

ledge which scientific research is capable of affording to practical experience to aid him in carrying out his improvements with a confident hope of ultimate success. Draining may be looked upon, therefore, as preliminary to all improvement; for no improvement can be effected unless the land be previously drained. It is also well known that a general system of drainage is not only beneficial in changing the climate with regard to the ripening of vegetation, but it has a material effect on the health of the population. Agues and fevers are not of so frequent occurrences in those districts where the land has been thoroughly drained.

2d, **Ploughing and Subsoiling**.—By the operation of the plough weeds are uprooted and insects are destroyed. By frequent turning, the soil is reduced to a minute state of division; it becomes more loose and pervious to the roots of the plant: the air so necessary both to animal and vegetable life, finds an easy access to the roots, and thus aids in developing the productive energy of the land. That air is essential to animal and vegetable life is evident from the fact that animals require a constant supply of oxygen, which they obtain from the air. Plants also require a constant supply of oxygen, which they obtain from the air. Plants also require a constant supply of carbonic acid, which is derived from the same source. Oxygen is essential to the healthy germination of seeds; and it is in consequence of their being deprived of a supply of it that they often lie in a dead state in the earth for many years, till, when brought to the surface and in contact with the air, they begin to exhibit signs of life. It is also supposed that the roots of living plants require a certain proportion of oxygen to support them in a healthy condition. In order to afford them this necessary supply it is requisite that the soil may be rendered permeable. Thus, by an actual mechanical means, namely, ploughing, an important chemical action is effected.

The organic matter of the soil is more rapidly and effectually decomposed when in contact with the air; consequently it becomes more readily resolved into those forms, namely, carbonic acid and water, which are best adapted for the nourishment of the young plant.

When the agency of the air is excluded the organic matter decays more slowly, and the compounds produced are often injurious to vegetation, thus retarding more than aiding the growth of the crop. By the presence of the air the decomposition of the inorganic substances in the soil is facilitated. Thus the soil, by frequent exposure to the influence of the air, will yield more readily a sufficiency of organic and inorganic food to the roots of the growing plant.

Nitric acid and ammonia, so essential to vegetation, are produced more readily in the soil when it is frequently turned by the alteration of the plough; so that the more thoroughly the land is ploughed and pulverized the more likely is the farmer to reap a valuable remuneration for his labour.

Subsoiling.—When the land has been thoroughly drained the use of the subsoil plough is of material importance. It goes eight or ten inches deeper than the common plough, tearing open and loosening the soil, so that the water finds a more ready escape and the air penetrates the more easily, enables the roots to descend with greater facility to the under soil. In stiff clayey subsoils this instrument is of supreme importance in mellowing, aerating, and in general giving a practical value to that which had been lying useless hitherto, beyond the reach of the common plough.

But it is after the land has been brought, by judicious draining, to a proper state of dryness that the value of the subsoil plough can be fully realized. It

is necessary that the sides of the cut effected by this implement be not allowed to cement together again, and to ensure this the dryness of the land must precede the operations of the subsoil plough. In order that the full effect of the drains be attained, especially where stiff clayey subsoils exist, and that the under layers may be meliorated in such a manner as to yield nutrition to vegetation, every practical and intelligent farmer will see cause to conclude that this is the best instrument for effecting the object desired.

IMPROVEMENT OF THE SOIL BY MIXING.—This is a practice often resorted to in those cases where the soil is defective in its physical constitution; such as in the case of peaty soils, where too much vegetable matter abounds, a mixture of earthy substances is capable of rendering it better fitted for the rearing of cultivated crops.

In the same manner, a sandy soil may be improved by a mixture of clay, and a clay may be improved by adding it to a mixture of sand. But the addition of these substances do not only produce a physical change in the qualities of soil, but have also in many instances a chemical effect. By the addition of clay to a peaty soil it not only renders it more consistent, but it yields to it those inorganic substances of which it was formerly deficient. It is thus with marls when applied to the land. The friability and openness of clayey soils are increased—they add to them carbonate and often phosphate of lime, substances which are not only highly beneficial but absolutely necessary to vegetation. There is little doubt that much good will result from such admixtures in many cases where the means are available and can be had at little expense. But as the change effected in many instances is not only in the physical character but also in the chemical constitution of the soil, we shall defer, till a future article, entering on the consideration of the improvement of the land by chemical means.

TO THE FARMERS OF NOTINGHAMSHIRE.

GENTLEMEN.—Little more than twelve months have elapsed since we first heard of the potato disease, and yet how important have been the results arising therefrom. It has produced two commissions of three commissioners each, with corresponding salaries: it has been made a peg upon which to hang free trade, and a lever with which to oust protection. Quire upon quire of faultless foolscap has been used to convey reports and opinions of various learned societies, agricultural, horticultural, chemical, and even clerical; and, *wonderful coincidence!!!* they have all come to the same conclusion, and have published nearly the same amount of information. After some six months' assiduous examination (Sundays and holidays included), during which some tons of diseased tubers have been peeled, cut, washed, grated, sliced, rasped, saturated with acids, and peeped at through microscopes, they have one and all arrived at the following conclusions, viz.—'That the potato is sick—very sick—exceedingly sick;—yes, it is truly sick, and very sick indeed.' After these opinions, gentlemen, you are perfectly justified in considering, and you may say it conscientiously, that the potato is dangerously ill. But whether the disease be pleurisy or phthoria, diabetes or dropsy, these learned persons furnish no diagnostics. Under these unfortunate circumstances we are obliged to go to the ailing tuber itself.

The potato was not known in England previous to the year 1563, when it was brought to this country from America by Captain Hawkins; and although it has been sufficiently long in this country to render it indigenous, yet we ought not, from this fact, to con-