DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
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DIVISION OF HORTICULTURE

THE POTATO IN CANADA

ITS CULTIVATION AND VARIETIES.

BY
W. T. MACOUN.
Dominion Horticulturist

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OTTAWA
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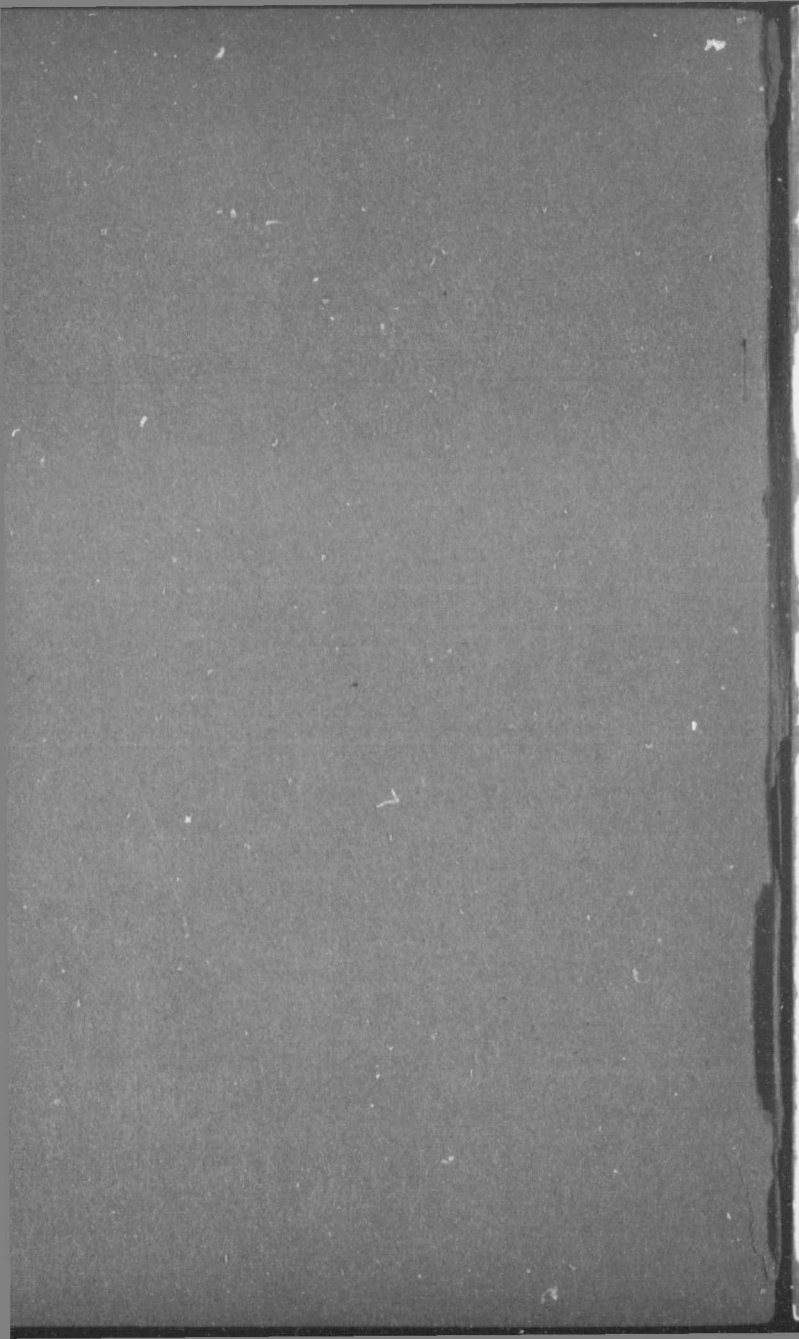

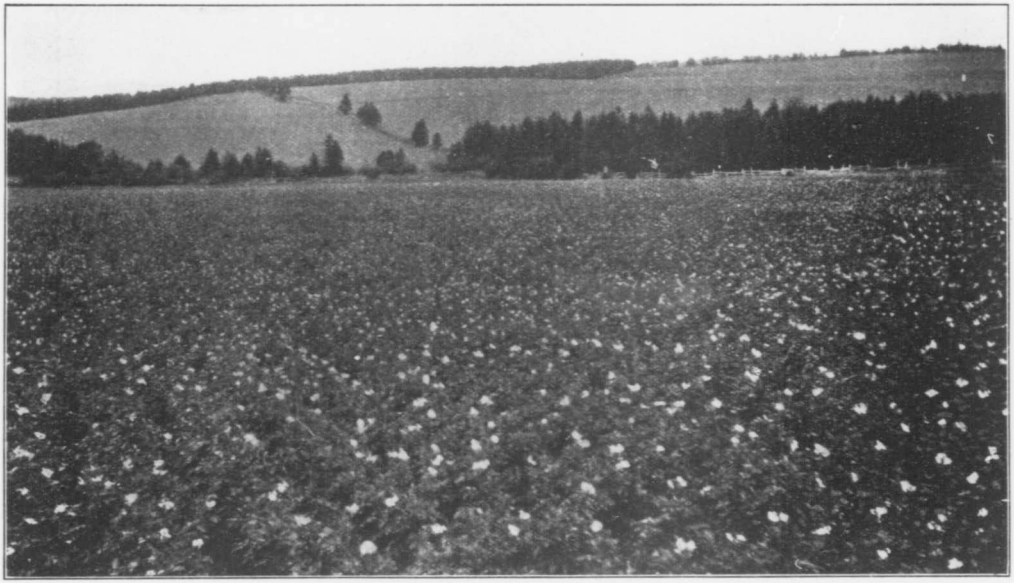

Field of Potatoes on Prince Edward Island.

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The Honourable,
The Minister of Agriculture,
Ottawa.

I have the honour to submit herewith the manuscript of Bulletin 90 of the Experimental Farms series, entitled "The Potato and its Cultivation in Canada," and prepared by the Dominion Horticulturist, W. T. Macoun.

This is the third edition of our regular bulletin on the above subject, and has been revised and brought up to date by the inclusion of considerable new data and additional information.

It is hoped that the information given in this publication will aid in increasing the yield and improving the quality of this most important food crop.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms.

OTTAWA, November 28, 1917.

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THE POTATO AND ITS CULTIVATION IN CANADA.

By W. T. MACOUN.

Dominion Horticulturist.

The potato (*Solanum tuberosum*) is a herbaceous perennial belonging to the *Solanaceæ* or Night Shade family, a large order containing 800 or more species, of which only a few are tuber-bearing. The cultivated potato is a native of the elevated parts of Chili, Peru and probably Mexico. It is believed that the potato was introduced into Europe first from America by the Spaniards during the latter part of the 16th century, but in 1586, a few years later, Sir Walter Raleigh or some of his colonists brought it from America to Ireland. The tubers were planted on Sir Walter Raleigh's estate at Youghal, near Cork, and the cultivation of potatoes extended from this place among the poorer Irish classes and also in England. In 1663 the Royal Society of England endeavoured to encourage the growth of potatoes as a cheap food in case of famine, but at that time they were not highly regarded, and the potato was not recognized generally as an article of food for man until the middle of the 18th century, or nearly 175 years ago, when a famine in Scotland in 1743 brought it into prominence as a cheap food and gave a great impetus to its cultivation. European countries had been just as slow to recognize the merits of the potato, for it was not until 1771, when a prize was offered in France for the discovery of a food that could take the place of wheat in the case of famine, that the potato came into prominence in that country. Parmentier, an apothecary, who brought forward the potato, was rewarded by the gift of 50 morgen of land from Louis XVI. During the 19th century the popularity of the potato increased rapidly in the United Kingdom and Europe, and with it the production grew in proportion.

In America the settlers used the potato to some extent for food during the 17th century, and as its value became appreciated it was grown in ever increasing quantities.

In its wild condition the potato was said not to grow nearly as large as when in cultivation, the tubers being borne nearer the surface of the soil and sometimes appearing on it. Those thus exposed turn green and are unfit for food. Where they grow deep enough in the soil to be at all edible, they are watery and insipid. The wild potato varies both in the colour of its blossoms and tubers, the latter ranging from red to white. Some botanists think that the true *Solanum tuberosum* has not been found wild since its introduction into Europe, and that the above notes refer to another tuber-bearing species.

The first good description of the potato under cultivation was made by de l'Ecluse, a noted French botanist, in 1601, who described it under the name of *Papas Peruanorum*. In his description he wrote that one tuber yielded as many as 50 tubers of unequal size from one to two inches long, irregularly ovoid and reddish. The flower was more or less pink externally and reddish within. He sowed seeds, which produced a white-flowered variety.

The potato has steadily improved in size and quality since the seventeenth century, and the potato of to-day is quite different from what it was at that time. This improvement has been brought about by originating new varieties from the best of the old ones and by better methods of cultivation.

The enormous quantity of potatoes now being produced in the principal potato growing countries of the world is well shown in the following table compiled from the Census and Statistics Monthly for December, 1915.

This immense production has come about chiefly from the fact that the potato has been found to be one of the cheapest foods that can be obtained. Its popularity has, moreover, been maintained by its palatability, for although closely related to some poisonous species, and under certain conditions more or less poisonous itself, the potato when properly grown is one of the most palatable articles of diet. Being without any decided flavour, it is disliked by few, and for this very reason it is a food of which few persons tire, being in this respect much like bread.

In addition to its direct food value, the potato is used in large quantities for the production of starch, glucose and alcohol. Potatoes are also dried and evaporated.

ACREAGE AND YIELDS OF POTATOES IN THE PRINCIPAL POTATO PRODUCING COUNTRIES OF THE WORLD.

Country.	Acreage Mean of 10 years, 1905-15.	Acreage 1914-15.	Total Crop Mean of 10 years 1905-15.	Total Crop, 1914-15.	Mean Yield per acre, 1905-15.
	acres.	acres.	bush.	bush.	bush.
Great Britain and Ireland	1,173,000	1,197,000	250,773,000	279,121,000	213·83
Canada	485,000	476,000	78,405,000	85,673,000	161·34
Australia	139,000	.....	14,414,000	.....	103·49
New Zealand	28,000	.....	5,779,000	.....	208·62
Total	1,825,000	1,673,000	349,371,000	364,794,000	171·82
United States	3,449,000	3,708,000	333,514,000	405,928,000	96·36
Argentina	170,000	.....	37,995,000	.....	285·20
Austria	2,123,000	.....	488,134,000	.....	156·28
Hungary	1,647,000	1,513,000	194,243,000	195,268,000	117·92
Belgium	377,000	411,000	94,917,000	.....	253·23
Denmark	139,000	151,000	29,247,000	.....	209·81
France	3,794,000	3,656,000	497,244,000	514,412,000	131·00
Algeria	40,000	.....	1,723,000	.....	43·12
Germany	8,226,000	8,367,000	1,681,355,000	1,674,394,000	204·31
Holland	405,000	416,000	84,515,000	92,806,000	208·18
Italy	712,000	716,000	60,856,000	61,105,000	85·34
Luxemburg	36,000	37,000	6,370,000	5,288,000	178·18
Norway	100,000	104,000	22,698,000	25,682,000	227·80
Roumania	85,000	.....	4,302,000	2,654,000	51·00
Russia in Europe	10,402,000	9,000,000	1,123,901,000	909,573,000	107·62
Russia in Asia	382,000	.....	31,560,000	.....	82·83
Sweden	377,000	.....	60,510,000	63,432,000	159,70
Japan	159,000	187,000	22,512,000	25,002,000	141·26
Chili	72,000	.....	7,664,000	.....	107·36
Total	35,520,000	29,939,000	5,132,631,000	4,375,085,000	144·50

"In the accompanying tables, says the Census Monthly, compiled from the publications of the International Institute of Agriculture, are shown the area and yield of potatoes in twenty-three of the principal countries of the world for each of the five years ended 1914-15, as compared with the mean of the ten years ended 1915. For countries in the northern hemisphere the period is for the years 1910 to 1914 and for countries in the southern hemisphere the years are from 1910-11 to 1914-15, the crop in these countries being planted in one calendar year and gathered in the next. Owing to the effects of the war the data for the last two years are not so complete as for the first three years; for certain of the countries the figures given are either not final or else no data are yet available.

"For some countries, owing to lack of data, the decennial averages are calculated from the results of periods of less than ten years. Certain other countries which grow potatoes, including Spain, Switzerland, Bulgaria, Serbia, Malta and Mauritius, are omitted from the tables for want of sufficient data. The annual production from these six countries may be estimated at about 129,289,000 bushels from 857,000 acres. Of these six countries, the largest producer is Spain with 100,884,000 bushels from 657,000 acres."

The following figures in regard to the potato crop for 1917 in some of the principal potato producing countries, have been supplied by the Census and Statistics Office, Ottawa.

ACREAGE AND YIELD OF POTATOES IN CANADA, THE UNITED STATES, GREAT BRITAIN, IRELAND AND FRANCE, 1916 and 1917.

Country.	Area.		Yield per acre.		Total yield.	
	1916.	1917.	1916.	1917.	1916.	1917.
	acres.	acres.	bush.	bush.	bush.	bush.
Canada	472,992	656,958	133·8	121·6	63,297,000	79,892,000
United States	3,550,000	4,348,000	80·4	101·1	285,437,000	439,686,000
England and Wales	427,948	508,190	218·4	.....	93,478,411	.....
Scotland	130,119	148,000	152·4	267·8	19,824,709	38,640,000
Ireland	586,308	709,263	154·94	.....	90,844,867	.....
France[1]	3,225,821	3,539,251	104·0	.....	335,510,277	.....

[1]Excluding territory in hostile occupation.

NOTE.—The figures of yield for 1917 are provisional.

THE POTATO IN CANADA.

The potato is used almost as freely as bread in Canada and, like that food, is thought as much of by the rich as by the poor. It can be obtained at all seasons of the year, and, if properly kept, is about as good at one time as at another. Being one of the most useful food products, its cultivation and improvement deserve the greatest attention.

The potato succeeds well everywhere in this country, where the season is long enough for the tubers to develop before the tops are killed by frost, hence potatoes are cultivated in practically every settlement in Canada, even up to, and within, the Arctic circle.

Although the potato is one of the most important food products of Canada, the methods of culture employed in growing this crop can be very much improved. This bulletin is published for the purpose of giving information to Canadian farmers, which should help them to obtain much better crops than they have hitherto had. The recommendations made are for the most part based on the results of experiments conducted at the Central Experimental Farm during the past thirty years, although the results of the work of other experimenters have not been overlooked, and have also been used when deemed advisable.

There are few, if any, crops which can be increased so much by one season's work as the potato, and the effect of good seed and good cultivation is very marked, but like most crops it does not get the attention which it should in Canada. It will be noticed in the above table that the mean yield per acre for Canada for the years 1905-15 is estimated at 161·34 bushels.

In the province of Ontario, where records in regard to the potato crop have been kept for thirty-five years, 1882-1916, the average yield for that period has been only 114 bushels per acre. Some of the best farmers in Canada grow from 400 to 500 bushels per acre and even larger yields are obtained, while 300 bushels per acre is not unusual. At the Central Experimental Farm the highest yield on a small plot was at the rate of 772 bushels per acre, but careful experiments have demonstrated that potatoes can be produced at the rate of over 1,000 bushels per acre. In a competition

conducted by the *Rural New Yorker,* potatoes were grown on a one-twentieth acre plot at the rate of 1,061 bushels per acre. While in field culture such high yields may not be possible, they are something to strive for and there is no doubt but that the average yield for Canada could be doubled if the best methods were employed by every grower.

EXPERIMENTS WITH POTATOES AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

When work was begun at the Central Experimental Farm in 1887, the importance of the potato crop was not forgotten, and experiments were begun at that time and have been continued ever since in order to gain information which might be used to improve the crops of potatoes in Canada. The first work done was to bring together, at the Central Experimental Farm, a large number of varieties for comparison of productiveness, quality, and freedom from disease. In the year 1887, there were 245 varieties tested, most of them having been obtained from Germany, where the largest number were offered for sale. New kinds have been added from time to time since then and many of the old ones have been discarded, but during the past thirty years, 752 named varieties have been tested. The results of this work will be discussed in the chapter on varieties.

In the years 1888, 1890, and 1905, potato seed was sown and 312 different seedlings were raised, and compared with the named varieties. The results of this work will also be found elsewhere in this bulletin. Experiments have been conducted with different kinds of sets, such as whole and cut potatoes of various sizes; in planting the sets at different distances apart; in planting at different depths, and in planting at different dates. Experiments have been made with tubers of the same variety from different localities. The yields from sprouted and unsprouted tubers have been compared. The yields from tubers from early and late plantings have been obtained. Mulching potatoes has been tried. Level and hill culture have also been compared. Experiments in spraying with different fungicides and insecticides for the prevention of blight and destruction of insects have likewise been among the important experiments carried on, and some of the results of these tests will be found in this bulletin. There have also been experiments with fertilizers. What is considered one of the most useful lines of work with potatoes has been the distribution of samples of the best varieties free to farmers throughout the country. This distribution was begun in 1891 and is being continued. At the Central Experimental Farm it is carried on by the Cereal Division and at the Branch Farms and Stations, by the superintendents. At the Central Farm, alone, there have been 151,813 three-pound samples sent out. These samples going to many farmers scattered through all parts of Canada, must have influenced the production and helped to increase the crop of potatoes very much.

VARIETIES.

The number of named varieties of potatoes is very large. A catalogue was published in 1886 by Henry L. de Vilmorin, Paris, France, in which names of 840 varieties are given, and this list represents but a small proportion of the number which have been named since the potato was first cultivated. The varieties of potatoes vary much in productiveness, season, quality, size, shape and colour, and even in resistance to disease, and this variability is taken advantage of where potatoes are grown for special purposes. A variety is considered fixed when it remains fairly true to the original description of it. Varieties may be grouped here into a few well-defined shapes, such as roundish, oblong, and long, although these might be subdivided into many others if perfect accuracy in description of shape were desired. There are great differences in taste as regards the flesh and quality of potatoes. The flesh of potatoes may be described as watery, waxy or soapy, and mealy, and white or yellow in colour.

In some parts of Europe, and even in Great Britain, a waxy potato is preferred to a mealy one, and a yellow-fleshed to a white-fleshed one, but in Canada nearly everyone prefers a white-fleshed, mealy potato, which will go to pieces when properly cooked. The profitable life of a potato is given by some authorities as from 12 to 15 years. This was also thought to be the limit of a potato's usefulness one hundred years ago. Experiments conducted at the Central Experimental Farm and elsewhere, however, indicate that by a judicious change of seed, the productiveness of a variety may be retained and increased. There are so many new and productive varieties introduced that the deterioration of a variety is more apparent than real.

This matter is discussed further under " Change of Seed."

Varieties of potatoes may be originated in three different ways.

SEEDLING VARIETIES.

By far the largest proportion of varieties of potatoes have been grown from seed. In the autumn when the potato vines have died, the green seed balls, or potato apples as they are sometimes called, may be found. These balls contain the seeds, which are imbedded in a mass of pulp, which may be mashed and the seeds washed out. In early spring these may be planted in the greenhouse or hot-bed, like tomato seeds, and when the young plants are large enough they may be pricked out and planted in pots. When the season for outdoor planting arrives they are taken from the pots and planted with the earth attached. They may then be treated as ordinary potato plants, although, being smaller, should be cared for better. The vines being very tender, are more subject to attacks from injurious insects than ordinary varieties. In the autumn, potatoes will be found in each hill, ranging in size from a marble to a hen's egg. Each plant will produce a different variety of potato. In order to start from a good basis, only the uniform and best potatoes should be kept from each plant, and if there is only one tuber satisfactory in this respect it only should be retained. The next season, potatoes are produced almost or quite as large as older varieties, but it will not be until the third or fourth year that the full value of the variety will be known. When the crop is dug the second season the best potato or potatoes should be taken from the most productive hill, and the rest discarded, and this should be continued even to the third and fourth year until the type is fixed. In 1888 there were 237 seedlings grown at the Central Experimental Farm, and 46 others added in 1890. By 1893 only 24 of these varieties were considered worth keeping. While two of these were continued until 1902, they were finally discarded as not being equal to the many other named varieties which were being tested. Thus, out of 283 seedlings, not one was found equal to some already on the market. This failure to originate a good variety out of so many was probably partly due to the fact that the seed was from English or European varieties, few of which yield well at Ottawa. A large proportion of the seedlings were kidney shaped and fine-looking, but lacked productiveness, like most of the kidney potatoes which have been tested at Ottawa. Seed taken from productive varieties of good shape and quality is likely to produce a small proportion of seedlings of merit. It is difficult to obtain seed nowadays from the best varieties, as there is little seed produced. This is no doubt due to the fact that the potato is propagated year after year from the tubers, and as the tuber-producing power of the potato increases, the organs of seed production are weakened and in most varieties refuse to produce seed at all. This non-production of seed is not, however, a thing of recent years only, although the introduction of early varieties which produce the least seed has made the fact more apparent. The year 1917 seems to have been more favourable to the production of seed than usual as many persons wrote that seed had been produced.

It is interesting to note that seed is produced quite freely on at least one variety at Great Slave Lake in Canada, and seedlings were grown at Ottawa in 1905 from seed ripened in the former locality.

CROSS-BRED VARIETIES.

The varieties of potatoes can be crossed artificially just as other vegetables are crossed, but comparatively little work had been done in cross-breeding potatoes in America until recently, as pollen is, as a rule, very difficult to find and potato breeders have, for the most part, been content to raise seedlings from chance seed balls found in the field. Special seed, said to have been obtained by crossing, is sometimes advertised, but it is believed that in most cases this seed was not produced by hand pollination, although there are a few men who have originated crosses by hand pollination.

A large proportion of the varieties of potatoes grown in America do not produce pollen that will germinate, hence pollen bearing or male parents are limited.

In crossing the potato the stamens should be removed before the pistil pushes through the bud, which is usually a day or two before the flower opens. After removing all the flowers which are too far advanced and the buds which have not developed enough, those which have been operated on are covered with a small paper bag, some of the stems and leaves being enclosed also. In another day or two the emasculated flowers will be in condition to receive the pollen which has been gathered in the meantime by taking flowers from the desired male parents and keeping them in boxes or bags until the pollen is needed. The pollen is either shaken from the anthers on to a watch glass or according to the experience of the Department of Agriculture, Washington, preferably jarred from the anthers on to the thumb nail after removing the pistil, and then, after removing the bags, applied to the pistils of the emasculated flowers. The bags are then replaced, enclosing some foliage as before and, if the cross is successful, the seed ball will develop rapidly and in a week one will know whether the crossing has been successful or not. When the seed balls are ripe they are treated as described under "Seedling varieties."

VARIETIES ORIGINATED BY BUD VARIATION, OR "SPORTS."

It has been said that varieties of potatoes "mix in the hill." This erroneous impression prevails among some people from the fact that occasionally a tuber will be produced by a plant which differs in colour, or perhaps in other respects from all the rest of the potatoes in the hill. This sporting, though not common, is found among other species of plants which occasionally produce branches bearing variegated leaves or different coloured flowers or fruit from the type. The potato tuber is a swollen underground stem and is just as likely to sport as any other stem. This so-called mixing is usually supposed to be caused by varieties crossing in the field, thus causing different coloured tubers to form the same season in the same hill. This, however, at least from present knowledge, is not the case.

IMPROVEMENT BY HILL SELECTION.

After a variety has been originated in any of the three ways already described, and after its general characteristics have been sufficiently fixed to introduce it, a variety may be changed, to some extent, by careful selection. This may be undertaken for the purpose of increasing the yield or to obtain a variety which is earlier or later, shallower in the eye, or of better shape. Selection may also be made to obtain a potato which is more resistant to disease and drought, better in quality, or with a higher percentage of starch, but while selection is desirable there needs to be more experimental evidence to show that marked, permanent changes in a variety can be made in this way.

The most accurate way to carry on hill selection is by the individual tuber or tuber-unit method by which the yield from each individual tuber is kept separate. When the variety to be used has been decided upon, care is taken at digging time to dig a number of hills separately so that the total product of each hill is known. The crop

from the best of these hills is stored separately. It is desirable to keep about 20 per cent more than will be planted in the spring to provide for loss during the winter. Plant the same number of marketable tubers, including the best from each of these selected hills in rows side by side, discarding the rest and planting the tubers whole. If the different lots are planted end to end in rows instead of in rows side by side, a stake should be put down to mark the division between each lot. It is important to have the soil uniform. In planting for hill selection it is desirable to have the hills about two and a half feet apart each way, so that the crop from each hill can be kept separate easily when the potatoes are dug.

When digging, the best hills are again saved separately from these rows and the rest of the crop from the best rows may be mixed and used for a field plot, the yield from which should be compared with the yield from unselected seed to find if any improvement has been made. The following year there will be enough of the seed from the hill selection to plant a large area. The selection should be kept up from individual hills each year, and there should be a gradual improvement in the general crop.

A simpler method of selection, and one which will be found to give good results, is to dig enough of the general crop by hand each year so that enough seed can be selected from good hills to give a sufficient quantity of seed for the general crop. By this method the poor hills including potatoes of low vitality and those affected with disease are eliminated and the standard raised. This is perhaps the best method of selection for the average farmer.

While the methods of selection described are mainly for the purpose of increasing the yield, it is desirable to select at the same time for purity, trueness to type, improvement of shape of tuber, and resistance to disease and anything else which will improve the value of the crop.

EXPERIMENTS IN HILL SELECTION AT THE EXPERIMENTAL FARMS.

Some work in hill selection has been carried on at the Central Experimental Farm, but while the results from selection at first showed a marked improvement in its favour when weather conditions were very unfavourable for obtaining seed of strong vitality, the gain from previous selection was lost, hence the desirability of selecting from seed of strong vitality each year. The benefits resulting from a first selection are shown in the following table.

The best hills were selected in 1905 from a crop of Clay Rose, Rural Blush, Gold Coin, Morgan Seedling, Carman No. 1, State of Maine, and Carman No. 3 potatoes, with the following result:—

Variety.	Total Yield per acre Selected. Bush.	Lb.	Total Yield per acre Unselected. Bush.	Lb.	Difference per acre in favour of Selection. Bush.	Lb.
Clay Rose	242	..	189	12	52	48
Rural Blush	237	36	176	..	61	36
Gold Coin	211	12	184	48	26	24
Morgan Seedling	211	12	176	..	35	12
Carman No. 1	193	36	206	48	13	12
State of Maine	189	12	149	36	39	36
Carman No. 3	149	36	149	36	..	..
Average of seven varieties.	204	55	176	..	28	55

The best hills of six of the above varieties were selected again in 1906 and compared in 1907 with unselected and with those which had not been selected since 1905. The results in 1907, which follow, might have been more favourable to the selections if the seed used had been better, but the season of 1906 was one of the poorest for potatoes which has been experienced. Owing to the dry weather, the tops dried up early, the potatoes were small, the seed was lacking in vitality and the growth from it was not regular or strong. Where farmers experience such results from

potatoes after having obtained good results by selection the writer advises a change to seed of strong vitality from another source and beginning to select over again.

Name of Variety.	Total Yield per acre. Selected in 1906 from Selection of 1905.		Total Yield per acre. Selected in 1905 and not in 1906.		Total Yield per acre. Unselected.	
	Bush.	lb.	Bush.	lb.	Bush.	lb.
Clay Rose	110	00	145	12	140	48
Rural Blush	167	12	184	48	114	24
Gold Coin	88	00	66	00	101	12
Morgan Seedling	52	48	79	12	114	24
Carman No. 1	131	00	123	12	96	48
State of Maine	52	48	70	24	52	48
Average	100	18	111	28	103	24

Hill selection was begun again at Ottawa in 1910, but after three seasons it was abandoned, as the results, owing to the seed being of low vitality, were not at all promising.

Work in hill selection is being carried on at the branch experimental farms and stations, and interesting results will, no doubt, soon be published.

IMPORTANCE OF SOURCE AND VITALITY OF SEED.

Up to the year 1906, the importance of the source of seed potatoes in Canada had not been strongly impressed upon the writer, although in the previous year, while on a visit to England, the importance of it was apparent. At the Experimental Farm at Ottawa, some varieties had been grown year after year from the same stock, grown on very similar sandy loam soil each year. Each year, the best potatoes were selected for planting in the experimental plots and the results obtained seemed to justify the continuance of the home grown stock from year to year. Taking the results from four well-known varieties, for instance, the average yields were the following for the first four and the last four years in the sixteen years, 1890-1905, during which there was no change of seed.

Variety.	1890-1893.	1902-1905.	Increase.
	Bushels per acre.	Bushels per acre.	Bushels per acre.
Early Rose	257	317	60
State of Maine	325	361	36
Empire State	301	338	37
Delaware	296	352	56

There was thus no indication of deterioration in the variety after sixteen years without change of seed, but a fair increase, due, no doubt, to careful selection and good cultivation each year. But in the year 1906 there was a sudden change. That year was one of the most unfavourable seasons for potatoes that has ever been experienced at the Central Experimental Farm. During the early part of summer there was sufficient rain to keep the plants growing nicely, but just after the last cultivation

dry, hot weather set in and continued throughout the remainder of the growing season, with the result that the plants were stunted, the foliage dried up prematurely and there was a poor crop of tubers. Moreover, during the month of July there was a veritable plague of aphis which attacked the foliage and doubtless did their share in lessening the crop. The best tubers were used for seed in 1907, but the best were small and had been prematurely ripened in 1906. The early part of the summer of 1907 was dry and the tubers did not form well. The crop was again small, although most of the tubers which formed became of marketable size, and were clean and well-formed. The best of these were used for seed in 1908, but, during that year, there was never enough moisture from the middle of June until the vines died, notwithstanding thorough cultivation. A severe attack of thrips also checked the growth of the vines. Again the best tubers were planted in 1909, and the seed used would have been considered, by its appearance, to be first-class, as it had been kept in a cool cellar and the tubers were firm and showed little sprouting when the potatoes were planted, yet the results were very poor.

A table of the yields of the four varieties already referred to for the years 1906-1909, is interesting:—

	Early Rose.	State of Maine.	Empire State.	Delaware.
	Yield per acre.	Yield per acre.	Yield per acre.	Yield per acre.
	Bush.	Bush.	Bush.	Bush.
1906	150	132	132	103
1907	128	174	117	114
1908	69	97	117	156
1909	18	62	62	53
Average 1906-09	91	116	132	131
Average 1902-1906 before the drought	317	361	338	352

It will be seen from the above figures that there had been a marked falling off in the yield during the last four years, part of which, in the years 1907 and 1908, was doubtless due to the weakened vitality of the seed, and part to the very unfavourable seasons. In 1909, with a more favourable season and good cultivation, the small yield is evidently owing largely to tubers low in vitality, although, in 1909, there was considerable injury from disease which caused the rotting of the stem. Newer seed of other varieties yielded, in these bad years, as high as at the rate of 224 bushels per acre in 1906, 462 bushels per acre in 1907, 325 bushels per acre in 1908, and 321 bushels per acre in 1909, showing that, notwithstanding unfavourable conditions, seed of strong vitality gave good results.

As the crop of potatoes had been so poor in 1906, and as the prospects for a good crop in 1907 from seed of the previous year's crop were not thought favourable, it was considered desirable to compare the results with tubers brought from other localities. Accordingly, small quantities of tubers of six well-known varieties of potatoes were procured from the Experimental Farm, Nappan, N.S. As the best of the home grown seed had been used in other experiments before this Nappan seed was planted, the results obtained that year are not considered reliable, but it may be said that the average yield from the imported varieties was almost twice as great as from the home-grown seed of the same sorts. In 1908, it was possible to make a fairer comparison, and the best seed from the imported stock of the year before was compared with the best seed of the home-grown stock. The results were published in the annual report for

1908, and showed an average increase from the six varieties of 133 bushels per acre in favour of the Nappan seed.

This test was continued in 1909, new seed of some of the same varieties being obtained from Nappan again that year and compared with the Nappan stock of 1907 grown two years at Ottawa, and with the old Central Farm stock. The results are as follows:—

Source of Seed—Nappan, N.S., 1909.	Rochester Rose. Yield per acre.		Carman No. 1. Yield per acre.		Vick Extra Early. Yield per acre.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Nappan Seed, 1909	215	36	198	..	171	36
C.E.F. seed	44	..	83	36	74	48
Difference in favour of Nappan seed	171	36	114	24	96	48

It will be seen from this table that in every case the Nappan seed of 1909 yielded much more than the Central Experimental Farm seed—nearly five times as much in one case, and more than twice as much in two cases. In two cases, the Nappan seed of 1907, yielded much better than the home-grown seed of the old stock, although in one case the Ottawa seed did a little better.

In 1910, seed from the Experimental Farm, Indian Head, Sask., was planted at Ottawa for comparison with potatoes grown at the Central Experimental Farm, with the following results:—

Name of Variety.	Indian Head Seed Yield per Acre. 1910.		Ottawa Seed Yield per Acre. 1910.		Difference in favour Indian Head Seed. 1910.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Empire State	448	48	107	48	341	..
Rawlings Kidney (Ashleaf Kidney)	443	18	41	48	401	30
Dalmeny Beauty	402	36	160	36	242	..
Late Puritan	402	36	39	36	363	..
Gold Coin	399	18	119	54	280	24
Reeves' Rose	374	..	118	48	255	12
Rochester Rose	363	..	136	24	226	36
Irish Cobbler	332	12	127	36	204	36
Money Maker	319	..	70	24	248	36
Carman No. 1	289	18	94	36	194	42
Morgan Seedling	279	24	46	12	233	12
Average	368	30	96	42	271	48

INCREASE IN VITALITY OF SEED.

From time to time varieties of potatoes are sent for trial to the branch Experimental Farms and Stations from the Central Farm, Ottawa. At first these potatoes are very inferior in vigour to those which have been growing at these stations for several years and, sometimes the yield is so poor the first year that the variety is discarded. In March, 1916, the following letter was sent to the Superintendents of the farms on the prairies, where usually the potatoes grow very vigorously:—

"You will, no doubt, remember that potatoes sent to you from Ottawa are usually weak growers when you receive them. I should be glad if you would inform me for how many seasons that weak growth continues, or do they make a strong growth the next year, the same as the ones you have been growing for several years?"

Following are some of the replies received:—

Experimental Farm, Brandon, Man. "In regard to the vigour of potatoes sent here from Ottawa. We find that it takes at least two years for such potatoes to attain the vigour of growth shown by the varieties that are acclimatized. That is, the third crop grown in this climate seems to be normal in vigour."

Experimental Farm, Indian Head, Sask. "In regard to the vitality of potatoes received from the Central Farm. In reply I might say that the last seed potatoes were received in 1914 and were considerably weaker than our home-grown seed, but this season no difference was noted. The one exception was with Morgan Seedling (pink) which was very weak the first season, and almost worthless in 1915. It has been the opinion at this farm that the vitality of the seed increases after the first season."

Experimental Station, Scott, Sask. "With reference to your inquiry of the 7th instant, *re* 'Weak growth of potatoes sent from Ottawa,' would say that this peculiarity has been very conspicuous on this station. Two varieties Early Ohio, O-1693, and Bermuda Early, O-1688, were received in April, 1913. The following table will illustrate the difference in yield per acre:—

	Triumph (Bermuda Early).		Early Ohio.		Other Varieties.			
	Bush.	Lb.	Bush.	Lb.			Bush.	Lb.
1913..	39	36	107	48	19 var. over		200	bush.
1914..	89	5	54	6	10	"	150	"
1915..	200	12	195	48	12	"	300	"

The shaws on both of these varieties were very stunted in appearance."

Experimental Station, Lacombe, Alta. "Referring to your letter of March 7, would say that I believe it requires the second year's growth, under western conditions, for potatoes grown from eastern seed to attain their full vigour. The first year they are received there is a noticeable difference, but the next season, in my judgment, they are up to the full relative vigour in evidence in the adjoining varieties which have been continuously grown here."

Experiment showing importance of change of seed—Taller plants from Indian Head seed; shorter plants of the same varieties from Ottawa seed.

31666—2½

In 1915, a comparison was made at Ottawa between seed from the Experimental Station, Fredericton, N.B., and Ottawa seed, with the following results. Both lots of seed were originally from the same source, the Fredericton stock being sent there from Ottawa in 1913, and the results show that stock which is low in vitality may be restored to vigour by planting for several seasons under other conditions.

Variety.	Ottawa Seed.				Fredericton Seed.			
	Plants appeared above ground.	Total yield per acre.	Marketable per acre.	Unmarketable per acre.	Plants appeared above ground.	Total yield per acre.	Marketable per acre.	Unmarketable, per acre.
		Bush. Lb.	Bush. Lb.	Bush. Lb.		Bush. Lb.	Bush. Lb.	Bush. Lb.
Bovee	18–VI	99 ..	50 36	48 24	17–VI	154 ..	92 24	61 36
Gold Coin	24–VI	57 12	39 36	17 36	17–VI	266 12	156 12	110 ..
Irish Cobbler	21–VI	105 36	59 24	46 12	17–VI	314 36	211 12	103 24
Green Mountain	24–VI	123 12	79 12	44 ..	17–VI	338 ..	220 ..	118 ..
Carman No. 1	19–VI	22 ..	.. ..	22 ..	19–VI	358 36	248 36	110 ..

In every case the Fredericton seed gave larger yields than the Ottawa seed, and the differences were in all cases very marked, leaving little doubt as to the greater vitality of the imported seed. It will also be noted that, in all cases but one, the growth of the imported seed was quicker than that of the Ottawa seed.

Following is a comparison of yields from seed from Fredericton, N.B.; Port Arthur, Ont.; and Ottawa, in 1917:—

Source of Seed.	Green Mountain.					
	Total Yield per acre, 1917.		Yield per acre marketable, 1917.		Yield per acre unmarketable, 1917.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Fredericton Seed	341	00	257	24	83	36
Port Arthur Seed	400	24	360	48	39	36
Ottawa Seed	85	48	68	12	17	36

Dr. C. A. Zavitz reports the following yields from seed potatoes of the Empire State variety from different sources in experiments conducted at the Ontario Agricultural College, Guelph, Ont. (Agricultural Gazette of Canada, December, 1917:—

Source of Seed.	1914.	1915.	1916.
	Bush. per acre.	Bush. per acre.	Bush. per acre.
Old Ontario	166·5	114·4	220·3
Muskoka (Ontario)	300·3	251·3	350·3
New Brunswick (Source 1)	205·4	235·5	232·3
New Brunswick (Source 2)	261·3	232·3	218·1

An experiment conducted by W. S. Blair, Superintendent, Experimental Station, Kentville, N.S., with Garnet Chili, Green Mountain, and Irish Cobbler varieties.

An experiment with several lots of Garnet Chili potatoes grown by a number of persons in 1914 was started under uniform conditions in 1915 at the Experimental Station, Kentville, N.S., and continued in 1916 and 1917. Following are the results obtained:—

GARNET CHILI.

Source Number.	Yield per acre, 1915.			Yield per acre, 1916.			Yield per acre, 1917.		
	Marketable.	Unmarketable.	Total.	Marketable.	Unmarketable.	Total.	Marketable.	Unmarketable.	Total.
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
1	220	20	240	192	20	212	236	19	255
2	94	26	120	94	14	108	195	29	224
3	212	14	226	200	12	212	296	14	310
4	186	20	206	192	12	204	293	22	315
5	26	10	36	52	16	68	88	2	90
6	32	14	46	68	22	90	118	12	130
7	176	34	210	176	12	188	275	17	292
8	52	22	74	80	16	96	126	8	134

It will be seen that there was a difference in yield in 1915 in the eight lots of Garnet Chili potatoes planted of 204 bushels, the highest being 240 bushels per acre and the lowest 36 bushels per acre. The difference in yield in 1916, from seed stock of these plots, was 144 bushels, the highest being 212 bushels and the lowest 68 bushels. The difference in yield in 1917 was 225 bushels, the highest being 315 bushels and the lowest 90 bushels.

Fifteen additional lots of Garnet Chili potatoes, obtained from growers in the spring of 1916, showed a difference of 120 bushels, the yield ranging from 278 bushels to 158 bushels per acre. In 1917 there was a difference of 182 bushels, the yield per acre varying from 380 bushels to 198 bushels.

GREEN MOUNTAIN.

Of ten lots of Green Mountain tested in 1916, the difference was 132½ bushels, varying from 313 bushels to 180½ bushels per acre. In 1917, the difference was 147 bushels, the yield ranging from 353 bushels to 206 bushels.

IRISH COBBLER.

In 1916, the seventeen lots of Irish Cobbler showed a difference of 142 bushels, the range being from 235 bushels down to 93 bushels per acre, while in 1917 the difference was 172 bushels, the yield varying from 346 bushels to 174 bushels.

Without a doubt, the grower with the very low yielding lot will detect the lack of vigour in his stock and get rid of it, but it is impossible to determine the difference between some of the strains until they are brought together side by side. There is, no doubt, a fluctuating variation within strains of a variety, and it would not be wise to drop out all except the highest one tested, but it seems that the number could be safely reduced to the fifty bushels difference in range.

The results, so far, would seem to point to a very practical way whereby a community, with the least possible help from outside sources, can vastly improve their standard varieties of potatoes. The best of a community could then be brought together at a central station and there further tested and outstanding strains developed for general distribution for seed purposes.

WHEN TO CHANGE SEED.

From this experiment it would appear that poor potato stocks improve under more favourable cultural and climatic conditions, but the importance of starting with good seed is very striking.

These results show that a change of seed sometimes more than doubles the yield of potatoes. How, then, is one to decide when it is desirable to have a change of seed, and what are the conditions which give seed strong vitality? If one knew when to change the seed and where to get it from, there is no doubt but that potato growing would be much more profitable.

In the first place, every potato grower should be an experimenter. He should try on a small scale the varieties which other experimenters have found most productive. If he discovers a variety which is better than his own, he should not only grow more of that variety, but, when he is getting the seed he should, if possible, get it from the same source as he obtained his trial lot from, for, if he obtained it from another source it might not do as well as his own.

If a grower has been getting but fair or poor crops from the variety he is growing, he should try a change of seed, even if the same variety is obtained. Moreover, when he has found that it pays him to obtain seed of a certain variety from a certain source, he should endeavour by experiment and calculation to learn whether it will pay him to change his seed every year, every two years, or every three years.

IMMATURE SEED.

It has been fairly well shown, we think, that potatoes which are prematurely ripened, either by an early drying up of the tops or by poor development on a weak vine, are low in vitality and should not be used as seed if the best results are desired. In Great Britain, it is now well recognized from the results of careful experiments that seed potatoes from the South of England, where the climate is comparatively dry and warm, and where potatoes ripen much more rapidly than they do in Scotland and Ireland, do not give nearly as large yields as seed potatoes from Scotland and Ireland. In an experiment which the writer had the opportunity of seeing at Sutton & Sons, Reading, England, in 1905, where Scotch and English seed of the same varieties had been planted side by side, the English stock was evidently three weeks nearer maturity than the Scotch stocks.

In an experiment conducted in England by the Department of Agriculture of Ireland in 1906, to determine the relative value of Irish and English seed potatoes there was a marked difference in favour of the Irish seed.

It would seem that the cause of the seed potatoes being better from Scotland and Ireland than from some parts of England is, that the tubers in the former countries are not hurried to maturity by hot, dry weather, and on this account have more vitality or power to make strong growth when planted than where the summers are comparatively hot and dry. Coming nearer home, the conditions in the drier and warmer parts of Canada may be compared with England, while the conditions in the moister and cooler parts of the Dominion may be compared with Scotland and Ireland. It may even be that seed potatoes from a cool, moist clay loam soil near home might show striking results when compared with the results from seed from light warm soils. The Nebraska Experiment Station found that potatoes grown under straw had strong vitality, while those under ordinary conditions were very low in vitality. Experiments are being conducted at Ottawa to learn, if possible, whether vigour can be obtained by growing potatoes locally under special conditions.

There is a difference between immature tubers and prematurely ripened tubers. Potatoes grown in cool climates tend to be immature. Potatoes grown in warmer and drier climates tend to be prematurely ripened. Immature potatoes may be growing vigorously and the tops be cut off by frost, or they may be dug before the tops are dead and before they are perfectly ripe. The tubers are checked in growth, but are full of vitality. It is interesting to note that immature potatoes have been recommended for seed potatoes in England for at least one hundred years.

The Department of Agriculture for Ireland makes this recommendation:—

"*Immature Seed.*—It is now recognized that seed from crops lifted before they fully mature will produce more vigorous plants, and, consequently, heavier yields than seed from crops which have been allowed to become fully ripe. In Ireland, this applies more particularly, perhaps, to early varieties, but it is a point worthy of notice by growers of seed potatoes."

At the Central Experimental Farm the seed from tubers grown from potatoes planted on June 23, and even on July 7, 1899, yielded, in 1900, more than those from potatoes planted May 22, 1899. The late planted ones were not so mature or were immature when dug.

In order to find whether a difference in soil would make any difference in the results, seed of Irish Cobbler, Green Mountain and Table Talk was obtained from the Fredericton station in 1916 and planted at Ottawa in sandy soil, black muck, and a rather heavy sandy loam. As the potatoes were beginning to be stolen these were all dug while the tops were still green and in the spring of 1917 were planted in rows side by side with the results in the following table. There are also given in the table the yields from the same varieties from Ottawa seed grown among the other varieties and dug with the main crop.

YIELDS in 1917 from potatoes dug when immature, 1916, as compared with those grown and dug with other varieties, 1916.

Variety.	Sandy Soil, 1916. Yield per acre, 1917.		Black Muck, 1916. Yield per acre, 1917.		Heavy Sandy Loam, 1916. Yield per acre, 1917.		Grown and dug with other varieties, 1916. Yield per acre, 1917.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Irish Cobbler	321	12	380	36	398	12	68	12
Green Mountain	330	00	325	36	378	24	85	48
Table Talk	365	12	276	6	319	00	224	24

It will be noted that the results are very much in favour of the potatoes grown from those dug when immature, and grown by themselves in 1916, as compared with those grown among the poor Ottawa stock and left until normal digging time.

YIELD of potatoes, 1917, from stock obtained from Fredericton in 1916, and planted at different dates at Ottawa in 1916, and the crop from each planting kept separate and the seed planted in 1917:—

Variety.	1916. Date planted.	Yield per acre, 1917.					
		Total yield.		Yield Marketable.		Unmarketable.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Green Mountain	May 22	6	36	0	0	6	36
"	June 5	33	00	22	0	11	00
"	June 19	35	12	19	48	15	24
"	July 3	22	00	6	48	13	12
Table Talk	May 22	81	24	55	0	26	24
"	June 5	114	24	88	0	26	24
"	June 19	187	0	160	36	26	24
"	July 3	224	24	180	24	44	00
Irish Cobbler	May 22	37	24	17	36	19	48
"	June 5	35	12	17	36	17	36
"	June 19	96	48	70	24	26	24
"	July 3	118	48	74	48	44	00

The yields from the above test were small and show the remarkably low yields obtained from Ottawa seed, but it is interesting to note that with the exception of the last planting of Green Mountain and the second planting of Irish Cobbler there is a regular increase in yield from the earliest to the latest plantings, which would seem to be evidence that the potatoes which were the most immature gave the best yields. This is in accordance with experience of growers elsewhere and corroborates experience of previous years at Ottawa.

The cause or causes of the very low yields at the Experimental Farm, Ottawa, during recent years from seed grown at Ottawa the previous year, are not yet clearly understood. The low yields began in the very dry seasons of 1906, 1907, and 1908, and there have been few good years for potatoes since, and, since that time, the diseases such as Leaf Roll, Mosaic and Rhizoctonia all have been found affecting the potato plants at Ottawa. How far these are the primary cause of the low yields and how much should be attributed to climate, is not yet certain, but the fact remains that by getting new seed every year from certain places, good yields can be obtained. While such marked results might not be obtained elsewhere, as at Ottawa, a change of seed is recommended, as stated elsewhere, where satisfactory yields are not being obtained. It has been the writer's observation that wherever potatoes grow vigorously, as a rule, until the tops are cut down by frost in the autumn, there will good seed potatoes be obtained, provided they are free from disease. Such sources of seed potatoes can be found in all the provinces of Canada and particularly in those parts of the provinces where the days and nights, during the growing season, are relatively cool, and where there is usually a good supply of moisture in the soil.

It has been shown by the experiments at Ottawa that the best results were obtained from the most immature seed, and while, doubtless, there is some other factor or factors than immaturity which ensure such good results from seed from the cooler parts of Canada, and which for the present may be called "vitality," it would seem, with our present knowledge, that the best seed will come from those parts of Canada where, as a rule, the main part of the crop is most immature, though of good marketable size, when the tops are cut down by autumn frosts, and where there is little or no disease in the crop.

NORTHERN *versus* SOUTHERN GROWN SEED.

Some attention has been paid to the comparison in yield between northern and southern grown seed potatoes, but the results are so conflicting that they are not given here. It will be seen from what has already been written that there are so many factors governing the results obtained from a change of seed that it would be difficult to tell with certainty whether, all things being equal, northern or southern grown seed is the better. As it is easier keeping northern grown seed from sprouting, on account of the potatoes maturing later, and as sprouting lessens the value of the potato for seed, it is probable that, as a rule, northern seed would stand a better chance in comparison with southern unless, where two crops are raised in the season, the second crop from the southern were used, when the southern seed might come out best.

There are several diseases which check the growth of potatoes and cause much loss. These are dealt with by the Botanical Division.

VARIETIES WHICH MAINTAIN THEIR VIGOUR AT OTTAWA.

It has been found at Ottawa that several varieties of potatoes maintain their vigour much better than the majority. The resistant varieties were practically all originated in Great Britain, and are but a few of the many which have been tested from there. They are Dalmeny Hero, Table Talk, Dalmeny Regent, Brydon, Dobbie Prolific, Scottish Triumph, Davies Warrior and others which may be found in the table of varieties showing a five years' average.

CULTIVATION.

THE POTATO PLANT.

Before beginning to grow potatoes it is important to know something about the potato plant and its habits in order that it may be cultivated intelligently. Some information has already been given in this direction, but something more may be said here. When a potato plant is growing, four distinct and important forms of vegetation

Potato plant, showing how much deeper the root system is than the tuber bearing stems.

are developed, in addition to flowers and fruit—which need not be discussed here. These are: roots, foliage, stems above ground, and under ground stems or *rhizomes* on

which the tubers are borne. Through the roots the whole plant, including the tubers, obtains its moisture and much of its food in a crude condition. The leaves are, as it were, the lungs of the plant and in them is elaborated or manufactured the plant food which is taken from the soil by the roots and also that which is obtained from the air. The stems are the conductors as well as utilizers of the plant food and are the framework of the plant. The stems also serve another purpose, for from their leaf axils below ground are developed the *rhizomes* or underground stems, the tips of which become the tubers. As the underground or tuber-bearing stems bear no roots they must depend for their development on the root system of the plant and the leaves, and the plant food which these bring to them. It will be seen, therefore, that it is important to have a good root system and a good leaf development in order to have a good crop of tubers. As a rule the larger the top the larger the crop will be, providing the tubers have a long enough season to develop properly. Occasionally when a very heavy application of a nitrogenous manure is made the crop will not be in proportion to the large tops.

CLIMATE AND SOIL.

The potato appears to thrive best in a moist, somewhat cloudy and temperate climate, but providing there is sufficient moisture in the soil and the growing season is long enough it is not at all fastidious in this respect. It is a little more particular in the matter of soil, but large crops are grown in a great variety of soils. The ideal soil for potatoes appears to be a rich, deep, friable, warm, sandy loam with good natural drainage, and well supplied with decayed or decaying vegetable matter. The potato requires a large amount of moisture to develop a large crop of potatoes, and for this reason the soil should be retentive of moisture. Potatoes will not, however, succeed well in cold soil where the water is stagnant near the surface, and thorough drainage is very essential to a good crop.

Potatoes succeed admirably on new land providing it is well drained and not too stiff, as the soil is filled with decayed vegetable matter and humus which help to make it loose. Such soil retains moisture well, and furnishes nitrogen in a very available form. They succeed well after sod also, as the decaying sod gives somewhat the same conditions as new land. Clay and clay loams are not so suitable to the potato crop as the warmer sandy loams and gravelly soils as they are usually colder and being, as a rule, stiffer, the tubers are not as even in shape nor as smooth. The quality of the potatoes grown in sandy or gravelly soils is better than that of those grown in clay or clay loams.

PLANT FOOD REQUIREMENTS AND FERTILIZER EXPERIMENTS.

The average results of a large number of analyses show that a crop of 200 bushels of potatoes, exclusive of the potato tops, which are usually left on the ground, removes from the soil approximately 40 pounds nitrogen, 20 pounds phosphoric acid, and 70 pounds potash. A crop of 25 bushels per acre of wheat, including straw, will remove about 42 pounds nitrogen, 23 pounds phosphoric acid and 40 pounds potash. A crop of 25 bushels per acre of wheat will remove more nitrogen from the soil than 200 bushels of potatoes, and yet we find farmers, as a rule, heavily manuring their soil intended for potatoes with barnyard manure, while no good farmer would apply barnyard manure direct to the wheat crop. It is true that the potato crop takes from the soil nearly twice as much potash as wheat, hence a light dressing of manure is advisable to supply this. In ten tons of manure there would be considerably more potash than the crop of potatoes would take from the soil, but of course this would not be all available for the potato crop.

It has been stated already that potatoes do well when grown after sod and it will be shown that the results from experiments conducted at the Central Experimental Farm in growing potatoes after clover sod, fully bear out the popular belief and show the wisdom of the practice of the best potato growers.

The following results taken from the annual reports of Dr. Wm. Saunders, late Director of the Dominion Experimental Farms, show the average increase for three years from the ploughing under of clover. The clover was sown with grain at the rate of 12 pounds per acre and ploughed under the following spring shortly before planting and after considerable growth had been made. The variety of potato planted in each year was the Everitt:—

YIELD PER ACRE OF POTATOES WITH AND WITHOUT CLOVER.

