

plant is not a distinct gain from the atmosphere. The largest amount of gain probably exists when the plant is in flower. That is the best period at which to turn it under as a green manure.

Mr. Barnard—Supposing the soil is poor in potash, how much nitrogen would be extracted from the air?

Mr. Shutt—The growth of legumes would not then be luxuriant. Although they are able to forage for themselves with regard to nitrogen, they require, comparatively speaking, large quantities of potash. They will also respond to applications of phosphoric acid and lime. Therefore, if we want a good growth of clover, we must furnish our soils with potash, phosphoric acid and lime.

With regard to the economy of either turning the clover down or feeding it off: If you have animals to feed it to, by all means feed it in every case, because in the manure which results you can return to the soil 70 per cent. of these plant food constituents. But if you have not got the animals, ploughing under the green crop of clover will still be a cheap source of nitrogen.

With regard to barn yard manure, the analysis of which has been placed at the bottom of the chart so that you may be able to compare it with the commercial fertilizers: Why is it that barn yard manure does not offer a balanced ration for the food of our fruit trees? Because it does not contain a sufficiency of potash for the nitrogen it possesses. It contains as much nitrogen as potash, and we should have two to four times as much potash as nitrogen. Consequently if you are going to furnish all the potash necessary for your fruit trees in the form of barn yard manure, you will have to add four times as much nitrogen as the trees need. This may do injury to your trees, because the action of excess of nitrogen in the soil prompts undue development of leaf and woody parts, and keeps the wood from maturing in the autumn.

Mr. Brodie—What action has land plaster and gypsum on plants to make them grow?

Mr. Shutt—Land plaster is a compound of lime and sulphuric acid, or oil of vitriol. Lime is an essential constituent of all plants, but more particularly of clover, peas, beans and all these crops known as the legumes. Consequently, the first valuable property of gypsum is in the furnishing of lime. Further, we find that plants require a certain amount of sulphur, and undoubtedly gypsum acts beneficially in furnishing this element. The action of lime and land plaster within the soil is to liberate a certain amount of potash. Land plaster, although in itself not a direct supplier of potash, thus indirectly is the means of furnishing a certain amount of this valuable element which the plants can use.

Mr. Brodie—It is used mostly on the leaf, especially when the dew is on the plants.

Mr. Shutt—The food of plants is taken in by their roots and their leaves—that by their leaves must be in the form of gas; that by the roots must be in solution. Gypsum cannot therefore be absorbed through the leaves. It readily becomes soluble in the soil water and the acid exudation of the rootlets, and thus becomes serviceable to plants.

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