

fills it with a heavy, plump kernel. The crops of grass that follow for several years correspond with the grain crops, but ultimately the vegetable matter is used up, and nearly all the soluble potash is used up—so that the farmer must resort to the plough and manure to get a fair crop again.

Every practical farmer who has attempted to raise wheat on highly manured land that has been long cultivated, knows that it is liable to lodge, and very frequently rust or mildew. These two evils might, I think, be nearly remedied by the application of the right amount of ashes—if that right amount could be ascertained and obtained by the farmer. As to the amount, he need not fear of getting on too much, if he will just reflect how much is left upon an acre of burnt land, where two or three hundred cords of hard wood is converted into ashes; but in all probability a very much less amount would answer. I conceive there is but little difficulty in any or every farmer's obtaining his supply, by ploughing up a small patch of sandy or gravelly sward land and letting the furrows remain till dry, then commence a fire with a small quantity of wood, and gradually pile on the sods, and very large heaps may be thus converted to ashes. The vegetable matter would be burnt, the particles of quartz, felspar and mica would be broken and shivered thereby, rendered soluble, and afford those very salts so essential to a good growth of grain. After the mass had become cool enough to be removed it should be put under cover, to be applied to his wheat ground, after being ploughed in the spring. In all probability fifteen or twenty cartloads would have the desired effect, and the good effects would also be felt for several years by the succeeding crops.

Frequently promising crops of wheat are almost entirely destroyed by rust. On highly manured lands, if there happens to be a day or two of warm, steamy, good corn weather, in July or August, at about the time wheat is in the milk, the rush of sap is so great, that if it do not produce apoplexy, it does that which is nearly as bad—it ruptures the tender and inefficient coating in the stock; the sap vessels burst; the sap exudes, and forms a coat of rust, and the crop is nearly ruined. In some of the agricultural papers the last year, I read an account that wheat never rusted where it was sowed upon an old coal heath, and that grass and other crops always succeed well, and were luxuriant. I think this was attributed to the remains of the charcoal; but perhaps a part might be justly attributed to some other cause—to its furnishing a thicker coat of glaze to the grain, and preventing the rupturing of the sap vessels.

I might cite a great many more facts in addition, to satisfy any one of the benefit of adding to our cultivated soil, potash in a more soluble state than we find it, as locked up in sand, gravel, stones, or rocks. You will find some of them in Mr Colman's 4th Report, viz. Mr Haggerton's compost of peat and barilla, Mr Jarvis's account of glass factory manure, Mr Whipple's statements in regard to the value of salt petre or nitre—that being about one-half potash, 102 lbs of nitre contains as much potash as 79 lbs of pot or pearl-ash of commerce. He applies about 150 lbs. to the acre.

But ashes are also useful in agriculture for neutralizing acidity in soils, and for the formation of nitre or salt petre for agricultural purposes.

In the sixth number (June, 1842), of the *Farmer's Monthly Visitor*, there is taken from the *Albany Cultivator*, an article or review of Dr. Dana's *Muck Manual*. In this article there is a statement made by the Doctor, and

another by the reviewer, which I think are calculated to lead to erroneous conclusions. The Doctor says, his first principle in agricultural chemistry is "one rock and consequently one soil." From this he lays down his second principle, "That rocks do not affect vegetation which covers them." The reviewer says that "rocks certainly exert a powerful influence on the soil that covers them in many cases," but this he says, "is owing to their physical condition, and not to their chemical constitution." Now, I think, to the mind of every farmer, the plain English of the above would be this: All soils are derived from rocks; all rocks are chemically the same; ergo, the chemical constituents of rocks never affect vegetation.

