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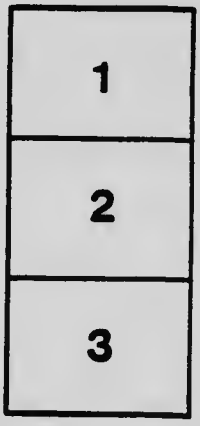

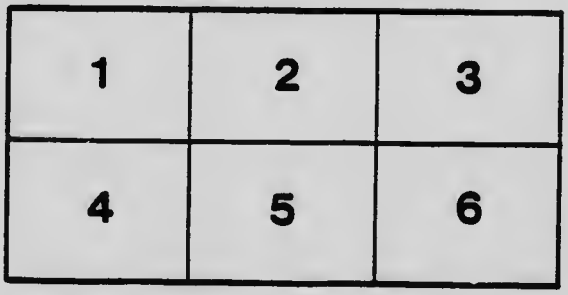

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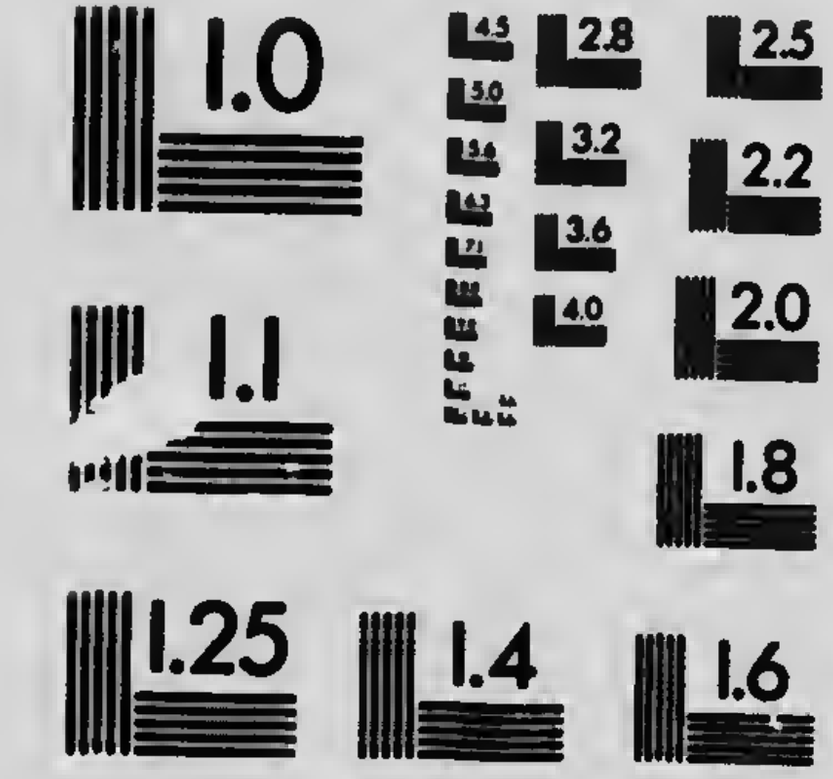

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DEPARTMENT OF AGRICULTURE
CENTRAL EXPERIMENTAL FARM
OTTAWA, CANADA.

THE POTATO AND ITS CULTURE

WITH LISTS OF

VARIETIES FOUND MOST USEFUL

BY

W. T. MACOUN

Dominion Horticulturist

BULLETIN No. 49

APRIL, 1905

Revised, December, 1910

...v direction of the Hon. SYDNEY A. FISHER, Minister o: Agriculture, Ottawa, Ont.

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Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

11222—1

To the Honourable
The Minister of Agriculture.

Sir,—I beg to submit for your approval Bulletin 49 of the Experimental Farm series on 'The Potato and its Culture,' which has been prepared under my direction by Mr. W. T. Macoun, Dominion Horticulturist.

The potato crop is everywhere one of great importance to the community. In this bulletin there are presented in convenient form the results gained through a long course of experiments, regarding the quality, productiveness and general usefulness of the best sorts of potatoes which have been under trial. The best methods of preparing the land for this crop, of planting and cultivating are fully explained; particulars are also given as to the most successful remedies which have been adopted for the destruction of the injurious insects which attack this plant and for the diseases which affect the vines and tubers.

The ease with which new varieties of potatoes are produced from seed has resulted in the origination during the past few years of a large number of new sorts. All those of special promise have been tested, and their relative merits compared, especially as regards their productiveness, quality and earliness of maturing. During the past twenty-three years over 1,000 varieties have thus been carefully tried, and all those of an inferior character discarded. This epitome of the work which has been carried on at the Experimental Farms with the potato is but an example. Similar work has been done with all the more important farm crops.

It is hoped that the information given in this bulletin will serve as a useful guide to farmers and gardeners in all parts of this country, and by indicating the most productive and desirable sorts of potato to plant, will lead to a large increase in the average crop, an improvement in the quality of the tubers produced, and that thus increased profits may be realized by the growers.

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

WM. SAUNDERS,
Director of Experimental Farms.

Ottawa, April 1, 1905.
Revised and reprinted, December, 1910.

11222—1½

THE POTATO AND ITS CULTURE

By W. T. MACOUN

Dominion Horticulturist.

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 twenty-two years, although the results of the work of other experimenters have not been overlooked, and have also been used when deemed advisable.

The production of potatoes in the largest producing countries of the world is very great. In the chief potato-growing countries of Europe, Great Britain and Ireland, and America, the following enormous quantities of potatoes are produced:—

Country.	Crop for 1909.	1899–1908. — Ten Years' Average Crop.
	Bushels.	Bushels.
Austria	479,621,000	455,799,000
†Belgium	82,846,000	85,851,000
Canada	99,087,000	
*France	625,087,000	466,728,000
Germany	1,710,161,000	1,593,027,000
Great Britain and Ireland	250,752,000	225,876[illegible],000
Hungary	200,304,000	169,592,000
Russia	1,193,659,000	976,2000,00
United States	376,587,000	261,214,000

*The figures in the first column are for 1908.
†The average is taken from eight years only, 1900 to 1907.

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.

Potato culture 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 culture 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 the inhabitants of Dawson City being able to grow them.

There is no farm crop, in our judgment, which will repay good culture as well as the potato, nor any of which the crop can be increased so much by one season's work. A few more bushels per acre can be added to the wheat and oat crop by careful husbandry, and the crop of turnips and mangels increased also, but the percentage of increase is much less than with the potato. The average yield per acre for the Province of Ontario for the year 1910 was 130 bushels, and for the past twenty-nine years, 116 bushels. According to the census of 1901, the average yield per acre for the whole of Canada was only 123·37 bushels, the province giving the highest yield being Prince Edward Island with 149·28 bushels. But the yield in Canada is considerably better than that of the United States, which, according to the census of 1899, was only 88·6 bushels per acre. The estimated yield for Canada for 1910 is 147·14 bushels per acre and the estimated yield for the United States for 1910 is 93·4 bushels per acre. Some of the best farmers in Canada have grown from 400 to 500 bushels per acre, and 300 bushels per acre is not at all unusual. At the Central Experimental Farm, Ottawa, the highest yield has been at the rate of 772 bushels per acre, but it has been proven by careful experiment that potatoes can be produced at the rate of over 1,000 bushels per acre, an actual and authentic experiment having shown that from a one-twentieth acre plot potatoes were grown at the rate of 1,061 bushels per acre. There have also been other cases where yields at the rate of 1,000 or more bushels per acre have been obtained. While in field culture such high yields may not be possible, they are something to strive for and there is no doubt 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 twenty-three 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. 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. From 1891 to 1910 inclusive, there have been 137,896 3-lb. samples sent out. These, 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.

DESCRIPTION AND HISTORY OF THE POTATO.

The potato (*Solanum tuberosum*) is a herbanceous perennial belonging to the *Solonaceæ* or Night Shade family, a large order containing 800 or more species, of which only six 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 about 150 years ago, when a famine in Scotland in 1743 brought it into prominence as a cheap food and gave a great impetus to its culture. 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.

IMPROVEMENT OF THE POTATO.

The potato, like most other plants taken from a wild state, or where cultivation has been rude, improves with good culture. In its wild condition the potato does not grow nearly as large as when in cultivation, the tubers are borne nearer the surface of the soil and sometimes appear 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.

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 culture.

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 wsys :

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 the second season is dug, 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 must have been taken from kidney varieties, as 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.

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. Some of these seedlings are still being tested but are not very promising.