Year.	Yield per Acre with Clover.		Yield per Acre without Clover.		Increase in Yield from the Clover.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1901 (3 plots averaged)	423	47	391	20	32	27
1902 (3 plots averaged)	391	40	352	40	39	..
1904 (1 plot)	402	..	362	20	39	40
Average increase for three years					37	2

It has been proven by careful experiments conducted at the Central Experimental Farm that the crop of grain is not lessened by sowing clover with it, hence practically the only outlay for the increased crop of potatoes is the price of 12 pounds of clover seed, which at 25 cents a pound is $3. Thirty-seven bushels of potatoes sold at 60 cents a bushel, is $22.20; deducting the cost of the clover seed, and the net increase in profit from the ploughing under of the clover would be $19.20. Furthermore, the value of the clover is not all exhausted by the potato crop.

The following extract, with tables from Bulletin No. 40, Central Experimental Farm, "Clover as a Fertilizer," by Dr. Wm. Saunders, Director, and Frank T. Shutt, Chemist, Dominion Experimental Farms, shows the relative value as plant food of clover and barnyard manure:—

"CLOVER COMPARED WITH BARN-YARD MANURE AS A FERTILIZER."

At the outset it should be understood that in advocating green manuring with clover, this crop is not brought forward as a material to replace barn-yard manure, but rather to supplement it and to make its application more effective. Barn-yard manure of good average quality contains about the following proportions of the chief fertilizing constituents:—

Nitrogen	10 lb. per ton.
Phosphoric acid	5 "
Potash	9 "

An application of ten tons per acre will, therefore, enrich the soil, approximately by the following amounts:—

Nitrogen	100 lb. per acre.
Phosphoric acid	50 "
Potash	90 "

"The chemical investigations made in connection with these experiments have shown that a vigorous crop of clover will contain, at a moderate estimate, in its foliage and roots:—

Nitrogen	from 100 to 150 lb. per acre.
Phosphoric acid	" 30 " 45 "
Potash	" 85 " 115 "

"Respecting nitrogen, it is evident that by the use of clover we can with a single crop furnish the soil with as large a quantity as would be supplied by a dressing of 10 tons of manure per acre. The greater part of the nitrogen is gathered by the clover from the air, a source not otherwise available, and is therefore a distinct addition to the soil. The amounts of phosphoric acid, potash, and lime in the clover have, it is true, been obtained from the soil, but have been largely drawn from depths beyond the reach of the roots of ordinary crops. The decay of the clover, moreover, liberates these important fertilizing elements in soluble and available forms, so that they can be readily utilized by the crops which follow."

As stated in the preceding extract, a large part of the nitrogen contained in a crop of clover is taken from the air, hence it is probable that, when a crop of potatoes is removed, little, if any, exhaustion takes place of the nitrogen which was in the soil before the clover was grown and ploughed under, and as the nitrogen from the decayed leaves and stems of the clover is in a very available condition, the potato plant is able to use much of it. It is very important to have the nitrogen in an available condition for a crop with as short a growing season as the potato has in this country.

From what has already been written, it will be readily seen that clover and barnyard manure are two very important and cheap fertilizers for the potato. The former obtains nitrogen from the air and brings up phosphoric acid and potash from great depths of the soil to be available for succeeding crops and in adding humus to the soil by its decay it makes the soil hold moisture better and renders it looser. Barnyard manure adds nitrogen, phosphoric acid and potash to the soil and increases the supply of humus in it, making the soil more retentive of moisture and looser.

COMMERCIAL FERTILIZERS.

As the results from the use of commercial fertilizers vary in different places and in different soils where they are tried, they will be discussed but briefly here. The results from the use of these fertilizers depend so much on the character of the soil and the availability of the plant food in it and on the amount of moisture and the availability of the plant food in the fertilizer itself, that it is necessary for each farmer to experiment for himself in order to find out whether the crops on his soil will be sufficiently benefited by the application of fertilizers to pay him to use them, as the cost of these is considerable compared with barnyard manure. There are a number of complete potato fertilizers on the market containing the plant food necessary for the potato crop in very available forms. If these are used they may be applied at the rate of from 500 to 800 pounds per acre. A good complete fertilizer for potatoes may be made by mixing 250 pounds nitrate of soda, 350 pounds superphosphate, and 200 pounds sulphate of potash, or muriate of potash, making 800 pounds in all. Even half of this quantity might give satisfactory results on good soil. Slightly better results have been obtained by sowing the fertilizer over the sets when they have been covered with a few inches of soil, and then covering the fertilizer by harrowing than by sowing it in the drill before the sets are planted. If the latter method is adopted the fertilizer should be mixed with the soil before the sets are dropped, as the buds are apt to be injured if the fertilizer comes in direct contact with them. Sulphate of potash has given better results than muriate of potash for potatoes, though both are good, but for the present neither of these is available in sufficient quantities.

FERTILIZERS RECOMMENDED FOR THE POTATO.

From the information obtained from experiments at the Central Experimental Farm and elsewhere, the writer would recommend growing potatoes after clover which had been top dressed with from ten to twelve tons of barnyard manure per acre. If the clover is ploughed under in the autumn, green manure would be the

best; if ploughed under in the spring, which is the better time, rotted manure is preferable, as it will become incorporated with the soil better than green manure and is not so likely to favour development of scab. The clover may be top dressed with green manure in late summer or autumn, even though the clover is not ploughed under until spring, in which case the manure increases the crop of clover for turning under and is sufficiently broken up and worked into the surface soil to be in good condition for mixing with it when ploughed. Potatoes succeed well after corn which has been given a heavy application of barnyard manure. It is better to manure heavily for the preceding crop than for the potato crop itself.

PREPARATION OF THE LAND.

The soil for potatoes should be well prepared before planting. Unlike some crops which succeed best when the soil is moderately firm when ready for seeding, the potato succeeds best in soil which is loose. In loose soil the tubers will be smooth and shapely; in soil which is firm or stiff the potatoes are usually misshapen and not nearly so attractive. The ploughing under of barnyard manure and clover makes the soil looser and this, added to their value in furnishing plant food, makes them particularly desirable. Soils which are very light and loose may be made too loose by the turning under of manure, especially when it is green and strawy, and while it is not the best practice to plough under green manure immediately before planting, especially on light soils, if it is done the soil should be given extra tillage so as to incorporate the manure with it thoroughly and keep the first few inches of soil from drying out and preventing the satisfactory sprouting of the potato sets.

Spring ploughing for the potato crop is usually best. Where rather stiff soil has to be used, fall ploughing may be preferable as the action of the frost upon it will help to loosen it. Good potato land should be ploughed in the spring, turning under the clover with its top dressing of manure. The soil should be ploughed deep enough so that the clover will be well covered. In order to get the clover well under, a chain is so fastened to the beam of the plough and the whiffle-tree, as to hold the clover down so that it may be covered more rapidly. An additional assistance in getting the clover covered is given by using a roller coulter or steel disc in front of the plough. This is usually about 14 inches in diameter and has a sharp edge which cuts the clover plant and prevents much clogging. The time of ploughing in the spring will depend somewhat on the method of planting. If a planter is used there is no necessity of opening furrows, and hence no trouble with clover which has been ploughed under, and the longer the clover is left growing in the spring the better the results are likely to be. If, however, furrows have to be opened, a good plan is to turn under the clover some days before planting time, then disc harrow a couple of times to prepare the land partially and later when one is ready to plant, the soil should be thoroughly harrowed with the smoothing harrow; by standing on the harrow or weighting it the upper few inches of soil will be thoroughly pulverized and loosened. It is very important to have the upper layers of soil in fine condition, as if the surface is rough the potato sets or young plants are likely to suffer in a dry time. Different methods of preparation will be necessary for different kinds of soil, but the nearer the land can be got into a thoroughly pulverized condition to a depth of about six inches or more before planting time the better the crop will be. When a planter is used, the soil should be ploughed, thoroughly harrowed, and then rolled just before planting. The advantages of the planter will be stated in the paragraph on planting.

When rotted barnyard manure is used on land without clover it should be applied in the spring and thoroughly mixed with the soil. If it is well rotted it may be harrowed in. Neither rotted nor fresh manure should be put in the drill with the sets, as manure when it comes in contract with the tubers favours the development of scab. This was well proven in experiments at the Central Experimental Farm.

PLANTING POTATOES ON GREEN SOD.

If the land has been ploughed the potatoes could be planted by opening holes for the sets about four or five inches deep and fourteen inches apart, making the rows 2½ feet apart, the manure having been spread over and harrowed in with the disc harrow. If the sod has not been ploughed one of the best methods of planting in green sod is to have some one planting when the ploughing is being done, the sets being dropped every third furrow and covered by the plough, when the next furrow is made. After the potatoes have been planted the ground is disc harrowed and if it is light soil it may be rolled after that to help close up any openings where grass could grow through and to compact the soil somewhat and hasten the rotting of the sod. This would not be desirable where the ground was heavy, as it would make it too firm. As soon as weeds start, harrow with the smoothing harrow and as soon as the potatoes are showing above the ground harrow again, then if thorough cultivation is followed afterwards and the tops protected from insects and disease, there should be a good crop.

TIME OF PLANTING.

The best time for planting potatoes will vary in the different parts of Canada, much depending on the condition of the ground and spring frosts, but when these have not to be considered the earlier the potatoes are planted the larger the crop is likely to be. The sets should not lie long in the ground before sprouting, as there is danger of rotting, hence they should not be planted when the soil is cold and wet. If they are planted too early also the young vines are liable to get nipped by spring frosts. As early potatoes usually command good prices it is often worth taking the risk of frost and planting early if the soil is in good condition. If the vines should be above ground and there is danger of frost they may be covered slightly with the soil by turning a shallow furrow over them. Potato growers have saved their vines by doing this. The importance of fairly early planting is brought out in the following experiment conducted at the Central Experimental Farm. In this experiment there is a steady and very marked decrease in the crop at each planting.

POTATOES PLANTED AT DIFFERENT DATES.

In 1898, an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898; July 23, 1899; July 21, 1900; July 11, 1901; July 24, 1902 and July 24, 1904. An early and a late variety were used each year, the varieties being Early Norther and Irish Daisy, in 1898; Early Norther and Rural Blush in 1899; Early Norther and Sir Walter Raleigh in 1900; Early St. George and Rural No. 2 in 1901; Everett and Carman No. 1 in 1902, and the same varieties in 1904. The test was not a fair one in 1903, owing to an extreme drought, hence the results obtained that year are omitted. In 1902 two plantings were made before the main crop was put in, the yields from the plantings made on May 15 being the best of the series. The yield per acre from the first planting of an early variety on May 1 was 268 bushels 24 pounds, and from the second planting on May 15, 294 bushels 48 pounds per acre. The yield per acre from the main crop, May 29, was only 217 bushels 48 pounds, so that there was a difference of 77 bushels per acre in favour of the early planting. The results from this one year's test indicate that the best time to plant potatoes is about the middle of May as manure when it comes in contact with the tubers favours the development of scab, or as soon after that date as possible. Where the summer is relatively cool and autumn frosts come late, later planting may be found desirable. The main purpose of this experiment was to find out how late potatoes could be grown and satisfactory crops obtained, and this experiment proves that as far north as Ottawa a fairly good

crop of marketable potatoes can be obtained by planting as late as July 10, when they might succeed an early crop, such as garden peas.

Date of Planting.	Total Average Yield per Acre, 1898–1904.		Average Yield per Acre of Marketable Potatoes, 1898–1904.		Average Yield per Acre of Unmarketable Potatoes, 1898–1904.	
Early Varieties.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1st planting: May 26, 1898, May 26, 1899, May 26, 1900, May 30, 1901, May 29, 1902, May 28, 1904	389	..	337	28	51	31
2nd planting: June 10, 1898, June 9, 1899, June 9, 1900, June 13, 1901, June 12, 1902, June 11, 1904	332	34	269	43	62	51
3rd planting: June 24, 1898, June 23, 1899, June 23, 1900, June 27, 1901, June 26, 1902, June 25, 1904	236	25	187	53	48	32
4th planting: July 8, 1898, July 7, 1899, July 7, 1900, July 11, 1901, July 10, 1902, July 9, 1904	110	9	69	40	40	29
5th planting: July 23, 1898, July 21, 1899, July 21, 1900, July 24, 1902, July 23, 1904	24	25	6	10	18	15
6th planting: Aug. 9, 1898	No potatoes					
7th planting: Aug. 23, 1898	"					
Late Varieties.						
Planted on the same dates as early varieties—						
1st planting	368	30	319	9	49	21
2nd "	281	31	227	51	53	40
3rd "	196	42	160	4	36	38
4th "	105	9	57	56	47	13
5th "	37	11	14	58	22	13
6th "	No potatoes					
7th "	"					

KIND OF SETS TO PLANT.

The condition the potatoes are in at planting is a very important factor in obtaining a maximum crop. If possible, potatoes should be prevented from sprouting, and in the chapter on storing the crop the best methods of keeping potatoes will be discussed. When the set is planted in the field and begins to sprout, the young plant gets its food to begin with from the parent set. It also utilizes the moisture in the set and in a dry time it is very important on this account alone to have sets well charged with moisture. When potatoes sprout in a warm, moist cellar, as they so often do, the shoots take from the tubers both plant food and moisture. These shoots are broken off when handling the potatoes, and hence when the tubers are cut for planting they are not in the best condition to produce a good crop of potatoes. Careful experiment and ordinary observation prove that the second shoots which appear are not so strong as the first. In order to be certain that when the sets are cut the eyes will start, a good practice is to spread the potatoes out in the light a few days before cutting them until the eyes start, when they may be cut more intelligently. Experiments conducted by the Department of Agriculture for Ireland in 1904, with main crop or late potatoes, sprouted as described in this bulletin under 'sprouting before planting,' showed an increase of 2 tons 13 cwt., or 99 bushels per acre in favour of sprouting the sets before planting. This is a large increase in the general crop.

The commonest and most popular experiments which have been conducted with the potato are those which deal with the kind of sets to plant. Shall they be whole potatoes, one eye, two or three eye pieces; half potatoes, quarter potatoes, stem ends, seed ends, or one of the other many kinds of sets which it is possible to use? These experiments have been going on for the past one hundred years and probably much longer, and the results have been very conflicting in many particulars, but in some

respects most of them agree. The experiments prove that all other things being equal the larger the set planted the larger the crop will be, hence large, whole potatoes usually give the largest crop; but as it is the largest crop of marketable potatoes at a minimum cost that is desired, it has not been found profitable, as a rule, to plant large whole potatoes. The more sprouts there are from a set the larger the proportion of small potatoes is likely to be, as the plant food available during the limited time the potato vine has to grow is not usually sufficient to bring to marketable size enough of the extra tubers produced when the large, whole potatoes are planted. Experiments were begun at the Central Experimental Farm in 1889 and were continued for nine years to get some information with regard to the best kind of sets to plant. It was found that when large, medium and small whole potatoes were compared, the crop decreased in proportion to the size of the potato planted. This varied, however, with different varieties. A large potato of one variety with a few eyes might not yield so well as the medium sized potato of another variety which had many eyes. This difference in results also occurred when the potatoes were cut into pieces of a certain weight regardless of the number of eyes; a set of a variety with few eyes might not yield so well as the same sized set of another variety having more eyes. The conclusion reached after many tests is that the most economical kind of set to use is one with about three eyes and a good amount of flesh. When eyes are wide apart, a good sized piece of flesh can be obtained with one eye or two eyes, but sometimes eyes do not sprout and many misses in the field have been caused by using sets with only one eye or with too little flesh. There should be a perfect stand of potatoes in the field, and the surest way to get this is to plant sets with about three eyes, although often good results are obtained from sets with two eyes, and even one eye, if proper precautions are taken. If the potato vines are frozen after appearing above ground, there will be a much better after-growth from sets having several eyes, as a larger proportion of the sprouts will not have reached the surface. The crop grown from the seed or rose end of a potato will be earlier than that from the stem end, but there will usually be a larger proportion of unmarketable potatoes. Both, however, should be used in planting for the main crop. There is only one thing in favour of sets with few eyes, and that is, the fewer eyes to a set, as a rule, the smaller proportion of unmarketable potatoes there will be.

At the Central Experimental Farm the practice is to select good medium to large potatoes, true to type if possible, and make four sets out of the medium sized potatoes, cutting lengthwise and then across. The practice of using small potatoes from which to make the sets year after year is a bad one. It stands to reason that the better developed the potatoes are the stronger will be the shoots from them and the larger the crop. An interesting experiment was conducted by Dr. C. A. Zavitz, Experimentalist, O.A.C., Guelph, Ont. For eight years he planted large, whole potatoes, medium sized potatoes, and small whole potatoes side by side, and each year he used for seed the large potatoes from the crop produced by the large potatoes, the medium sized from the medium, and the small from the small. The average results for eight years were: large, whole potatoes, 199 bushels; medium sized whole potatoes, 173 bushels; small whole marketable potatoes, 116 bushels; and very small unmarketable potatoes, 99 bushels. These are very convincing results as to the value of using good seed year after year.

CUTTING THE SETS.

There are several potato cutters on the market, but while some of these are better than others, the most satisfactory way is to cut by hand.

Twice the amount can be cut in a given time and the sets will be more evenly divided, if the easily made potato cutter depicted in the drawing shown herewith is used instead of the old method of cutting with the knife held in the hand.

All that is required is to fasten a one-inch board, six inches wide, planed on the upper side, to the top of a barrel or box, holding it on tightly by two deep cleats. A

long, sharp, thin table-knife is fixed through the board in a slanting position, as shown in the illustration.

To cut, take the potato in both hands and push it lengthwise over the knife, dropping the sets into the barrel or box. Should the sets be too large, the juice of the potato will cause the two parts to stick together and they can then be cut either lengthwise or crosswise as desired.

CONDITION OF SETS WHEN PLANTED.

Many farmers cut their potatoes several days or perhaps weeks before planting time, at odd times, it may be, or during inclement weather when they cannot work outside. In another experiment conducted by Mr. Zavitz for eight years it was found that seed planted as soon as it was cut yielded on an average eight bushels per acre more than when they were left unplanted for four or five days. At the Central Experimental Farm, Ottawa, it was found that leaving the sets uncovered in the drills for from one to two days lessened the yields very much. The sets covered at once yielded at the rate of 308 bushels 18 pounds per acre; left uncovered one day, 202 bushels 13 pounds; uncovered two days, 155 bushels 48 pounds. It will be seen that the crop was reduced almost one-half by leaving the sets exposed in the field for two days, the variety being Early Rose. The relative yields will depend much on the condition of the weather. The first day the sets were exposed it was sunny and warm, the second was cloudy and cool. In the same experiments, potatoes which had been cut for one month and left in the root house were compared with potatoes cut and covered the same day. Those which were cut and covered the same day yielded 308 bushels 18 pounds per acre; those which had been cut one month, 165 bushels 45 pounds per acre, a difference of over 142 bushels 33 pounds per acre. This experiment was not continued at Ottawa, hence these are only the results of one year.

It will be seen from the foregoing how important it is to plant freshly cut seed. Unfortunately, owing to the scarcity of labour, farmers often have to cut their potatoes when they can. If potatoes have to be cut several days before planting it is well to know the best way to keep them. It has been found that by coating the potatoes as soon as cut with land plaster or gypsum, sets will keep better and the yields be increased.

INFLUENCE OF COATING FRESHLY CUT SEED WITH FINELY GROUND LAND PLASTER AND LIME.

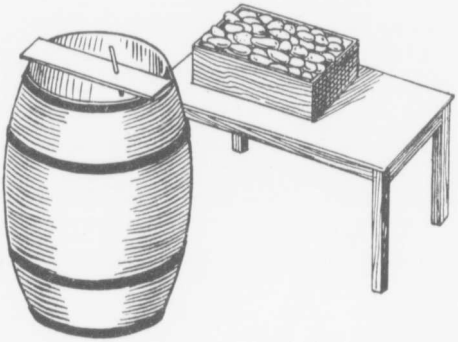
No continued experiments have been tried at the Central Experimental Farm in comparing the effect, on the yield, of sets covered with finely ground land plaster or gypsum and lime, but such experiments have been conducted at the Ontario Agricultural College, Guelph, Ont., with the following results, which show the importance of treating the seed in this way.

"The following table gives the average of twenty-two tests conducted for five years in treating freshly cut seed potatoes in different ways before planting:—

Treatment of Freshly Cut Seed Potatoes.	Weight of 30 largest potatoes per plot (lb.). Average 5 years.	Percentage of crop marketable. Average 4 years.	Yield per acre (bushels). Average 5 years.
Coated with ground plaster	13·9	81·1	214·4
Coated with slacked lime	13·6	78·9	200·6
Not treated	12·8	78·8	190·8

"The average results show that freshly cut potatoes which were coated with land plaster gave 23·6 bushels per acre per annum over those which were left untreated. The results from the sets treated with lime occupied an intermediate position between those from the sets treated with land plaster and those left untreated. In each of four

out of the five separate years the plaster-coated sets produced the highest total yield per acre, and also the highest percentage of marketable potatoes. The average weight of the largest potatoes produced from the coated seed was higher than that of those produced from the untreated sets.

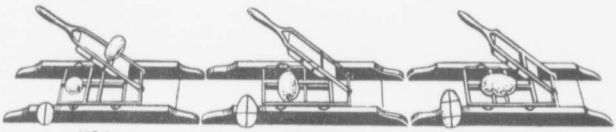


Method of cutting potatoes for seed.

Method of cutting potatoes for seed.

"Another experiment was conducted for seven years in succession in which finely ground brick and road dust were each used for coating freshly cut seed potatoes in comparison with land plaster. The average results of fourteen tests made in seven

years show the following yields of potatoes in bushels per acre per annum: untreated, 179·4; road dust, 186·0; ground brick, 189·5; and land plaster, 191·1.



Method of cutting potatoes for seed

Method of cutting potatoes for seed.

"In the average results for twelve years untreated seed gave an average of 184·1, lime coated seed, 199·3, and plaster coated seed, 200·8 bushels per acre per annum. The results varied somewhat in different years but in the majority of the tests the land plaster or gypsum gave better returns than slaked lime for coating the freshly cut seed tubers."

BEST DEPTH TO PLANT.

It is important to know the most economical depth to plant potatoes, as there is no doubt that different depths of planting will give different results, but there will not be the same results on all soils. The yield, however, is not the only point to be taken into consideration, the question of labour being important also. While shallow planting has given the best yields at Ottawa in loose, sandy loam soil, the most economical depth is from four to five inches for good loamy soils on account of the harrowing which is necessary to destroy weeds and which would drag out sets which were planted shallower. Sets should be planted deeper in soils likely to dry out than in others more retentive of moisture.

An experiment was conducted for seven years at the Central Experimental Farm in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. The sets had at least three eyes each and were almost uniform in size. The soil was sandy loam every year. Level cultivation was adopted and hence very little soil was thrown on the potatoes after they were covered at planting time. The sets were covered by the hoe, the work being very carefully done. Notes were taken on the depths at which the tubers were formed in 1899, 1900 and 1901, and it was found that most of them were within 4 inches of the surface of the soil even where the sets had been planted six, seven and eight inches deep. Where the sets were planted less than four inches deep nearly all the tubers were found between that and the surface of the soil. This test was begun in 1898 and in the following table the average results are given. The average is for six years only, as in 1903 the severe drought spoiled the experiment that year. The yields in this table represent, as a rule, the average from the yields of two varieties. Each variety was planted in one row 33 feet in length, the rows in the experiment being 30 inches apart. The soil was dug out to the proper depth with a spade for greater accuracy.

EXPERIMENT IN PLANTING POTATOES AT DIFFERENT DEPTHS IN SANDY LOAM SOIL.

Depth of Planting.	Average Yield per Acre, 6 years.	
	Bush.	Lb.
1 inch	466	2
2 "	380	57
3 "	405	19
4 "	393	59
5 "	387	20
6 "	377	5
7 "	307	20
8 "	284	1

It will be seen from the table that the potatoes planted only one inch deep gave by far the largest average yield. In every year of the six of which the average is given the potatoes planted one inch deep gave the highest yields. This is accounted for in several ways. The first inch or two of soil in spring is decidedly warmer than that below, hence the potatoes sprouted sooner. When the potato sprouted so near the surface, the nodes on the shoots would be nearer together than those lower down and as the tuber-bearing stems are produced at the nodes, the more nodes there were the more tubers there would likely be. In its wild state the potato bears the tubers near the surface of the ground. While there were a few more potatoes exposed to the sun when they were planted only one inch deep, the increase in yield far more than offset these and in the results which are given these green potatoes were not weighed with the others and are not recorded in the table. The sets were covered about one and a half inches more by cultivation during the season, so that they were eventually two and a half inches deep. It must be borne in mind that these results were obtained in loose, sandy loam soil. In stiff soils shallow planting might not have given as good returns. Much of the success of shallow planting will also depend on the moisture in the soil. Shallow planting will not give good results when it is dry at planting time. The only explanation that can be offered for the sets two inches deep producing less than those three inches deep, is that there would be less moisture two inches deep than at three inches deep, and the warmth of the soil, which would be less at two inches than at one inch, would be more than offset by this less amount of moisture. From three inches in depth the yields decrease regularly.

From the results obtained it would seem clear that where early potatoes are wanted, the sets should be planted shallow in the warm soil. Although the best results

have been obtained in sandy loam soil which was well supplied with moisture by planting only one inch deep, this method is not recommended for general field culture, Unless the surface of the soil is kept loose and free from weeds, the potato crop will not be large. In order to kill a large proportion of the weeds which grow, the ground should be harrowed once or twice before the potatoes come up or just as they are coming up, and if the sets were only one inch deep they would be dragged out, hence from 4 to 5 inches is the most satisfactory depth to plant.

DISTANCE APART TO PLANT.

It is important to know the most economical distance apart to plant the sets, so as to get the largest yields with the least amount of seed. Those varieties which have small tops may be planted a little closer than those kinds which are more vigorous. At the Central Experimental Farm an experiment has been conducted for eight years to determine the most economical distance apart in the rows to plant varieties of average vigour, and in the following table results are given. The table gives the average of seven years only as the very severe drought of 1903 interfered with the experiment that season. In most cases the results are based upon the average of two varieties each year, each grown in one row 33 feet in length.

EXPERIMENTS IN PLANTING POTATOES AT DIFFERENT DISTANCES APART.

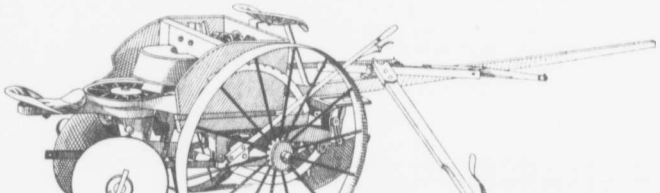
Distance apart of Sets.	Seed Required per Acre.	Average Yield per Acre, 7 years.		Average Yield per Acre after Deducting Seed.	
	Bushels.	Bush.	Lb.	Bush.	Lb.
10 inches apart	35	345	8	310	8
12 "	29	350	16	321	16
14 "	25	353	53	328	53
16 "	22	323	51	301	51
18 "	19	267	48	248	48

It will be seen from the above table that after deducting the seed used, the net average yield is greatest from the sets planted 14 inches apart. It is, therefore, recommended to plant most varieties of potatoes from 12 to 14 inches apart in the rows. The amount of seed used in this experiment may appear excessive to many farmers who cut to one and two eyes, but at the Central Experimental Farm it has been found best to use sets with a liberal amount of flesh. From our own experience and the experience of others, the best distance between the rows is 30 inches, or just enough to permit of easy cultivation, but if the distance were 36 inches from four to five bushels less seed per acre would be used. Where potatoes are ridged it may be advisable to have the rows a little wider apart.

PLANTING AND COVERING.

The best method of bringing the land into good condition having been discussed, also the time to plant, kinds of sets to use, depth and distance apart to plant, it remains before taking up the question of cultivation to say something about the actual planting itself. A common method among farmers is to open the furrows, drop sets by hand and close the furrows with an ordinary plough. This is not the best way. A better plan is to open the furrows with the double mould board plough, making them deep enough, so that when the potatoes are covered and the soil levelled the sets will be from four to five inches below the surface. The furrows may also be covered with this implement. When covered with either of these ploughs the soil should be levelled

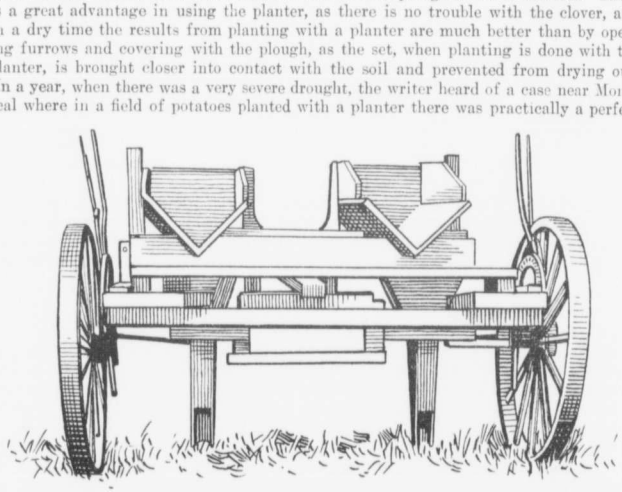
afterwards with the smoothing harrow. Some good growers use an implement with two concave discs for opening and closing the furrows, as, where clover is ploughed under, it is sometimes dragged out when the furrows are made with the plough.



Potato Planter.

The most satisfactory method of planting, however, for one with a fairly large or large area to cover, is with the potato planter, of which there are several good ones now on the market.

The potato planter makes the row, opens the furrows, plants or drops the sets, covers them and applies commercial fertilizers at the same time if desired. To do as much by hand would require a span of horses and a man to open the furrows with a plough, three men or boys to plant, and one man to scatter the fertilizer; and a span of horses and a man with a double mould board plough to cover the sets. There is a great advantage in using the planter, as there is no trouble with the clover, and in a dry time the results from planting with a planter are much better than by opening furrows and covering with the plough, as the set, when planting is done with the planter, is brought closer into contact with the soil and prevented from drying out. In a year, when there was a very severe drought, the writer heard of a case near Montreal where in a field of potatoes planted with a planter there was practically a perfect



Home-made Potato Planter.

stand, while a field of a neighbour just over the fence planted by hand and covered with a plough was practically a failure. If the planter is properly watched there will be few, if any, misses from sets not being dropped. In a very dry time when there is danger of the sets drying out, it is wise to roll the land before the potatoes are up, loosening it again with the harrow as soon as there is rain.

HOW TO CONSTRUCT A POTATO PLANTER.

DESCRIPTION OF A CONVENIENT, HOME-MADE IMPLEMENT THAT ANY FARMER MAY MAKE FOR HIMSELF.

The accompanying illustration shows a simple home-made implement, made by Geo. R. Barrie Galt, Ont., that farmers when planting potatoes, will find very convenient. The following description gives particulars, showing how the planter may be made and operated.

The main frame is 3 feet 6 inches by 5 feet, and made of hardwood planks 2 inches thick by 10 inches wide, bolted together at the corners. The spouts are made of heavy gas pipe, 14 inches long and 3½ inches in diameter, tapered at the point like a cultivator tooth, so that they will not drag the sod or manure. The upper end of the tooth has a thread on it and is screwed into a piece of hardwood scantling 6 inches by 6 inches and 28 inches long, bolted firmly to the frame. The balance of the spout attached to the hopper is made of heavy zinc and is wider at the top for convenience in dropping in the potatoes. The spouts are placed 3 feet apart and the wheels are centered 18 inches from them, so that the one wheel comes back into its own mark, thus making all the rows the same distance apart. Should it be desired to have the rows closer together, the machine can be made on the same principle to suit any distance.

The wheels are the kind used on the old fashioned walking cultivators, with levers for raising and lowering. The ratchets on the levers should be small and close together, so that they can be moved up or down any desired distance. Gang-plough wheels with ratchets on the sides may also be used by elevating the frame to suit.

The wheels should be so placed that the machine will balance when two boys are sitting on the back. The boxes, holding one bushel of cut potatoes, are shaped like a mason's hod and held firmly in place in front of the top end of the spouts. The distance apart for dropping the cut potatoes is regulated by blocks, bolted on the spokes, which come in contact with a piece of light steel spring, which makes a noise so that the boys know when to drop the sets into the spout. A seat may be arranged directly behind the spouts for the comfort of those dropping the potatoes.

As soon as the potatoes are planted it is advisable to harrow the land so that any that are not deep enough may be covered. It is also advisable to harrow several times before the potatoes come up, the last harrowing to be just when the spouts are appearing. The harrowing will kill weeds and keep the crust broken to form a mulch to conserve moisture and warm the soil. In this way growth is encouraged and much time is saved in weeding of the potatoes after they are up.

ANOTHER HOME-MADE PLANTER.

A home made potato planter originating with Prof. J. Bracken, Agricultural College, Saskatoon, Sask., has given good satisfaction. The materials required are a gang plow, a length of stove pipe or sheet of tin, two bolts, some nails and a small rag. The seat of the sulky is taken off, then a hopper is made which will hold two or three bushels of potatoes and this is bolted to the seat post. The hopper has a board nailed over the bottom and this projects a few inches. A hole is left in front of the hopper over the board so that the potato sets can be easily flipped out by hand without pouring out in a flow on the operator. The length of stovepipe or sheet of tin is pinched in at the lower end, then wired in place so that the upper end is directly underneath the mouth of the hopper and the lower end just behind the share. The

sets dropped into this pipe drop in the centre of the furrow, and if a gang plow is used they are immediately covered by the rear plow. The white rag is tied to the sulky wheel for a timer. There is a box for the driver. The boy or man who regulates the rate of seeding sits with his back to the driver facing the hopper.

Six, seven or eight sets dropped while the white rag on the sulky wheel makes one revolution puts the sets the right distance apart. If used on a three furrow gang plow all the land would be ploughed as fast as it is planted; with only a two furrow machine a single furrow plow should follow the gang in order to put the rows at the right distance apart.

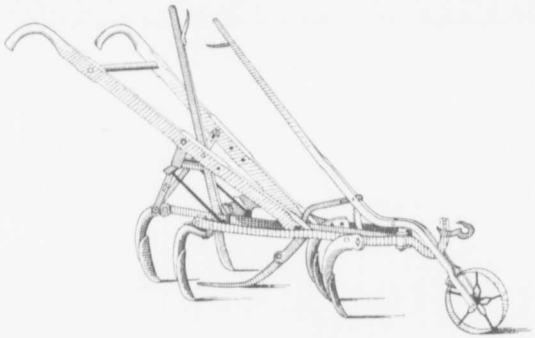
Home-made Potato Planter.

TILLAGE.

The success of the potato crop depends in a large measure on the kind of cultivation given. No matter how much the land has been manured and how carefully the sets have been planted, if the soil is allowed to become hard, the weeds permitted to grow apace, and moisture lost, which could be saved, the crop will be very much reduced. A few days after the sets have been covered by the plough and before the plants have been above ground, but not until the weed seeds have germinated, the soil should be harrowed with the smoothing harrow to level it and to kill the myriads of weeds which usually germinate about that season of the year. If possible, the soil should be harrowed twice before the potatoes are far enough up to be injured. If two harrowings are given there should be little trouble from weeds afterwards, and harrowing is a much more economical way of getting rid of them than by hand hoeing. As soon as the potatoes are far enough up so that the rows can be readily distinguished, the cultivator should be put in and the soil loosened between the rows to as great a depth as possible the first time and as near the sets as it is safe to go without disturbing them, so as to loosen the soil for the tubers. All future cultivations should be quite shallow to prevent injury to the roots and tubers. The soil should be cultivated every week or ten days, depending on the weather, the object being to keep the surface soil loose until the tops meet well between the rows. If the soil becomes baked evaporation of moisture will be very rapid. From five to six cultivations, or even more, are none too many and it will be found that the crop usually increases in proportion to the number of cultivations. A very careful series of experiments to determine the value of cultivation was carried on by Prof. I. P. Roberts, late Director of the Cornell Experiment Station. In one experiment the yield from six cultivations was 344·8 bushels, and from three cultivations 303·3 bushels, or a difference of 41·5 bushels. In another

case the yield from a plot cultivated six times, was 310·5 bushels, and from a plot cultivated three times, 269·6 bushels, or a difference of 40·9 bushels.

Conservation of moisture is very important in growing potatoes and thorough cultivation is one of the best ways to retain moisture. The potato vines would not suffer from drought, as they often do in the middle of summer, if the soil were properly prepared to begin with and well cultivated during the early part of the season. The vines must be kept growing thriftily from the time they appear above ground until autumn if a maximum crop is to be obtained. If growth is checked in the middle of summer the crop suffers and the tubers when they start to increase in size when the rains come are very likely to become misshapon. The accompanying cut represents a good type of cultivator. A good cultivator is very essential in growing potatoes.



LEVEL *versus* RIDGE CULTIVATION.

The ridging of potatoes is an old method and is the practice usually followed in Great Britain and Europe at the present time and also in America, although level cultivation has been growing in favour in America during the past fifteen or twenty years. Ridging was probably adopted in the first place for the main purpose of affording good drainage as in most climates it is important not to have the potato in soil which is very wet. Soil is also warmer when ridged and in cool or moderately cool climates the increase in the warmth of the soil by ridging is favourable to the crop. The condition for the development of shapely tubers is also better in the loose ground which the moulding up of the soil affords. Potatoes are dug much more easily in soil which is ridged or hilled up than where level culture is adopted.

Many farmers owing to lack of help and sometimes through lack of knowledge, give no further attention to their potato crop after the beetles are killed and when haying begins, and as an end to the culture for the season they ridge up just before haying. There is no doubt some advantage in ridging over leaving the soil level when such conditions prevail, as the ridging will give the tubers loose soil to develop in, while the soil would soon get hard if left flat and not cultivated.

There are districts in Canada where the climatic conditions in summer are not very unlike those in Great Britain. In such districts ridging will probably as a rule give better results than level culture. There are, however, large areas where droughts are liable to occur and where conservation of moisture is a very important factor in obtaining a good crop. In such districts the best results will probably, as a rule, be obtained if thorough and deep working of the soil be given and by adopting level cultivation. The reason is easily apparent. The evaporation of moisture is not as great from

level soil as from soil in ridges. Few experiments seem to have been tried for comparing level with ridge cultivation, but in the drier parts level culture has, as a rule, given the better results. It should be clearly understood, however, that unless the soil is well worked the better conditions of the soil for the development of tubers when it is ridged will offset the advantage of retaining more moisture by level cultivation. An experiment was conducted at the Central Experimental Farm for four years for the purpose of comparing level with ridge cultivation in the soil at the Farm, which is almost ideal soil for potatoes, being a friable sandy loam which does not dry out. In 1900, 1901 and 1902 two varieties were used in this test, the Everitt and Carman No. 1 in 1900, and Early Sunrise and Carman No. 1 in 1901 and 1902. In 1904 Carman No. 1, Burnaby Mammoth, Maule Thoroughbred, Reeves Rose, Prolific Rose, and Canadian Beauty. The average yield per acre of all the varieties under test is given in the results for each year:—

LEVEL *vs.* RIDGE CULTIVATION, SOIL MOIST, FRIABLE, SANDY LOAM.

Method of Culture.	1900.		1901.		1902.		1904.		Average 4 years.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Level	743	23	374	7	457	36	419	28	448	38
Ridge	555	37	414	4	518	15	393	48	470	26

Average yield per acre in favour of ridging, 21 bushels 48 pounds.

This experiment resulted in 21 bushels 48 pounds in favour of ridge cultivation in the moist, sandy loam at Ottawa. There was only one summer out of the four which was dry, and that was in 1901, but that year ridging gave an increase of practically 40 bushels per acre more than level culture. In 1904, the only year when level cultivation gave the best results, three out of the six varieties gave best results from ridging. Further experiments in this direction are necessary.

It would be advisable for each farmer to try for himself whether level or ridge cultivation gives the better results under the conditions on his farm.

MULCHING POTATOES.

No systematic experiments have been conducted at the Central Experimental Farm in mulching potatoes, but this method has been tried by a number of experimenters, some of whom report favourably and some unfavourably on it. In some cases heavy yields have been recorded by mulching. The condition of the soil has very much to do with success or failure. If potatoes are mulched early in the season the soil may be kept too cold making the conditions bad for the development of a good crop of tubers. To mulch heavily enough to save all cultivation by preventing weeds from growing and conserving moisture, requires too much material and is not profitable. The best and most economical results are obtained by mulching lightly between the rows after the last possible cultivation. This will help very much to conserve moisture in a dry time. Very good yields are sometimes obtained by simply preparing the ground thoroughly, laying the sets on the surface and then mulching with straw. Very shapely tubers of large size are sometimes obtained thus. In new settlements where the soil is shallow and difficult to work fair crops might be obtained by mulching in this way.

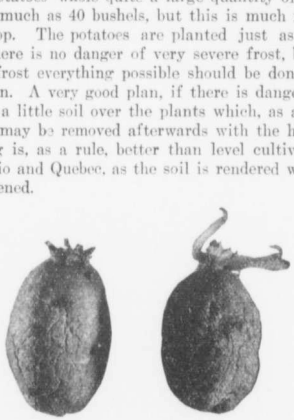
"SPROUTING" BEFORE PLANTING FOR EARLINESS AND INCREASED YIELD.

Where there is a demand for early potatoes it is important for the potato growers to know how he can hasten the development of the tubers, as the sooner the potatoes are on the market in good condition the more money he will make out of them as a rule. The method usually adopted by the best growers is to use an extra early variety and

"sprout" the potatoes before planting. Medium-sized tubers are selected before they have begun to sprout and placed in single layers in shallow boxes or trays with the seed end up. The boxes are then put in a bright, airy cool place, where the temperature is low enough to prevent sprouting. After a few days the potatoes will turn green and the skin becomes much tougher than before the potatoes were exposed. The potatoes are now given a little more heat, but still kept in a bright, airy place. From the seed end will now develop two or three strong sprouts and the object of exposing the potatoes at first to toughen the skin is now apparent, for most of the eyes do not start and practically the whole strength of the potato is concentrated in a few sprouts at the end. This is what is desired, as the fewer sprouts there are the larger proportion of marketable potatoes there will be. If the potatoes are given plenty of light and the place where they are kept, fairly cool, the sprouts will become very sturdy and strongly attached to the tuber and will not be broken off in handling unless very carelessly used. Tubers will develop more quickly from sprouts made slowly in a bright cool place than from sprouts which have grown rapidly in a dark place, and furthermore, the yields will be much heavier. Potatoes which sprout in the dark are, moreover, very difficult to handle, as the sprouts break off very easily. It is not absolutely necessary to place the potatoes with the seed ends up as very satisfactory results are obtained when potatoes are emptied indiscriminately into shallow boxes or trays and then treated as already described. The sprouts should be about two inches in length at time of planting. If longer the sets are more difficult to handle.

The warmest and best drained soil that can be obtained should be used for extra early potatoes and the sets should be planted shallow so that they will get the advantage of the heat from the surface soil. The potatoes are planted whole, as they do not rot as readily as cut pieces, and the sprouts also have more to draw on. The sprouts are, of course, left uppermost when the potato is planted. As most extra early varieties have small tops the sets may, as a rule, be planted a little closer than for the main crop.

By planting the potatoes whole quite a large quantity of seed per acre is used, some growers using as much as 40 bushels, but this is much more than offset by the early and increased crop. The potatoes are planted just as soon as the soil is dry enough to work, and there is no danger of very severe frost, but as considerable risk has to be taken from frost everything possible should be done to prevent the young plants from being frozen. A very good plan, if there is danger of frost, is to plough a light furrow turning a little soil over the plants which, as a rule, will be sufficient to protect them. This may be removed afterwards with the harrow or in some other way. Moderate ridging is, as a rule, better than level cultivation in growing extra early potatoes in Ontario and Quebec, as the soil is rendered warmer and the development of the tubers hastened.



Sprouted in the light. Sprouted in the dark.

An experiment was conducted at the Lacombe Station in 1915 with sprouted versus unsprouted sets. The sets were placed in a box and exposed to sunlight about ten days before planting. The sprouted sets appeared above the ground and came in bloom one

week earlier and continued to show superior vigour and growth throughout the entire season. The yield from the sprouted sets excelled that secured from the unsprouted by more than 50 per cent.

The following results were obtained at the Central Experimental Farm, Ottawa, in 1916.

Variety.	Sprouted.			Unsprouted.		
	Total yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.	Total yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.
	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.
Early varieties—						
Crines Lightning	563 48	529 48	34 0	354 18	289 54	64 24
Irish Cobbler	227 12	153 54	73 18	164 36	100 12	64 24
Early Rose	322 06	254 06	68 0	261 18	139 36	121 42
Medium to late varieties—						
Table Talk	193 12	136 0	57 12	168 08	73 18	94 48
Palmeny Hero	246 0	193 18	52 42	182 36	100 12	82 24
Brydon	177 12	141 24	35 48	185 18	85 06	100 12

RATE OF DEVELOPMENT OF TUBERS, SHOWING IMPORTANCE OF KEEPING POTATO TOPS GREEN.

No more striking proof is afforded of the importance of keeping the potato tops green and the plants growing thriftily well into the month of September than the results obtained by Prof. L. R. Jones, at the Vermont Agricultural Experiment Station, by digging potatoes at different dates and estimating the yield per acre. This experiment is recorded in Bulletin No. 72 of the Vermont Station. It is a simple experiment and one which every farmer should try for himself. Following is the table showing the results obtained:—

YIELD OF TUBERS AT DIFFERENT DATES—WHITE STAR POTATOES PLANTED MAY 20.

Date of Digging.	Total Yield per Acre.	Yield of Marketable Size.	Average Size of Tubers.
	Bushels.	Bushels.	Ounces.
August 2	58	30	1·6
12	115	75	2·0
22	230	163	3·7
September 1	304	234	4·4
12	356	303	5·2
22	379	353	5·7

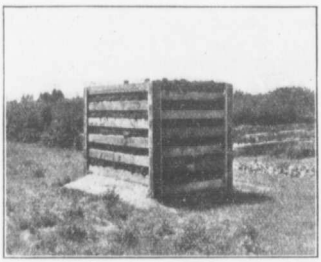
It will be seen that 119 bushels per acre of marketable potatoes developed during the month of September. In the province of Ontario many fields of potatoes are dry and brown by September, either through lack of cultivation or from disease. Not only is the yield of potatoes much increased by keeping the vines green well into September, but the quality of the potatoes is much improved also. When potatoes are killed early in the season, many of the tubers are immature. In a previous chapter we have tried to show the importance of good cultivation in maintaining a vigorous growth through the early part of the season; in the chapter on Insects and Diseases it will be shown how the tops may be kept green through the latter part of the season.

GROWING POTATOES IN CRATES OR PENS.

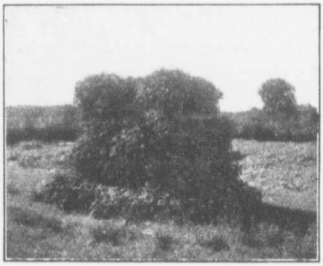
Early in the summer of 1917, articles appeared in Canadian newspapers in which a novel method of growing potatoes was described by which it was claimed a very large yield could be produced, as much as 42,000 bushels per acre having been said to have been obtained by the originator of the system. These articles appear to have been based on one which appeared in the *New York Times*, in which a method followed by R. E. Hendricks, Kansas City, Mo., was described.

Briefly, the plan consisted of growing potatoes in a large pen or crate-like structure filled with soil and in which potato sets were planted. The size of the pen in which potatoes were said to have been grown at the rate of 42,000 bushels per acre was 6 feet in depth, 6 feet in width, and 8 feet in length.

As there was much interest in Ottawa in 1917 in growing vegetables on small areas, and in order to learn what could be grown in a pen of this size, one was constructed at the Experimental Farm. Six-inch boards were nailed to four corner posts, the boards being left six inches apart to leave space for the plants to grow through, the whole forming a crate of the dimensions above. Rich loamy soil was thrown in and large potato sets having three or more good eyes were planted one foot apart opposite the openings between the boards, the sets being thus six inches by one foot apart. There were six such openings all around the crate, or, in other words, there were to be six rows of potatoes, one above the other. In addition, the sets were planted one foot apart over the top of the crate. A little sod was used along the openings at the sides and ends to prevent the soil from falling out. There were 181 sets planted,



Potato pen C.E.F. after planting—June, 1917.



Potato pen C.E.F.—August, 1917.

which weighed 42 pounds. In order to ensure an abundant supply of moisture all through the crate, six upright lines of three-inch tiles went from the bottom to the top of the crate at equal distances apart, the tiles being blocked at the lower end to prevent the water getting away there. These tiles were filled with water from time to time, and the moisture reached the soil through the joints of the tiles.

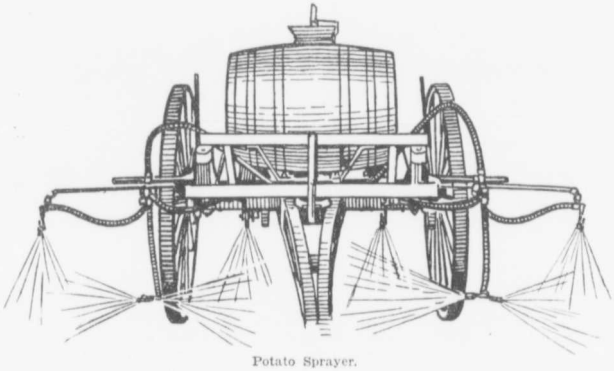
The planting was done on June 16, and would have been done before but that it was not until about this time that attention was drawn to this method. As the plants did not appear through the openings between the boards along the sides and ends as soon as expected, an examination was made, and it was found that the shoots, instead of coming out, were growing straight up behind the boards, hence it became necessary to bend each one towards the opening, after which they grew well and eventually the whole crate was well covered with vines. The plants were kept thoroughly sprayed to prevent injury from insects and late blight, and were still green when killed by frost on October 8. The potatoes were dug on October 17, when 81 pounds 4 ounces of marketable and 12 pounds 4 ounces of unmarketable tubers were harvested. If

the yield per acre is estimated on the basis of the number of square feet of the surface of the earth covered by the crate—namely, 48 square feet—the yield would be at the rate of 1,229 bushels per acre marketable and 185 bushels per acre unmarketable, or a total yield per acre of 1,414 bushels. But the fact remains that 42 pounds of seed were planted and only 81 pounds 4 ounces of marketable potatoes were harvested, which is a very small return for the amount of seed planted and the labour involved. The potatoes were practically all found within six inches of the surface of the soil, whether on the top or along the sides or ends of the crate.

From the experience gained from one year's trial, this is not a practice to be recommended, and, while the method of planting was not quite the same as that described in some of the articles referred to, where it was suggested to plant sets all through the crate, yet considering the small yields from the plants which got abundance of light, there would be little gained by planting sets, the stalks of which would have to grow several feet to get to the light, and without plants with leaves, or with the few leaves that could develop when the plants reached the surface, the number of tubers from each set must be very small indeed.

PROTECTING POTATOES FROM INJURIOUS INSECTS AND FUNGOUS DISEASES.

The leaves of the potato vine must be kept intact and in a thrifty condition if a maximum crop is to be obtained, and both insects and diseases should and can be fought and conquered if the well-known and thoroughly tested preventatives and remedies are used.



Potato Sprayer.

Spraying for the Colorado potato beetle should not be delayed until the vines are badly injured, but preparation should be made to spray as soon as the larvæ or young bugs hatch. In about a week after the eggs are laid the young beetles or larvæ appear and begin to devour the foliage with a rapidity which is only too well known. The last brood of larvæ, which disappear into the soil before severe frost, pupate there, remaining in the ground in the form of perfect insects until the following spring. Fortunately, there are good remedies for this insect in Paris green, arsenate of lead, and other insecticides. The importance of preserving the foliage as nearly intact as possible has already been impressed on our readers. It is well known that the loss in a crop where the vines have been allowed to be devoured by potato beetles is enormous,

the crop sometimes being scarcely worth digging. The longer the spraying is delayed the greater loss there will be. If cheap help can be obtained it will be advisable to spray the vines when they are quite small, or pick off the old beetles before they have deposited their eggs, but if help is scarce it may not be possible to do this, and the temptation to leave the old "bugs" alone is great, as they do little injury to the foliage. Unfortunately, on perhaps the majority of farms, nothing is done to destroy the potato beetles until the foliage is noticed partly eaten. This is too late. By the time the poison takes effect the vines are badly injured and the future crop much lessened.

Potato growers should not wait until the vines are injured, but should be on the look-out for the young "bugs," and as soon as they appear an application of some good insecticide should be made. As the eggs are not all laid at the same time, the larvæ do not hatch all at the same time, and it is usually necessary to spray several times before they are all killed. As it is important to kill the beetles as soon as possible, an insecticide which will act quickly is desirable and also one that will adhere to the foliage. Paris green and arsenate of lead are two of the best poisons to use. Paris green should be applied in the proportion of 8 ounces or more Paris green to 40 gallons of water, with about 4 ounces of lime to neutralize the effect of free arsenic on the foliage. Four ounces of Paris green to 40 gallons of water will kill the insects, but does not act as quickly as eight ounces. If applied dry, a good proportion is 1 pound Paris green to 50 pounds slaked lime, land plaster or any perfectly dry powder. The dry mixture should be applied when the vines are wet, so that it will adhere better. There are strong advocates for both the wet and the dry mixtures. Wet mixtures may be put on at any time when the weather is fine, but, if the best results are to be obtained dry mixtures should be applied only when the dew is on the foliage. If the dry mixture is put on when the foliage is moist it will adhere better than the wet mixture and will also be more evenly distributed. Arsenate of lead paste used in the proportion of two to three pounds to forty gallons of water, or powdered arsenate of lead at the rate of 1 to 1½ pounds adheres better to the foliage than Paris green and is a good poison to use. It does not appear to kill quite so rapidly as Paris green, and a mixture is recommended of 8 ounces Paris green and 1½ pounds of paste arsenate of lead to 40 gallons of water. "Bug Death" dry and also in the proportion of 1 pound to 2 gallons of water, has been found a good insecticide, but is more expensive than Paris green.

The cucumber flea-beetle frequently does much harm to the potato crop, and being so small, is often not seen, but the result of its depredations will be found in the many small holes which may be noticed in the leaves and in the lessening of the crop on this account. Spraying with Bordeaux mixture and arsenate of lead will control this.

