

le; since were carbon and oxygen to combine in the presence of the nascent hydrogen—this is to say, were there not sufficient members of the oxygen family to ally with those of the carbon family on the one hand, and the hydrogen family on the other—the unallied members of the hydrogen family, in their single life, might be productive of considerable damage. If that hydrogen can be utilized as water, all is well; if left alone, it becomes the victim of other spirits, and produces such combinations as nitric acid, humic acid, and acetic acid, which acting are destructive of life.

For the agriculturist, there is but one practical conclusion for all this. He will readily infer that the soil, in order to fertility, must contain a suitable quantity of organic matter, which the atmosphere, by a process of slow combustion, transfers into carbonic acid and water, and ultimately into nitrates and ammoniacal salts. Organic matters, when submitted to the united action of air, moisture, and a suitable temperature, give rise to carbonic acid and water; and nitrogenous, to ammonia. When buried in a sufficiently open, their combustion is so obvious that, in warm climates, it may happen at the end of some years that a clean soil, rich in gases, becomes so poor as to be unable to give support without the application of manure. Thus humus, and all the last terms of the putrefaction of vegetable substances, are so many sources which emit carbonic acid; and it is beyond doubt that an important part of the efficacy of organic origin ought to be attributed to this emission, whether it be that the acid gas absorbed by the roots runs the course of the organism of the plant, or that, turned into the surrounding atmosphere, the light decomposes it under the influence of the leaves which assimilate the carbon." It is very easy to regard, therefore, every particle of humus in the soil as a focus from whence carbonic acid gas is constantly emanating" to modify that atmosphere which descends from above, and fit it for its mission to the roots which pervade the seed-bed in search of support for the wondrous development of woody fibre, green leaf, tender blossom, and selected seed. F. R. S.—*Express*.

Advantages Derived from Shading the Soil with Green Crops.

We have frequently contended—and the actual experience which every year brings with further confirmation to the fact—that the exhaustion of even our very best soils is due so much to constant cropping as to the crops which play so prominent a part in the system of agriculture. It is true that corn and tobacco draw largely upon our soils, and especially upon the phosphates and the potash they contain. It is true, also, "that shallow and careless cultivation has done much to

assist in exhausting lands which were regarded at one time as of almost in exhausting lands which were regarded at one time as of almost inexhaustible fertility," and statistics likewise show that whilst the area of cultivation has been extended year after year, the average product per acre has diminished.

One of the primary reasons why these crops have proved so deleterious to the soil, is the fact that the system of cultivation required to bring them to perfection, keeps the intervals between the growing plants utterly bare during the hottest months of the year. The action of the sun upon these exposed surfaces, together with the constant stirring of the soil for the purpose of keeping it loose and light and friable, whilst it promotes the solubility of its plant-food, yet at the same time exposes the organic and inorganic substances which constitute in their several proportions the elements of fertility to great loss, both by evaporation and by washing rains. As an illustration of this process of exhaustion by the simple exposure of bare soil to the action of the sun and the rain in summer time, we may cite the following facts. A piece of land kept constantly ploughed, without any crop whatever being grown upon it, if not suffered to grow up in weeds, will gradually lapse from a state of fertility into one of comparative barrenness. It has been losing year after year, by evaporation and by leaching rains, the greater portion of its plant-food, its vegetable and mineral wealth, "if we may be permitted to so term it. As a signal proof of this we have in our mind's eye a peach orchard which twenty years ago was planted upon as fine a piece of soil as is to be found anywhere within ten miles of Baltimore. It was a light, loose chocolate soil, and the quality when the orchard was originally planted, was that of the best tobacco land. That orchard was ploughed regularly every season to promote the growth of the peach trees, and to facilitate the ripening of the fruit. It is the usual custom with the best peach-growers. In twelve years, or by the time the peach trees began to show signs of decay, those fifty acres bore every evidence of a soil that had been utterly exhausted. Yet with the exception of the peach trees themselves, not a single crop of any kind had been taken from the land. Now, this rapid exhaustion could not be charged to the demands made upon the soil by the peach trees alone, but to the fact that the soil was kept perfectly bare throughout the summer.

Again—take the converse of the proposition. So long as lands are kept shaded they continue to increase in fertility. Does any one doubt this? Let him turn out an old field, and after a while a new growth of wood and brush will spring up, except when the land is worn into gullies, and with the growth of this wood, the