

ON THE ADVANTAGES WHICH HAVE BEEN DERIVED, AND ARE LIKELY TO ACCRUE TO AGRICULTURE, FROM THE APPLICATION OF IT OF THE PRINCIPLES OF VEGETABLE PHYSIOLOGY AND CHEMISTRY. BY HENRY R. MADDEN, ESQ., M.D.

In order that soil may be advantageously subjected to continued cropping, the farmer must keep up its essential qualities by ploughing, harrowing, and any other operations necessary to pulverize it. The value of the impalpable matter in soil has been already alluded to, and we shall accordingly confine ourselves in this place to the enumeration of the practical advantages arising from a knowledge of the facts there brought forward.

The effect of ploughing, harrowing, &c., &c., is twofold: 1st. It looses the soil, and renders it more porous: 2nd. It pulverizes it; both of these are of the greatest value; while the first prepares the soil for freer admission of air and moisture, the latter renders these capable of acting chemically upon the different ingredients contained beneath its surface. The necessity of pulverizing is evident, because, as far as plants are concerned, it is of little consequence whether their roots come in contact with an agglutinated mass of powder, or a stone; both are equally impenetrable, and hence both are equally useless; so that a soil badly pulverized is in many respects similar to a very stony soil, with one exception, viz., that the masses of matter which are capable of being reduced to powder, being more porous than stone, are capable of absorbing a greater quantity of the liquids contained in soil, and thereby impoverishing the land; it is therefore of the utmost consequence for the fertility of the soil, that it should from time to time be pulverized to the greatest extent of which it is capable, without the expenditure of too great a quantity of labour. All must be aware that Jethro Tull was so deeply impressed with the importance of this pulverizing of the soil, that he frequently affirmed that, if properly performed, it might altogether supersede the necessity of manuring. Of course this idea is extravagant, but still, as it resulted from practical experience, it tends to show in a faint light the great value of the operation. In process of time, science may enable us to employ some more efficient method for increasing the quantity of impalpable matter in soil, in a shorter period than it can be effected by the gradual disintegration of the stones by the influence of the weather, and thus render the loosest sands capable of profitable cultivation.

Soil intended for continued cultivation must have its supply of organic matter, and part also of its mineral ingredients, renewed by returning to it, from time to time, in the shape of manure, what has been removed from it in the form of crops. We have already observed that physiologists are far from being at one in their ideas regarding the exact manner in which the organic matter of soil influences its vegetation, but still they all acknowledge the practical advantage of a good supply; many, however, suppose that the value of manures consists merely in their mineral ingredients, while others place all their value in one single element of the organic portions, namely, their resin. Be this as it may, we have still the fact acknowledged by all, that to keep up the productive power of a soil, it must be supplied with manure. Much practical advantage may be gained by studying carefully the relation subsisting between the composition of a soil, and that of the manure best suited for it, because it will invariably be found that the manure acts most beneficially, which

contains the best supply of whatever is deficient in quantity in the soil for which it is intended, and that much good material is constantly lost or rendered unprofitable by the absence of any attempt to accommodate the manure to the soil. When the researches of the chemist shall have enabled him to decide with accuracy as to the peculiar food best adapted for each crop, this accommodation will be capable of being carried to a much greater extent than it possibly can be at present.

But the condition, as well as the composition of the manure must be attended to, because soil must have its activity preserved by adding to it, at certain periods, substance in a state of fermentation. Numerous facts tend to prove that the success of many crops depends upon the existence of fermenting matter in the soil, and that however rich it may be in other respects, these crops can only be advantageously cultivated after a fresh addition of manure; this is particularly the case with the turnip.—Without dung the richest soil will bear but an indifferent crop; while with manure, very poor soil, if it be not too wet, will at all times give a good return. Science has not as yet been able to account for this satisfactorily, although many of her votaries are willing to acknowledge its truth, and it is obvious that an acquaintance with the fact must be of the greatest value in assisting the farmer in his arrangements, for he will of course apply dung when he intends to raise a crop requiring the existence of fermenting matter, and thus ensure its success, while he does no injury to the following crops, whose growth is, to a certain extent, less dependent on the condition of the soil.

