stiff, being composed of blackish mould intermixed with friable fat clay.

The whole being thus prepared, the seeds were dibbled in at their respective depths, on the 9th of August, 1809, and the produce was taken up on the 30th of November, that is, 113 days after planting.

The following table of the results, exhibits the produce of each experiment, or 30 feet of rows, in pounds; the weight of the six largest potatoes; and the computed acreable produce in pounds, and in bushels.

for the manures, according to the black lines in the following diagram:

	Class 1.				*Class* 2.				*Class* 3.				*Class* 4.				
	Seed the size of Walnuts planted whole.				Large seed cut in pieces.				Eyes, middle sized Potatoes.				Small Potatoes planted whole.				
Depths	12	9	6	3	12	9	6	3	12	9	6	3	12	9	6	3	of planting
	Horse Dung Litter, 35 *loads per acre.*																
No. of the	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	experiments
	Hog's Dung Litter, 35 *loads per acre.*																
No. of the	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	experiments
	Guana; or, Sea-fowl Dung, 35 *bushels per acre.*																
No. of the	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	experiments
	No Manure.																
No. of the	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	experiments

66 feet.

66 feet.

The figures 12. 9. 6. 3. represent the depths of planting in inches, and the positions of each two rows which traversed the manured and unmanured parts. The numbers 1 to 64 shew the situations of the experiments. The three narrow paths which separated the manured divisions reduced the cultivated space from $16\frac{1}{2}$ to 15 feet: each experiment upon the two rows consisted therefore of 15 feet in length, or of 30 feet of rows; which, as will be hereafter explained, is the 726th part of an acre.

The manures were evenly spread over the beds in the orders and quantities specified in the diagram; they were then trenched one spit deep into the soil. The transverse lines mark the spaces for each class of seed, and by crossing the manure divisions they formed 16 squares, containing each four distinct experiments; so that the total number was 64. The soil was rather

TABLE *of the Results of the Experiments, exhibiting the number of pounds that each* 30 *feet of rows yielded, the weight of the six largest Potatoes from each experiment, the computed acreable produce, in pounds and bushels, and the total quantities produced from each sort of seed, at the several depths, throughout the manured and unmanured parts, in the extent of* 120 *feet of rows.*

NOTE.—30 *feet of rows are the* 726*th, and* 120 *feet the* 181.5 *of an acre.*

Class 1.—Seed the size of Walnuts planted whole.

Twelve Inches deep.

Number.	MANURES.	Produce of 30 feet of rows.	Weight of the six largest.	Produce per acre in lbs.	Produce per acre in bush. 56lbs.	REMARKS.
		lbs.	lbs. oz.			
1	Horse dung	38	2 8	27588	492	
17	Hog's ditto	31½	1 14	22869	408	
33	Sea-fowl ditto	38½	2 4	27951	499	
49	None -	26	1 8	18876	337	
						lbs.
	Total	134				134 × 181.5 equal to 24321 lbs. per acre.
			Nine Inches deep.			
2	Horse dung	35½	1 8	25773	460	
18	Hog's ditto	33	1 12	23958	427	
34	Sea-fowl ditto	36	2 2	26136	466	
50	None -	29	1 6	21054	375	very stiff black clay soil.
						lbs.
	Total	133½				133½ × 181.5 equal to 24239lbs. per acre.
			Six Inches deep.			
3	Horse dung	45	2 8	32670	583	
19	Hog's ditto	34½	1 2	25347	447	
35	Sea-fowl ditto	42	2 2	30492	544	
51	None	30½	2 2	22143	395	very stiff black clay.
						lbs.
	Total	152				152 × 181.5 equal to 27588lbs. per acre.
			Three Inches deep.			
4	Horse dung	37	2 0	26862	479	
20	Hog's ditto	32	2 4	23232	414	
36	Sea-fowl ditto	41	1 14	29766	531	
52	None	24	2 2	17424	311	
						lbs.
	Total	134				134 × 181.5 equal to 24321 lbs. per acre.

Class 3.—Eyes of middle-sized Potatoes scooped out.

Twelve Inches deep.

Number.	MANURES.	Produce of 30 feet of rows.	Weight of the six largest	Produce per acre in lbs.	Produce per acre in bush. 56lbs.	REMARKS.
		lbs.	lbs. oz.			
9	Horse dung	37	3 4	26862	479	
25	Hog's ditto	28	1 10	16698	298	
41	Sea-fowl ditto	29¼	3 10	21417	382	
57	None	12¼	2 2	9256	165	
	Total	102¼				lbs. 102¼ × 181.5 equal to 18558lbs. per acre.
			Nine Inches deep.			
10	Horse dung	37	3 4	26862	479	
26	Hog's ditto	28	3 2	16698	298	
42	Sea-fowl ditto	29	2 12	21054	375	
58	None	16¼	2 6	11797	210	
	Total	105¼				lbs. 105¼ × 181.5 equal to 19102lbs. per acre.
			Six Inches deep.			
11	Horse dung	43½	3 10	31581	563	best sort
27	Hog's ditto	37¼	3 14	27225	485	
43	Sea-fowl ditto	44½	3 8	32307	576	
59	None	26	2 0	18876	337	
	Total	151¼				lbs. 151¼ × 181.5 equal to 27497lbs. per acre.
			Three Inches deep.			
12	Horse dung	29¼	4 10	21417	382	
28	Hog's ditto	37½	2 14	27225	485	numerous small excrescences on the haulm.
44	Sea-fowl ditto	35	2 14	25410	453	
60	None	26½	2 10	19239	343	
	Total	128½				lbs. 128½ × 181.5 equal to 23323lbs. per acre.

Class 2.—Large Seed cut in pieces.

Twelve Inches deep.

Number.	MANURES.	Produce of 30 feet of rows.	Weight of the six largest.	Produce per acre in lbs.	Produce per acre in bush. 56lbs.	REMARKS.
		lbs.	lb. oz.			
5	Horse dung	50	3 2	36300	648	very fine.
21	Hog's ditto	28½	2 8	20691	369	
37	Sea-fowl ditto	39	2 2	28314	505	
53	None -	22	2 2	15972	285	
	Total	139½				lbs. 139½ × 181.5 equal to 25319lbs. per acre.
			Nine Inches deep.			
6	Horse dung	45½	3 0	33033	589	
22	Hog's ditto	33½	2 6	24321	434	
38	Sea-fowl ditto	43	3 0	31218	557	
54	None -	29½	1 6	21417	382	
	Total	151½				lbs. 151½ × 181.5 equal to 27497lbs. per acre.
			Six Inches deep.			
7	Horse dung	41½	4 2	29766	531	
23	Hog's ditto	36½	2 2	26136	466	
39	Sea-fowl ditto	45½	2 10	33033	589	
55	None -	31½	1 14	22869	408	
	Total	154				lbs. 154 × 181.5 equal to 27951 lbs. per acre.
			Three Inches deep.			
8	Horse dung	39½	3 0	28677	511	
24	Hog's ditto	29	1 12	21054	375	
40	Sea-fowl ditto	43	3 12	31218	557	
56	None -	32	2 14	23232	414	
	Total	143½				lbs. 143½ × 181.5 equal to 26045lbs. per acre.

The following is an abstract from the preceding table, and is a comparative view of the effects of the several classes of seed, shewing the total produce in pounds.

	Pounds.
Class 1. Seed the size of walnuts planted whole, yielded	553½
2. Large seed cut in pieces - - -	588½
3. Eyes of middle sized potatoes - -	487½
4. Small potatoes planted whole - -	615½
Total pounds -	2245

These results will be pleasing to the planters, since they have clearly ascertained that small potatoes planted whole, which would not fetch so good a price in the market as the largest sort, are the best for seed.

The following is a comparative view of the effects of different depths of planting, shewing the total produce in pounds.

	Pounds.
1st. Six inches deep, yielded - -	637
2d. Three ditto, ditto - - -	549
3d. Nine ditto, ditto - - - -	547¼
4th. Twelve ditto, ditto - - -	511¾
Total pounds -	2245

By these results, it is proved, that planting at the depth of six inches on stiffish land is the most productive: but if the soil be of a lighter and freer sort, it is probable nine inches, or more, would yield best, because the moisture necessary for vegetation lays deeper in that sort than in a more retentive soil.

The following is a comparative view of the effects of the manures: shewing the total produce in pounds.

	Pounds.
1st. The guana:* or, sea-fowl dung at 35 bushels per acre, yielded - -	639
2d. Horse dung litter at 35 cart loads or 420 bushels per acre, yielded - - -	626
3d. Hog's dung litter, at 35 cart loads, or 420 bushels per acre, yielded - - -	534
4th. No manure - - - -	446
Total pounds -	2245

* The guana or sea-fowl dung, which is found in considerable quantities upon Egg Island, was first recommended to my notice by the Right Honourable Sir Joseph Banks, President of the Royal Society. "It furnishes," says he, "the loading of an immense "number of vessels that are constantly employed in bringing it from small islands, to the "main land on the western coast of South America, where it is sold and distributed for "the purpose of manure; which it answers, in a degree, infinitely superior to any other "article we have the knowledge of.—A handful is considered as sufficient for several "square yards of land, the produce of which is exuberant, in consequence of the force of "this application."

The accuracy of this valuable communication has been most amply confirmed by my experiments in the culture of potatoes, as well as upon grass lands. Thirty-five bushels of the guana, or three cart loads per acre, appear to me, equivalent in effect, to seventy loads of good rot-dung. I should imagine that abundance of this most valuable manure might be had from many of the rocks and islands on the coasts of Scotland.

The effect of the guana upon grass land is comparatively greater than in the potatoe experiments.—From what cause this proceeds it may be difficult to explain: but as Dr. Priestley found, by experiment, that vegetables throve best when they were made to grow in air made putrid by the decomposition of animal and vegetable substances, it may be inferred that the very strong effluvia which issues from the sea-fowl dung, or guana, together with its being readily washed among the roots of vegetables by the first falls of rain, are circumstances that may possibly render its effects, as a top dressing, greatly superior to those it produces when it is mixed with the soil. By this mixture its powers may be weakened, and a great portion of effluvia, which by some is supposed the proper food of plants, being retained underground, cannot escape and unite with the atmosphere.