In 1824, Loudon, in describing ten of the earliest varieties of potatoes which were in general cultivation at that time, writes: 'No blossoms are produced by any of the above sorts.' An interesting experiment conducted by Knight in 1806 is also given by the same author. Knight wished to find if the cause of no seeds being produced was owing to the increased production of the tubers, and writes thus of his experiment: 'I suspected the cause of the constant failure of the early potatoes to produce seeds to be the preternaturally early formation of the tuberous root which draws off for its support that portion of the sap which in other plants of the same species affords nutriment to the blossoms and seeds, and experiments soon satisfied me that my conjectures were perfectly well founded. I took several methods of placing the plants to grow in such a situation as enabled me to readily prevent the formation of tuberous roots, but the following appearing the best it is unnecessary to trouble the society with an account of any other. Having fixed strong stakes in the ground, I raised the mould in a heap round the bases of them and in contact with the stakes; on their south sides I planted the potatoes from which I wished to obtain seeds. When the young plants were about four inches high, they were secured to the stakes with shreds and nails and the mould was then washed away, by a strong current of water from the bases of their stems, so that the fibrous roots only of the plants entered the soil. The fibrous roots of this plant are perfectly distinct organs from the runners which give existence and subsequently convey nutriment to the tuberous roots; and as the runners are wholly out of the soil, the formation of tuberous roots is easily prevented; and whenever this is done numerous blossoms will soon appear, and almost every blossom will afford fruit and seeds.' This experiment is recorded at some length here, as it is the only one of its kind that has come under the writer's notice, and it may prove suggestive to potato breeders in America.

CROSS-BRED VARIETIES.

Alhough it is quite possible to artificially cross varieties of potatoes just as other vegetables are crossed, very little of this work has been done, the principal reason being that pollen is so difficult to find and breeders have for the most part been content to raise seedlings from seed gathered in the field. Special seed, said to have been obtained by cross-breeding, is sometimes advertised, but it may be safely stated that in most cases this seed was not produced by hand pollination. Cross pollination, no doubt, takes place in the field, which is brought about by the agency of wind and insects, and in the seedlings from seed produced in such a field, some characteristics of the varieties which were growing in the field will, no doubt, be apparent.

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.

VARIETIES CHANGED OR IMPROVED BY 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 so changed by careful selection that it would not be recognized later on if compared with the original in field culture. This selection may be undertaken for

the purpose of increasing the yield, or to obtain a variety which is earlier or later, shallower in the eye and of better shape; it may also be undertaken to obtain a potato which is more resistant to disease, better in quality, or with a higher percentage of starch.

When the variety or varieties to be improved have been decided upon, the sets are planted in the ordinary way or a little farther apart in the rows. At digging time the best potato from the most productive hill is saved and all the others discarded; or the best potato in the hill that is freest from disease; or the best potato from any other standpoint. This best potato is planted the following season and the selection is continued until the characteristics sought for appear fixed. Great differences have been found by experimenters in the yields from different hills of the same variety, and while the work of breeding by selection is comparatively new, very striking results have been obtained already.

MOST PRODUCTIVE VARIETIES.

Since the year 1887, variety testing has been one of the chief experiments conducted with potatoes at the Central Experimental Farm. As previously stated, 752 named varieties have been tested since that time. Each year the different sets are grown side by side under as nearly uniform conditions as possible, and the yields are carefully recorded when the crop is dug. If, after giving it a thorough test, a variety is found not to be sufficiently productive, to be of undesirable shape and appearance, or of inferior quality, it is discarded. New kinds are constantly being tested. In the following table a list will be found of the twelve varieties of potatoes out of an average of 128 tested yearly in the uniform test plots which have averaged highest in productiveness for the past five years, with descriptive notes regarding them.

As an example of the importance of planting good seed of the most productive varieties, it may be stated that during the five years, 1900-1904, the average yield per acre of the heaviest yielding variety of each year was 596 bushels 12 pounds, and the poorest yielding variety, 135 bushels 85 pounds, a difference of 460 bushels 14 pounds per acre. Even in the list of twelve varieties given in the following table there is a difference in yield of 123 bushels 5 pounds per acre between the first and twelfth. The yields given in these tables are higher than would be obtained in field culture, as these potatoes were grown on comparatively small plots:

TABLE I.—Twelve Most Productive Varieties of Potatoes—Average of Five Years, 1906–1910.

Number.	Name of Variety.	Number of Years Under Test.	Season.	Shape.	Colour.	Depth of Eyes.	Quality.	Average Yield per Acre 1906–1910.	
								Bushels.	Lbs.
1	Dalmeny Beauty	7	Medium late	Oval to roundish, flattened	White	Shallow	Good	276	19
2	Hard to Beat	5	"	" "	"	"	"	228	22
3	Carman No. 1	16	"	Oblong to roundish	"	Shallow to medium	"	196	41
4	Gold Coin	8	"	" "	"		"	178	25
5	Late Puritan	17	"	Long to oblong	"	Medium	"	178	12
6	Empire State	23	Medium	Long	"	"	"	177	19
7	Ashleaf Kidney	7	"	Oval to roundish	"	"	"	172	16
8	Rochester Rose	16	Early	Oblong to long	Pink	"	"	171	10
9	Sharpe's Victor	6	Medium	Oval to long flattened	White	Shallow	"	168	44
10	Dewey	6	"	Roundish to oval, flattened	"	"	"	160	36
11	Extra Early Hero	6	Early	Long	Pink	"	"	153	31
12	Holborn Abundance	22	Late	Roundish	White	Medium to deep	Medium	153	14

Three other varieties, not tested long enough in the uniform test plot to be included in this table, but which have averaged well for four years are: King Edward, 310 bush. 45 lbs. per acre; Factor, 268 bush. 57 lbs. per acre; Sutton's Prolific, 245 bush. 51 lbs. per acre.

EXTRA EARLY VARIETIES OF POTATOES.

For nine years, digging tests have been made to determine which varieties of potatoes were fit for market soonest. Samples were dug twice each week beginning from six to eight weeks after planting, depending on the season, and continuing through the month of August. Notes were taken on the number of potatoes produced by each variety at each digging, the size of the largest potatoes and the number that were marketable. Following are notes on some of these extra early varieties:—

New Early Standard.—This is a roundish white potato with medium to deep eyes, much resembling Early Petoskey. Not a heavy yielder.

Early Petoskey.—A very early, ndish, white potato with medium to deep eyes. This and New Early Stand re much alike.

Early Trumbull.—One of the earliest. An oblong, white potato with a medium eye. It has not proven very productive.

Bovee.—This is a productive, extra early variety. It is pink and white in colour, oblong in shape, and has eyes of medium depth.

Eureka Extra Early.—This variety is very similar to Snowball and apparently nearly as early.

Snowball.—This is a roundish, white potato with medium to deep eyes and of good quality. It is a very early variety, but is not a heavy cropper.

Rochester Rose.—The Rochester Rose is a pink potato of the Early Rose type, but is earlier and much more productive than that old favourite. It is one of the most productive early sorts.

Bliss' Triumph.—This variety and the Stray Beauty are very similar if not identical. It is a very early kind, but a poor yielder, and the quality of the young potatoes is not as good as some others.

Early Ohio.—The Early Ohio is an old favourite and well deserves the praise which it has had in the past. It is about as early as any, and the new potatoes are drier than most other early kinds. The Early Andes, Early Six Weeks, Early Dawn, and Early Market, are all of this type. None of these has proven as productive as Rochester Rose.

BLIGHT AND ROT RESISTANT VARIETIES.

The Late Blight and Rot which, some seasons, causes serious injury in certain parts of Canada and always lessens the crop more or less, is causing inquiry to be made among farmers as to the possibility of obtaining varieties which are resistant to it. At the Central Experimental Farm notes are taken each year on the time when the tops of the different varieties die. In this way it has been possible to obtain fairly accurate information as to their relative blight resistance. It is true that the vines of these varieties have been sprayed with Bordeaux mixture most of the years when these notes were taken, but the average results are confirmed in most cases by notes taken of the varieties when they had not been sprayed. So that it may be fairly stated that the varieties having the tops least injured are the most blight-resistant as far as foliage is concerned. The relative rotting in the cellar has not been

recorded, but the relative rotting in the field before digging has been, and confirms the notes on the blighting of the tops.

Since 1905 those varieties which have proven productive and freest from blight when sprayed with Bordeaux mixture, have been grown by themselves and have not been sprayed with Bordeaux mixture. In all, fifty-three varieties have been grown in this way. A large proportion of these have been discontinued as they have not done well when unsprayed. In the following table are the names of twolve tested during the past three years, with yields. These are all medium late or late sorts and it has been noticed for several years that the potatoes freest from late blight are the later varieties.

TABLE II.—Twelve Varieties of Potatoes—Not Sprayed with Bordeaux Mixture, 1908-10.

