about the increase in the stock of bees in the country? The increase generally comes from three methods—natural swarming, nucleus and combless package, which is imported. The aim of the experienced bee-keeper is to do away with natural swarming, because he knows he gets as big a surplus from a colony that has no swarming impulse, and he aims to do away with natural swarming, and, if he wants an increase, he gets it from the nucleus. It is almost impossible to get a surplus from the colonies during the first season from the nucleus. So that there is nothing left for the coming season, and if the bee-keeper wants to get a good surplus, he has to go into the importation of the combless package. The matter was discussed at the convention, and it was turned over to the Bee-keepers' Association to look after the importation of bees in this manner. It has been tried the past two seasons, but trouble was experienced in selecting experienced men. The Association, however, has been engaged for a number of seasons in the importation of queen bees for the improvement in the stock, and that scheme worked out successfully, so they turned over the importation of the combless package to the Association as well. Some preparations have been made for increased production in the coming season. In the spring, of course, where the hives are low in stores, it will be necessary to feed again, so as to have a well built up, beautiful white honey when the season opens.

Re-queening is becoming quite an important matter with the bee-keepers in the Province, and thousands of queen bees are imported every year where there is a deterioration in stock.

Protection from disease has been very largely in the hands of our Department, and we hope to be able to look after it again the coming season as we have in the past.

The indications are that there should be good crops, both of fruit and honey, in the coming season; sufficient, I think, to take care of our markets, possibly more than enough to take care of our markets in reference to apples. This will mean a certain amount of cheap fruit for the consumers in the Province, which they haven't had for some years.

# INDEX

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	PAGE
INTRODUCTION .....	1
<b>Results of Co-operative Experiments in Agriculture:</b>	
Dr. C. A. ZAVITZ .....	3
<b>Sources of Farm Seed Supply for the Province of Ontario:</b>	
Experimental Union: Prof. W. J. SQUIRREL .....	24
Ontario Seed Trade: WALTER STEELE .....	25
District Representatives: R. S. DUNCAN .....	28
Field Crop Competitions: J. LOCKIE WILSON .....	29
Canadian Seed Growers' Association: L. H. NEWMAN .....	31
The Western Ontario Seed Growers' Association: A. MCKENNEY.....	32
Ontario Corn Growers' Association: P. L. FANCHER .....	33
Dominion Seed Branch: W. J. W. LENNOX .....	33
<b>Root Seed Growing in Canada:</b>	
Dr. M. O. MALTE .....	36
HENRY STOKES .....	42
Dr. C. A. ZAVITZ .....	43
<b>Practical Suggestions in the Production of Food Materials for the Coming Year:</b>	
Wheat and Beans: Dr. C. A. ZAVITZ .....	44
Beef and Bacon: Prof. G. E. DAY .....	47
Butter and Cheese: Prof. H. H. DEAN.....	50
Poultry and Eggs: Prof. W. R. GRAHAM .....	52
Fruit and Honey: P. W. HODGETTS .....	53