On the 29th of July, 1808, I marked out a space, on the lawn in front of Plantation-

Class 4.—Small Potatoes planted whole.

Twelve Inches deep.

Number.	MANURES.	Produce of 90 feet of rows.	Weight of the six largest	Produce per acre in lbs.	Produce per acre in bush. 56lbs.	REMARKS.
		lbs.	lbs. oz			
13	Horse dung	31	1 12	22506	401	
29	Hog's ditto	38½	1 6	27951	499	
45	Sea-fowl ditto	38	1 0	27588	492	
61	None	28½	1 12	20691	369	
	Total	136				lbs. 136 × 181.5 equal to 24684lbs. per acre.
			Nine Inches deep.			
14	Horse dung	39½	1 8	28677	512	
30	Hog's ditto	40½	1 12	29403	525	
46	Sea-fowl ditto	43	2 0	31218	557	
62	None	34	1 12	24684	440	
	Total	157				lbs. 157 × 181.6 equal to 28495lbs. per acre.
			Six Inches deep.			
15	Horse dung	45	1 12	32670	583	
31	Hog's ditto	42	1 10	30492	544	
47	Sea-fowl ditto	48½	2 0	35211	628	nearly a heaped bushel remarkably fine potatoes.
63	None	44	2 6	31944	570	
	Total	179½				lbs. 179½ × 181.5 equal to 32579lbs. per acre.
			Three Inches deep.			
16	Horse dung	32	1 12	23232	414	
32	Hog's ditto	34	2 2	24684	440	
48	Sea-fowl ditto	43	2 0	31218	557	
64	None	34	2 0	24684	440	
	Total	143				lbs. 143 × 181.5 equal to 25954lbs. per acre.

These results decisively prove the great advantage of manuring the lands, which would evidently repay the additional expense,

h use, which measured one rod in breadth, and twelve rods in length. This was divided into twelve equal parts, or square rods, and numbered progressively from 1 to 12. The guana was reduced to a powder, and sifted; and upon Number 1 a quart of this powder was evenly strewed by the hand; this is at the rate of five Winchester bushels per acre; because 160 square rods, or an acre, would have required that number of quarts, or exactly five bushels. In the same manner Number 2 had two quarts, Number 3 three quarts, and so on to Number 12, which had twelve quarts, or at the rate of 60 bushels per acre.

From the 29th of July there were, daily, drizzling rains until the 5th of August, when the effect of this invaluable manure began to appear. On the following day the whole extent of the 12 rods became highly verdant, and exhibited such a contrast to the unmanured part of the lawn, that it had the appearance of having been newly turfed with a finer kind of sod. The effect gradually increased; and in the first week of October, that is, in little more than two months, the higher numbers, from 6 to 12, (having from 30 to 60 bushels per acre), excited the surprise of every person who saw them, being covered with the most exuberant grass that can be imagined, and having more the resemblance of a crop of young wheat, very thickly sown, than of any grass I ever beheld.

This is the more remarkable, as at that time, the copious rains which fell in August, and the spring season had made no visible effect on the adjoining part of the lawn.

It was from a frequent and careful inspection of the above experiments that I have estimated 35 bushels of guana per acre to be equivalent in effect, upon grass lands, to 70 loads of good rot-dung.

I have been informed that guana is sold at Lima, and at other towns on the coast of Peru, for a dollar a bag, of 50 pounds weight, and that it is much in use there for manuring fruit trees and gardens.

It is certainly one of the most powerful of manures; and therefore it is necessary to be cautious in using it. I have observed, when too much is laid upon grass, that it burns and destroys it.—I would therefore recommend, to those who may try it on fruit trees, to begin with not more than three quarters of a pint to each tree, and to trench it, about a foot deep, all round the roots. If the first application be found insufficient, a second, or third, may be given at intervals of two or three months; or, a better mode, perhaps, of determining the quantity of guana proper for each fruit tree, would be to select about a dozen trees of the same kind and size, and to vary the quantities, by an easy progression, from three quarters of a pint, to one or two quarts, or more, to each tree.

A. B.

and would maintain the potatoe grounds in good heart. These might, no doubt, be further improved by rotations of corn and green crops, which would prevent those disappointments that arise after perpetual croppings of potatoes for 12 or 14 years without manure. By such a practice, labour becomes useless, its expenses are thrown away; and the lands, originally productive, are, in the end, completely exhausted. This is a fact well known to the planters.

It has already been mentioned that the greatest produce was from experiment No. 5; which was large seed cut in pieces, planted 12 inches deep, and manured with horse dung litter. Thirty feet of the rows yielded 50 pounds of very fine potatoes, which is at the rate of 648 bushels per acre.

To those who are unaccustomed to such calculations, it may be proper to explain in what manner the results in the Table are computed, from the length of 30 feet of rows.

An English statute acre consists of 10 square chains. This may be more readily comprehended by imagining a space one chain in breadth, and ten in length. As a chain measures 66 feet, it is evident an acre of the above form will be 66 feet broad, and 660 feet long—and consequently the contents of an acre are 43560 square feet.

If this acre be planted in rows, 2 feet asunder, there may be placed 33 rows in its breadth—and this number of rows, multiplied by 660 feet, will give 21780 feet for the total length of the rows. Then, if this sum be divided by 30 feet, it will be found that this length of rows is exactly the 726th part of an acre—consequently, the produce, in pounds, of any one of my experiments, multiplied by 726, will give the acreable produce in pounds. To find this produce in bushels, divide by 56 pounds, the weight of a St. Helena bushel.

For example, experiment No. 5, yielded 50 pounds; multiplying this by 726, gives 36300 pounds, and dividing by 56, gives 648 bushels, as entered in the Table.

I was, however, accidentally led into this mode of computation —because, as I have already stated, the rows had been reduced from $16\frac{1}{2}$ to 15 feet. The readiest way, of determining the acreable produce of a crop of potatoes, or of corn—is first to ascertain the quantity yielded from one rod (that is $16\frac{1}{2}$ feet square), measured upon any part of the field, and then to multiply that quantity by 160 (which is the number of square rods in an acre), the product will be the computed quantity per acre.

January 12th, 1811.

SECTION III.

Easy Mode of Thrashing, Cleaning, and Preserving all Sorts of Grain, as practised in India, and various Parts of Europe; recommended in the Infancy of St. Helena Farming.

THROUGHOUT India, the manner of reaping and preserving corn, is nearly the same. It is cut down within four inches of the ground; and when dried in the sun, it is, without binding it in sheaves, put in small stacks about ten or twelve feet high. The stalks are placed outward, and the ears inward. After remaining in the stacks a week or ten days, it is spread evenly on a thrashing-floor, made hard, level, and smooth; and coated with a mixture of cow-dung, clay, and water. The grain is then trodden, by driving a number of cattle over it. When the thrashing is completed, the straw is separated from the grain and chaff; and these being projected in the air, by means of wooden shovels, the corn becomes perfectly winnowed, by this simple process, which is performed entirely in the open field.

The natives of India have various ways of preserving grain. Some put it in large earthen jars, and keep it in their houses; others use pits, about fifteen or twenty feet deep. These are excavated, in a dry and compact soil, by digging a narrow shaft, two or three feet in diameter, which is gradually widened towards the bottom, and forms a spacious cave under ground, leaving only a small opening at top. Through this opening, after the cave has been lined with straw rope, the grain is deposited; and the opening is then closed by a few sticks or boards, over which soil is laid, and made level with the surface of the field. These

under-ground granaries exclude all air and moisture, and grain is preserved in them for several years.—I think it is probable that potatoes on this island might be preserved in the same manner for several months.

In some parts of India, small store-rooms are erected, which are strongly floored with planks, to keep out the *bandicoots*, a species of destructive rat, much larger than those at St. Helena. In the store-rooms, no opening is left for air: but there are small doors, one above another, for the convenience of taking out the grain as it is wanted.

In some of the northern countries of Europe, the flail is not used in thrashing. A large circle is cleared, and levelled, upon an open and elevated place. After the stones, or gravel, have been carefully removed, water is sprinkled—and the space is covered with short straw. A post is then fixed in the centre of the circle, and as soon as the soil is somewhat dry, it is trodden by horses, fastened by means of a rope, to the central post.—As the horses are driven round, the rope gradually shortens; and the animals, when they have approached the centre, are made to move in a contrary direction. After repeatedly pursuing this alternate career, towards and from the centre, the floor is at length prepared. The sheaves are now untied, and disposed in successive circles from the post to the circumference, in order to be trodden. The thrashing is performed exactly in the same manner as in preparing the floor, by driving two or three horses round the post until all the ears are separated. The straw, which is reduced to very short pieces, is separated, and used as fodder during the winter; and the grain and chaff are then collected into a heap, and the winnowing performed in the same manner as is practised in India.

It is remarkable that the winnowing of corn in Egypt and

in several parts of the Mediterranean, are the same as above-mentioned. The mode of thrashing in Egypt is, however, different; for small carts are there made use of, which, by being driven repeatedly over the corn, separates the grain from the straw in a manner equally effectual as the other two modes I have described.

24th January, 1811.

SECTION IV.

Experiments illustrating the beneficial Effect of frequently stirring the Soil.

MR. Curwen's discoveries and improvements, in the culture of vegetables, are curious and interesting; and are deserving the attention of all who are engaged in this species of husbandry. They seem to me peculiarly applicable to the circumstances of this island; they point out modes of rendering lands more productive, without any risk of being exhausted, even by continual cropping for a series of years. I conceive, therefore, that the whole of Mr. Curwen's valuable communication, on those important subjects, must be highly gratifying and acceptable to many of your readers.*

It is my intention to follow Mr. Curwen in some of his experiments. I feel a confidence of success, even from the present state of a small comparative experiment, which I have now in process.—It was begun about four months ago, with a view of ascertaining the effect of frequently stirring the soil, and exposing it to the influence of the rains and atmosphere. I selected, for this purpose, a very unpromising spot of land, the soil a pale brown friable clay, which, in some parts, was bare, and in others producing nothing but the coarsest sort of tufted grass. The space for the experiments (measuring two rods in length and one in breadth) was divided into two equal parts. Number 1, was broken up on the 11th of December last, by trenching with the

* Mr. Curwen's communication to the Society of Arts, dated 9th June, 1808, was printed in the St. Helena Register, for the information of the landholders.

spade to the depth of 10 or 12 inches. From that day until the time of dibbling in the seed, on the 23d of February, it had been, at equal intervals, five times stirred or turned. One-half of Number 1 was then dibbled with potatoes, and the other with barley; and, at the same time, the adjoining square rod, Number 2, was broken up, and dibbled, in every respect, in the same manner.