Number.	Name of Variety.	Number of Years Under Test.	Season.	Shape.	Colour.	Depth of Eyes.	Quality.	Yield per Acre Sound Tubers 1910.		Yield per Acre Diseased Tubers 1910.		Average Yield per Acre Three Years 1908-1910.	
								Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	King Edward	5	Late	Roundish to oval, flattened.	White	Shallow	Good	195	48	4	24	245	40
2	Dalmeny Beauty	7	Medium late	Oval to roundish, flattened	"	"	"	182	36	6	36	213	48
3	Factor	5	"	" "	"	"	"	147	24	6	36	203	8
4	Hard to Beat	5	"	" "	"	"	"	96	48			202	24
5	Highlander	4	"	" "	"	"	"	129	48	6	36	188	31
6	Duchess of Cornwall	5	"	" "	"	"	"	75	54	4	24	177	50
7	White Giant	4	"	Oblong	"	Medium	"	147	24			154	44
8	Dr. Maerker	12	Late	Roundish	"	Medium to deep	Medium	92	24	13	12	154	0
9	Sirdar	4	Medium late	Roundish, flattened	"	Shallow	Good	41	48	68	12	188	20
10	Holborn Abundance	22	Late	Roundish	"	Medium to deep	Medium	107	48	4	24	101	56
11	Carman No. 1	16	Medium late	Oblong to roundish	"	Shallow to medium	Good	83	36	46	12	98	52
12	State of Maine	21	"	" "	"	Medium to shallow	"	55	0	35	12	74	4

MOST PRODUCTIVE EARLY VARIETIES.

There has been a large number of early varieties of potatoes tested at the Central Experimental Farm during the past seventeen years. As soon as a variety has been grown long enough to judge of its merits it is usually discarded if it has not proven productive. Even although a variety is a fairly good yielder, if it does not average as well as another of the same type or one very much like it, it is usually discontinued. An exception, however, is made in the case of early kinds which, although not as productive as others not so early, are sometimes retained on account of their extreme earliness, but among these extra early ones, also, the most productive variety of a certain type is usually kept and the poor yielding ones discarded. If seed of these extra early varieties were obtained from the cooler parts of Canada or from the districts suggested under 'Change of Seed,' there is no doubt but that a marked increase in yield would be observed. In the following table will be found a list of the six early varieties which have yielded best on the average for the past five years.

TABLE III.

SIX MOST PRODUCTIVE EARLY VARIETIES OF POTATOES—AVERAGE 1906-1910.

Name of Variety.	Number of Years Under Test.	Shape.	Colour.	Depth of Eyes.	Quality.	Average Yield per Acre, 1906-1910.	
						Bush.	Lbs.
Rochester Rose	16	Oblong to long	Pink	Medium	Good	171	10
Extra Early Hero	6	Long	"	Shallow	"	153	31
Reeves' Rose	14	Oblong	"	Medium	"	152	41
Irish Cobbler	14	Roundish	White	Deep to medium	"	150	20
Vick's Extra Early	19	Oblong to long	Pink and white	Medium	"	150	2
Crine's Lightning	9	Oblong	Pink, red in eyes	"	"	132	26

VARIETIES AS AFFECTED BY CHANGE 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.

—	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

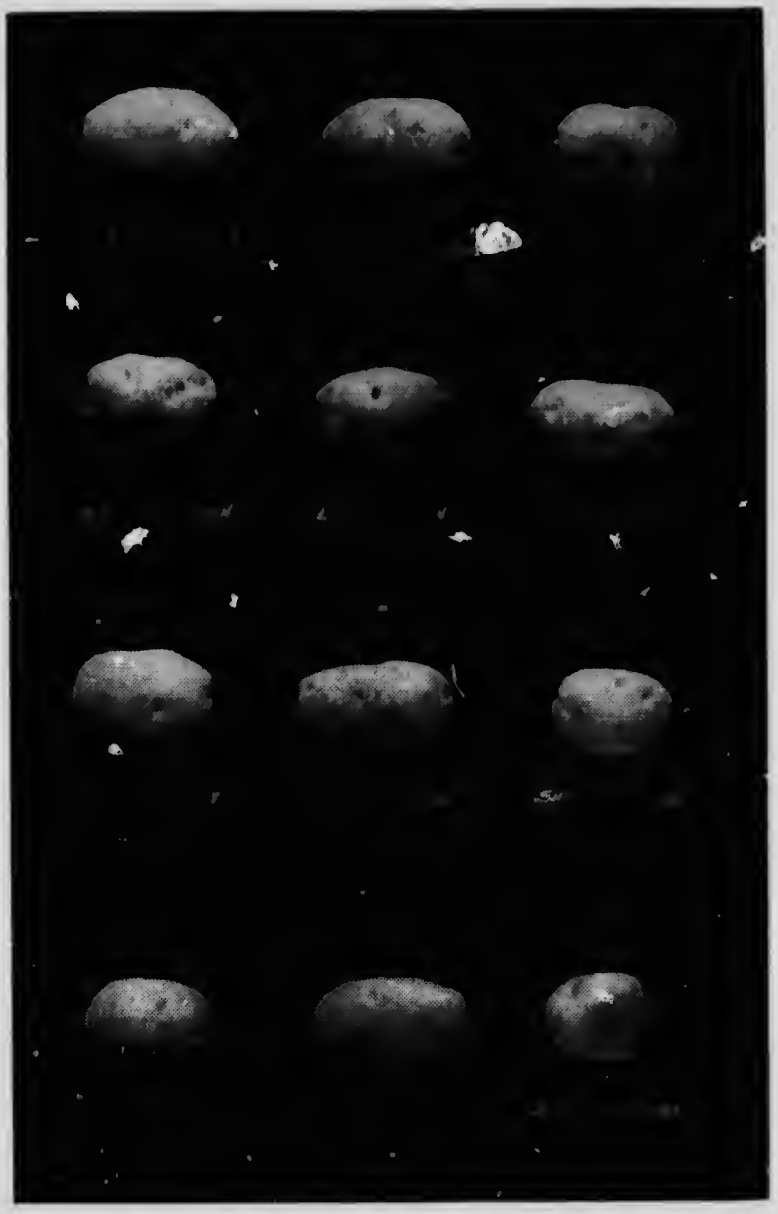
There was thus no indication of deterioration in the variety after sixteen years without change of seed, but a fair increase, due, no doubt, to careful selection and good cultivation each year. But in the year 1906 there was a sudden change. That years was one of the most unfavourable seasons for potatoes that have 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,



Twelve most productive varieties of potatoes. Average of five years test.—Central Experimental Farm, Ottawa.

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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 that 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.	Rochester Rose.		Carman No. 1.		Vick's Extra Early.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Nappan seed, 1909	215	36	196	..	171	36
Nappan seed, 1907	127	36	82	48	196	..
C. E. F. seed	44	..	83	24	74	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 :

TABLE IV.

Name of Variety.	Indian Head Seed Yield per Acre.		Ottawa Seed Yield per Acre.		Difference in favour Indian Head Seed.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Empire State	448	48	107	48	341	..
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

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.

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 is now fairly well proven 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 Ontario may be compared with England, while the conditions in the moister and cooler parts of Ontario and the Maritime provinces may be compared with Scotland and Ireland. It is possible that as marked results could be obtained from a change of seed from the cooler parts of Quebec and Northern Ontario as from Nappan, Nova Scotia. It may even be that seed potatoes from a cool, moist clay loam soil near home might show some striking results.

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 23rd, and even on July 7th, 1899, yielded, in 1900, more than those from potatoes planted May 22nd, 1899. The late planted ones were not so mature or were immature when dug.

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.

CULTURE.

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 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.

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, 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 Everett :—

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.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
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 14 cents a pound is $1.68. Thirty-seven bushels of potatoes sold at 40 cents a bushel, is $14.80 ; deducting the cost of the clover seed, and the net increase in profit from the ploughing under of the clover would be $13.12. 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 lbs. 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 lbs. 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 lbs. 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 plantfood 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.

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 the 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 thoroughly incorporate the manure with it 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 partially prepare the land, and later when one is ready to plant, the soil should 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 contact with the tubers favours the development of scab. This was well proven in experiments at the Central Experimental Farm.

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 their 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 23rd, 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 or as soon after that date as possible. 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.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
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 set 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 'Forcing Potatoes for Early Market,' showed an increase of 2 tons 13 cwt., or 90 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 Mr. 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.

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, pota-

toes 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 fresh 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. Even coating the sets with land plaster when freshly cut and planting immediately has, according to experiments conducted at Guelph, given an increase of 16·4 bushels per acre. The principal reason of this increase probably is that the coating with land plaster prevents evaporation of moisture from the set, thus permitting the young plant to draw more moisture from it. 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.

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 has been 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.	Lbs.
1 inch	466	2
2 "	389	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.	Lbs.	Bush.	Lbs.
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, recom-

mended 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.

POTATO PLANTER.

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.

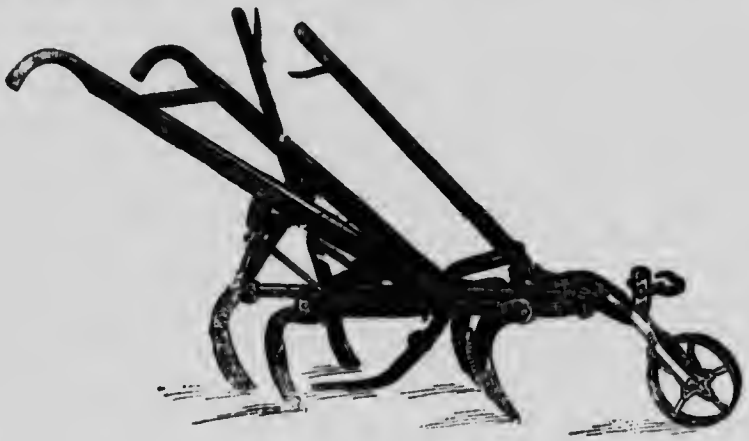
The most satisfactory method of planting, however, for one with a fairly large or large area to cover, is with the potato planter, of which there are several good ones now on the market. The planter in the illustration is the Robbins planter, made by the Bateman Manufacturing Co., Grenlock, N.J., U.S.