It is found that the parts of the leaves which are injured by the flea beetle make suitable lodging places and points for germination of the spores of the early, and possibly, late blight. We believe that keeping vines covered with Bordeaux mixture and Paris green is the best preventative in this case.

THE EARLY BLIGHT OR LEAF SPOT DISEASE AND THE LATE BLIGHT OR ROT.

Although much of the premature killing of potato vines is due to the early blight, which is frequently mistaken for the late blight, the latter is by far the more serious disease, as it spreads with much greater rapidity and in addition to the killing of the tops causes the rotting of the tubers.

The late blight usually appears between the middle of July and the first of August, though sometimes earlier or later, depending on the season and part of Canada. The strong and disagreeable odour from a potato field where the late blight is at work is familiar to all, and although it is too late to get the best results after the disease has begun to spread rapidly, it may sometimes be checked by thorough spraying at that time. The loss from blight is usually greatest from the main crop on late varieties, as the early potatoes are usually well advanced before the conditions are the most favourable for the rapid development of the disease. The

weather which appears to favour the spread of the late blight, is what is usually known as "muggy," or close days with much moisture in the air. With these conditions myriads of spores germinate, and the disease spreads through the tissues of the leaves and destroys them with great rapidity. The object of spraying is to protect the leaves with the Bordeaux mixture so that if the spores germinate they are killed by it.

In the following table will be found the average results obtained at the Central Experimental Farm for the years 1901, 1902 and 1904. Some varieties of potatoes are much less subject to blight than others:—

	1901. Average Yield per acre of Marketable Potatoes Sprayed four times, and Unsprayed.		1902. Average Yield per acre of Marketable Potatoes Sprayed four times, and Unsprayed.		1904. Average Yield per acre of Marketable Potatoes Sprayed five times, and Unsprayed.		Average Yield per acre of Marketable Potatoes Three Years Sprayed, and Unsprayed.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Sprayed	333	43	310	12	369	21	337	45
Unsprayed	233	11	189	54	306	39	243	15
Average increase in yield per acre of marketable potatoes from spraying	100	32	120	18	62	42	94	30

The cost of spraying potatoes with Bordeaux mixture is not large compared with the great increase in yield from the use of it.

As it would be sometimes necessary to spray with Paris green about the time of the first application of Bordeaux mixture, these could be put on together, hence the expense of one spraying with Paris green may be deducted. The average increase from spraying three years has been shown to be 94½ bushels. At 60 cents a bushel, this is $56.70, or after deducting $13, the approximate cost of spraying, a net profit of $43.70 per acre. As a good spray pump can be obtained for less than this amount, the price of a pump would be more than saved on one acre in one season. It has been found that one spraying only, if applied just when the disease begins to spread, has been found to give very satisfactory results, and the more the disease is studied the safer it will be to reduce the number of applications to two or three, but for the ordinary farmer it is wise to begin spraying about the middle of July, and keep the vines covered until September, and it will usually take at least four applications to accomplish this. Other preventatives have been tried, but none has given as satisfactory results as Bordeaux mixture made as described under the formulas for spraying. The illustration showing sprayed and unsprayed potatoes demonstrates the advantage of spraying to protect the foliage from blight. The vines on the unsprayed plot were dead eighteen days before those on the sprayed.

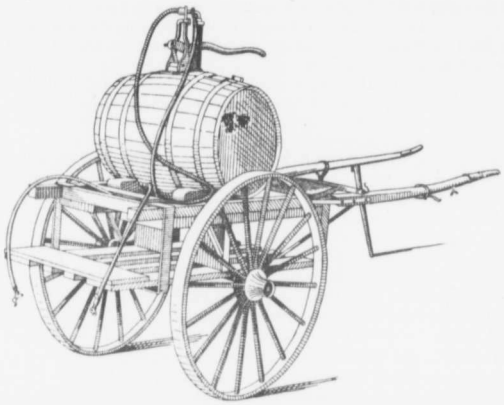
The results of spraying at the Central Experimental Farm in 1910, on plots of one-forty-fourth of an acre each were as follows:—

	Yield per Acre.	
	Bush.	Lb.
Sprayed with Bordeaux mixture	234	40
Not sprayed with Bordeaux mixture	117	20
Sprayed with Soda Bordeaux (Burgundy Mixture)	190	18
Not sprayed with Bordeaux until August 1st	200	12

Experiments with "Bug Death," which were reported on in the annual reports of the Central Experimental Farm for 1902 and 1904, did not give nearly as satisfactory results as Bordeaux mixture. "Bug Death" and Bordeaux mixture together did, however, give better results in 1904, than Bordeaux mixture alone. This combination was tried only one season, hence no definite conclusions can be drawn.

METHODS OF APPLYING SPRAY MIXTURES.

A good spray pump is considered an absolute necessity with every progressive fruit grower, but there are few farmers who yet own one. It has been proven by experiments at the Central Experimental Farm that more than the price of a good spray pump can be saved in one year on one acre by spraying potatoes with Bordeaux mix-



Spray Pump.

ture to prevent blight or rot, but a spray pump is useful for other purposes than applying liquid mixture to the potato crop. Many farmers have some fruit trees or bushes which need spraying and a spray pump is very useful and necessary in treating them. A pump may also be used to whitewash or paint barns, outbuildings and fences, it having been found that one of the most economical methods is to use a spray pump. It may be used for disinfecting stables, cleaning vehicles and washing windows. No farmer and no potato grower should be without a good spray pump. Good pumps suitable for most purposes cost from about $25 upwards; cheaper ones may be obtained, but are not as satisfactory, and it is much more economical to get a good one to begin with. One great advantage that a good pump has over a poor one is that the operator can develop more power with it. The accompanying cut represents a spray pump mounted on a special cart for spraying purposes:—

Spraying is not sprinkling. A spray should be applied in the form of a fine fog-like mist, and this only can be obtained with a good pump and a good nozzle, the latter being almost as important as the former. When spraying, the object is not to put on so much liquid that it will run down the leaves, but just enough to cover the leaves evenly and well, as the insecticide or fungicide must be evenly distributed over the leaf so that every part will be protected if the best results are to be obtained. A fine spray will envelop the leaf, protecting the underside as well, which is important. If the spray is coarse and much of it is applied the liquid will run down the leaf carrying

with it the fungicide or poison and this accumulating at the tips of the leaves often causes burning and injury to them. It is also very wasteful to apply the liquid in a coarse spray.

Potato spraying attachments are now made for most good sprayers and from four to six rows can be sprayed at one time. The latest devices have the nozzles arranged so that the vines may be sprayed from beneath as well as above, which is important, as all parts of the plant above ground should be protected. With these attachments one man and a horse can get over a large area in a day. This is not always the most economical way to do, as for instance, if a nozzle or nozzles should become clogged the machine may go for some distance before this is noticed and there will be a patch left unprotected where the potato beetles can work and the late blight may get a strong foothold, or perhaps the cart will jolt. Thoroughness is very essential, both in spraying for the potato beetle and for blight. A wise plan, if a four or six row attachment is used, is to have a man or boy on the back of the sprayer watching for any clogging of the nozzles. A method, though a little slower than that mentioned, is to spray two rows at one time, a man or a boy driving and one sitting at the back holding a hose and nozzles in each hand. By this method one can direct the spray better and can immediately note and fix a nozzle, if it should become clogged. In this way the work is more certain to be thoroughly done, and thoroughness, especially when disease or insects are very troublesome, is better than speed. The distance apart of the rows should be regulated at time of planting, so that the horse and wheels of the cart will come between the rows. Many home-made machines for spraying are used, but most of these are very wasteful of material and the liquid is put on in so coarse a spray that it runs down the leaf and most of the poison is washed off or down to the tip. There is no doubt that much of the difficulty in killing Colorado potato beetles is due to the fact that the poison is not evenly and thoroughly distributed over the leaves. There is the same defect with the watering can, which is an article which has been used in spraying potatoes for many years. There is no doubt that the reason why the dry application of Paris green for the prevention of the Colorado potato beetle is preferred in many places to the liquid is that when applied dry, the poison is more evenly distributed. Various shakers and blowers have been invented for applying poison dry.

The effectiveness of an application of an insecticide or fungicide will be in proportion to the thoroughness with which the mixture is applied. Every part of the leaf left unprotected may mean a foothold for insects or disease.

FORMULAE RECOMMENDED.

Bordeaux mixture.—For Early and Late Blight, and for Flea Beetles:—

Copper sulphate (bluestone)	4 to 6 pounds.
Unslaked lime	4 "
Water (1 barrel)	40 gallons.

Dissolve the copper sulphate by suspending it in a wooden or earthen vessel containing four or five or more gallons of water. It will dissolve more quickly in warm water than in cold. Slake the lime in another vessel. If the lime, when slaked, is lumpy or granular, it should be strained through coarse sacking or a fine sieve. Pour the copper sulphate solution into a barrel, or it may be dissolved in this in the first place; half fill the barrel with water, add the slaked lime, fill the barrel with water and stir thoroughly. It is then ready for use. It is important not to mix the lime water and the sulphate of copper solution before diluting.

A stock solution of copper sulphate and lime wash may be prepared and kept in separate covered barrels throughout the spraying season. The quantities of copper sulphate, lime and water should be carefully noted.

Soda Bordeaux (Burgundy mixture).—For early and late blight:—

Copper sulphate (bluestone)	6 lb.
Washing soda (carbonate of soda)	7½ "
Water (1 barrel)	40 gallons.

Dissolve copper sulphate as for Bordeaux mixture. Dissolve 7½ lbs. washing soda in four gallons of water. Pour the copper sulphate solution into a barrel; half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda Bordeaux adheres better to the foliage when freshly made than ordinary Bordeaux mixture, but it deteriorates rapidly in this respect and must be used as soon as made. If left to stand for twenty-four hours it will have lost nearly all its adhesiveness. The Soda Bordeaux is not recommended in preference to the ordinary Bordeaux mixture, but where lime cannot be obtained it may be used with good results. Furthermore, on account of its freedom from gritty matter there is less likelihood of the nozzle becoming clogged when it is used. As washing soda is considerably more expensive than lime this mixture costs more than the ordinary Bordeaux mixture.

For Colorado potato beetle.—Add 8 ounces of Paris green to the above formula or 3 pounds of arsenate of lead paste, or 1½ pounds dry arsenate of lead; or a mixture of 8 ounces Paris green and 1½ pounds of arsenate of lead paste or half the amount of dry.

Paris green.—For Colorado potato beetle:—

Paris green	8 oz.
Unslaked lime	4 oz.
Water	40 gallons.

A less quantity of Paris green, say 4 ounces to 40 gallons of water is sufficient if the insects have just hatched. Make a paste of the Paris green before diluting, by mixing a little water with it. It will not settle as quickly in the barrel if this is done.

Arsenate of lead.—For Colorado potato beetle:—

Arsenate of lead paste, 2 to 3 lbs., or dry, 1 to 1½ lbs.	
Water	40 gallons.

Arsenate of lead varies considerably in the amount of arsenic it contains, some brands being poorer than others, hence two to three pounds to forty gallons of water are recommended.

Make the arsenate of lead into a thin paste by the addition of a little water, preferably warm, before diluting. Arsenate of lead adheres better to the foliage than Paris green and its use is recommended on this account, but as it does not appear to kill as rapidly as Paris green a mixture of 8 ounces Paris green and 1½ pounds arsenate of lead paste to 40 gallons of water is suggested.

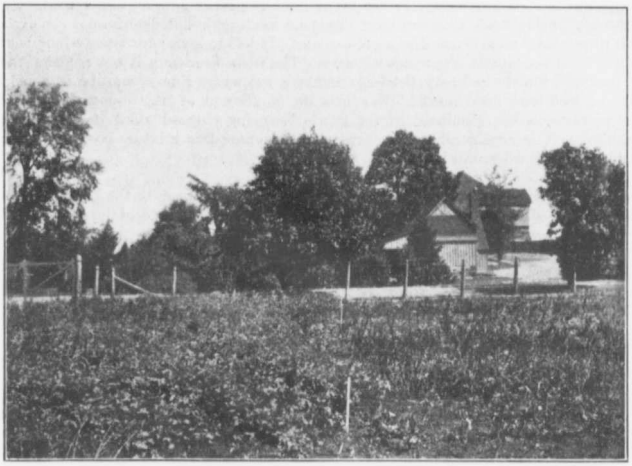
Dry mixture.—One pound Paris green with 50 pounds flour, land plaster, slaked lime or any other perfectly dry powder.

Corrosive sublimate and formalin solutions.—For Potato Scab or Rhizoctonia, soak the tubers before planting, either:—

I. For 3 hours in a solution of Corrosive Sublimate 1 oz. in water, 12 gallons. When dry cut up for planting.

II. For 2 hours in a solution of commercial formalin (Formaldehyde) 8 oz. in water, 15 gallons; or 1 oz., in water, 2 gallons.

Formalin has the advantage of being neither poisonous nor corrosive, while Corrosive Sublimate is a fatal poison if taken internally. It also corrodes metals. The solution should therefore be made in wooden or glazed vessels. It appears, however, to be more effective than formalin. Tablets may be procured at any druggist of such a size that one dissolved in a quart of water gives a solution of 1 to 2,000. All treated seed potatoes should be planted, and any solution left over should be poured into a hole in the ground. Selection of sound tubers is desirable as treatment is not always effectual.



Potatoes sprayed to prevent late blight. Unsprayed potatoes.

Other insecticides and fungicides.—There are a number of insecticides and fungicides now offered for sale under various names, but none of those which have been tested at the Central Experimental Farm has been found as satisfactory to use as those we have recommended, although some of them have proven effective.

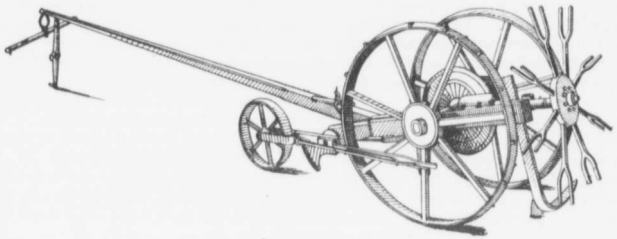
Importance of having Good Materials and Preparing the Mixtures Properly.—The importance of having good materials cannot be too strongly impressed upon potato growers. Great losses may occur from having an insecticide or fungicide of poor quality. The mixture should be carefully prepared. Unless a mixture or solution is made properly and applied at the right time it may have little or no effect and the time and materials are lost. There may also be injury to the vines.

DIGGING POTATOES.

If potatoes have not been affected with late blight or rot the best time to dig them is as soon as the tops have died, if the weather is favourable. Potatoes are usually dug just after the corn is harvested or before the frost becomes severe enough to freeze the soil to a depth of an inch or so. This time of digging is usually chosen as a matter of convenience and quite irrespective of when the stalks die, as the latter dry up in many places about September 1, and often before, and the potatoes are

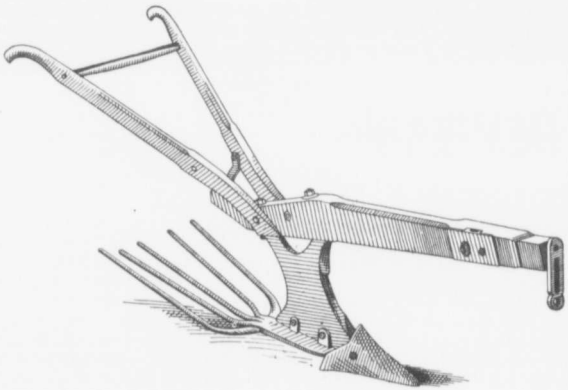
frequently not dug until about a month afterwards. When the soil is well drained and not wet there is not much danger to the crop by leaving it in the ground for this length of time, but if there is no disease the sooner they are dug the better.

Potatoes which have been killed by late blight will usually rot as soon as the conditions are favourable, and for this reason a diseased crop is better left in the ground as the tubers which are diseased will most of them show signs of rot before



Potato Digger.

they have to be taken up on account of frost and they need not be picked up at all. If diseased potatoes are dug and stored as soon as the tops are dead, the disease will be almost certain to develop in the pit or cellar and healthy tubers will rot from contact with the diseased ones. It is not good practice to dig diseased potatoes early and pile them in the field. It is better to delay digging as long as possible and then put the potatoes in a cool, well ventilated cellar where the disease may be checked. Potatoes in wet soil should be dug sooner than those in that which is drier and well drained.



Potato Digger.

Potatoes should be dug in dry weather so that when they are taken to the cellar or store-room they will be perfectly dry. If the tubers are housed when wet the conditions become very favourable for the development of the disease which may affect them and for the rotting of the healthy potatoes from contact with those thus affected.

Where there are large areas to be dug a good potato digger is essential. Not only will a potato digger raise the crop more economically than a fork or plough but with it the grower is more likely to get his crop dug and picked up while the weather is fine, which is a great consideration. There are a number of good potato diggers now on the market which will dig up and leave on the surface of the soil practically all the tubers.

Next to a good potato digger a fork-like attachment to a plough does the best work. That in the illustration is one used at the Central Experimental Farm with very fair success. The fork is attached to the side of the plough and not to the point, in which it differs from some others. Being attached to the side, it prevents much clogging from the potato tops as the rows can be ploughed from the side. There are some potatoes left in the ground even when this attachment is used, but not nearly as many as with the plough.

The following description of how this digger is made may prove useful:

Take the mouldboard off a good strong plough and use the land side as a foundation to which attach the fork which extends behind. This fork should be constructed of ½-inch or ⅝-inch iron, should consist of five prongs, each about two feet long, and should stand at the back about one foot from the ground, when the plough is on the level. These prongs should start off about two inches apart and end up about three inches apart, the two outside prongs being the highest; and further, the two outside prongs where they jut or bow from the stem should be sharpened or flattened so as to present a cutting edge where they would naturally get into the soil and follow behind the plough.

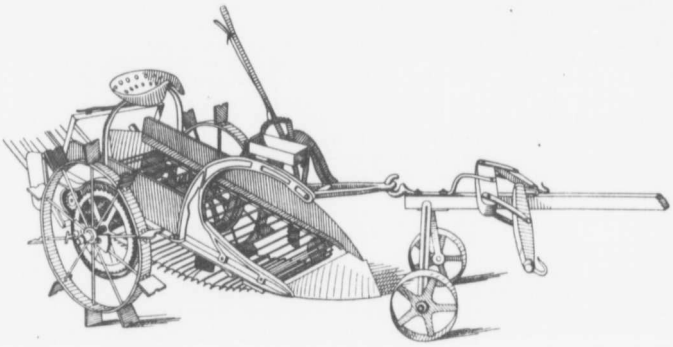
Ploughing potatoes out has become quite a common method among farmers since help began to get scarce and it was difficult to get men to dig, but in ploughing them out there is always a large number of potatoes left in the ground and the additional labour required to pick up these potatoes which are scattered all over the field is considerable.

The old-fashioned yet thorough way of digging with the four tined potato fork is too slow and expensive a method now that good men are difficult to get and wages are so high, but where these do not have to be taken into consideration as good or better work is done by a man than by any implement. A man with a fork will dig little more than half an acre a day. A good potato digger will dig from three to five acres a day.

STORING POTATOES.

Potatoes should be stored dry in a cool, well ventilated cellar which is perfectly dark. There is no doubt that great losses occur every year from the careless storing of potatoes which are put in wet in comparatively warm and poorly ventilated cellars and piled in great heaps, giving almost ideal conditions for the development of the disease which may be in them and very favourable conditions for rotting. The expense of putting in a good system of ventilation in a cellar would be soon offset by the better condition in which the potatoes would keep, and hence the more profit there would be from them. If it is not considered wise to go to this expense every effort should be made to have as good a circulation about the potatoes as possible. Instead of piling the potatoes against the wall or on the floor, slats should be nailed a little apart about six inches or more from the wall. This will give a circulation of air behind the pile. A temporary floor should be put down about six inches above the permanent floor with cracks between the boards. This will permit air to circulate under and through the pile. Then if the piles have to be made very large, square ventilators of wood made of slats and running from the top to the bottom of the pile could be put in here and there through the pile. These with the ventilation afforded

at the sides and bottom will keep the potatoes in much better condition than if they were in a solid pile. Another good plan is to keep the potatoes in large crates made with slats close enough together to prevent the potatoes getting out. The ventilation between these crates would assist very much in keeping the tubers in good condition. Thousands of bushels of potatoes are lost every year when there is disease in the crop, by neglecting ventilation. The temperature of the cellar or store-house should be kept as nearly 33° to 35° F. as possible. The cooler potatoes are kept without freezing the better. It has already been stated how much the value of the tubers for seed is lessened by sprouting, but they are also much injured for eating. Moreover, if the potatoes are held over to sell in the spring there will be a great deal of shrinkage in weight if potatoes are allowed to sprout. It is important to have some means of letting cool air into the cellar towards spring when it is difficult to keep potatoes from sprouting. The cool air should be let in at night when the temperature is lowest and the cellar kept closed during the day.



Potato Digger.

Sometimes it is difficult to get all the crop to the cellar at digging time and when this is the case they may be put in piles of forty or fifty bushels and covered with straw with a little earth on top to keep them dry, more earth being put over the straw if the weather becomes cold. If the potatoes are diseased, however, it is not safe to pile them in this way and even if they are healthy, piling in the field should be avoided if at all possible, as the crop is much easier to handle afterwards in the cellar than outside in the cold, perhaps inclement, weather. If potatoes are found to be diseased at digging time a good plan is to fix up a place in the barn where it is quite dry and where frost can be kept out for a time and spread the potatoes out in as shallow piles as possible. The place should, however, be made perfectly dark as potatoes soon deteriorate very much in quality if exposed to light.

New settlers in the prairie provinces have difficulty in storing their potatoes before they get a good cellar, and older settlers sometimes have not sufficient accommodation. The following description of a pit made and used successfully for several years in Manitoba, should be of assistance to those requiring such a place for storing potatoes.

STORING POTATOES OUTSIDE.

To store about 1,000 bushels, a hole in the ground 14 feet wide, 4 to 4½ feet deep, and about 30 feet long will give ample space. The sides and ends of the hole may be

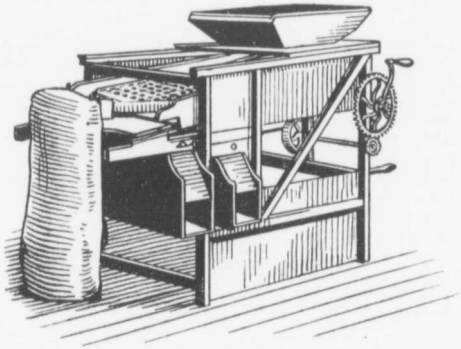
lined with boards to prevent earth from falling in, though the earth may be braced back with poles if boards cannot be readily obtained. Fill the hole to a height of 3½ feet with potatoes, then place logs along the sides and ends to hold back the earth thrown out and for supports for the poles of the roof. The depth of this side log and elevation in centre of roof is to be left as an air space and no straw or rubbish whatever is put on top of the potatoes. A roof is made with poles placed close together. There should be but a slight elevation at the centre of the roof.

When the poles for the roof are in place there should be a little hay thrown over them to keep the soil from falling through. The roof should now be well sodded and some of the loose earth which was dug out of the hole shovelled over the sods to make about 1 foot deep of earth and sods. Another foot of well rotted, dry horse manure will be sufficient during the coldest winter. The natural ground heat from the bottom will keep the temperature fairly even. In a pit this size there should be three ventilators each about 4 x 6 inches made of boards, one at each end and one in the centre. These should be put in when roofing. These are closed in the very cold weather with old sacks, and empty boxes then turned over them, when the weather becomes frosty; the centre ventilator may be kept closed all the time. There should be no potatoes directly under the end ventilators as the drip of water from them might cause the potatoes to rot. A thermometer can be let down any time to test the temperature. In a pit of this kind the temperature should not go much below 40° F. It is advisable to have a small space at one end to get to the potatoes in the spring. This should be sunk as deep as the pit and roofed over as the pit, and can be kept filled with manure or old bags during the winter to prevent frost getting in.

An inexpensive, outside root cellar used at the Rosthern Experimental Station is described, and plans for which are illustrated, in Exhibition Circular No. 71 of the Experimental Farm Series.

MARKETING.

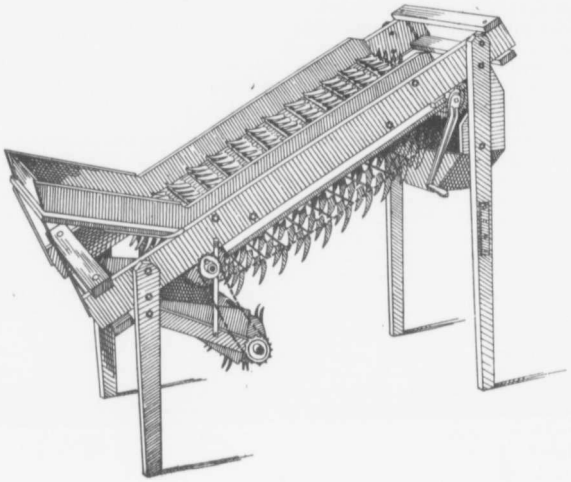
There is usually more profit, taking one year with another, in selling potatoes as soon after digging time as possible. While occasionally when rot has been bad and the crop short throughout the country and one happens to have perfectly sound tubers it may pay to hold them over, yet on the whole it is wiser for the grower to sell at a



Potato Grader.

fair price in the autumn as he thus avoids all the anxiety regarding the keeping of the crop and does not take any risk from probable losses.

Some of the varieties of potatoes which are poor in quality are freest from blight, hence these are becoming popular with some potato growers. Some of the potatoes of best quality, however, are also freest from blight. We believe that leaving everything else out of consideration it will pay a potato grower to grow varieties of good quality which are equally or more productive than those perhaps a little freer from blight, and spray them with Bordeaux mixture. He would then be in a position to offer the very best potatoes to his customers who would soon appreciate those of better quality. The question of how to market potatoes depends so much on local conditions that it is not considered desirable to go very fully into it here. The practice of the



Potato Grader.

best growers is to sort and bag the potatoes just before they are ready to market them. Good machines for sorting and removing the sprouts from potatoes can now be obtained which lessens the labour very much.

IRRIGATION OF POTATOES.

By W. H. Fairfield, M.S., *Superintendent, Experimental Station, Lethbridge, Alta.*

There is an impression more or less general that potatoes grown with irrigation are apt to lack in quality; that when cooked they are inclined to be soggy or watery and less mealy and dry than are potatoes raised without the aid of irrigation. That there are grounds for this belief cannot be denied, for, if the crop is irrigated in a careless manner and too much water is applied, the resulting crop is almost sure to be poor in quality, as just pointed out. However, by using reasonable care and intelligence, this trouble may be easily avoided. To begin with, the land should be in good tilth. There is probably no better preparation than to summer-fallow the land the season previous to when the potatoes are to be planted. If an application of manure could be given before the land is ploughed for the summer-fallow, so that it would have a chance

to rot during the summer, the yield of the following crop would be materially increased. Another quite satisfactory method is to manure the land in the spring and then raise a grain crop to be cut for green feed. This will leave the land relatively clean for the potatoes. As soon as a farmer on an irrigated farm has enough alfalfa seeded down so that he can afford to break up a four or five-year-old field to plant his potatoes on, he will have a field that will be certain to give large returns.

As indicated above, to avoid the possibility of producing potatoes of poor quality, care must be exercised as to when and how the crop is irrigated. It probably requires more skill and experience to raise potatoes successfully under irrigation than any other crop commonly grown here at the present time. The secret appears to lie in being able to keep the plants growing vigourously from the beginning with no set-backs, and on the other hand in being able to apply the water so that too sudden growth will not be stimulated at any time. If possible, the first irrigation should not only be very light, but it should not be given until the small potatoes are set and are perhaps the size of peas. This stage is usually about the time the first blooms appear. If the crop is wet before this time there is danger of the plants setting more potatoes than they will be able to develop to a marketable size. To be sure that the potatoes are not wet too much when the first irrigation is given, it is well to run the water between every alternate row only and turn it off just as soon as it gets through so as not to let the ground soak up any more than is necessary. As soon as the ground dries sufficiently, the land should be given a shallow cultivation. About ten days after the first irrigation, the second should be given. This time, the water may be run down between all the rows and should be allowed to remain running until the land is well wet. After irrigation has once begun, the land should never be allowed to dry out completely. Unless heavy showers intervene, it will be found necessary, in order to maintain this condition, to irrigate about every ten days. After each irrigation, as soon as the surface of the soil dries sufficiently, it should be given a shallow cultivation. If, for any reason, after irrigation has once begun, the land is allowed to become relatively dry, the potatoes should not again be irrigated, for, if they are, a second growth is almost certain to be induced, and this will injure the quality, for the main cause of soggy potatoes being produced when grown under irrigation is from allowing the land to become somewhat dry so that the growth is checked and then applying and inducing a fresh growth of roots and tops.

COST OF GROWING POTATOES.

The cost of growing potatoes varies in different parts of Canada. Labour is more expensive in some provinces than in others. In certain parts of Canada there are no Colorado potato beetles to contend with and rarely any serious injury from late blight, making spraying not so important a part of the operations. In 1915 the cost of growing potatoes was recorded at several of the experimental farms and stations and following are the details as published in the annual report of the Experimental Farms for 1916. These are preceded by a table giving the estimated cost of growing and marketing one acre of potatoes in the province of Ontario with the object of obtaining at least 300 bushels per acre; and also by a table giving the cost of growing one acre of potatoes in the Acre Profit Competition in Ontario in 1916:—

ESTIMATED COST OF GROWING AND MARKETING ONE ACRE OF POTATOES IN THE PROVINCE OF ONTARIO WITH THE OBJECT OF OBTAINING, AT LEAST, 300 BUSHELS PER ACRE.

Rent of land, one year		$ 3 00
*Cost of 12 pounds clover seed at 25 cents		3 00
Barnyard manure, 12 tons at $1 (¼ exhausted in one year)		4 00
Ploughing in spring		2 75
Disc harrowing twice		1 00
Harrowing once with smoothing harrow		20
Drilling, 2½ hours at 40 cents		1 00
**Seed, 25 bushels at 60 cents		15 00
Cutting seed, one day		2 00
Planting seed, one day		2 00
Covering, 1¼ hours at 40 cents		50
Harrowing twice with smoothing harrow		40
Cultivating six times, one horse and man, 15 hours at 35 cents		5 25
Hoeing once, one day		2 00
Poison and bluestone		10 00
Spraying three times with poison, horse and men, 6 hours at 55 cents		3 30
Spraying four times with Bordeaux mixture, horse and two men, 8 hours at 55 cents		4 40
Digging, 3½ hours at 40 cents		1 33
Picking up potatoes, 2½ days at $2		5 00
Storing 4 loads, 4 hours at 40 cents		1 60
Sorting and marketing, 4 days at $2	$8 00	
Team part of 2 days at $2	4 00	12 00
Wear and tear on machinery and interest on money		85
		$80 58

* Clover sown with previous crop and ploughed under in the autumn.

** The price of seed in 1917 was about $3 per bushel hence $60 should be added to the cost for seed in that year.

The cost of growing an acre of potatoes as given in the preceding table is large, but this is fully justified by the results which should be obtained if it is incurred. If the best methods are followed there should be no difficulty in getting 300 bushels per acre. The amount of seed recommended, namely 25 bushels, may seem large to many farmers who are in the habit of using from 10 to 12 bushels, but if the larger sets are tried, the results based on experience at Ottawa will, as a rule, fully justify the extra amount of seed. The estimate of the value of the seed, if based on the season of 1917 would, of course, have been much larger, but 60 cents a bushel is considered a fair average. The importance of having vigorous, healthy seed cannot be too often impressed on potato growers. When a potato planter is used, which places the sets in close contact with the soil and moisture, the sets need not be so large and the item for seed would be reduced. If a potato planter were used the cost of planting would also be considerably reduced. The prices for insecticides and bluestone vary considerably from year to year. If they are bought in large quantities the price is less than when a few pounds only are obtained. The cost of application will also vary according to the method employed, that given in the table being

considered a maximum amount. It is thought best to estimate the various items of expense on a small, rather than a large, acreage as the majority of farmers grow only a few acres of potatoes.

If one desired to estimate how much it cost to grow a bushel of potatoes in Ontario in 1917 it would not be fair to figure on the basis of 300 bushels per acre, but rather on the average yield per acre, which is 114 bushels per acre. The average farmer would not be likely to use more than 18 bushels of seed per acre, if as much; he would not spray to prevent late blight which would lessen the cost by about $13 per acre and there would only be about half the cost for picking, storing and marketing as is charged against a 300-bushel per acre crop.

COST OF GROWING ONE ACRE OF POTATOES, IN ACRE PROFIT COMPETITION IN ONTARIO, 1916.

The Ontario Department of Agriculture, through its district representatives, conducted an acre profit competition with potatoes during 1916. These are open to young men who have taken the four week course in agriculture conducted by the district representatives.

Following will be found the yields obtained by the eight winners and the cost of production. In estimating the cost of operation $5 per acre was allowed for the rent of the land, $2 for ploughing, 15 cents an hour for manual and 10 cents an hour for horse labour. We have not the details in regard to all the charges made in growing these crops but it will be noticed that the charge for manual and horse labour is considerably less than the estimate in the preceding table. The item for sorting and marketing may not be included, nor the $3 for clover seed to produce the crop to plough under and a considerably less quantity of seed than twenty-five bushels was, doubtless, used.

POTATOES.

(Price of Seed, $1.00 per Bush.)

County.	Winner.	Yield.	Cost of Production.	Profit.
Middlesex	William S. Courtis, R.R. 2, Mt. Brydges	320	44·67	275·33
Sudbury	Napoleon Chenier, Hamner	295	38·55	256·45
Renfrew	Arthur Griese, Beachburg	288	41·25	246·75
Rainy River	Herbert C. Nixon, Emo	300	63·08	236·92
Algoma	John Wm. Simpson, Sault Ste. Marie	285	48·10	236·90
Timiskaming	Leonard Nickle, Hanbury	208	63·14	144·86
Grenville	Chas. L. Ferguson, R.R. 3, Spencerville	161	47·55	113·45
Northumberland	J. Arthur Down, R.R. 1, Hilton	70	53·87	16·13

Cost of Growing One Acre of Potatoes.

Experimental Station, Charlottetown, P.E.I., 1915.

One-half of an acre was planted with Irish Cobbler, an early variety, and another one-half acre along-side was planted with Green Mountain, a main crop variety of potatoes.

Details with Cost.	Variety.	
	Irish Cobbler.	Green Mountain.
Number of acres	½	½
Rent of land at $3 per acre	$1 50	$1 50
Share of manure at the rate of 25 tons per acre	2 50	2 50
Use of machinery at 60c. per acre	0 30	0 30
10 bushels of seed at 50c. per bushel	5 00	5 00
Ploughing and ribbing, autumn 1914, 2½ hours at 34c	0 85	0 85
Harrowing in autumn, 2 hours and 36 minutes at 34c	0 97	0 97
Discing in spring, 37 minutes at 41c. per hour	0 25	0 25
Harrowing in spring, 1 hour at 34c	0 34	0 34
Rolling one-third hour at 34c. per hour	0 11	0 11
Cutting sets, 4 hours and 25 minutes labour at 17c. per hour	0 75	0 75
Planting, 1 hour at 34c. per hour	0 34	0 34
Planting, 1 hour at 17c. per hour	0 17	0 17
Spraying, 1 hour and 10 minutes at 34c. per hour	0 40	0 40
Spray material, 7 applications (Poisoned Bordeaux)	2 98	2 98
Hoeing, 5 hours manual labour at 17c	0 85	0 85
Cultivating, 3 hours at 27c. per hour	0 81	0 81
Cultivating, 2 hours and 20 minutes at 34c	0 80	0 80
Picking potatoes, 20 hours at 17c. per hour	3 40	3 40
Digging and harrowing, 1 hour and 17 minutes at 34c	0 44	0 44
Hauling 2 hours at 27c. per hour	0 54	0 54
Storing, 7 hours at 17c. per hour	1 19	1 19
Cost per plot	$24 49	$24 49
Cost per acre	48 98	48 98
Yield of potatoes per plot	128 bush. 43 lb.	151 bush. 10 lb.
Yield of potatoes per acre	257 " 26 "	302 " 20 "
Cost to produce 1 ton of potatoes	$6 47	$5 40
Cost to produce 1 bushel of potatoes	0 19 03	0 16 2

Experimental Station, Fredericton, N.B., 1915.

Seed, 21 bushels at 60 cents per bushel	$12 60
Cutting seed at 10 cents per bushel	2 10
Ploughing land twice at 32 cents per hour	3 20
Harrowing twice	0 64
Harrowing in manure with disc harrow	1 28
Manure, 16 tons at $1	16 00
Applying manure with spreader	2 72
Fertilizer, 400 pounds applied in row when planting	6 37
Planting, man, boy and team, 3 hours	1 41
Cultivating 5 times, 7½ hours at 25 cents	1 87
Horse hoeing (hilling), 3 times, 4½ hours at 32 cents	1 44
Hand hoeing (partially), 15 hours at 18 cents	2 70
Weeding (partially), 2 hours at 18 cents	0 36
Spraying, six times at $1.25	7 50
Digging, man and team, 4 hours	1 28
Picking up potatoes, 5 men, 5 hours each at 18 cents	4 50
Delivering from field, man and team, 3 hours	0 96
	$66 93
Cost per bushel, to grow ..cents.	27·95

The total yield from the acre was 239·25 bushels, of which 220 bushels (80 barrels) were sold out of the field at $1.75 per barrel for table stock and the balance (7 barrels) of small and bruised tubers were sold for poultry feeding at 50 cents per barrel. The sale value of the crop was thus $143.50, which, after deducting the cost of production, left a profit balance of $76.57 for the acre.

Experimental Station, Ste. Anne de la Pocatière, Que.

Seed, 28 bushels at 35 cents per bushel	$ 9 80
Rent of land at $3 per acre	3 00
Use of implements at 60 cents per acre	0 60
Cost of one-third of an application of 24 tons manure per acre at $1 per ton	8 00
First autumn ploughing, 2 horses at 34 cents, 10 hours	3 40
Disc harrowing in autumn, 2 horses, 10 hours at 34 cents	3 40
Ploughing in spring, 2 horses, 10 hours at 34 cents	3 40
Disc harrowing, 2 horses, 5 hours at 34 cents	1 70
Harrowing with smoothing harrow, 2 horses, 2 hours at 34 cents	0 68
Drilling, 2 horses, 5 hours at 34 cents	1 70
Planting, hand work, 45 hours at 17 cents	7 65
First harrowing, 2 horses, 2 hours at 34 cents	0 68
Second harrowing, 2 horses, 2 hours at 34 cents	0 68
Hoeing and weeding, 1 horse, 10 hours at 27 cents	2 70
First spraying, 10 ounces Paris green, 2 pounds arsenate of lead in 40 gallons water	0 95
Spraying, hand work, 5 hours at 17 cents	0 85
Transporting the insecticide, 2 horses, 3 hours at 34 cents	1 02
Hoeing and cultivating the soil, 1 horse, 10 hours at 27 cents	2 70
Second spraying, 6 pounds lime, 6 pounds sulphate of copper, 12 ounces Paris green, 40 gallons water	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	0 85
Hoeing, 1 horse, 10 hours at 27 cents	2 70
Third spraying, insecticide and Bordeaux mixture	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	0 85
Digging, 2 horses, 10 hours at 34 cents	3 40
Hand work, 80 hours at 17 cents	13 60
Picking and storing, 40 hours at 17 cents	6 80
Cartage, 2 horses, 5 hours at 34 cents	1 70
Hand work, 10 hours at 17 cents	1 70
Total cost	$89 25
Total yield per acre ..bushels.	301
Cost per bushel, to grow ..cents.	29·98

Experimental Station, Lennoxville, Que., 1915.

Rent of land at $3 per acre per year	$ 3 00
Cost of labour: (*a*) Two horses at 8 cents per hour per horse	11 68
(*b*) For manual labour at 17½ cents per hour	32 20
Cost of manure at $1 per ton	10 00
Cost of seed	16 41
Cost of spraying materials	4 72
Total cost	$ 78 01

Receipts.

Total value of salable potatoes, one acre at 60 cents per bushel	$152 88
Value of unsalable potatoes at 15 cents per bushel	2 17
	$155 05

Statement of Profit and Loss.

Total value of crop as above	$155 05
Total cost of production	78 01
Total net profit	$ 77 04
Net cost of producing one bushel of 60 pounds	0 29

Experimental Farm, Brandon, Man, 1915.

——	Bushels Marketable.	Bushels Non-Marketable.	Total Bushels.	Value of Seed at $1.00 per bushel.	Cost of Cutting and Planting.	Cost of Harrowing and Cultivating.	Cost of Spraying.	Cost of Harvesting.	Total Cost.	Value of Marketable tubers at 50c. per bush.	Value of Non-marketable tubers at $3.00 per ton.	Total value.	Net Profit per acre.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
½ Acre, Table Talk.	40·15	5·816	45·966	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
½ Acre, Early Bovee	49·78	7·016	56·796	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total for ½ acre....	89·93	12·832	102·762	10 30	6 80	1 06	3 30	19 45	40 91	.....	.....	.....	.....
Total for 1 acre....	179·86	25·66	205·52	20 60	13 60	2 12	6 60	38 90	81 82	89 93	2 31	92 24	10 42

Cost per bushel to grow, 45.49 cents.
Value of manual labour, 19½ cents per hour.
Value of horse labour, 7 cents per hour.
Value of poison spray (Paris green), 40 cents per pound.

Experimental Farm, Indian Head, Sask., 1915.

An exact record was kept of the labour on an acre plot up to the time the potatoes were stored away in the root cellar. The total, including seed and rent of land, amounted to $84.15. The yield of marketable potatoes was 401 bushels, which brought the cost practically *21 cents per bushel.* A walking plough was used for opening up the drills, and also for ploughing out the crop. By the use of modern potato machinery, which would be employed in planting large areas, the cost could be considerably reduced.

Experimental Station, Scott, Sask., 1915.

A 1-acre field was planted with potatoes, half with the Gold Coin and half with the Everitt.

Rent of land, one year	$ 3 00	
Barnyard manure, 12 tons at $1 per ton (¼ exhausted in one year)	4 00	
Ploughing in early spring, 10 hours at 33 cents per hour	3 30	
Packing, ⅔ hour at 33 cents per hour	0 22	
Harrowing twice, 1 hour at 33 cents	0 33	
Making and covering drills, 9 hours at 33 cents per hour	2 97	
Seed, 25 bushels at 50 cents per bushel	12 50	
Cutting and planting sets, 4 men, 9 hours at 19 cents per hour	6 84	
Harrowing and packing after planting, 1 hour at 33 cents	0 33	
Harrowing twice later, ⅔ hour at 33 cents per hour	0 26	
Cultivating three times and hilling, 9 hours at 26 cents per hour	2 34	
Ploughing out, 1 man and horse, 6 hours at 26 cents per hour	1 56	
Picking up, manual labour, 56 hours at 19 cents per hour	10 64	
Storing, 2 men and team, 5 hours at 53 cents per hour	2 65	
Total cost	$50 94	
Cost of growing, one bushel		24·03
Yield per acre, Gold Coin ..bushels	227	
" " Everitt "	197	
Average "	212	

Experimental Station, Lacombe, Alta., 1915.

May	12—double harrowing, 1 man and 4 horses	1 hour.
"	13—furrowing, 1 man and team	2½ "
"	13—covering, 1 man and team	2½ "
"	13—planting, 2 men	10 "
"	13—cutting potatoes, 1 man	8 "
"	20—packing, 1 man and 2 horses	1 "
June	4—harrowing, 1 man and team	1 "
"	22—harrowing, 1 man and team	1¼ "
Oct.	5—digging, 1 man and 4 horses	2¼ "
"	5—digging, 8 men	7½ "
"	5—hauling, 2 men and team	4 "

Cost Items.

1 man and 4 horses, 3¼ hours	$ 1 56
1 man and 2 horses, 12¼ hours	4 17
1 man and 1 horse, 2¾ hours	0 74
Manual labour, 98 hours	19 60
Formalin used on seed	1 25
Seed used, 22 bushels at 50 cents	11 00
Rent of land	2 00
Total cost	$ 40 32
Cost to produce and put in cellar, per bushel	14·66
Returns, 1,650 pounds at 40 cents per bushel	110 07
Profit on 1 acre	69 75

POTATO GROWING CONTEST FOR BOYS IN CARLETON AND RUSSELL COUNTIES, ONTARIO, 1912-1916.

The potato is not only a very useful crop but a very interesting one as well, and its cultivation appeals to boys, hence it is one of the best crops to use in a field competition, as the interest of a large proportion of the competitors is likely to be maintained. This has been well demonstrated in a most successful competition which has been financed by Mr. R. B. Whyte, Ottawa, in the counties of Carleton and Russell since 1912, the writer being a member of the committee formed to help in the work. In order that this example may, perhaps, lead to competitions of a somewhat similar nature being inaugurated in other parts of Canada, some details in regard to it are herewith given. These have been furnished by Mr. L. H. Newman, Ottawa, secretary of the committee in charge of the competition, and from whom further information can be obtained.

Objects.—1. To stimulate an interest among the boys in farm work by showing them that there is more in the soil than is ever gotten out of it, and that by proper methods the profits from crop raising may often be immensely increased.

2. To give the boys something definite to do, and to encourage a friendly rivalry among them.

3. To pave the way toward the formation in each county of some definite organization such as a potato-growing association or club.

4. To provide a simple means of instructing and directing boys in the first principles of successful farming; namely, proper soil cultivation, seed selection, methods of planting and cultivation, rotation of crops, use of implements, and the great importance of keeping careful farm accounts.

Prizes.—In order to arouse special interest and to keep up the enthusiasm, substantial prizes were offered in each county by Mr. R. B. Whyte, of Ottawa, who took the initiative in inaugurating the competition.

These prizes were as follows:—

First prize—$15 and silver medal.
Second prize—$12 and silver medal.
Third prize—$10 and silver medal.
Fourth prize—$8.
Fifth prize—$6.
Sixth prize—$4.

Plot Inspection.—Plans were also laid to have each boy receive instructions on his own plot through Mr. W. D. Jackson, of Carp, representative of agriculture for Carleton county, a member of the competition committee, who undertook to visit each competitor and to submit a report on the field work of each. These reports were used in awarding the prizes.

Instruction of Competitors.—In order to assist competitors in their work, an eight-page booklet entitled, "Directions for the Culture of Potatoes," was prepared and sent to them.

Rules Governing Competition.—1. Competitors must not be under twelve or over eighteen years of age on May 15, the day that entries to the competition close.

2. Each competitor must operate a potato plot of exactly one-tenth of an acre.

3. The variety grown must be of good cooking quality. Such varieties as Carman No. 1, Vermont Gold Coin, or Green Mountain are recommended. Where the competitor desires to operate with any variety other than those specified above, he must submit the name of such variety to the committee for approval.

4. Each competitor must do all the work himself, except in the case of the younger boys, who may be assisted with such work as ploughing, etc.

5. An accurate account must be kept showing the expenses and profits of the enterprise. This will include rent of land, cost of labour, seed, manure, spraying, etc.

6. Scale of charges to be used by each competitor: Rent of land, $3 per acre; each horse, 10 cents an hour; each man, 20 cents an hour; stable manure, $1 per ton; seed at market price per bushel; spraying material at current prices.

7. A record of such matters as date of planting, variety planted, etc., must be kept by each competitor, who will be supplied with blank forms for this purpose. Where such record is supplemented by a short history or story of the work, due credit will be allowed in making the awards.

8. The plot of each competitor will be inspected during the growing season by a member of the committee, who will judge it according to a certain scale of points. The score awarded for field culture will be considered in making the final awards as below indicated.

9. The digging and weighing of the crop must be supervised by a school teacher, justice of the peace, clergyman or other qualified individual, who will certify as to the correctness of the report of yield.

10. One bushel of tubers, properly labelled and representing the average quality, smoothness and size of tubers produced shall be sent to the county fair at Richmond in September. The score awarded by the judge on this exhibit will be considered in awarding the prizes.

11. The prizes will be awarded on the following basis:—

(*a*) Report of inspector on thoroughness of field culture, etc.	100	points.
(*b*) Certified report of yield as submitted by competitor	100	"
(*c*) Award of judge on one bushel exhibit sent to county fair	100	"
(*d*) Written report of competitor as called for in Sections 5 and 7	100	"
Total	400	"

Score used in judging tubers at county fair:—

1. Purity of variety	10	points.
2. Uniformity	10	"
3. Size	10	"
4. Smoothness	10	"
5. Shape	5	"
6. Nature of skin	5	"
7. Colour	10	"
8. Freedom from disease	15	"
9. Quality	25	"
Total	100	"

SOME RESULTS OF THE CONTEST.

The interest in the contest has been well maintained during the past five years and the results have been most encouraging. The number of competitors who completed the work in 1916 was smaller than usual owing to the weather being too wet for planting and later extremely dry. The contest has taught the boys that by proper care, even in unfavourable seasons, a good crop can be obtained.

The yields from the plots worked by the boys have been much above the average of the counties during the years of the contest. The following figures speak for themselves:—

Year.	Number of competitors who completed work.	Highest yield per acre in:	Average yield per acre in:	Highest cost per bushel in:	Lowest cost per bushel in:	Average cost per bushel in:
		Bush.	Bush.	Cents.	Cents.	Cents.
1912	22	540	307	55	9·8	25
1913	31	450	240	81	14	35
1914	27	650	320	49	12	22
1915	27	639	310	48	7	20
1916	14	420	247	67	15	32

AVERAGE YIELDS PER ACRE OF MOST PRODUCTIVE POTATOES AT EXPERIMENTAL FARMS AND STATIONS IN CANADA WITH VARIETIES RECOMMENDED.

EXPERIMENTAL FARM, OTTAWA, ONTARIO.

TWELVE MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.			Yield per acre marketable.			Yield per acre unmarketable.		
	Bush.	Lb.	Oz.	Bush.	Lb.	Oz.	Bush.	Lb.	Oz.
Dalmeny Hero	379	19	0	288	51	6	90	27	6
Table Talk	357	30	0	295	01	0	62	29	0
Dalmeny Regent	347	36	0	272	35	0	75	1	0
Brydon	326	42	0	256	57	9	69	44	6
Dobbie Prolific	321	45	0	271	2	6	50	42	0
Scottish Triumph	300	2	0	228	56	6	71	6	0
Davies Warrior	293	29	0	242	26	6	51	2	6
Brydon Beauty	283	54	0	224	24	0	59	30	0
Wee MacGregor	281	13	0	186	47	0	94	36	0
Scott	278	53	0	206	43	0	72	9	9
Empire State	277	23	0	222	25	0	54	57	0
Up-to-date	273	49	0	216	48	0	57	1	0
Average of four years.									
Moreton	349	38	0	295	16	0	54	21	0

Varieties recommended.—Early: Irish Cobbler (Eureka Extra Early) and Early Ohio for market gardeners where extreme earliness is desired. Main crop: Green Mountain, (including Gold Coin, Carman No. 1, and Wee MacGregor, which are very

similar to it), and Empire State. Dalmeny Hero, Table Talk, Dalmeny Regent and Brydon are all promising British varieties, the seed of which cannot be generally obtained but which retain their vigor better at Ottawa than some of the varieties recommended and hence yield better over a five year period without change of seed. Irish Cobbler and Green Mountain, for instance, while not appearing in this table yield very well when new seed is obtained frequently.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Table Talk	487	35	401	09	86	26
Selina Burbank	403	13	336	54	66	19
McIntyre	395	35	331	16	64	19
Dreer Standard	375	35	331	47	43	48
Empire State	368	34	302	45	65	49
Lion Paw	356	11	314	12	41	59

Varieties recommended.—Early: Early Rose, Irish Cobbler. Main crop: Green Mountain, Table Talk, McIntyre. For Bermuda trade: Garnet Chili, and Bliss Triumph.

EXPERIMENTAL FARM, NAPPAN, N.S.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	Lb.		Bush.	Lb.
Everitt	382	50	Irish Cobbler	345	40
Wee MacGregor	380	20	Rawlings Kidney	345	37
Vick Extra Early	347	47	Rochester Rose	345	28

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early. Main crop: Green Mountain, Wee MacGregor, Rawlings Kidney, Carman No. 1.

EXPERIMENTAL STATION, KENTVILLE, N.S.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Manistee	197	30	174	15	23	15
New Queen	188	45	162	..	26	45
Empire State	187	15	163	15	24	..
Sir Walter Raleigh	180	15	159	45	20	30
Wee MacGregor	179	04	155	04	24	..
Rawlings Kidney	178	15	152	22	22	53

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain, Delaware.

EXPERIMENTAL STATION, FREDERICTON, N.B.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.	
	Bush.	Lb.
Morgan Pink Seedling	430	15
Dreer Standard	429	30
New Scotch Rose	428	30
Houlton Rose	410	15
Irish Cobbler	406	..
Table Talk	405	45

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	Lb.		Bush.	Lb.
Rawlings Kidney	335	52	Morgan Pink Seedling	300	40
Morgan Seedling	321	56	Davies Warrior	299	12
Vick Extra Early	311	40	Dreer Standard	288	56

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early. Main crop: Green Mountain.

Experimental Station, Cap Rouge, Que.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Table Talk	285	49	248	25	37	24
Irish Cobbler	230	33	212	31	18	02
Gold Coin	215	53	198	43	17	10
Vick Extra Early	211	35	202	47	8	48
Rochester Rose	203	59	184	37	19	22
Morgan Seedling	192	30	175	20	17	10

Varieties recommended.—Early: Irish Cobbler. Main crop: Table Talk, Carman No. 3, Gold Coin, Davies Warrior.

Experimental Station, Lennoxville, Que.

YIELD OF VARIETIES, 1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	Lb.		Bush.	Lb.
Green Mountain	276	22	Early Ohio	205	28
Pride of the North	260	66	Irish Cobbler	145	32

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain.

Experimental Station, Morden, Man.

