

number of careful analyses made, in different seasons, of soils which are already productive. The kind and quantity of manures best adapted to renovate worn-out lands can be shown only by their careful analysis and the *noted* results of manures upon these lands. It is not enough to know that a particular manure is adapted to a particular soil. The most economical quantity, that which will give the greatest profit from the smallest outlay, should be shown, both as to present increase and future returns.

The above remarks lead us to the consideration of those substances which are used as

MANURES.

By manures are to be understood those substances which applied to soils, can either directly or indirectly supply plants with nourishment. This is a general definition of manures. It becomes special in reference to different soils, and they are then in this relation, whatever substances can supply the absence or deficiency of those constituents of the soil which are necessary to vegetation, either by supplying this absence or deficiency of themselves, or which by their action on the soil, can set free substances which may be present, but not in a form capable of assimilation by the plant. The most perfect knowledge, then, of the use of manures must be derived from a knowledge of their nature and composition, and also of the soils to which they are applied, and this is nothing more nor less than the science of Chemistry.

In the application of all manures particular attention should be paid to their equal and thorough distribution through the soil, so that each plant may have its due supply. In the selection of a manure, particular attention should be given to its mechanical or physical state. Many failures of manures are to be attributed not to the fact that the soil was not deficient in their constituents, but that the manure used was not in a fit state or condition when applied to the land to be used by the plant.

An acre of land contains 6,272,640 square inches; a pound av. 7,000 grs. It requires, then, about 900 pounds of any manure to supply one grain to each square inch of soil. If, then, in the application of 1,000 pounds of manure, say twenty bushels of bone dust or any other manure, and there be fragments of it weighing from one to two hundred grains, as is often the case, there must be in some places nearly from 1 to 200 square inches entirely destitute of manure.

In order to give to the soil manure in the proportion of