information required with regard to each crop; and, in order that this may be done in a manner the most likely to elicit information, power should be given to the members to associate with themselves practical farmers or others whose experience may be likely to prove useful.

V. *On Various Modes of Planting the Potato, with a View to the most Profitable Crop. By* Sir W. Denison, F.R.S., *&c.* [*Read 9th April,* 1851.]

It may be interesting to the Society to have a record of the results of certain experiments recently carried on under my directions within the Domain in a paddock which has been under cultivation for several years.

The object of these experiments was, in the first place, to ascertain the effect produced by under-draining the land; and, in the second, to decide upon the best mode of planting potatoes,—that is, the mode by which any given area of land could be made to produce the most profitable crop.

The field upon a portion of which these experiments have been made is that opposite the Powder Magazine, having some rows of oak-trees along its east and west sides: the ground slopes gradually to the south east,—while it has a more rapid fall towards a water-course or drain running diagonally across it from west to east, or thereabouts.

The soil varies a good deal in character; but in that portion upon which the experiments were made it may be called a sandy loam: in the upper part the clay may be said to predominate, and in the lower the sand. There is also a ridge or bank where the broken surface of the sandstone substratum is intermingled with the soil.

This ground has been cultivated for several years in the usual careless manner, having borne, I believe, successive crops of oats, or oat hay, with very little manure. The soil was light, and easily moved for a depth of about 6 inches; but on the sole of the furrow made by the plough it was as hard as the road, the clayey loam of which it was composed being very tenacious.

I commenced draining these four acres by cutting ditches 30 inches deep and 30 feet apart, in the direction of the line of quickest descent, or nearly so, to the central water-course. Into these drains split palings were placed for the purpose of keeping the water-way open in a triangular form, (thus V), the paling being 5 or 6 feet long and about 4 inches wide: the earth was then filled in upon the top of the water-way thus formed, but no attempt was made to ram or consolidate it.

I should have been glad to have taken the trench deeper, say to the depth of 4 feet, which appears to be sanctioned by experiments made in England; but the men employed were not used to the work, and the hardness of the subsoil made it very difficult for them even to reach the depth of 30 inches. The want of depth was therefore compensated for by putting the drains near together.

Having filled in the drains, and having, in the course of the work, ascertained the nature of the subsoil, and the extent of available soil above the hard substratum, I decided upon attempting to break up a portion of it by employing one of Read's subsoil ploughs, purchased by me from Mr. John Walker, who kindly attended one morning to instruct my workmen in the mode of using it. By this plough following in the furrow turned out by an ordinary plough, the ground has been broken up to the depth of at least 4 inches below the solid surface of the ordinary sub-

soil. By a repetition of the same process, in a direction across that formerly taken, another 3 or 4 inches may be gained. I shall not attempt to describe the subsoil plough, except in very general terms.

It consists of an iron beam, made of two wrought iron bars, kept at a certain distance apart by means of intervening cast iron plates, the whole being carefully rivetted together. Through the interval between these bars are passed the iron standards from the axles of two pairs of wheels,—also the strong coulter and share which breaks up the ground; and as these standards and coulter can be moved up or down so as to bring the beam as near or as far from the axle as may be wished, or to raise or lower the coulter, it is evident that, within certain limits, the edge or working part of the latter may be brought as far below the wheel as may be required; and as these wheels run at the bottom of the furrow made by an ordinary plough, the subsoil coulter may be made to stir the ground to any reasonable depth.

The plough did its work most effectually: with two horses it worked its way through the hard subsoil quite as fast as the leading ordinary plough could move, though the work, it must be allowed, was harder by far. It was found desirable to *spell* the horses, giving them turn about in the ordinary and in the subsoil plough.

When stones or roots were met with they were thrown out easily; and while the action on the subsoil was generally to crumble it up into fine particles, it occasionally, when the ground was very hard, turned up a large lump, without, however, bringing it to the surface. Further experience of the behaviour of the plough has led me to think it desirable to strengthen both the upright standards, from the axle and the coulter, by thickening them nearly a quarter of an inch. I have found that in hard stony ground both these are apt to

yield to the lateral pressure and jerks produced by the action of the horse.

The ground, having been thus brought into a proper state, received a good dressing of compost, consisting of a mixture of stable manure, sea-weed, street sweepings, and sea-wrack, collected at a spot where an eddy causes a collection of a variety of different matters: the manure was thrown into the furrows turned out to receive the potatoes. In one instance sea-weed was used by itself quite fresh, and the potatoes planted upon it.

The course pursued was to turn out a set of ten furrows, 3 feet apart, from centre to centre, occupying thus a width of 30 feet. In these first furrows the potatoes were planted at distances of about 3 feet apart between the sets. In a second set of ten furrows, the potatoes were planted at distances of 18 inches apart.

A set of 12 furrows, occupying a like space of 30 feet in width, was then turned out; and in these the potatoes were planted at distances of 30 inches apart.

