

spade, the bottom being wider than the diameter of the tile. The most skilled workmen should perform this duty. The finest and most compact soil should be packed beside and over the tiles. When the bottom of the trench is narrow, the tiles may be laid by standing on the tiles already laid, first covering them with a few inches of earth.

Direction of the drains.—Where practicable, the drains should always go directly down the descent, even when the fall is great. If the tile is small enough no danger need be apprehended from the effects of the velocity of the flow. In such cases, however, the flow should be straight and smooth as possible. Drains at ordinary distances apart cannot be expected to work to the best advantage unless the highest point of the line of saturation lies midway between the drains. In oblique drains, when the distances apart are, say 50 feet, then the water must flow 50 feet laterally through the soil, whereas it would have to flow only half this distance if the drain were cut directly down the descent, and the pressure of the water into the drain becomes weakened. Another objection to oblique drains is that any obstruction is apt to cause the water to leak out.

Experiments with Potatoes—Potato Rot—Profits and Losses on Fertilizers.

(A Lecture delivered by W. A. Macdonald before the Middlesex Agricultural Council.)

No. III.

The remaining rows were devoted to the testing of different varieties of potatoes and different methods of cultivation, no manure or fertilizer having been applied. The results of different methods of planting, noted in bushels per acre, are given in the following table:

TABLE SHOWING THE RESULTS OF DIFFERENT METHODS OF PLANTING.

	Total Yield.	Percentage Rotten.
Trench system—4 inches deep...	265	16
" " 6 " " "	275	14
" " 12 " " "	150	8½
Hoe culture...	187	13
" " hilled up	214	17½
" " flat	178	15

The first item in the table is the average production of the three unmanured rows which I already mentioned, the trenches having been dug with the spade. The next differed only in the potatoes being planted six inches deep instead of four inches, and you see that deep planting resulted in a yield of 10 bushels per acre over and above the shallower planting. The potatoes in all these rows were planted whole and 18 inches apart; but those in the third row mentioned in the table were planted 12 inches apart, 4 inches deep, and cut to one or two eyes. Observe the insignificant yield; but there was a great advantage in the percentage rotten—not much more than half of that in the rows where the potatoes were planted whole.

The first row mentioned in the "hoe culture" was the ordinary system of planting, viz., opening a shallow trench with the hoe and covering the potatoes about 3 inches deep, leaving the surface of the ground flat. In the second row, the trench opened with the hoe was very shallow, but the ground was hilled up, covering the potatoes about 3 inches deep; while in the third row the trench opened with

the hoe was about 4 inches deep, and the ground was turned back until the surface was level. In these rows the potatoes were planted whole and 18 inches apart. Observe that the differences in the yield are considerable; but I attribute the inferior yield of the flat culture row mainly to the wet season and the undrained soil; under reverse conditions, it is quite probable that the yields would also be reversed. By "flat culture" I mean that the rows were never hilled up. The variety planted in all these six rows was also the Beauty of Hebron.

The following table gives a list of the different varieties which I tested, and the yield in bushels per acre, with percentages rotten, of each variety, no manure having been applied. The ordinary hoe system of planting was employed, the potatoes being planted whole and 18 inches apart:

TABLE SHOWING THE RESULT OF EIGHT DIFFERENT VARIETIES.

	Total Yield.	Percentage Rotten.
Early Rose	213	29
Belle	200	37
Mammoth Pearl	254	26
Clarke No. 1	263	9
Morning Star	300	16
White Star	233	10
Early Ohio	225	22
Early Gem	282	9

I should add that I tested another variety, but as I only had seven potatoes, I have not included it in the above table. The variety is quite new and unknown, and is called the Bronze King, having been originated by Mr. E. W. Chambers, of Oxford county, and is a cross between the Early Rose and the Garnet Chili. It proved perfectly rot-proof, but succumbed to the blight before the tubers were fully grown. The quality is excellent. I believe it is worthy of a place amongst our leading varieties, but should be further tested.