It is deserving remark, that the soil of Number 1, by frequent stirring, had become, and still continues, of a much darker hue than Number 2; and the potatoes and barley upon the former are infinitely superior to those on the latter; in so much, that the tufts of young barley are now, at least, five or six times more bulky than those upon Number 2.

For the information of those engaged in cultivation, I communicate these facts; because they are clearly decisive of the advantages from repeatedly stirring the soil. At a future period, I may give the result of the above experiments; in the mean time, I can assert with confidence, from the experience I have already had, that the cheapest and best mode of bringing old grass land into cultivation, is to pare off the turf to the depth of about two inches, and, when dry, to burn it; and immediately after to spread the ashes over the surface. The first ploughing should then be given, but not too deep; by this the labour of the cattle will be lessened, and the slags, or clods, will be smaller. The two or three after ploughings should go gradually deeper. Care should be taken, by harrowing, to clear the land entirely of roots, and of every sort of vegetable substance. If these operations are performed at proper seasons, so as to be completed just before the setting in of the rains either in January or July, that destructive insect the grub may be starved, and the land brought into the very highest state of preparation for receiving the seed. I will venture to say,

if any one will but try the above process of cultivation, even upon a small scale, with the spade, and common garden rake, he will not be disappointed; and will find just reason to infer, that it is very possible to obtain abundant crops of vegetables, or corn, from many parts of this island, that are, in their present state, totally desolate and barren.

22d April, 1811.

SECTION V.

Feeding Chickens—an Exposition of the unreasonable and exorbitant Prices of Poultry at St. Helena, in 1811.

"IT is stated by Mr. Jackson, in the sixth volume of the Commercial, Agricultural, and Manufacturer's Magazine, that he has found that three pounds of meal, flour, or grain, of such a sort as does not cost more than one penny a pound, or to the farmer and cottager not even so much, with water, and what other fare the little creature can find for itself, will feed and fatten a chicken sufficiently from the time of its bursting the shell, until that of its being of a growth, and in a condition, suitable for its being carried to market. And that the allowance of another penny is sufficient for the attention and labour which its rearing requires, The prime cost of the egg may be one halfpenny. Thus he conceives that even in the vicinity of any great town, a chicken that shall bring ninepence, or rather one shilling, in the market, and is, in comparison with other things, worth as much for the use of your own table, whether you be a rich or poor man, may be produced and reared at the expense of fourpence halfpenny."

The above is an Extract from Mr. Dickson's Complete Body of Agriculture, page 1209, and may be deserving the attention of those who are in the habits of rearing poultry in this island.—It will also serve to shew that 15 to 20 shillings for a middle sized fowl, and 25 shillings for a duck, where grain is about twopence per pound, must be a pretty profitable trade.

27th June, 1811.

SECTION VI.

On Planting Trees—Growth of Pineasters—remarkable Change in the Quality of Fir Timber in St. Helena—extensive Plantations of Pineasters recommended—Mimosa Myrtifolia (*or Botany Bay Willow*), *its rapid Growth—yields innumerable Pods, containing a sort of Pulse fit for feeding Poultry—its Culture recommended.*

"By viewing nature, nature's handmaid, art,
Makes mighty things from small beginnings grow." DRYDEN.

THERE are no trees that succeed so well on this island as the pineaster and a mimosa, which is usually called the Botany Bay willow. They grow on the poorest lands, withstand the south-east wind, and thrive in the most exposed situations.

Most of the pineasters at Plantation-house are from seed, brought here by Mr. Henry Porteous, and sown on the 1st of July, 1787. I have lately measured the girt of several of the largest trees; one is 5 feet and 7 inches; others are from 5 to 3 feet, and even less, differing in size according to the soil in which they are planted. These girts were taken at 4 feet above the ground.

One of those trees was blown down in February last. It has since been used for various purposes. The first 7 feet above ground squared to 13 inches; the whole of the stem measured 146 superficial feet, and the large branches contained 47; making the total from one single tree, 193 feet superficial. The smaller branches yielded a considerable quantity of fuel.

The timber is of a very superior quality: it differs materially from either the Memel, or the American fir, being of a closer

grain, beautifully veined, and resembling in some degree, a pale mahogany.

It appears, by the printed laws and ordinances, that the importance of planting trees has been often, during the last century, strongly pressed upon the landholders by the Court of Directors: but leaving what is past, and looking forward to the next five and twenty years, it may be useful to take a view of the invaluable benefits which might be conferred on this denuded island, by a due attention to the orders of the Company; and above all by forming plantations of pineasters, particularly on the leeward sides of the mountains, and other parts in the interior of the island, where, on account of a greater moisture, and a cooler atmosphere, it may be expected they would produce even larger timber than in the vicinity of Plantation-house.

As Governor Roberts's directions on the 31st May, 1709, (which require the distance from one tree to another not to exceed seven feet, or at the rate of 888 trees to an acre) are different from the practice of the present time: it may be proper in this place, to say a few words upon the number of trees that should be planted on an acre.

In the Transactions of the Society of Arts, Vol. XXVI. there is an account of Dr. A. Bain's plantations in Dorsetshire, of 338,199 forest trees, upon 250 acres of poor land. He allotted 2000 to each acre. His plantations are of a mixed sort, consisting of 289,555 Scotch firs; 4362 oaks; 12,290 larch; Spanish chestnut 5647; spruce 3450; ash 11,050; pineaster 1900; sycamore 4050; birch 1700; and hazel 4195. The Scotch firs and pineasters succeed far better than any of the other trees.

The same number of trees to an acre has been also allotted in the Duke of Portland's plantations in England; where trees of various sizes are placed in an irregular manner. And Mr.

Nicol remarks, in his Treatise on Planting, that " he who plants " too thin, with the idea of saving trouble in thinning, deviates " as widely from the right path, as he who thins none at all."

Relying, therefore, upon established practice, and such good authority it seems advisable to plant trees at the rate of 2000 to an acre; which is something less than five feet asunder. The thinning of the plantations would, in a few years, well repay the trouble, by the ample supplies of fuel they would produce; and by leaving the choicest trees to attain their full growth, they would, in the course of 20 or 25 years, be of very great value in affording excellent timber upon the farms, either for sale, or for the purpose of erecting buildings.

Let us now suppose the possibility of forming plantations of pineasters, upon 600 acres of the St. Helena mountains; and that 2000 trees are planted upon each acre, and of which 500 timber trees shall be produced, (four or five and twenty years hence) from each acre, or in all 300,000 timber trees.

Suppose also that the average superficial feet in each of those timber trees, to be no more than 150 feet, which, from 300,000 trees, would be 45,000,000 superficial feet; and rated at 4d. (the recent price of imported American timber) would be, in value, seven hundred and fifty thousand pounds. This is at the rate of no more than 50 shillings for each timber tree, exclusive of vast quantities of fuel from the thinning of the plantations, and from the lopping of the timber trees at the time they are cut down.

In regard to the Mimosa Myrtifolia, or Botany-bay willow, there are at Plantation-house several young trees that were raised from seed sown on the 20th January, 1810, and afterwards transplanted. The largest is 9 or 10 feet high, a beautiful shrub now in blossom, and covering a space of about 8 feet in diameter. This sort of Mimosa attains the height of 20 to 25 feet.

It produces annually an immense number of long pods full of seed; so that it might not only be propagated to any extent, but as the seed is greedily devoured by rats, it may be presumed that its general culture would be highly beneficial, both in speedily raising fuel, as in contributing to the support of poultry, hogs, and other live stock. I have tried it with poultry who seem to relish it equally as other grain.

I hope that these hints will be duly considered, and that they may tend to excite a spirit of emulation in planting trees, which no doubt might be greatly promoted if premiums were offered by the Court of Directors, to every landholder, who shall have growing, in a thriving state, 20 or 25,000 trees.

22d July, 1811.

SECTION VII.

On Potatoes—two Crops in the Year—extensive Culture recommended—solid Nourishment of, compared with Flour—Culture of Corn recommended as a green or dry Fodder for Cattle—former heavy Losses in Cattle ascribed to improvident management—Notices of dry Seasons, and Losses in Cattle, from the year 1724 *to* 1792.*—Seasons of Drought produced by the Operation of some general Cause—severe Drought at St. Helena in* 1791-2 *pervaded the Peninsula of India; and felt at Montserrat in the West Indies.*

"LEEK to the Welsh, to Dutchmen BUTTER's dear,
Of Irish swains POTATOE is the cheer." GAY.

DOCTOR ADAM SMITH, in his *Wealth of Nations*, observes, that, "the chairmen, porters, and coal-heavers in London, and those "unfortunate women who live by prostitution, the strongest "men, and the most beautiful women perhaps in the British "dominions, are said to be, the greater part of them, from the "lowest rank of people in Ireland, who are generally fed with "*Potatoes*. No food can afford a more decisive proof of its nou-"rishing quality, or of its being peculiarly suitable, to the health "of the human constitution."

If this able writer had visited St. Helena, or had been aware of the practice of raising *two crops* a year from the same land, or of producing 36,000 pounds of *Potatoes* annually from an acre, without manure, which Colonel Broughton has found to be the average of his crops at Long Wood, which is by no means the richest land here, it would have afforded him even a much greater contrast, and a more forcible comparison than he has drawn

between the produce of an acre of *Potatoes* and an acre of *Wheat* in England. The former he rates at only twelve thousand pounds weight; the latter at two thousand, and allowing "half the "weight of *Potatoes*, to go to water, (a very large allowance)," he infers that "one acre of *Potatoes* producing 6000 weight of "solid nourishment, is equal to three times the quantity pro- "duced from an acre of *Wheat*."

