the acre, and twenty pounds if on heavy clay soil, if there is any danger of baking.

As soon as the beet plants can be seen in rows across the field, it is time to begin cultivation. When the plant is in its fourth leaf, it is time to block and thin—on light soils, nine inches apart; on heavy soils, eight inches apart—and single to one plant. I find by following these instructions it yields a heavy tonnage and large percentage of sugar. It is necessary to cultivate once a week until the beet leaves reach across the rows. As the beets grow, it is quite necessary to arrange your cultivator in such a way as not to disturb the plants. I find the Moline beet implements sufficient for working the beet crop.

Middlesex Co. GEO. SHEPPARD.

Profitable Beet-growing.

A well-drained clay loam, with a porous subsoil, is the best for sugar beets. The higher ground does very well, but the subsoil is harder and not so porous, and requires the drains closer. Because of this, the soil is more apt to become soggy in wet weather, and I think beets want a lively soil, that will admit the air readily. Frequent cultivation will do much to help this, as well as cause the soil to retain moisture.

We have tried beets after barley and clover, and would much prefer the latter. Both years the treatment given was the same, but the best crop came after the clover, also the easiest to cultivate and harvest, the soil being friable and not sticky in wet weather when we have to harvest.

We used good stable manure stored in a shed, applied it in the fall, and plowed as deep as we could.

I like the disk for spring work, as soon as the ground is dry, and go over the land as often as convenient, the oftener the better, until ready to sow. The disk pulverizes the ground, and makes a good seed-bed before sowing. Harrow well, and roll to make the ground as smooth as possible, as the seed will cover better and be more likely to grow if the weather is dry. I would prefer the garden-drill for a small piece, (say, an acre or so), as I can sow it in half a day, and I think it sows more evenly and covers better than the farm drill. I think fifteen pounds plenty for hand drill—as good as twenty pounds for farm drill. We sow about twenty-one inches apart, and as soon in May as the land is in good shape.

We thin as soon as beets are up all along the row, say two or three inches, or the two leaves are a nice size. We use a common hoe to block to about eight or nine inches, but must be governed by the stand we have, and pull the bunches left by hand, which is rather a tedious job, but it pays to do it carefully the first time, as it will save trouble afterward. I find it necessary to go over them a second time, as some will be missed and others grow after being thinned.

We cultivate as often as time and weather will permit, the oftener the better, and until the leaves begin to cover the ground. I do not think it hurts them if some are broken off by the cultivator. We bought a small-toothed cultivator from a Massey-Harris agent, which answers very well, especially when the plants are small, and as the teeth are close, 15 I think in all, it pulverizes the ground very well. We find it well to go through with the hoe once or twice, if we have time. The acreage put in beets on a 100-acre farm will depend on circumstances, the condition of the land, and the amount of labor one can hire; but in no case sow more than can be well cared for. I think a small piece well cared for is better than double the size with even medium care. I think it is worth $40 an acre to properly care for and harvest a good crop, and then there will be left a good profit. My acre last year raised 49,600 pounds gross at Wallaceburg; discount 12½ per cent., leaving 43,050 pounds, testing 16.1 per cent., and I got $100.20, after paying for seed and all expenses outside of labor at $40, leaving me a profit of $60.20. P. McPHEDRAN.

Lambton Co., Ont.

Sensible Sugar-beet Culture.

I have grown sugar beets for the last three years, and I think clay loam gives a good sweet beet. I had beets on sandy loam last season that did well and tested as high as seventeen per cent. sugar.

I think clover sod, plowed late in the fall, is the place for beets, as they do well after clover and are very easily kept clean. I would advise manuring with barnyard manure, sowing to fall wheat, and seeding to clover; then pasture the following season, and plow late in the fall.

I like to work the land as soon in the spring as it is fit to work. I use a disk, and harrow it down level, then let it stand until any weeds there are start to come up, then work up again. The more work put on land before sowing, the easier beets are kept clean. I find it pays to use all machinery that is made for handling beets. I sow with a beet-drill, twenty inches apart, and would not sow less than fifteen pounds seed per acre. I find the sooner the beets are thinned after all the seed is up the better. I use a beet cultivator, which does two rows at a time, and find the oftener you go through them the better. What acreage a man should have on one hundred acres depends on his help; if he could get help at the right time he could handle twenty acres, grow a rotation of crops, and always have the land in good shape for beets.

