

If we now turn our attention more particularly to the elements of the first group, or those which disappear in the process of combustion, we find them to be carbon, hydrogen, sulphur, nitrogen, phosphorus, oxygen and chlorine. In the process of rapid combustion, the hydrogen is converted into water and passes off as aqueous vapor. The carbon becomes changed into carbon dioxide—a gas prejudicial to animal life—and disappears in part into the surrounding atmosphere, the remainder being fixed in the ash residue, where we also find the acids of sulphur, nitrogen and phosphorus combined with the mineral constituents to form the corresponding salts. In decay or slow combustion, the same changes are finally accomplished, with the additional formation of volatile sulphur and ammonia compounds. The loss or diminution in volume which a plant suffers in the process of combustion, will thus be seen to correspond, in general terms, to the elimination of the organic matter, which consists almost wholly of carbon, hydrogen and oxygen, with very small quantities of the other elements mentioned.

If we next inquire into the composition of the second or incombustible group, we find it to contain potassium, sodium, calcium, magnesium, iron and silicon. These elements, as already stated, are found in combination with the acids derived from combustion of the elements of the first group. In exceptional cases, manganese, bromine and iodine, as well as arsenicum, copper and other metals may be found in the ash, but for various reasons which need not be dealt with at the present time, they are usually not regarded as constituting elements of plant food. It thus appears that of the sixty-seven chemical elements known to science, only thirteen are to be regarded as of importance in the economy of the plant.

With these general facts before us, we are now prepared to inquire into the sources whence they are derived; and in this respect we may again divide them into two groups, those derived from—1st, the air, and 2nd, the soil.