

hand upon it, adding much to the labor and precariousness of its production. Rots and blights and a long list of evil fungi hover about the potato field, multiplying as the years go by, so that the potato long years ago ceased to be the lazy man's crop, if ever it was. The prospect for the future is that wise endeavor will be a prime requisite in the successful growing of the potato.

But from all these troubles and dangers that beset the potato there has been opened a wide, plain road of escape for the wise man with endeavor. The men who have opened this road are the agricultural chemists and the makers of potato machines. To-day the potato is a proposition for the little patch behind the house or for the big field. There is no profitable half-way point. Either the man must content himself with planting only so much as he can cultivate with a hoe, a watering pot and a club, or he must take a team, a full equipment of potato machines and an agricultural station bulletin. If his soil is not positively anti-potato in its composition (and very little of our soil is) the man who undertakes the production of potatoes with machines and wisdom will find it one of the most pleasant and profitable farm crops.

WHERE POTATOES GROW.

The north is the home of the best potato, notwithstanding the fact that its native habitat was much farther south and west. Big crops of good keepers are now solely northern productions. The south can raise two crops a year, but it cannot produce a potato that will stand storage or prove a vigorous producer of its kind. Therefore it has come about in the course of events that the country south of the Ohio and Missouri rivers is coming north for its seed potatoes. Potatoes will grow well far north of the present corn limit. At the Agricultural Experiment Station at Indian Head, Saskatchewan, potatoes at the rate of over 600 bushels per acre have been raised on the trial plots. Field crops in that country, however, do not reach the general average of Minnesota, Wisconsin and Michigan.

New York leads the Union in total of potatoes produced, the annual crop being about 34,000,000 bushels. Most of these are consumed within the state, though some are shipped to New England and the south. Wisconsin stands second as a potato producer, with 24,000,000 bushels annually, of which she ships out about 12,000,000 bushels—the largest surplus of any state in the Union. Michigan ranks third, with an average yield of 20,000,000 bushels and a surplus of about 7,000,000 bushels. Minnesota, the fourth in rank, raises 15,000,000 bushels and ships out about 5,000,000 bushels. Maine ranks fifth with 12,000,000 to 14,000,000 bushels of which she ships about 6,000,000 bushels. In Maine, Wisconsin and Minnesota there are certain districts very productive of high grade potatoes. Aroostook county, Me., is the great potato grower of that state, growing more than half the potatoes shipped from the state.

The country's annual potato crop does not vary much from 300,000,000 bushels. This year it may pass this mark a little, it being the greatest yield since the year 1896, when the yield was about 350,000,000 bushels. When our crop is short we import from Germany. New England sometimes buys a few Canadian potatoes, but as a rule Canada consumes her entire yield. Germany produces about 1,600,000,000 bushels annually, or fully three times our crop. German growers make their land produce about two potatoes to one of ours per acre. They are the most expert growers in the world. While they are large potato eaters and feed neighbor nations a portion of their enormous crop, a very considerable part goes to starch and to the making of commercial alcohol. This alcohol is largely used as fuel for engines as gasoline is. This is proving a very economical fuel and promises to work quite a revolution in its line.

HOW POTATOES GROW.

In Minnesota and Wisconsin the best potato districts have a comparatively light, sandy loam soil. Other conditions being equal, a fairly loose soil is preferable to a heavy, compact one. On the latter soil the plowing under of certain crops to lighten the soil is desirable. But potatoes are grown on a great variety of soils with profit. Even the black, "fat" soil of the Red River valley will produce a most excellent quality of certain varieties of potatoes. The greatest potato farm in Minnesota is in the Red River valley.

Any treatment tending to enrich the soil, or loosen heavy soils, promotes potato production.

Plowing under rye, or peas or clover, is practiced on all but the very lightest soils. Commercial fertilizers are much appreciated by the potato. Expert potato farmers who raise record crops use commercial fertilizers to a greater or lesser degree. Nitrate of soda and sulphate of potash are the favorites. Potatoes are best grown in some crop rotation, as their fungus enemies lurk in the soil and multiply marvelously on a second crop. Potato scab is almost a certainty on a crop following another. For this scab a very efficient remedy is found in formalin, the seed potatoes being soaked a while in a weak solution of this chemical just before planting.

The fungus diseases of the potato are all, fortunately, amenable to the same treatment, namely the application of the Bordeaux mixture. Experiments this year at the Minnesota Experiment Station show that five applications of this mixture not only saved the crop from rot, but made the yield from 200 to 300 per cent. greater than that of unsprayed potatoes. Farmers' tests in New York state under the direction of the agricultural college show that the spraying increased the yield from thirty-nine to fifty-six bushels per acre. A little Paris green in the Bordeaux mixture thoroughly discourages the ambitions of the Colorado beetle. Applications of these remedies in dust form have proved to be, so far less valuable than application by spraying that they are not counted practicable.

MACHINES IN POTATO CULTURE.

The list of potato diseases and insect enemies would discourage the average farmer were it not for the fact that the horse sprayer has given the farmer a sure and easy defense. The best sprayer produces a perfect fog about the plant, wetting both the upper and lower sides of the leaves. When applied in season this becomes an almost perfect preventative of the whole list of blights and rots.