It is evident therefore, that the same train of argument applied to this island, would make the annual produce of one acre of *Potatoes*, in solid nourishment, equal to *nine* acres of *Wheat* in England.

From the peculiar advantages which St. Helena enjoys in the extraordinary produce, as well as in the excellent quality of this invaluable root, it is evident that the extensive culture of *Potatoes*, is deserving the utmost attention, not merely as a food for man but for cattle and live stock of all kinds. The imports of flour, rice and paddy, and of salted meat, might thus be diminished, the island might easily be made to abound with every necessary of life, which is assuredly the best mode of depressing the present exorbitant prices; and the diminution of those wants which are obtained from other countries, would no doubt, have the effect of retaining, amongst the cultivators of the soil, a very great proportion of the sums that are annually paid for foreign supplies.

The annual consumption of flour is about 1600 barrels, which would cost in England, including the barrels, according to the invoice per Walmer Castle in 1807, £8674. If freight and charges be added at £5. per ton, and rating six barrels to a ton, this would be 266 tons, or £1330, making the total cost of 1600 barrels of flour, when landed here, £10,004.

Now from what has been said, and following Doctor Adam Smith's deductions, I will proceed to shew that an equal quantity

of the " solid nourishment" contained in 1600 barrels of flour might be obtained in *Potatoes*, from thirty-three acres of this island, and admitting the rent, and the labour in cultivating the *two* crops annually, at even 30 pounds per acre, which is a very large sum, and particularly when the plough management is introduced, that for nine hundred and ninety pounds sterling, there might be raised of wholesome nourishing food, a substitute or equivalent, for what costs when brought to this island, more than ten thousand pounds sterling! Sixteen hundred casks of flour, at 370 pounds each, contain 592,000 pounds, and thirty-three acres of *Potatoes* at 36,000 pounds per annum, would be 1,188,000, the half of which being 594,000 pounds, is " the solid nourishment," according to Doctor Adam Smith: which is even *more* than that contained in the above number of casks of flour.

Mr. Parmentier found, from a number of experiments, that good bread might be made from equal quantities of flour and potatoes. No doubt, two thirds of flour to one third of potatoes would be better: and some of this sort made here by a neighbour who well understands the comforts and good things of this life, was superior to any bread I ever tasted on this island. I would recommend a trial to the St. Helena bakers; they would find by this mixture that the bread has a fresher taste, and that it has the property of keeping better than that which is made of the flour imported from England: besides, by making flour go farther, they could afford to dispose of bread at a cheaper rate than that made wholly from flour.

I trust that these remarks will stimulate our landholders to their own interests, and that we shall soon have at least an hundred acres of potatoes added to the present cultivation. By this I do not mean to exclude the use of flour, but I am fully persuaded, that the advantage and convenience arising even from this addition in

feeding man and livestock, would soon lead to a more extensive culture. In a year or two the inhabitants would thus become far less dependent on foreign imports; and the potatoe culture upon an enlarged scale, would also enable the landholders to give a portion to their cattle, at those times when they are much reduced by the impoverished state of the pastures; by this the lives of many might be saved during an unfavourable season. But the more effectually to guard against the fatal consequences that may justly be apprehended from a dry season, under the present management of cattle, I cannot too strongly recommend the expediency of alternate crops of potatoes and corn: the latter might be raised as at the Cape of Good Hope, either as a dry or green fodder; and of which there might always be a certain supply particularly when the rains have only partially failed: this was most clearly proved in February and November, 1810, as will appear from what is stated in page 28* of the printed Laws and Ordinances, and in pages 51† and 76‡ of the Goat papers.

Further advantages would result from the alternate crops of potatoes and corn, since they would preserve the lands in good heart; and if some attention were paid to manuring, it would prevent them being exhausted, and becoming unprofitable, which they often have been by continually repeating the potatoe crops. It is, moreover, the opinion of eminent agriculturists

* February 28th, 1810. "The WHEAT sown on the 9th of November is now in full "ear; the grass at present is much burnt up. Fodder of WHEAT, BARLEY, or OATS, "would be very serviceable.'

† "The GUINEA GRASS is likely to do wonders here: some looked green and beau- "tiful during some very dry weather, which burnt up all the GRASS around it."

‡ "On the 29th of November 1810, it was ascertained, that one acre of GREEN OATS, "yielded at this season of the year MORE nourishment for Cattle, than any ONE "HUNDRED acres of the Long Wood pastures."

Notices regarding bad Seasons and Losses in Cattle, extracted from the Consultations, and from Letters from the Court of Directors.

In the year 1724, February 12.—Bad seasons for 4 or 5 years past: *in dread of a famine.*

1738, June 13.—Losses sustained in cattle, by the late dryness in the weather.

	Cattle.
Loss to the inhabitants - -	555
Ditto Company - - -	132
Total	687

1739, May 4th.—Rainy seasons had failed for the last 4 or 5 years.

1747, March 9th.—Rains failed last season.

April 11.—Unusual drought for several months past.

May 26.—On account of the grass lands being burnt up by the continuation of dry weather, cattle were fed, during six weeks with plantain trees.

1748, May 10th.—Yams so scarce, that only 32 soldiers can be supplied weekly.

1752, August 3.—A failure of rain for some time past.

February 22 —Heavy rains fell on the 20th instant

1759, December 7th.—For want of rain, the island and cattle in bad condition. The Court of Directors recommend promoting the increase of stock of all kinds.

1772, January 8.—Long continuance of dry weather occasioned great diminution in the number of cattle.

1774, December 23.—The island restored to a flourishing state.

1779, May 17.—The island in a distressed situation from the present drought—and from the loss and poverty of cattle.

that such a rotation would, in a great measure, secure potatoes against the ravages of the caterpillar.

What eminent advantages does the whole of this easy system of management hold out! I am firmly resolved to pursue it; for I have often seriously reflected on the great losses that have been sustained here by the planters. I have endeavoured to discover the causes, which I cannot but ascribe, almost entirely, to improvident management. No care whatever is taken to guard against evils similar to what have frequently visited this remote spot on the globe. In 1738 the planters lost 555 head of cattle, and the Company 132. The total number that perished at that time, from the extreme dryness of the weather, was 687. This is a dreadful warning. What a blow would such a season give to the landholders of the present day! For there is absolutely not the smallest precaution taken to avert it. I cannot behold this picture without apprehension; for the value of the number of cattle that died in 1738, (and a far greater number in 1791 and 1792) at the present market price, may be fairly rated at 6 to 8000 pounds, sterling.

To excite a serious attention in the minds of the landholders, who have almost the whole of their property in cattle, and more strongly to impress them with the dreadful consequences of trusting wholly to pasture lands, and in the hope also they will pay some attention to the facts and hints I now set before them, I shall conclude these remarks with a brief statement of every notice I can find on record, that relates to the visitations of unfavourable seasons, and to the calamities which have been experienced by preceding generations.

impossible to account for the uncertainty in the fall of rain. Most countries whether mountainous or flat are subject to it: and it would seem from experience and comparisons, that the variations which have taken place, have sometimes been effected by the operation of some general cause. The severe drought felt here in 1791 and 1792 was far more calamitous in India. Doctor Anderson states, in a letter to Colonel Kyd, dated the 9th of August, 1792, that owing to a failure of rain, during the above two years, one half of the inhabitants in the northern circars had perished by famine; "and the remainder were so feeble "and weak, that on the report of rice coming from the Malabar "coast, 5000 poor people left Rajamundry, and very few of them "reached the sea-side, although the distance is only 50 miles." The Doctor further observes "that betwixt the latitudes 16° and "18° on the coast of Coromandel, there was so little rain during "the years 1764, 1765, and 1766, that the country was desolated "by famine." It appears by Mr. Bryan Edwards's History of the West Indies, that the season of 1791-2 were unusually dry at the island of Montserrat.

It will be observed, by the extracts I have given, that no notice is taken of dry seasons at those periods; and that the greatest continuance of seasons *uncomplained of*, was betwixt the years 1724 and 1738. This interval was fourteen years. Now as there has been no serious drought since 1792, it should be kept in mind that the present interval of favourable seasons, being nineteen years, already exceeds any other on record. We know not how soon another visitation may take place. Let us then be wise and prudent, from dear bought experience, and use every means in our power to be prepared for it.

15th August, 1841

July 19.—Great mortality among the cattle.

1780, April 17.—The Company's flock of sheep in bad condition "from the long drought and present failure of our summer rains."

June 5.—The island in a distressed state.

1781, March 1.—Torrents damaged Sandy Bay fortifications.

June 2.—The island had sustained severe drought for three years.

1791, April 13.—Colonel Brooke informs Doctor Anderson at Madras, that while the grass is burnt up, his Guinea grass, at High Knoll, looked "green and beautiful."

May 30.—Thirty-two of the Company's cattle (including calves) died during six months. The Company's stock on July 11, was 340 cattle.

October 21.—The season continued alarmingly dry—the crops of potatoes failed—the yam grounds grown very unprofitable—and numbers of the cattle have died.

1792, April 9.—Company's cattle, December 31	-	369
Dead - - - -		91

Here it appears that one fourth of the Company's stock died.

1792, August 17.—The planters petition to Government, representing that they "have, by the late drought, lost one half of their stock of cattle."

Philosophers of all ages have built a hope of being able to discover by repeated observations, some rules concerning the variations of seasons, and changes in the weather, convinced that such discoveries would be of the highest utility, especially in agriculture; because by foreseeing, even in part, the circumstances of the seasons, we should have it in our power to prevent, at least in some degree, the losses arising from them. But from the imperfection of our present knowledge of this subject, it is

SECTION VIII.

Modes proposed to the Landholders for averting the Evils incident to Seasons of Drought.

ALTHOUGH I have frequently endeavoured to draw the attention of breeders of cattle here to their own interests, and have strongly urged them to imitate the practice of the most enlightened agriculturists, by raising green crops of corn, mangel wurzel, turnips, potatoes, &c. for the purpose of preserving the lives of poor half-starved beasts, at the time the grass lands are burned up, or when the rains set in—yet, in case some of them, who have never witnessed any other management than that which has ever prevailed here, should consider such things as mere effusions of imagination or fancy, I must therefore request their attention to the following extract from the New Farmer's Calendar.

