

matter incorporated in its growth is supplied at and near to the surface, and more than enough of vegetable matter is available there usually, which precludes the necessity of the plant drawing subsistence from lower depths. But if the grass really requires nutrition from any considerable depth, it would derive none, because generally saturation with water is so complete that air gets no access; no mold can therefore be prepared, nor any nutrient elements rise up with heated vapor to feed or nourish the growing grass above. And the same causes prevent the roots from penetrating far below the surface; which in fact it is unnecessary for them to do, so long as previous crops remain on the ground, affording the identical elements of the crop for decomposition and reorganization. The depth or quantity of matter in such states and situations, is then of no advantage till after it has been exposed to atmospheric disintegration and solution; I say solution, for *heat*, the prime agent of this process, is derived directly from the air—which are not likely to take place till the soil has been subjected to the exhaustive process of culture and cropping.

In the instances of swamp, (of which I have owned some fine tracts,) the roots of trees do *not* penetrate to so great depths as on uplands with a non-saturated subsoil, both because of the too cold temperature below, and the ample nutritive matter abounding at or near the surface. Rather the roots of swamp timber *spread* out, forming radii of large circles, and no better proof of this is needed, than the obviously *large proportion* of swamp timber that is uprooted by severe gales and hurricanes, as compared with smaller destruction on uplands from the same causes, and where the roots *do* penetrate much deeper, perhaps twice as deep.

Admitting that a variable proportion of matter arising from the decay of vegetable growth, is caught and passes off in prevailing currents, there is generally as much supplied as carried away by this agency. And the same currents that cool the air diminish equally the absorption and ascent of organic particles, and consequently the rate of growth in trees or crops, according to the state of the weather. The bulk of natural grass is reduced much by annual mowings, which lead to the necessity of seeding with more valuable but less bulky cultivated grass: the reduction in bulk and weight being due to the absence of the substance of previous growth, as a natural manure of the plant, which must derive its growth therefore from a reduced supply of convertible elements. Instead of *assorted* matter on the surface ready for decomposition and immediate or simultaneous reorganization, the process and rate of growth must be governed by the more measured and gradual process of atmospheric disintegration and solution, which results chiefly from the same natural process as growth itself.

By inspecting the rings which mark the yearly growth of trees, we discover unmistakeable evidence of different degrees of growth in different years, and we all know the differences which result to our ordinary grain crops, from more or less favorable seasons of growth in successive seasons. Can any one doubt, then, that the best seasons for farm crops are also the best for growing trees? or that the latter make the most growth in the best growing weather.

Or is it to be wondered at that the leaves of one year are not *all* decayed by the next, though a year later *more* than a year's product of leaves may decay, and trees make *more* than an annual average growth. The yearly growth may vary, but it will not much exceed the supply of decaying vegetable matter on the ground. And it remains a fact that the leaves of forests and swamps are decomposed and reabsorbed, and organized annually according to the weather and rate of growth in trees. In some seasons decay and growth will be below, in others will exceed the annual average. But the fact and principle will remain, that they specially *manure* themselves from the products of previous growth, and always supply, or derive their supply of organic and mineral matter