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 1903, 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 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 up, it is wise to roll the land before the potatoes are up, loosening it again with the harrow as soon as there is rain.

CULTIVATION.

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



CULTIVATOR.

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. J. 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 Planet Junior cultivator. A good cultivator is very essential in growing potatoes.

LEVEL VERSUS RIDGE CULTURE.

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 culture 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 easier in soil which is ridged 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 culture. 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 culture, 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 culture. An experiment was conducted at the Central Experimental Farm for four years for the purpose of comparing level with ridge culture 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 Everett 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's 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 CULTURE, SOIL MOIST, FRIABLE, SANDY LOAM.

Method of Culture.	1900.		1901.		1902.		1904.		Average 4 years.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Level	543	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 culture 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 culture 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 culture 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.

FORCING POTATOES FOR EARLY MARKET.

Where there is a demand for early potatoes it is important for the potato grower 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

tot 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.

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, of 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
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 following chapter on Insects and Diseases it will be shown how the tops may be kept green through the latter part of the season.

SOME INSECTS AND FUNGOUS DISEASES.

In some parts of Canada injurious insects and fungous diseases of the potato are practically unknown, but in the provinces of Ontario and Quebec both are very destructive. 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. It is not necessary in a bulletin of this kind to mention all

Photo by Frank T. Shutt.

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

the injurious insects and fungous diseases to which the potato is subject, but the more important ones are herewith discussed. Communications in regard to insects affecting the potato should be addressed to Dr. C. Gordon Hewitt, Dominion Entomologist, and in regard to diseases to Mr. H. T. Güssow, Dominion Botanist, Central Experimental Farm, Ottawa, Ont.

COLORADO POTATO BEETLE (*Doryphora decemlineata*, Say).—This is such a well-known insect that it need scarcely be described. It may be well, however, to give its life history for the benefit of those who do not know it. The mature beetle hibernates in winter and begins to fly early in the spring. As soon as the first leaves of the potato appear above ground, the beetles fly to them and soon lay their yellow eggs in clusters on the under side of the leaves. In about a week 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, sometimes the crop 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 lb. Paris green to 50 lbs. 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 used in the proportion of two to three pounds to forty gallons of water 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 suggested of 8 ounces Paris green and 1½ pounds of arsenate of lead to 40 gallons of water. Bug Death dry and also in the proportion of 1 lb. to 2 gallons of water, has been found a good insecticide, but is more expensive than Paris green.

THE CUCUMBER FLEA-BEETLE (*Epitrix cucumeris*, Harr.).—This little insect 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.

In his report for 1901, Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, writes the following regarding this insect :—

'This minute beetle, which does not exceed one-twentieth of an inch in length, is black, covered with short fuscous hairs, and is much more frequently complained of as a potato pest than as an enemy to any other crop. It is sometimes, in the hot dry summers, one of the worst enemies of the potato, eating many small holes through the leaves and reducing them so much that they are unable to perform their functions. Reports of injury have been received from Vancouver Island and several places in Ontario. The best remedy for this insect appears to be spraying the vines with Bordeaux mixture and Paris green. This treatment has given far better results than spraying with Paris green alone. The practice too, of spraying potatoes with Bordeaux mixture is an excellent one, being an effective preventive of the Early Blight, as well as the much more destructive Potato Rot or Late Blight.'

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 the Late Blight. We believe, as recommended in the above quotation, that keeping vines covered with Bordeaux mixture and Paris green is the best preventive in this case.

The Early Blight or Leaf Spot Disease (*Alternaria Solani* (E. & M.) Jones & Grant. This disease was known until recent years by the name of *Macrosporium Solani*, E. & M., but through the investigations of Prof. L. R. Jones, Botanist, of the Vermont Experiment Station, the name has been changed to *Alternaria Solani*. The Early Blight is not nearly as destructive as the Late Blight, and does not cause the rotting of the potatoes. It is most destructive in dry seasons or in neglected fields where the plants are not making thrifty growth, developing much more rapidly on foliage which is not vigorous than on that which is healthy. Fields of potatoes which appear to have ripened prematurely or very early are frequently brought into this condition by the Early Blight. It usually begins to appear early in July and is sometimes taken for the Late Blight. This disease appears in spots, having concentric rings irregularly over the leaf, quite in contrast with the Late Blight which is usually observed first in large patches on the leaf. The spots of the Early Blight gradually enlarge and unite when several spots will form quite a large area. When these spots extend to the margin of the leaf it causes the edge to curl up, giving it somewhat the same appearance as Tip Burn or Scald, and finally the whole leaf may wither or dry up, followed by the death of the potato plant. While this disease is called the Early Blight, it occurs late in the season as well as early and may be found in an active condition during the month of September.

This disease spreads by means of spores, which alight on the leaves, germinate and penetrate the epidermis and breathing pores. The disease then permeates the tissues of the plant and new spores are again borne in a short time. The disease is carried over winter in the dead potato stalks.

Prevention and Remedy.—The treatment of this disease is preventive rather than remedial. The vines should be kept covered with Bordeaux mixture from the middle of July until the end of the season. It is a good plan to burn the stems after digging.

Late Blight or Rot *(Phytophthora infestans.* D. By.).—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 life history of this disease was described in 1846, and little more is now known regarding it than at that time.

The disease passes the winter in the tubers and is taken to the field in them and is planted with the sets. When the vines begin to grow it starts to develop also and grows up through the tissues of the potato stems. During the early part of July or early in

August it produces on the under sides of the leaves myriads of tiny spores which in the mass have a frost-like appearance. These spores make the 'rust' stage which is caused by the leaf tissues drying up where the spores have been feeding on them, leaving dark brown spots. It is at this stage that the future infection takes place, as the spores being carried rapidly by the wind alight on the foliage, germinate, develop and in a very short time destroy the leaves. The disease spreads with such rapidity that in a few days the tops in the whole field are destroyed. Infection of the tubers is supposed to take place in two ways. In the first place by the disease spreading through the plant and by means of the underground stems reaching the tubers; and secondly by the spores being washed below the surface of the ground and reaching the tubers, infecting them, and if the conditions are favourable for the development of the disease, causing them to rot. This latter means of infection seems to be conclusively proven by some experiments carried on in Denmark by J. L. Jensen, Director of the Bureau Ceres in Copenhagen. The results of his experiments were published in 1882 in a little book called 'How to Overcome the Potato Disease by a Simple and Easily Performed Method of Cultivation.' As this book was published before Bordeaux mixture was discovered as a preventive of blight, it is very interesting and suggestive. The following quotation from this book gives in a few words the results of eight experiments which were conducted by ridging up the potatoes and comparing those thus treated with those grown under flat cultivation. The ridges were made high and sharp at the top to shed rain and prevent spores being washed down to the tubers.

'In estimating the value of the present most important experimental results it must be borne in mind that the potatoes at all the experimental stations were grown side by side without any difference whatever in the conditions under which they were grown other than in the moulding alone. Consequently the disease has, by perfect protective moulding, on an average been diminished from 23·4 or 18·7 per cent to 1·4 per cent, or verbally expressed, from a very considerable magnitude to what may, practically taken, be called a mere trace of disease. Expressed in entire numbers, the average disease for the different methods of moulding from flat to perfectly protective (high and sharp ridges) stands as 17:13:3:1.'

While this high protective moulding which consisted in high ridges sharp at the top and with the tops of the vines bent over, appears to have prevented the spores reaching the tubers, it had of course no effect in preventing the tops from being destroyed by it.

The disease usually appears in Ontario and Quebec between the middle of July and the first of August, though sometimes later. 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 and 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, warm 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.

Prevention of Late Blight.—It is now about twenty-five years since Bordeaux mixture was first used for the prevention of Late Blight, the first known application of it having been made in France in 1885. From the very first it gave good results and has been steadily growing in favour ever since, but only a small proportion of Canadian farmers even at this date spray their potatoes for the prevention of Blight. In America the first systematic and continuous experiments with the Bordeaux mixture were those begun at the Vermont Agricultural Experiment Station by Prof. L. R. Jones. He began experimenting in 1889, and for eighteen consecutive years continued demon-

strating the practical value of Bordeaux mixture as a preventative of Late Blight and Rot. In Bulletin 142, published in 1909, he gives the average results of eighteen years' experiments. The yield of potatoes where sprayed averaged 271 bushels; where unsprayed, 159 bushels, or an average difference in favour of spraying of 112 bushels per acre. The lowest gain from spraying during this period was 26 per cent, the highest 215 per cent, the average 92 per cent. This should be sufficient evidence for every farmer that even if some years the Blight does not do much injury, yet it pays many times over to spray every year.