Bothwell Co., Ont. ALBERT JENNER.

Preparation of the Seed-bed.

Now that spring is upon us again, and seed time is nearly here, it might not be out of place for me to give my method of preparing the ground for the seed. In the first place, be sure to keep these points before you: First, have the ground dry enough; secondly, be sure to get the soil worked up prime; thirdly, get your crop in as early as possible; and, lastly, use none but the very best seed.

As a general rule, fall plowing gives the best results in this section; therefore, I try to get all my land gang-plowed as soon as the fields are cleared of the crops—this gives all the weed seeds a chance to start—then I cross-plow this with the single plow; this kills all the weeds that have started, and leaves the land in excellent shape.

In the spring I put three horses on the spring-tooth cultivator, and go over this ground three or four times. If there are any extra hard spots I give them extra cultivating, so as to get the ground all up fine and even. As soon as possible, and there is seldom any delay, I go on with the seeder, and have a man follow me with a harrow, so as to cover all seed that may miss getting covered; this is especially necessary when sowing clover or timothy with the grain, and it also breaks any lumps there may be. Then as soon as possible I go over this ground with the land roller; this presses the ground around the seed, causes it to germinate quickly, levels down all lumps, and presses all stones too small to be picked out of the way of the binder's knives.

If the land is unavoidably left till spring to be plowed, I get to plowing it as soon as possible, but do not go on before it is dry enough, for if plowed wet it is apt to bake, and once in this condition it is almost impossible to get it into a good seed-bed. If the ground is harrowed as fast as plowed, it will be better, especially if it is heavy clay.

In regard to the varieties of grain, I might say that the Sensation, Imp. Ligowo and Banner are the leading oats. I have had good success with Emmer, and like it for feed. The weevil almost prohibits the growing of peas. White Fife is the leading spring wheat, and Winter King the best fall variety. I make it a point to try at least one experiment from both the Experimental Farm and Experimental Union, and consider them beneficial in more than one way; this is also a cheap way to get into new seed. CANUCK.

Prince Edward Co., Ont.

Potato Culture.

The potato is the most valuable root grown for the support of the human family, and so it is very important that it be cultivated to good advantage.

Take a piece of sod land, plow in the fall, sow with oats the following spring, bring the land into as fine condition as possible. After the oats are harvested, spread on the stubble land about fifteen loads barnyard manure to the acre, plow under, and leave in this rough condition until the following spring, so that the frost may get a better chance to pulverize the soil and kill the couch grass. Some make a mistake by smoothing the land in the fall, and thereby exposing a smaller surface to the elements. As soon as the land is dry in the spring it should be plowed so as not to allow weeds and grass to get a start. When the time comes to plant, which should be about the twentieth of May, work up the land thoroughly as for turnips. This is necessary in order that the soil may be loosened, and the tubers have a chance to grow. Another light coat of fresh manure may now be applied, and the potatoes plowed in about four inches deep, fourteen inches apart in the rows, and thirty-two inches between rows. A large yield can be obtained by selecting the largest potatoes for seed, and cutting at least two eyes to each set, and plant immediately. It is of great importance that the seed be sprinkled with land plaster, which will form a coating on the set, and thus protect it from dying and decaying. After being planted, the ground should be well harrowed and rolled. As soon as the young plants are four or five inches above ground, the scuffler can be put to work, and every eight or ten days should be run through them, especially after a shower. Hilling is not necessary, as it grades up the rows so that the water settles in the center between rows, and is then furthest from the plants. Hoeing is a very important operation, as it fulfills two objects—it extirpates weeds and also loosens and pulverizes the surface soil, which is very effective in promoting the growth of the plants; it also admits air and water, and thus retains moisture. One of the most difficult operations is ridding the plants of the potato bug. It is an endless job to pick off the old ones, as I have seen some farmers try to do, but more attention should be paid to the young ones. We have had good success during the past season by spraying with the Bordeaux mixture and Paris green. The lime in the mixture prevents the Paris green from burning the foliage, and also keeps the rain from washing the poison off. I don't think Paris green causes potatoes to rot, as some farmers maintain. Rot is caused principally by the condition of the land and weather. There are several very good potato-diggers to be had, but we always prefer to plow out, and one person can scratch out about fifty bushels a day. By following this method of cultivation, we have always produced over two hundred bushels to the acre.