It frequently happens that the farmer is not contented with his soil in its natural condition, on account of certain defects under which it labours, and which the recorded experience of his ancestors has informed him can be overcome or counteracted by certain processes which he may carry into effect with more or less facility, according to circumstances. The chief of these are draining, liming, and paring and burning; and our object in mentioning them here is to point out what is really effected by each, so that farmers may be prevented from misapplying them from ignorance of their peculiar mode of action.

(To be Continued).

From The Colonial Farmer.

PEAT, AND RICH MOULD.

Many writers commend these two very different substances under the name of vegetable matter, sometimes observing that a soil may be barren in consequence of the excess of vegetable matter. This language is calculated to mislead, and confuse the young student in agriculture. In Europe there have been disputes concerning the origin of peat, and some very whimsical theories formed upon the subject. Here, where there are such great quantities, and where it is constantly forming, we have only need to use our own eyes to see how it originates. Most of the soil of our swamps on the coast is peat. These swamps were formerly dry; they are for the greater part on elevated situations, and rarely have any considerable stream running through them, although in heavy rains great quantities of water run into them. There is always a considerable quantity of wood matted in them, mostly in a decayed state. A large proportion of the peat was originally what is technically called the "Epidermis" of ve-

getables, comprehending the "Ross" or hard outer bark of the trees, and the thin paper-like outer bark of the shrubs and evergreen plants. This is by far the most imperishable part of vegetables, and in a vastly greater proportion upon the slowly-growing trees and shrubs of the barrens, than on the productions of a fertile soil. Together with the "ross" of the fir, there is a considerable quantity of resin which falls from the trees with it. This is increased by the leaves of the various shrubs of barren heathy ground which generally hold a considerable proportion of resin, together with the astringent antiseptics, tannin, and gallic acid.—These last are indeed contained in the barks of nearly all trees and shrubs of the barrens in large proportions. Their taste is not perceptible in any considerable degree in the "Ross," but as this was originally bark, abounding in astringent matter, there is good reason to think it still retains it, neutralized by oxygen, for which astringents have such an affinity that they will take it from nitric acid, as any one may convince himself by putting a solution of nitrate of silver into a strong decoction of black spruce bark, or dwarf laurel leaves, when the silver will be deposited in a metallic form. There is also a considerable quantity of charcoal, and a portion of the shells of small bugs of various kinds (coleopterous insects) mixed with the other ingredients. For the land where peat is found is covered with trees of the fir kind, always liable to be overrun by fires in dry seasons; and one heavy rain, after the ground has been smoothed by a fire which has burnt off the moss and strainer of small bushes, carries more material into the swamps than had entered them for seven years before, and it is at such times that the charcoal is floated in, together with the shells of innumerable bugs who had been killed by the fire that burnt off the moss in which they burrowed. When the wood of bogs is destroyed they produce moss, diminutive shrubs, and small useless sedges, which abounding in resin, tannin or woody matter, have very little nutriment, and for this reason decay very slowly. These substances are deprived of a part of the soluble matter they once contained by steeping in water for ages. It is not strange that this, when drained and exposed to the air should prove a barren soil; it is composed of the half decayed remains of vegetables natives of a barren soil, vegetables which can thrive only on a poor soil. To make this support the plants of a fertile soil, something must be added to it which it has not, and it must be deprived of a part of something which it has.

The vegetables which grow on fertile soils hold a large quantity of mucilaginous matter instead of resinous, and a considerable quantity of potash. When dead they change to a fine mould in which the natives of such soils grow rapidly, and of this kind of vegetable matter there is never an excess, the ground that has most of it being the most fertile. Between the fertile mould produced by the decayed leaves of cabbage, turnips, or tobacco, and the peat formed from "Ross," resin, sulphur, and decayed moss, there are many gradations; and when swamp soil is used to increase the manure, the best should be chosen. That which has been formed from the leaves and decayed wood from hardwood land should be preferred, and such is to be found in the swamps which have a considerable brook passing through them, formed from a number of rivulets which descend from a hardwood hill. The best for fuel, and least valuable for manure, is in the swamps near which the only growth of wood is of the Fir or Pine family, and very small and scrubbed. Yet