

ON THE LAND

MALNUTRITION OF PLANTS.

Malnutrition or the imperfect nourishment of plants may arise either from an insufficiency of plant foods in the soil or from an excess of some particular food constituent.

Just as doctors are continually saying that people as a rule eat too much, especially too much nitrogenous food in the shape of meat, and from this cause become increasingly subject to such complaints as gout, skin diseases, appendicitis, etc., so plant experts point out that in the development of intensive cultivation there is a danger of supplying plants with too much nourishment of a forcing, nitrogenous nature, and to this cause is attributed some of the diseases to which plants are liable to suffer, or if not actual disease, a diminution in the quality of the crop. Thus turnips may develop a dropsical watery character, potatoes become unsightly from spotty skins, cereals get their tender stems easily attacked by insects. Plants grown in greenhouses and market garden produce are especially liable to suffer from an excess of nourishment or a supply of ill-balanced plant foods. Crops are grown in quick succession year after year on the same soil, continually enriched by large dressings of fertilisers, so that the soil becomes quite surfeited with plant food, and does not get the healthy influences of a period of fallow.

An expert of an American Agricultural Experimental Station devoted for some years special study to this subject, in consequence of the attention of the station having been called to an increasing number of plant troubles, and in a good many cases he found typical cases of malnutrition caused by an excess of some particular substance in the soil. These troubles, according to his investigation, "all originate from an injudicious use of commercial fertilisers, or from applying certain manures to crops in excess of what they can stand."

In some cases an excess of fertilisers causes burning of the roots, which results in the death of the plant, but usually the greater trouble comes from an excess of nitrates in the soil.

In several instances of tomato plant disease it was found that they had been affected by the excessive use of fertilisers, and tests of the foliage for nitrates revealed an excess in the leaves. They had a curled and crinkled appearance, caused by the contorted vascular bundles or veins. These symptoms have been occasionally found in the field as well as in plants growing in greenhouses, and analyses have shown the nitrate excess.

Greenhouse cucumbers seem to be especially susceptible to injury from manures and fertilisers; the condition of a soil which will destroy a crop of cucumbers will not affect the lettuce plant, and roses and carnation plants might appear underfed in such soils.

Some of the most severe cases of malnutrition resulted from the use of fowl manure worked into soil already provided with an abundance of plant food, such as would be obtained from a constant use of horse manure. In numerous cases where fowl manure was freely used symptoms of malnutrition followed.

An experiment was made in one of the houses of the station, devoted exclusively to the growing of American Beauty roses. The soil was prepared, as usual, with a rich dressing of stable and cow manure, and liquid manure was applied freely once a week. The first year the roses did well, and for the purpose of

experiment an attempt was made to grow a new crop of roses on the same soil, which was partially renewed by application of liquid cow manure. The plants had not been in the soil many weeks before they began to die, and it was not unusual for many to die in one week. The result of this experiment was only what was expected; the beds were then flooded with water, and analyses made of the water that drained through the soil. The result was surprising, and it was difficult to conceive of any plant living under such soil conditions. After the soil had been drenched and the injurious substances washed out, not a death occurred among the plants.

From the nature of the conditions causing malnutrition a remedy is not difficult to find. The first essential, of course, is to be careful in the use of manures and fertilisers. The excessive use of nitrogenous fertilisers, unless balanced by other constituents, especially phosphate of lime, is to be avoided. The soil must be kept open, well drained, and aerated. The change of crops by suitable rotation is always advisable.

In the treatment of beds and small surfaces it has been found very beneficial to cover the soil with a few inches of loam—new roots quickly form in the loam, and have supplied the plant with proper food for its development.

HAND-FEEDING OF SHEEP.

Except in exceptional times, such as that which has just been experienced, sheepfarmers of this country do not require to consider the question of hand-feeding, though in many districts a modicum of hard feed would make a vast difference to the condition in which hoggets would come through the winter, and would be handsomely repaid in the reduction of the death-rate (says the *N.Z. Farmer*). It was recently shown by practical tests conducted by the West Australian Department of Agriculture that one pound of chaff a day was sufficient for the maintenance of an average sheep through a dry period. The sheep under test were kept in a ploughed-up paddock during a period of three months, and it was demonstrated that growing sheep from 60lb to 70lb live weight could be kept in a healthy condition, even during cold, rough weather, for three months on the cheap, home-grown material. The sheep were kept in a healthy condition for 15 weeks during adverse wintry conditions, on approximately one pound of chaff a day, without any additional food whatever. It was also considered that larger sheep in milder weather, with the same amount of food, and a natural picking, generally obtainable, would also keep in an equally healthy condition. It is generally known, of course, by sheep men that sheep will thrive amazingly on a very small amount of dry pasture, and in the light of experience of dry conditions in this country the result of the West Australian experiment is quite feasible.

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