sower whereas the lighter seeds will blow farther away.

As a seed-barrow delivers the seed nearer to the ground, it will, as a rule, distribute the grasses more evenly than the most skilful hand sower. But whichever method is adopted, there is a decided advantage in making two sowings. If the grasses and clovers are mixed together, half the quantity should be sown by passing up and down the land, and the other half by crossing the first sowing at right angles. When the grasses and clovers are separate, the grasses can be put in one way, and the clovers should cross them. (1)

A chain-harrow is the best implement for covering the seeds. In its absence, a bush-harrow will answer. What is wanted is that as many seeds as possible shall be just covered with soil and no more. Grass seeds will germinate and become established when they are merely pressed upon the surface of the earth, provided they are not picked up by birds, or scorched under a hot sun. But many will not germinate at all at a greater depth than half an inch. Hence the necessity of a fine soil and shallow sowing.

The roller must closely follow the harrow and it is a safer plan to roll twice in different directions.

WALTER S. G. BUNBURY,

Compton Model Farm.

MANURES

A practical summary of the experiments at Rothamsted Farm (England.)

ROOT CROPS.

Like sugar-beet grown for sugar, roots grown for the purposes of stock feeding are very artificial production. The swollen root contains the reserve material for the second growth of the stem and seed; and the conditions of growth, as to the period of the season selected the soil and the manuring, are such as to obtain the greatest development within the season.

Roots are generally considered to be restorative crops. They depend, to a large extent, for their successful development, on large quantities of manures, which is often applied for the previous crop, but as a rule for the roots themselves; and when grown without manure, even from the same seed as the manured crop either for a few years in the same land successively, or even in rotation, they soon come back to the uncultivated condition.

Independently of the advantage arising from the opportunity which the growth of roots affords for the cleaning of the land, the benefits of growing the crop in rotation are due to the large amount of manure applied for its growth, to the residue of the manure left in the soil for future crops, to the large amount of manure returned by the dead leaves, to the large production of food and to the small amount of the most important manurial constituents of the roots which is retained by the stock consuming them, the rest returning again as manure.

It is entirely fallacious to think that root crops gain a large amount of nitrogen from the atmosphere by means of their extended leaf surface. No crop is more dependent on nitrogen in an available condition within the soil; and if a good crop of turnips is grown by superphosphate of lime alone it is a proof that the soil must contain the necessary nitrogen.

A characteristic difference between the uncultivated and the cultivated turnip is that the latter contains a much lower percentage of nitrogen, and a much higher percentage of carbonaceous constituents, especially sugar, by the accumulation of which the percentage of nitrogen is reduced. Yet it is under the influence of nitrogenous manures that the greatest amount of sugar is produced.

If nitrogenous manures are used in excess, there will be not only a restricted proportion of root, but an undue proportion of leaf. In fact, the higher the nitrogenous manuring and the heavier the soil, the greater is the tendency to produce a large amount of leaf.

In the case of both swedes and common turnips the leaf contains a much higher percentage of dry substance than the root; and the dry substance of the leaf contains a much higher percentage of both nitrogen and total mineral matter than does that of the root.

The root of the swede contains a less percentage of water than that of the ordinary turnip and therefore has a higher percentage of solid food material. The solid matter in the swede contains less mineral matter and consequently a higher percentage of organic food stuff.

The more deeply and powerfully rooting and

⁽¹⁾ Very good .- Ed.