Expert potato farmers estimate that the farmer with 160 acres of land suitable for corn or potatoes can handle twenty to thirty acres of potatoes without extra help, and with help in harvesting can handle fifty to sixty acres, provided he uses a full equipment of modern machines. Without machines five acres would be the limit of this farm's potato capacity.

Thus modern potato machines multiply from six to twelve times the capability of the average farmer to produce potatoes. Equipped thus any intelligent farmer with the right soil should have a crop that in the very worst year should not net him a loss, while in an average year it should make a profit equal to or better than any other crop. But about once in four years it will win him a prize—at least this is the history of potato culture in the potato states. The story of potato farming in the sandy counties of Minnesota and Wisconsin has been a story of rise from poverty to affluence. Farmers there who under general farming were then classed as "sand lotters," without cash or credit, now carry bank pass books, drive top buggies and handsome horses, build red barns and white houses and send their boys to college.

An equipment of potato machines should consist of a potato seed cutter, a horse planter with fertilizer attachment, a weeder, a horse cultivator that can work deep or shallow, a furrow sprayer, a horse digger and a sorter. If the farmer will supply himself with a few hundred one-bushel crates, it will lessen greatly the work of handling potatoes. The planter, if the best, will easily do the work of eight men and do it better. The same saving will be made by the seed cutter. The weeder, used from the time of planting till the potatoes are four inches high, will reduce the cost of cultivation very materially and keep weeds back till the cultivator can make a clean field without hand work. The cultivation of potatoes should not exceed in cost the cultivation of corn. A four-row sprayer will cover twenty-five to thirty acres a day. The mixture is not expensive, thus making the killing of the fungus enemies a comparatively easy proposition.

The best potato planter will give, because of its more accurate work, a crop 10 per cent. better than that planted by hand. There is no comparison between the work of a four-row horse sprayer and that done by hand. The machine can earn its cost many times over in one season. Experiments in New York state show that the cost of one of these sprayers is earned annually on every acre it covers. The potato digger is likewise a labor-saver and a profit-maker, though its efficiency varies with the kind of soil and surface which it is worked. No great potato grower is

without it. The entire equipment of potato machines should not cost the farmer to exceed \$300, if he uses but one machine of each kind.

COST OF PRODUCING POTATOES.

Expert farmers operating in western and north-western states for a series of years reckon the cost of raising and marketing potatoes at from 12 to 18 cents per bushel. Under extremely favorable conditions the cost has been known to run as low as 9 cents per bushel, but a fair figure is 15 to 18 cents. Secretary Coburn, of the Kansas department of agriculture, estimates the cost per bushel in thirty-two counties of that state at a little more than 20 cents per bushel. But Kansas is not the best potato state, and this estimate reckons with all kinds of methods of potato culture, good and bad.

On the farm of Henry Schroeder, of Sabin, Minn., the great Red River valley potato grower, the making of a potato crop is a more simple process. Stubble land is spring plowed. After one harrowing the planting is done by machines. The planting is followed by two harrowings, after which a two-horse weeder is used at least three times. Then the cultivator is kept going as long as possible. The four-row sprayer is kept at work in its season. After grain harvest, or about September 15th, the digging begins. Two kinds of machine diggers are used, each followed by about six men picking and sacking. The potatoes then go to underground potato houses. In these the potatoes are piled from eight to nine feet deep where they keep well till spring. The cellars are well ventilated, but in winter are covered with about two feet of straw. Car shipments are made throughout the entire winter.—*Farm Implement News*.

Wheat Growing in the Canadian West.

By W. R. Motherwell, Minister of Agriculture for Saskatchewan, before the second annual convention of the Dominion Seed Growers' Association, Ottawa.

Wheat production in Western Canada twenty five years ago was confined practically to a few pioneer settlements in the Red River valley of Manitoba.

But just as successful wheat culture to the south of us extended westward from the Eastern to the Middle States and from thence to the Dakotas and Minnesota during the last half century, so in Western Canada during the past quarter century, has a similar expansion westward and northward been steadily going on until the far off Peace River country has come to be recognized as within the scope of successful agriculture in this respect. In the light of these experiences, it is a bold man indeed who win to-day, presume to prescribe the limit, either ill extent of wheat area or exportable surplus of our great Western Empire. Statisticians of more or less accuracy and sources of information have estimated our capacity to grow wheat all the way from two hundred and twenty five millions to one billion bushels per annum. While the latter figure is doubtless extravagant, moderate and well informed men are of the opinion that an average of these two figures is quite within the range of possibility during the next twenty five years.

And when one considers the invariable moderating effect that settlement always seems to have on temperature, together with the fact that earlier varieties of wheat are continually being evolved by our painstaking experimenters, the mind fails to grasp the future possibilities of Western Canada as the future granary of the empire.

But I take it that a paper of this nature will be of more interest and greater usefulness if the present methods of wheat production in the West are referred to, together with the leading principles to be observed and dangers to be avoided.

If one is to attain the greatest success in the cultivation of wheat on the western prairie, there are at least three outstanding questions that demand intelligent study and prompt action, and these are, soil moisture, good seed and weeds.

Taking on the average year and the average prairie, soil moisture is by far the most important question that should engage the active attention of the farmer. Because of this, bare summer fallowing is becoming and indeed, in many parts, has already become the very foundation upon which successful wheat culture is based and profitably carried on. True, there are many lessons from this, but these are invariably