The testimony of an experienced "farmer and breeder," as well as an able writer upon these subjects, will shew that my sentiments are not singular; and that the practice I recommend has long been adopted, with complete success, both on the Continent of Europe, and in the United Kingdoms. I should hope that such testimony, added to the facts and proofs I have adduced ("that crops of corn are infinitely heavier, and far more certain, "than the produce of even the best grass lands") will afford to every unprejudiced mind the most unerring conviction that the proposed new system would be extremely advantageous; and that it is even more peculiarly suited to the circumstances of

* On the green and root crops, for "the support of cattle"—See New Farmer's Calendar, page 382.

Saint Helena than perhaps of any other establishment of the British empire.

I therefore entertain a sanguine hope that the breeders of cattle may look to their own interests, and that they may at length listen to the voice of reason and experience, and immediately set about guarding themselves and families from inevitable ruin, to which they are every season exposed, merely through improvident management.

But, if neither facts nor arguments will awaken them to a sense of the evils incident to an entire dependence on pasture lands, let them then duly reflect on the dreadful effects they will undoubtedly feel, if no precautions are taken, whenever it shall please the Almighty disposer of all things to revisit Saint Helena with another calamitous season similar to those which have been sometimes experienced here: and particularly in the years 1791 and 1792. Alas! under our present circumstances, what would be the consequence of such a visitation: Our stock of cattle may be estimated at 20,000 pounds sterling.—Half this sum might be irrecoverably lost: and as the effect of a diminution in the breeding stock would long be felt by the proprietors, it is not too much to say that the loss, consequent to so great a calamity, to themselves and families, would not be less than the full value of the present stock of cattle.

In page 76 of the Goat papers, it is proved that in four months from the period of sowing oats, 36,320 pounds of green fodder were obtained at Long Wood from an acre. Suppose 50 pounds of this nutritious sustenance were allotted to each beast—one acre would feed two throughout the year—four for six months—or eight for three months.

Let the proprietors also consider the vast importance of having their stock of working oxen maintained at all times in full

strength and vigour, and compare the work they would perform with that of animals so much exhausted that it is sometimes with difficulty they can crawl up the long ascents of this island. Let them compare also the weight and value of a well-fed beast for slaughter, with those miserable creatures that are sometimes sold to the shipping (*perhaps to save a natural death;*) and they cannot fail to be convinced of the superior advantages of the proposed, over the present system of feeding cattle.

August 15*th*, 1811.

SECTION IX.

On Pineaster Trees, communicated in Letters to Sir JOSEPH BANKS *and Sir* JOHN SINCLAIR.

To the Right Hon. Sir John Sinclair, Bart. President of the Board of Agriculture.

SIR,

I BEG leave to present you with a specimen of fir timber, the produce of pineaster trees raised on this island. The transmutation which has been effected, by some natural cause, or causes, in the texture and appearance of fir timber, seemed to me so very curious and extraordinary that I could not deny myself the gratification of submitting it to the inspection of yourself, and of the Honourable Members of the Board of Agriculture.

The inclosed is a copy of my letter to the Right Honourable Sir Joseph Banks; which, with the St. Helena Register of July last, will afford you full information concerning those pineaster trees; the latter also contains my sentiments upon the vast benefits that would undoubtedly, in a very short period, result to this denuded island, if a due regard were paid to the propagation of trees that produce so beautiful and valuable a timber.

I have the honour to be, with great respect,

SIR,

Your most obedient humble Servant,

ALEXANDER BEATSON.

St. Helena, 18th September, 1811.

To the Right Honpurable Sir Joseph Banks, K. B. President of the Royal Society.

SIR,

HAVING lately discovered that pineaster trees raised at St. Helena, from English seed, yield a timber far superior to any of the pine species I have ever seen or heard of, and conceiving that their rapid growth, and the very extraordinary change which has been effected in the appearance and texture of fir timber, are circumstances deserving the attention of those who are accustomed to contemplate the causes and effects in nature, I beg leave to present you with a specimen of the fir timber of this island.

Of the tree from which this specimen was taken, I have published a short account in page 17 of the inclosed St. Helena Register: but after I had sent it to the press, I perceived I had been led into a mistake in naming it "Scotch fir;" for upon examination, and comparing its branches, leaves, cones, and seed, with the descriptions of the various species of pine, they seem to me in every respect, to accord with those of the pineaster. *Pinus foliis geminis crasciusculus glabris, conis pyramidatus acutis.*

In order, however, to be further satisfied on this matter, I have sent by the present conveyance, to Sir Hugh Inglis, a twig and cones of the trees in question, together with some seeds of the very tree from which the specimen of wood was taken. It is of consequence to be certain upon this point, that I may receive the proper seed from England; for it is my intention to establish seed-beds and nurseries, sufficient to plant on this island several hundred acres of this most valuable timber.

Many trees of different sorts have been already tried here; there are none, however, so peculiarly adapted to the climate and

soil, nor that stand the almost unceasing south-easterly wind, so well as the pineaster. In the higher and cooler parts they thrive surprisingly; but in those less elevated, and towards the north and south extremities of the island, the summer heats are too powerful for the propagation of trees that are indigenous to the colder climates.

I have been lately informed by Doctor Roxburgh, that his attempts to raise the oak in the vicinity of Calcutta have failed. Here it is seen covered with beautiful foliage for about nine months in the year, and its girt attains a considerable size; yet the main stems seldom rise above 8 or 10 feet: whereas the pineaster, when sheltered under the leeward sides of the hills, against the prevailing south-east wind, grows straight and beautiful, and arrives at the height of 50 to 60 feet in the space of twenty-four years.

The following are the dimensions of a pineaster tree (transplanted from a seed bed, sown on the 1st of July, 1787) which grows upon the leeward side of a hill about 300 yards west from Plantation-house. It is therefore well sheltered, and having been drawn up perfectly erect and straight, by the surrounding oaks, it is fit for a small mast of 35 or 40 feet in length.

	feet	in.
Lower girt, at 1 foot above ground, - -	4	8
Girt, 26 feet ditto, - - - -	3	7
Of serviceable timber, the length is -	40	0
Total height to the summit of the highest branches	58	0

I have the honour to be, with great respect,

SIR,

Your most obedient humble Servant,

ALEXANDER BEATSON.

St. Helena, 18th September, 1811.

SECTION X.

On Guana or Sea-fowl Dung—and Experiments on the Culture of Mangel Wurzel. Communicated in a Letter to Sir JOSEPH BANKS, *Bart.*

To the Rt. Hon. Sir Joseph Banks, K. B. President of the Royal Society.

SIR,

BEING much indebted to you for a Communication on the subject of GUANA, or SEA-FOWL DUNG, which first led to its being noticed as a manure on this island, I beg leave to present you with the accompanying "REMARKS on the CULTURE of MANGEL WURZEL;" in which you will have the gratification of observing the very powerful effect of the GUANA, when contrasted with HOG'S DUNG and ASHES, or with land unmanured.

I have the honour to be, with great respect,
SIR,
Your most obedient humble Servant,

ALEXANDER BEATSON.

St. Helena, 15th October, 1811.

Remarks on the Culture of MANGEL WURZEL *in the Island of St. Helena.*

My attention was accidentally directed to the culture of *mangel wurzel*, which is the white or sugar beet, lately so celebrated in Prussia, by observing the rapid vegetation of its leaves, and the frequent cuttings obtained from some plants that were set out on the 6th February from a seed-bed sown on the 3d January, 1809: but it was not until the 21st of June following

TABLE I.—*Exhibiting the Produce in Leaves of* 259 *Plants of Mangel Wurzel at Plantation-house Garden, from Seed sown on the* 3d *January, transplanted on the* 6th *February, and manured on the* 21*st June* 1809.

Dates of Cuttings	No Manure.	Hog's Dung.	Guana, or Sea-fowl Dung	
	130 Plants	81 Plants.	48 Plants.	
1809.	lb. oz.	lb. oz.	lb. oz.	
Feb. 24	37 0	107 0	106 0	1st Cutting } Estimated
April 8	45 0	123 0	72 0	2d Ditto } Estimated
June 21	62 0	117 0	58 0	3d Ditto } Estimated
Aug. 22	36 8	107 4	106 6	4th Ditto
Oct. 22	45 0	123 0	72 0	5th Ditto
Dec. 22	62 0	117 8	58 8	6th Ditto
1810.				
March 23	38 0	62 0	37 8	7th Ditto
May 23	81 0	126 0	114 0	8th Ditto
July 24	29 0	72 0	37 0	9th Ditto
Sept. 22	36 0	79 0	65 0	10th Ditto
Nov. 22	36 0	59 0	32 0	11th Ditto
	507 8	1092 12	758 1	TOTALS
	—167th	—269th	—454th	Proportions of an Acre
	84752	293949	344160	Acreable Produce in lbs.
	—38	—131	—153	Ditto in Tons.

The plants were placed in rows, two feet asunder, in a blackish stiff soil; and at the distance of one foot in the rows. An acre planted in this manner would contain 21780 plants; 48 plants are therefore very nearly (as entered in the Table) the 454th part of an acre; because $48 \times 454 = 21792$. In the same manner the other proportions are deduced.

Observing the produce in leaves had diminished at the last three cuttings, and that they had also been much infested with caterpillars since they began to decline, I had the roots taken up on the 17th January 1811. From the 22d November to that time the growth of the leaves was inconsiderable; they were,

that I resolved to try the effects of manures; and, accordingly, a portion of the transplanted mangel wurzel, being 130 plants, was left without manure: 81 plants had a top dressing of hog's dung and ashes, at the rate of about 30 loads, or 360 bushels per acre, and the remaining portion, containing 48 plants, was treated in the same manner with Guana, or sea-fowl dung, in the proportion of only 35 bushels per acre.

If I had predetermined to report on these experiments, I should have made them in a more regular form; that is, I should have allowed an equal number of plants to each; but under the circumstances which have led to them, the result shall be given, exactly as they were recorded at the periods of cutting the leaves, and when the experiments were completed.

