Pounds per Acre of Minerals Removed by Ordinary Crop.

	Total Ash.	Silica.	Chlorine.	Sulphuric Acid	Phosphoric Acid.	Magnesia.	Lime.	Soda.	Potash.
Turnips, root....	218	2.6	10.9	25.7	22.4	5.7	25.5	17.0	108.0
" leaf....	146	5.1	11.2	19.1	10.7	3.8	48.5	7.6	40.2
Total crop .	364	7.7	22.1	44.8	33.1	9.5	74.0	24.6	148.8
Swedes, root....	163	3.1	6.8	22.3	16.9	6.8	19.7	22.9	63.3
" leaf. ..	75	3.6	8.3	8.0	4.8	2.4	22.7	9.2	16.4
Total crop..	238	6.7	15.1	30.3	21.7	9.2	42.4	32.0	70.7
Mangel, root....	410	16.4	40.6	15.2	34.0	10.8	24.2	75.4	101.1
" leaf....	280	9.2	49.8	20.2	16.1	27.2	29.1	65.2	71.4
Total crop.	690	25.6	90.4	35.4	49.1	40.9	53.3	140.6	202.5
Sugar-beet, root	160	6.1	3.9	7.5	23.0	15.2	10.2	16.6	76.8
" leaf	117	3.6	6.7	9.2	8.5	21.2	22.8	19.4	25.6
Total crop..	277	9.7	10.6	16.7	31.5	36.4	33.0	36.0	102.4
Carrots, root....	195	3.9	9.6	13.6	21.8	10.1	21.3	40.4	75.2
" leaf....	250	13.0	22.2	20.6	9.5	9.7	80.2	45.5	41.0
Total crop..	445	16.9	31.8	34.0	31.3	19.8	101.5	85.9	116.2

It will be seen from the preceding tabulated statement that a moderate crop of turnips, amounting to 17 tons of roots, takes from the soil upon which it is grown as much as 364 lbs. of mineral matters; a crop of 14 tons, 238 lbs.; and 22 tons of mangel as much as 690 lbs. from every acre of ground. By far the largest proportion of the mineral matters thus removed from the land consists of potash and the quantity of phosphoric acid taken up by root crops from the soil is also considerable, and much larger than the amount carried off in a good crop of wheat or barley.

Root crops thus exhaust the land, to a greater extent than cereals, of available mineral constituents, and, I may, add they also exhaust the land rapidly of its nitrogenous constituents. Many persons regard root crops rather as restorative crops in a rotation, whereas in reality they exhaust the land far more rapidly of available plant food than cereals, if the roots are not consumed upon the land. No crop affords so good an indication of the agricultural condition of land as a crop of swedes or mangels. On naturally poor soils, or on land exhausted by continuous cropping, and grown without a sufficient supply of manure, the poverty of the land manifests itsefs much more strikingly in the scanty root crop, than in other crops of the rotation; and, on the other hand, a high agricultural condition, or great natural fertility, shows itself strikingly in the heavy root crops which are raised on such land. This circumstance explains the universal practice to manure the land liberally for roots, more especially for mangels, which, it will be seen by the preceding figures, remove more plant food from the soil than any other root crop. It also explains the policy of consuming the roots upon the land upon which they have been grown, and supplies a good reason to landowners to refuse their tenants to sell roots off the land without special agreement, in which provision is made for ample restoration of the claments of fertility which are removed from the land in the shape of roots. In good practice, however, roots enrich the land, and put it in good heart for the proceeding crop—not because the root crops take little or nothing out of the land, but because, as a rule, roots are liberally manured, and the produce is either wholly or in part consumed upon the land, and the elements of fertility are thus practically retained on the farm.

INFLUENCE OF SOIL.

The demand which roots make upon the land, both for mineral and organic food constituents, clearly points out the intimate connection between the character and condition of the land and the root produce, which may be reasonably expected from the different descriptions of soils. Every good farmer knows full well that some soils are naturally better adapted to root culture than others, and that the character of the land not only affects the weight of the produce, but also the feeding and keeping qualities of the roots. For instance, it is a well-known fact that turnips grown on peaty soils are not to be compared in point of feeding qualities with roots grown on naturally rich alluvial soil, or a good loamy friable soil. Again, soils destitute of lime and potash, like many light sandy soils, are liable to produce turnips affected by Anbury, or the disorder known as finger-and-toe, and there are certain free-growing soils upon which roots ripen prematurely, and turn out spongy and innutritious, whilst on stiff clays, not brought into a friable condition by autumn cultivation, roots do not arrive at maturity, and yield but a scanty crop. Allow me to illustrate this part of my subject by referring to some examples which have been brought under my notice at various times. In the first place let me direct your attention to the subjoined analysis, representing the composition of a good friable clay-loam, with a fair admixture of sand, a soil admirably well adapted to the growth of sound, nutritious swedes and mangels.

