will it thrive in a soil abounding in humus but destitute of some other constituents requisite for carrying the plant to maturity. This has been exemplified in the rich soil of many parts of Brasil, and in Germany. In such lands the stalk attains no strength, and droops prematurely. The cause is the following. The stalk requires the silicate of potash, and the grain requires the phosphate of magnesia, to strengthen them; and humus does not contain, and consequently cannot supply either of these salts to the growing plant. The plant may become a shrub, but it cannot bear fruit. "Again," says Leibig, "How does it happen that wheat does not flourish on a sandy soil, and that a calcareous soil is also unsuitable for its growth, unless it be mixed with a considerable quantity of clay? It is because these soils do not contain alkalies in sufficient quantity; the growth of wheat being arrested by this circumstance, even should all other substances be presented in abundance."

Trees, which renew their leaves annually, require for those leaves from six to ten times more alkalies than the fir tree or pine, hence pines and firs attain a comparatively large size in soils, upon which hard wood trees acquire a stunted growth. This observation of Leibig is familiarly exemplified upon the plains of Wilmot and Aylesford, in Nova Scotia. DeSuassure ascertained that 1000 parts of dried leaves of oak yielded 55 parts of ashes, of which 24 parts consisted of alkalies soluble in water; the same quantity of pine leaves gave only 29. parts of ashes, which contained 4 and some fractionals soluble salts. When a forest of pines or firs have been burnt, they restore alkalies to the soil, sufficient for the growth of beeches, wild cherry, &c., which spring up after them.

Wheat will not thrive on a soil, which has produced wormwood, nor will wormwood thrive where wheat has grown, because they each exhaust the alkalies of the soil.

100 parts of the stalks of wheat

yield 15 parts and some fractionals of ashes. The same quantity of the dry stalks of barley yields 8 parts and some fractionals of ashes, and 100 parts of the stalks of oats yielded only 4 parts and some fractionals of ashes. The ashes of all these three kinds of straw are the same composition : hence we see what plants require for their growth, and that the field which can only yield one crop of wheat can raise two crops of barley, or three crops of oats.

All the different kinds of grasses require the silicate of potash, which is conveyed to the soil, or rendered soluble in it by the irrigation (overflowing) of meadows. Reeds and such plants containing large quantities of siliceous earths, or silicate of potash, thrive luxuriantly in marshes, agillaceous soils, ditches, streamlets, and other places where the change of water furnishes a constant supply of dissolved silica. The quantity of silicate of potash removed from a This meadow in hay is very great. was manifested near Heidelberg in Germany: a stack of hay was struck with lightning, the ashes contained a quantity of fused vitreous matter, which was found to be the silicate of potash.

Potash is not the only substance requisite for the existence of most plants : It may be replaced in many cases by soda, magnesia and lime : but other substances besides alkalies are necessary to support the life of plants.-Phosphoric acid has been found in the ashes of all plants, and always in combination with alkalies or alkaline Many seeds contain phosearths. phates, and phosphate, of magnesia abounds in the different kinds of Plants obtain their phosphograin. ric acid from the soil, and it is a constituent of all land capable of cultiva-Phosphoric acid is detected in tion. many mineral waters, and also in combination with, lead, clay, slate and lime. The soil furnishes phosphoric acid to plants, and plants give it out to animals for the formation of bone, and of those constituents of the brain, which contain phosphorus.