

Let no experiment be received as proof of a doctrine in agriculture unless the composition of the soil, as well as its physical character, be shown. The fallacy to which Mr. Lawes' experiments would lead are so obvious as not to require refutation.

From all, then, that has been said, from the known and ascertained condition of soils of notorious fertility; from the composition of crops that are grown for food; from the effects of the application of manures, it is to be concluded that the productiveness of a soil *to the extent of the production of the plant is due*: 1. To the presence, in exact ratio, of the mineral constituents named above; 2. The condition in which these substances are found as to their solubility; and 3d. The capacity of the soil, as to its physical texture, to supply the growing plant with organic food from the atmosphere. The proportion of the several mineral constituents best adapted to produce fertility and the requisite physical structure can be found, or at least approximated to, by a large 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