Composition of a Good Turnip Loam.

Moisture	4.575
Organic matter	6.327
Oxide of iron	4.713
Alumina	5.544
Lime	1.291
Magnesia	.747
Potash	1.714
Soda	.687
Sulphuric acid	.101
Phosphoric acid	.146
Chlorine	.006
Silica	74.058
	100.000

Here we have soil in good friable condition, and of considerable depth, containing all the elements which enter into the composition of the ashes of root crops. It will be seen that the soil contains, practically speaking, enough potash to supply the wants of many heavy crops of roots; that it contains a fair proportion of lime, and as much phosphoric and sulphuric acid as is generally found in fairly fertile soils. It also embodies a good deal of organic matter, and, in short, meets largely all the requirements in plant food for root crops. Land of that description may, therefore, be expected to produce heavy, sovnd, and nutritious roots. In contrast with this rich turnip loam, I place before you the results which I obtained in the examination of two poor sandy soils from a farm in Wiltshise. These soils contained in 100 parts:—

Poor Sandy Soil.

	No. 1.	No. 2.
Organic matter and water of combination	5.36	4.82
Oxides of iron and alumina	5.78	12.16
Carbonate of lime	.25	.15
Phosphoric acid	traces	traces
Sulphuric acid	.08	traces
Magnesia and alkalies	.41	.46
Insoluble silicious matter (chiefly sand)	88.12	82.41
	100.00	100.00

Both were taken by me from a light sandy field, on the slope of a hill, in a district where the land abounds visibly in limestone and calcareous gravel. Several turnip fields surrounding the gently sloping hill from which the samples were taken I ascertained were moderately stiff calcareous clays, and the turnips grown there had a healthy appearance, and promised a fair average yield. On the side and top of the hilly field, on the other hand, there was not a sound turnip to be seen, except on two isolated spots, upon which, I subsequently learned, a cart of gas-lime had been unloaded the preceding year. The roots were so much injured by Anbury that it was not considered worth while to send sheep over the field. The soil No. 1 was taken from the top of the hill, where the turnips were most affected by Anbvry; and No. 2 soil was a bright, red-colored soil from the slopes of the hill, where the turnips were likewise much diseased. A glance at the analyses of the two soils shows that both contained merely traces of phosphoric acid, and scarcely more of lime, whilst the potash, soda, and magnesia together did not quite amount to ½ per cent. Bearing in mind that an average crop of 17 tons of turnips removes from the land as much as 148.8 lb. of potash, and 74 lb of lime, or altogether 364 lbs. of mineral matters, it is evident that the dificiency of available ash constituents, and more especially the want of lime and potash in the sandy field, fully accounted for the failure of the root crop, and the diseased state of the turnips in this field. It not unfrequently happens that, as in the case before us, on simliar light soils turnips make a good start, and at first grow remarkably vigorously up to the time of thinning out, soon after which they make no further progress, and gradually dwindle away almost altogether, evidently for the want of the appropriate plant-food in such soils. In such cases the first thing that should be done with the land is to apply to it a good dressing of lime or marl, or gas-lime, if it can be obtained at a smaller expenditure of money. Lime, in some shape or other, often proves to be an effectual remedy against Anbury in roots, and without a sufficiency of this necessary constituent, no root crop can come to perfection. In addition to lime, however, poor sandy soil on which turnips fail should be well manured with ordinary dung, for as lime supplies only one of the elements of fertility, and does not meet, therefore, the natural deficiency of potash and other essential food-constituents for root crops, common dung, which contains all the fertilising elements required by roots, meets better the natural poverty of poor sandy soil than most artificial manures. It is an interesting circumstance that on the spot of the field upon which gas-lime had been unloaded the preceding year the turnips were sound, and of a fair size. There was another place, occupying only a few square yards, in the corner of the same sandy field, which presented a remarkable contrast to the rest of the turnip field. On this spot the roots were perfectly healthy, and of a good size, and it appeared that on this spot a dung heap had been set up in previous years. The subsequent examination of samples of soils from those green spots of the turnip field showed that both contained a much larger proportion of lime and alkalies than the rest of the field, where the turnips failed. We have thus presented to us here interesting practical illustrations of the intimate relation which