At the Central Experimental Farm, Ottawa, this disease has received much attention, because of the importance of the potato crop in Canada and the great loss there is every year from Blight and Rot. In his report for 1892, Dr. James Fletcher, Entomologist and Botanist, described the life history of the Late Blight and recommended the use of Bordeaux mixture as a preventative of the same. Circulars were also sent the same year to the leading newspapers. In 1894, Dr. Fletcher published a bulletin on Potato Blights, in which further information was given and from that time a continuous effort has been made to get farmers to spray their potatoes for this destructive disease. Experiments were begun in 1892 at the Central Experimental Farm and at Nappan, N.S., with gratifying results. During the past few years the Blight has been worse than usual and the effect of spraying has been more marked. In the following table will be found the average results obtained at the Central Experimental Farm for the years 1901, 1902 and 1904. In 1903 the stand of plants was uneven owing to a protracted drought in spring and the results were made of no value. As we have already stated, some varieties of potatoes appear to be 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.	Lbs.	Bush.	Lbs.	Bush	Lbs.	Bush.	Lbs.
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. Following are approximately the items of expense:—

Cost of Spraying with Bordeaux Mixture for the Prevention of Blight, per Acre—Four Applications.

Bluestone, 72 lbs. at 9 cents	$6 48
Spraying four times, horse and two men—8 hours at 40 cents	3 20
Total	$9 68

This expense will be less on large areas and with the best appliances for making and using the mixtures; from four to six dollars being a fair estimate for large areas. Bluestone can be obtained in large quantities wholesale for about five cents per pound.

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, 80 cents, may be deducted, leaving $8.88 as the extra cost in applying Bordeaux mixture. The average increase from spraying three years has been shown to be 94½ bushels. At 40 cents a bushel, this is $37.80, or after deducting $8.88, a net profit of $28.92 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.	Lbs.
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 have been reported on in the annual reports of the Central Experimental Farm for 1902 and 1904, have not given 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 has only been tried one season, hence no definite conclusions can be drawn.

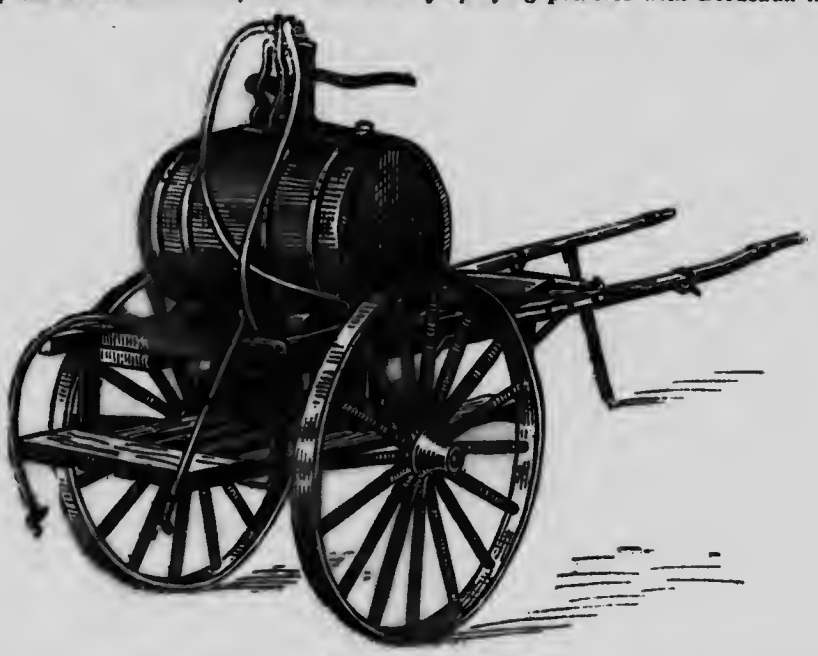
Tip Burn.—This is a drying up of the tips and margins of leaves, and is due to a loss of vigour in the plant either on account of hot, dry weather or neglect in cultivation. Leaves injured by Tip Burn are often affected with the Early Blight disease also. Thorough cultivation will prevent Tip Burn to a large extent.

Potato Scab (*Oospora Scabies*, Thaxter).—In some parts of Canada and under certain conditions of soil and treatment of it, the potato scab has been very troublesome, preventing the proper development of the tubers and making them unattractive, and hence less saleable. Many persons believe that the scab is caused by insects in the soil and by other agencies than the true one, but the life history of the scab has been studied and it has been proven to be a parasitic fungus. It is usually most troublesome in alkaline soils and land which has been heavily dressed with fresh barnyard manure is especially favourable to the spread of the disease, especially when the manure is put in the furrows and comes in close contact with the tubers. Lime and ashes also have the effect of increasing the amount of scab. The spores of the scab fungus develop in the field on the affected parts of the potato and are thus taken to the root-house when the potatoes are dug. There is no doubt that many potatoes not diseased in the field are infected in the root-house or on the way to it by some of the myriads of spores from the diseased potatoes falling on them. It is believed that the scab spores will be in the ground for from six to seven years and will re-infect a crop after that time. This shows the importance of avoiding fields which have produced scabby potatoes as long as possible. The spores on potatoes intended for seed can be destroyed by two known remedies which appear equally good, the first being a solution of formalin (Formaldehyde), 8 ozs., or ½ pint in 15 gallons of water. The potatoes should be soaked in this for two hours. The second remedy is a solution of Corrosive

Sublimate, in the proportion of 1 ounce to 7 gallons of water, the tubers being soaked for 1½ hours. When the tubers are dry they may be cut for planting. The same solution may be used several times. This treatment will assure the planting of seed free from spores, but if the spores are already in the field they may re-infect the tubers. As the scab of potatoes appears to be the same as affects some of the field roots, it will be well to avoid planting potatoes after a crop of scabby roots. The potatoes freest from scab are usually found after clover sod or in acid soils. Such fertilizers as muriate of potash, sulphate of potash, and nitrate of soda appear to check the disease. Land plaster and common salt are also useful. Some varieties of potatoes are less subject to scab than others.

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 mounted on a Cart.

ture to prevent blight or rot, but a spray pump is useful for other purposes than applying liquid mixture to the potato crop. Most farmers in the provinces of Ontario and Quebec 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 Spramotor 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 attachment is used, is to have a man or boy on the back of the sprayer watching for any clogging of nozzles. The method preferred by the writer, 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 Beetle 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.

FORMULAS RECOMMENDED.

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

Copper sulphate (bluestone)	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 quicker 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.

For Colorado Potato Beetle.—Add 8 ounces of Paris green to the above formula or 3 pounds of arsenate of Lead; or a mixture of 8 ounces Paris green and 1½ pounds of arsenate of Lead.

Formalin, Corrosive Sublimate.—For Potato Scab

Soak the tubers either:—

1. For two hours in a solution of commercial Formalin (Formaldehyde) 8 oz., in water 15 gallons, or

2. For one and a half hours in a solution of Corrosive Sublimate 1 oz., in water 7 gallons. When dry cut up for planting.

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. All treated seed should be planted, and any solution left over should be poured into a hole in the ground.

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	2 to 3 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 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 lbs. arsenate of lead to forty gallons of water is suggested.

Dry Mixture.—1 pound Paris green with 50 pounds flour, land plaster, slaked lime or any other perfectly dry powder.

Soda Bordeaux (Burgundy mixture).—For Early and Late Blight :—

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

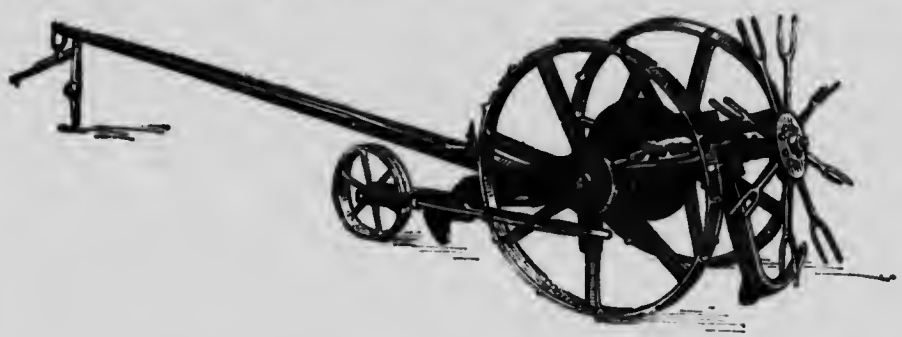
Dissolve copper sulphate as for Bordeaux mixture. Dissolve 7½ lbs. washing soda in four gallons of water. Pour the copper sulphate solution into a barrel; half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda 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.

Other Insecticides and Fungicides.—There are a number of insecticides and fungicides now offered for sale under various names, but none of these 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 mixtures 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



Potato Digger.

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 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.

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.

Potato Digger.

