

iron and clay in their absorbent capacity, it has a more particular use, that of forming the stalk and stem of plants and the husk or outward envelope of the grain. In combination with potash, soda, lime and magnesia, but more particularly with potash, it gives hardness and firmness to the stalk of grasses, indian corn, wheat, rye, oats, &c. It gives strength to the stalk to support the weight of the blades and ear, forms channels for the circulation of the sap, and for the transmission from the root of whatever nutriment other parts of the plant may require. Without the presence of this substance, and that too in a suitable state to be taken up by the roots, whatever quantity of the other constituents of plants might be present in a soil, vegetation could not arrive at any perfection. If the materials for the grain or ear existed, still there would be no stalk to support them. The quantity in different soils varies from thirty-five per cent in the "Black Gum Swamp Soils" of Somerset and Worcester, to ninety-two and seventy-four hundredths in some of the soils of Cecil, Kent, Queen Anne's, Talbot, Caroline and Dorchester counties.

The soils which in common parlance are called "Sandy Soils" frequently contain no more sand than those which are called "White Oak Soils, or Pipe Clay Soil."

The difference in their texture is due to the size of the individual grains of sand and not to the quantity which actually exists. Other things being equal, the finer the grains of sand the better the soil. As the growing crop can only use such materials as are already in or can be reduced to a soluble state; whatever can conduce to the state of solution will benefit them. The finer the grains of sand the more easily they are acted on by atmospheric agency, and the more speedily will they yield whatever substances they may *contain*. But there is another and a very great difference in the value of coarse and fine sand. A large part of the food of plants is derived from the atmosphere. This food must be absorbed wholly by the soil in the early growth of the plant, and if the soil has not the power of absorption, the plant will pine, languish and die, unless it be supported by applied manures. Sand in a very fine state of division has powerful absorbent qualities, it absorbs and retains atmospheric food for plants and to a very great extent supplies that place of alumina (clay) and the per oxide of iron, which are famous for this property.

IRON.

Another constituent substance of soils is *iron*.

It always is present though not in the form of metallic iron, but in the state or condition of an oxide of iron. When metallic iron is exposed to air and moisture, it becomes rough and covered with reddish or brown scales. This is what is called in common language *rust of iron*, the process is called *rusting*. In chemical language it is called the *oxidation* of iron and the product an *oxide of iron*. In soils it is generally in the condition of per oxide or its highest degree of oxidation and gives a reddish or