SIX MOST PRODUCTIVE VARIETIES, YEAR 1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Everitt	294	48	250	48	44	..
Irish Cobbler	279	24	253	..	26	24
Vick Extra Early	277	12	257	24	19	48
Early Hebron	272	48	250	48	22	..
Wee MacGregor	268	24	259	36	8	48
Morgan Seedling	259	36	242	..	17	36

Varieties recommended.—Early: See Brandon List. Early Ohio is popular in the district. Too soon yet to recommend any from experience at the Station. Main Crop: See Brandon List.

EXPERIMENTAL FARM, BRANDON, MAN.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Table Talk	407 03	Valley Success (Early Rose group)	383 19
Woodbury White Rose	405 03	Reeves Rose	373 46
Wee MacGregor	393 35	Rawlings Kidney	373 43

Varieties recommended.—Early: Bovee, Hamilton Early, Early White Prize. Main crop: Empire State, Wee MacGregor, Rawlings Kidney. In a four years' average, the Empire State has yielded at the rate of 415 bushels 15 pounds per acre.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Gold Coin	413 04	Dreer Standard	372 25
Houlton Rose	395 03	Irish Cobbler	364 34
Wee MacGregor	391 06	Table Talk	353 28

Varieties recommended.—Early: Early Ohio, Vick Extra Early, Irish Cobbler. Main crop: Wee MacGregor, Gold Coin, Carman No. 1.

EXPERIMENTAL STATION, ROSTHERN, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1911-1915.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Dreer Standard	512 24	Rawlings Kidney	479 36
Everitt	498 12	Rochester Rose	472 48
Money Maker	485 36	Late Puritan	438 24

Varieties recommended.—Wee MacGregor, Irish Cobbler, Everitt, Early Ohio, Rawlings Kidney, Dreer Standard.

EXPERIMENTAL STATION, SCOTT, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Morgan Seedling	337 52	Table Talk	304 02
Rawlings Kidney	317 51	Gold Coin	292 03
Wee MacGregor	317 16	Carman No. 1	284 46

Varieties recommended.—Early: Everitt. Main crop: Wee MacGregor.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

(Irrigated.)

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Reeves Rose	511	40	471	00	40	40
Table Talk	506	00	463	28	42	32
Vick Extra Early	505	42	475	40	30	02
Irish Cobbler	500	20	463	00	37	20
Dalmeny Beauty	468	50	429	00	39	50
Gold Coin	466	40	441	10	25	30

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early, Rochester Rose, Reeves Rose. Main crop: Gold Coin, Wee MacGregor, Table Talk, Empire State. Irish Cobbler makes both a good early and a good main crop potato in places where the soil is rich and the season short, as it yields well and ripens well, ensuring good quality.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

(Non-irrigated.)

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Gold Coin	361	02	333	32	27	30
Dalmeny Beauty	352	11	294	42	51	29
Empire State	344	32	308	32	36	00
Morgan Seedling	343	18	301	09	42	09
Irish Cobbler	341	39	305	16	36	23
Factor	334	29	299	01	35	28

Experimental Station, Lacombe, Alta.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Empire State	439	33	407	09	32	24
Table Talk	424	10	347	07	77	03
Early Norther	414	29	372	47	41	42
Epicure	408	39	349	28	59	11
Morgan Seedling	408	19	382	02	26	17
Wee MacGregor	402	49	373	16	29	33

Varieties recommended.—Early: Irish Cobbler, Houlton Rose, Early Norther. Main crop: Table Talk, Empire State, Wee MacGregor, Epicure.

Experimental Station, Invermere, B.C.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF THREE YEARS, 1914-16.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Late Puritan	427	32	302	08	125	24
Houlton Rose	422	24	303	36	118	48
Irish Cobbler	389	24	284	32	104	52
Wee MacGregor	387	56	287	28	100	28
Eureka Extra Early	371	48	200	56	170	52
Snow	346	52	275	44	71	08

Varieties recommended.—Early: Irish Cobbler, Eureka Extra Early. Main crop: Wee MacGregor, Late Puritan, Clyde, American Wonder, Table Talk. Conquering Hero is of especially good quality.

Experimental Station, Summerland, B.C.

SIX MOST PRODUCTIVE VARIETIES, YEAR 1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	lb.		Bush.	lb.
New Queen	638	..	Morgan Seedling	488	24
Vick Extra Early	550	..	Rochester Rose	488	24
Mortgage Lifter	532	24	Table Talk	488	24

Not sufficient experience yet to recommend any varieties especially.

EXPERIMENTAL FARM, AGASSIZ, B.C.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre, unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Gold Coin	385	09	319	16	65	44
Empire State	368	12	296	30	71	42
Money Maker	342	20	259	08	83	12
Rawlings Kidney	336	10	256	07	80	03
Dalmeny Beauty	333	30	271	17	62	13
Irish Cobbler	324	16	251	07	73	09

Varieties recommended.—Early: Irish Cobbler, Early Rose, Rochester Rose, Early Hero. Main crop: Gold Coin, Dreer Standard, Empire State, American Wonder, Carman No. 1. The variety called Sutton Reliance is much grown on the lower mainland of British Columbia.

EXPERIMENTAL STATION, SIDNEY, VANCOUVER ISLAND, B.C.

SIX MOST PRODUCTIVE VARIETIES.

Variety.	Variety.
Factor.	Dobbie Prolific.
Table Talk.	Irish Cobbler.
Late Puritan.	Conquering Hero.

Varieties recommended.—Early: Irish Cobbler, Eureka Extra Early. Main crop: Factor, Table Talk, Million Dollar, and Netted Gem. Varieties most popular on Vancouver Island: Sir Walter Raleigh, Million Dollar, Up-to-Date, Netted Gem, and Eureka Extra Early.

GROUP CLASSIFICATION OF POTATOES.

The same variety of potato is often sold under several different names and, on the other hand, some varieties, though of different origin, are so much alike that one cannot with certainty distinguish them. It has seemed best, therefore, to divide potatoes into groups of varieties and possible synonyms having certain characters in common. By this method, if varieties are sold under different names, anyone may test those of the same group side by side and learn for himself what the differences, if any, are between them. Often the difference in the vigour of the seed is of greater importance than the difference, if any, between the so-called varieties.

The best group classification for varieties of American origin is that given by Prof. Wm. Stuart, potato specialist of the Bureau of Plant Industry, Department of Agriculture, Washington, D.C., in bulletin No. 176, Bureau of Plant Industry, entitled "Group Classification and Varietal Descriptions of some American Potatoes", and as

the writer believes that it is desirable to have the same classification adopted for all America, if possible, Prof. Stuart's "Classification Key" with names of varieties or synonyms of each group which have come under the writer's notice in Canada are herewith given.

CLASSIFICATION KEY.

"*Group 1.—Cobbler.*

Tubers: Roundish; skin creamy white.

Sprouts: Base, leaf scales, and tips slightly or distinctly tinged with reddish violet or magenta. In many cases the colour is absent.

Flowers: Light rose-purple; under intense heat may be almost white."

Varieties: Early Petoskey, Extra-Early Eureka, Irish Cobbler.

"*Group 2.—Triumph.*

Tubers: Roundish, skin creamy white, with more or less numerous splashes of red, or carmine, or solid red; maturing very early.

Sprouts: Base leaf scales, and tips more or less deeply suffused with reddish violet.

Flowers: Very light rose-purple."

Varieties: Bermuda Early, Noroton Beauty, Quick Lunch (Uncle Gideon's), (Bliss) Triumph, Stray Beauty.

"*Group 3.—Early Michigan.*

Tubers: Oblong or elongate-flattened; skin white or creamy white, occasionally suffused with pink around bud-eye cluster in Early Albino.

Sprouts: Base light rose-purple; tips creamy white or light rose-purple.

Flowers: White."

Varieties: Earley Albino, Early Michigan, Early Puritan, Early White Prize, Woodbury White Rose.

"*Group 4.—Rose.*

Tubers: Roundish oblong to elongate-flattened, or spindle-shape flattened; skin flesh-coloured or pink, or (in the case of the White Rose) white.

Sprouts: Base and internodes creamy white to deep rose-lilac; leaf scales and tips cream to rose-lilac.

Flowers: White in sections 1 and 2; rose-lilac in section 3."

Varieties: Section 1, Clark No. 1, Early Fortune, Early Norther, Early Rose, Early Sunrise, Early Thoroughbred, Everitt, Extra-Early Vermont, Houlton Rose, Late Rose, Northern Beauty, Rochester Rose. Section 2, Manistee; Section 3, Crine Lightning, Lee Favorite, New Ideal, New Scotch Rose, Seneca Beauty.

"*Group 5.—Early Ohio.*

Tubers: Round, oblong, or ovoid; skin flesh-coloured or light pink, with numerous small, raised russet dots.

Sprouts: Base, leaf scales, and tips more or less deeply suffused with carmine-lilac to violet-lilac or magenta.

Flowers: White."

Varieties: Early Ohio, Early Market, Early Six Weeks, White Ohio, Ohio Junior.

"*Group 6.—Hebron.*

Tubers: Elongated, somewhat flattened, sometimes spindle-shaped; skin creamy white, more or less clouded with flesh colour or light pink.

Sprouts: Base creamy white to light lilac; leaf scales and tips pure mauve to magenta, but colour sometimes absent.

Flowers: White."

Varieties: Country Gentleman, Crown Jewel, Early Beauty of Hebron, Early Bovee, Gem of Aroostook, Harbinger, Late Beauty of Hebron, New Queen, Quick Crop, White Elephant, Morgan Seedling.

"*Group 7.—Burbank.*

Tubers: Long, cylindrical to somewhat flattened, inclined to be slightly spindle-shaped; skin white to light creamy white, smooth and glistening, or deep russet in the case of section 2.

Sprouts: Base creamy white or faintly tinged with magenta; leaf scales and tips usually lightly tinged with magenta.

Flowers: White."

Varieties: Section 1. Burbank, or Burbank Seedling, Money-Maker, White Beauty, White Chief; Section 2. California Russet, Cambridge Russet, New Wonderful, Hammond Wonderful.

"*Group 8.—Green Mountain.*

Tubers: Moderately to distinctly oblong, usually broad, flattened; skin a dull creamy or light russet colour, frequently having russet-brown splashes toward the seed end.

Sprouts: Section 1, base, leaf scales, and tips creamy white; Section 2, base usually white, occasionally tinged with magenta, leaf scales and tips tinged with lilac to magenta.

Flowers: White."

Varieties: Carman No. 1, Clyde, Delaware, *Dooley, †Empire State, Freeman, Gold Coin, Green Mountain, Green Mountain, Jr., Norcross, Snow, State of Maine, Uncle Sam; Section 2, Charles Downing.

"*Group 9.—Rural.*

Tubers: Broadly round-flattened to short oblong, or distinctly oblong-flattened; skin creamy white, or deep russet in the case of section 2.

Sprouts: Base dull white; leaf scales and tips violet-purple to pansy violet.

Flowers: Central portion of corolla deep violet; with the purple growing lighter toward the outer portion; five points of corolla white, or nearly so."

Varieties: Carman No. 3, *Dooley (as grown in Western Ontario), Great Divide, Million Dollar, Noxall, Rural New Yorker No. 2, Sir Walter Raleigh, White Giant; Section 2, Dibble Russet.

"*Group 10.—Pearl.*

Tubers: Round-flattened to heart-shape flattened, usually heavily shouldered; skin dull white, dull russet, or brownish white in section 1, or a deep bluish purple in section 2.

Sprouts: Section 1, base, leaf scales, and tips usually faintly tinged with lilac; Section 2, base, leaf scales, and tips vinous mauve.

Flowers: White."

Variety: Pearl; Section 2, Blue Victor.

"*Group 11.—Peachblow.*

Tubers: Round to round-flattened or round-oblong; skin creamy white, splashed with crimson or solid pink; eyes usually bright carmine. Includes some early-maturing varieties.

Sprouts: Base, leaf scales, and tips more or less suffused with reddish violet.

Flowers: Purple."

Varieties: Improved Peachblow, Peachblow, Nott Peachblow.

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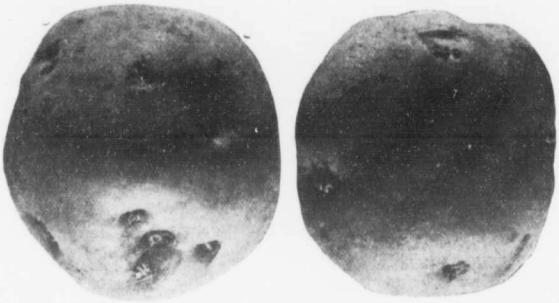
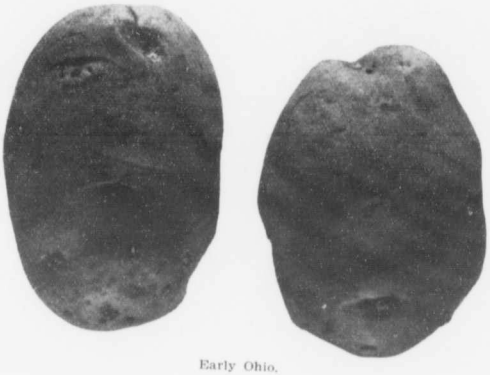
* The Dooley grown in Western Ontario belongs to the Rural Group.

† It is doubtful if Empire State should remain in this group as it is very distinct from Green Mountain. The American Wonder is much like Empire State.

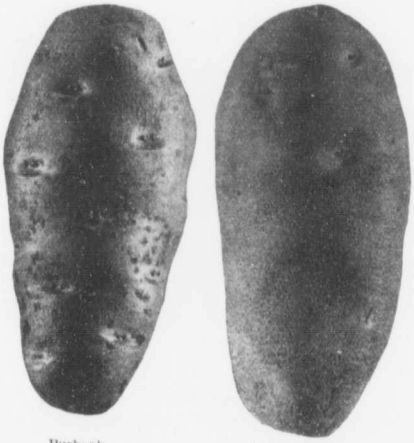


Irish Cobbler.

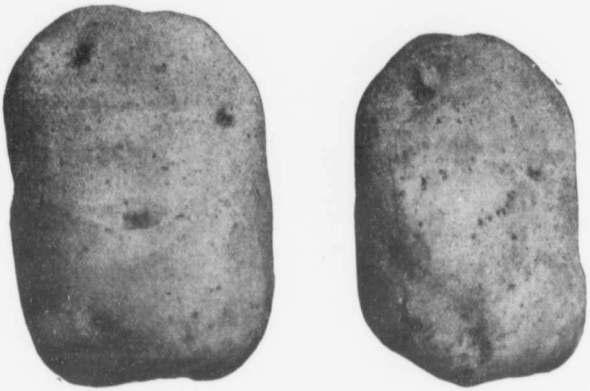
Early Rose.



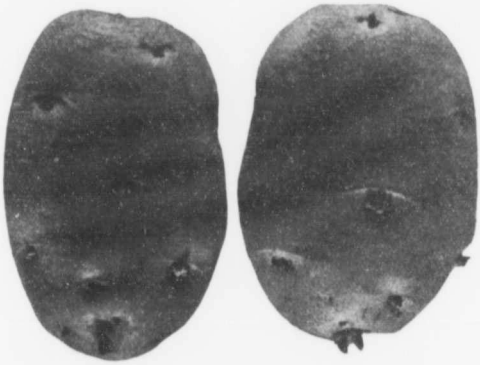
Early Ohio.



Burbank. Netted Gem.



Green Mountain.

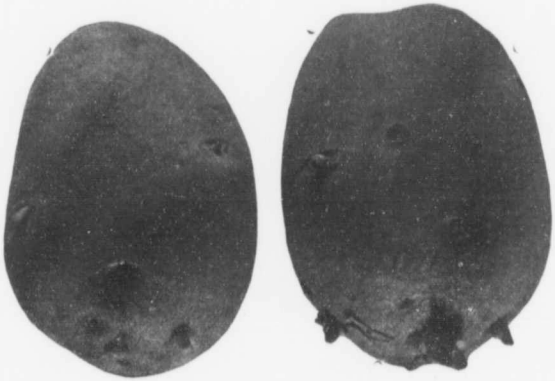


Gold Coin.

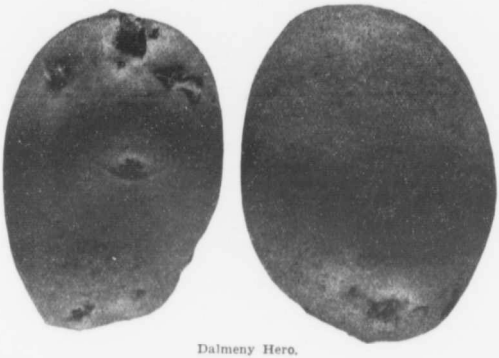
Empire State.

1. Carman No. 3.
2. Sir Walter Raleigh.
3. Todd Wonder.

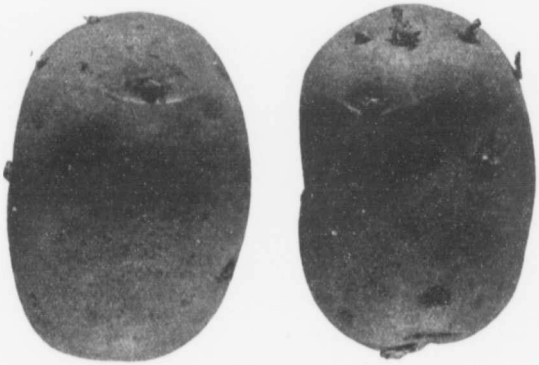
Table Talk.



Dalmeny Regent.



Dalmeny Hero.



Dobbie Prolific.

DESCRIPTIONS OF VARIETIES.

Popular descriptions have been made of the varieties which have yielded best at the Experimental Farms and Stations in Canada and additional varieties that are interesting for other reasons. Included in the descriptions will be found the names of other well-known varieties closely resembling, if not identical with, those which are described. The information in regard to the origins of these varieties has been taken almost entirely from bulletin No. 176 of the Bureau of Plant Industry, Washington, D.C., by Wm. Stuart, who has especial facilities for tracing them out.

Bliss Triumph.—One of the earliest varieties. It is rather a poor yielder in many places in Canada but in the best potato districts it is sometimes grown for seed for the growers in Bermuda, as this is a popular variety there for shipping to American markets during the winter months. The Bermuda Early and Stray Beauty are apparently other names for this variety which originated in Connecticut and was introduced by B. K. Bliss & Sons in 1878. It was claimed to be a seedling of Peerless crossed with a seedling of Early Rose. The vine of this variety is quite erect and the foliage of a deeper green than most potatoes. The tubers are rarely above medium size, roundish in shape and red in colour; the eyes are medium in depth.

Bovee.—This early variety, which has done well in many places, is very similar to the Early Beauty of Hebron, the latter being seldom found now, most of the Beauty of Hebron grown apparently being the late type, such as White Elephant. Other early varieties much like Bovee are New Queen, and Vick Extra Early. Bovee, or Early Bovee, originated as a seedling with Martin Bovee, Northville, Michigan, some years after the Early Beauty of Hebron was introduced, the latter being originated by E. L. Coy, Hebron, N.Y., and claimed to be a seedling of Garnet Chili. The Early Beauty of Hebron was introduced in 1878 by J. M. Thorburn & Co., New York. Season early; plant a strong grower, and productive. Tubers oblong to oval; colour pink and yellowish; eyes moderately numerous, medium in depth.

Burbank (seedling).—The Burbank potato is most popular in Nova Scotia and in British Columbia, where it has succeeded very well. The Money Maker is very similar and also Selina Burbank. Originated by Luther Burbank in 1873 and is claimed to be a seedling of Early Rose. Introduced by J. J. H. Gregory in 1876. Season medium late; plant a strong grower; tubers long, cylindrical; skin dull white; eyes shallow to medium.

Carman No. 3.—Originated by E. S. Carman in 1888. Claimed to be a seedling of a seedling. Introduced in 1895 by J. M. Thorburn & Co. This variety has yielded well in some parts of Canada. Season late; plant a strong grower; tubers oval to roundish, somewhat flattened; skin creamy white; eyes comparatively few and shallow. Good in quality.

Dooley.—"Originated from one hill of potatoes selected in the field in Waupaca county, Wisconsin, 1896; introduced by Gunson, Brown & Co., in 1900." (Zavitz.) A strong grower; tubers oval, flattened; skin creamy white; eyes medium to shallow. Quality good. Has yielded well in places.

Early Ohio.—Originated by Alfred Reese in 1871, and claimed to be a seedling of Early Rose. Introduced by J. J. H. Gregory in 1875. The Early Ohio continues to be grown fairly extensively in Canada and particularly in the provinces of Ontario and Manitoba, where it is highly regarded for early digging for city markets, a large proportion of the early tubers being of good size and the quality of the potatoes exceptionally good. It is not, however, as productive as the Irish Cobbler. Season very early; a strong to medium grower; tubers round-oblong, not tapering at the

ends like many varieties, but being almost uniformly thick from one end to the other; skin light pink, deeper in colour at seed end; eyes moderately numerous, shallow or protruding. Quality good.

Early Rose.—The Early Rose, Rochester Rose, Everitt, Early Norther, Early Hero, Houlton Rose, Reeves Rose, Clark No. 1, Early Fortune, Early Thoroughbred, Early Sunrise, Extra Early Vermont and others are all so much alike that they may be treated as one variety. It seems very probable that most of these are merely selections from the Early Rose which have lost their distinguishing characteristics.

The Early Rose was originated by Albert Bresee, Hubbardton, Vermont, in 1861, and was claimed to be a seedling of the Garnet Chili. Introduced in a limited way in 1867 by D. S. Heffron, Utica, N.Y., and to the general public by B. K. Bliss & Sons in 1868, since which time it has been very popular and while in recent years it has been displaced to a considerable extent by a few other early and more productive varieties, it is still planted to a large extent under this or some other name. It is a vigorous grower and under favourable conditions produces a good crop. The tubers are oblong to long, pink in colour, with eyes of medium depth. The eyes, which are fairly numerous, usually sprout strongly from one end of the tuber to the other, thus ensuring a good stand of plants. The quality is, as a rule, good, the tubers cooking dry and mealy.

Early White Prize.—An early white skinned variety, oblong to long in shape and with eyes of medium depth. Quality good.

Empire State.—The Empire State has long been a popular variety in Canada, especially in the province of Ontario, and yields well on the average. The American Wonder is very similar to it. While included in the Green Mountain group it is quite distinct from most of the other varieties of the group. It was originated by E. L. Coy, Hebron, N.Y., in 1881 and claimed to be an inbred seedling of White Elephant. Introduced by W. A. Burpee in 1885. Season medium to late; plant a strong grower and productive; tubers oblong to long, white, with numerous medium to deep eyes, most of which usually throw strong sprouts.

Garnet Chili.—The Garnet Chili is mainly grown, in Canada, in the Maritime Provinces where it is raised especially for seed for the Bermuda growers. It was originated by C. E. Goodrich, Utica, N. Y., in 1853 and claimed to be a seedling of Rough Purple Chili. Introduced by Goodrich in 1857. Season late; plant a strong upright grower; tubers roundish to oblong, flattened at ends; skin red; eyes medium in depth.

Green Mountain.—This is a variety in the most important group of potatoes cultivated in Canada, the varieties being, it is believed, more extensively grown than any others. They are all medium to late in season and the bulk of the potatoes stored for winter use are of this group. There are many varieties very similar in appearance including Carman No. 1, Clyde, Gold Coin (Vermont), Delaware, Dreer Standard (not Dreer Early Standard), Green Mountain, Green Mountain Jr., Norcross, Snow, State of Maine, Uncle Sam and Wee MacGregor. American Wonder and Empire State which are included in this group are quite distinct from the others being longer in shape. The Green Mountain variety is grown more in the Maritime Provinces than any other. In Ontario and Quebec, Carman No. 1 and Gold Coin, which cannot be distinguished from the Green Mountain, are, perhaps, the most common, though the quantity of Green Mountain grown in recent years has increased rapidly as much seed has been sent from New Brunswick. On the prairies the Gold Coin and Wee MacGregor are best known, the latter originating with T. Rowan, MacGregor, Man.

Green Mountain was originated by O. H. Alexander, Charlotte, Vermont, in 1878 and is claimed to be a seedling from a cross between Dunmore and Excelsior and was introduced by Everitt & Co., in 1885. It is a strong grower and a good cropper, but

does not retain its vigour so well as some varieties under trying conditions. The tubers are oblong in shape, inclined to be blocky or flattened at the ends, and white or creamy in colour with more or less russet. The eyes are moderately numerous and medium in depth.

Irish Cobbler.—Origin unknown, but supposed to have been first grown by an Irish shoemaker in Marblehead, Mass. Sold by Vaughan Seed Company in 1895. This is the most popular early potato grown in Canada. It is both early and productive and maintains its vitality better than many other varieties. The Eureka Extra Early cannot be distinguished from this, although claimed to have been originated by Geo. R. Pedrick of New Jersey in 1895 and claimed to be a sport of Early Morn. While not of the best shape, and eyes being rather deep, it has, by its regularity in producing good crops, displaced to a large extent more attractive looking varieties. It is easy to distinguish this from the white flowered varieties of the Green Mountain group in the field, if it should get mixed with them, as it has purple flowers. Season early; plant a strong grower; foliage deep green in colour; tubers roundish, flattened somewhat at ends; skin creamy white; eyes moderately numerous and medium to deep. Quality good.

Late Puritan.—This is very similar to Early Puritan and is medium in season rather than late; oblong in shape and with numerous eyes of medium depth. Quality good.

Lion Paw.—An oval, white potato which has succeeded well at the Experimental Station, Charlottetown, P.E.I.

McIntyre.—The McIntyre potato is grown mainly on Prince Edward Island where it is very popular on account of its yield and good shipping qualities. Season late; plant a strong grower; tubers long to oval, irregular; colour of skin yellowish mottled with pinkish purple to purple; eyes numerous, medium to deep; quality good when well matured.

Manistee.—This variety is somewhat similar to Maggie Murphy. Introduced by E. F. Dibble in 1904.

Million Dollar.—A white skinned potato of unknown origin introduced by the Salzer Seed Company.

Moreton.—An oval, flattened, white skinned potato with shallow eyes which has yielded exceptionally well at Ottawa and was procured from the firm of Joseph Harris, Coldwater, N.Y.

Morgan Seedling.—This and a white seedling were sent to the Central Experimental Farm in 1904 by the Family Herald and Weekly Star, Montreal, which had received them from H. H. Morgan, Manchester, N.H., under the name of "Morgan Seedling." It is a variety of the Hebron group, which has yielded very well in different parts of Canada. Season medium; plant strong grower; tubers oval to long; colour of skin pink and yellowish; eyes moderately numerous, medium in depth. Quality good.

New Scotch Rose.—Claimed to have been introduced from Scotland by an American firm. Plant a strong grower; season medium early; tubers oblong to oval flattened; colour of skin pink; eyes few and medium in depth. Resembles Maggie Murphy somewhat.

Netted Gem.—This variety is now much grown in British Columbia and, on account of its handsome appearance, good quality, and productiveness, is very popular there. Other varieties very closely resembling, if not identical with it, are California Russet, Cambridge Russet, New Wonderful and Hammond Wonderful. Origin

unknown. Season late; plant a vigorous grower; tubers long to oval, elongated; skin russet-brown, finely netted; eyes shallow.

Pride of the North.—A variety of unknown origin which has done well in the Eastern townships of the province of Quebec. Season medium to late; plant a strong grower and productive; tubers oval; flattened; skin pale pink, brighter in eyes; eyes few to moderately numerous, medium in depth to shallow.

Rawlings Kidney.—Origin unknown. Tubers sent to the Central Experimental Farm by Heber Rawlings, Forest, Ont., in 1904, under the name of "Ashleaf Kidney," but not being typical Ashleaf Kidney this variety has been called Rawlings Kidney. It is much like Green Mountain and Gold Coin. It has succeeded particularly well in the prairie provinces. Season medium late; plant a strong grower; tubers oval to oblong; colour of skin yellowish; eyes moderately numerous; medium in depth. Quality good.

Rural New Yorker, No. 2.—Originated by E. S. Carman. Introduced to Rural New Yorker subscribers in 1888 and offered for sale by J. M. Thorburn & Company in 1889. A seedling of seedlings, through several generations. Season medium late; plant vigorous; tubers oblong to round-oval, somewhat flattened; skin white; eyes few, medium to shallow; quality good.

Sir Walter Raleigh.—Originated by E. S. Carman. Claimed to be a seedling of the Rural New Yorker No. 2. Introduced by Peter Henderson in 1897. A productive variety in some parts of Canada. Season late; plant a strong grower; tubers roundish-oval; skin creamy white; eyes scattered and medium to shallow in depth. Good in quality.

Woodbury White Rose.—A moderately early, white skinned variety of oblong shape and moderately deep eyes; a variety which has done well in Manitoba.

VARIETIES OF BRITISH ORIGIN.

During the past thirty years several hundred varieties of potatoes of British and European origin have been tested at the Central Experimental Farm. The great majority of these proved unproductive, many of them setting very few tubers. The climate at Ottawa was evidently unsuitable for them. A few, however, have succeeded very well at Ottawa and elsewhere. Some of them are able to retain their vitality while such American varieties as the Green Mountain, Early Rose, Early Ohio, and others have become very weak in vitality under similar conditions. Brief descriptions of these follow. Some of them are very much alike. The quality of most of these varieties is good.

Brydon.—Season medium late; plant a strong grower; flowers violet; tubers oval-elongated; colour of skin dull yellow; eyes few to medium, shallow.

Brydon Beauty.—Season medium late; plant a strong grower; flowers violet; tubers nearly ovoid; colour of skin white; eyes few, shallow.

Conquering Hero.—Season late; plant a strong grower; flowers purple; tubers oval-elongated; skin yellow; eyes few, medium in depth.

Dalmeny Beauty.—Season medium; plant a strong grower; flowers pinkish white; tubers oval; skin yellow; eyes few, shallow.

Dalmeny Hero.—Season medium; plant a strong grower; tubers oval, flattened; skin yellow; eyes few, shallow.

Dalmeny Regent.—Season medium; plant a strong grower; flowers purple; tubers oval; skin yellow, eyes few, shallow.

Davies Warrior.—Season late; plant a strong grower; flowers violet; tubers oval-elongated; flattened; skin yellow; eyes few, shallow. This variety has done exceptionally well in the province of Ontario, and has been widely distributed by the Ontario Agricultural College.

Dobbie Prolific.—Season late; plant a strong grower; flowers violet; tubers oval, flattened; eyes few to moderately numerous; shallow.

Epicure.—Season medium early; plant a strong grower; flowers white; tubers roundish; colour pale pink; eyes many, deep.

Factor.—Season late; plant a strong grower; flowers purple; tubers oval, flattened; skin yellow; eyes few, shallow.

Scot (The).—Season late; plant a strong grower; flowers violet; tubers oval, flattened; skin yellow; eyes few, shallow.

Scottish Triumph.—Season late; plant a strong grower; flowers pale violet; tubers roundish oval, flattened; skin yellow; eyes few, shallow.

Table Talk.—Season late; plant a strong grower; flowers deep violet; tubers oval-elongated; skin yellow; eyes few, shallow. This variety was first disseminated to any extent in Canada by the Experimental Station, Lacombe, Alberta, and has since been found to succeed well in all the provinces of Canada. It is of good quality and very productive.

Up-to-date.—Season late; plant a strong grower; flowers violet; tubers oval; skin yellow; eyes few, shallow to medium in depth.

VARIETIES OF POTATOES TESTED AT CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT., 1887-1917.

In the following table will be found a list of the named varieties of potatoes, with the exception of a few unnamed seedlings, which have been tested at the Central Experimental Farm since the year 1887 when the first potatoes were planted. In this list there are 836 names. Of these, a few represent varieties which were sent for test which may be identical with others, as no name of variety was given. There may also be a few very similar ones among the others. In addition to these there were 281 seedlings originated at the Central Experimental Farm, which have been discarded, making the total number of varieties tested, named and unnamed, about 1,117. In addition to the name, the year when each variety was first secured and the last year it was planted are given, also the reasons for discarding a variety where this has been done.

In the column where notes are given as to the reason why a variety was discarded, "I.P." stands for inferior productiveness, "I.Q." for inferior quality, and "D.E." for deep eyes. Some varieties although quite productive were not as heavy croppers as others and hence were not retained. It was not considered advisable, either, to continue varieties which were productive but of inferior quality and deep in the eye unless there was some other reason for continuing them.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.

Name of Variety.	Year When Tested.	Why Discarded.
Abundance	1887–1888, 1895–1899	I.P.
Acme Blanche	1908–1909	I.P.
Acquisition	1912	I.P.
Adirondack	1887–1890	I.P.
Admiral	1909	I.P.
Advancer	1912–1913	I.P.
Alabaster	1899–1901	I.P.
Alarich	1899–1901	I.P.
Alaska	1907	I.P.
Alexandria	1887–1888	I.P.
Alexander Prolific	1889–1892	I.P.
Algiers	1887–1889	I.P.
Algoma No. 1	1891–1899	I.P.
Algoma No. 2	1891	I.P.
Algoma No. 3	1891–1892	I.P.
Alkohol	1887–1888	I.P.
Alma	1887–1888	I.P.
Almond Blue	1887–1888	I.P.
Alpha	1887–1890	I.P.
Apollo	1899–1904–1906	I.P.
Ambrosia	1899–1904	I.P.
American Giant	1893–1907	I.P.
American Wonder	1888–1894, 1905-1910, 1912–1915	I.P.
Amylon	1887–1889	I.P.
Andersen	1887–1888	I.P.
Aroostook Wonder	1912–1913	I.P.
Ashleaf Kidney	1904–1910, 1912–1915	I.P.
Ashtop Fluke	1887–1888	I.P., I.Q.
Asparagus	1887–1892	I.P.
August der Starke	1887–1888	I.P.
Aurora	1887–1888	I.P., I.Q.
Australian	1887–1888	I.P.
Babbit	1905–1909	I.P.
Balmoral	1890–1891	I.P.
Barkley Seedling	1905–1910	
Barrett, P.	1909–1910	
Beauty of Hebron	1887–1902	I.P.
Beauty of Kent	1908–1909	I.P.
Beauty of Ottawa	1891	I.P.
Belle Ecossaise	1908–1910	I.P.
Belle de Fontenay	1908–1909	I.P.
Bedson	1890	I.P.
Beefsteak	1887–1889	I.P.
Bergeron, J. N., from	1895–1903	I.Q., D.E.
Bermuda Early	1911–1913	I.P.
Big Rose	1907–1909	I.P.
Bill Nye	1897–1902	I.P.
Bismark	1887–1889	I.P.
Bisquit	1887–1888	I.Q.
Bliss Triumph	1887–1891, 1899–1905	I.P., I.Q.
Blue Bell	1890–1891	I.P.
Blue Cup	1892–1899	I.P.
Blue Giant	1906–1909	I.P.
Blue Prolific	1906–1909	I.P.
Blue Seedling	1909–1910	
Blucher	1887–1888	I.P.
Bolero	1908–1909	I.P.
Bombay	1887–1889	I.P.
Bountiful	1911–1913	I.P.
Bovee	1897–1910, 1912–1915	I.P.
Bovinia	1887–1888	I.P., I.Q.
Brandale	1908–1909	I.P.
Brant	1890, 1892–1893	I.P.
Bras d'Or Seedling	1892–1895	I.P.
Breck Chance	1907–1909	I.P.
Bretonne	1908–1909	I.P.
British Queen	1912–1913	I.P.
Brosseau, A. S., from	1897–1904	D.E.
Brown Rot Proof	1895–1903	I.P.
Brownell Best	1887–1888, 1891	I.P.
Brownell Beauty	1887–1888	I.P.
Brownell Multiplier	1887–1888	I.P., I.Q.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

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ITS CULTIVATION AND VARIETIES.

BY
W. T. MACOUN.
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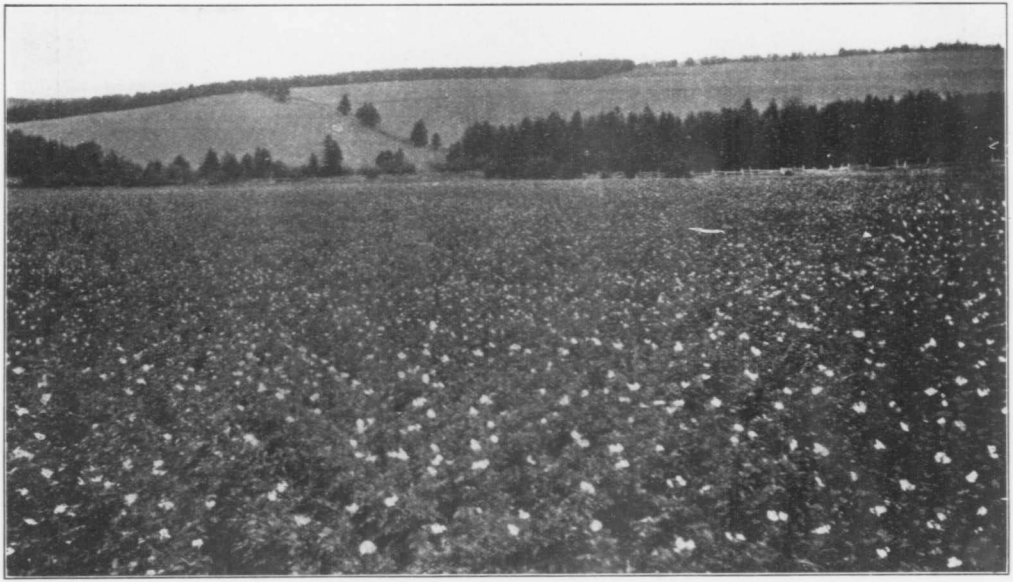

Field of Potatoes on Prince Edward Island.

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31666—1½

The Honourable,
The Minister of Agriculture,
Ottawa.

I have the honour to submit herewith the manuscript of Bulletin 90 of the Experimental Farms series, entitled "The Potato and its Cultivation in Canada," and prepared by the Dominion Horticulturist, W. T. Macoun.

This is the third edition of our regular bulletin on the above subject, and has been revised and brought up to date by the inclusion of considerable new data and additional information.

It is hoped that the information given in this publication will aid in increasing the yield and improving the quality of this most important food crop.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms.

OTTAWA, November 28, 1917.

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THE POTATO AND ITS CULTIVATION IN CANADA.

By W. T. MACOUN.

Dominion Horticulturist.

The potato (*Solanum tuberosum*) is a herbaceous perennial belonging to the *Solanaceæ* or Night Shade family, a large order containing 800 or more species, of which only a few are tuber-bearing. The cultivated potato is a native of the elevated parts of Chili, Peru and probably Mexico. It is believed that the potato was introduced into Europe first from America by the Spaniards during the latter part of the 16th century, but in 1586, a few years later, Sir Walter Raleigh or some of his colonists brought it from America to Ireland. The tubers were planted on Sir Walter Raleigh's estate at Youghal, near Cork, and the cultivation of potatoes extended from this place among the poorer Irish classes and also in England. In 1663 the Royal Society of England endeavoured to encourage the growth of potatoes as a cheap food in case of famine, but at that time they were not highly regarded, and the potato was not recognized generally as an article of food for man until the middle of the 18th century, or nearly 175 years ago, when a famine in Scotland in 1743 brought it into prominence as a cheap food and gave a great impetus to its cultivation. European countries had been just as slow to recognize the merits of the potato, for it was not until 1771, when a prize was offered in France for the discovery of a food that could take the place of wheat in the case of famine, that the potato came into prominence in that country. Parmentier, an apothecary, who brought forward the potato, was rewarded by the gift of 50 morgen of land from Louis XVI. During the 19th century the popularity of the potato increased rapidly in the United Kingdom and Europe, and with it the production grew in proportion.

In America the settlers used the potato to some extent for food during the 17th century, and as its value became appreciated it was grown in ever increasing quantities.

In its wild condition the potato was said not to grow nearly as large as when in cultivation, the tubers being borne nearer the surface of the soil and sometimes appearing on it. Those thus exposed turn green and are unfit for food. Where they grow deep enough in the soil to be at all edible, they are watery and insipid. The wild potato varies both in the colour of its blossoms and tubers, the latter ranging from red to white. Some botanists think that the true *Solanum tuberosum* has not been found wild since its introduction into Europe, and that the above notes refer to another tuber-bearing species.

The first good description of the potato under cultivation was made by de l'Ecluse, a noted French botanist, in 1601, who described it under the name of *Papas Peruanorum*. In his description he wrote that one tuber yielded as many as 50 tubers of unequal size from one to two inches long, irregularly ovoid and reddish. The flower was more or less pink externally and reddish within. He sowed seeds, which produced a white-flowered variety.

The potato has steadily improved in size and quality since the seventeenth century, and the potato of to-day is quite different from what it was at that time. This improvement has been brought about by originating new varieties from the best of the old ones and by better methods of cultivation.

The enormous quantity of potatoes now being produced in the principal potato growing countries of the world is well shown in the following table compiled from the Census and Statistics Monthly for December, 1915.

This immense production has come about chiefly from the fact that the potato has been found to be one of the cheapest foods that can be obtained. Its popularity has, moreover, been maintained by its palatability, for although closely related to some poisonous species, and under certain conditions more or less poisonous itself, the potato when properly grown is one of the most palatable articles of diet. Being without any decided flavour, it is disliked by few, and for this very reason it is a food of which few persons tire, being in this respect much like bread.

In addition to its direct food value, the potato is used in large quantities for the production of starch, glucose and alcohol. Potatoes are also dried and evaporated.

ACREAGE AND YIELDS OF POTATOES IN THE PRINCIPAL POTATO PRODUCING COUNTRIES OF THE WORLD.

Country.	Acreage Mean of 10 years, 1905-15.	Acreage 1914-15.	Total Crop Mean of 10 years 1905-15.	Total Crop, 1914-15.	Mean Yield per acre, 1905-15.
	acres.	acres.	bush.	bush.	bush.
Great Britain and Ireland	1,173,000	1,197,000	250,773,000	279,121,000	213·83
Canada	485,000	476,000	78,405,000	85,673,000	161·34
Australia	139,000	.....	14,414,000	.....	103·49
New Zealand	28,000	.....	5,779,000	.....	208·62
Total	1,825,000	1,673,000	349,371,000	364,794,000	171·82
United States	3,449,000	3,708,000	333,514,000	405,928,000	96·36
Argentina	170,000	.....	37,995,000	.....	285·20
Austria	2,123,000	.....	488,134,000	.....	156·28
Hungary	1,647,000	1,513,000	194,243,000	195,268,000	117·92
Belgium	377,000	411,000	94,917,000	.....	253·23
Denmark	139,000	151,000	29,247,000	.....	209·81
France	3,794,000	3,656,000	497,244,000	514,412,000	131·00
Algeria	40,000	.....	1,723,000	.....	43·12
Germany	8,226,000	8,367,000	1,681,355,000	1,674,394,000	204·31
Holland	405,000	416,000	84,515,000	92,806,060	208·18
Italy	712,000	716,000	60,856,000	61,105,000	85·34
Luxemburg	36,000	37,000	6,370,000	5,288,000	178·18
Norway	100,000	104,000	22,698,000	25,682,000	227·80
Roumania	85,000	.....	4,302,000	2,654,000	51·00
Russia in Europe	10,402,000	9,000,000	1,123,901,000	909,573,000	107·62
Russia in Asia	382,000	.....	31,560,000	.....	82·83
Sweden	377,000	.....	60,510,000	63,432,000	159,70
Japan	159,000	187,000	22,512,000	25,002,000	141·26
Chili	72,000	.....	7,664,000	.....	107·36
Total	35,520,000	29,939,000	5,132,631,000	4,375,085,000	144·50

"In the accompanying tables, says the Census Monthly, compiled from the publications of the International Institute of Agriculture, are shown the area and yield of potatoes in twenty-three of the principal countries of the world for each of the five years ended 1914-15, as compared with the mean of the ten years ended 1915. For countries in the northern hemisphere the period is for the years 1910 to 1914 and for countries in the southern hemisphere the years are from 1910-11 to 1914-15, the crop in these countries being planted in one calendar year and gathered in the next. Owing to the effects of the war the data for the last two years are not so complete as for the first three years; for certain of the countries the figures given are either not final or else no data are yet available.

"For some countries, owing to lack of data, the decennial averages are calculated from the results of periods of less than ten years. Certain other countries which grow potatoes, including Spain, Switzerland, Bulgaria, Serbia, Malta and Mauritius, are omitted from the tables for want of sufficient data. The annual production from these six countries may be estimated at about 129,289,000 bushels from 857,000 acres. Of these six countries, the largest producer is Spain with 100,884,000 bushels from 657,000 acres."

The following figures in regard to the potato crop for 1917 in some of the principal potato producing countries, have been supplied by the Census and Statistics Office, Ottawa.

ACREAGE AND YIELD OF POTATOES IN CANADA, THE UNITED STATES, GREAT BRITAIN, IRELAND AND FRANCE, 1916 and 1917.

Country.	Area.		Yield per acre.		Total yield.	
	1916.	1917.	1916.	1917.	1916.	1917.
	acres.	acres.	bush.	bush.	bush.	bush.
Canada	472,992	656,958	133·8	121·6	63,297,000	79,892,000
United States	3,550,000	4,348,000	80·4	101·1	285,437,000	439,686,000
England and Wales	427,948	508,190	218·4	.....	93,478,411	.....
Scotland	130,119	148,000	152·4	267·8	19,824,709	38,640,000
Ireland	586,308	709,263	154·94	.....	90,844,867	.....
France[1]	3,225,821	3,539,251	104·0	.....	335,510,277	.....

[1]Excluding territory in hostile occupation.

NOTE.—The figures of yield for 1917 are provisional.

THE POTATO IN CANADA.

The potato is used almost as freely as bread in Canada and, like that food, is thought as much of by the rich as by the poor. It can be obtained at all seasons of the year, and, if properly kept, is about as good at one time as at another. Being one of the most useful food products, its cultivation and improvement deserve the greatest attention.

The potato succeeds well everywhere in this country, where the season is long enough for the tubers to develop before the tops are killed by frost, hence potatoes are cultivated in practically every settlement in Canada, even up to, and within, the Arctic circle.

Although the potato is one of the most important food products of Canada, the methods of culture employed in growing this crop can be very much improved. This bulletin is published for the purpose of giving information to Canadian farmers, which should help them to obtain much better crops than they have hitherto had. The recommendations made are for the most part based on the results of experiments conducted at the Central Experimental Farm during the past thirty years, although the results of the work of other experimenters have not been overlooked, and have also been used when deemed advisable.

There are few, if any, crops which can be increased so much by one season's work as the potato, and the effect of good seed and good cultivation is very marked, but like most crops it does not get the attention which it should in Canada. It will be noticed in the above table that the mean yield per acre for Canada for the years 1905-15 is estimated at 161·34 bushels.

In the province of Ontario, where records in regard to the potato crop have been kept for thirty-five years, 1882-1916, the average yield for that period has been only 114 bushels per acre. Some of the best farmers in Canada grow from 400 to 500 bushels per acre and even larger yields are obtained, while 300 bushels per acre is not unusual. At the Central Experimental Farm the highest yield on a small plot was at the rate of 772 bushels per acre, but careful experiments have demonstrated that potatoes can be produced at the rate of over 1,000 bushels per acre. In a competition

conducted by the *Rural New Yorker,* potatoes were grown on a one-twentieth acre plot at the rate of 1,061 bushels per acre. While in field culture such high yields may not be possible, they are something to strive for and there is no doubt but that the average yield for Canada could be doubled if the best methods were employed by every grower.

EXPERIMENTS WITH POTATOES AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

When work was begun at the Central Experimental Farm in 1887, the importance of the potato crop was not forgotten, and experiments were begun at that time and have been continued ever since in order to gain information which might be used to improve the crops of potatoes in Canada. The first work done was to bring together, at the Central Experimental Farm, a large number of varieties for comparison of productiveness, quality, and freedom from disease. In the year 1887, there were 245 varieties tested, most of them having been obtained from Germany, where the largest number were offered for sale. New kinds have been added from time to time since then and many of the old ones have been discarded, but during the past thirty years, 752 named varieties have been tested. The results of this work will be discussed in the chapter on varieties.

In the years 1888, 1890, and 1905, potato seed was sown and 312 different seedlings were raised, and compared with the named varieties. The results of this work will also be found elsewhere in this bulletin. Experiments have been conducted with different kinds of sets, such as whole and cut potatoes of various sizes; in planting the sets at different distances apart; in planting at different depths, and in planting at different dates. Experiments have been made with tubers of the same variety from different localities. The yields from sprouted and unsprouted tubers have been compared. The yields from tubers from early and late plantings have been obtained. Mulching potatoes has been tried. Level and hill culture have also been compared. Experiments in spraying with different fungicides and insecticides for the prevention of blight and destruction of insects have likewise been among the important experiments carried on, and some of the results of these tests will be found in this bulletin. There have also been experiments with fertilizers. What is considered one of the most useful lines of work with potatoes has been the distribution of samples of the best varieties free to farmers throughout the country. This distribution was begun in 1891 and is being continued. At the Central Experimental Farm it is carried on by the Cereal Division and at the Branch Farms and Stations, by the superintendents. At the Central Farm, alone, there have been 151,813 three-pound samples sent out. These samples going to many farmers scattered through all parts of Canada, must have influenced the production and helped to increase the crop of potatoes very much.

VARIETIES.

The number of named varieties of potatoes is very large. A catalogue was published in 1886 by Henry L. de Vilmorin, Paris, France, in which names of 840 varieties are given, and this list represents but a small proportion of the number which have been named since the potato was first cultivated. The varieties of potatoes vary much in productiveness, season, quality, size, shape and colour, and even in resistance to disease, and this variability is taken advantage of where potatoes are grown for special purposes. A variety is considered fixed when it remains fairly true to the original description of it. Varieties may be grouped here into a few well-defined shapes, such as roundish, oblong, and long, although these might be subdivided into many others if perfect accuracy in description of shape were desired. There are great differences in taste as regards the flesh and quality of potatoes. The flesh of potatoes may be described as watery, waxy or soapy, and mealy, and white or yellow in colour.

In some parts of Europe, and even in Great Britain, a waxy potato is preferred to a mealy one, and a yellow-fleshed to a white-fleshed one, but in Canada nearly everyone prefers a white-fleshed, mealy potato, which will go to pieces when properly cooked. The profitable life of a potato is given by some authorities as from 12 to 15 years. This was also thought to be the limit of a potato's usefulness one hundred years ago. Experiments conducted at the Central Experimental Farm and elsewhere, however, indicate that by a judicious change of seed, the productiveness of a variety may be retained and increased. There are so many new and productive varieties introduced that the deterioration of a variety is more apparent than real.

This matter is discussed further under "Change of Seed."

Varieties of potatoes may be originated in three different ways.

SEEDLING VARIETIES.

By far the largest proportion of varieties of potatoes have been grown from seed. In the autumn when the potato vines have died, the green seed balls, or potato apples as they are sometimes called, may be found. These balls contain the seeds, which are imbedded in a mass of pulp, which may be mashed and the seeds washed out. In early spring these may be planted in the greenhouse or hot-bed, like tomato seeds, and when the young plants are large enough they may be pricked out and planted in pots. When the season for outdoor planting arrives they are taken from the pots and planted with the earth attached. They may then be treated as ordinary potato plants, although, being smaller, should be cared for better. The vines being very tender, are more subject to attacks from injurious insects than ordinary varieties. In the autumn, potatoes will be found in each hill, ranging in size from a marble to a hen's egg. Each plant will produce a different variety of potato. In order to start from a good basis, only the uniform and best potatoes should be kept from each plant, and if there is only one tuber satisfactory in this respect it only should be retained. The next season, potatoes are produced almost or quite as large as older varieties, but it will not be until the third or fourth year that the full value of the variety will be known. When the crop is dug the second season the best potato or potatoes should be taken from the most productive hill, and the rest discarded, and this should be continued even to the third and fourth year until the type is fixed. In 1888 there were 237 seedlings grown at the Central Experimental Farm, and 46 others added in 1890. By 1893 only 24 of these varieties were considered worth keeping. While two of these were continued until 1902, they were finally discarded as not being equal to the many other named varieties which were being tested. Thus, out of 283 seedlings, not one was found equal to some already on the market. This failure to originate a good variety out of so many was probably partly due to the fact that the seed was from English or European varieties, few of which yield well at Ottawa. A large proportion of the seedlings were kidney shaped and fine-looking, but lacked productiveness, like most of the kidney potatoes which have been tested at Ottawa. Seed taken from productive varieties of good shape and quality is likely to produce a small proportion of seedlings of merit. It is difficult to obtain seed nowadays from the best varieties, as there is little seed produced. This is no doubt due to the fact that the potato is propagated year after year from the tubers, and as the tuber-producing power of the potato increases, the organs of seed production are weakened and in most varieties refuse to produce seed at all. This non-production of seed is not, however, a thing of recent years only, although the introduction of early varieties which produce the least seed has made the fact more apparent. The year 1917 seems to have been more favourable to the production of seed than usual as many persons wrote that seed had been produced.

It is interesting to note that seed is produced quite freely on at least one variety at Great Slave Lake in Canada, and seedlings were grown at Ottawa in 1905 from seed ripened in the former locality.

CROSS-BRED VARIETIES.

The varieties of potatoes can be crossed artificially just as other vegetables are crossed, but comparatively little work had been done in cross-breeding potatoes in America until recently, as pollen is, as a rule, very difficult to find and potato breeders have, for the most part, been content to raise seedlings from chance seed balls found in the field. Special seed, said to have been obtained by crossing, is sometimes advertised, but it is believed that in most cases this seed was not produced by hand pollination, although there are a few men who have originated crosses by hand pollination.

A large proportion of the varieties of potatoes grown in America do not produce pollen that will germinate, hence pollen bearing or male parents are limited.

In crossing the potato the stamens should be removed before the pistil pushes through the bud, which is usually a day or two before the flower opens. After removing all the flowers which are too far advanced and the buds which have not developed enough, those which have been operated on are covered with a small paper bag, some of the stems and leaves being enclosed also. In another day or two the emasculated flowers will be in condition to receive the pollen which has been gathered in the meantime by taking flowers from the desired male parents and keeping them in boxes or bags until the pollen is needed. The pollen is either shaken from the anthers on to a watch glass or according to the experience of the Department of Agriculture, Washington, preferably jarred from the anthers on to the thumb nail after removing the pistil, and then, after removing the bags, applied to the pistils of the emasculated flowers. The bags are then replaced, enclosing some foliage as before and, if the cross is successful, the seed ball will develop rapidly and in a week one will know whether the crossing has been successful or not. When the seed balls are ripe they are treated as described under "Seedling varieties."