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 to 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 out from the stem should be sharpened or flattened so

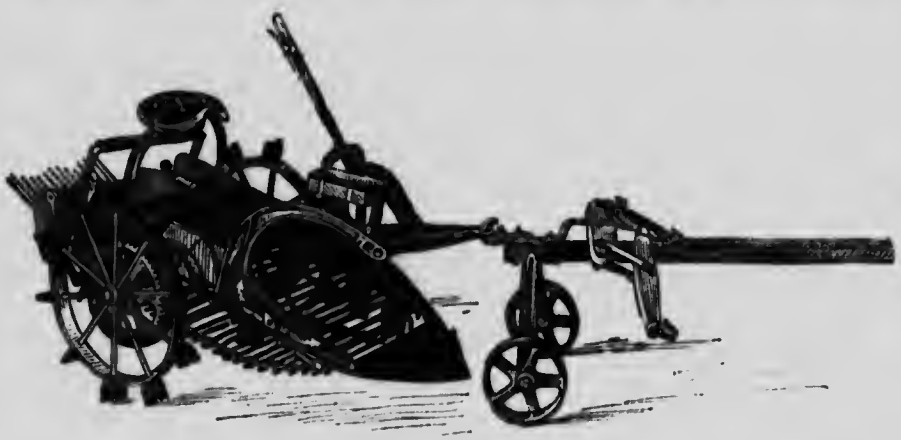
as to present a cutting edge where they would naturally get into the soil and follow behind the plough.

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.

The first cut is the Ellard digger, manufactured by W. J. Ellard, Ottawa, Ont. The digger with the fork-like attachment was made at the Central Experimental Farm. The last cut is the potato digger manufactured by the Galt Potato Machinery Co., Galt, Ont.

Storing.—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.

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 accomodation. The following description of a pit made and used successfully for several years by Mr. T. Rowan, Macgregor, Man., should be of assistance to those requiring such a place for storing potatoes.

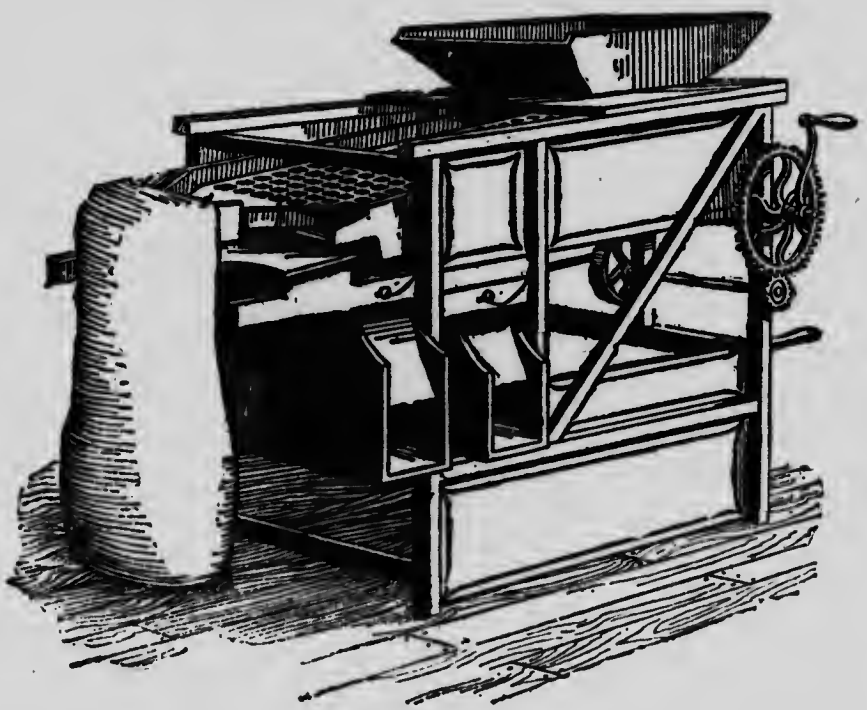
To store about 1,000 bushels, a hole in the ground 14 feet wide, 4 to 4½ feet deep, and about 30 feet long will give ample space. The sides and ends of the hole may be lined with boards to prevent earth from falling in, though the earth may be braced back with poles if boards cannot be readily obtained. 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.

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 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 Sorter.

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. The sorter or separator represented by the illustration is made by Matthew Moody & Sons, Terrebonne, Que.

COST OF GROWING AND MARKETING ONE ACRE OF POTATOES.

Rent of land, one year	$ 3 00
Cost of 12 lbs. clover seed at 17 cts.	2 04
Barnyard manure, 12 tons at $1 (½ exhausted in one year)	4 00
Ploughing in spring	2 00
Disc harrowing twice	0 75
Harrowing once with smoothing harrow	0 15
Drilling 2½ hours at 30 cts.	0 75
Seed, 25 bushels at 40 cts.	10 00
Cutting seed, one day	1 50
Planting seed, one day	1 50
Covering, 1¼ hours at 30 cts.	0 37
Harrowing twice with smoothing harrow	0 30
Cultivating six times, 15 hours at 25 cts.	3 75
Hoeing once, one day	1 50
Poison	2 00
Bluestone, 72 lbs. at 9 cts.	6 48
Spraying three times with poison, horse and men, 6 hours at 40 cts.	2 40
Spraying 4 times with Bordeaux mixture, horse and 2 men, 8 hours at 40 cts.	3 20
Digging 3½ hours at 30 cts.	1 00
Picking up potatoes, 2½ days at $1.50	3 75
Storing 4 loads, 4 hours at 30 cts.	1 20
Sorting and marketing, man, 4 days at $1.50—$6; team parts of 2 days at $1.50—$3.00	9 00
Wear and tear on machinery and interest on money	0 85
	$ 61 49

The cost of growing an acre of potatoes as given in the preceding table is large but this expense 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 and the table of expenses is estimated on that yield. 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 will, we believe, fully justify the extra amount of seed. When a potato planter is used which places the sets in close contact with the soil and moisture, the sets need not be as large and this item of expense would be reduced. If a potato planter were used the cost of planting would also be considerably reduced. The prices put for Paris green and bluestone may be less or may be a little more than one would have to pay. If buying in large quantities the prices would be considerably lower. The cost of application will also vary according to the method employed, that given in the table being a maximum amount. It was thought best to have the various items of expense above rather than below what the actual cost would probably be on a large acreage, as the majority of farmers have not a large acreage of potatoes.

VARIETIES OF POTATOES TESTED AT CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT., 1887-1910.

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 770 names. Of these, 18 represent varieties which were sent for test which may be synonyms of others as no name of variety was given. There may also be a few synonyms among the others. The total number of distinct varieties recorded in this table, is we believe, at least 743. 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 1,024. 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.

Name of Variety.	Year When Tested.	Why Discarded.
Abundance	1887-1888, 1895-1899	I.P.
Acme Blanche	1908-1909	I.P.
Adirondack	1887-1890	I.P.
Admiral	1909	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	1899-1907	I.P.
American Wonder	1899-1904, 1906-1910	
Amylon	1887-1889	I.P.
Andersen	1887-1888	I.P.
Ashleaf Kidney	1904-1910	
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.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Australian	1887-1888	I.P.
Babbit	1905-1909	I.P.
Balmoral	1890-1891	I.P.
Barkley's Seedling	1905-1910	
Barrett, P.	1909-1910	
Beauty of Hebron	1887-1892	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.
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.
Bovee	1897-1910	
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's Chance	1907-1909	I.P.
Bretonne	1908-1909	I.P.
Brosseau, A. S., from	1897-1904	D.E.
Brown's Rot Proof	1895-1903	I.P.
Brownell's Best	1887-1888, 1891	I.P.
Brownell's Beauty	1887-1888	I.P.
Brownell's Multiplier	1887-1888	I.P., I.Q.
Brownell's Superior	1887-1889	I.P.
Brownell's Winner	1890-1891, 1902	I.P., I.Q.
Bruce	1907-1910	
Brunhilde	1887-1888, 1889-1904, 1906	I.P.
Buffalo	1907-1910	
Bunder Landwirthe	1899-1901	I.P.
Burbank's Seedling	1887-1889, 1899-1904	I.P.
Burnaby Mammoth	1893-1910	
Burpee's Extra Early	1890-1903, 1905-1910	
Burpee's Seedling No. 37	1889-1892	I.P.
Burpee's Superior	1889-1891	I.P.
Calico Early	1887-1891	I.P.
California Cup	1900-1901	I.P.
Callao Large	1887-1890	I.P.
Caillon	1887-1888	I.P.
Cambridge Russet	1898-1905	I.P.
Canadian Beauty	1898-1910	
Canadian Red	1906-1910	I.P.
Cardinal	1908-1909	I.P.
Carman No. 1	1895-1910	
Carman No. 3	1896-1906	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.

Photo by Frank T. Shutt.

Sprayed Potatoes. Unsprayed Potatoes.

