

decomposable part, and that which would have been soluble in dilute hydrochloric acid after the acetic solution.

The considerable quantities of alumina dissolved both by weak and strong acids shows all the soils to be readily acted on by weather, and consequently having a proportionate facility for renewing their fertility. This is especially the case with No. 3 soil. There is no marked deficiency of any normal constituent in any of the soils, with the exception of chlorine and sulphuric acid. In No. 1 soil both are nearly absent; in soil No. 2 the chlorine is a mere trace, and in soil No. 5 the sulphuric acid is very minute. The actual weight of these minute quantities, however, when multiplied up to that actually existing in an acre of soil one foot deep, is, as has been shown by Professor Way, not at all insignificant.

Phosphoric acid is present in soil Nos. 1, 2, 3 in unusually large quantities, the average for a fertile soil being 0.10 per cent. With certain limitations, it is scarcely fair, when all the constituents of a soil are essential to the proper development of plants, to attach a higher importance to one than to another; some, however, are invariably present in large quantities, and seem to serve more as a medium of growth than by any chemical activity; some constituents are more easily and cheaply supplied than others; the direct application of some to an appropriate crop producing a corresponding increase in yield, when a supply of others would produce no increase.

The large amount of phosphoric acid in the three soils (Nos. 1, 2, 3), should, by disintegration and proper cultivation, maintain their fertility for ages to come, and the coral and chalk (Nos. 4, 5) will furnish excellent dressings for clay sands where there is a deficiency of lime.

To maintain the fertility of a soil under proper cultivation, it is necessary to supply in the manure the minerals which are taken off in the crop. It by no means follows that the constituents of a crop form the best fertilizers for that crop; in fact, the contrary statement seems to hold good—the special manure for some crops is just that constituent in which they are deficient. The wheat crop, for instance, which is starchy rather than nitrogenous, is greatly increased by the direct application of nitrogenous manures. The same may be said of the sugarcane, and, I have little doubt, of arrowroot. In the case of wheat, the increase in the crop by the nitrogenous manures may be calculated within narrow limits; but, if supplied to a bean crop, not only no benefit is found, but in some cases positive injury. Green crops of all