The three first cuttings not having at the time attracted my notice, were not weighed; I have therefore taken them in the following Table, at the proportions of the 4th, 5th, and 6th cuttings, which is a fair presumption, as they are in general, most productive in the early stages of their growth.

however, cut off close to the crowns, and the whole, after being pruned of the small fibres, weighed 1196 pounds.

As the roots of the experiment lots were not separately weighed, I deduce their respective produce in the following manner.

As the total weight of the leaves,
Is to the total weight of the roots;
So is the weight of the leaves from each experiment,
To its proportion of the roots. Then,

lbs.		lbs.		lbs.		lbs.	
2358	:	1196	::	507	:	257	no manure.
2358	:	1196	::	1093	:	$554\frac{1}{2}$	Hog's dung and ashes
2358	:	1196	::	753	:	$384\frac{1}{2}$	Guana, or sea-fowl dung.

These results being reduced to acreable produce, in the same manner as the leaves in the preceding Table, will be as follows;

No manure, 257lbs. x 167th = 42919lbs. or $19\frac{1}{4}$ tons of roots per acre.

Hog's dung and ashes, $554\frac{1}{2}$lbs. x 269th = 149160lbs. or $66\frac{1}{2}$ tons of roots per acre.

Guana, or sea-fowl dung, $384\frac{1}{2}$lbs. x 454th = 174563lbs. or $77\frac{3}{4}$ tons of roots per acre.

Now, the acreable produce in leaves and roots from each experiment will stand thus;

	Leaves — Acreable Produce.	*Roots* — Acreable Produce.	*Total acreable Produce of the leaves & roots.*
No manure - -	38 tons	$+19\frac{1}{4}$ tons	$= 57\frac{1}{4}$ tons
Hog's dung and ashes	131	$+66\frac{1}{2}$	$=197\frac{1}{2}$
Guana, or sea-fowl dung	$153\frac{1}{4}$	$+77\frac{3}{4}$	$=231$

These results are manifest proofs of the great benefit of manuring the lands. They likewise shew the surprising effect of the Guana, from which it may be inferred, that 35 *bushels* of this manure are equivalent to 35 *loads* of hog's dung and ashes; or,

or in other words, that one bushel of the former is, in effect, equal to twelve bushels of the latter.

The fluctuations that were found, at the periods of cutting the leaves, in the effects of these two manures, are rather remarkable, and not easily to be accounted for. The general effect of the Guana, during the whole period from the 21st June 1809, was superior to the hog's dung. Yet this last, on six occasions, exceeded the others: but as this and other comparisons, may be made, and a variety of deductions may occur, upon inspecting the following Table, it would be superfluous to add any particular observations.

TABLE II.—*Shewing the Produce of Forty-eight Plants of each Experiment, and the Fluctuations in the Produce of Leaves, at the Periods of Cutting.*

Dates of Cutting.	Leaves of 48 plants. No manure	Leaves of 48 plants. Hog's-dung and ashes.	Leaves of 8 plants. Sea-fowl dung.	
1809.	lbs.	lbs.	lbs.	
February 24	13	63	106	1st Cutting }
April 8	16	73	72	2d Ditto } Estimated
June - 21	23	70	58	3d Ditto }
August 22	13½	63½	106¼	4th Ditto
October 22	16½	73½	72	5th Ditto
December 22	23	70	58½	6th Ditto
1810.				
March 23	14¼	36½	37	7th Ditto 3 months growth.
May - 23	29¼	75¼	114	8th Ditto
July - 24	10¾	42	37	9th Ditto
Sept. - 22	13	46¼	65	10th Ditto
Nov. - 22	13¼	35	32	11th Ditto
Produce	186½	648¼	758¼	in 22 months and 19 days
Multiply by the proportion of	454th.	454th	454th	48 plants to an acre.
Pounds.	84671	294305	344160	acreable produce of leaves.

As these products correspond as nearly as could be expected, with those computed from three different proportions of an acre,

in Table I.—it is a proof there can be no material errors in the calculations.

When the roots were taken up, on the 17th of January last, very few of them were in a decayed state; some had rotted in the centre: but, in general, they were sound and good; notwithstanding they had remained above two years in the soil; that is, from the period of sowing the seed. The four largest roots weighed as follows:

No. 1	- - - - - -	28 pounds.
2	- - - - - -	11 ditto.
3	- - - - - -	19 ditto.
4	- - - - - -	20 ditto.

Having thus detailed these experiments, I shall now proceed to offer a few remarks, which will shew the important benefits that might soon be derived from a general, and extensive culture of this excellent vegetable.

It certainly possesses advantages over every other plant hitherto introduced in field culture.—Its produce is immense, and I have found it to grow, with considerable luxuriance, upon land where no other vegetation was ever seen.* It has also the singular

* This was determined by an experiment I made soon after my arrival here. I selected a barren ridge, between two deep ravines, on the north-west side of High Knoll. From its situation and declining surface, no moisture could be retained. On the 27th August 1808 it was trenched, and on the following day sown with sixteen different sorts of seed, so that it had not the advantage of the meliorating effects that might have been derived from exposure to the air and atmosphere. For a long time there was no appearance of vegetation; at length, in the beginning of April, 1809, seven months after sowing, and when it had been soaked by the rains, I observed the drill of mangel wurzel one connected line of fine thriving plants: the fifteen rows of other seeds, excepting a few of the rape, had not vegetated. This is a positive proof that mangel wurzel would grow in almost any soil or situation. The seeds which were sown at the same time as the mangel wurzel, were coffee, cotton, wheat, barley, oats, peas, buck wheat, spring tares, lucerne, burnet, sanfoin, silla, chicory, rape, and sunflower.—Not a plant of any of these, except the rape, which soon after died, ever appeared.

cattle, sheep, hogs, &c.—The leaves are also an excellent substitute for spinage.

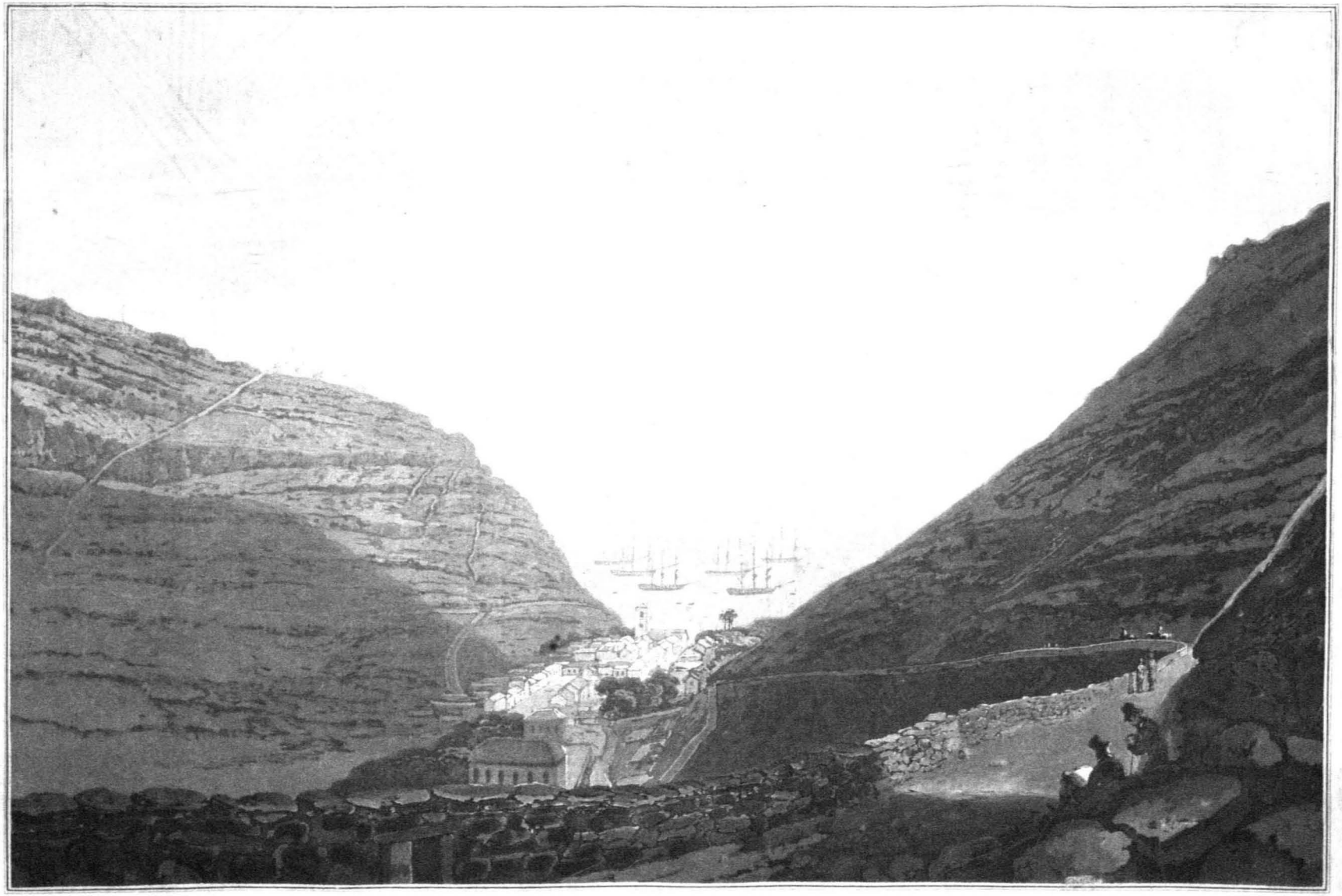
It is very probable that a more abundant produce from mangel wurzel than appears in my experiments, might at all times be secured, if the lands were manured, and carefully prepared for its reception, and the proper seasons of sowing and planting attended to. In a piece of strong land, at Plantation-house, newly broken up, without being manured, some of the plants from seeds sown on the 3d of January, were set out on the 6th of February, 1809.—On the 11th of October following, I sent on board His Majesty's ship Lion, fifty of those plants, which were the finest I had ever seen. The following were the weights and circumferences of the five largest:

	Weight of the whole plant.		*Circumference of the roots.*	
	lb.	oz.	ft.	in.
No. 1	41	3	2	1
2	39	1	1	9
3	39	6	1	10
4	38	0	2	0
5	37	14	1	11

At Long Wood, Colonel Broughton has lately taken up some very fine specimens from land that was not manured: they were of six months growth from the seed—the leaves had been cut twice. Many of the roots weighed from six to ten pounds each: but admitting even the lowest of these rates, and allowing one pound of leaves at each cutting, the produce would be eight pounds from each plant; which, at 20,000 plants to an acre, would be 160,000 pounds, or about 70 tons per acre, of nutritious food for cattle, in the short period of five or six months from the time of sowing the seed. Can any thing place the importance of the culture of mangel wnrzel in a more obvious point of view than this deduction?