VARIETIES ORIGINATED BY BUD VARIATION, OR "SPORTS."

It has been said that varieties of potatoes "mix in the hill." This erroneous impression prevails among some people from the fact that occasionally a tuber will be produced by a plant which differs in colour, or perhaps in other respects from all the rest of the potatoes in the hill. This sporting, though not common, is found among other species of plants which occasionally produce branches bearing variegated leaves or different coloured flowers or fruit from the type. The potato tuber is a swollen underground stem and is just as likely to sport as any other stem. This so-called mixing is usually supposed to be caused by varieties crossing in the field, thus causing different coloured tubers to form the same season in the same hill. This, however, at least from present knowledge, is not the case.

IMPROVEMENT BY HILL SELECTION.

After a variety has been originated in any of the three ways already described, and after its general characteristics have been sufficiently fixed to introduce it, a variety may be changed, to some extent, by careful selection. This may be undertaken for the purpose of increasing the yield or to obtain a variety which is earlier or later, shallower in the eye, or of better shape. Selection may also be made to obtain a potato which is more resistant to disease and drought, better in quality, or with a higher percentage of starch, but while selection is desirable there needs to be more experimental evidence to show that marked, permanent changes in a variety can be made in this way.

The most accurate way to carry on hill selection is by the individual tuber or tuber-unit method by which the yield from each individual tuber is kept separate. When the variety to be used has been decided upon, care is taken at digging time to dig a number of hills separately so that the total product of each hill is known. The crop

from the best of these hills is stored separately. It is desirable to keep about 20 per cent more than will be planted in the spring to provide for loss during the winter. Plant the same number of marketable tubers, including the best from each of these selected hills in rows side by side, discarding the rest and planting the tubers whole. If the different lots are planted end to end in rows instead of in rows side by side, a stake should be put down to mark the division between each lot. It is important to have the soil uniform. In planting for hill selection it is desirable to have the hills about two and a half feet apart each way, so that the crop from each hill can be kept separate easily when the potatoes are dug.

When digging, the best hills are again saved separately from these rows and the rest of the crop from the best rows may be mixed and used for a field plot, the yield from which should be compared with the yield from unselected seed to find if any improvement has been made. The following year there will be enough of the seed from the hill selection to plant a large area. The selection should be kept up from individual hills each year, and there should be a gradual improvement in the general crop.

A simpler method of selection, and one which will be found to give good results, is to dig enough of the general crop by hand each year so that enough seed can be selected from good hills to give a sufficient quantity of seed for the general crop. By this method the poor hills including potatoes of low vitality and those affected with disease are eliminated and the standard raised. This is perhaps the best method of selection for the average farmer.

While the methods of selection described are mainly for the purpose of increasing the yield, it is desirable to select at the same time for purity, trueness to type, improvement of shape of tuber, and resistance to disease and anything else which will improve the value of the crop.

EXPERIMENTS IN HILL SELECTION AT THE EXPERIMENTAL FARMS.

Some work in hill selection has been carried on at the Central Experimental Farm, but while the results from selection at first showed a marked improvement in its favour when weather conditions were very unfavourable for obtaining seed of strong vitality, the gain from previous selection was lost, hence the desirability of selecting from seed of strong vitality each year. The benefits resulting from a first selection are shown in the following table.

The best hills were selected in 1905 from a crop of Clay Rose, Rural Blush, Gold Coin, Morgan Seedling, Carman No. 1, State of Maine, and Carman No. 3 potatoes, with the following result:—

Variety.	Total Yield per acre Selected. Bush.	Lb.	Total Yield per acre Unselected. Bush.	Lb.	Difference per acre in favour of Selection. Bush.	Lb.
Clay Rose	242	..	189	12	52	48
Rural Blush	237	36	176	..	61	36
Gold Coin	211	12	184	48	26	24
Morgan Seedling	211	12	176	..	35	12
Carman No. 1	193	36	206	48	13	12
State of Maine	189	12	149	36	39	36
Carman No. 3	149	36	149	36	..	..
Average of seven varieties.	204	55	176	..	28	55

The best hills of six of the above varieties were selected again in 1906 and compared in 1907 with unselected and with those which had not been selected since 1905. The results in 1907, which follow, might have been more favourable to the selections if the seed used had been better, but the season of 1906 was one of the poorest for potatoes which has been experienced. Owing to the dry weather, the tops dried up early, the potatoes were small, the seed was lacking in vitality and the growth from it was not regular or strong. Where farmers experience such results from

potatoes after having obtained good results by selection the writer advises a change to seed of strong vitality from another source and beginning to select over again.

Name of Variety.	Total Yield per acre. Selected in 1906 from Selection of 1905.		Total Yield per acre. Selected in 1905 and not in 1906.		Total Yield per acre. Unselected.	
	Bush.	lb.	Bush.	lb.	Bush.	lb.
Clay Rose	110	00	145	12	140	48
Rural Blush	167	12	184	48	114	24
Gold Coin	88	00	66	00	101	12
Morgan Seedling	52	48	79	12	114	24
Carman No. 1	131	00	123	12	96	48
State of Maine	52	48	70	24	52	48
Average	100	18	111	28	103	24

Hill selection was begun again at Ottawa in 1910, but after three seasons it was abandoned, as the results, owing to the seed being of low vitality, were not at all promising.

Work in hill selection is being carried on at the branch experimental farms and stations, and interesting results will, no doubt, soon be published.

IMPORTANCE OF SOURCE AND VITALITY OF SEED.

Up to the year 1906, the importance of the source of seed potatoes in Canada had not been strongly impressed upon the writer, although in the previous year, while on a visit to England, the importance of it was apparent. At the Experimental Farm at Ottawa, some varieties had been grown year after year from the same stock, grown on very similar sandy loam soil each year. Each year, the best potatoes were selected for planting in the experimental plots and the results obtained seemed to justify the continuance of the home grown stock from year to year. Taking the results from four well-known varieties, for instance, the average yields were the following for the first four and the last four years in the sixteen years, 1890-1905, during which there was no change of seed.

Variety.	1890-1893.	1902-1905.	Increase.
	Bushels per acre.	Bushels per acre.	Bushels per acre.
Early Rose	257	317	60
State of Maine	325	361	36
Empire State	301	338	37
Delaware	296	352	56

There was thus no indication of deterioration in the variety after sixteen years without change of seed, but a fair increase, due, no doubt, to careful selection and good cultivation each year. But in the year 1906 there was a sudden change. That year was one of the most unfavourable seasons for potatoes that has ever been experienced at the Central Experimental Farm. During the early part of summer there was sufficient rain to keep the plants growing nicely, but just after the last cultivation

dry, hot weather set in and continued throughout the remainder of the growing season, with the result that the plants were stunted, the foliage dried up prematurely and there was a poor crop of tubers. Moreover, during the month of July there was a veritable plague of aphis which attacked the foliage and doubtless did their share in lessening the crop. The best tubers were used for seed in 1907, but the best were small and had been prematurely ripened in 1906. The early part of the summer of 1907 was dry and the tubers did not form well. The crop was again small, although most of the tubers which formed became of marketable size, and were clean and well-formed. The best of these were used for seed in 1908, but, during that year, there was never enough moisture from the middle of June until the vines died, notwithstanding thorough cultivation. A severe attack of thrips also checked the growth of the vines. Again the best tubers were planted in 1909, and the seed used would have been considered, by its appearance, to be first-class, as it had been kept in a cool cellar and the tubers were firm and showed little sprouting when the potatoes were planted, yet the results were very poor.

A table of the yields of the four varieties already referred to for the years 1906-1909, is interesting:—

	Early Rose.	State of Maine.	Empire State.	Delaware.
	Yield per acre.	Yield per acre.	Yield per acre.	Yield per acre.
	Bush.	Bush.	Bush.	Bush.
1906	150	132	132	103
1907	128	174	117	114
1908	69	97	117	156
1909	18	62	62	53
Average 1906-09	91	116	132	131
Average 1902-1906 before the drought	317	361	338	352

It will be seen from the above figures that there had been a marked falling off in the yield during the last four years, part of which, in the years 1907 and 1908, was doubtless due to the weakened vitality of the seed, and part to the very unfavourable seasons. In 1909, with a more favourable season and good cultivation, the small yield is evidently owing largely to tubers low in vitality, although, in 1909, there was considerable injury from disease which caused the rotting of the stem. Newer seed of other varieties yielded, in these bad years, as high as at the rate of 224 bushels per acre in 1906, 462 bushels per acre in 1907, 325 bushels per acre in 1908, and 321 bushels per acre in 1909, showing that, notwithstanding unfavourable conditions, seed of strong vitality gave good results.

As the crop of potatoes had been so poor in 1906, and as the prespects for a good crop in 1907 from seed of the previous year's crop were not thought favourable, it was considered desirable to compare the results with tubers brought from other localities. Accordingly, small quantities of tubers of six well-known varieties of potatoes were procured from the Experimental Farm, Nappan, N.S. As the best of the home grown seed had been used in other experiments before this Nappan seed was planted, the results obtained that year are not considered reliable, but it may be said that the average yield from the imported varieties was almost twice as great as from the home-grown seed of the same sorts. In 1908, it was possible to make a fairer comparison, and the best seed from the imported stock of the year before was compared with the best seed of the home-grown stock. The results were published in the annual report for

1908, and showed an average increase from the six varieties of 133 bushels per acre in favour of the Nappan seed.

This test was continued in 1909, new seed of some of the same varieties being obtained from Nappan again that year and compared with the Nappan stock of 1907 grown two years at Ottawa, and with the old Central Farm stock. The results are as follows:—

Source of Seed—Nappan, N.S., 1909.	Rochester Rose. Yield per acre.		Carman No. 1. Yield per acre.		Vick Extra Early. Yield per acre.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Nappan Seed, 1909	215	36	198	..	171	36
C.E.F. seed	44	..	83	36	74	48
Difference in favour of Nappan seed	171	36	114	24	96	48

It will be seen from this table that in every case the Nappan seed of 1909 yielded much more than the Central Experimental Farm seed—nearly five times as much in one case, and more than twice as much in two cases. In two cases, the Nappan seed of 1907, yielded much better than the home-grown seed of the old stock, although in one case the Ottawa seed did a little better.

In 1910, seed from the Experimental Farm, Indian Head, Sask., was planted at Ottawa for comparison with potatoes grown at the Central Experimental Farm, with the following results:—

Name of Variety.	Indian Head Seed Yield per Acre. 1910.		Ottawa Seed Yield per Acre. 1910.		Difference in favour Indian Head Seed. 1910.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Empire State	448	48	107	48	341	..
Rawlings Kidney (Ashleaf Kidney)	443	18	41	48	401	30
Dalmeny Beauty	402	36	160	36	242	..
Late Puritan	402	36	39	36	363	..
Gold Coin	399	18	119	54	280	24
Reeves' Rose	374	..	118	48	255	12
Rochester Rose	363	..	136	24	226	36
Irish Cobbler	332	12	127	36	204	36
Money Maker	319	..	70	24	248	36
Carman No. 1	289	18	94	36	194	42
Morgan Seedling	279	24	46	12	233	12
Average	368	30	96	42	271	48

INCREASE IN VITALITY OF SEED.

From time to time varieties of potatoes are sent for trial to the branch Experimental Farms and Stations from the Central Farm, Ottawa. At first these potatoes are very inferior in vigour to those which have been growing at these stations for several years and, sometimes the yield is so poor the first year that the variety is discarded. In March, 1916, the following letter was sent to the Superintendents of the farms on the prairies, where usually the potatoes grow very vigorously:—

"You will, no doubt, remember that potatoes sent to you from Ottawa are usually weak growers when you receive them. I should be glad if you would inform me for how many seasons that weak growth continues, or do they make a strong growth the next year, the same as the ones you have been growing for several years?"

Following are some of the replies received:—

Experimental Farm, Brandon, Man. "In regard to the vigour of potatoes sent here from Ottawa. We find that it takes at least two years for such potatoes to attain the vigour of growth shown by the varieties that are acclimatized. That is, the third crop grown in this climate seems to be normal in vigour."

Experimental Farm, Indian Head, Sask. "In regard to the vitality of potatoes received from the Central Farm. In reply I might say that the last seed potatoes were received in 1914 and were considerably weaker than our home-grown seed, but this season no difference was noted. The one exception was with Morgan Seedling (pink) which was very weak the first season, and almost worthless in 1915. It has been the opinion at this farm that the vitality of the seed increases after the first season."

Experimental Station, Scott, Sask. "With reference to your inquiry of the 7th instant, *re* 'Weak growth of potatoes sent from Ottawa,' would say that this peculiarity has been very conspicuous on this station. Two varieties Early Ohio, O-1693, and Bermuda Early, O-1688, were received in April, 1913. The following table will illustrate the difference in yield per acre:—

	Triumph (Bermuda Early).		Early Ohio.		Other Varieties.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1913..	39	36	107	48	10 var. over	200 bush.
1914..	89	5	54	6	10 "	150 "
1915..	200	12	195	48	12 "	300 "

The shaws on both of these varieties were very stunted in appearance."

Experimental Station, Lacombe, Alta. "Referring to your letter of March 7, would say that I believe it requires the second year's growth, under western conditions, for potatoes grown from eastern seed to attain their full vigour. The first year they are received there is a noticeable difference, but the next season, in my judgment, they are up to the full relative vigour in evidence in the adjoining varieties which have been continuously grown here."

Experiment showing importance of change of seed—Taller plants from Indian Head seed; shorter plants of the same varieties from Ottawa seed.

31666—2½

In 1915, a comparison was made at Ottawa between seed from the Experimental Station, Fredericton, N.B., and Ottawa seed, with the following results. Both lots of seed were originally from the same source, the Fredericton stock being sent there from Ottawa in 1913, and the results show that stock which is low in vitality may be restored to vigour by planting for several seasons under other conditions.

Variety.	Ottawa Seed.				Fredericton Seed.			
	Plants appeared above ground.	Total yield per acre.	Marketable per acre.	Unmarketable per acre.	Plants appeared above ground.	Total yield per acre.	Marketable per acre.	Unmarketable, per acre.
		Bush. Lb.	Bush. Lb.	Bush. Lb.		Bush. Lb.	Bush. Lb.	Bush. Lb.
Bovee	18-VI	99 ..	50 36	48 24	17-VI	154 ..	92 24	61 36
Gold Coin	24-VI	57 12	39 36	17 36	17-VI	266 12	156 12	110 ..
Irish Cobbler	21-VI	105 36	59 24	46 12	17-VI	314 36	211 12	103 24
Green Mountain	24-VI	123 12	79 12	44 ..	17-VI	338 ..	220 ..	118 ..
Carman No. 1	19-VI	22 ..	.. ..	22 ..	19-VI	358 36	248 36	110 ..

In every case the Fredericton seed gave larger yields than the Ottawa seed, and the differences were in all cases very marked, leaving little doubt as to the greater vitality of the imported seed. It will also be noted that, in all cases but one, the growth of the imported seed was quicker than that of the Ottawa seed.

Following is a comparison of yields from seed from Fredericton, N.B.; Port Arthur, Ont.; and Ottawa, in 1917:—

Source of Seed.	Green Mountain.					
	Total Yield per acre, 1917.		Yield per acre marketable, 1917.		Yield per acre unmarketable, 1917.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Fredericton Seed	341	00	257	24	83	36
Port Arthur Seed	400	24	360	48	39	36
Ottawa Seed	85	48	68	12	17	36

Dr. C. A. Zavitz reports the following yields from seed potatoes of the Empire State variety from different sources in experiments conducted at the Ontario Agricultural College, Guelph, Ont. (Agricultural Gazette of Canada, December, 1917:—

Source of Seed.	1914.	1915.	1916.
	Bush. per acre.	Bush. per acre.	Bush. per acre.
Old Ontario	166·5	114·4	220·3
Muskoka (Ontario)	300·3	251·3	350·3
New Brunswick (Source 1)	205·4	235·5	232·3
New Brunswick (Source 2)	261·3	232·3	218·1

An experiment conducted by W. S. Blair, Superintendent, Experimental Station, Kentville, N.S., with Garnet Chili, Green Mountain, and Irish Cobbler varieties.

An experiment with several lots of Garnet Chili potatoes grown by a number of persons in 1914 was started under uniform conditions in 1915 at the Experimental Station, Kentville, N.S., and continued in 1916 and 1917. Following are the results obtained:—

GARNET CHILI.

Source Number.	Yield per acre, 1915.			Yield per acre, 1916.			Yield per acre, 1917.		
	Marketable.	Unmarketable.	Total.	Marketable.	Unmarketable.	Total.	Marketable.	Unmarketable.	Total.
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
1	220	20	240	192	20	212	236	19	255
2	94	26	120	94	14	108	195	29	224
3	212	14	226	200	12	212	296	14	310
4	186	20	206	192	12	204	293	22	315
5	26	10	36	52	16	68	88	2	90
6	32	14	46	68	22	90	118	12	130
7	176	34	210	176	12	188	275	17	292
8	52	22	74	80	16	96	126	8	134

It will be seen that there was a difference in yield in 1915 in the eight lots of Garnet Chili potatoes planted of 204 bushels, the highest being 240 bushels per acre and the lowest 36 bushels per acre. The difference in yield in 1916, from seed stock of these plots, was 144 bushels, the highest being 212 bushels and the lowest 68 bushels. The difference in yield in 1917 was 225 bushels, the highest being 315 bushels and the lowest 90 bushels.

Fifteen additional lots of Garnet Chili potatoes, obtained from growers in the spring of 1916, showed a difference of 120 bushels, the yield ranging from 278 bushels to 158 bushels per acre. In 1917 there was a difference of 182 bushels, the yield per acre varying from 380 bushels to 198 bushels.

GREEN MOUNTAIN.

Of ten lots of Green Mountain tested in 1916, the difference was 132½ bushels, varying from 313 bushels to 180½ bushels per acre. In 1917, the difference was 147 bushels, the yield ranging from 353 bushels to 206 bushels.

IRISH COBBLER.

In 1916, the seventeen lots of Irish Cobbler showed a difference of 142 bushels, the range being from 235 bushels down to 93 bushels per acre, while in 1917 the difference was 172 bushels, the yield varying from 346 bushels to 174 bushels.

Without a doubt, the grower with the very low yielding lot will detect the lack of vigour in his stock and get rid of it, but it is impossible to determine the difference between some of the strains until they are brought together side by side. There is, no doubt, a fluctuating variation within strains of a variety, and it would not be wise to drop out all except the highest one tested, but it seems that the number could be safely reduced to the fifty bushels difference in range.

The results, so far, would seem to point to a very practical way whereby a community, with the least possible help from outside sources, can vastly improve their standard varieties of potatoes. The best of a community could then be brought together at a central station and there further tested and outstanding strains developed for general distribution for seed purposes.

WHEN TO CHANGE SEED.

From this experiment it would appear that poor potato stocks improve under more favourable cultural and climatic conditions, but the importance of starting with good seed is very striking.

These results show that a change of seed sometimes more than doubles the yield of potatoes. How, then, is one to decide when it is desirable to have a change of seed, and what are the conditions which give seed strong vitality? If one knew when to change the seed and where to get it from, there is no doubt but that potato growing would be much more profitable.

In the first place, every potato grower should be an experimenter. He should try on a small scale the varieties which other experimenters have found most productive. If he discovers a variety which is better than his own, he should not only grow more of that variety, but, when he is getting the seed he should, if possible, get it from the same source as he obtained his trial lot from, for, if he obtained it from another source it might not do as well as his own.

If a grower has been getting but fair or poor crops from the variety he is growing, he should try a change of seed, even if the same variety is obtained. Moreover, when he has found that it pays him to obtain seed of a certain variety from a certain source, he should endeavour by experiment and calculation to learn whether it will pay him to change his seed every year, every two years, or every three years.

IMMATURE SEED.

It has been fairly well shown, we think, that potatoes which are prematurely ripened, either by an early drying up of the tops or by poor development on a weak vine, are low in vitality and should not be used as seed if the best results are desired. In Great Britain, it is now well recognized from the results of careful experiments that seed potatoes from the South of England, where the climate is comparatively dry and warm, and where potatoes ripen much more rapidly than they do in Scotland and Ireland, do not give nearly as large yields as seed potatoes from Scotland and Ireland. In an experiment which the writer had the opportunity of seeing at Sutton & Sons, Reading, England, in 1905, where Scotch and English seed of the same varieties had been planted side by side, the English stock was evidently three weeks nearer maturity than the Scotch stocks.

In an experiment conducted in England by the Department of Agriculture of Ireland in 1906, to determine the relative value of Irish and English seed potatoes there was a marked difference in favour of the Irish seed.

It would seem that the cause of the seed potatoes being better from Scotland and Ireland than from some parts of England is, that the tubers in the former countries are not hurried to maturity by hot, dry weather, and on this account have more vitality or power to make strong growth when planted than where the summers are comparatively hot and dry. Coming nearer home, the conditions in the drier and warmer parts of Canada may be compared with England, while the conditions in the moister and cooler parts of the Dominion may be compared with Scotland and Ireland. It may even be that seed potatoes from a cool, moist clay loam soil near home might show striking results when compared with the results from seed from light warm soils. The Nebraska Experiment Station found that potatoes grown under straw had strong vitality, while those under ordinary conditions were very low in vitality. Experiments are being conducted at Ottawa to learn, if possible, whether vigour can be obtained by growing potatoes locally under special conditions.

There is a difference between immature tubers and prematurely ripened tubers. Potatoes grown in cool climates tend to be immature. Potatoes grown in warmer and drier climates tend to be prematurely ripened. Immature potatoes may be growing vigorously and the tops be cut off by frost, or they may be dug before the tops are dead and before they are perfectly ripe. The tubers are checked in growth, but are full of vitality. It is interesting to note that immature potatoes have been recommended for seed potatoes in England for at least one hundred years.

The Department of Agriculture for Ireland makes this recommendation:—

"*Immature Seed.*—It is now recognized that seed from crops lifted before they fully mature will produce more vigorous plants, and, consequently, heavier yields than seed from crops which have been allowed to become fully ripe. In Ireland, this applies more particularly, perhaps, to early varieties, but it is a point worthy of notice by growers of seed potatoes."

At the Central Experimental Farm the seed from tubers grown from potatoes planted on June 23, and even on July 7, 1899, yielded, in 1900, more than those from potatoes planted May 22, 1899. The late planted ones were not so mature or were immature when dug.

In order to find whether a difference in soil would make any difference in the results, seed of Irish Cobbler, Green Mountain and Table Talk was obtained from the Fredericton station in 1916 and planted at Ottawa in sandy soil, black muck, and a rather heavy sandy loam. As the potatoes were beginning to be stolen these were all dug while the tops were still green and in the spring of 1917 were planted in rows side by side with the results in the following table. There are also given in the table the yields from the same varieties from Ottawa seed grown among the other varieties and dug with the main crop.

YIELDS in 1917 from potatoes dug when immature, 1916, as compared with those grown and dug with other varieties, 1916.

Variety.	Sandy Soil, 1916. Yield per acre, 1917.		Black Muck, 1916. Yield per acre, 1917.		Heavy Sandy Loam, 1916. Yield per acre, 1917.		Grown and dug with other varieties, 1916. Yield per acre, 1917.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Irish Cobbler	321	12	380	36	398	12	68	12
Green Mountain	330	00	325	36	378	24	85	48
Table Talk	365	12	276	6	319	00	224	24

It will be noted that the results are very much in favour of the potatoes grown from those dug when immature, and grown by themselves in 1916, as compared with those grown among the poor Ottawa stock and left until normal digging time.

YIELD of potatoes, 1917, from stock obtained from Fredericton in 1916, and planted at different dates at Ottawa in 1916, and the crop from each planting kept separate and the seed planted in 1917:—

Variety.	1916. Date planted.	Yield per acre, 1917.					
		Total yield.		Yield Marketable.		Unmarketable.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Green Mountain	May 22	6	36	0	0	6	36
"	June 5	33	00	22	0	11	00
"	June 19	35	12	19	48	15	24
"	July 3	22	00	6	48	13	12
Table Talk	May 22	81	24	55	0	26	24
"	June 5	114	24	88	0	26	24
"	June 19	187	0	160	36	26	24
"	July 3	224	24	180	24	44	00
Irish Cobbler	May 22	37	24	17	36	19	48
"	June 5	35	12	17	36	17	36
"	June 19	96	48	70	24	26	24
"	July 3	118	48	74	48	44	00

The yields from the above test were small and show the remarkably low yields obtained from Ottawa seed, but it is interesting to note that with the exception of the last planting of Green Mountain and the second planting of Irish Cobbler there is a regular increase in yield from the earliest to the latest plantings, which would seem to be evidence that the potatoes which were the most immature gave the best yields. This is in accordance with experience of growers elsewhere and corroborates experience of previous years at Ottawa.

The cause or causes of the very low yields at the Experimental Farm, Ottawa, during recent years from seed grown at Ottawa the previous year, are not yet clearly understood. The low yields began in the very dry seasons of 1906, 1907, and 1908, and there have been few good years for potatoes since, and, since that time, the diseases such as Leaf Roll, Mosaic and Rhizoctonia all have been found affecting the potato plants at Ottawa. How far these are the primary cause of the low yields and how much should be attributed to climate, is not yet certain, but the fact remains that by getting new seed every year from certain places, good yields can be obtained. While such marked results might not be obtained elsewhere, as at Ottawa, a change of seed is recommended, as stated elsewhere, where satisfactory yields are not being obtained. It has been the writer's observation that wherever potatoes grow vigorously, as a rule, until the tops are cut down by frost in the autumn, there will good seed potatoes be obtained, provided they are free from disease. Such sources of seed potatoes can be found in all the provinces of Canada and particularly in those parts of the provinces where the days and nights, during the growing season, are relatively cool, and where there is usually a good supply of moisture in the soil.

It has been shown by the experiments at Ottawa that the best results were obtained from the most immature seed, and while, doubtless, there is some other factor or factors than immaturity which ensure such good results from seed from the cooler parts of Canada, and which for the present may be called "vitality," it would seem, with our present knowledge, that the best seed will come from those parts of Canada where, as a rule, the main part of the crop is most immature, though of good marketable size, when the tops are cut down by autumn frosts, and where there is little or no disease in the crop.

NORTHERN *versus* SOUTHERN GROWN SEED.

Some attention has been paid to the comparison in yield between northern and southern grown seed potatoes, but the results are so conflicting that they are not given here. It will be seen from what has already been written that there are so many factors governing the results obtained from a change of seed that it would be difficult to tell with certainty whether, all things being equal, northern or southern grown seed is the better. As it is easier keeping northern grown seed from sprouting, on account of the potatoes maturing later, and as sprouting lessens the value of the potato for seed, it is probable that, as a rule, northern seed would stand a better chance in comparison with southern unless, where two crops are raised in the season, the second crop from the southern were used, when the southern seed might come out best.

There are several diseases which check the growth of potatoes and cause much loss. These are dealt with by the Botanical Division.

VARIETIES WHICH MAINTAIN THEIR VIGOUR AT OTTAWA.

It has been found at Ottawa that several varieties of potatoes maintain their vigour much better than the majority. The resistant varieties were practically all originated in Great Britain, and are but a few of the many which have been tested from there. They are Dalmeny Hero, Table Talk, Dalmeny Regent, Brydon, Dobbie Prolific, Scottish Triumph, Davies Warrior and others which may be found in the table of varieties showing a five years' average.

CULTIVATION.

THE POTATO PLANT.

Before beginning to grow potatoes it is important to know something about the potato plant and its habits in order that it may be cultivated intelligently. Some information has already been given in this direction, but something more may be said here. When a potato plant is growing, four distinct and important forms of vegetation

Potato plant, showing how much deeper the root system is than the tuber bearing stems.

are developed, in addition to flowers and fruit—which need not be discussed here. These are: roots, foliage, stems above ground, and under ground stems or *rhizomes* on

which the tubers are borne. Through the roots the whole plant, including the tubers, obtains its moisture and much of its food in a crude condition. The leaves are, as it were, the lungs of the plant and in them is elaborated or manufactured the plant food which is taken from the soil by the roots and also that which is obtained from the air. The stems are the conductors as well as utilizers of the plant food and are the framework of the plant. The stems also serve another purpose, for from their leaf axils below ground are developed the *rhizomes* or underground stems, the tips of which become the tubers. As the underground or tuber-bearing stems bear no roots they must depend for their development on the root system of the plant and the leaves, and the plant food which these bring to them. It will be seen, therefore, that it is important to have a good root system and a good leaf development in order to have a good crop of tubers. As a rule the larger the top the larger the crop will be, providing the tubers have a long enough season to develop properly. Occasionally when a very heavy application of a nitrogenous manure is made the crop will not be in proportion to the large tops.

CLIMATE AND SOIL.

The potato appears to thrive best in a moist, somewhat cloudy and temperate climate, but providing there is sufficient moisture in the soil and the growing season is long enough it is not at all fastidious in this respect. It is a little more particular in the matter of soil, but large crops are grown in a great variety of soils. The ideal soil for potatoes appears to be a rich, deep, friable, warm, sandy loam with good natural drainage, and well supplied with decayed or decaying vegetable matter. The potato requires a large amount of moisture to develop a large crop of potatoes, and for this reason the soil should be retentive of moisture. Potatoes will not, however, succeed well in cold soil where the water is stagnant near the surface, and thorough drainage is very essential to a good crop.

Potatoes succeed admirably on new land providing it is well drained and not too stiff, as the soil is filled with decayed vegetable matter and humus which help to make it loose. Such soil retains moisture well, and furnishes nitrogen in a very available form. They succeed well after sod also, as the decaying sod gives somewhat the same conditions as new land. Clay and clay loams are not so suitable to the potato crop as the warmer sandy loams and gravelly soils as they are usually colder and being, as a rule, stiffer, the tubers are not as even in shape nor as smooth. The quality of the potatoes grown in sandy or gravelly soils is better than that of those grown in clay or clay loams.

PLANT FOOD REQUIREMENTS AND FERTILIZER EXPERIMENTS.

The average results of a large number of analyses show that a crop of 200 bushels of potatoes, exclusive of the potato tops, which are usually left on the ground, removes from the soil approximately 40 pounds nitrogen, 20 pounds phosphoric acid, and 70 pounds potash. A crop of 25 bushels per acre of wheat, including straw, will remove about 42 pounds nitrogen, 23 pounds phosphoric acid and 40 pounds potash. A crop of 25 bushels per acre of wheat will remove more nitrogen from the soil than 200 bushels of potatoes, and yet we find farmers, as a rule, heavily manuring their soil intended for potatoes with barnyard manure, while no good farmer would apply barnyard manure direct to the wheat crop. It is true that the potato crop takes from the soil nearly twice as much potash as wheat, hence a light dressing of manure is advisable to supply this. In ten tons of manure there would be considerably more potash than the crop of potatoes would take from the soil, but of course this would not be all available for the potato crop.

It has been stated already that potatoes do well when grown after sod and it will be shown that the results from experiments conducted at the Central Experimental Farm in growing potatoes after clover sod, fully bear out the popular belief and show the wisdom of the practice of the best potato growers.

The following results taken from the annual reports of Dr. Wm. Saunders, late Director of the Dominion Experimental Farms, show the average increase for three years from the ploughing under of clover. The clover was sown with grain at the rate of 12 pounds per acre and ploughed under the following spring shortly before planting and after considerable growth had been made. The variety of potato planted in each year was the Everitt:—

YIELD PER ACRE OF POTATOES WITH AND WITHOUT CLOVER.

Year.	Yield per Acre with Clover.		Yield per Acre without Clover.		Increase in Yield from the Clover.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1901 (3 plots averaged)	423	47	391	20	32	27
1902 (3 plots averaged)	391	40	352	40	39	
1904 (1 plot)	402	..	362	20	39	40
Average increase for three years					37	2

It has been proven by careful experiments conducted at the Central Experimental Farm that the crop of grain is not lessened by sowing clover with it, hence practically the only outlay for the increased crop of potatoes is the price of 12 pounds of clover seed, which at 25 cents a pound is $3. Thirty-seven bushels of potatoes sold at 60 cents a bushel, is $22.20; deducting the cost of the clover seed, and the net increase in profit from the ploughing under of the clover would be $19.20. Furthermore, the value of the clover is not all exhausted by the potato crop.

The following extract, with tables from Bulletin No. 40, Central Experimental Farm, "Clover as a Fertilizer," by Dr. Wm. Saunders, Director, and Frank T. Shutt, Chemist, Dominion Experimental Farms, shows the relative value as plant food of clover and barnyard manure:—

"CLOVER COMPARED WITH BARN-YARD MANURE AS A FERTILIZER."

At the outset it should be understood that in advocating green manuring with clover, this crop is not brought forward as a material to replace barn-yard manure, but rather to supplement it and to make its application more effective. Barn-yard manure of good average quality contains about the following proportions of the chief fertilizing constituents:—

Nitrogen	10 lb. per ton.
Phosphoric acid	5 "
Potash	9 "

An application of ten tons per acre will, therefore, enrich the soil, approximately by the following amounts:—

Nitrogen	100 lb. per acre.
Phosphoric acid	50 "
Potash	90 "

"The chemical investigations made in connection with these experiments have shown that a vigorous crop of clover will contain, at a moderate estimate, in its foliage and roots:—

Nitrogen	from 100 to 150 lb. per acre.
Phosphoric acid	" 30 " 45 "
Potash	" 85 " 115 "

"Respecting nitrogen, it is evident that by the use of clover we can with a single crop furnish the soil with as large a quantity as would be supplied by a dressing of 10 tons of manure per acre. The greater part of the nitrogen is gathered by the clover from the air, a source not otherwise available, and is therefore a distinct addition to the soil. The amounts of phosphoric acid, potash, and lime in the clover have, it is true, been obtained from the soil, but have been largely drawn from depths beyond the reach of the roots of ordinary crops. The decay of the clover, moreover, liberates these important fertilizing elements in soluble and available forms, so that they can be readily utilized by the crops which follow."

As stated in the preceding extract, a large part of the nitrogen contained in a crop of clover is taken from the air, hence it is probable that, when a crop of potatoes is removed, little, if any, exhaustion takes place of the nitrogen which was in the soil before the clover was grown and ploughed under, and as the nitrogen from the decayed leaves and stems of the clover is in a very available condition, the potato plant is able to use much of it. It is very important to have the nitrogen in an available condition for a crop with as short a growing season as the potato has in this country.

From what has already been written, it will be readily seen that clover and barnyard manure are two very important and cheap fertilizers for the potato. The former obtains nitrogen from the air and brings up phosphoric acid and potash from great depths of the soil to be available for succeeding crops and in adding humus to the soil by its decay it makes the soil hold moisture better and renders it looser. Barnyard manure adds nitrogen, phosphoric acid and potash to the soil and increases the supply of humus in it, making the soil more retentive of moisture and looser.

COMMERCIAL FERTILIZERS.

As the results from the use of commercial fertilizers vary in different places and in different soils where they are tried, they will be discussed but briefly here. The results from the use of these fertilizers depend so much on the character of the soil and the availability of the plant food in it and on the amount of moisture and the availability of the plant food in the fertilizer itself, that it is necessary for each farmer to experiment for himself in order to find out whether the crops on his soil will be sufficiently benefited by the application of fertilizers to pay him to use them, as the cost of these is considerable compared with barnyard manure. There are a number of complete potato fertilizers on the market containing the plant food necessary for the potato crop in very available forms. If these are used they may be applied at the rate of from 500 to 800 pounds per acre. A good complete fertilizer for potatoes may be made by mixing 250 pounds nitrate of soda, 350 pounds superphosphate, and 200 pounds sulphate of potash, or muriate of potash, making 800 pounds in all. Even half of this quantity might give satisfactory results on good soil. Slightly better results have been obtained by sowing the fertilizer over the sets when they have been covered with a few inches of soil, and then covering the fertilizer by harrowing than by sowing it in the drill before the sets are planted. If the latter method is adopted the fertilizer should be mixed with the soil before the sets are dropped, as the buds are apt to be injured if the fertilizer comes in direct contact with them. Sulphate of potash has given better results than muriate of potash for potatoes, though both are good, but for the present neither of these is available in sufficient quantities.

FERTILIZERS RECOMMENDED FOR THE POTATO.

From the information obtained from experiments at the Central Experimental Farm and elsewhere, the writer would recommend growing potatoes after clover which had been top dressed with from ten to twelve tons of barnyard manure per acre. If the clover is ploughed under in the autumn, green manure would be the

best; if ploughed under in the spring, which is the better time, rotted manure is preferable, as it will become incorporated with the soil better than green manure and is not so likely to favour development of scab. The clover may be top dressed with green manure in late summer or autumn, even though the clover is not ploughed under until spring, in which case the manure increases the crop of clover for turning under and is sufficiently broken up and worked into the surface soil to be in good condition for mixing with it when ploughed. Potatoes succeed well after corn which has been given a heavy application of barnyard manure. It is better to manure heavily for the preceding crop than for the potato crop itself.

PREPARATION OF THE LAND.

The soil for potatoes should be well prepared before planting. Unlike some crops which succeed best when the soil is moderately firm when ready for seeding, the potato succeeds best in soil which is loose. In loose soil the tubers will be smooth and shapely; in soil which is firm or stiff the potatoes are usually misshapen and not nearly so attractive. The ploughing under of barnyard manure and clover makes the soil looser and this, added to their value in furnishing plant food, makes them particularly desirable. Soils which are very light and loose may be made too loose by the turning under of manure, especially when it is green and strawy, and while it is not the best practice to plough under green manure immediately before planting, especially on light soils, if it is done the soil should be given extra tillage so as to incorporate the manure with it thoroughly and keep the first few inches of soil from drying out and preventing the satisfactory sprouting of the potato sets.

Spring ploughing for the potato crop is usually best. Where rather stiff soil has to be used, fall ploughing may be preferable as the action of the frost upon it will help to loosen it. Good potato land should be ploughed in the spring, turning under the clover with its top dressing of manure. The soil should be ploughed deep enough so that the clover will be well covered. In order to get the clover well under, a chain is so fastened to the beam of the plough and the whiffle-tree, as to hold the clover down so that it may be covered more rapidly. An additional assistance in getting the clover covered is given by using a roller coulter or steel disc in front of the plough. This is usually about 14 inches in diameter and has a sharp edge which cuts the clover plant and prevents much clogging. The time of ploughing in the spring will depend somewhat on the method of planting. If a planter is used there is no necessity of opening furrows, and hence no trouble with clover which has been ploughed under, and the longer the clover is left growing in the spring the better the results are likely to be. If, however, furrows have to be opened, a good plan is to turn under the clover some days before planting time, then disc harrow a couple of times to prepare the land partially and later when one is ready to plant, the soil should be thoroughly harrowed with the smoothing harrow; by standing on the harrow or weighting it the upper few inches of soil will be thoroughly pulverized and loosened. It is very important to have the upper layers of soil in fine condition, as if the surface is rough the potato sets or young plants are likely to suffer in a dry time. Different methods of preparation will be necessary for different kinds of soil, but the nearer the land can be got into a thoroughly pulverized condition to a depth of about six inches or more before planting time the better the crop will be. When a planter is used, the soil should be ploughed, thoroughly harrowed, and then rolled just before planting. The advantages of the planter will be stated in the paragraph on planting.

When rotted barnyard manure is used on land without clover it should be applied in the spring and thoroughly mixed with the soil. If it is well rotted it may be harrowed in. Neither rotted nor fresh manure should be put in the drill with the sets, as manure when it comes in contract with the tubers favours the development of scab. This was well proven in experiments at the Central Experimental Farm.

PLANTING POTATOES ON GREEN SOD.

If the land has been ploughed the potatoes could be planted by opening holes for the sets about four or five inches deep and fourteen inches apart, making the rows 2½ feet apart, the manure having been spread over and harrowed in with the disc harrow. If the sod has not been ploughed one of the best methods of planting in green sod is to have some one planting when the ploughing is being done, the sets being dropped every third furrow and covered by the plough, when the next furrow is made. After the potatoes have been planted the ground is disc harrowed and if it is light soil it may be rolled after that to help close up any openings where grass could grow through and to compact the soil somewhat and hasten the rotting of the sod. This would not be desirable where the ground was heavy, as it would make it too firm. As soon as weeds start, harrow with the smoothing harrow and as soon as the potatoes are showing above the ground harrow again, then if thorough cultivation is followed afterwards and the tops protected from insects and disease, there should be a good crop.

TIME OF PLANTING.

The best time for planting potatoes will vary in the different parts of Canada, much depending on the condition of the ground and spring frosts, but when these have not to be considered the earlier the potatoes are planted the larger the crop is likely to be. The sets should not lie long in the ground before sprouting, as there is danger of rotting, hence they should not be planted when the soil is cold and wet. If they are planted too early also the young vines are liable to get nipped by spring frosts. As early potatoes usually command good prices it is often worth taking the risk of frost and planting early if the soil is in good condition. If the vines should be above ground and there is danger of frost they may be covered slightly with the soil by turning a shallow furrow over them. Potato growers have saved their vines by doing this. The importance of fairly early planting is brought out in the following experiment conducted at the Central Experimental Farm. In this experiment there is a steady and very marked decrease in the crop at each planting.

POTATOES PLANTED AT DIFFERENT DATES.

In 1898, an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898; July 23, 1899; July 21, 1900; July 11, 1901; July 24, 1902 and July 24, 1904. An early and a late variety were used each year, the varieties being Early Norther and Irish Daisy, in 1898; Early Norther and Rural Blush in 1899; Early Norther and Sir Walter Raleigh in 1900; Early St. George and Rural No. 2 in 1901; Everett and Carman No. 1 in 1902, and the same varieties in 1904. The test was not a fair one in 1903, owing to an extreme drought, hence the results obtained that year are omitted. In 1902 two plantings were made before the main crop was put in, the yields from the plantings made on May 15 being the best of the series. The yield per acre from the first planting of an early variety on May 1 was 268 bushels 24 pounds, and from the second planting on May 15, 294 bushels 48 pounds per acre. The yield per acre from the main crop, May 29, was only 217 bushels 48 pounds, so that there was a difference of 77 bushels per acre in favour of the early planting. The results from this one year's test indicate that the best time to plant potatoes is about the middle of May as manure when it comes in contact with the tubers favours the development of scab, or as soon after that date as possible. Where the summer is relatively cool and autumn frosts come late, later planting may be found desirable. The main purpose of this experiment was to find out how late potatoes could be grown and satisfactory crops obtained, and this experiment proves that as far north as Ottawa a fairly good

crop of marketable potatoes can be obtained by planting as late as July 10, when they might succeed an early crop, such as garden peas.

Date of Planting.	Total Average Yield per Acre, 1898-1904.		Average Yield per Acre of Marketable Potatoes, 1898-1904.		Average Yield per Acre of Unmarketable Potatoes, 1898-1904.	
Early Varieties.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1st planting: May 26, 1898, May 26, 1899, May 26, 1900, May 30, 1901, May 29, 1902, May 28, 1904	389	..	337	28	51	31
2nd planting: June 10, 1898, June 9, 1899, June 9, 1900, June 13, 1901, June 12, 1902, June 11, 1904	332	34	269	43	62	51
3rd planting: June 24, 1898, June 23, 1899, June 23, 1900, June 27, 1901, June 26, 1902, June 25, 1904	236	25	187	53	48	32
4th planting: July 8, 1898, July 7, 1899, July 7, 1900, July 11, 1901, July 10, 1902, July 9, 1904	110	9	69	40	40	29
5th planting: July 23, 1898, July 21, 1899, July 21, 1900, July 24, 1902, July 23, 1904	24	25	6	10	18	15
6th planting: Aug. 9, 1898	No potatoes.					
7th planting: Aug. 23, 1898	"					
Late Varieties.						
Planted on the same dates as early varieties—						
1st planting	368	30	319	9	49	21
2nd "	281	31	227	51	53	40
3rd "	196	42	160	4	36	38
4th "	105	9	57	56	47	13
5th "	37	11	14	58	22	13
6th "	No potatoes.					
7th "	"					

KIND OF SETS TO PLANT.

The condition the potatoes are in at planting is a very important factor in obtaining a maximum crop. If possible, potatoes should be prevented from sprouting, and in the chapter on storing the crop the best methods of keeping potatoes will be discussed. When the set is planted in the field and begins to sprout, the young plant gets its food to begin with from the parent set. It also utilizes the moisture in the set and in a dry time it is very important on this account alone to have sets well charged with moisture. When potatoes sprout in a warm, moist cellar, as they so often do, the shoots take from the tubers both plant food and moisture. These shoots are broken off when handling the potatoes, and hence when the tubers are cut for planting they are not in the best condition to produce a good crop of potatoes. Careful experiment and ordinary observation prove that the second shoots which appear are not so strong as the first. In order to be certain that when the sets are cut the eyes will start, a good practice is to spread the potatoes out in the light a few days before cutting them until the eyes start, when they may be cut more intelligently. Experiments conducted by the Department of Agriculture for Ireland in 1904, with main crop or late potatoes, sprouted as described in this bulletin under 'sprouting before planting,' showed an increase of 2 tons 13 cwt., or 99 bushels per acre in favour of sprouting the sets before planting. This is a large increase in the general crop.

The commonest and most popular experiments which have been conducted with the potato are those which deal with the kind of sets to plant. Shall they be whole potatoes, one eye, two or three eye pieces; half potatoes, quarter potatoes, stem ends, seed ends, or one of the other many kinds of sets which it is possible to use? These experiments have been going on for the past one hundred years and probably much longer, and the results have been very conflicting in many particulars, but in some

respects most of them agree. The experiments prove that all other things being equal the larger the set planted the larger the crop will be, hence large, whole potatoes usually give the largest crop; but as it is the largest crop of marketable potatoes at a minimum cost that is desired, it has not been found profitable, as a rule, to plant large whole potatoes. The more sprouts there are from a set the larger the proportion of small potatoes is likely to be, as the plant food available during the limited time the potato vine has to grow is not usually sufficient to bring to marketable size enough of the extra tubers produced when the large, whole potatoes are planted. Experiments were begun at the Central Experimental Farm in 1889 and were continued for nine years to get some information with regard to the best kind of sets to plant. It was found that when large, medium and small whole potatoes were compared, the crop decreased in proportion to the size of the potato planted. This varied, however, with different varieties. A large potato of one variety with a few eyes might not yield so well as the medium sized potato of another variety which had many eyes. This difference in results also occurred when the potatoes were cut into pieces of a certain weight regardless of the number of eyes; a set of a variety with few eyes might not yield so well as the same sized set of another variety having more eyes. The conclusion reached after many tests is that the most economical kind of set to use is one with about three eyes and a good amount of flesh. When eyes are wide apart, a good sized piece of flesh can be obtained with one eye or two eyes, but sometimes eyes do not sprout and many misses in the field have been caused by using sets with only one eye or with too little flesh. There should be a perfect stand of potatoes in the field, and the surest way to get this is to plant sets with about three eyes, although often good results are obtained from sets with two eyes, and even one eye, if proper precautions are taken. If the potato vines are frozen after appearing above ground, there will be a much better after-growth from sets having several eyes, as a larger proportion of the sprouts will not have reached the surface. The crop grown from the seed or rose end of a potato will be earlier than that from the stem end, but there will usually be a larger proportion of unmarketable potatoes. Both, however, should be used in planting for the main crop. There is only one thing in favour of sets with few eyes, and that is, the fewer eyes to a set, as a rule, the smaller proportion of unmarketable potatoes there will be.

At the Central Experimental Farm the practice is to select good medium to large potatoes, true to type if possible, and make four sets out of the medium sized potatoes, cutting lengthwise and then across. The practice of using small potatoes from which to make the sets year after year is a bad one. It stands to reason that the better developed the potatoes are the stronger will be the shoots from them and the larger the crop. An interesting experiment was conducted by Dr. C. A. Zavitz, Experimentalist, O.A.C., Guelph, Ont. For eight years he planted large, whole potatoes, medium sized potatoes, and small whole potatoes side by side, and each year he used for seed the large potatoes from the crop produced by the large potatoes, the medium sized from the medium, and the small from the small. The average results for eight years were: large, whole potatoes, 199 bushels; medium sized whole potatoes, 173 bushels; small whole marketable potatoes, 116 bushels; and very small unmarketable potatoes, 99 bushels. These are very convincing results as to the value of using good seed year after year.

CUTTING THE SETS.

There are several potato cutters on the market, but while some of these are better than others, the most satisfactory way is to cut by hand.

Twice the amount can be cut in a given time and the sets will be more evenly divided, if the easily made potato cutter depicted in the drawing shown herewith is used instead of the old method of cutting with the knife held in the hand.

All that is required is to fasten a one-inch board, six inches wide, planed on the upper side, to the top of a barrel or box, holding it on tightly by two deep cleats. A

long, sharp, thin table-knife is fixed through the board in a slanting position, as shown in the illustration.

To cut, take the potato in both hands and push it lengthwise over the knife, dropping the sets into the barrel or box. Should the sets be too large, the juice of the potato will cause the two parts to stick together and they can then be cut either lengthwise or crosswise as desired.

CONDITION OF SETS WHEN PLANTED.

Many farmers cut their potatoes several days or perhaps weeks before planting time, at odd times, it may be, or during inclement weather when they cannot work outside. In another experiment conducted by Mr. Zavitz for eight years it was found that seed planted as soon as it was cut yielded on an average eight bushels per acre more than when they were left unplanted for four or five days. At the Central Experimental Farm, Ottawa, it was found that leaving the sets uncovered in the drills for from one to two days lessened the yields very much. The sets covered at once yielded at the rate of 308 bushels 18 pounds per acre; left uncovered one day, 202 bushels 13 pounds; uncovered two days, 155 bushels 48 pounds. It will be seen that the crop was reduced almost one-half by leaving the sets exposed in the field for two days, the variety being Early Rose. The relative yields will depend much on the condition of the weather. The first day the sets were exposed it was sunny and warm, the second was cloudy and cool. In the same experiments, potatoes which had been cut for one month and left in the root house were compared with potatoes cut and covered the same day. Those which were cut and covered the same day yielded 308 bushels 18 pounds per acre; those which had been cut one month, 165 bushels 45 pounds per acre, a difference of over 142 bushels 33 pounds per acre. This experiment was not continued at Ottawa, hence these are only the results of one year.

It will be seen from the foregoing how important it is to plant freshly cut seed. Unfortunately, owing to the scarcity of labour, farmers often have to cut their potatoes when they can. If potatoes have to be cut several days before planting it is well to know the best way to keep them. It has been found that by coating the potatoes as soon as cut with land plaster or gypsum, sets will keep better and the yields be increased.

INFLUENCE OF COATING FRESHLY CUT SEED WITH FINELY GROUND LAND PLASTER AND LIME.

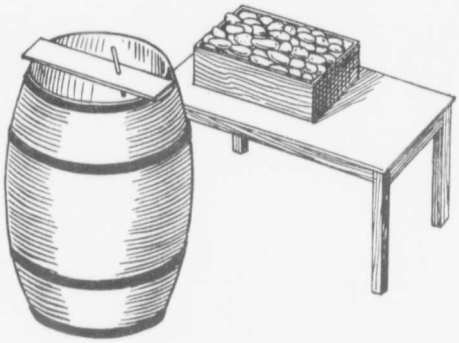
No continued experiments have been tried at the Central Experimental Farm in comparing the effect, on the yield, of sets covered with finely ground land plaster or gypsum and lime, but such experiments have been conducted at the Ontario Agricultural College, Guelph, Ont., with the following results, which show the importance of treating the seed in this way.

"The following table gives the average of twenty-two tests conducted for five years in treating freshly cut seed potatoes in different ways before planting:—

Treatment of Freshly Cut Seed Potatoes.	Weight of 30 largest potatoes per plot (lb.). Average 5 years.	Percentage of crop marketable. Average 4 years.	Yield per acre (bushels). Average 5 years.
Coated with ground plaster	13·9	81·1	214·4
Coated with slacked lime	13·6	78·9	200·6
Not treated	12·8	78·8	190·8

"The average results show that freshly cut potatoes which were coated with land plaster gave 23·6 bushels per acre per annum over those which were left untreated. The results from the sets treated with lime occupied an intermediate position between those from the sets treated with land plaster and those left untreated. In each of four

out of the five separate years the plaster-coated sets produced the highest total yield per acre, and also the highest percentage of marketable potatoes. The average weight of the largest potatoes produced from the coated seed was higher than that of those produced from the untreated sets.

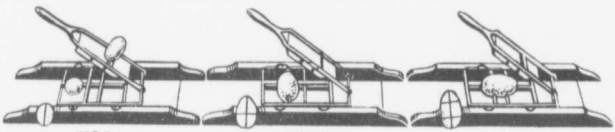


Method of cutting potatoes for seed.

Method of cutting potatoes for seed.

"Another experiment was conducted for seven years in succession in which finely ground brick and road dust were each used for coating freshly cut seed potatoes in comparison with land plaster. The average results of fourteen tests made in seven

years show the following yields of potatoes in bushels per acre per annum: untreated, 179·4; road dust, 186·0; ground brick, 189·5; and land plaster, 191·1.



Method of cutting potatoes for seed

Method of cutting potatoes for seed.

"In the average results for twelve years untreated seed gave an average of 184·1, lime coated seed, 199·3, and plaster coated seed, 200·8 bushels per acre per annum. The results varied somewhat in different years but in the majority of the tests the land plaster or gypsum gave better returns than slaked lime for coating the freshly cut seed tubers."

BEST DEPTH TO PLANT.

It is important to know the most economical depth to plant potatoes, as there is no doubt that different depths of planting will give different results, but there will not be the same results on all soils. The yield, however, is not the only point to be taken into consideration, the question of labour being important also. While shallow planting has given the best yields at Ottawa in loose, sandy loam soil, the most economical depth is from four to five inches for good loamy soils on account of the harrowing which is necessary to destroy weeds and which would drag out sets which were planted shallower. Sets should be planted deeper in soils likely to dry out than in others more retentive of moisture.