The potatoes were planted about the end of July or the beginning of August; the season was, as every body is aware, very dry: notwithstanding, there were very few failures, except in those rows which were manured with raw sea-weed,—where it would appear that sets had decayed.

The potatoes at the lower end of the field, where the soil was more sandy, were ready for digging in February; while those at the upper end showed the haulm quite green till March.

The mode which I adopted in order to ascertain the relative amount of crop upon a given area of land was as follows:—a length of 30 feet was measured along a single ridge of potatoes, noting down the average distances between the ridges and counting the number of sets contained in the

30 feet: the potatoes were then dug out, weighed, and counted.

The accompanying Table will show the results.—The first column of the Table is merely the number of the experiment; the second shows the number of sets taken up; the third the distance between the ridges; the fourth the distance between the sets in the ridges; the fifth gives the total weight of potatoes taken up; the sixth the number of potatoes; the seventh is formed by dividing the total weight by the number of sets, and gives the average weight from each set; the eighth is formed by dividing the total number of potatoes by the number of sets, giving thus the average number of potatoes to each set. The average weight of each potato, as shown in the ninth column, is found by dividing the average weight of the set by the average number of potatoes at each root, or it may be got by dividing the total weight by the whole number of potatoes; the tenth column shows the number of sets to the acre; and the eleventh gives the weight of the produce per acre, as deduced from the measurements made and weights taken.

Considered as an experiment, the results are inconclusive as to the best mode of planting potatoes; but there is, nevertheless, some valuable information gained. It is evident from the first seven experiments, when the ridges were drawn from 2 ft. 7 in. to 3 ft. distance, and the sets from 1 ft. 8 in. to 3 ft. apart, that the average size of the potato far exceeded that given by the latter experiments, where the distance between the ridges was rather less, and the spaces between the sets varied from 12½ to 21 inches.

The average of the first seven experiments gives for the weight of each potato 4·013 ozs.; the average of the five last experiments gives for the weight of each potato 1·61 oz., or not much more than one-third of the weight of the former.

On reference to the 12th experiment, it will be seen that the total weight per acre very far exceeded that given by any of the other experiments; but this I believe may, to a certain extent, be attributed to the nature of the soil at the particular locality.

If, then, this (12th experiment) be thrown out of consideration, a reference to the remaining experiments will show that a distance of from 30 to 36 inches between the ridges, and from 20 to 24 inches between the sets, is better adapted to secure the two objects of fine individual potatoes, and a large crop per acre, than where the potatoes are placed either farther apart or nearer together in the ridges.

I propose, however, to continue these experiments during the present year; and I have been thus minute in detailing the course pursued, in the hope that some of the other members may be induced to turn their attention to this and to similar matters of interest to the agriculturist and market-gardener, and to communicate any results at which they may arrive to the Society.

Tabular Statement of Experiments on the Culture of the Potato, 1850-1. *By* SIR W. DENISON.

NO. OF EXPERIMENT.	Number of Sets taken up.	Distance of Ridges apart.	Distance of Sets apart.	Total Weight of Potatoes taken up.	No. of Potatoes taken up.	Average Weight of each Set.	Average No. of Potatoes to each Set.	Average Weight of each Potato.	No. of Sets per Acre.	Weight of Produce per Acre.	REMARKS.
		ft. in.	ft. in.	lbs.		lbs. oz.		ounces.		ton cwt. qr. lbs	
1	11	2 10	2 9	18	71	1 10	6·45	4· 04	5667	4 2 2 0	
2	10	2 10	3 0	20½	77	2 0½	7· 7	4· 26	5152	4 14 1 5	
3	11	2 10	2 9	23	88	2 1½	8·	4·176	5667	5 5 3 0	
4	18	3 0	1 8	31½	130	1 12	7·22	3· 87	8712	6 16 0 14	
5	17	3 0	1 9	28	120	1 10⅓	5·88	4· 48	8228	6 1 0 0	
6	15	2 7	2 0	25	120	1 10½	8· 0	3· 32	8430	6 4 3 21	
7	15	2 7	2 0	25	100	1 10½	6·66	3· 98	8430	6 4 3 21	
8	21	2 7½	1 5¼	24½	240	1 2½	11· 4	1·632	11182	5 16 1 18	Several small Potatoes among these unfit for sale.
9	22	2 7½	1 4¾	22½	270	1 0⅓	12· 3	1·528	11334	5 3 1 19	Of these 81 were too small for sale—the remainder too were small; the ground in this and former experiment was hard.
10	17	2 9	1 9	26	242	1 8½	14· 2	1· 71	8860	6 0 3 0	Of these 84 were too small.
11	18	2 5	1 8	18	176	1 0	9·77	1· 63	10762	4 7 0 18	Of these 61 were too small: the ground here was inferior, being stony.
12	29	2 3	1 0½	36	370	1 1	12· 7	1· 56	19246	10 13 0 14	Of these 122 were too small; the ground was in good order, the Potatoes however were very small.