Central Experimental Farm, Ottawa, 28th September, 1904.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Chicago Market	1887-1902	I.P.
Churchill Seedling	1900-1902	I.P.
Chilian Variety Araneana 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's Pride	1903-1910	
Clark's No. 1	1888-1902	I.P.
Clyde	1907-1910	I.P.
Clarendon	1890	I.P.
Clay Rose	1895-1906	I.P.
Climax	1887-1888, 1905	I.P.
Cockeryoats	1887-1888	I.Q.
Columbus	1897-1902	I.P.
Cottar	1907-1910	
Compton's Surprise	1887-1891	I.P.
Connolly, T., Seedling	1889	I.P.
Conqueror	1887-1891	I.P.
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's Lightning	1902-1910	
Crown Jewel	1889-1899	I.P.
Cyclop	1899-1904	I.P.
Czarine	1903-1909	I.P.
Dabersche	1887-1888	I.P.
Daisy	1890-1902	I.P.
Dakota Red	1889-1903	I.Q., D.E.
Dalmahoy	1887-1889	I.P.
Dalmeny Beauty	1904-1910	
Dalmeny Early	1906-1909	I.P.
Darby	1890-1891	I.P.
Dark Red Seedling	1898-1901	I.P.
Darling J., from	1898-1899	I.P.
Dawson City, from	1903-1904	I.P.
Daybreak	1903-1909	I.P.
Debreau, R. Seedling	1891-1892	I.P.
Delaware	1890-1909	I.P.
Deliciosa	1887-1888	I.P.
Delight	1889-1891	I.P.
Dempsey Seedling	1910	
Detroit	1887-1888	I.P.
Dewdrop	1909-1910	
Dewey	1905-1910	
Dewey Rose	1907-1909	I.P.
Diaeta	1887	I.P.
Discovery	1905-1909	I.P.
Diamond	1907-1909	I.P.
Dibble's Favorite	1907-1910	
Dobson's Early	1900-1902	I.P.
Doctor	1887-1889	I.P.
Doherty's Seedling	1898-1906	I.P.
Dooley	1901-1910	
Dr. Maerker	1899-1910	
Dreer's Standard	1894-1910	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	I.P.
Dumfries Early White	1888-1891	I.P.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.- *Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Dutch Blue	1901-1902	I.P.
Duchess of Cornwall	1906-1910	
Dutch Blue Flowering	1887-1888	I.P.
Dykeman	1887-1888	I.P.
Early Albino	1889-1892	I.P.
Early Andes	1898-1904, 1906-1909	I.P.
Early Astonisher	1906-1909	I.P.
Earliest of All	1893-1902	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 Fortune	1896-1899	I.P.
Early Gem	1892-1899	I.P.
Early Giant	1887-1888	I.Q.
Early Household	1887-1890	I.P.
Early Harvest	1895-1902	I.P.
Early Harvester, Pink	1903-1909	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	I.P.
Early Manistee	1905	I.P.
Early Manitoba	1890-1891	I.P.
Early May	1905-1909	I.P.
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	I.P.
Early Ohio	1887-1910	
Early Petoskey	1905, 1907-1910	
Early Pride	1899-1902, 1906-1909	I.P.
Early Puritan	1890-1903, 1906	I.P.
Early Regent	1909-1910	
Early Rose	1887-1909	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	I.P.
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	I.P.
Early Sunlight	1904-1909	I.P.
Early Superior	1904-1909	I.P.
Early Surprise	1910	
Early Thorburn	1892-1899	I.P.
Early Trumbull	1905-1910	
Early White Prize	1895-1910	
Early Wisconsin	1907-1910	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	
Emperor	1887-1888	I.P.
Emperor Forcing	1887-1888	I.Q.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Emperor William	1887-1891	I.P.
Empire State	1888-1910	
Empress of India	1887-1888	I.P.
Empress Queen	1904-1909	I.P.
Enormous	1899-1906	I.P.
Epicure	1906-1910	
Erfurt Early Bound	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	I.Q.
Eureka Extra Early	1901-1910	
Euphyllos	1887-1889	I.P.
Everett	1891-1910	
Evergood	1904-1909	I.P.
Express	1909-1910	
Extra Early Hero	1905-1910	
Extra Early Gault	1907-1909	I.P.
Extra Ruper Crane	1888-1890	I.P.
Eye Carpenter	1887-1892	I.P.
Factor	1906-1910	
Fantail Rose	1906-1909	I.P.
Farmer's 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.
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	
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.
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.

Varieties of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Great Divide	1895-1902	I.P.
Great Eastern	1888-1891	I.P.
Green Mountain	1890-1903, 1910	
Hale's 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	
Harlequin	1887-1888	I.P.
Harmful	1908-1909	I.P.
Harris' Snowball	1905-1910	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's Jubilee	1906-1910	I.P.
Highlander	1907-1910	
Holborn Abundance	1889-1910	
Hochheim	1887-1888	I.P., I.Q.
Houseoye Rose	1897-1899	I.P.
Hopeful	1893-1899	I.P.
Houlton Rose	1897-1902	I.P.
Howard	1909	I.P.
Idaho	1887-1889	I.Q.
Ideal	1895-1899, 1905-1909	I.P.
Immigrant	1906-1910	I.P.
Imperator	1889-1890	I.P.
Improved Early Ohio	1907-1910	
Ines	1888	I.P.
Invincible	1906-1909	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	
Irish Daisy	1895-1903	I.P.
I.X.L.	1893-1909	I.P.
Jackson's Improved	1887-1889	I.P.
Jackson's White	1887-1889	I.P.
James Nugget	1903-1904	I.P.
Japanese	1890	I.P.
Joanette	1887	I.P.
John Bull	1903-1909	I.P.
Johnson's 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 Crane	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	1889-1892	I.P.
King of the Valley	1891	I.P.
King's Champion	1908-1910	

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Kidney August	1887-1890	I.P.
Kidney Blue	1887-1888	I.P.
Kidney Degun's 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.
Lark's Eye	1887-1889	I.P.
Laird	1907-1909	I.P.
Larkson, from	1887-1888	I.P.
Lady Finger	1890-1892	I.P.
Late Petoskey	1909-1910	
Late Puritan	1894-1910	
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's Favorite	1899-1901, 1903-	I.P.
Le Loisy	1908-1909	I.P.
Leo	1907-1909	I.P.
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's Banner	1899-1902	I.P.
Lizzie's Pride	1893-1902	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.
Lowe, John, from	1891-1892	I.P.
Magnum Bonum (American)	1887-1889	I.P.
Magnum Bonum (Sutton's)	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's 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	
Manitoba Kidney	1890-1891	I.P.
Manitoba Kidney White	1890-1899	I.P.
Maple Leaf	1906-1910	I.P.
Marjohn	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's Thoroughbred	1897-1909	I.P.
Mayfield Blossom	1909-1910	
Mayflower Early	1887-1889	I.P.
May Queen Early	1887-1893	I.P.
May Queen	1890-1899	I.P.