An experiment was conducted for seven years at the Central Experimental Farm in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. The sets had at least three eyes each and were almost uniform in size. The soil was sandy loam every year. Level cultivation was adopted and hence very little soil was thrown on the potatoes after they were covered at planting time. The sets were covered by the hoe, the work being very carefully done. Notes were taken on the depths at which the tubers were formed in 1899, 1900 and 1901, and it was found that most of them were within 4 inches of the surface of the soil even where the sets had been planted six, seven and eight inches deep. Where the sets were planted less than four inches deep nearly all the tubers were found between that and the surface of the soil. This test was begun in 1898 and in the following table the average results are given. The average is for six years only, as in 1903 the severe drought spoiled the experiment that year. The yields in this table represent, as a rule, the average from the yields of two varieties. Each variety was planted in one row 33 feet in length, the rows in the experiment being 30 inches apart. The soil was dug out to the proper depth with a spade for greater accuracy.

EXPERIMENT IN PLANTING POTATOES AT DIFFERENT DEPTHS IN SANDY LOAM SOIL.

Depth of Planting.	Average Yield per Acre, 6 years.	
	Bush.	Lb.
1 inch	466	2
2 "	380	57
3 "	405	19
4 "	393	59
5 "	387	20
6 "	377	5
7 "	307	20
8 "	284	1

It will be seen from the table that the potatoes planted only one inch deep gave by far the largest average yield. In every year of the six of which the average is given the potatoes planted one inch deep gave the highest yields. This is accounted for in several ways. The first inch or two of soil in spring is decidedly warmer than that below, hence the potatoes sprouted sooner. When the potato sprouted so near the surface, the nodes on the shoots would be nearer together than those lower down and as the tuber-bearing stems are produced at the nodes, the more nodes there were the more tubers there would likely be. In its wild state the potato bears the tubers near the surface of the ground. While there were a few more potatoes exposed to the sun when they were planted only one inch deep, the increase in yield far more than offset these and in the results which are given these green potatoes were not weighed with the others and are not recorded in the table. The sets were covered about one and a half inches more by cultivation during the season, so that they were eventually two and a half inches deep. It must be borne in mind that these results were obtained in loose, sandy loam soil. In stiff soils shallow planting might not have given as good returns. Much of the success of shallow planting will also depend on the moisture in the soil. Shallow planting will not give good results when it is dry at planting time. The only explanation that can be offered for the sets two inches deep producing less than those three inches deep, is that there would be less moisture two inches deep than at three inches deep, and the warmth of the soil, which would be less at two inches than at one inch, would be more than offset by this less amount of moisture. From three inches in depth the yields decrease regularly.

From the results obtained it would seem clear that where early potatoes are wanted, the sets should be planted shallow in the warm soil. Although the best results

have been obtained in sandy loam soil which was well supplied with moisture by planting only one inch deep, this method is not recommended for general field culture, Unless the surface of the soil is kept loose and free from weeds, the potato crop will not be large. In order to kill a large proportion of the weeds which grow, the ground should be harrowed once or twice before the potatoes come up or just as they are coming up, and if the sets were only one inch deep they would be dragged out, hence from 4 to 5 inches is the most satisfactory depth to plant.

DISTANCE APART TO PLANT.

It is important to know the most economical distance apart to plant the sets, so as to get the largest yields with the least amount of seed. Those varieties which have small tops may be planted a little closer than those kinds which are more vigorous. At the Central Experimental Farm an experiment has been conducted for eight years to determine the most economical distance apart in the rows to plant varieties of average vigour, and in the following table results are given. The table gives the average of seven years only as the very severe drought of 1903 interfered with the experiment that season. In most cases the results are based upon the average of two varieties each year, each grown in one row 33 feet in length.

EXPERIMENTS IN PLANTING POTATOES AT DIFFERENT DISTANCES APART.

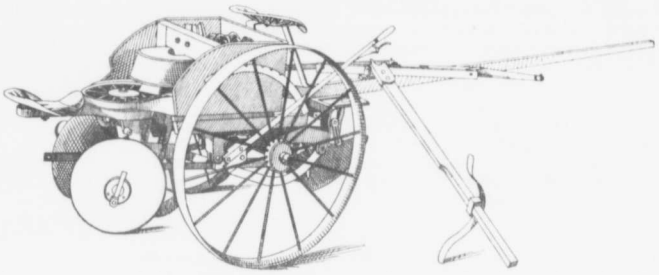
Distance apart of Sets.	Seed Required per Acre.	Average Yield per Acre, 7 years.		Average Yield per Acre after Deducting Seed.	
	Bushels.	Bush.	Lb.	Bush.	Lb.
10 inches apart	35	345	8	310	8
12 "	29	350	16	321	16
14 "	25	353	53	328	53
16 "	22	323	51	301	51
18 "	19	267	48	248	48

It will be seen from the above table that after deducting the seed used, the net average yield is greatest from the sets planted 14 inches apart. It is, therefore, recommended to plant most varieties of potatoes from 12 to 14 inches apart in the rows. The amount of seed used in this experiment may appear excessive to many farmers who cut to one and two eyes, but at the Central Experimental Farm it has been found best to use sets with a liberal amount of flesh. From our own experience and the experience of others, the best distance between the rows is 30 inches, or just enough to permit of easy cultivation, but if the distance were 36 inches from four to five bushels less seed per acre would be used. Where potatoes are ridged it may be advisable to have the rows a little wider apart.

PLANTING AND COVERING.

The best method of bringing the land into good condition having been discussed, also the time to plant, kinds of sets to use, depth and distance apart to plant, it remains before taking up the question of cultivation to say something about the actual planting itself. A common method among farmers is to open the furrows, drop sets by hand and close the furrows with an ordinary plough. This is not the best way. A better plan is to open the furrows with the double mould board plough, making them deep enough, so that when the potatoes are covered and the soil levelled the sets will be from four to five inches below the surface. The furrows may also be covered with this implement. When covered with either of these ploughs the soil should be levelled

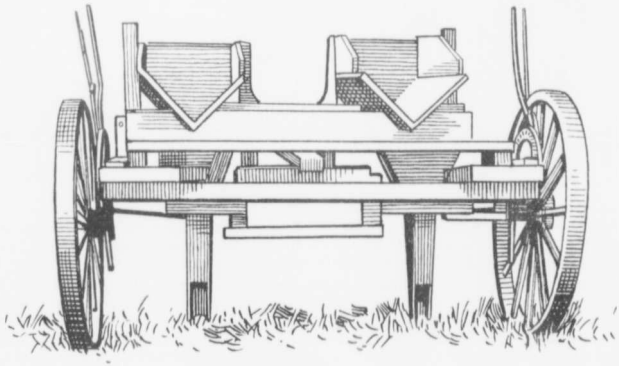
afterwards with the smoothing harrow. Some good growers use an implement with two concave discs for opening and closing the furrows, as, where clover is ploughed under, it is sometimes dragged out when the furrows are made with the plough.



Potato Planter.

The most satisfactory method of planting, however, for one with a fairly large or large area to cover, is with the potato planter, of which there are several good ones now on the market.

The potato planter makes the row, opens the furrows, plants or drops the sets, covers them and applies commercial fertilizers at the same time if desired. To do as much by hand would require a span of horses and a man to open the furrows with a plough, three men or boys to plant, and one man to scatter the fertilizer; and a span of horses and a man with a double mould board plough to cover the sets. There is a great advantage in using the planter, as there is no trouble with the clover, and in a dry time the results from planting with a planter are much better than by opening furrows and covering with the plough, as the set, when planting is done with the planter, is brought closer into contact with the soil and prevented from drying out. In a year, when there was a very severe drought, the writer heard of a case near Montreal where in a field of potatoes planted with a planter there was practically a perfect



Home-made Potato Planter.

stand, while a field of a neighbour just over the fence planted by hand and covered with a plough was practically a failure. If the planter is properly watched there will be few, if any, misses from sets not being dropped. In a very dry time when there is danger of the sets drying out, it is wise to roll the land before the potatoes are up, loosening it again with the harrow as soon as there is rain.

HOW TO CONSTRUCT A POTATO PLANTER.

DESCRIPTION OF A CONVENIENT, HOME-MADE IMPLEMENT THAT ANY FARMER MAY MAKE FOR HIMSELF.

The accompanying illustration shows a simple home-made implement, made by Geo. R. Barrie Galt, Ont., that farmers when planting potatoes, will find very convenient. The following description gives particulars, showing how the planter may be made and operated.

The main frame is 3 feet 6 inches by 5 feet, and made of hardwood planks 2 inches thick by 10 inches wide, bolted together at the corners. The spouts are made of heavy gas pipe, 14 inches long and 3¼ inches in diameter, tapered at the point like a cultivator tooth, so that they will not drag the sod or manure. The upper end of the tooth has a thread on it and is screwed into a piece of hardwood scantling 6 inches by 6 inches and 28 inches long, bolted firmly to the frame. The balance of the spout attached to the hopper is made of heavy zinc and is wider at the top for convenience in dropping in the potatoes. The spouts are placed 3 feet apart and the wheels are centered 18 inches from them, so that the one wheel comes back into its own mark, thus making all the rows the same distance apart. Should it be desired to have the rows closer together, the machine can be made on the same principle to suit any distance.

The wheels are the kind used on the old fashioned walking cultivators, with levers for raising and lowering. The ratchets on the levers should be small and close together, so that they can be moved up or down any desired distance. Gang-plough wheels with ratchets on the sides may also be used by elevating the frame to suit.

The wheels should be so placed that the machine will balance when two boys are sitting on the back. The boxes, holding one bushel of cut potatoes, are shaped like a mason's hod and held firmly in place in front of the top end of the spouts. The distance apart for dropping the cut potatoes is regulated by blocks, bolted on the spokes, which come in contact with a piece of light steel spring, which makes a noise so that the boys know when to drop the sets into the spout. A seat may be arranged directly behind the spouts for the comfort of those dropping the potatoes.

As soon as the potatoes are planted it is advisable to harrow the land so that any that are not deep enough may be covered. It is also advisable to harrow several times before the potatoes come up, the last harrowing to be just when the spouts are appearing. The harrowing will kill weeds and keep the crust broken to form a mulch to conserve moisture and warm the soil. In this way growth is encouraged and much time is saved in weeding of the potatoes after they are up.

ANOTHER HOME-MADE PLANTER.

A home made potato planter originating with Prof. J. Bracken, Agricultural College, Saskatoon, Sask., has given good satisfaction. The materials required are a gang plow, a length of stove pipe or sheet of tin, two bolts, some nails and a small rag. The seat of the sulky is taken off, then a hopper is made which will hold two or three bushels of potatoes and this is bolted to the seat post. The hopper has a board nailed over the bottom and this projects a few inches. A hole is left in front of the hopper over the board so that the potato sets can be easily flipped out by hand without pouring out in a flow on the operator. The length of stovepipe or sheet of tin is pinched in at the lower end, then wired in place so that the upper end is directly underneath the mouth of the hopper and the lower end just behind the share. The

sets dropped into this pipe drop in the centre of the furrow, and if a gang plow is used they are immediately covered by the rear plow. The white rag is tied to the sulky wheel for a timer. There is a box for the driver. The boy or man who regulates the rate of seeding sits with his back to the driver facing the hopper.

Six, seven or eight sets dropped while the white rag on the sulky wheel makes one revolution puts the sets the right distance apart. If used on a three furrow gang plow all the land would be ploughed as fast as it is planted; with only a two furrow machine a single furrow plow should follow the gang in order to put the rows at the right distance apart.

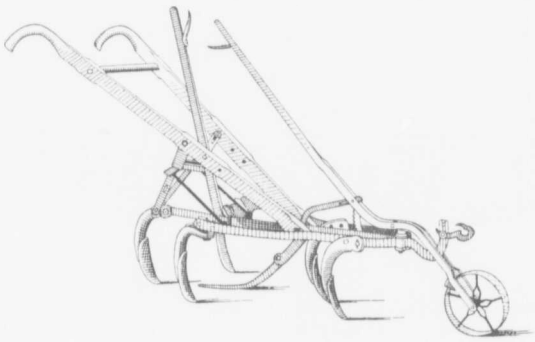
Home-made Potato Planter.

TILLAGE.

The success of the potato crop depends in a large measure on the kind of cultivation given. No matter how much the land has been manured and how carefully the sets have been planted, if the soil is allowed to become hard, the weeds permitted to grow apace, and moisture lost, which could be saved, the crop will be very much reduced. A few days after the sets have been covered by the plough and before the plants have been above ground, but not until the weed seeds have germinated, the soil should be harrowed with the smoothing harrow to level it and to kill the myriads of weeds which usually germinate about that season of the year. If possible, the soil should be harrowed twice before the potatoes are far enough up to be injured. If two harrowings are given there should be little trouble from weeds afterwards, and harrowing is a much more economical way of getting rid of them than by hand hoeing. As soon as the potatoes are far enough up so that the rows can be readily distinguished, the cultivator should be put in and the soil loosened between the rows to as great a depth as possible the first time and as near the sets as it is safe to go without disturbing them, so as to loosen the soil for the tubers. All future cultivations should be quite shallow to prevent injury to the roots and tubers. The soil should be cultivated every week or ten days, depending on the weather, the object being to keep the surface soil loose until the tops meet well between the rows. If the soil becomes baked evaporation of moisture will be very rapid. From five to six cultivations, or even more, are none too many and it will be found that the crop usually increases in proportion to the number of cultivations. A very careful series of experiments to determine the value of cultivation was carried on by Prof. I. P. Roberts, late Director of the Cornell Experiment Station. In one experiment the yield from six cultivations was 344·8 bushels, and from three cultivations 303·3 bushels, or a difference of 41·5 bushels. In another

case the yield from a plot cultivated six times, was 310·5 bushels, and from a plot cultivated three times, 269·6 bushels, or a difference of 40·9 bushels.

Conservation of moisture is very important in growing potatoes and thorough cultivation is one of the best ways to retain moisture. The potato vines would not suffer from drought, as they often do in the middle of summer, if the soil were properly prepared to begin with and well cultivated during the early part of the season. The vines must be kept growing thriftily from the time they appear above ground until autumn if a maximum crop is to be obtained. If growth is checked in the middle of summer the crop suffers and the tubers when they start to increase in size when the rains come are very likely to become misshapen. The accompanying cut represents a good type of cultivator. A good cultivator is very essential in growing potatoes.



LEVEL *versus* RIDGE CULTIVATION.

The ridging of potatoes is an old method and is the practice usually followed in Great Britain and Europe at the present time and also in America, although level cultivation has been growing in favour in America during the past fifteen or twenty years. Ridging was probably adopted in the first place for the main purpose of affording good drainage as in most climates it is important not to have the potato in soil which is very wet. Soil is also warmer when ridged and in cool or moderately cool climates the increase in the warmth of the soil by ridging is favourable to the crop. The condition for the development of shapely tubers is also better in the loose ground which the moulding up of the soil affords. Potatoes are dug much more easily in soil which is ridged or hilled up than where level culture is adopted.

Many farmers owing to lack of help and sometimes through lack of knowledge, give no further attention to their potato crop after the beetles are killed and when haying begins, and as an end to the culture for the season they ridge up just before haying. There is no doubt some advantage in ridging over leaving the soil level when such conditions prevail, as the ridging will give the tubers loose soil to develop in, while the soil would soon get hard if left flat and not cultivated.

There are districts in Canada where the climatic conditions in summer are not very unlike those in Great Britain. In such districts ridging will probably as a rule give better results than level culture. There are, however, large areas where droughts are liable to occur and where conservation of moisture is a very important factor in obtaining a good crop. In such districts the best results will probably, as a rule, be obtained if thorough and deep working of the soil be given and by adopting level cultivation. The reason is easily apparent. The evaporation of moisture is not as great from

level soil as from soil in ridges. Few experiments seem to have been tried for comparing level with ridge cultivation, but in the drier parts level culture has, as a rule, given the better results. It should be clearly understood, however, that unless the soil is well worked the better conditions of the soil for the development of tubers when it is ridged will offset the advantage of retaining more moisture by level cultivation. An experiment was conducted at the Central Experimental Farm for four years for the purpose of comparing level with ridge cultivation in the soil at the Farm, which is almost ideal soil for potatoes, being a friable sandy loam which does not dry out. In 1900, 1901 and 1902 two varieties were used in this test, the Everitt and Carman No. 1 in 1900, and Early Sunrise and Carman No. 1 in 1901 and 1902. In 1904 Carman No. 1, Burnaby Mammoth, Maule Thoroughbred, Reeves Rose, Prolific Rose, and Canadian Beauty. The average yield per acre of all the varieties under test is given in the results for each year:—

LEVEL *vs.* RIDGE CULTIVATION, SOIL MOIST, FRIABLE, SANDY LOAM.

Method of Culture.	1900.		1901.		1902.		1904.		Average 4 years.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Level	743	23	374	7	457	36	419	28	448	38
Ridge	555	37	414	4	518	15	393	48	470	26

Average yield per acre in favour of ridging, 21 bushels 48 pounds.

This experiment resulted in 21 bushels 48 pounds in favour of ridge cultivation in the moist, sandy loam at Ottawa. There was only one summer out of the four which was dry, and that was in 1901, but that year ridging gave an increase of practically 40 bushels per acre more than level culture. In 1904, the only year when level cultivation gave the best results, three out of the six varieties gave best results from ridging. Further experiments in this direction are necessary.

It would be advisable for each farmer to try for himself whether level or ridge cultivation gives the better results under the conditions on his farm.

MULCHING POTATOES.

No systematic experiments have been conducted at the Central Experimental Farm in mulching potatoes, but this method has been tried by a number of experimenters, some of whom report favourably and some unfavourably on it. In some cases heavy yields have been recorded by mulching. The condition of the soil has very much to do with success or failure. If potatoes are mulched early in the season the soil may be kept too cold making the conditions bad for the development of a good crop of tubers. To mulch heavily enough to save all cultivation by preventing weeds from growing and conserving moisture, requires too much material and is not profitable. The best and most economical results are obtained by mulching lightly between the rows after the last possible cultivation. This will help very much to conserve moisture in a dry time. Very good yields are sometimes obtained by simply preparing the ground thoroughly, laying the sets on the surface and then mulching with straw. Very shapely tubers of large size are sometimes obtained thus. In new settlements where the soil is shallow and difficult to work fair crops might be obtained by mulching in this way.

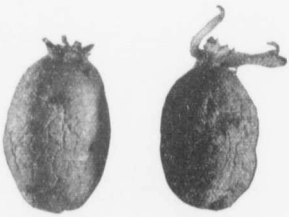
"SPROUTING" BEFORE PLANTING FOR EARLINESS AND INCREASED YIELD.

Where there is a demand for early potatoes it is important for the potato growers to know how he can hasten the development of the tubers, as the sooner the potatoes are on the market in good condition the more money he will make out of them as a rule. The method usually adopted by the best growers is to use an extra early variety and

"sprout" the potatoes before planting. Medium-sized tubers are selected before they have begun to sprout and placed in single layers in shallow boxes or trays with the seed end up. The boxes are then put in a bright, airy cool place, where the temperature is low enough to prevent sprouting. After a few days the potatoes will turn green and the skin becomes much tougher than before the potatoes were exposed. The potatoes are now given a little more heat, but still kept in a bright, airy place. From the seed end will now develop two or three strong sprouts and the object of exposing the potatoes at first to toughen the skin is now apparent, for most of the eyes do not start and practically the whole strength of the potato is concentrated in a few sprouts at the end. This is what is desired, as the fewer sprouts there are the larger proportion of marketable potatoes there will be. If the potatoes are given plenty of light and the place where they are kept, fairly cool, the sprouts will become very sturdy and strongly attached to the tuber and will not be broken off in handling unless very carelessly used. Tubers will develop more quickly from sprouts made slowly in a bright cool place than from sprouts which have grown rapidly in a dark place, and furthermore, the yields will be much heavier. Potatoes which sprout in the dark are, moreover, very difficult to handle, as the sprouts break off very easily. It is not absolutely necessary to place the potatoes with the seed ends up as very satisfactory results are obtained when potatoes are emptied indiscriminately into shallow boxes or trays and then treated as already described. The sprouts should be about two inches in length at time of planting. If longer the sets are more difficult to handle.

The warmest and best drained soil that can be obtained should be used for extra early potatoes and the sets should be planted shallow so that they will get the advantage of the heat from the surface soil. The potatoes are planted whole, as they do not rot as readily as cut pieces, and the sprouts also have more to draw on. The sprouts are, of course, left uppermost when the potato is planted. As most extra early varieties have small tops the sets may, as a rule, be planted a little closer than for the main crop.

By planting the potatoes whole quite a large quantity of seed per acre is used, some growers using as much as 40 bushels, but this is much more than offset by the early and increased crop. The potatoes are planted just as soon as the soil is dry enough to work, and there is no danger of very severe frost, but as considerable risk has to be taken from frost everything possible should be done to prevent the young plants from being frozen. A very good plan, if there is danger of frost, is to plough a light furrow turning a little soil over the plants which, as a rule, will be sufficient to protect them. This may be removed afterwards with the harrow or in some other way. Moderate ridging is, as a rule, better than level cultivation in growing extra early potatoes in Ontario and Quebec, as the soil is rendered warmer and the development of the tubers hastened.



Sprouted in the light. Sprouted in the dark.

An experiment was conducted at the Lacombe Station in 1915 with sprouted versus unsprouted sets. The sets were placed in a box and exposed to sunlight about ten days before planting. The sprouted sets appeared above the ground and came in bloom one

week earlier and continued to show superior vigour and growth throughout the entire season. The yield from the sprouted sets excelled that secured from the unsprouted by more than 50 per cent.

The following results were obtained at the Central Experimental Farm, Ottawa, in 1916.

Variety.	Sprouted.			Unsprouted.		
	Total yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.	Total yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.
	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.	Bush. lb.
Early varieties—						
Crines Lightning	563 48	529 48	34 0	354 18	289 54	64 24
Irish Cobbler	227 12	153 54	73 18	164 36	100 12	64 24
Early Rose	322 06	254 06	68 0	261 18	139 36	121 42
Medium to late varieties—						
Table Talk	193 12	136 0	57 12	168 08	73 18	94 48
Dalmeny Hero	246 0	193 18	52 42	182 36	100 12	82 24
Brydon	177 12	141 24	35 48	185 18	85 06	100 12

RATE OF DEVELOPMENT OF TUBERS, SHOWING IMPORTANCE OF KEEPING POTATO TOPS GREEN.

No more striking proof is afforded of the importance of keeping the potato tops green and the plants growing thriftily well into the month of September than the results obtained by Prof. L. R. Jones, at the Vermont Agricultural Experiment Station, by digging potatoes at different dates and estimating the yield per acre. This experiment is recorded in Bulletin No. 72 of the Vermont Station. It is a simple experiment and one which every farmer should try for himself. Following is the table showing the results obtained:—

YIELD OF TUBERS AT DIFFERENT DATES—WHITE STAR POTATOES PLANTED MAY 20.

Date of Digging.	Total Yield per Acre.	Yield of Marketable Size.	Average Size of Tubers.
	Bushels.	Bushels.	Ounces.
August 2	58	30	1·6
12	115	75	2·9
22	230	163	3·7
September 1	304	234	4·4
12	356	303	5·2
22	379	353	5·7

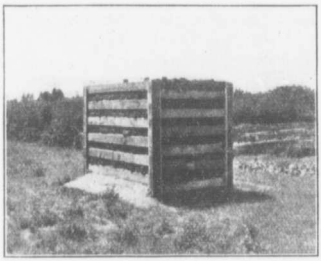
It will be seen that 119 bushels per acre of marketable potatoes developed during the month of September. In the province of Ontario many fields of potatoes are dry and brown by September, either through lack of cultivation or from disease. Not only is the yield of potatoes much increased by keeping the vines green well into September, but the quality of the potatoes is much improved also. When potatoes are killed early in the season, many of the tubers are immature. In a previous chapter we have tried to show the importance of good cultivation in maintaining a vigorous growth through the early part of the season; in the chapter on Insects and Diseases it will be shown how the tops may be kept green through the latter part of the season.

GROWING POTATOES IN CRATES OR PENS.

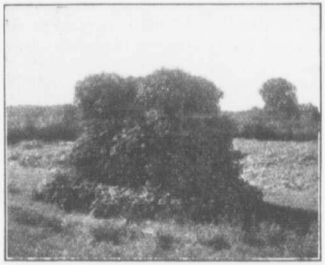
Early in the summer of 1917, articles appeared in Canadian newspapers in which a novel method of growing potatoes was described by which it was claimed a very large yield could be produced, as much as 42,000 bushels per acre having been said to have been obtained by the originator of the system. These articles appear to have been based on one which appeared in the *New York Times*, in which a method followed by R. E. Hendricks, Kansas City, Mo., was described.

Briefly, the plan consisted of growing potatoes in a large pen or crate-like structure filled with soil and in which potato sets were planted. The size of the pen in which potatoes were said to have been grown at the rate of 42,000 bushels per acre was 6 feet in depth, 6 feet in width, and 8 feet in length.

As there was much interest in Ottawa in 1917 in growing vegetables on small areas, and in order to learn what could be grown in a pen of this size, one was constructed at the Experimental Farm. Six-inch boards were nailed to four corner posts, the boards being left six inches apart to leave space for the plants to grow through, the whole forming a crate of the dimensions above. Rich loamy soil was thrown in and large potato sets having three or more good eyes were planted one foot apart opposite the openings between the boards, the sets being thus six inches by one foot apart. There were six such openings all around the crate, or, in other words, there were to be six rows of potatoes, one above the other. In addition, the sets were planted one foot apart over the top of the crate. A little sod was used along the openings at the sides and ends to prevent the soil from falling out. There were 181 sets planted,



Potato pen C.E.F. after planting—June, 1917.



Potato pen C.E.F.—August, 1917.

which weighed 42 pounds. In order to ensure an abundant supply of moisture all through the crate, six upright lines of three-inch tiles went from the bottom to the top of the crate at equal distances apart, the tiles being blocked at the lower end to prevent the water getting away there. These tiles were filled with water from time to time, and the moisture reached the soil through the joints of the tiles.

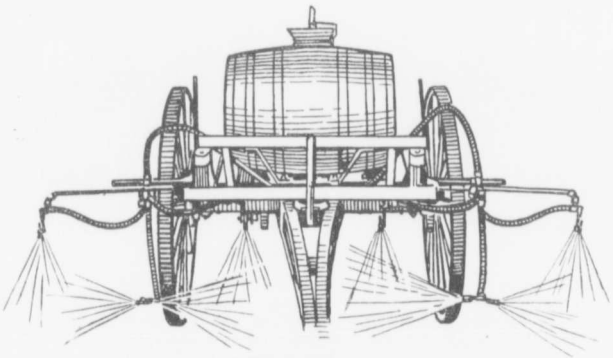
The planting was done on June 16, and would have been done before but that it was not until about this time that attention was drawn to this method. As the plants did not appear through the openings between the boards along the sides and ends as soon as expected, an examination was made, and it was found that the shoots, instead of coming out, were growing straight up behind the boards, hence it became necessary to bend each one towards the opening, after which they grew well and eventually the whole crate was well covered with vines. The plants were kept thoroughly sprayed to prevent injury from insects and late blight, and were still green when killed by frost on October 8. The potatoes were dug on October 17, when 81 pounds 4 ounces of marketable and 12 pounds 4 ounces of unmarketable tubers were harvested. If

the yield per acre is estimated on the basis of the number of square feet of the surface of the earth covered by the crate—namely, 48 square feet—the yield would be at the rate of 1,229 bushels per acre marketable and 185 bushels per acre unmarketable, or a total yield per acre of 1,414 bushels. But the fact remains that 42 pounds of seed were planted and only 81 pounds 4 ounces of marketable potatoes were harvested, which is a very small return for the amount of seed planted and the labour involved. The potatoes were practically all found within six inches of the surface of the soil, whether on the top or along the sides or ends of the crate.

From the experience gained from one year's trial, this is not a practice to be recommended, and, while the method of planting was not quite the same as that described in some of the articles referred to, where it was suggested to plant sets all through the crate, yet considering the small yields from the plants which got abundance of light, there would be little gained by planting sets, the stalks of which would have to grow several feet to get to the light, and without plants with leaves, or with the few leaves that could develop when the plants reached the surface, the number of tubers from each set must be very small indeed.

PROTECTING POTATOES FROM INJURIOUS INSECTS AND FUNGOUS DISEASES.

The leaves of the potato vine must be kept intact and in a thrifty condition if a maximum crop is to be obtained, and both insects and diseases should and can be fought and conquered if the well-known and thoroughly tested preventatives and remedies are used.



Potato Sprayer.

Spraying for the Colorado potato beetle should not be delayed until the vines are badly injured, but preparation should be made to spray as soon as the larvæ or young bugs hatch. In about a week after the eggs are laid the young beetles or larvæ appear and begin to devour the foliage with a rapidity which is only too well known. The last brood of larvæ, which disappear into the soil before severe frost, pupate there, remaining in the ground in the form of perfect insects until the following spring. Fortunately, there are good remedies for this insect in Paris green, arsenate of lead, and other insecticides. The importance of preserving the foliage as nearly intact as possible has already been impressed on our readers. It is well known that the loss in a crop where the vines have been allowed to be devoured by potato beetles is enormous,

the crop sometimes being scarcely worth digging. The longer the spraying is delayed the greater loss there will be. If cheap help can be obtained it will be advisable to spray the vines when they are quite small, or pick off the old beetles before they have deposited their eggs, but if help is scarce it may not be possible to do this, and the temptation to leave the old "bugs" alone is great, as they do little injury to the foliage. Unfortunately, on perhaps the majority of farms, nothing is done to destroy the potato beetles until the foliage is noticed partly eaten. This is too late. By the time the poison takes effect the vines are badly injured and the future crop much lessened.

Potato growers should not wait until the vines are injured, but should be on the look-out for the young "bugs," and as soon as they appear an application of some good insecticide should be made. As the eggs are not all laid at the same time, the larvæ do not hatch all at the same time, and it is usually necessary to spray several times before they are all killed. As it is important to kill the beetles as soon as possible, an insecticide which will act quickly is desirable and also one that will adhere to the foliage. Paris green and arsenate of lead are two of the best poisons to use. Paris green should be applied in the proportion of 8 ounces or more Paris green to 40 gallons of water, with about 4 ounces of lime to neutralize the effect of free arsenic on the foliage. Four ounces of Paris green to 40 gallons of water will kill the insects, but does not act as quickly as eight ounces. If applied dry, a good proportion is 1 pound Paris green to 50 pounds slaked lime, land plaster or any perfectly dry powder. The dry mixture should be applied when the vines are wet, so that it will adhere better. There are strong advocates for both the wet and the dry mixtures. Wet mixtures may be put on at any time when the weather is fine, but, if the best results are to be obtained dry mixtures should be applied only when the dew is on the foliage. If the dry mixture is put on when the foliage is moist it will adhere better than the wet mixture and will also be more evenly distributed. Arsenate of lead paste used in the proportion of two to three pounds to forty gallons of water, or powdered arsenate of lead at the rate of 1 to 1½ pounds adheres better to the foliage than Paris green and is a good poison to use. It does not appear to kill quite so rapidly as Paris green, and a mixture is recommended of 8 ounces Paris green and 1½ pounds of paste arsenate of lead to 40 gallons of water. "Bug Death" dry and also in the proportion of 1 pound to 2 gallons of water, has been found a good insecticide, but is more expensive than Paris green.

The cucumber flea-beetle frequently does much harm to the potato crop, and being so small, is often not seen, but the result of its depredations will be found in the many small holes which may be noticed in the leaves and in the lessening of the crop on this account. Spraying with Bordeaux mixture and arsenate of lead will control this.

It is found that the parts of the leaves which are injured by the flea beetle make suitable lodging places and points for germination of the spores of the early, and possibly, late blight. We believe that keeping vines covered with Bordeaux mixture and Paris green is the best preventative in this case.

THE EARLY BLIGHT OR LEAF SPOT DISEASE AND THE LATE BLIGHT OR ROT.

Although much of the premature killing of potato vines is due to the early blight, which is frequently mistaken for the late blight, the latter is by far the more serious disease, as it spreads with much greater rapidity and in addition to the killing of the tops causes the rotting of the tubers.

The late blight usually appears between the middle of July and the first of August, though sometimes earlier or later, depending on the season and part of Canada. The strong and disagreeable odour from a potato field where the late blight is at work is familiar to all, and although it is too late to get the best results after the disease has begun to spread rapidly, it may sometimes be checked by thorough spraying at that time. The loss from blight is usually greatest from the main crop on late varieties, as the early potatoes are usually well advanced before the conditions are the most favourable for the rapid development of the disease. The

weather which appears to favour the spread of the late blight, is what is usually known as "muggy," or close days with much moisture in the air. With these conditions myriads of spores germinate, and the disease spreads through the tissues of the leaves and destroys them with great rapidity. The object of spraying is to protect the leaves with the Bordeaux mixture so that if the spores germinate they are killed by it.

In the following table will be found the average results obtained at the Central Experimental Farm for the years 1901, 1902 and 1904. Some varieties of potatoes are much less subject to blight than others:—

	1901. Average Yield per acre of Marketable Potatoes Sprayed four times, and Unsprayed.		1902. Average Yield per acre of Marketable Potatoes Sprayed four times, and Unsprayed.		1904. Average Yield per acre of Marketable Potatoes Sprayed five times, and Unsprayed.		Average Yield per acre of Marketable Potatoes Three Years Sprayed, and Unsprayed.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Sprayed	333	43	310	12	369	21	337	45
Unsprayed	233	11	189	54	306	39	243	15
Average increase in yield per acre of marketable potatoes from spraying	100	32	120	18	62	42	94	30

The cost of spraying potatoes with Bordeaux mixture is not large compared with the great increase in yield from the use of it.

As it would be sometimes necessary to spray with Paris green about the time of the first application of Bordeaux mixture, these could be put on together, hence the expense of one spraying with Paris green may be deducted. The average increase from spraying three years has been shown to be 94½ bushels. At 60 cents a bushel, this is $56.70, or after deducting $13, the approximate cost of spraying, a net profit of $43.70 per acre. As a good spray pump can be obtained for less than this amount, the price of a pump would be more than saved on one acre in one season. It has been found that one spraying only, if applied just when the disease begins to spread, has been found to give very satisfactory results, and the more the disease is studied the safer it will be to reduce the number of applications to two or three, but for the ordinary farmer it is wise to begin spraying about the middle of July, and keep the vines covered until September, and it will usually take at least four applications to accomplish this. Other preventatives have been tried, but none has given as satisfactory results as Bordeaux mixture made as described under the formulas for spraying. The illustration showing sprayed and unsprayed potatoes demonstrates the advantage of spraying to protect the foliage from blight. The vines on the unsprayed plot were dead eighteen days before those on the sprayed.

The results of spraying at the Central Experimental Farm in 1910, on plots of one-forty-fourth of an acre each were as follows:—

	Yield per Acre.	
	Bush.	Lb.
Sprayed with Bordeaux mixture	234	40
Not sprayed with Bordeaux mixture	117	20
Sprayed with Soda Bordeaux (Burgundy Mixture)	190	18
Not sprayed with Bordeaux until August 1st	200	12

Experiments with "Bug Death," which were reported on in the annual reports of the Central Experimental Farm for 1902 and 1904, did not give nearly as satisfactory results as Bordeaux mixture. "Bug Death" and Bordeaux mixture together did, however, give better results in 1904, than Bordeaux mixture alone. This combination was tried only one season, hence no definite conclusions can be drawn.

METHODS OF APPLYING SPRAY MIXTURES.

A good spray pump is considered an absolute necessity with every progressive fruit grower, but there are few farmers who yet own one. It has been proven by experiments at the Central Experimental Farm that more than the price of a good spray pump can be saved in one year on one acre by spraying potatoes with Bordeaux mix-

Spray Pump.

ture to prevent blight or rot, but a spray pump is useful for other purposes than applying liquid mixture to the potato crop. Many farmers have some fruit trees or bushes which need spraying and a spray pump is very useful and necessary in treating them. A pump may also be used to whitewash or paint barns, outbuildings and fences, it having been found that one of the most economical methods is to use a spray pump. It may be used for disinfecting stables, cleaning vehicles and washing windows. No farmer and no potato grower should be without a good spray pump. Good pumps suitable for most purposes cost from about $25 upwards; cheaper ones may be obtained, but are not as satisfactory, and it is much more economical to get a good one to begin with. One great advantage that a good pump has over a poor one is that the operator can develop more power with it. The accompanying cut represents a spray pump mounted on a special cart for spraying purposes:—

Spraying is not sprinkling. A spray should be applied in the form of a fine fog-like mist, and this only can be obtained with a good pump and a good nozzle, the latter being almost as important as the former. When spraying, the object is not to put on so much liquid that it will run down the leaves, but just enough to cover the leaves evenly and well, as the insecticide or fungicide must be evenly distributed over the leaf so that every part will be protected if the best results are to be obtained. A fine spray will envelop the leaf, protecting the underside as well, which is important. If the spray is coarse and much of it is applied the liquid will run down the leaf carrying

with it the fungicide or poison and this accumulating at the tips of the leaves often causes burning and injury to them. It is also very wasteful to apply the liquid in a coarse spray.

Potato spraying attachments are now made for most good sprayers and from four to six rows can be sprayed at one time. The latest devices have the nozzles arranged so that the vines may be sprayed from beneath as well as above, which is important, as all parts of the plant above ground should be protected. With these attachments one man and a horse can get over a large area in a day. This is not always the most economical way to do, as for instance, if a nozzle or nozzles should become clogged the machine may go for some distance before this is noticed and there will be a patch left unprotected where the potato beetles can work and the late blight may get a strong foothold, or perhaps the cart will jolt. Thoroughness is very essential, both in spraying for the potato beetle and for blight. A wise plan, if a four or six row attachment is used, is to have a man or boy on the back of the sprayer watching for any clogging of the nozzles. A method, though a little slower than that mentioned, is to spray two rows at one time, a man or a boy driving and one sitting at the back holding a hose and nozzles in each hand. By this method one can direct the spray better and can immediately note and fix a nozzle, if it should become clogged. In this way the work is more certain to be thoroughly done, and thoroughness, especially when disease or insects are very troublesome, is better than speed. The distance apart of the rows should be regulated at time of planting, so that the horse and wheels of the cart will come between the rows. Many home-made machines for spraying are used, but most of these are very wasteful of material and the liquid is put on in so coarse a spray that it runs down the leaf and most of the poison is washed off or down to the tip. There is no doubt that much of the difficulty in killing Colorado potato beetles is due to the fact that the poison is not evenly and thoroughly distributed over the leaves. There is the same defect with the watering can, which is an article which has been used in spraying potatoes for many years. There is no doubt that the reason why the dry application of Paris green for the prevention of the Colorado potato beetle is preferred in many places to the liquid is that when applied dry, the poison is more evenly distributed. Various shakers and blowers have been invented for applying poison dry.

The effectiveness of an application of an insecticide or fungicide will be in proportion to the thoroughness with which the mixture is applied. Every part of the leaf left unprotected may mean a foothold for insects or disease.

FORMULAE RECOMMENDED.

Bordeaux mixture.—For Early and Late Blight, and for Flea Beetles:—

Copper sulphate (bluestone)	4 to 6 pounds.
Unslaked lime	4 "
Water (1 barrel)	40 gallons.

Dissolve the copper sulphate by suspending it in a wooden or earthen vessel containing four or five or more gallons of water. It will dissolve more quickly in warm water than in cold. Slake the lime in another vessel. If the lime, when slaked, is lumpy or granular, it should be strained through coarse sacking or a fine sieve. Pour the copper sulphate solution into a barrel, or it may be dissolved in this in the first place; half fill the barrel with water, add the slaked lime, fill the barrel with water and stir thoroughly. It is then ready for use. It is important not to mix the lime water and the sulphate of copper solution before diluting.

A stock solution of copper sulphate and lime wash may be prepared and kept in separate covered barrels throughout the spraying season. The quantities of copper sulphate, lime and water should be carefully noted.

Soda Bordeaux (Burgundy mixture).—For early and late blight:—

Copper sulphate (bluestone)	6 lb.
Washing soda (carbonate of soda)	7½ "
Water (1 barrel)	40 gallons.

Dissolve copper sulphate as for Bordeaux mixture. Dissolve 7½ lbs. washing soda in four gallons of water. Pour the copper sulphate solution into a barrel; half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda Bordeaux adheres better to the foliage when freshly made than ordinary Bordeaux mixture, but it deteriorates rapidly in this respect and must be used as soon as made. If left to stand for twenty-four hours it will have lost nearly all its adhesiveness. The Soda Bordeaux is not recommended in preference to the ordinary Bordeaux mixture, but where lime cannot be obtained it may be used with good results. Furthermore, on account of its freedom from gritty matter there is less likelihood of the nozzle becoming clogged when it is used. As washing soda is considerably more expensive than lime this mixture costs more than the ordinary Bordeaux mixture.

For Colorado potato beetle.—Add 8 ounces of Paris green to the above formula or 3 pounds of arsenate of lead paste, or 1½ pounds dry arsenate of lead; or a mixture of 8 ounces Paris green and 1½ pounds of arsenate of lead paste or half the amount of dry.

Paris green.—For Colorado potato beetle:—

Paris green	8 oz.
Unslaked lime	4 oz.
Water	40 gallons.

A less quantity of Paris green, say 4 ounces to 40 gallons of water is sufficient if the insects have just hatched. Make a paste of the Paris green before diluting, by mixing a little water with it. It will not settle as quickly in the barrel if this is done.

Arsenate of lead.—For Colorado potato beetle:—

Arsenate of lead paste, 2 to 3 lbs., or dry, 1 to 1½ lbs.	
Water	40 gallons.

Arsenate of lead varies considerably in the amount of arsenic it contains, some brands being poorer than others, hence two to three pounds to forty gallons of water are recommended.

Make the arsenate of lead into a thin paste by the addition of a little water, preferably warm, before diluting. Arsenate of lead adheres better to the foliage than Paris green and its use is recommended on this account, but as it does not appear to kill as rapidly as Paris green a mixture of 8 ounces Paris green and 1½ pounds arsenate of lead paste to 40 gallons of water is suggested.

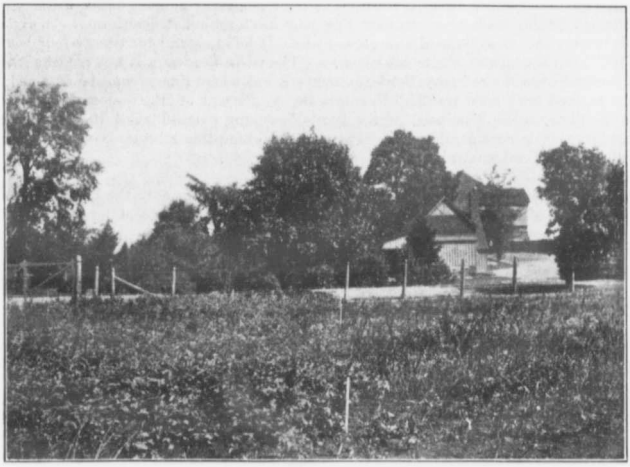
Dry mixture.—One pound Paris green with 50 pounds flour, land plaster, slaked lime or any other perfectly dry powder.

Corrosive sublimate and formalin solutions.—For Potato Scab or Rhizoctonia, soak the tubers before planting, either:—

I. For 3 hours in a solution of Corrosive Sublimate 1 oz. in water, 12 gallons. When dry cut up for planting.

II. For 2 hours in a solution of commercial formalin (Formaldehyde) 8 oz. in water, 15 gallons; or 1 oz., in water, 2 gallons.

Formalin has the advantage of being neither poisonous nor corrosive, while Corrosive Sublimate is a fatal poison if taken internally. It also corrodes metals. The solution should therefore be made in wooden or glazed vessels. It appears, however, to be more effective than formalin. Tablets may be procured at any druggist of such a size that one dissolved in a quart of water gives a solution of 1 to 2,000. All treated seed potatoes should be planted, and any solution left over should be poured into a hole in the ground. Selection of sound tubers is desirable as treatment is not always effectual.



Potatoes sprayed to prevent late blight. Unsprayed potatoes.

Other insecticides and fungicides.—There are a number of insecticides and fungicides now offered for sale under various names, but none of those which have been tested at the Central Experimental Farm has been found as satisfactory to use as those we have recommended, although some of them have proven effective.

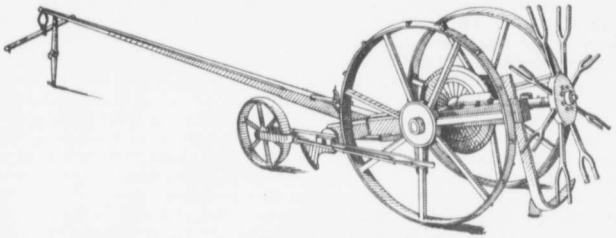
Importance of having Good Materials and Preparing the Mixtures Properly.—The importance of having good materials cannot be too strongly impressed upon potato growers. Great losses may occur from having an insecticide or fungicide of poor quality. The mixture should be carefully prepared. Unless a mixture or solution is made properly and applied at the right time it may have little or no effect and the time and materials are lost. There may also be injury to the vines.

DIGGING POTATOES.

If potatoes have not been affected with late blight or rot the best time to dig them is as soon as the tops have died, if the weather is favourable. Potatoes are usually dug just after the corn is harvested or before the frost becomes severe enough to freeze the soil to a depth of an inch or so. This time of digging is usually chosen as a matter of convenience and quite irrespective of when the stalks die, as the latter dry up in many places about September 1, and often before, and the potatoes are

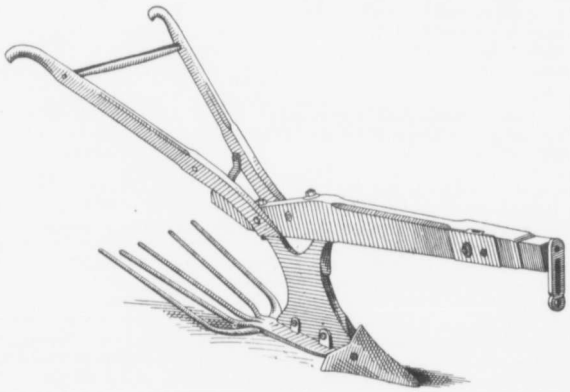
frequently not dug until about a month afterwards. When the soil is well drained and not wet there is not much danger to the crop by leaving it in the ground for this length of time, but if there is no disease the sooner they are dug the better.

Potatoes which have been killed by late blight will usually rot as soon as the conditions are favourable, and for this reason a diseased crop is better left in the ground as the tubers which are diseased will most of them show signs of rot before



Potato Digger.

they have to be taken up on account of frost and they need not be picked up at all. If diseased potatoes are dug and stored as soon as the tops are dead, the disease will be almost certain to develop in the pit or cellar and healthy tubers will rot from contact with the diseased ones. It is not good practice to dig diseased potatoes early and pile them in the field. It is better to delay digging as long as possible and then put the potatoes in a cool, well ventilated cellar where the disease may be checked. Potatoes in wet soil should be dug sooner than those in that which is drier and well drained.



Potato Digger.

Potatoes should be dug in dry weather so that when they are taken to the cellar or store-room they will be perfectly dry. If the tubers are housed when wet the conditions become very favourable for the development of the disease which may affect them and for the rotting of the healthy potatoes from contact with those thus affected.

Where there are large areas to be dug a good potato digger is essential. Not only will a potato digger raise the crop more economically than a fork or plough but with it the grower is more likely to get his crop dug and picked up while the weather is fine, which is a great consideration. There are a number of good potato diggers now on the market which will dig up and leave on the surface of the soil practically all the tubers.

Next to a good potato digger a fork-like attachment to a plough does the best work. That in the illustration is one used at the Central Experimental Farm with very fair success. The fork is attached to the side of the plough and not to the point, in which it differs from some others. Being attached to the side, it prevents much clogging from the potato tops as the rows can be ploughed from the side. There are some potatoes left in the ground even when this attachment is used, but not nearly as many as with the plough.

The following description of how this digger is made may prove useful:

Take the mouldboard off a good strong plough and use the land side as a foundation to which attach the fork which extends behind. This fork should be constructed of ½-inch or ⅝-inch iron, should consist of five prongs, each about two feet long, and should stand at the back about one foot from the ground, when the plough is on the level. These prongs should start off about two inches apart and end up about three inches apart, the two outside prongs being the highest; and further, the two outside prongs where they jut or bow from the stem should be sharpened or flattened so as to present a cutting edge where they would naturally get into the soil and follow behind the plough.

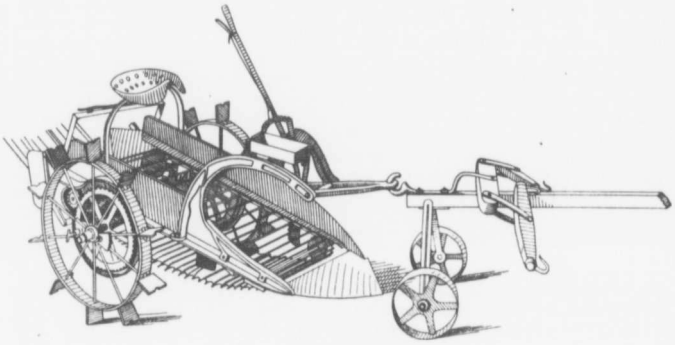
Ploughing potatoes out has become quite a common method among farmers since help began to get scarce and it was difficult to get men to dig, but in ploughing them out there is always a large number of potatoes left in the ground and the additional labour required to pick up these potatoes which are scattered all over the field is considerable.

The old-fashioned yet thorough way of digging with the four tined potato fork is too slow and expensive a method now that good men are difficult to get and wages are so high, but where these do not have to be taken into consideration as good or better work is done by a man than by any implement. A man with a fork will dig little more than half an acre a day. A good potato digger will dig from three to five acres a day.

STORING POTATOES.

Potatoes should be stored dry in a cool, well ventilated cellar which is perfectly dark. There is no doubt that great losses occur every year from the careless storing of potatoes which are put in wet in comparatively warm and poorly ventilated cellars and piled in great heaps, giving almost ideal conditions for the development of the disease which may be in them and very favourable conditions for rotting. The expense of putting in a good system of ventilation in a cellar would be soon offset by the better condition in which the potatoes would keep, and hence the more profit there would be from them. If it is not considered wise to go to this expense every effort should be made to have as good a circulation about the potatoes as possible. Instead of piling the potatoes against the wall or on the floor, slats should be nailed a little apart about six inches or more from the wall. This will give a circulation of air behind the pile. A temporary floor should be put down about six inches above the permanent floor with cracks between the boards. This will permit air to circulate under and through the pile. Then if the piles have to be made very large, square ventilators of wood made of slats and running from the top to the bottom of the pile could be put in here and there through the pile. These with the ventilation afforded

at the sides and bottom will keep the potatoes in much better condition than if they were in a solid pile. Another good plan is to keep the potatoes in large crates made with slats close enough together to prevent the potatoes getting out. The ventilation between these crates would assist very much in keeping the tubers in good condition. Thousands of bushels of potatoes are lost every year when there is disease in the crop, by neglecting ventilation. The temperature of the cellar or store-house should be kept as nearly 33° to 35° F. as possible. The cooler potatoes are kept without freezing the better. It has already been stated how much the value of the tubers for seed is lessened by sprouting, but they are also much injured for eating. Moreover, if the potatoes are held over to sell in the spring there will be a great deal of shrinkage in weight if potatoes are allowed to sprout. It is important to have some means of letting cool air into the cellar towards spring when it is difficult to keep potatoes from sprouting. The cool air should be let in at night when the temperature is lowest and the cellar kept closed during the day.



POTATO DIGGER.

Sometimes it is difficult to get all the crop to the cellar at digging time and when this is the case they may be put in piles of forty or fifty bushels and covered with straw with a little earth on top to keep them dry, more earth being put over the straw if the weather becomes cold. If the potatoes are diseased, however, it is not safe to pile them in this way and even if they are healthy, piling in the field should be avoided if at all possible, as the crop is much easier to handle afterwards in the cellar than outside in the cold, perhaps inclement, weather. If potatoes are found to be diseased at digging time a good plan is to fix up a place in the barn where it is quite dry and where frost can be kept out for a time and spread the potatoes out in as shallow piles as possible. The place should, however, be made perfectly dark as potatoes soon deteriorate very much in quality if exposed to light.

New settlers in the prairie provinces have difficulty in storing their potatoes before they get a good cellar, and older settlers sometimes have not sufficient accommodation. The following description of a pit made and used successfully for several years in Manitoba, should be of assistance to those requiring such a place for storing potatoes.

STORING POTATOES OUTSIDE.

To store about 1,000 bushels, a hole in the ground 14 feet wide, 4 to 4½ feet deep, and about 30 feet long will give ample space. The sides and ends of the hole may be

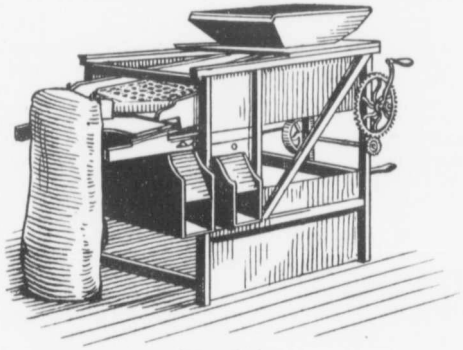
lined with boards to prevent earth from falling in, though the earth may be braced back with poles if boards cannot be readily obtained. Fill the hole to a height of 3½ feet with potatoes, then place logs along the sides and ends to hold back the earth thrown out and for supports for the poles of the roof. The depth of this side log and elevation in centre of roof is to be left as an air space and no straw or rubbish whatever is put on top of the potatoes. A roof is made with poles placed close together. There should be but a slight elevation at the centre of the roof.