But the largest plant that has yet been produced here, is one I sent to England, with several others, in July, 1810.—It was raised from seed, put in the ground on the 3d of March, and transplanted to land newly broken up, on the first of May, 1809; when it was taken up in July (that is, at sixteen months from the period of sowing) the circumference of the crown of the root measured 37 inches. It had about twenty strong horizontal branches, two or three inches in diameter.—The leaves and small ends of those branches were cut off, and weighed 52 pounds. The root and remaining parts of the branches on it, in the state it was sent to England, weighed 63 pounds.—In all, the weight of this one plant, from unmanured land, was 115 pounds. I have been since informed it was by far the largest of the kind ever seen in England.

15*th October*, 1811.



Sam.l Davis Esq.r del.t

W.m Daniell fecit.

James Town. St. Helena. viewed from the road to Long Wood.

property of being unmolested by an insect (I believe the dolphin fly) which is here extremely destructive to cabbages, turnips, and radishes. I have very often observed, where alternate plants of cabbage and mangel wurzel were growing in the same rows, and touching each other, that whilst the former were absolutely annihilated by that destructive insect; not one was to be seen on the mangel wurzel leaves. This extraordinary circumstance seems to favour Lord Bacon's notions (however much they have been exploded) that some insects "breedeth of dew and leaves in "spring; and commonly when the East winds have much "blown—the cause whereof is, the dryness of that wind; for, to "all *vivification upon putrefaction*, it is requisite the matter be "not too moist."

But, whatever may be the origin of those insects, it is of little consequence to the present subject. I have merely stated a fact, which may possibly attract notice, and may be of some use to those who are engaged in the contemplation of matters of this nature.

The mangel wurzel, when fairly established in the soil (which, like every other crop upon an extensive scale, ought to be just before the expected rains in January and February, or in July and August), will soon acquire such vigour as to become almost independent of rain: for having a tap root, penetrating 12 to 18 inches, or more, into the soil, it will always find sufficient moisture, at that depth, for carrying on the process of vegetation. In the course of five or six months, from the seed, if sown or planted in good soil, three cuttings of the leaves may be obtained, which may average about three pounds from each plant; and the roots will then have attained the weight of five to ten pounds each. Wherefore it seems to me, after every attention I have given this subject, that the most profitable culture would be to take three cuttings of the leaves, and at the third cutting, to dig up the roots:—these, as well as the leaves, afford a nutritious food for

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15*th October*, 1811.

SECTION XI.

On naked Barley, or Barley Wheat—Report and Opinions of Warren Hastings Esq., and of Sir Hugh Inglis, on the Utility and Importance of this valuable Corn—Singular Account of its Introduction at St. Helena.

In this island, where the intemperate use of spirits had raged for more than a century, and where now the breweries are successfully established, and a change introduced, from which the most salutary effects have already resulted, upon the character and conduct of the garrison, the blacks, and others, by the substitution of wholesome beer for an abominable and deleterious Indian spirit, that had cost the Company more in the lives of their soldiers than all the revenue supposed to have been derived from it—it is undoubtedly of much importance, in the present pursuits in agriculture, to be informed of the *very best* sort of barley for malting.

In the sixth volume, part 2, of the Communications to the Board of Agriculture, that distinguished character, Warren Hastings Esq.; writes to the President of the Board, "that he has cultivated *naked barley*, about twelve years; having received the first seeds of it from Mr. Pacey, an eminent farmer in Gloucestershire, under the name of black barley; though, from its resemblance to wheat, he would rather have called it *barley wheat*; but he adopted the name of the head of the communication, out of deference to the Board of Agriculture. The original stock was 53 grains, which were sown in the fruit garden, and the first record of its produce was 10¼ bushels in 1799, which had increased to 36 bushels in the following year, since which

time it has been sown instead of common barley. The quality of the grain is asserted not to have degenerated, but the assertion is made in 1809, with a confidence something abated from that of the preceding year; and the only change of soil has been from the higher to the lower lands, and *vice versa*, on the domain at Dayelsford. It was sown at the same seasons with other barley, but no trial to ascertain the relative quantity of produce has been made with any satisfactory result; but in 1805 it was believed to be rather superior. The straw is said to be as good, if not better, for cattle, than that of common barley, and the weight of an equal measure to exceed in the proportion of 5 to 4; and as an exhausting plant it is not deemed worse than common barley; and all the grasses are found to thrive well under it. *Naked barley* has not found a purchaser when offered in market, but Mr. Hastings cultivates it for the sole purpose of converting it into malt, for which he considers it particularly adapted, as he has seldom known one grain to be defective in vegetation at the malt-house.

The writer concludes by expressing his decided conviction of the great utility and importance of the grain, and declares his intention of extending his culture of it beyond the quantity required for his own use, that the surplus may be for sale at the disposal of the Board. He considers it to be the corn, which, next to rice, gives the greatest weight of flour per acre, and it may be eaten with no other preparation than that of boiling, and requires little or no dressing at the mill, having no husk, and consequently producing no bran."

The superiority of this kind of barley has been further extolled in some observations that follow the preceding communication. —"When barley wheat is more widely cultivated, it will be better "known, and we have no hesitation in pronouncing that the

ferent kinds of seeds, the barley wheat was the first that sprouted. The progress will be seen by the following Table.

Table of Experiment in Barley Wheat.

1810, July 31st.—Sowed a few grains in a bed about 3 feet square.

August 11th.—Young plants appeared. The time of sowing was a month too late, the weather cold, and only one heavy shower, since the seed was sown.

Sep. 25th.—From the ground to the top of the leaves 2 feet.

Oct. 14th.—Strong: but not in ear.

20th.—Ears appearing.

Nov. 15th.—Handsome round years—counted 96 grains in an ear.

29th.—Approaching to ripeness—Canary birds so greedily devour it, that we are obliged to cover the bed with nets.

Dec. 28th.—The ears were collected, some were bearded, and others were without beards—I concluded at this time they were of different species—and accordingly separated the plain from the bearded grains.

	Grains.
Two ears of the bearded sort yielded 138 barley corns, which weighed - -	48½ Aps. weight.
Two ears plain, containing 109 barley corns, weighed - - -	51½ ditto.
Total weight of the produce of 4 ears	100

Average weight of 100 barley corns - 40½ grains.

The total quantity saved of both kinds, was 2850 barley corns, which I have since ascertained would fill three common sized wine glasses.

" desire of extending the cultivation of it will be beyond the " power of Mr. Hastings to supply the seed."

The wheat barley now growing here, is from Mr. Hastings's stock. I received it from Sir Hugh Inglis, who has been indefatigable in every thing that relates to our improvements. At the time he sent it, he informed me that a gentleman in Devonshire having occasion to plough up four acres of a lawn, they were first sown with turnips; and he had a very poor crop. Early in April he again sowed the four acres, with four bushels of barley wheat, which came up very thin, but at the end of June, when Sir Hugh Inglis saw it, it was the wonder of the country, and at harvest the four acres yielded two hundred and forty bushels, or 60 bushels per acre.

Some experiments I have lately made with this valuable corn, will be found to coincide with the statements given by these respectable authorities. They will likewise shew that both hexagonal barley, and barley wheat, are rather improved in this soil and climate, because from comparative weights of one hundred grains, (the produce of the island crops,) *I have invariably found them* much heavier than the English seed.

Of the two casks of barley wheat I received from Sir Hugh Inglis, in 1810 and 1811, unfortunately not a grain would vegetate: the whole was damaged. Relying on the casks, I gave ten pounds of seed, which were contained in a bag that accompanied the cask in 1810 to Colonel Broughton. This seed was perfectly good. It was sown at Long Wood, and had a fine appearance, but as it approached to maturity, it was attacked by Canary birds, and none was saved. Fortunately, however, I reserved a few grains, taken out of the bag, for one of the numbers of an experiment bed in the front garden at Plantation-house. These were sown in a square, rather less than three feet, and of 81 dif-

they would all have had the full benefit of the rainy seasons, and a better produce might have been expected. To these seed times I shall, in future, pay the strictest attention; having seen numerous instances of the bad effects of being too late in putting plants, or seeds, in the ground.

Barley wheat is of a darker hue than wheat in general: the grains are smaller; and its relative weight with other corn appears by the following comparison:

	Weight of 100 Grains of English Seed.	Weight of 100 Grains of St. Helena produce.
Wheat -	65 grains Apoth. weight	
Hexagonal Barley	62 ditto	71¼ at Plantation-house
Barley Wheat	47¼ ditto	*50½ second crop
Hexagonal Barley	- - - -	78½ at Long Wood

I have already stated, that the produce from 2280 dibble holes weighed 135 pounds (or 2160 ounces); this being the $\frac{95}{100}$ part of an ounce, is very nearly one ounce from one seed.

Very different from this was the result of Mr. Arthur Young's experiment in the year 1791, with common barley; he found that $9\frac{1}{2}$ seed grains produced no more than an ounce, whereas in my second experiment $9\frac{1}{2}$ seed grains of barley wheat must have given $7\frac{3}{10}$ ounces, or about *seven times* the weight yielded from common barley.

An acre dibbled in rows, in the same manner as my second experiment, would contain 58,080 holes; wherefore, if 2280 holes yielded 2160 ounces, an acre would have produced 55,900 ounces; or 3494 pounds avoirdupoise.

Let us now compare this produce with Mr. Young's experiment above alluded to.

On the 25th of April, 1791, he dibbled 198 grains of four rowed

*100 grains of the first crop weighed only 49½.