Prince Co., P. E. I. JAMES STAVERT.

Problems of the Soil—V.: Plant Food.

While plants require many elements for food, three only are of importance from an agricultural standpoint, not because they are of more importance to the plant than others, but because, as a general rule, they are the only ones that our soils cannot supply in sufficient quantities for all crops. These are nitrogen, potash and phosphoric acid. Given a soil in proper physical condition, its fertility will depend on the amounts of these elements which it contains in a form that may be used by plants. The whole question of fertility, leaving out for the moment the question of physical conditions, depends on the condition of the soil in reference to these three elements, and all systems of manuring, and rotations of crops, are based on the capabilities of the soil, and the needs of the plant in this regard. If we would understand the principles of agriculture, we must know something of these elements, their manner of occurrence, the sources of supply available to us, and the means at our disposal to increase the available amount in the soil.

Strange as it may seem, when we remember that our crops often suffer from the lack of a sufficient supply, nearly all soils contain an abundant store of these elements. This is particularly true in the case of potash and phosphoric acid, for chemical analysis reveals the fact that in the upper layers of soil, that are within easy reach of the roots of plants, are supplies of these elements sufficient for the needs of hundreds of crops. Both these substances are minerals, occurring in the rocks of the earth, and in the little particles of broken-down rock of which soils are chiefly formed. They also occur in the remains of plants and animals that have died and decayed in the soil. During their life these elements were taken up by these living organisms for food, and after their death their remains contain them. Nitrogen differs from the other two elements, in not being a mineral, but a gas. It occurs in the air, and it is probable that the nitrogen of the soil was all derived originally from the air. In the soil it occurs chiefly in the decaying organic matter, or humus, of the surface soil. It also exists in much less quantities in the soil than either potash or phosphoric acid, is more liable to loss, and is the first element lacking in ordinary farm soils.

How is it, then, if ordinary soils contain an abundance of these elements, that our plants lack them? Simply because they are not in a form available to the plants. Plants cannot make use of solid food. Food, to be of use to them, must be soluble, either in water or in the weak acid of the plant juices, and most of the food stored in the soil is neither. The minute particles of rock in the soil contain large supplies of both potash and phosphoric acid, but neither water nor the juice of the plants can readily act on them. Of course, under the influence of decay, they gradually yield up their stores of fertility, but this action is too slow to give an abundant supply. Much of the nitrogen of the soil is also in a form not readily available to plants. Hence, though soils contain large quantities of fertilizing elements, our plants are really dependent on a small quantity held in an available form. This, from the very fact of its being easily available, is the more readily lost, both by the removal in crops and by being dissolved in drainage water and carried out of the soil. Virgin soils contain rich supplies of available food, but under the influence of cropping and cultivation the more available food is removed and the less left, till the rich crops of new land gradually give place to the miserable crops of old and farmed-out soils. How to keep an abundant supply of available plant-food is the great problem of agriculture. Old and unproductive land may yet contain an abundance of plant-food, but we must bring it into an available form before the soil can become fertile.

In what form does plant-food become easily available in the soil? Not in the mineral portions, for these supply food but slowly, but in humus of the right quality. Humus differs in quality according to the plants from which it is formed, and some humus is not very valuable. But if we can keep the soil well supplied with good humus, we have the best supply of available food. Humus, being formed from plants, contains all the elements of plant-food in an easily available condition, and the question of increasing the amount of good humus is the great one, where we attempt to increase the fertility of the soil without the aid of artificial fertilizers. How this may be done we shall see later. D.

Potato Varieties.

To the Editor "Farmer's Advocate":

I noticed your note appended to my article on potato culture, April 21st issue, page 529. The standard early varieties planted here are: New Queens, Beauty of Hebron, Bovee, Bliss, Triumph, and Pride of the South. Any of these will ripen here in about ninety days. The standard late varieties are: Dakota Red, Delaware, Green Mountain, White Elephant, Carman, etc. There are many other kinds planted here in Aroostook.

Aroostook Co., Maine. W. T. ASHBY.