When the poles for the roof are in place there should be a little hay thrown over them to keep the soil from falling through. The roof should now be well sodded and some of the loose earth which was dug out of the hole shovelled over the sods to make about 1 foot deep of earth and sods. Another foot of well rotted, dry horse manure will be sufficient during the coldest winter. The natural ground heat from the bottom will keep the temperature fairly even. In a pit this size there should be three ventilators each about 4 x 6 inches made of boards, one at each end and one in the centre. These should be put in when roofing. These are closed in the very cold weather with old sacks, and empty boxes then turned over them, when the weather becomes frosty; the centre ventilator may be kept closed all the time. There should be no potatoes directly under the end ventilators as the drip of water from them might cause the potatoes to rot. A thermometer can be let down any time to test the temperature. In a pit of this kind the temperature should not go much below 40° F. It is advisable to have a small space at one end to get to the potatoes in the spring. This should be sunk as deep as the pit and roofed over as the pit, and can be kept filled with manure or old bags during the winter to prevent frost getting in.

An inexpensive, outside root cellar used at the Rosthern Experimental Station is described, and plans for which are illustrated, in Exhibition Circular No. 71 of the Experimental Farm Series.

MARKETING.

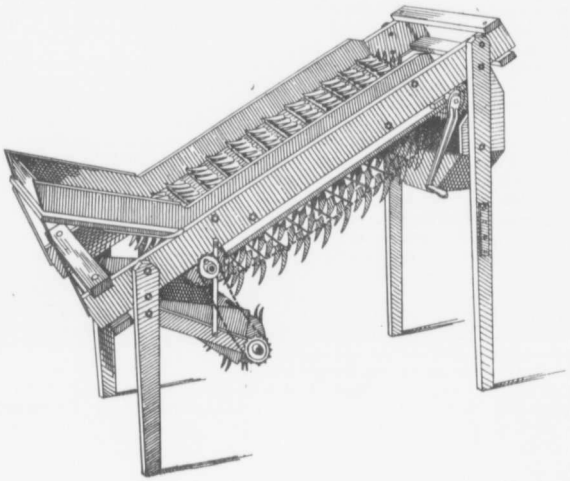
There is usually more profit, taking one year with another, in selling potatoes as soon after digging time as possible. While occasionally when rot has been bad and the crop short throughout the country and one happens to have perfectly sound tubers it may pay to hold them over, yet on the whole it is wiser for the grower to sell at a



Potato Grader.

fair price in the autumn as he thus avoids all the anxiety regarding the keeping of the crop and does not take any risk from probable losses.

Some of the varieties of potatoes which are poor in quality are freest from blight, hence these are becoming popular with some potato growers. Some of the potatoes of best quality, however, are also freest from blight. We believe that leaving everything else out of consideration it will pay a potato grower to grow varieties of good quality which are equally or more productive than those perhaps a little freer from blight, and spray them with Bordeaux mixture. He would then be in a position to offer the very best potatoes to his customers who would soon appreciate those of better quality. The question of how to market potatoes depends so much on local conditions that it is not considered desirable to go very fully into it here. The practice of the



Potato Grader.

best growers is to sort and bag the potatoes just before they are ready to market them. Good machines for sorting and removing the sprouts from potatoes can now be obtained which lessens the labour very much.

IRRIGATION OF POTATOES.

By W. H. Fairfield, M.S., *Superintendent, Experimental Station, Lethbridge, Alta.*

There is an impression more or less general that potatoes grown with irrigation are apt to lack in quality; that when cooked they are inclined to be soggy or watery and less mealy and dry than are potatoes raised without the aid of irrigation. That there are grounds for this belief cannot be denied, for, if the crop is irrigated in a careless manner and too much water is applied, the resulting crop is almost sure to be poor in quality, as just pointed out. However, by using reasonable care and intelligence, this trouble may be easily avoided. To begin with, the land should be in good tilth. There is probably no better preparation than to summer-fallow the land the season previous to when the potatoes are to be planted. If an application of manure could be given before the land is ploughed for the summer-fallow, so that it would have a chance

to rot during the summer, the yield of the following crop would be materially increased. Another quite satisfactory method is to manure the land in the spring and then raise a grain crop to be cut for green feed. This will leave the land relatively clean for the potatoes. As soon as a farmer on an irrigated farm has enough alfalfa seeded down so that he can afford to break up a four or five-year-old field to plant his potatoes on, he will have a field that will be certain to give large returns.

As indicated above, to avoid the possibility of producing potatoes of poor quality, care must be exercised as to when and how the crop is irrigated. It probably requires more skill and experience to raise potatoes successfully under irrigation than any other crop commonly grown here at the present time. The secret appears to lie in being able to keep the plants growing vigourously from the beginning with no set-backs, and on the other hand in being able to apply the water so that too sudden growth will not be stimulated at any time. If possible, the first irrigation should not only be very light, but it should not be given until the small potatoes are set and are perhaps the size of peas. This stage is usually about the time the first blooms appear. If the crop is wet before this time there is danger of the plants setting more potatoes than they will be able to develop to a marketable size. To be sure that the potatoes are not wet too much when the first irrigation is given, it is well to run the water between every alternate row only and turn it off just as soon as it gets through so as not to let the ground soak up any more than is necessary. As soon as the ground dries sufficiently, the land should be given a shallow cultivation. About ten days after the first irrigation, the second should be given. This time, the water may be run down between all the rows and should be allowed to remain running until the land is well wet. After irrigation has once begun, the land should never be allowed to dry out completely. Unless heavy showers intervene, it will be found necessary, in order to maintain this condition, to irrigate about every ten days. After each irrigation, as soon as the surface of the soil dries sufficiently, it should be given a shallow cultivation. If, for any reason, after irrigation has once begun, the land is allowed to become relatively dry, the potatoes should not again be irrigated, for, if they are, a second growth is almost certain to be induced, and this will injure the quality, for the main cause of soggy potatoes being produced when grown under irrigation is from allowing the land to become somewhat dry so that the growth is checked and then applying and inducing a fresh growth of roots and tops.

COST OF GROWING POTATOES.

The cost of growing potatoes varies in different parts of Canada. Labour is more expensive in some provinces than in others. In certain parts of Canada there are no Colorado potato beetles to contend with and rarely any serious injury from late blight, making spraying not so important a part of the operations. In 1915 the cost of growing potatoes was recorded at several of the experimental farms and stations and following are the details as published in the annual report of the Experimental Farms for 1916. These are preceded by a table giving the estimated cost of growing and marketing one acre of potatoes in the province of Ontario with the object of obtaining at least 300 bushels per acre; and also by a table giving the cost of growing one acre of potatoes in the Acre Profit Competition in Ontario in 1916:—

ESTIMATED COST OF GROWING AND MARKETING ONE ACRE OF POTATOES IN THE PROVINCE OF ONTARIO WITH THE OBJECT OF OBTAINING, AT LEAST, 300 BUSHELS PER ACRE.

Rent of land, one year		$ 3 00
*Cost of 12 pounds clover seed at 25 cents		3 00
Barnyard manure, 12 tons at $1 (¼ exhausted in one year)		4 00
Ploughing in spring		2 75
Disc harrowing twice		1 00
Harrowing once with smoothing harrow		20
Drilling, 2½ hours at 40 cents		1 00
**Seed, 25 bushels at 60 cents		15 00
Cutting seed, one day		2 00
Planting seed, one day		2 00
Covering, 1¼ hours at 40 cents		50
Harrowing twice with smoothing harrow		40
Cultivating six times, one horse and man, 15 hours at 35 cents		5 25
Hoeing once, one day		2 00
Poison and bluestone		10 00
Spraying three times with poison, horse and men, 6 hours at 55 cents		3 30
Spraying four times with Bordeaux mixture, horse and two men, 8 hours at 55 cents		4 40
Digging, 3½ hours at 40 cents		1 33
Picking up potatoes, 2½ days at $2		5 00
Storing 4 loads, 4 hours at 40 cents		1 60
Sorting and marketing, 4 days at $2	$8 00	12 00
Team part of 2 days at $2	4 00	
Wear and tear on machinery and interest on money		85
		$80 58

* Clover sown with previous crop and ploughed under in the autumn.

** The price of seed in 1917 was about $3 per bushel hence $60 should be added to the cost for seed in that year.

The cost of growing an acre of potatoes as given in the preceding table is large, but this is fully justified by the results which should be obtained if it is incurred. If the best methods are followed there should be no difficulty in getting 300 bushels per acre. The amount of seed recommended, namely 25 bushels, may seem large to many farmers who are in the habit of using from 10 to 12 bushels, but if the larger sets are tried, the results based on experience at Ottawa will, as a rule, fully justify the extra amount of seed. The estimate of the value of the seed, if based on the season of 1917 would, of course, have been much larger, but 60 cents a bushel is considered a fair average. The importance of having vigorous, healthy seed cannot be too often impressed on potato growers. When a potato planter is used, which places the sets in close contact with the soil and moisture, the sets need not be so large and the item for seed would be reduced. If a potato planter were used the cost of planting would also be considerably reduced. The prices for insecticides and bluestone vary considerably from year to year. If they are bought in large quantities the price is less than when a few pounds only are obtained. The cost of application will also vary according to the method employed, that given in the table being

considered a maximum amount. It is thought best to estimate the various items of expense on a small, rather than a large, acreage as the majority of farmers grow only a few acres of potatoes.

If one desired to estimate how much it cost to grow a bushel of potatoes in Ontario in 1917 it would not be fair to figure on the basis of 300 bushels per acre, but rather on the average yield per acre, which is 114 bushels per acre. The average farmer would not be likely to use more than 18 bushels of seed per acre, if as much; he would not spray to prevent late blight which would lessen the cost by about $13 per acre and there would only be about half the cost for picking, storing and marketing as is charged against a 300-bushel per acre crop.

COST OF GROWING ONE ACRE OF POTATOES, IN ACRE PROFIT COMPETITION IN ONTARIO, 1916.

The Ontario Department of Agriculture, through its district representatives, conducted an acre profit competition with potatoes during 1916. These are open to young men who have taken the four week course in agriculture conducted by the district representatives.

Following will be found the yields obtained by the eight winners and the cost of production. In estimating the cost of operation $5 per acre was allowed for the rent of the land, $2 for ploughing, 15 cents an hour for manual and 10 cents an hour for horse labour. We have not the details in regard to all the charges made in growing these crops but it will be noticed that the charge for manual and horse labour is considerably less than the estimate in the preceding table. The item for sorting and marketing may not be included, nor the $3 for clover seed to produce the crop to plough under and a considerably less quantity of seed than twenty-five bushels was, doubtless, used.

POTATOES.

(Price of Seed, $1.00 per Bush.)

County.	Winner.	Yield.	Cost of Production.	Profit.
Middlesex	William S. Courtis, R.R. 2, Mt. Brydges	320	44·67	275·33
Sudbury	Napoleon Chenier, Hamner	295	38·55	256·45
Renfrew	Arthur Griese, Beachburg	288	41·25	246·75
Rainy River	Herbert C. Nixon, Emo	300	63·08	236·92
Algoma	John Wm. Simpson, Sault Ste. Marie	285	48·10	236·90
Timiskaming	Leonard Nickle, Hanbury	208	63·14	144·86
Grenville	Chas. L. Ferguson, R.R. 3, Spencerville	161	47·55	113·45
Northumberland	J. Arthur Down, R.R. 1, Hilton	70	53·87	16·13

Cost of Growing One Acre of Potatoes.

Experimental Station, Charlottetown, P.E.I., 1915.

One-half of an acre was planted with Irish Cobbler, an early variety, and another one-half acre along-side was planted with Green Mountain, a main crop variety of potatoes.

Details with Cost.	Variety.	
	Irish Cobbler.	Green Mountain.
Number of acres	½	½
Rent of land at $3 per acre	$1 50	$1 50
Share of manure at the rate of 25 tons per acre	2 50	2 50
Use of machinery at 60c. per acre	0 30	0 30
10 bushels of seed at 50c. per bushel	5 00	5 00
Ploughing and ribbing, autumn 1914, 2½ hours at 34c	0 85	0 85
Harrowing in autumn, 2 hours and 36 minutes at 34c	0 97	0 97
Discing in spring, 37 minutes at 41c. per hour	0 25	0 25
Harrowing in spring, 1 hour at 34c	0 34	0 34
Rolling one-third hour at 34c. per hour	0 11	0 11
Cutting sets, 4 hours and 25 minutes labour at 17c. per hour	0 75	0 75
Planting, 1 hour at 34c. per hour	0 34	0 34
Planting, 1 hour at 17c. per hour	0 17	0 17
Spraying, 1 hour and 10 minutes at 34c. per hour	0 40	0 40
Spray material, 7 applications (Poisoned Bordeaux)	2 98	2 98
Hoeing, 5 hours manual labour at 17c	0 85	0 85
Cultivating, 3 hours at 27c. per hour	0 81	0 81
Cultivating, 2 hours and 20 minutes at 34c	0 80	0 80
Picking potatoes, 20 hours at 17c. per hour	3 40	3 40
Digging and harrowing, 1 hour and 17 minutes at 34c	0 44	0 44
Hauling 2 hours at 27c. per hour	0 54	0 54
Storing, 7 hours at 17c. per hour	1 19	1 19
Cost per plot	$24 49	$24 49
Cost per acre	48 98	48 98
Yield of potatoes per plot	128 bush. 43 lb.	151 bush. 10 lb.
Yield of potatoes per acre	257 " 26 "	302 " 20 "
Cost to produce 1 ton of potatoes	$6 47	$5 40
Cost to produce 1 bushel of potatoes	0 19·03	0 16·2

Experimental Station, Fredericton, N.B., 1915.

Seed, 21 bushels at 60 cents per bushel	$12 60
Cutting seed at 10 cents per bushel	2 10
Ploughing land twice at 32 cents per hour	3 20
Harrowing twice	0 64
Harrowing in manure with disc harrow	1 28
Manure, 16 tons at $1	16 00
Applying manure with spreader	2 72
Fertilizer, 400 pounds applied in row when planting	6 37
Planting, man, boy and team, 3 hours	1 41
Cultivating 5 times, 7½ hours at 25 cents	1 87
Horse hoeing (hilling), 3 times, 4½ hours at 32 cents	1 44
Hand hoeing (partially), 15 hours at 18 cents	2 70
Weeding (partially), 2 hours at 18 cents	0 36
Spraying, six times at $1.25	7 50
Digging, man and team, 4 hours	1 28
Picking up potatoes, 5 men, 5 hours each at 18 cents	4 50
Delivering from field, man and team, 3 hours	0 96
	$66 93
Cost per bushel, to grow ..cents.	27·95

The total yield from the acre was 239·25 bushels, of which 220 bushels (80 barrels) were sold out of the field at $1.75 per barrel for table stock and the balance (7 barrels) of small and bruised tubers were sold for poultry feeding at 50 cents per barrel. The sale value of the crop was thus $143.50, which, after deducting the cost of production, left a profit balance of $76.57 for the acre.

Experimental Station, Ste. Anne de la Pocatière, Que.

Seed, 28 bushels at 35 cents per bushel	$ 9 80
Rent of land at $3 per acre	3 00
Use of implements at 60 cents per acre	0 60
Cost of one-third of an application of 24 tons manure per acre at $1 per ton	8 00
First autumn ploughing, 2 horses at 34 cents, 10 hours	3 40
Disc harrowing in autumn, 2 horses, 10 hours at 34 cents	3 40
Ploughing in spring, 2 horses, 10 hours at 34 cents	3 40
Disc harrowing, 2 horses, 5 hours at 34 cents	1 70
Harrowing with smoothing harrow, 2 horses, 2 hours at 34 cents	0 68
Drilling, 2 horses, 5 hours at 34 cents	1 70
Planting, hand work, 45 hours at 17 cents	7 65
First harrowing, 2 horses, 2 hours at 34 cents	0 68
Second harrowing, 2 horses, 2 hours at 34 cents	0 68
Hoeing and weeding, 1 horse, 10 hours at 27 cents	2 70
First spraying, 10 ounces Paris green, 2 pounds arsenate of lead in 40 gallons water	0 95
Spraying, hand work, 5 hours at 17 cents	0 85
Transporting the insecticide, 2 horses, 3 hours at 34 cents	1 02
Hoeing and cultivating the soil, 1 horse, 10 hours at 27 cents	2 70
Second spraying, 6 pounds lime, 6 pounds sulphate of copper, 12 ounces Paris green, 40 gallons water	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	0 85
Hoeing, 1 horse, 10 hours at 27 cents	2 70
Third spraying, insecticide and Bordeaux mixture	1 35
Transporting the spray mixture, 2 horses, 3 hours at 34 cents	1 02
Hand work, 5 hours at 17 cents	0 85
Digging, 2 horses, 10 hours at 34 cents	3 40
Hand work, 80 hours at 17 cents	13 60
Picking and storing, 40 hours at 17 cents	6 80
Cartage, 2 horses, 5 hours at 34 cents	1 70
Hand work, 10 hours at 17 cents	1 70
Total cost	$89 25
Total yield per acre	301 bushels.
Cost per bushel, to grow	29·98 cents.

Experimental Station, Lennoxville, Que., 1915.

Rent of land at $3 per acre per year	$ 3 00
Cost of labour: (a) Two horses at 8 cents per hour per horse	11 68
(b) For manual labour at 17½ cents per hour	32 20
Cost of manure at $1 per ton	10 00
Cost of seed	16 41
Cost of spraying materials	4 72
Total cost	$ 78 01

Receipts.

Total value of salable potatoes, one acre at 60 cents per bushel	$152 88
Value of unsalable potatoes at 15 cents per bushel	2 17
	$155 05

Statement of Profit and Loss.

Total value of crop as above	$155 05
Total cost of production	78 01
Total net profit	$ 77 04
Net cost of producing one bushel of 60 pounds	0 29

Experimental Farm, Brandon, Man, 1915.

	Bushels Marketable.	Bushels Non-Marketable.	Total Bushels.	Value of Seed at $1.00 per bushel.	Cost of Cutting and Planting.	Cost of Harrowing and Cultivating.	Cost of Spraying.	Cost of Harvesting.	Total Cost.	Value of Marketable tubers at 50c. per bush.	Value of Non-marketable tubers at $3.00 per ton.	Total value.	Net Profit per acre.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
¼ Acre, Table Talk	40·15	5·816	45·966	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
¼ Acre, Early Bovee	49·78	7·016	56·796	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total for ½ acre.....	89·93	12·832	102·762	10 30	6 80	1 06	3 30	19 45	40 91	.....	.....	.....	.....
Total for 1 acre.....	179·86	25·66	205·52	20 60	13 60	2 12	6 60	38 90	81 82	89 93	2 31	92 24	10 42

Cost per bushel to grow, 45.49 cents.
Value of manual labour, 19½ cents per hour.
Value of horse labour, 7 cents per hour.
Value of poison spray (Paris green), 40 cents per pound.

Experimental Farm, Indian Head, Sask., 1915.

An exact record was kept of the labour on an acre plot up to the time the potatoes were stored away in the root cellar. The total, including seed and rent of land, amounted to $84.15. The yield of marketable potatoes was 401 bushels, which brought the cost practically *21 cents per bushel.* A walking plough was used for opening up the drills, and also for ploughing out the crop. By the use of modern potato machinery, which would be employed in planting large areas, the cost could be considerably reduced.

Experimental Station, Scott, Sask., 1915.

A 1-acre field was planted with potatoes, half with the Gold Coin and half with the Everitt.

Rent of land, one year	$ 3 00
Barnyard manure, 12 tons at $1 per ton (½ exhausted in one year)	4 00
Ploughing in early spring, 10 hours at 33 cents per hour	3 30
Packing, ⅔ hour at 33 cents per hour	0 22
Harrowing twice, 1 hour at 33 cents	0 33
Making and covering drills, 9 hours at 33 cents per hour	2 97
Seed, 25 bushels at 50 cents per bushel	12 50
Cutting and planting sets, 4 men, 9 hours at 19 cents per hour	6 84
Harrowing and packing after planting, 1 hour at 33 cents	0 33
Harrowing twice later, ⅔ hour at 33 cents per hour	0 26
Cultivating three times and hilling, 9 hours at 26 cents per hour	2 34
Ploughing out, 1 man and horse, 6 hours at 26 cents per hour	1 56
Picking up, manual labour, 56 hours at 19 cents per hour	10 64
Storing, 2 men and team, 5 hours at 53 cents per hour	2 65
Total cost	$50 94
Cost of growing, one bushel	24·03
Yield per acre, Gold Coin ..bushels	227
" " Everitt "	197
Average "	212

Experimental Station, Lacombe, Alta., 1915.

May	12—double harrowing, 1 man and 4 horses	1 hour.
"	13—furrowing, 1 man and team	2½ "
"	13—covering, 1 man and team	2½ "
"	13—planting, 2 men	10 "
"	13—cutting potatoes, 1 man	8 "
"	20—packing, 1 man and 2 horses	1 "
June	4—harrowing, 1 man and team	1 "
"	22—harrowing, 1 man and team	1½ "
Oct.	5—digging, 1 man and 4 horses	2¼ "
"	5—digging, 8 men	7½ "
"	5—hauling, 2 men and team	4 "

Cost Items.

1 man and 4 horses, 3¼ hours	$ 1 56
1 man and 2 horses, 12¼ hours	4 17
1 man and 1 horse, 2¾ hours	0 74
Manual labour, 98 hours	19 60
Formalin used on seed	1 25
Seed used, 22 bushels at 50 cents	11 00
Rent of land	2 00
Total cost	$ 40 32
Cost to produce and put in cellar, per bushel	14·66
Returns, 1,650 pounds at 40 cents per bushel	110 07
Profit on 1 acre	69 75

POTATO GROWING CONTEST FOR BOYS IN CARLETON AND RUSSELL COUNTIES, ONTARIO, 1912-1916.

The potato is not only a very useful crop but a very interesting one as well, and its cultivation appeals to boys, hence it is one of the best crops to use in a field competition, as the interest of a large proportion of the competitors is likely to be maintained. This has been well demonstrated in a most successful competition which has been financed by Mr. R. B. Whyte, Ottawa, in the counties of Carleton and Russell since 1912, the writer being a member of the committee formed to help in the work. In order that this example may, perhaps, lead to competitions of a somewhat similar nature being inaugurated in other parts of Canada, some details in regard to it are herewith given. These have been furnished by Mr. L. H. Newman, Ottawa, secretary of the committee in charge of the competition, and from whom further information can be obtained.

Objects.—1. To stimulate an interest among the boys in farm work by showing them that there is more in the soil than is ever gotten out of it, and that by proper methods the profits from crop raising may often be immensely increased.

2. To give the boys something definite to do, and to encourage a friendly rivalry among them.

3. To pave the way toward the formation in each county of some definite organization such as a potato-growing association or club.

4. To provide a simple means of instructing and directing boys in the first principles of successful farming; namely, proper soil cultivation, seed selection, methods of planting and cultivation, rotation of crops, use of implements, and the great importance of keeping careful farm accounts.

Prizes.—In order to arouse special interest and to keep up the enthusiasm, substantial prizes were offered in each county by Mr. R. B. Whyte, of Ottawa, who took the initiative in inaugurating the competition.

These prizes were as follows:—

First prize—$15 and silver medal.
Second prize—$12 and silver medal.
Third prize—$10 and silver medal.
Fourth prize—$8.
Fifth prize—$6.
Sixth prize—$4.

Plot Inspection.—Plans were also laid to have each boy receive instructions on his own plot through Mr. W. D. Jackson, of Carp, representative of agriculture for Carleton county, a member of the competition committee, who undertook to visit each competitor and to submit a report on the field work of each. These reports were used in awarding the prizes.

Instruction of Competitors.—In order to assist competitors in their work, an eight-page booklet entitled, "Directions for the Culture of Potatoes," was prepared and sent to them.

Rules Governing Competition.—1. Competitors must not be under twelve or over eighteen years of age on May 15, the day that entries to the competition close.

2. Each competitor must operate a potato plot of exactly one-tenth of an acre.

3. The variety grown must be of good cooking quality. Such varieties as Carman No. 1, Vermont Gold Coin, or Green Mountain are recommended. Where the competitor desires to operate with any variety other than those specified above, he must submit the name of such variety to the committee for approval.

4. Each competitor must do all the work himself, except in the case of the younger boys, who may be assisted with such work as ploughing, etc.

5. An accurate account must be kept showing the expenses and profits of the enterprise. This will include rent of land, cost of labour, seed, manure, spraying, etc.

6. Scale of charges to be used by each competitor: Rent of land, $3 per acre; each horse, 10 cents an hour; each man, 20 cents an hour; stable manure, $1 per ton; seed at market price per bushel; spraying material at current prices.

7. A record of such matters as date of planting, variety planted, etc., must be kept by each competitor, who will be supplied with blank forms for this purpose. Where such record is supplemented by a short history or story of the work, due credit will be allowed in making the awards.

8. The plot of each competitor will be inspected during the growing season by a member of the committee, who will judge it according to a certain scale of points. The score awarded for field culture will be considered in making the final awards as below indicated.

9. The digging and weighing of the crop must be supervised by a school teacher, justice of the peace, clergyman or other qualified individual, who will certify as to the correctness of the report of yield.

10. One bushel of tubers, properly labelled and representing the average quality, smoothness and size of tubers produced shall be sent to the county fair at Richmond in September. The score awarded by the judge on this exhibit will be considered in awarding the prizes.

11. The prizes will be awarded on the following basis:—

(*a*)	Report of inspector on thoroughness of field culture, etc.	100 points.
(*b*)	Certified report of yield as submitted by competitor	100 "
(*c*)	Award of judge on one bushel exhibit sent to county fair	100 "
(*d*)	Written report of competitor as called for in Sections 5 and 7	100 "
	Total	400 "

Score used in judging tubers at county fair:—

1.	Purity of variety	10 points.
2.	Uniformity	10 "
3.	Size	10 "
4.	Smoothness	10 "
5.	Shape	5 "
6.	Nature of skin	5 "
7.	Colour	10 "
8.	Freedom from disease	15 "
9.	Quality	25 "
	Total	100 "

SOME RESULTS OF THE CONTEST.

The interest in the contest has been well maintained during the past five years and the results have been most encouraging. The number of competitors who completed the work in 1916 was smaller than usual owing to the weather being too wet for planting and later extremely dry. The contest has taught the boys that by proper care, even in unfavourable seasons, a good crop can be obtained.

The yields from the plots worked by the boys have been much above the average of the counties during the years of the contest. The following figures speak for themselves:—

Year.	Number of competitors who completed work.	Highest yield per acre in:	Average yield per acre in:	Highest cost per bushel in:	Lowest cost per bushel in:	Average cost per bushel in:
		Bush.	Bush.	Cents.	Cents.	Cents.
1912	22	540	307	55	9·8	25
1913	31	450	240	81	14	35
1914	27	650	320	49	12	22
1915	27	639	310	48	7	20
1916	14	420	247	67	15	32

AVERAGE YIELDS PER ACRE OF MOST PRODUCTIVE POTATOES AT EXPERIMENTAL FARMS AND STATIONS IN CANADA WITH VARIETIES RECOMMENDED.

EXPERIMENTAL FARM, OTTAWA, ONTARIO.

TWELVE MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.			Yield per acre marketable.			Yield per acre unmarketable.		
	Bush.	Lb.	Oz.	Bush.	Lb.	Oz.	Bush.	Lb.	Oz.
Dalmeny Hero	379	19	0	288	51	6	90	27	6
Table Talk	357	30	0	295	01	0	62	29	0
Dalmeny Regent	347	36	0	272	35	0	75	1	0
Brydon	326	42	0	256	57	9	69	44	6
Dobbie Prolific	321	45	0	271	2	6	50	42	0
Scottish Triumph	300	2	0	228	56	6	71	6	0
Davies Warrior	293	29	0	242	26	6	51	2	6
Brydon Beauty	283	54	0	224	24	0	59	30	0
Wee MacGregor	281	13	0	186	47	0	94	36	0
Scott	278	53	0	206	43	0	72	9	9
Empire State	277	23	0	222	25	0	54	57	0
Up-to-date	273	49	0	216	48	0	57	1	0
Average of four years.									
Moreton	349	38	0	295	16	0	54	21	0

Varieties recommended.—Early: Irish Cobbler (Eureka Extra Early) and Early Ohio for market gardeners where extreme earliness is desired. Main crop: Green Mountain, (including Gold Coin, Carman No. 1, and Wee MacGregor, which are very

similar to it), and Empire State. Dalmeny Hero, Table Talk, Dalmeny Regent and Brydon are all promising British varieties, the seed of which cannot be generally obtained but which retain their vigor better at Ottawa than some of the varieties recommended and hence yield better over a five year period without change of seed. Irish Cobbler and Green Mountain, for instance, while not appearing in this table yield very well when new seed is obtained frequently.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.	Yield per acre marketable.	Yield per acre unmarketable.
	Bush. Lb.	Bush. Lb.	Bush. Lb.
Table Talk	487 35	401 09	86 26
Selina Burbank	403 13	336 54	66 19
McIntyre	395 35	331 16	64 19
Dreer Standard	375 35	331 47	43 48
Empire State	368 34	302 45	65 49
Lion Paw	356 11	314 12	41 59

Varieties recommended.—Early: Early Rose, Irish Cobbler. Main crop: Green Mountain, Table Talk, McIntyre. For Bermuda trade: Garnet Chili, and Bliss Triumph.

EXPERIMENTAL FARM, NAPPAN, N.S.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-16.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. Lb.		Bush. Lb.
Everitt	382 50	Irish Cobbler	345 40
Wee MacGregor	380 20	Rawlings Kidney	345 37
Vick Extra Early	347 47	Rochester Rose	345 28

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early. Main crop: Green Mountain, Wee MacGregor, Rawlings Kidney, Carman No. 1.

Experimental Station, Kentville, N.S.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Manistee	197	30	174	15	23	15
New Queen	188	45	162	..	26	45
Empire State	187	15	163	15	24	..
Sir Walter Raleigh	180	15	159	45	20	30
Wee MacGregor	179	04	155	04	24	..
Rawlings Kidney	178	15	152	22	22	53

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain, Delaware.

Experimental Station, Fredericton, N.B.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.	
	Bush.	Lb.
Morgan Pink Seedling	430	15
Dreer Standard	429	30
New Scotch Rose	428	30
Houlton Rose	410	15
Irish Cobbler	406	..
Table Talk	405	45

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain.

Experimental Station, Ste. Anne de la Pocatière, Que.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FOUR YEARS, 1913-1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	Lb.		Bush.	Lb.
Rawlings Kidney	335	52	Morgan Pink Seedling	300	40
Morgan Seedling	321	56	Davies Warrior	299	12
Vick Extra Early	311	40	Dreer Standard	288	56

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early. Main crop: Green Mountain.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Table Talk	285	49	248	25	37	24
Irish Cobbler	230	33	212	31	18	02
Gold Coin	215	53	198	43	17	10
Vick Extra Early	211	35	202	47	8	48
Rochester Rose	203	59	184	37	19	22
Morgan Seedling	192	30	175	20	17	10

Varieties recommended.—Early: Irish Cobbler. Main crop: Table Talk, Carman No. 3, Gold Coin, Davies Warrior.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

YIELD OF VARIETIES, 1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	Lb.		Bush.	Lb.
Green Mountain	276	22	Early Ohio	205	28
Pride of the North	260	66	Irish Cobbler	145	32

Varieties recommended.—Early: Irish Cobbler. Main crop: Green Mountain.

EXPERIMENTAL STATION, MORDEN, MAN.

SIX MOST PRODUCTIVE VARIETIES, YEAR 1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Everitt	294	48	250	48	44	
Irish Cobbler	279	24	253		26	24
Vick Extra Early	277	12	257	24	19	48
Early Hebron	272	48	250	48	22	
Wee MacGregor	268	24	259	36	8	48
Morgan Seedling	259	36	242		17	36

Varieties recommended.—Early: See Brandon List. Early Ohio is popular in the district. Too soon yet to recommend any from experience at the Station. Main Crop: See Brandon List.

EXPERIMENTAL FARM, BRANDON, MAN.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Table Talk	407 03	Valley Success (Early Rose group)	383 19
Woodbury White Rose	405 03	Reeves Rose	373 46
Wee MacGregor	393 35	Rawlings Kidney	373 43

Varieties recommended.—Early: Bovee, Hamilton Early, Early White Prize. Main crop: Empire State, Wee MacGregor, Rawlings Kidney. In a four years' average, the Empire State has yielded at the rate of 415 bushels 15 pounds per acre.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Gold Coin	413 04	Dreer Standard	372 25
Houlton Rose	395 03	Irish Cobbler	364 34
Wee MacGregor	391 06	Table Talk	353 28

Varieties recommended.—Early: Early Ohio, Vick Extra Early, Irish Cobbler. Main crop: Wee MacGregor, Gold Coin, Carman No. 1.

EXPERIMENTAL STATION, ROSTHERN, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1911-1915.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Dreer Standard	512 24	Rawlings Kidney	479 36
Everitt	498 12	Rochester Rose	472 48
Money Maker	485 36	Late Puritan	438 24

Varieties recommended.—Wee MacGregor, Irish Cobbler, Everitt, Early Ohio, Rawlings Kidney, Dreer Standard.

EXPERIMENTAL STATION, SCOTT, SASK.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.	Variety.	Total Yield per acre.
	Bush. lb.		Bush. lb.
Morgan Seedling	337 52	Table Talk	304 02
Rawlings Kidney	317 51	Gold Coin	292 03
Wee MacGregor	317 16	Carman No. 1	284 46

Varieties recommended.—Early: Everitt. Main crop: Wee MacGregor.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

(Irrigated.)

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Reeves Rose	511	40	471	00	40	40
Table Talk	506	00	463	28	42	32
Vick Extra Early	505	42	475	40	30	02
Irish Cobbler	500	20	463	00	37	20
Dalmeny Beauty	468	50	429	00	39	50
Gold Coin	466	40	441	10	25	30

Varieties recommended.—Early: Irish Cobbler, Vick Extra Early, Rochester Rose, Reeves Rose. Main crop: Gold Coin, Wee MacGregor, Table Talk, Empire State. Irish Cobbler makes both a good early and a good main crop potato in places where the soil is rich and the season short, as it yields well and ripens well, ensuring good quality.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

(Non-irrigated.)

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Gold Coin	361	02	333	32	27	30
Dalmeny Beauty	352	11	294	42	51	29
Empire State	344	32	308	32	36	00
Morgan Seedling	343	18	301	09	42	09
Irish Cobbler	341	39	305	16	36	23
Factor	334	29	299	01	35	28

EXPERIMENTAL STATION, LACOMBE, ALTA.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Empire State	439	33	407	09	32	24
Table Talk	424	10	347	07	77	03
Early Norther	414	29	372	47	41	42
Epicure	408	39	349	28	59	11
Morgan Seedling	408	19	382	02	26	17
Wee MacGregor	402	49	373	16	29	33

Varieties recommended.—Early: Irish Cobbler, Houlton Rose, Early Norther. Main crop: Table Talk, Empire State, Wee MacGregor, Epicure.

EXPERIMENTAL STATION, INVERMERE, B.C.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF THREE YEARS, 1914-16.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Late Puritan	427	32	302	08	125	24
Houlton Rose	422	24	303	36	118	48
Irish Cobbler	389	24	284	32	104	52
Wee MacGregor	387	56	287	28	100	28
Eureka Extra Early	371	48	200	56	170	52
Snow	346	52	275	44	71	08

Varieties recommended.—Early: Irish Cobbler, Eureka Extra Early. Main crop: Wee MacGregor, Late Puritan, Clyde, American Wonder, Table Talk. Conquering Hero is of especially good quality.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

SIX MOST PRODUCTIVE VARIETIES, YEAR 1916.

Variety.	Total Yield per acre.		Variety.	Total Yield per acre.	
	Bush.	lb.		Bush.	lb.
New Queen	638	..	Morgan Seedling	488	24
Vick Extra Early	550	..	Rochester Rose	488	24
Mortgage Lifter	532	24	Table Talk	488	24

Not sufficient experience yet to recommend any varieties especially.

EXPERIMENTAL FARM, AGASSIZ, B.C.

SIX MOST PRODUCTIVE VARIETIES, AVERAGE OF FIVE YEARS, 1912-1916.

Variety.	Total Yield per acre.		Yield per acre marketable.		Yield per acre, unmarketable.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Gold Coin	385	00	319	16	65	44
Empire State	368	12	296	30	71	42
Money Maker	342	20	259	08	83	12
Rawlings Kidney	336	10	256	07	80	03
Dalmeny Beauty	333	30	271	17	62	13
Irish Cobbler	324	16	251	07	73	09

Varieties recommended.—Early: Irish Cobbler, Early Rose, Rochester Rose, Early Hero. Main crop: Gold Coin, Dreer Standard, Empire State, American Wonder, Carman No. 1. The variety called Sutton Reliance is much grown on the lower mainland of British Columbia.

EXPERIMENTAL STATION, SIDNEY, VANCOUVER ISLAND, B.C.

SIX MOST PRODUCTIVE VARIETIES.

Variety.	Variety.
Factor.	Dobbie Prolific.
Table Talk.	Irish Cobbler.
Late Puritan.	Conquering Hero.

Varieties recommended.—Early: Irish Cobbler, Eureka Extra Early. Main crop: Factor, Table Talk, Million Dollar, and Netted Gem. Varieties most popular on Vancouver Island: Sir Walter Raleigh, Million Dollar, Up-to-Date, Netted Gem, and Eureka Extra Early.

GROUP CLASSIFICATION OF POTATOES.

The same variety of potato is often sold under several different names and, on the other hand, some varieties, though of different origin, are so much alike that one cannot with certainty distinguish them. It has seemed best, therefore, to divide potatoes into groups of varieties and possible synonyms having certain characters in common. By this method, if varieties are sold under different names, anyone may test those of the same group side by side and learn for himself what the differences, if any, are between them. Often the difference in the vigour of the seed is of greater importance than the difference, if any, between the so-called varieties.

The best group classification for varieties of American origin is that given by Prof. Wm. Stuart, potato specialist of the Bureau of Plant Industry, Department of Agriculture, Washington, D.C., in bulletin No. 176, Bureau of Plant Industry, entitled "Group Classification and Varietal Descriptions of some American Potatoes", and as

the writer believes that it is desirable to have the same classification adopted for all America, if possible, Prof. Stuart's "Classification Key" with names of varieties or synonyms of each group which have come under the writer's notice in Canada are herewith given.

CLASSIFICATION KEY.

"*Group 1.—Cobbler.*

Tubers: Roundish; skin creamy white.

Sprouts: Base, leaf scales, and tips slightly or distinctly tinged with reddish violet or magenta. In many cases the colour is absent.

Flowers: Light rose-purple; under intense heat may be almost white."

Varieties: Early Petoskey, Extra-Early Eureka, Irish Cobbler.

"*Group 2.—Triumph.*

Tubers: Roundish, skin creamy white, with more or less numerous splashes of red, or carmine, or solid red; maturing very early.

Sprouts: Base leaf scales, and tips more or less deeply suffused with reddish violet.

Flowers: Very light rose-purple."

Varieties: Bermuda Early, Noroton Beauty, Quick Lunch (Uncle Gideon's), (Bliss) Triumph, Stray Beauty.

"*Group 3.—Early Michigan.*

Tubers: Oblong or elongate-flattened; skin white or creamy white, occasionally suffused with pink around bud-eye cluster in Early Albino.

Sprouts: Base light rose-purple; tips creamy white or light rose-purple.

Flowers: White."

Varieties: Earley Albino, Early Michigan, Early Puritan, Early White Prize, Woodbury White Rose.

"*Group 4.—Rose.*

Tubers: Roundish oblong to elongate-flattened, or spindle-shape flattened; skin flesh-coloured or pink, or (in the case of the White Rose) white.

Sprouts: Base and internodes creamy white to deep rose-lilac; leaf scales and tips cream to rose-lilac.

Flowers: White in sections 1 and 2; rose-lilac in section 3."

Varieties: Section 1, Clark No. 1, Early Fortune, Early Norther, Early Rose, Early Sunrise, Early Thoroughbred, Everitt, Extra-Early Vermont, Houlton Rose, Late Rose, Northern Beauty, Rochester Rose. Section 2, Manistee; Section 3, Crine Lightning, Lee Favorite, New Ideal, New Scotch Rose, Seneca Beauty.

"*Group 5.—Early Ohio.*

Tubers: Round, oblong, or ovoid; skin flesh-coloured or light pink, with numerous small, raised russet dots.

Sprouts: Base, leaf scales, and tips more or less deeply suffused with carmine-lilac to violet-lilac or magenta.

Flowers: White."

Varieties: Early Ohio, Early Market, Early Six Weeks, White Ohio, Ohio Junior.

"*Group 6.—Hebron.*

Tubers: Elongated, somewhat flattened, sometimes spindle-shaped; skin creamy white, more or less clouded with flesh colour or light pink.

Sprouts: Base creamy white to light lilac; leaf scales and tips pure mauve to magenta, but colour sometimes absent.

Flowers: White."

Varieties: Country Gentleman, Crown Jewel, Early Beauty of Hebron, Early Bovee, Gem of Aroostook, Harbinger, Late Beauty of Hebron, New Queen, Quick Crop, White Elephant, Morgan Seedling.

"*Group 7.—Burbank.*

Tubers: Long, cylindrical to somewhat flattened, inclined to be slightly spindle-shaped; skin white to light creamy white, smooth and glistening, or deep russet in the case of section 2.

Sprouts: Base creamy white or faintly tinged with magenta; leaf scales and tips usually lightly tinged with magenta.

Flowers: White."

Varieties: Section 1. Burbank, or Burbank Seedling, Money-Maker, White Beauty, White Chief; Section 2. California Russet, Cambridge Russet, New Wonderful, Hammond Wonderful.

"*Group 8.—Green Mountain.*

Tubers: Moderately to distinctly oblong, usually broad, flattened; skin a dull creamy or light russet colour, frequently having russet-brown splashes toward the seed end.

Sprouts: Section 1, base, leaf scales, and tips creamy white; Section 2, base usually white, occasionally tinged with magenta, leaf scales and tips tinged with lilac to magenta.

Flowers: White."

Varieties: Carman No. 1, Clyde, Delaware, *Dooley, †Empire State, Freeman, Gold Coin, Green Mountain, Green Mountain, Jr., Norcross, Snow, State of Maine, Uncle Sam; Section 2, Charles Downing.

"*Group 9.—Rural.*

Tubers: Broadly round-flattened to short oblong, or distinctly oblong-flattened; skin creamy white, or deep russet in the case of section 2.

Sprouts: Base dull white; leaf scales and tips violet-purple to pansy violet.

Flowers: Central portion of corolla deep violet; with the purple growing lighter toward the outer portion; five points of corolla white, or nearly so."

Varieties: Carman No. 3, *Dooley (as grown in Western Ontario), Great Divide, Million Dollar, Noxall, Rural New Yorker No. 2, Sir Walter Raleigh, White Giant; Section 2, Dibble Russet.

"*Group 10.—Pearl.*

Tubers: Round-flattened to heart-shape flattened, usually heavily shouldered; skin dull white, dull russet, or brownish white in section 1, or a deep bluish purple in section 2.

Sprouts: Section 1, base, leaf scales, and tips usually faintly tinged with lilac; Section 2, base, leaf scales, and tips vinous mauve.

Flowers: White."

Variety: Pearl; Section 2, Blue Victor.

"*Group 11.—Peachblow.*

Tubers: Round to round-flattened or round-oblong; skin creamy white, splashed with crimson or solid pink; eyes usually bright carmine. Includes some early-maturing varieties.

Sprouts: Base, leaf scales, and tips more or less suffused with reddish violet.

Flowers: Purple."

Varieties: Improved Peachblow, Peachblow, Nott Peachblow.

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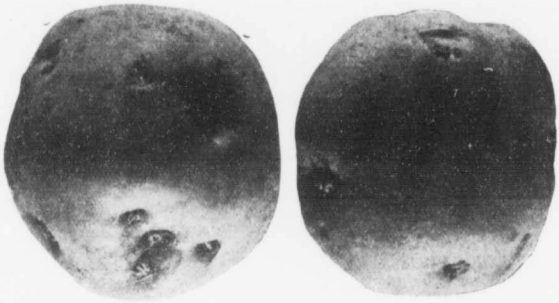
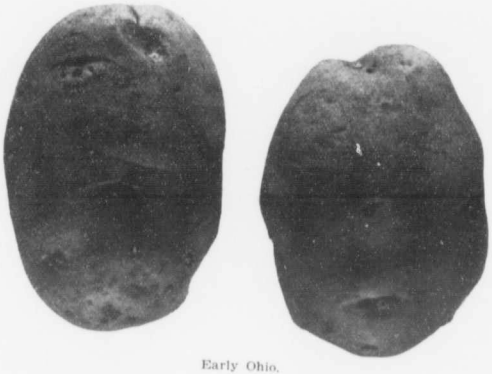
*The Dooley grown in Western Ontario belongs to the Rural Group.

†It is doubtful if Empire State should remain in this group as it is very distinct from Green Mountain. The American Wonder is much like Empire State.

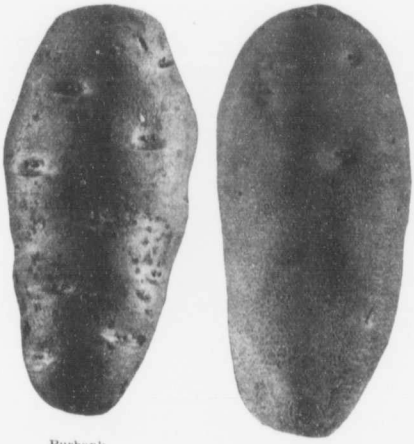


Irish Cobbler.

Early Rose.

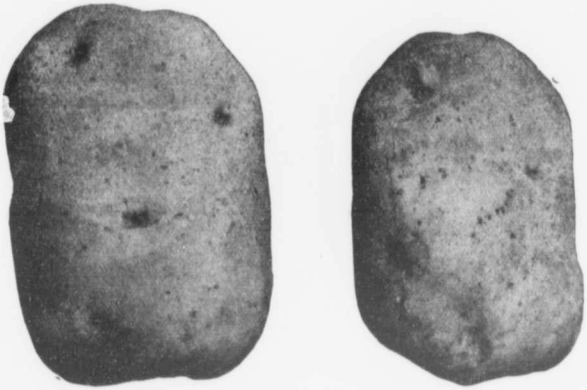


Early Ohio.

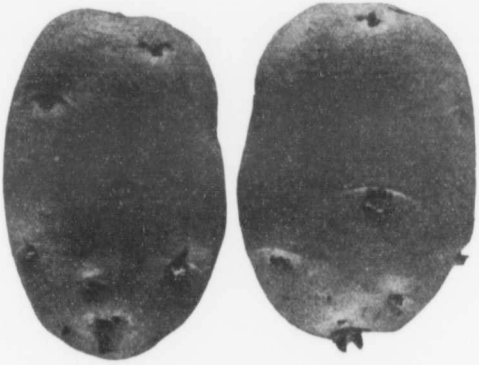


Burbank.

Netted Gem.



Green Mountain.

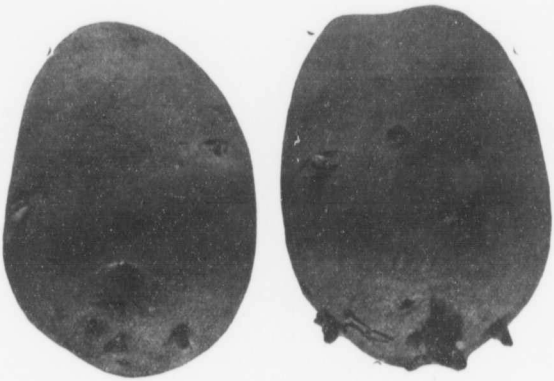


Gold Coin.

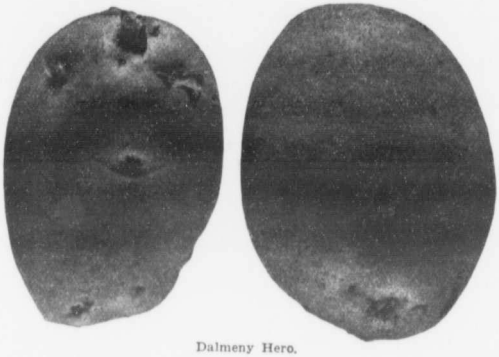
Empire State.

1. Carman No. 3.
2. Sir Walter Raleigh.
3. Todd Wonder.

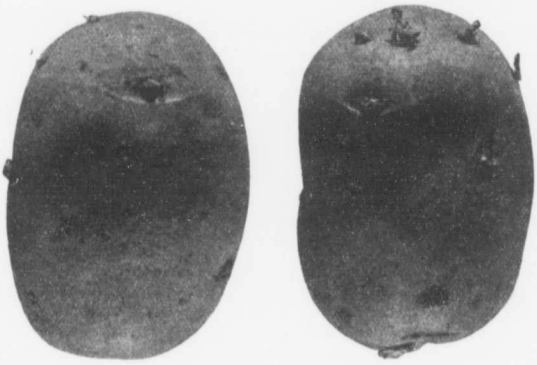
Table Talk.



Dalmeny Regent.



Dalmeny Hero.



Dobbie Prolific.

DESCRIPTIONS OF VARIETIES.

Popular descriptions have been made of the varieties which have yielded best at the Experimental Farms and Stations in Canada and additional varieties that are interesting for other reasons. Included in the descriptions will be found the names of other well-known varieties closely resembling, if not identical with, those which are described. The information in regard to the origins of these varieties has been taken almost entirely from bulletin No. 176 of the Bureau of Plant Industry, Washington, D.C., by Wm. Stuart, who has especial facilities for tracing them out.

Bliss Triumph.—One of the earliest varieties. It is rather a poor yielder in many places in Canada but in the best potato districts it is sometimes grown for seed for the growers in Bermuda, as this is a popular variety there for shipping to American markets during the winter months. The Bermuda Early and Stray Beauty are apparently other names for this variety which originated in Connecticut and was introduced by B. K. Bliss & Sons in 1878. It was claimed to be a seedling of Peerless crossed with a seedling of Early Rose. The vine of this variety is quite erect and the foliage of a deeper green than most potatoes. The tubers are rarely above medium size, roundish in shape and red in colour; the eyes are medium in depth.

Bovee.—This early variety, which has done well in many places, is very similar to the Early Beauty of Hebron, the latter being seldom found now, most of the Beauty of Hebron grown apparently being the late type, such as White Elephant. Other early varieties much like Bovee are New Queen, and Vick Extra Early. Bovee, or Early Bovee, originated as a seedling with Martin Bovee, Northville, Michigan, some years after the Early Beauty of Hebron was introduced, the latter being originated by E. L. Coy, Hebron, N.Y., and claimed to be a seedling of Garnet Chili. The Early Beauty of Hebron was introduced in 1878 by J. M. Thorburn & Co., New York. Season early; plant a strong grower, and productive. Tubers oblong to oval; colour pink and yellowish; eyes moderately numerous, medium in depth.

Burbank (seedling).—The Burbank potato is most popular in Nova Scotia and in British Columbia, where it has succeeded very well. The Money Maker is very similar and also Selina Burbank. Originated by Luther Burbank in 1873 and is claimed to be a seedling of Early Rose. Introduced by J. J. H. Gregory in 1876. Season medium late; plant a strong grower; tubers long, cylindrical; skin dull white; eyes shallow to medium.

Carman No. 3.—Originated by E. S. Carman in 1888. Claimed to be a seedling of a seedling. Introduced in 1895 by J. M. Thorburn & Co. This variety has yielded well in some parts of Canada. Season late; plant a strong grower; tubers oval to roundish, somewhat flattened; skin creamy white; eyes comparatively few and shallow. Good in quality.

Dooley.—"Originated from one hill of potatoes selected in the field in Waupaca county, Wisconsin, 1896; introduced by Gunson, Brown & Co., in 1900." (Zavitz.) A strong grower; tubers oval, flattened; skin creamy white; eyes medium to shallow. Quality good. Has yielded well in places.

Early Ohio.—Originated by Alfred Reese in 1871, and claimed to be a seedling of Early Rose. Introduced by J. J. H. Gregory in 1875. The Early Ohio continues to be grown fairly extensively in Canada and particularly in the provinces of Ontario and Manitoba, where it is highly regarded for early digging for city markets, a large proportion of the early tubers being of good size and the quality of the potatoes exceptionally good. It is not, however, as productive as the Irish Cobbler. Season very early; a strong to medium grower; tubers round-oblong, not tapering at the

ends like many varieties, but being almost uniformly thick from one end to the other; skin light pink, deeper in colour at seed end; eyes moderately numerous, shallow or protruding. Quality good.

Early Rose.—The Early Rose, Rochester Rose, Everitt, Early Norther, Early Hero, Houlton Rose, Reeves Rose, Clark No. 1, Early Fortune, Early Thoroughbred, Early Sunrise, Extra Early Vermont and others are all so much alike that they may be treated as one variety. It seems very probable that most of these are merely selections from the Early Rose which have lost their distinguishing characteristics.

The Early Rose was originated by Albert Bresee, Hubbardton, Vermont, in 1861, and was claimed to be a seedling of the Garnet Chili. Introduced in a limited way in 1867 by D. S. Heffron, Utica, N.Y., and to the general public by B. K. Bliss & Sons in 1868, since which time it has been very popular and while in recent years it has been displaced to a considerable extent by a few other early and more productive varieties, it is still planted to a large extent under this or some other name. It is a vigorous grower and under favourable conditions produces a good crop. The tubers are oblong to long, pink in colour, with eyes of medium depth. The eyes, which are fairly numerous, usually sprout strongly from one end of the tuber to the other, thus ensuring a good stand of plants. The quality is, as a rule, good, the tubers cooking dry and mealy.

Early White Prize.—An early white skinned variety, oblong to long in shape and with eyes of medium depth. Quality good.

Empire State.—The Empire State has long been a popular variety in Canada, especially in the province of Ontario, and yields well on the average. The American Wonder is very similar to it. While included in the Green Mountain group it is quite distinct from most of the other varieties of the group. It was originated by E. L. Coy, Hebron, N.Y., in 1881 and claimed to be an inbred seedling of White Elephant. Introduced by W. A. Burpee in 1885. Season medium to late; plant a strong grower and productive; tubers oblong to long, white, with numerous medium to deep eyes, most of which usually throw strong sprouts.