In comparing the trench system with hoe culture, I am convinced that it pays to use the spade instead of the hoe, providing the soil is inclined to be stiff, and I attribute the superior yield in the trench system to the mellowing of the seed bed, which is a matter of great importance in potato culture. There is a superstition abroad that a vegetable soil is best for potatoes; but it is not because the soil is *vegetable*, but because it is *mellow*, and when a clayey soil is spaded into a mellow condition, it produces a better yield than any other soil. Vegetable matter has just the kind of nutriment which potatoes don't need, while clay soils are usually rich in potash—just what potatoes like to feed on. However, by special manuring and cultivation, any soil can be made suitable. Moreover, I am convinced that 50 bushels per acre—the quantity of seed which I used—is nearer the mark than 10 or 12 bushels, as is the ordinary practice. I used the rate of 12 bushels per acre only on one row, where the potatoes were cut and planted 12 inches apart, and the table shows that the yield was very inferior. However, when the land is cheap and the potatoes dear, I would not always recommend so intensive a system of culture: per potato, the yield can be increased by cutting to one eye; but there will be a heavy loss in the yield per acre.

The largest yield of potatoes which I have ever known was about 1300 bushels per acre; but the conditions were then all favorable. If my soil had been drained, I might have profit-

ably used about four times the quantity of fertilizers, or say 1200 to 1600 pounds per acre. You may here denounce me as speaking about market gardening and not about potato culture for farmers; but I assure you my object is to find out whether the farmer can grow his potatoes more profitably in the garden than in the field. It is a question of spade versus plow. In field culture a fair average is 150 bushels per acre, while by the intensive system 750 bushels per acre can be as easily assured; in other words, if 150 bushels are the quantity to be raised, one-fifth of an acre will be sufficient, being a saving of four-fifths of an acre of land, and I question if more labor is required to raise 150 bushels on the intensive system. It will require two days for one man to dig the trenches on the fifth of an acre; but the remaining labor will be less than by the extensive system. It stands to reason that an ordinary application of manure or fertilizers will produce more profitable results on a fifth of an acre than when scattered over a whole acre of land.

TABLE SHOWING COST OF PRODUCTION OF ONE-THIRD OF AN ACRE.

Dr.	
Plowing and harrowing	\$ 1.25
Digging trenches, planting, etc.	10.50
Fertilizers	1.15
16½ bush. seed @ 30c	4.95
Hoeing (3 times)	7.50
Paris Green 20c., applying same 50c.	.70
Digging and picking	8.80
Assorting and putting in cellar	2.25
Total	\$37.10
Cr.	
By 55 bushels @ 50c	27.50
Total loss	\$ 9.60

I paid \$3.00 per day for man and team; \$1.25 for a man, and \$1.00 for a boy. I have not charged interest and taxes because the price of the land has sufficiently increased to cover these amounts.

With so many obstacles to contend with, it would have been a miracle if I had produced a gain. The soil was worn out, only about one-half of the rows was manured, and these should have received about four times the quantity of fertilizers which I applied, had the soil been drained; the season was wet, the potatoes suffered from rot, and the blight struck them before the tubers matured. After lying in a pit for two weeks before they were put into the cellar, ten more bushels were found to be rotten, leaving only 55 bushels of marketable potatoes out of a total yield of 80 bushels, having also removed a few bushels of unmerchantable size; but up to the end of January only a bushel and a half rotted in the cellar, and the remainder is now all perfectly sound.

I have not yet lost courage in my scheme of intensive farming, and believe that the farming of the future must take this direction, whether in the field or in the garden; and if one acre can be cultivated most profitably on the intensive scale, the same principle will apply to the whole farm. I now know what my soil requires, and how to restore its fertility most cheaply, and this knowledge will cover, many times over, all the loss which I sustained in my experiments.

My favorite variety is the White Star. It is the only variety which withstood the blight, and a very small percentage suffered from rot. It is medium with respect to earliness, the quality is excellent, and very few other varieties are superior to it as a yielder. This is not my own experience alone, but also that of