

and which we find as constituents of their body, are naturally divided into two classes, viz: such as are capable of assuming the gaseous state and then form a constituent of the atmosphere—water, carbonic acid, and ammonia—and such as, by their involatility, are bound to the soil through which they are diffused in minute particles, and are not liable to loss unless assimilated by the plants and subsequently removed with the crop—I mean the phosphates, sulphates, chlorides and silicates of the alkalies and alkaline earths, or the mineral constituents of plants.

These latter substances, though they form a comparatively small part of the body of the plant, are nevertheless indispensable for the development of vegetable life; and it is the absolute quantity of these matters present which we regard as the totality of the directly nourishing capacity of the soil. The means by which they may be supplied to soils deficient in them are given to us in various forms, as bones, mineral phosphorites, Mexican and Columbian guanos, super-phosphates, ashes, common salt, plaster of Paris, &c.

The former class of substances, on the other hand, furnish the material for the main body of the plant, inasmuch as the whole of its combustible or organic part is formed from the constituents of these nutriments. Their supply depends to a large extent on the mechanical texture of the soil; for it is the particular proportion in which the fundamental constituents of soil (sand, clay, lime and humus) are present which causes a more or less perfect communication of the soil with the atmosphere, which furthermore promotes the formation of these very substances in the body of the soil itself, and which also exercises an attractive power for these nutriments, and retains and reserves them if they have once become appropriated by the soil.

Among them, *water* is the most common and abundant, for the supply of which nature provides in a liberal manner. But in spite of its being met with almost every where in nature, we are well aware of the fact that it is not seldom wanted, and then usually at a time when the plants need it most urgently for their final development. The injurious effect of dry seasons on *present* crops is well known. On the other hand we meet soils entirely destitute of productiveness, and find, upon examination, that their sterility is the consequence of their wet condition, they being saturated with moisture, and even permit the water to rest upon them and to remain there for a considerable length of time. If, by some means, the water is removed from this kind of soils, they are at once rendered fertile and fit to reach the highest state of culture.

This state of things shows clearly that the water, though a nutriment to plants that cannot be dispensed with, is nevertheless, to the highest extent injurious to vegetation, if permitted to ac-