Varieties of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
May Wonder	1909-1910	
Member of Parliament	1887-1890	I.P.
Merrill	1908-1910	I.P.
Meteor	1[illegible]	I.P.
Michigan Rose	1[illegible]1910	
Midlothian Early	1[illegible]	I.P.
Miles Early	1[illegible]	I.P.
Milky White	1[illegible]	I.P.
Million Dollar	1[illegible]	
Mills' Prize	1[illegible]	I.P.
Minister	1[illegible] 1907-1909	I.P.
Minister Von Miquel	1[illegible]	I.P.
Mohawk	1[illegible]	I.P.
Montana Bluff	1[illegible]	I.P.
Monroe County	1[illegible]	I.P.
Money Maker	1[illegible]1910	
Montcalm	1[illegible]	I.P.
Moreton	19[illegible]	
Morgan Seedling	1[illegible]1910	
Morgan White	1901-1909	I.P.
Murray, D., Seedling No. 1	1902-1904	I.P.
Murray, D., Seedling No. 2	1902-1903	I.P.
Mrs. Forsaker	1889-1890	I.P.
Mountain Rose	1888	I.Q.
Mulhouse	1887-1888	I.P., I.Q.
Myatt's Ashleaf	1905-1910	
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	I.P., D.E.
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	
Nettleleaved	1887-1888	I.Q.
New Rothe Salat	1899-1904, 1906	I.P.
New Badger State	1889-1891	I.P.
New Climax	1906	I.P.
New Early Standard	1907-1910	
New King	1910	
New Queen	1895-1903	I.P.
New Reliance	1906-1910	
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	
Norcross	1905-1910	
Norton 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's Peachblow	1903-1904, 1906	I.P., D.E.
No Name	1907-1910	I.P.
Noxall	1907-1910	
Nudel Red	1887-1888	I.P.
Ockel's 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.
Oregon Beauty	1897-1899	I.P.
Orphans	1895-1899, 1907-1910	I.P.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Oxford	1887-1888	I.P., I.Q.
Ouvremont, G. W., Seedling	1910	
Paris Forcing	1887-1888	I.Q.
Paris Prize	1887-1888	I.Q., D.E.
Paragon (Thorburn's)	1887-1891	I.P.
Patate Beige	1897-1898	I.P.
Paterson's Albert	1887-1889	I.P.
Paterson's Blue	1887-1890	I.P.
Paterson's Blue Kidney	1887-1888	I.P.
Paterson's Napoleon	1887-1888	I.P., I.Q.
Paterson's Red Kidney	1887-1888	I.P.
Paterson's Victoria	1887-1888	I.P.
Pat's Choice	1902-1906	I.P.
Pauline Lucca	1887-1888	I.P.
Peacemaker	1906-1909	I.P.
Peach Blow	1887-1888, 1898-1904, 1906	D.E.
Peach Blow (red skinned)	1887-1888	I.Q.
Peach Blow (Foster's Early)	1887-1888	I.P.
Peach Blow (Improved)	1887-1888	I.P., I.Q.
Pearce	1900-1909	I.P.
Pearl of Home	1891	I.P.
Pearce's Extra Early	1893-1902	I.P.
Pearce's Prize Winner	1893-1896, 1898-1902	I.P.
Pearl	1887-1888, 1907-1909	I.P.
Pearl of Savoy	1887-1891, 1905-1909	I.P.
Pearmain	1908-1909	I.P.
Peck's 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.
Perlection	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.
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	
Pio Nano	1887-1888	I.P.
Planet	1907-1910	
Polaris	1893-1903	I.P.
Pomeranian Red	1887-1888	I.P.
Pootaluck	1889-1891	I.P.
Potentate	1905-1909	I.P.
Polyganos	1887-1888	I.P.
Prairie Seedling	1887-1891	I.P.
President Kruger	1906-1910	
Preston	1890-1891	I.P.
Price, from Holland	1887-1889	I.P.
Pride of America	1887-1891	I.P.
Pride of the Market	1894-1902	I.P.
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	
Prince Frederick Charles	1887-1888	I.Q.
Prize Taker	1895-1902	I.P.
Prolific Breezes	1887-1889	I.P.
Prolific Rose	1899-1904	I.P.
Prolific	1906-1910	
Prosperity	1909-1910	
Prol. Xmichey	1908-1909	I.P.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
Purple and Gold	1887-1889	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 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's Golden Gem	1910	
Record	1895-1898, 1909-1910	
Red Fish	1887-1888	I.P.
Red Mouse	1887-1888	I.P., I.Q.
Red Rock	1900-1904	I.P.
Red River Valley	1891-1893	I.P.
Red Skinned Flourball	1887-1888	I.Q.
Reeves' Rose	1897-1910	
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's Gem	1887-1889	I.P.
Richter's Improved	1887-1891	I.P.
Richter's 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's Beauty of Beauties	1890-1892	I.P.
Rose of the North	1898-1902	I.P.
Rose No. 9	1897-1906	I.P.
Rose's New Giant	1888-1891	I.P.
Rose's 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.
Ruby	1887-1891	I.P.
Rural Blush	1889-1910	
Rural No. 2	1889-1892, 1896-1903	I.P.
Russell's Seedling	1894-1898	I.P.
Rust Proof	1905-1909	I.P.
Rutling Rose	1908-1910	I.P.
Sabean's Elephant	1895-1910	
Sachsen Yellow Fleshed Onion	1887-1888	I.P.
Sago Black	1887-1888	I.P.
Satisfaction	1894-1899, 1909-1910	
Sausisse	1906-1909	I.P.
Scott	1906-1909	I.P.
Saunders	1890	I.P.
Scotch Blue	1887-1888	I.P., I.Q.
Scotch Champion	1888-1892	I.P.
Scottish Queen	1887-1888	I.Q.
Scotland's Pride	1910	
Scotch Mountain Rose	1887-1888	I.P., D.E.
Schoolmaster	1887-1890	I.P.
Sealsfeet	1908-1910	

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year when Tested.	Why Discarded.
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's Seedling	1887-1903	I.P.
Shipper's 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	1903-1909	I.P.
Silverskin	1887-1888	I.P.
Sirdar	1907-1910	
Sion House	1906-1910	
Sir John Llewellyn	1905-1910	I.P.
Sir Walter Raleigh	1897-1903	I.P.
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's Best Early	1906-1909	I.P.
Snow	1907-1910	
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	1887-1889	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.
Superlative	1907-1910	
Supreme	1906-1909	I.P.
Surprise	1889-1891	I.P.
St. Jean	1887-1888	I.P.
St. Johns Bay	1887-1888	I.Q.
St. Patrick	1887-1891	I.P.
Swiss Snowflake	1897-1909	I.P.
Symonds, J. (Black Seedling)	1891	I.P.
Table King	1894-1899	I.P.
Talisman	1908-1910	
Telephone	1887-1890	I.P.
Ten Dollar	1907-1910	I.P.
Think of Me	1891	I.P.

VARIETIES of Potatoes Tested at the Central Experimental Farm, &c.—*Continued.*

Name of Variety.	Year When Tested.	Why Discarded.
Thorburn	1888-1897, 1900-1902	I.Q.
Thuenelda	1887-1888	I.Q.
Tilley, R., from	1901	I.P.
Todd's Seedling	1902-1904	I.P.
Todd, W.H., Seedling	1910	
Triumph de Pomerania	1887-1888	I.Q.
Trophime	1887 1889	I.P., I.Q.
Trophy	1887-1888	I.Q.
Troy Seedling	1895-1903	I.P.
Tuttle's Excelsior	1887-1888	D.E.
Truffle	1887-1888	I.P.
Twentieth Century	1899-1902, 1907-1909	I.P.
Uncle Gideon's Quick Lunch	1908, 1909, 1910	
Uncle Sam	1897-1910	
Unica	1899-1901	I.P.
Up-to-Date	1901-1903, 1910	
Vanguard	1887-1893	I.P.
Vanier, D., from	1892-1903	I.Q.
Van Deman's Earliest	1902-1905	I.P.
Van Orman's Earliest	1906-1907	I.P.
Venus	1887-1888	I.P., I.Q.
Veribest	1909-1910	
Vermont	1887-1893	I.P.
Vick's Extra Early	1892-1910	
Vick's 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	
Wall's Orange	1900-1904	I.P.
Washington	1905-1909	I.P.
Wee Macgregor	1906-1910	
Wesel	1899-1901	I.P.
Wellington	1907-1910	
White Albino	1904-1910	
White Beauty	1893-1902, 1907-1910	
White Chief	1909-1910	
White Elephant	1887-1889, 1891-1892, 1897-1909	I.P.
White Fleshed Onion	1887-1888	I.P
White Giant	1898-1902, 1907-1910	
White Mammoth	1905-1910	
White Ohio	1907-1910	I.P.
White Rose	1907-1910	
White Wonder	1909-1910	
White Star	1887-1891	I.P.
White Sprout	1887-1890	I.P.
White Queen	1887-1888	D.E.
Wilson's First Choice	1906-1909	I.P.
Williams' Early	1887-1889	I.P.
Windsor Castle	1906-1910	
Woltman	1899-1909	I.P.
Wonderful	1901-1910	I.P.
Wonder of the World	1887-1893, 1896-1902, 1908-1910	
World's Fair	1894-1899	I.P.
Wortley	1906-1909	I.P.
Zwickau	1887-1888	I.P.
Zwiebel Kartoffel	1908-1909	I.P.

SUMMARY.

Although the potato is a very important food product of Canada the methods of culture 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 was about 123 bushels when the last census was taken in 1901.

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.

The twelve most productive varieties grown at the Central Farm for five years are Dalmeny Beauty, Hard-to-Beat, Carman No. 1, Gold Coin, Late Puritan, Empire State, Ashleaf Kidney, Rochester Rose, Sharp's Victor, Dewey, Early Hero, Holborn Abundance. Factor and Sutton's Prolific, tested for four years, are very productive varieties.

The six most productive early varieties for five years are Rochester Rose, Extra Early Hero, Reeves' Rose, Irish Cobbler, Vick's Extra Early, Crine's Lightning.

Some of the earliest varieties are Early Petoskey, New Early Standard, Eureka Extra Early, Burpee's Extra Early, Early Trumbull, Bliss Triumph, Early Ohio, Rochester Rose, Bovee.

Some productive varieties most free from blight are: King Edward, Dalmeny Beauty, Factor, Hard-to-Beat, Highlander, Duchess of Cornwall.

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.

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 lbs. nitrogen, 20 lbs. phosphoric acid, and 70 lbs. 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 lbs. or more per acre in the proportion of 250 lbs. nitrate of soda, 350 lbs. superphosphate, and 200 lbs. 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 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 diseases affecting the potato are Early and Late Blight, and Potato Scab. The two former can be prevented by spraying thoroughly with Bordeaux mixture, beginning before the disease appears and keeping the vines covered. From three or 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 four to six dollars on large areas and about nine 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 two hours in a solution of formalin or for one and a half hours in a solution of corrosive sublimate.

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 a 300 bushel per acre crop of potatoes is estimated at $61.19, although this will be reduced considerably on large areas where the most modern machinery is used.

The number of varieties of potatoes tested at the Central Experimental Farm from 1887 to 1910 is about 1,000.

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