Garnet Chili.—The Garnet Chili is mainly grown, in Canada, in the Maritime Provinces where it is raised especially for seed for the Bermuda growers. It was originated by C. E. Goodrich, Utica, N. Y., in 1853 and claimed to be a seedling of Rough Purple Chili. Introduced by Goodrich in 1857. Season late; plant a strong upright grower; tubers roundish to oblong, flattened at ends; skin red; eyes medium in depth.

Green Mountain.—This is a variety in the most important group of potatoes cultivated in Canada, the varieties being, it is believed, more extensively grown than any others. They are all medium to late in season and the bulk of the potatoes stored for winter use are of this group. There are many varieties very similar in appearance including Carman No. 1, Clyde, Gold Coin (Vermont), Delaware, Dreer Standard (not Dreer Early Standard), Green Mountain, Green Mountain Jr., Norcross, Snow, State of Maine, Uncle Sam and Wee MacGregor. American Wonder and Empire State which are included in this group are quite distinct from the others being longer in shape. The Green Mountain variety is grown more in the Maritime Provinces than any other. In Ontario and Quebec, Carman No. 1 and Gold Coin, which cannot be distinguished from the Green Mountain, are, perhaps, the most common, though the quantity of Green Mountain grown in recent years has increased rapidly as much seed has been sent from New Brunswick. On the prairies the Gold Coin and Wee MacGregor are best known, the latter originating with T. Rowan, MacGregor, Man.

Green Mountain was originated by O. H. Alexander, Charlotte, Vermont, in 1878 and is claimed to be a seedling from a cross between Dunmore and Excelsior and was introduced by Everitt & Co., in 1885. It is a strong grower and a good cropper, but

does not retain its vigour so well as some varieties under trying conditions. The tubers are oblong in shape, inclined to be blocky or flattened at the ends, and white or creamy in colour with more or less russet. The eyes are moderately numerous and medium in depth.

Irish Cobbler.—Origin unknown, but supposed to have been first grown by an Irish shoemaker in Marblehead, Mass. Sold by Vaughan Seed Company in 1895. This is the most popular early potato grown in Canada. It is both early and productive and maintains its vitality better than many other varieties. The Eureka Extra Early cannot be distinguished from this, although claimed to have been originated by Geo. R. Pedrick of New Jersey in 1895 and claimed to be a sport of Early Morn. While not of the best shape, and eyes being rather deep, it has, by its regularity in producing good crops, displaced to a large extent more attractive looking varieties. It is easy to distinguish this from the white flowered varieties of the Green Mountain group in the field, if it should get mixed with them, as it has purple flowers. Season early; plant a strong grower; foliage deep green in colour; tubers roundish, flattened somewhat at ends; skin creamy white; eyes moderately numerous and medium to deep. Quality good.

Late Puritan.—This is very similar to Early Puritan and is medium in season rather than late; oblong in shape and with numerous eyes of medium depth. Quality good.

Lion Paw.—An oval, white potato which has succeeded well at the Experimental Station, Charlottetown, P.E.I.

McIntyre.—The McIntyre potato is grown mainly on Prince Edward Island where it is very popular on account of its yield and good shipping qualities. Season late; plant a strong grower; tubers long to oval, irregular; colour of skin yellowish mottled with pinkish purple to purple; eyes numerous, medium to deep; quality good when well matured.

Manistee.—This variety is somewhat similar to Maggie Murphy. Introduced by E. F. Dibble in 1904.

Million Dollar.—A white skinned potato of unknown origin introduced by the Salzer Seed Company.

Moreton.—An oval, flattened, white skinned potato with shallow eyes which has yielded exceptionally well at Ottawa and was procured from the firm of Joseph Harris, Coldwater, N.Y.

Morgan Seedling.—This and a white seedling were sent to the Central Experimental Farm in 1904 by the Family Herald and Weekly Star, Montreal, which had received them from H. H. Morgan, Manchester, N.H., under the name of "Morgan Seedling." It is a variety of the Hebron group, which has yielded very well in different parts of Canada. Season medium; plant strong grower; tubers oval to long; colour of skin pink and yellowish; eyes moderately numerous, medium in depth. Quality good.

New Scotch Rose.—Claimed to have been introduced from Scotland by an American firm. Plant a strong grower; season medium early; tubers oblong to oval flattened; colour of skin pink; eyes few and medium in depth. Resembles Maggie Murphy somewhat.

Netted Gem.—This variety is now much grown in British Columbia and, on account of its handsome appearance, good quality, and productiveness, is very popular there. Other varieties very closely resembling, if not identical with it, are California Russet, Cambridge Russet, New Wonderful and Hammond Wonderful. Origin

unknown. Season late; plant a vigorous grower; tubers long to oval, elongated; skin russet-brown, finely netted; eyes shallow.

Pride of the North.—A variety of unknown origin which has done well in the Eastern townships of the province of Quebec. Season medium to late; plant a strong grower and productive; tubers oval; flattened; skin pale pink, brighter in eyes; eyes few to moderately numerous, medium in depth to shallow.

Rawlings Kidney.—Origin unknown. Tubers sent to the Central Experimental Farm by Heber Rawlings, Forest, Ont., in 1904, under the name of "Ashleaf Kidney," but not being typical Ashleaf Kidney this variety has been called Rawlings Kidney. It is much like Green Mountain and Gold Coin. It has succeeded particularly well in the prairie provinces. Season medium late; plant a strong grower; tubers oval to oblong; colour of skin yellowish; eyes moderately numerous; medium in depth. Quality good.

Rural New Yorker, No. 2.—Originated by E. S. Carman. Introduced to Rural New Yorker subscribers in 1888 and offered for sale by J. M. Thorburn & Company in 1889. A seedling of seedlings, through several generations. Season medium late; plant vigorous; tubers oblong to round-oval, somewhat flattened; skin white; eyes few, medium to shallow; quality good.

Sir Walter Raleigh.—Originated by E. S. Carman. Claimed to be a seedling of the Rural New Yorker No. 2. Introduced by Peter Henderson in 1897. A productive variety in some parts of Canada. Season late; plant a strong grower; tubers roundish-oval; skin creamy white; eyes scattered and medium to shallow in depth. Good in quality.

Woodbury White Rose.—A moderately early, white skinned variety of oblong shape and moderately deep eyes; a variety which has done well in Manitoba.

VARIETIES OF BRITISH ORIGIN.

During the past thirty years several hundred varieties of potatoes of British and European origin have been tested at the Central Experimental Farm. The great majority of these proved unproductive, many of them setting very few tubers. The climate at Ottawa was evidently unsuitable for them. A few, however, have succeeded very well at Ottawa and elsewhere. Some of them are able to retain their vitality while such American varieties as the Green Mountain, Early Rose, Early Ohio, and others have become very weak in vitality under similar conditions. Brief descriptions of these follow. Some of them are very much alike. The quality of most of these varieties is good.

Brydon.—Season medium late; plant a strong grower; flowers violet; tubers oval-elongated; colour of skin dull yellow; eyes few to medium, shallow.

Brydon Beauty.—Season medium late; plant a strong grower; flowers violet; tubers nearly ovoid; colour of skin white; eyes few, shallow.

Conquering Hero.—Season late; plant a strong grower; flowers purple; tubers oval-elongated; skin yellow; eyes few, medium in depth.

Dalmeny Beauty.—Season medium; plant a strong grower; flowers pinkish white; tubers oval; skin yellow; eyes few, shallow.

Dalmeny Hero.—Season medium; plant a strong grower; tubers oval, flattened; skin yellow; eyes few, shallow.

Dalmeny Regent.—Season medium; plant a strong grower; flowers purple; tubers oval; skin yellow, eyes few, shallow.

Davies Warrior.—Season late; plant a strong grower; flowers violet; tubers oval-elongated; flattened; skin yellow; eyes few, shallow. This variety has done exceptionally well in the province of Ontario, and has been widely distributed by the Ontario Agricultural College.

Dobbie Prolific.—Season late; plant a strong grower; flowers violet; tubers oval, flattened; eyes few to moderately numerous; shallow.

Epicure.—Season medium early; plant a strong grower; flowers white; tubers roundish; colour pale pink; eyes many, deep.

Factor.—Season late; plant a strong grower; flowers purple; tubers oval, flattened; skin yellow; eyes few, shallow.

Scot (The).—Season late; plant a strong grower; flowers violet; tubers oval, flattened; skin yellow; eyes few, shallow.

Scottish Triumph.—Season late; plant a strong grower; flowers pale violet; tubers roundish oval, flattened; skin yellow; eyes few, shallow.

Table Talk.—Season late; plant a strong grower; flowers deep violet; tubers oval-elongated; skin yellow; eyes few, shallow. This variety was first disseminated to any extent in Canada by the Experimental Station, Lacombe, Alberta, and has since been found to succeed well in all the provinces of Canada. It is of good quality and very productive.

Up-to-date.—Season late; plant a strong grower; flowers violet; tubers oval; skin yellow; eyes few, shallow to medium in depth.

VARIETIES OF POTATOES TESTED AT CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT., 1887-1917.

In the following table will be found a list of the named varieties of potatoes, with the exception of a few unnamed seedlings, which have been tested at the Central Experimental Farm since the year 1887 when the first potatoes were planted. In this list there are 836 names. Of these, a few represent varieties which were sent for test which may be identical with others, as no name of variety was given. There may also be a few very similar ones among the others. In addition to these there were 281 seedlings originated at the Central Experimental Farm, which have been discarded, making the total number of varieties tested, named and unnamed, about 1,117. In addition to the name, the year when each variety was first secured and the last year it was planted are given, also the reasons for discarding a variety where this has been done.

In the column where notes are given as to the reason why a variety was discarded, "I.P." stands for inferior productiveness, "I.Q." for inferior quality, and "D.E." for deep eyes. Some varieties although quite productive were not as heavy croppers as others and hence were not retained. It was not considered advisable, either, to continue varieties which were productive but of inferior quality and deep in the eye unless there was some other reason for continuing them.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.

Name of Variety.	Year When Tested.	Why Discarded.
Abundance	1887–1888, 1895–1899	I.P.
Acme Blanche	1908–1909	I.P.
Acquisition	191?	I.P.
Adirondack	1887–1890	I.P.
Admiral	1909	I.P.
Advancer	1912–1913	I.P.
Alabaster	1899–1901	I.P.
Alarich	1899–1901	I.P.
Alaska	1907	I.P.
Alexandria	1887–1888	I.P.
Alexander Prolific	1889–1892	I.P.
Algiers	1887–1889	I.P.
Algoma No. 1	1891–1899	I.P.
Algoma No. 2	1891	I.P.
Algoma No. 3	1891–1892	I.P.
Alkohol	1887–1888	I.P.
Alma	1887–1888	I.P.
Almond Blue	1887–1888	I.P.
Alpha	1887–1890	I.P.
Apollo	1899–1904–1906	I.P.
Ambrosia	1899–1904	I.P.
American Giant	1893–1907	I.P.
American Wonder	1888–1894, 1905-1910, 1912–1915	I.P.
Amylon	1887–1889	I.P.
Andersen	1887–1888	I.P.
Arcostock Wonder	1912–1913	I.P.
Ashleaf Kidney	1904–1910, 1912–1915	I.P.
Ashtop Fluke	1887–1888	I.P., I.Q.
Asparagus	1887–1892	I.P.
August der Starke	1887–1888	I.P.
Aurora	1887–1888	I.P., I.Q.
Australian	1887–1888	I.P.
Babbit	1905–1909	I.P.
Balmoral	1890–1891	I.P.
Barkley Seedling	1905–1910	
Barrett, P.	1909–1910	
Beauty of Hebron	1887–1902	I.P.
Beauty of Kent	1908–1909	I.P.
Beauty of Ottawa	1891	I.P.
Belle Ecossaise	1908–1910	I.P.
Belle de Fontenay	1908–1909	I.P.
Bedson	1890	I.P.
Beefsteak	1887–1889	I.P.
Bergeron, J. N., from	1895–1903	I.Q., D.E.
Bermuda Early	1911–1913	I.P.
Big Rose	1907–1909	I.P.
Bill Nye	1897–1902	I.P.
Bismark	1887–1889	I.P.
Bisquit	1887–1888	I.Q.
Bliss Triumph	1887–1891, 1899–1905	I.P., I.Q.
Blue Bell	1890–1891	I.P.
Blue Cup	1892–1899	I.P.
Blue Giant	1906–1909	I.P.
Blue Prolific	1906–1909	I.P.
Blue Seedling	1909–1910	
Blucher	1887–1888	I.P.
Bolero	1908–1909	I.P.
Bombay	1887–1889	I.P.
Bountiful	1911–1913	I.P.
Bovee	1897–1910, 1912–1915	I.P.
Bovinia	1887–1888	I.P., I.Q.
Brandale	1908–1909	I.P.
Brant	1890, 1892–1893	I.P.
Bras d'Or Seedling	1892–1895	I.P.
Breck Chance	1907–1909	I.P.
Bretonne	1908–1909	I.P.
British Queen	1912–1913	I.P.
Brosseau, A. S., from	1897–1904	D.E.
Brown Rot Proof	1895–1903	I.P.
Brownell Best	1887–1888, 1891	I.P.
Brownell Beauty	1887–1888	I.P.
Brownell Multiplier	1887–1888	I.P., I.Q.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Brownell Superior	1887–1889	I.P.
Brownell Winner	1890–1891, 1902	I.P., I.Q.
Bruce	1907–1910, 1911–1912	I.P.
Brunhilde	1887–1888, 1889–1904, 1906	I.P.
Brydon	1912	
Brydon Beauty	1912	
Buckeye State	1911–1913	I.P.
Buffalo	1907–1910	
Bunder Landwirthe	1899–1901	I.P.
Burbank Seedling	1887–1889, 1899–1904	I.P.
Burnaby Mammoth	1893–1910	
Burpee Extra Early	1890–1903, 1905–1910, 1912–1915	I.P.
Burpee Seedling No. 37	1889–1892	I.P.
Burpee Superior	1889–1891	I.P.
Calico Early	1887–1891	I.P.
California Cup	1900–1901	I.P.
California Russet	1911–1913	I.P.
Callao Large	1887–1890	I.P.
Caillon	1887–1888	I.P.
Cambridge Russet	1898–1905	I.P.
Canadian Beauty	1898–1910, 1913	I.P.
Canadian Red	1906–1910	I.P.
Canadian Standard	1911–1913	I.P.
Cardinal	1908–1909	I.P.
Carman No. 1	1895–1910, 1914–1915	I.P.
Carman No. 3	1896–1906, 1912–1914	I.P.
Careless Match	1891–1892	I.P.
Centennial	1887–1889	I.P.
Ceres	1887–1888	I.P., D.E., I.Q.
Chamaeleon	1887–1888	I.P., I.Q.
Champion	1887–1888	I.P., I.Q.
Champion of the Earlies	1898–1902	I.P.
Chapman	1909–1910	
Chas. Downing	1890–1899	I.P.
Chas. Fidler	1904–1909	I.P.
Chicago Market	1887–1902	I.P.
Churchill Seedling	1900–1902	I.P.
Chilian Variety Aranеana Musca	1907	
Chilian Variety Cabritas	1907–1909	I.P.
Chilian Variety Doyes	1907–1909	I.P.
Chilian Variety Pastanesa	1907–1909	I.P.
Circassienne	1887–1889	I.P.
Clark Pride	1903–1910	
Clark No. 1	1888–1902	I.P.
Clyde	1907–1910, 1916	
Clarendon	1890	I.P.
Clay Rose	1895–1906	I.P.
Climax	1887–1888, 1905	I.P.
Cockeycoats	1887–1888	I.Q.
Columbus	1897–1902	I.P.
Cottar	1907–1910	
Compton Surprise	1887–1891	I.P.
Connolly, T., Seedling	1889	I.P.
Conqueror	1887–1891	I.P.
Conquering Hero	1912–1914	
Corona Beauty	1890–1891	I.P.
Cornflower	1887–1888	I.Q.
Cosmopolitan	1899–1901	I.P.
Cottage	1887–1888	I.Q.
Countess	1887–1888	I.P., I.Q.
Count Moltke	1887–1889	I.P.
Country Gentleman	1899–1909	I.P.
Craig Seedling	1898	I.P.
Crine Lightning	1902–1910	
Crown Jewel	1889–1899	I.P.
Cyclop	1899–1904	I.P.
Czarine	1908–1909	I.P.
Dabersche	1887–1888	I.P.
Daisy	1890–1902	I.P.
Dakota Red	1889–1903	I.Q., D.E.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Dalhousie Seedling	1912–1913	
Dalmahoy	1887–1889	I.P.
Dalmeny Beauty	1904–1910	
Dalmeny Early	1906–1909	I.P.
Dalmeny Hero	1912	
Dalmeny Regent	1912	
Darby	1890–1891	I.P.
Dark Red Seedling	1898–1901	I.P.
Darling, J., from	1898–1899	I.P.
Davies Warrior	1912	
Dawson City, from	1903–1904	I.P.
Daybreak	1903–1909	I.P.
Debreau, R., Seedling	1891–1892	I.P.
Delaware	1890–1909, 1912–1914	I.P.
Delicosa	1887–1888	I.P.
Delight	1889–1891	I.P.
Dempsey Seedling	1910	
Detroit	1887–1888	I.P.
Dewdrop	1909–1910	
Dewey	1905–1910, 1912	I.P.
Dewey Rose	1907–1909	I.P.
Diacta	1887	I.P.
Discovery	1905–1909	I.P.
Diamond	1907–1909, 1911–1913	I.P.
Dibble Favorite	1907–1910	
Dobbie Prolific	1912	
Dobson Early	1900–1902	I.P.
Doctor	1887–1889	I.P.
Doherty Seedling	1898–1906	I.P.
Dooley	1901–1910, 1916	
Dr. Maerker	1899–1910	
Dreer Standard	1894–1910, 1912–1915	I.P.
Dr. Lucius	1908–1910	I.P.
Duana	1899–1901	I.P.
Dublin Prize	1901–1904	I.Q.
Duc de Magenta	1887–1888	I.P.
Duke of York	1905–1909, 1913	I.P.
Dumfries Early White	1888–1891	I.P.
Dutch Blue	1901–1902	I.P.
Duchess of Cornwall	1906–1910, 1913	I.P.
Dutch Blue Flowering	1887–1888	I.P.
Dykeman	1887–1888	I.P.
Early Albino	1889–1892, 1912–1913	I.P.
Early Andes	1898–1904, 1906–1909	I.P.
Early Ashleaf	1912–1913	I.P.
Early Astonisher	1906–1909	I.P.
Earliest of All	1893–1902, 1911–1913	I.P.
Early Bird	1887–1889, 1906–1910	
Early Bangor	1907–1909	I.P.
Early Carter	1902–1909	I.P.
Early Dawn	1898–1902	I.P.
Early Eating	1890–1892	I.P.
Early Eclipse	1909–1910	
Early Elkinah	1900–1910	
Early Envoy	1901–1909	I.P.
Early Excelsior	1905–1910	
Early Exeter	1907–1909	I.P.
Early Favorite	1912–1914	
Early Fortune	1896–1899	I.P.
Early Gem	1892–1899	I.P.
Early Giant	1887–1888	I.Q.
Early Hebron	1912	
Early Household	1887–1890	I.P.
Early Harvest	1895–1902	I.P.
Early Harvester, Pink	1906–1909	I.P.
Early Harvester, White	1907–1910	I.P.
Early Johnston	1904–1909	I.P.
Early King	1908–1909	I.P.
Early Market	1899–1902, 1912–1915	I.P.
Early Manistee	1905	I.P.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Early Manitoba	1890–1891	I.P.
Early May	1905–1909, 1912–1914	
Early Maine	1889–1891	I.P.
Early Michigan	1899–1903	I.P.
Early Monarch	1908–1910	I.P.
Early Mortgage Lifter	1906–1909	I.P.
Early Norther	1894–1903, 1912–1915	I.P.
Early Ohio	1887–1910, 1912–1916	
Early Petoskey	1905, 1907–1910	
Early Pride	1899–1902, 1906–1909	I.P.
Early Puritan	1890–1903, 1906, 1911–1912	
Early Regent	1909–1910	
Early Rose	1887–1909, 1912–1915	I.P.
Early Round Blue	1887–1888	I.P., D.E.
Early Russet	1909	I.P.
Early Sensation	1909–1910	I.P.
Early Six Weeks	1895–1902, 1916	
Early Short Topped	1887–1888	I.P.
Early St. George	1898–1905	I.P.
Early Summer	1900–1904, 1906–1907	I.P.
Early Sunrise	1889–1903, 1906, 1913–1915	I.P.
Early Sunlight	1904–1909	I.P.
Early Superior	1904–1909	I.P.
Early Surprise	1910–1912	I.P.
Early Thorburn	1892–1899	I.P.
Early Trumbull	1905–1910	
Early Walters	1911–1913	I.P.
Early White Prize	1895–1910	
Early Wisconsin	1907–1910	I.P.
Eclipse	1913	I.P.
Edwards, R., Seedling No. 1	1894	I.P.
Edwards, R., Seedling No. 2	1894–1899	I.P.
Edwards, R., Seedling No. 3	1894–1899	I.P.
Egg	1897–1899	I.P.
Eightyfold	1905–1909	I.P.
Eiffel	1908–1910	I.P.
Elegant (Richters)	1887–1889	I.P.
Elbingen White	1887–1888	I.Q.
Eldorado	1906–1910, 1912–1914	I.P.
Emmigrant	1911–1914	I.P.
Emperor	1887–1888	I.P.
Emperor Forcing	1887–1888	I.Q.
Emperor William	1887–1891	I.P.
Empire State	1888–1910, 1912	
Empress of India	1887–1888	I.P.
Empress Queen	1904–1909	I.P.
Enormous	1899–1906	I.P.
Epicure	1906–1910, 1911–1914	I.P.
Erfurt Early Round	1887–1889	I.P.
Erfurt Incomparable	1887–1889	I.P.
Erfurt Red Skin	1887–1888	I.P.
Erste Von Nassengrund	1888	I.Q.
Eureka	1887–1888, 1912–1914	I.Q., I.P.
Eureka Extra Early	1901–1910, 1916	
Euphyllos	1887–1889	I.P.
Everitt	1891–1910, 1912	I.P.
Evergood	1904–1909	I.P.
Evergrand	1913	I.P.
Express	1909–1910	
Extra Early Hero	1905–1910	
Extra Early Gault	1907–1909	I.P.
Extra Early Surprise	1916	
Extra Ruper Crane	1888–1890	I.P.
Eye Carpenter	1887–1892	I.P.
Factor	1906–1910	
Fantail Rose	1906–1909	I.P.
Farmer Blush	1887–1889	I.P.
Farinosa	1887–1888	I.Q.
Ferwell, W. E., Seedling	1909–1910	
Fidelos	1908–1909	I.P.
Fidelia	1887–1890	I.P.
Fields Ashleaf	1912–1913	I.P.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Fierz	1887	I.P.
Filera	1887–1889	I.P.
Fillbasket	1897–1899	I.P.
Fin de Siecle	1908–1909	I.P.
First Crop Ashleaf	1889–1891	I.P.
First, from Wassingram	1887	I.P.
Flemish Beauty, Seedling	1893–1905	I.P.
Flourball	1887–1888, 1906–1910, 1913–1915	I.P.
Flour of Eden	1889–1892	I.P.
Fortyfold	1887–1888	I.P.
Frame Early	1887–1892	I.P.
Franz Duke	1899–1901	I.P.
Freeman	1894–1899	I.P.
French Monarch	1909	I.P.
French Red	1894–1898	I.P.
French White	1894–1896	I.P.
Freza	1899–1901	I.P.
Fullerton, J. K., from	1892–1894	I.P.
Ganea	1887–1888	I.P., I.Q.
Garnet Chili	1887–1888	I.P.
Gleason Late Blue	1887–1892	I.P.
Gem of Aroostook	1899–1902	I.P.
Genessee Flat	1909–1910	
General Gordon	1893–1904	I.P.
Geo. H. Foraker	1889–1891	I.P.
Giant	1887–1888	I.P.
Giant Blue	1887–1889, 1908–1909	I.P.
Giant Dutch Long	1887–1889	I.P.
Giant Early	1888	I.P.
Giant of Marmont	1887–1889	I.P.
Goes	1908–1909	I.P.
Goodrich Early	1887–1888	I.P.
Goodrich Late	1887–1892	I.P.
Gold Coin	1903–1910	
Golden Early	1887–1888	I.P.
Gold Finder	1912–1914	I.P.
Golden Gem	1912	I.P.
Goodfellow	1907–1909	I.P.
Good News	1897–1899	I.P.
Gov. La Follette	1907–1910	I.P.
Grand Chancellor	1907–1910	I.P.
Grant	1890–1891	I.P.
Great Divide	1895–1902	I.P.
Great Eastern	1888–1891	I.P.
Green Mountain	1890–1903, 1910, 1912	
Green Mountain Jr	1912–1915	I.P.
Hale Champion	1892–1902	I.P.
Halberstadt	1887–1889	I.P.
Halton Seedling	1889–1893	I.P.
Hammelshainer Blue	1887–1888	I.Q.
Handsworth Early Prolific	1887–1889	I.P.
Harbinger	1893–1899, 1906–1909	I.P.
Hard to Beat	1906–1910, 1912–1913	I.Q.
Harlequin	1887–1888	I.P.
Harmbul	1908–1909	I.P.
Harris Snowball	1905–1910, 1912–1913	I.P.
Harvest King	1899–1902	I.P.
Harrison	1887–1889	I.P.
Harvester	1887–1888	I.Q.
Heath	1887–1888	I.P.
Hercules	1887–1888	I.P.
Hertha	1887–1888	I.P.
Hibernia	1904–1906	I.P.
Hick Jubilee	1906–1910	I.P.
Highlander	1907–1910	
Holborn Abundance	1889–1910	
Hochheim	1887–1888	I.P., I.Q.
Honeoye Rose	1897–1899	I.P.
Hopeful	1893–1899	I.P.
Houlton Rose	1897–1902, 1912–1915	I.P.
Howard	1909	I.P.
Idaho	1887–1889	I.Q.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Ideal	1895–1899, 1906–1909	I.P.
Immigrant	1906–1910, 1912	I.P.
Imperator	1889–1890	I.P.
Improved Ashleaf	1912–1914	I.P.
Improved Early Ashleaf	1912–1913	I.P.
Improved Early Ohio	1907–1910, 1912–1915	I.P.
Industry	1912–1913	I.P.
Inez	1888	I.P.
Invincible	1908–1909	I.P.
Ionia Seedling	1905–1909	I.P.
Ireland	1907–1910	I.P.
Irish Blue	1887–1888	I.P.
Irish Champion	1892–1893	I.P.
Irish Cobbler	1897–1910, 1917	
Irish Daisy	1895–1903	I.P.
I.X.L.	1893–1909	I.P.
Jackson Improved	1887–1889	I.P.
Jackson White	1887–1889	I.P.
James Nugget	1903–1904	I.P.
Japanese	1890	I.P.
Jeannie Dean	1912–1915	I.P.
Joanette	1887	I.P.
John Bull	1903–1909	I.P.
Johnson No. 2	1907–1910	
Joseph Rigault	1887–1888	I.P., D.E.
Juana	1899–1904	I.P.
Jubilee	1899–1909	I.P.
Jumbo	1887–1889	I.P.
June	1905–1909	I.P.
June Eating, Craines	1889–1891	I.P.
Kaiser	1901–1909	I.P.
Kelley	1907–1909	I.P.
Kidney	1909	I.P.
King of All	1909–1910	
King Edward	1906–1910	
King Edward VII	1906–1909	I.P.
King of the Earlies	1887–1891	I.P.
King of Michigan	1901–1903, 1907–1910	
King Seedling	1909–1910	
King of the Roses	1897–1899	I.P.
King of the Russets	1889–1891	I.P.
King of the Valley	1891	I.P.
King Champion	1908–1910	
Kidney August	1887–1890	I.P.
Kidney Blue	1887–1888	I.P.
Kidney Degun Yellow	1887–1889	I.P.
Kidney English	1888–1890	I.P.
Kidney Kirchners	1887–1888	I.P., I.Q.
Kidney Kings White	1887–1889	I.P.
Kidney Late White	1887–1888	I.P.
Kidney Margolin	1887–1889	I.P.
Kidney Red	1887	I.P.
Kidney Red Skinned	1887–1888	I.P.
Kidney Royal White	1888	I.P.
Koppe	1887–1888	I.P.
Knowles Big Crop	1908–1910	I.P.
Kyle, R. J., from	1892	I.P.
Langworthy	1912–1913	I.P.
Lark Eye	1887–1889	I.P.
Laird	1907–1909	I.P.
Larkson, from	1887–1888	I.P.
Lady Finger	1889–1892	I.P.
Late Petoskey	1909–1910	
Late Puritan	1894–1910, 1912–1915	I.P.
Late Red Large	1887–1888	I.Q.
Late Rose	1887–1889, 1891–1893	I.P.
Late Rose (Blue)	1887–1888	I.Q.
Late Rose (White)	1887–1889	I.P.
Leeds Beauty	1909	I.P.
Lee Favorite	1899–1901, 1903	I.P.
Le Loisy	1908–1909	I.P.
Leo	1907–1909	I.P.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Lemieux, from	1892	D.E.
Leila	1899–1901	I.P.
Lightning Express	1897–1899	I.P.
Light Red Seedling	1898–1901	I.P.
Lilley, Miss Mary, Seedling	1910	
Lippian Rose	1887–1889	I.P.
Lira	1887–1889	I.P.
Livingston	1899–1903	I.P.
Livingston Banner	1899–1902	I.P.
Lizzie Pride	1895–1902	I.P.
Longfellow	1906–1909	I.P.
Lord Mayor	1887–1888	I.P.
Lortie, E., from	1895–1898	I.P.
London	1890–1899	I.P.
Long Keeper	1912–1914	
Lowe, John, from	1891–1892	I.P.
Magnum Bonum (American)	1887–1889	I.P.
Magnum Bonum (Sutton)	1887–1888	I.P.
Magnum Bonum (Select Carter)	1889–1891	I.P.
Maggie Murphy	1895–1903	I.Q.
Magyar King	1906–1909	I.P.
Main Crop	1895–1898	I.P.
Malden Recorder	1905–1909	I.P.
Mammoth Pearl	1900–1906	I.P.
Mammoth Prolific	1887–1891	I.P.
Manhattan	1887–1890	I.P.
Manistee	1906–1910, 1912–1915	I.P.
Manitoba Kidney	1890–1891	I.P.
Manitoba Kidney White	1890–1899	I.P.
Maple Leaf	1906–1910	I.P.
Marjolin	1908–1909	I.P.
Martins	1894–1899	I.P.
Mataysine	1908–1909	I.P.
Matchless	1887–1889	I.P.
Matador	1887–1889	I.P.
Maule Thoroughbred	1897–1909	I.P.
Mayfield Blossom	1909–1910	
Mayflower Early	1887–1889	I.P.
May Queen Early	1887–1903	I.P.
May Queen	1906–1909	I.P.
May Wonder	1909–1910	
Member of Parliament	1887–1890	I.P.
Merrill	1895–1909	I.P.
Meteor	1899–1901	I.P.
Michigan Rose	1909–1910	
Midlothian Early	1906–1909	I.P.
Miles Early	1907–1909	I.P.
Milky White	1887–1888	I.P.
Million Dollar	1905–1910, 1913	I.P.
Mills Prize	1898–1902	I.P.
Minister	1889–1891, 1892, 1907–1909	I.P.
Minister Von Miquel	1907–1909	I.P.
Mohawk	1887–1888	I.P.
Monarch	1912–1913	I.P.
Montana Bluff	1900–1905	I.P.
Monroe County	1893–1899	I.P.
Money Maker	1895–1910, 1912–1915	I.P.
Montcalm	1907–1909	I.P.
Moreton	1910, 1916	
Morgan Seedling	1903–1914	I.P.
Morgan White	1903–1909	I.P.
Murray, D., Seedling No. 1	1902–1904	I.P.
Murray, D., Seedling No. 2	1902–1903	I.P.
Mrs. Foraker	1889–1890	I.P.
Mountain Rose	1888	I.Q.
Mulhouse	1887–1888	I.P., I.Q.
Myatt Ashleaf	1905–1910, 1912–1914	I.P.
Mackintosh, D. R., from	1897–1898	I.P.
McCloskey, R. A. Seedling No. 1	1910	
McCloskey, Seedling No. 2	1910	
McCord, from	1897–1899	I.P.
McIntyre	1890-1891, 1900-1903, 1910, 1911-14	I.P., D.E.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
McKenzie, Geo., from	1892–1899	I.P.
McMurray, Thos., Seedling	1894–1895	I.P.
Napoleon	1887–1888, 1895–1909	I.P.
Naught Six	1905–1910	
Nebraska	1907–1910, 1912–1915	I.P.
Nettlecayed	1887–1888	I.Q.
Neue Rothe Salat	1899–1904, 1906	I.P.
New Badger State	1889–1891	I.P.
New Chieftain	1912	
New Climax	1906	I.P.
New Colonist	1912–1914	I.P.
New Dearborn	1914	
New Early Standard	1907–1910	
New First Crop	1912–1913	I.P.
New Guardian	1912–1914	I.P.
New King	1910, 1912	I.P.
New Key Stone	1912–1915	I.P.
New Provider	1912–1914	I.P.
New Queen	1895–1903, 1912–1915	I.P.
New Reliance	1906–1910	
New Scotch Rose	1912–1915	I.P.
New Variety No. 1	1894–1902	I.Q., D.E.
New Variety from M. G. Clarke	1906	I.P.
Niagara	1887–1889	I.P.
Ninetyfold	1905–1909	I.P.
Nine Weeks	1887–1888	I.Q.
Nobleman	1907–1910, 1911–1912	I.P.
Norcross	1905–1910, 1912–1913	I.P.
Noroton Beauty	1905–1909	I.P.
Northern Beauty	1901–1907	I.P.
Northern Star	1904–1906	I.P.
Northern Spy	1893–1902	I.Q., D.E.
Nott Peachblow	1903–1904, 1906	I.P., D.E.
No Name	1907–1910	I.P.
Noxall	1907–1916	
Nudel Red	1887–1888	I.P.
Ockel Rio Frio	1887–1888	I.P.
Odin	1887–1888	I.P.
Ohio Gunner	1889–1891	I.P.
Ohio Junior	1897–1902	I.P.
Oneida	1887–1889	I.P.
Onion Early	1887–1890	I.P.
Onion Red Skinned	1887–1888	I.Q.
Ontario Wonder	1915	I.P.
Oregon Beauty	1897–1899	I.P.
Orphans	1895–1899, 1907–1910	I.P.
Oxford	1887–1888	I.P., I.Q.
Ouvrement, G. W., Seedling	1910	
Pan American	1912–1915	I.P.
Paris Forcing	1887–1888	I.Q.
Paris Prize	1887–1888	I.Q., D.E.
Paragon (Thorburn)	1887–1891	I.P.
Patate Belge	1897–1898	I.P.
Paterson Albert	1887–1889	I.P.
Paterson Blue	1887–1890	I.P.
Paterson Blue Kidney	1887–1888	I.P.
Paterson Napoleon	1887–1888	I.P., I.Q.
Paterson Red Kidney	1887–1888	I.P.
Paterson Victoria	1887–1888	I.P.
Pat Choice	1902–1906	I.P.
Pauline Lucca	1887–1888	I.P.
Peacemaker	1906–1909	I.P.
Peachblow	1887–1888, 1898–1904, 1906	D.E.
Peachblow (red skinned)	1887–1888	I.Q.
Peachblow (Foster Early)	1887–1888	I.P.
Peachblow (improved)	1887–1888	I.P., I.Q.
Pearce	1900–1909	I.P.
Pearl of Home	1891	I.P.
Pearce Extra Early	1893–1902	I.P.
Pearce Prize Winner	1893–1896, 1898–1902	I.P.
Pearl	1887–1888, 1907–1909	I.P.
Pearl of Savoy	1887–1891, 1905–1909	I.P.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Pearmain	1908–1909	I.P.
Peck Early	1903–1909	I.P.
Peerless	1887–1888	I.P.
Peerless Junior	1895–1899	I.P.
Penn Manor	1899–1905	I.P.
Penzance Kidney	1892–1893	I.P.
Perfection	1907–1910	I.P.
Perle	1899–1901	I.P.
Perron, A. No. 1 from	1898	I.P.
Perron, A. No. 2 from	1898	I.P.
Pesca	1887–1888	I.P.
Peru, from	1907–1909	I.P.
Pierremont Seedling	1912–1914	I.P.
Pingree	1901–1906	I.P.
Pink Eye	1898–1905	I.P.
Pink Seedling from A. D. Smith	1909–1910	
Pine Cone	1887–1889	I.P.
Pinnacle Beauty	1907–1910, 1912–1914	I.P.
Pio Nano	1887–1888	I.P.
Pioneer Pride	1916	
Planet	1907–1910	
Plucky Baltimore	1916	
Polaris	1893–1903	I.P.
Pomeranian Red	1887–1888	I.P.
Pootaluck	1889–1891	I.P.
Potentate	1905–1909	I.P.
Polygunos	1887–1888	I.P.
Prairie Seedling	1887–1891	I.P.
Premium Gem	1914	I.P.
President Kruger	1906–1910	
Preston	1890–1891	I.P.
Price, from Holland	1887–1889	I.P.
Pride	1913–1914	I.P.
Pride of America	1887–1891	I.P.
Pride of the Market	1894–1902	I.P.
Pride of the North	1917	
Pride of the Table	1894–1899	I.P.
Pride of Tunbridge	1905–1909	I.P.
Prime Minister	1887–1891	I.P.
Prince Bismarck	1889	I.P.
Prince Albert	1907–1910, 1912–1914	I.P.
Prince Frederick Charles	1887–1888	I.O.
Prize Taker	1895–1902	I.P.
Progress	1912–1913	I.P.
Prolific Breezes	1887–1889	I.P.
Prolific Rose	1899–1904	I.P.
Prolific	1906–1910	
Prosperity	1909–1910	
Prof. Xmichey	1908–1909	I.P.
Provost	1912–1914	I.P.
Purple and gold	1887–1889	I.P.
Purple Nuts	1913	I.P.
Pyke, Geo., from	1900–1901	I.P.
Quaker City	1897–1903	I.P.
Quarantine de la Halle	1887–1888	I.P.
Queens	1887–1888	I.Q.
Queen of Potatoes	1887–1888	I.Q., D.E.
Queen of Thanet	1908–1910	
Queen of the Earth	1908–1910	
Queen of the Hebrons	1911–1913	I.P.
Queen of the Valley	1887–1888, 1891–1899	I.Q.
Quick Crop	1903–1909	I.P.
Quick Lunch	1905–1906, 1909–1910	
Ramona	1907–1909	I.P.
Raspberry Leaved	1887–1889	I.P.
Rawdon Rose	1897–1905	I.P.
Rawlings, Heber, Seedling	1906–1910	
Reading Giant	1894–1902	I.P.
Read Golden Gem	1910	
Record	1895–1898, 1909–1910	
Red Fish	1887–1888	I.P.
Red Mouse	1887–1888	I.P., I.Q.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Red Rock	1900–1904	I.P.
Red River Valley	1891–1893	I.P.
Red Skinned Flourball	1887–1888	I.Q.
Reeves Rose	1897–1910, 1912–1915	I.P.
Reinish Early Kidney	1887–1889	I.P.
Reliance	1905–1909	I.P.
Richer, Mrs. M., Seedling	1908–1909	I.P.
Richmond	1907–1910	I.P.
Richter Gem	1887–1889	I.P.
Richter Improved	1887–1891	I.P.
Richter Schneerose	1887–1892	I.P.
Rio White	1887–1888	I.P
Rochester Rose	1895–1910	
Rockwood	1890–1891	I.P.
Roe, T. W., Seedling	1909–1910	I.P
Rognon Violet	1908–1909	I.P.
Rose of Erin	1898–1902	I.P.
Rosedale	1890	I.P.
Rose Beauty of Beauties	1890–1892	I.P.
Rose of the North	1898–1902, 1911–1912	I.P.
Rose No. 9	1897–1906	I.P.
Rose New Giant	1888–1891	I.P.
Rose New Invincible	1891	I.P.
Rosy Morn	1887–1893	I.P.
Rothrant	1887–1890	I.P.
Rough Coat Cup	1902–1904	I.P.
Rough Diamond	1889–1892	I.P.
Rouge Royale	1905	I.P.
Rouge Hative de Province, France	1908–1909	I.P.
Royalty	1912–1915	I.P.
Ruby	1887–1891	I.P.
Rural Blush	1889–1910	
Rural No. 2	1889–1892, 1896–1903	I.P.
Russell Seedling	1894–1898	I.P.
Russet Queen	1912–1915	I.P.
Rust Proof	1905–1909	I.P.
Rutling Rose	1908–1910	I.P.
Sabean Elephant	1895–1910	
Sachsen Yellow Fleshed Onion	1887–1888	I.P.
Sago Black	1887–1888	I.P.
Satisfaction	1894–1899, 1909–1910, 1912–1914	
Sausisse	1906–1909	I.P.
Saunders	1890	I.P.
Scot, The	1906–1909, 1912	
Scotch Blue	1887–1888	I.P., I.Q.
Scotch Champion	1888–1892	I.P.
Scottish Queen	1887–1888	I.Q.
Scottish Triumph	1912	
Scotland Pride	1910	
Scotch Mountain Rose	1887–1888	I.P., D.E.
Schoolmaster	1887–1890	I.P.
Sealsfeet	1908–1910, 1912–1913	I.P.
Seattle, from	1892–1903	I.P.
Sebec	1887–1888	I.P.
Seed	1887–1888	I.P.
Seedling No. 102, Lawrence	1909	I.P.
Seedling No. 214 (C.E.F.)	1895–1902	D.E.
Seedling No. 230 (C.E.F.)	1894–1902	D.E.
Seedling Rock	1887–1888	I.P.
Seedling No. 7 (Agassiz)	1896–1904	I.Q.
Semmel	1887–1888	I.Q.
Seneca Queen	1899–1902	I.P.
Sensation	1910	
Sharpe Seedling	1887–1903	I.P.
Sharp Victor	1912–1913	I.P.
Shipper Pride	1907–1909	I.P.
Shoat	1906–1909	I.P.
Sieberhauser	1887–1888	I.P.
Siegfried	1887–1888, 1889–1901	I.P.
Silver Dollar	1900–1903	I.P.
Silver King	1908–1909, 1912–1914	I.P.
Silverskin	1887–1888	I.P.

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Sirdar	1907–1910	
Sion House	1906–1910	
Sir John Lewellyn	1905–1910, 1912–1914	I.P.
Sir Walter Raleigh	1897–1903, 1912	
Six Weeks	1891	I.P.
Six Weeks Long White	1887–1888	I.P.
Six Weeks Long White (Improved)	1887–1888	I.P.
Six Weeks Round Blue	1887–1889	I.P.
Six Weeks Round White	1887–1890	I.P.
Small Frying	1887–1888	I.P., D.E.
Smith Bros. No. 2	1909–1910	
Snider Best Early	1906–1909	I.P.
Snow	1907–1910, 1912–1915	I.P.
Snowball	1902–1909	I.P.
Snowdrop	1905–1909	I.P.
Snowflake	1887–1891	I.P.
Solanum Commersonii Violet	(see Blue Giant.)	
Soleil Levant	1906–1909	I.P.
Sophie	1907–1909	I.P.
Southern Queen	1907–1909	I.P.
Sovereign	1887–1888	I.P., I.Q.
South Brazilian	1887–1888	I.P.
Stairs, Jas. W., Seedling	1906–1909	I.P.
Stambulow	1899–1901	I.P.
Standard	1906–1909	I.P.
Stanley	1890–1891	I.P.
State of Maine	1890–1910	
Star of the East	1905–1909	I.P.
Ste. Helene Rouge	1908–1909	I.P.
Stonewall	1890–1892	I.P.
Stourbridge Glory	1895–1899	I.P.
Strachan, Alex., from	1900	I.P.
Stray Beauty	1889–1891	I.P.
Sugar	1887–1891	I.P.
Sukreta	1887–1891	I.P.
Suleika	1899–1901	I.P.
Summit	1889–1902	I.P.
Sunlight	1916	
Superlative	1907–1910, 1912	
Supreme	1906–1909	I.P.
Surprise	1889–1891	I.P.
Sutton A-1	1911–1914	I.P.
Sutton Prolific	1912–1914	I.P.
St. Jean	1887–1888	I.P.
St. Johns Bay	1887–1888	I.Q.
St. Patrick	1887–1891, 1911–1914	I.P.
Swiss Snowflake	1897–1909	I.P.
Symonds, J. (Black Seedling)	1891	I.P.
Table King	1894–1899, 1912–1913	I.P.
Table Talk	1912	
Talisman	1908–1910	
Telephone	1887–1890	I.P.
Ten Dollar	1907–1910	I.P.
Think of Me	1891	I.P.
Thorburn	1888–1897, 1900–1902	I.Q.
Thusnelda	1887–1888	I.Q.
Tilley, R., from	1901	I.P.
Todd Seedling	1902–1904	I.P.
Todd, W. H., Seedling	1910	
Todd Wonder	1912–1915	I.P.
Trust Buster	1916	
Triumph de Pomerania	1887–1888	I.Q.
Trophine	1887–1889	I.P., I.Q.
Trophy	1887–1888	I.Q.
[illegible] Seedling	1895–1903	I.P.
[illegible]le Excelsior	1887–1888	D.E.
Truffle	1887–1888	I.P.
Twentieth Century	1899–1902, 1907–1909	I.P.
Uncle Gideon Quick Lunch	1906, 1909, 1910	
Uncle Sam	1897–1910	
Unica	1899–1901	I.P.
Up-to-Date	1901–1903, 1910	

VARIETIES OF POTATOES TESTED AT THE CENTRAL EXPERIMENTAL FARM.—*Concluded.*

Name of Variety.	Year When Tested.	Why Discarded.
Vanguard	1887–1893	I.P.
Vanier, D., from	1892–1903	I.Q.
Van Deman Earliest	1902–1905	I.P.
Van Orman Earliest	1906–1907	I.P.
Venus	1887–1888	I.P., I.Q.
Veribest	1909–1910	
Vermont	1887–1893	I.P.
Vermont Gold Coin	1912–1916	
Vick Extra Early	1892–1910, 1912	I.P.
Vick No. 9	1903–1906	I.P.
Vickton	1905–1908	I.P.
Victor	1905–1910	
Victoria	1890–1901	I.P.
Victoria Pale Red	1887–1888	I.Q.
Victor Rose	1895–1899	I.P.
Vigorosa	1899–1902	I.P.
Violet Rempal	1908–1909	I.P.
Virginian Potato	1906–1909	I.P.
Volunteer	1910	
Voodle Red	1887	I.P.
Vulcan	1907–1910, 1912–1913	I.P.
Wall Orange	1903–1904	I.P.
Washington	1907–1909	I.P.
Wee MacGregor	1906–1910, 1912	
Wesel	1899–1901	I.P.
Wellington	1907–1910	
White Albino	1904–1910	
White Beauty	1893–1902, 1907–1910	
White Chief	1909–1910, 1912–1914	I.P.
White Elephant	1887–1889, 1891–1892, 1897–1909	I.P.
White Fleshed Onion	1887–1888	I.P.
White Giant	1893–1902, 1907–1910	
White Mammoth	1905–1910	
White Ohio	1907–1910	I.P.
White Rose	1907–1910	
White Wonder	1909–1910, 1912–1914	I.P.
White Star	1887–1891	I.P.
White Sprout	1887–1890	I.P.
White Queen	1887–1888	D.E.
Wilson First Choice	1906–1909	I.P.
Williams Early	1887–1889	I.P.
Windsor Castle	1906–1910, 1913	I.P.
Woltman	1899–1909	I.P.
Wonderful	1901–1910	I.P.
Wonder of the World	1887–1893, 1896–1902, 1908–1910	
Wordsley Pride	1912–1913	I.P.
World Fair	1894–1899	I.P.
Wortley	1906–1909	I.P.
Yellow Transpareat	1912	
Yeoman	1912–1913	I.P.
Zwickau	1887–1888	I.P.
Zwiebel Kartoffel	1908–1909	I.P.

There were tested in 1916 and 1917 eleven varieties of cross-bred potatoes originated by the Bureau of Plant Industry, Washington, D.C.

SUMMARY.

Although the potato is a very important food product in Canada, the methods of cultivation can be much improved.

The potato succeeds well in Canada almost everywhere where the season is long enough for the tubers to develop before the tops are killed by frost.

There is no farm crop the yield of which can be increased so much by one season's work as the potato.

Potatoes have been grown at the rate of over 700 bushels per acre in small plots at the Central Experimental Farm. The average yield for the whole of Canada for the years 1905-14 is estimated at 161·34 bushels per acre.

The potato is a native of South America and Mexico and was introduced into Ireland in 1585 or 1586, and from there to England.

New varieties of potatoes may be originated from seed, by bud variation, or changed by selection.

Varieties may be affected either favourably or unfavourably by change of seed. If seed is obtained from a comparatively cool, moist climate it will give a much larger yield, as a rule, than seed from a drier and warmer climate.

Strong vitality and freedom from disease in seed potatoes are of great importance.

Potatoes succeed best in a moist, somewhat cloudy and temperate climate and in a rich, deep, friable, warm, sandy loam soil with good natural drainage, a constant though not too great a supply of moisture and well supplied with decayed or decaying vegetable matter.

A crop of 200 bushels of potatoes, exclusive of the potato tops, removes from the soil approximately 40 pounds nitrogen, 20 pounds phosphoric acid, and 70 pounds potash.

Potatoes succeed well after clover, there being an average increase in a three-years' test of 37 bushels per acre where clover was used than where it was not.

Heavy manuring with barnyard manure is not recommended, but the use of a moderate quantity is advised applied on the clover in the autumn. If used in the spring the manure should be well rotted.

Chemical fertilizers, if used, should be applied at the rate of 500 to 800 pounds or more per acre in the proportion of 250 pounds nitrate of soda, 350 pounds superphosphate, and 200 pounds sulphate of potash or muriate of potash.

The soil should be very thoroughly prepared; the better the preparation, the better the crop is likely to be.

The best time to plant varies: it depends largely on the condition of the ground and spring frosts. As a rule, the best time is as soon as possible after danger from frost is past.

Sets should be cut from medium or large potatoes and planted, and covered as soon as possible after planting. If allowed to wither the crop will be less. An increased yield will be obtained by coating the sets with land plaster, gypsum or lime, especially if potatoes are cut a few days before planting. A set should have a large amount of flesh and about three eyes.

The best depth to plant is from four to five inches.

Potatoes should be planted in rows 30 inches apart with a set from 12 to 14 inches apart in the rows.

Potato planters are very satisfactory.

The crop of potatoes will usually increase in proportion to the number of times the potatoes are cultivated during the growing season. There was found to be an increase of 40 bushels per acre in a crop of potatoes cultivated six times over those cultivated three times.

Level cultivation will sometimes give better results than ridging, and vice versa. Where the soil is stiff, ridging is advisable. Where the soil is loose and liable to suffer from drought in a dry time, level culture is recommended. Where the soil is both loose and moist, ridging will usually give best results.

Mulching with straw is too expensive and results do not justify its use.

Potatoes can be forced by some days and the yield increased by sprouting the potatoes before planting.

The crop of marketable potatoes can be almost doubled by having three weeks' growth in September.

Potato tops should be protected from insects and diseases as the yield will be in proportion to the leaves uninjured.

The Colorado Potato Beetle and Cucumber Flea Beetle are the most injurious insects. The former can be killed by using Paris green or arsenate of lead, and the latter can be prevented from doing injury by Bordeaux mixture and Paris green or arsenate of lead.

The principal disease affecting the potato is the Late Blight, which can be prevented by spraying thoroughly with Bordeaux mixture, beginning before the disease appears and keeping the vines covered. From three to four sprayings are sufficient. In a three years' test the increase in yield by spraying with Bordeaux mixture was 94 bushels. The total cost per acre will be from six to eight dollars on large areas and about thirteen dollars on small areas, although good results will be obtained in some seasons with less expenditure.

The spores of potato scab may be destroyed on the potato before planting by soaking the tubers for three hours in a solution of corrosive sublimate, or for two hours in a solution of formalin.

Spraying mixtures should be applied at the proper time and thoroughly if good results are to be expected.

It is important to success to have a good spray pump and pure spraying materials.

Good potato diggers are now on the market by which potatoes can be dug more economically than with the plough or fork. Potatoes should be dug in dry weather so that they will be dry when taken to the cellar.

If potatoes are diseased it is best to leave them in the ground as long as possible.

Tubers should be stored in a dry, cool, well ventilated cellar and kept at a temperature between 33° and 35° F. if possible.

It is usually more profitable to market potatoes in the autumn than to store them.

Good machines for sorting potatoes can now be obtained.

The cost of growing potatoes varies, much depending on the care given the crop and the kind of machinery used.

The number of varieties of potatoes tested at the Central Experimental Farm from 1887 to 1917 is about 1,100.

ACKNOWLEDGMENTS.

As it seemed desirable to include in this bulletin results obtained in growing potatoes at the branch farms and stations, tables giving the cost per acre of growing potatoes at a number of them have been used; the average yield of the most productive varieties for five years are also given with the varieties recommended. While much of this information has already appeared in the annual reports of the branch farms and stations, I desire to gratefully acknowledge the co-operation of the superintendents by furnishing additional matter.

I desire also to express my appreciation of having available Bulletin 176 of the Bureau of Plant Industry, Washington, on "Group Classification and Varietal Descriptions of Some American Potatoes" by Prof. Wm. Stuart, and of being able to use in this bulletin the classification of potatoes described in that bulletin, thus helping to make the classification uniform for both Canada and the United States. The origins of varieties have also been taken from that bulletin.

Bulletin 239 of the Department of Agriculture, Ontario, on Potatoes, by Dr. C. E. Zavitz has also been consulted and some information taken from it.

I desire, also, to thankfully acknowledge my indebtedness to Dr. Frank T. Shutt, Assistant Director, Experimental Farms, for taking most of the photographs which illustrate this bulletin, and which help to make it more useful and interesting.