ELEMENTS TAKEN FROM THE SOIL BY TREES.

A correspondent of the *Country Gentleman* writes as to the comparative exhaustive power of different kinds of forest trees upon the soils where they have grown. He had heard that the pine barrens are so called because pine woods made land barren and that certain native species are poison to land. The letter was referred to Mr. B. E. Fernow, chief of the Forestry Division of the Department of Agriculture, and we quote the main points in his reply:

"As far as exhaustion of minerals from the soil is concerned, no fear need be entertained, since forest trees require only the smallest quantity of the commoner kinds of minerals from the soil, and, in addition, they return the bulk of these to the soil in a more soluble form by the fall of leaves and twigs; hence they improve the top soil, as is well known. The foliage of some trees decomposes more readily than that of others, and forming a humus of more or less desirable composition, this beneficial effect varies with the species; thus while the conifers, especially larch and spruce, as well as the beech, are among the greatest improvers of soils, the humus from catalpas, black locust, etc., is of little use, while the foliage of the oaks decays but slowly, and hence does less for the improvement of the soil. But the saying that "red oak and black walnut poison the soil" is probably an overstatement—at least, we have no knowledge that this is really so or any reason to believe it; they are simply less useful in making humus.

"Of much more moment to tree life than the minerals is the water of the soil, and in respect to the amount of water transpired, trees differ very widely, so that, in general, deciduous-leaved leaves may transpire six times as much as coniferous trees. The pines especially are moderate users of water. These latter are satisfied with such small amounts that they can occupy the dry sands of the pine barrens to the exclusion of other species. The deterioration of soil under given trees, then, depends upon the rapid exhaustion of the soil moisture. This exhaustion, is, however, much less due to the transpiration by the trees themselves than to the surface evaporation, and this again is dependent upon the amount of shade which the trees exert. Under a dense growth of the shady beech, hemlock, spruce, sugar-maple, etc., no exhaustion of moisture takes place, while under the light-foliaged birch or oak, especially in later life when the crowns become thinned out, the sun reaches the soil readily and much water is evaporated. In addition, if these trees stand alone in a field, the raindrops readily fall through the foliage upon the soil and compact it; thus much less water can percolate and the evaporation from the compacted soil is increased, as every farmer will understand who cultivates his crop in order to reduce evaporation.

"As far as influence upon neighboring crops is concerned, trees exert a deleterious influence upon the immediately adjoining portion of either by their shade—and some species are shadier than others, hence a difference in degree of effect—or by their competition for moisture. Some kinds like cottonwoods, willows, and elms, require not only more water than others, but their root systems are capable of rapid and enormous extension in search of water, so that their influence is far-reaching. Grape vines are of the same nature, so that it is almost useless to cultivate in the neighborhood of a vineyard unless the soil contains a superabundance of moisture. The taproot trees are less injurious, because they supply themselves from greater depths, while the shallow-rooted ones, like black locust, beech, spruce, etc., compete on the same level with the annual crops."