THE ELEMENTS OF GOOD TILLAGE.

When the reader reflects, that for the greatest production we must have the very best soil, in the best condition, and furnished with a sufficient amount of those constituents which enter into the formation of the plant, he will perceive at a glance what a field for improvement we have, before we can say that our cultivated lands are in a state of good tillage. Take the best lot of virgin soil, abounding with all the elements which sustain a vigorous forest growth, clear it, and subdue its natural wildness by the plowshare, and the very process of culture usually adopted, independent of the exhausting routine of production indulged in, acts detrimentally, and in a few years its tilth is destroyed. It may be light and porous, when first subjected to the plow, but the process of repeated cultivation, by improper elements, with the loss of vegetable matter lessens the bulk of soil, and it becomes hard, dry and non-absorbent, a state entirely uncongenial to the production of crops, and the processes of easy tillage.

Another fruitful cause of change in the texture of soils is, that, as soon as the roots of the trees are destroyed their cavities are filled up by cultivation, and natural drainage is obstructed.

Lands, which were sufficiently dry for all the purposes of cultivation when first cleared, from these causes become too wet, and the stagnant water soon causes the tenacious particles in the soil to run together, forming an underlying hard pan, which can be subdued only by proper under-draining, and in some localities by sub-soiling. Nature so arranges all her requirements, that there is always a perfect and congenial adaptation of soil to the particular plant and locality which is to produce it, and from this cause the productions of the earth, in a completely natural state, are always perfect. The swamps and the valleys, the hills and the mountains, each have families of trees and plants adapted to the productive elements which their soils contain, as well as to the particular state of dampness or avidity which may obtain. Those productions which delight in aridity are never found in damp and inundated locations, and *vica versa* with aquatic plants.

These facts from nature, are sufficient to show with clearness, that when man attempts to adapt the soil to the various products grown on cultivated lands, he has much more to do, to render this operation perfect, than is usually effected by the ordinary processes of tillage resorted to. Exhaustion, and its injurious effects upon the aggregate products of a country, so prejudicial to permanent prosperity, is but a secondary subject, compared to the importance of the primary preparation of the soil, and its perfect reclamation from nature, to the requirements incident to the production of artificial crops. If perfect preparation is made at the commencement, it requires no lengthened deduction of figures, to show that exhaustion is in a great measure prevented, and a cure is applied before the disease has made its appearance.

The presence of ammonia in rain water, is one of the great elements of fertility, it being furnished in a natural way to the growing crops just when they are in the state most needed. The best locations of natural loam and alluvial deposites absorb and retain this element in large quantities. Hence, the natural fertility of such soils, whilst the great importance of seasonable and frequent showers to the planter, whose soil is deficient in these absorbing and retentive qualities, is made evident, from the same hygroscopic influences. Ordinary plowing in the South, on upland does not bring into use more than three inches in depth of soil. Experiments have been made by Mr. Dalton,* with a cylindrical vessel ten inches in diameter, three feet deep, filled with gravel, sand and soil—having a discharge pipe at the bottom, by which to measure the quantity of water that ran off, and which gave perfect drainage the top of the soil being covered with grass, the whole buried so that the top was even with the ground, shows that earth that is moderately moist will take up three inches of water without carrying it beyond the point of saturation. This amount had in the preceding dry month been taken up by the plants and evaporated, and without making the soil too dry, had so drawn upon it, that it could imbibe three inches, which fell in four days.

Mr. Dalton arrived at very satisfactory conclusions respecting the amount of water imbibed by the soil by saturation, and stated that in the spring after the melting of the winter's snows, a cubic foot of this saturated earth is to water in its specific gravity as five to three; dried to moisture suitable for the reception of seed, it loses one-twelfth of its weight; and when perfectly dried it loses one-third. He also argued that when it had lost one-sixth of its weight by drying, it was not too dry to support vegetation. When it had lost two-thirds, it appeared like top soil in summer. Hence, every foot of earth so saturated, contains seven inches of water, and it may part with one half of its water, and not be too dry for supporting vegetation. We start in the spring with this amount of water—say three inches in depth, within one foot of the top of the ground. Roots and plants go down lower than this, if the soil is congenial to their reception.

Common operations of plowing, with good implements, will render porous and permeable ten inches in depth of soil, whilst extraordinary plowing may

*See Geddes' Prize Essay.