From this fresh seed I hoped to establish a sufficient quantity for extensive cultivation: and I have not been disappointed. I accordingly prepared a spot in the garden, measuring 108 links by 37, or about the 25th part of an acre. It was marked out in rows 12 inches asunder, and the seed dibbled three inches deep at 9 inches apart in the row. The number of dibble holes was 2280; but as 570 holes had two seeds in each, the number of grains dibbled was 2850: the following is the result.

1811. March 16th.—Dibbled 2850 grains of barley wheat in 2280 holes, of which 570 had two seeds.

21st.—Plants appeared.

31st.—Promising crop.

May 15th.—Remarkably exuberant.

26th.—Some in ear.

June 4th.—Many in ear.

9th.—Almost all in ear, a very fine crop.

July 25th.—Nearly ripe.

28th.—No difference between the produce of the plain and bearded seed. In each there are some with beards and some plain. The beards fall off as the crop ripens.

29th.—Cut the crop. Produce 135 pounds from the 25th part of an acre, is at the rate of $56\frac{1}{4}$ bushels, at 60 pounds per acre.

On the 3d of August this small quantity was spread over about four acres and ploughed in. It is now a strong and exuberant crop, full in ear, and promises a very abundant produce, even more than sufficient to sow *all* the cultivated lands at present on this island.

Justice indeed has not been done to any of these experiments; they have all been too late in sowing. If the first had been sown about the end of June, 1810, the second about the end of December, and the last, now in the ground, in the end of June,

pare the magnitude of the prospects that the extension of agriculture holds out, with the small supplies annually furnished to the shipping, must be convinced, that the present system of limited cultivation is a bad one; and that the profits that are received from the lands of St. Helena, are trivial indeed in comparison with those that are attainable.

November, 1811.

barley, one seed in each hole. On the 29th of September "he reaped them; and, clipping off the ears," weighed them; the produce was $20\frac{1}{4}$ ounces. He does not state whether this be the weight of the ears, or of the clean grain: but, afterwards, he infers that $9\frac{1}{2}$ grains of seed produced one ounce of corn.

Hence, it follows, if 198 seed grains gave $20\frac{1}{4}$ ounces, 58,080 would produce 6013 ounces, or 376 pounds.—Thus we find that the *weight* of my produce, from an acre of barley wheat at St. Helena (being at the rate of 3494 pounds); is about nine times *the weight* of that of common barley, according to Mr. Young.

But, quitting these minutiæ, I will take a more enlarged view of these comparisons, and proceed by a different mode of investigation.

The average acreable produce of common barley in England, according to Mr. Donaldson, is about 30 bushels: but rating it 40, and the medium weight of a bushel, at 48 pounds; this average produce will be no more than 1920 pounds; or 1574 pounds *less, in weight*, than from the second barley wheat experiment.

In short, whether we consider the comparatively small quantity of barley wheat seed required to sow an acre, its *more weighty* produce than common barley, its naked, instead of husky grains, and its equality with other barley, in the produce of straw; and, if these circumstances are combined with Mr. Hastings's opinions on the various uses to which barley wheat may be applied; it seems to be, in every respect, infinitely superior to the common sorts of barley. It is probable too, from its near resemblance to wheat, that it may yield a flour superior to that from common barley; and although this is a point which has hitherto not been ascertained; yet from what is already known of the barley wheat, it certainly bids fair to become an invaluable corn on this island.

By the comparisons of the weights of English seed, with that produced from the first and second St. Helena crops, it has been seen that the second crop yielded heavier and larger corn than the English, in the proportion of $47\frac{1}{4}$ to $50\frac{1}{2}$, and that the first crop, gave only $40\frac{1}{2}$ grains weight to the 100 barley-corns. Further trials may determine in what respects the barley wheat may be affected here by the climate and soil; for having beheld so extraordinary a change, as has taken place in the quality of fir timber, (to a resemblance of pale mahogany) from pineaster trees raised from English seed, who can tell but other vegetable productions may likewise undergo (though less perceptibly) a similar change? In the weight of common barley, I have stated that the St. Helena produce has been found more weighty than the seed from which it was raised; and the following notes will prove that it maintains this superiority.

1809. March 14th.—100 English barley-corns weighed 62 grs.
100 St. Helena ditto - $71\frac{1}{2}$
Difference - $9\frac{1}{2}$

The above were kept in a dry place, and again weighed nineteen months afterwards.

1810. Nov. 1st.—100 English barley corns weighed 61 grs.
100 St. Helena, ditto - - 69
Difference - 8

Barley wheat is therefore in every point of view, a grain that merits the attention of all our cultivators; for by common industry it might be raised in sufficient quantity to supply the island breweries, by which, those sums that are now remitted to England (from £6000. to £8000. annually for malt,) might be retained here and participated among the landholders. Surely persons who duly reflect on these important facts, and who com-

SECTION XII.

On clearing Lands of Grubs—Detail of a Set of Experiments, by which is ascertained an effectual Mode of clearing Lands of those destructive Insects.

THE suggestions of an anonymous writer for clearing land of grubs, which appeared in the Register for February last, have induced me to try the effect of what is recommended, by a set of experiments; and as the result has been completely successful, the following account will, I conceive, be gratifying to every agriculturist.

The objects of my experiments were to imitate a clean summer fallow; and to contrast it with land newly broken up, and having upon it young crops, for the sustenance and nourishment of that destructive insect.

With this view, I prepared four large boxes, with ledges of wood overlapping the insides of the upper edges, in such a manner that the grubs could not escape. These boxes, placed in the open air, were nearly filled with soil, taken from a field lately broken up, where those insects abounded, and had totally destroyed a fine crop of oats after it had grown to the height of 6 to 8 inches.

The soil was carefully sifted, and every grub taken out, before it was put in the boxes. Two dozen grubs, of different sizes (from about an inch and a half in length, to half an inch) were then allotted to each box. Those in No. 1, were fed daily with fresh leaves of mangel wurzel; No. 2, with potatoes and potatoe haulm; No. 3 and 4, represented a clean fallow, without a

particle of vegetable substance remaining; the only difference was, that No. 4 was occasionally watered.

It was on the 10th of September last, that twenty-four grubs were put into each of the boxes; on the 14th, I examined them as follows:

No. 1.—Grubs fat and lively.

No. 2.—Ditto ditto

No. 3.—Some grubs dead, others of a blackish colour; thin and sickly.

No. 4.—The same as No. 3.

On the 17th, I again examined them.

No. 1.—Some as healthy and vigorous as at the time they were put in the box.

No. 2.—Some healthy; but in general fallen off.

No. 3.—Some dead; the rest miserably thin and shrivelled; and of a darker colour.

No. 4.—Some dead; but in general better than No. 3.

On the 23d of September, observing in No. 1 a ball of clay, about the size and shape of a small walnut, and not knowing what it was, I broke it, and accidentally destroyed a chrysalis, the inside of which was filled with a liquid resembling cream. I afterwards found that it is in this manner the grubs surround themselves with soil when they begin to perceive the approaches of transformation.

On the 1st of October, the grubs fed in boxes, No. 1, and 2, were still fat and thriving; but in the starvation boxes very few remained alive.

On the 13th of October, a chrysalis had been formed in box No 2: there might have been more; for I did not, until the 23d, empty the boxes, in order to ascertain the state of the grubs. On that day it was as follows:

" remains to be done, in order to perfect our knowledge of the " nature and modes of destroying these very destructive insects." —*Farmer's Dictionary, see Grub.*

The preceding detail undoubtedly affords a striking proof of a clean fallow being one of the most effectual modes of clearing lands of the grub. It was, indeed, reasonable to suppose it would be so; because, if no vegetable substance remain in the soil, for the sustenance of so voracious a creature—whether he be newly hatched by the summer heats, or arrived at full growth, it seemed, at least probable, that he must infallibly perish. Every one can judge whether or not this fact has not now been clearly established.

In the first stage of these experiments I was, for a short time, apprehensive that the plan recommended by the anonymous writer might not succeed; because I observed that some of the grubs, that were put up in paper, had discharged a considerable quantity of earthy substance. It seems therefore probable, that (like worms) the grubs, in some degree, subsist upon earth; but the results have shewn that they cannot possibly exist, even for a few weeks, without vegetable food.

A prolonged, or a repeated fallow would, no doubt, be more efficacious than the short period of my experiments. This should be given in warm and dry weather; for it is then the eggs, deposited by moths, bring forth the young grubs.—Upon these too, in their tender state, the effect would be more speedy than upon grubs that are arrived at full growth. In this stage they are extremely tenacious of life. I have seen them survive, for half a minute, upon ashes so hot that my fingers were burnt in a few seconds. I have kept some in a strong solution of tobacco—others in a solution of alkali, and found them alive, after being twelve hours in these steeps. The common roller has no effect upon

No 1, contained 18 lively chrysalids, and 12 healthy grubs: these are six more than were put in the box. This increase I conceive to have been occasioned, either from some extremely small grubs in the soil having escaped notice, or from eggs having been hatched after the experiments were begun.

No. 2, contained 16 chrysalids and 6 strong fat grubs: two must have died.

No. 3, contained a single chrysalis.—This possibly proceeded from one of the grubs, at the time it was put in, being in readiness for transformation; and consequently it escaped the fate of every other that was put in that box.

No. 4. In this box not a grub or chrysalis was to be found, all had perished; not even their remains were to be discerned. I think it therefore probable that the wood-lice (oniscus armadilla), which were found in great numbers, particularly in No. 3 and 4, had devoured the bodies of the dead grubs.

After the examination on the 23d of October, the grubs and chrysalids belonging to No. 1 and 2 were replaced in their respective boxes, and four young mangel wurzel plants were set in each, and watered. On the morning of the following day the plants in No. 1 and 2 were all destroyed: whilst those in No. 3 and 4 are still in a thriving condition.

On the 30th of October, one of the chrysalids taken from box No. 1, and put into a glass, covered with thin gauze, produced a grey moth.

I have been induced to give this minute detail of the experiments, as I think it may convey some useful information upon a subject that is interesting to agriculturists; for I remark, in a late publication, wherein several modes for the extirpation of the grub are pointed out, that the author concludes with this observation.

"But notwithstanding these judicious remarks, much still