For the sake of many of our farmers, I wish the above was true; but the weak and sickly appearance, and light and short crops of corn, we every year see growing upon soils containing sulphate of iron—iron pyrites, or what farmers more commonly call brimstone rocks, proves the above untrue. There are six thousand acres of land in this State, that once yielded heavy crops of corn, that now with a dressing of fifteen or twenty loads of manure will not give more than the same number of bushels of corn, and without manure it would not yield five bushels per acre; and this decrease in amount of crop, is almost wholly in consequence of sulphurous and sulphuric acid in the soil, derived from the disintegration of rocks containing sulphur and iron. Hundreds of our farmers have dug solid and heavy rocks from the soil, and laid them into wall, and soon the oxygen of the air and water combines with the iron, and it is decomposed and converted to an oxide of rust; this sets the sulphur free, and that combines with oxygen and forms sulphurous or sulphuric acid, according to the amount of oxygen in combination with the sulphur. This renders the soil acid, and unfortunately, the more of this land is worked by the plough and harrow, the worse it is, by exposing the stone more and more to the action of the oxygen and eliminating increased quantities of sulphur.

When corn is planted on lands, containing this acid, derived from such rocks, it generally looks well and promising for a few weeks, at least as long as the plant draws its nourishment from the decomposing kernel. But after the rootlets on the main roots are formed, and they begin to fulfil their office, by absorbing water from the soil, a re-action takes place and the plant remains stationary for several weeks—the leaves assume a reddish purple colour, the main root is corroded or rusted off, to the length of one or two inches, and the farmer generally lays all the blame to worms, while, in fact, there may not be a dozen in an acre. After a while a new set of roots start out at the lower joint, but so few and weak, the crop is light, and a large portion of the corn in attempting to cut it, is pulled up at harvesting by the sickle.

I think upon inquiry among farmers having land containing this kind of rock, you will find hundreds that will confirm my statements. Here the inquiry may arise, is there any remedy? Yes: unleached ashes will neutralize the acidity of such soils, (precisely as salaratus does sour dough), by combining with the free acid of the soil and forming a neutral sulphate of potash. But I have my doubts about Plaster of Paris being useful on such soils, for it is composed of 40 parts sulphuric acid, (oil of vitriol), and 28 of lime, but the acid is neutralized by the lime, and therefore inert. But reasoning from chemical principles, if we apply to such soils, hydrate or slacked lime, it will combine with the acid of the soil, and the lime will be converted into sulphate of lime—Plaster of Paris—and thus remove the free acid from the soil, in the ratio of 40 lbs. of

acid to 28 lbs. of lime. It can also be remedied by very heavy dressings of manure; but that is not always within the reach of the farmer.

"It is well ascertained that different soils have different properties; prejudicial to the growth of some plants, and favourable to the perfection of others; and it would be a most fortunate circumstance if these differences in the properties of soils were better understood, and more generally acted upon by the great mass of farmers. Notwithstanding the bad character I have given soils containing sulphur in excess, for growing corn; and for many other crops, it is equally prejudicial; yet is peculiarly favourable to the perfection of others. In Jones's 'Conversations on Chemistry,' page 136, speaking of sulphur, he says, 'it exists in some vegetables, especially those of a cruciform tribe,' that is, the tribe of plants consisting of cabbage, turnip, mustard, radish and cress, of every variety. In some respects this family of plants possesses peculiarities contained in no other tribe.

In the December number of the *Genesee Farmer*, page 185, there is an extract copied from the *Farmer's Journal*, (Eng.) on soils, by Wm Chatterly, from which I make the following extract—

"The state of chemical combinations, in which the various ingredients of the soil are found, also materially influences its fertility, though such combination should differ somewhat for particular crops. For instance, wheat requires, that a portion of silica, should be in union with potash, and for clover, that sulphur should exist in the soil in the condition of a soluble sulphate. In confirmation of the above theories, I will relate a few facts that have come under my immediate observation. In 1837, I came into possession of an old farm that had not a furrow ploughed on it for 20 years. In one of the fields there were 12 or 15 acres that had been yearly mowed all this time, and did not average 5 cwt. of hay per acre. Many of the rocks and stones in the soil were of the 'brimstone order.' That spring I ploughed about an acre and a half—being as far as I could judge, the best land of the field, manured with about 20 loads of manure; something over an acre was planted with potatoes, the rest with corn. From the friable appearance of the soil, and the long time it had lain in grass, I expected to have raised a good crop, but in July and August, I observed many of the tops wilted and dead. Upon examination, I found the stalks from the surface of the ground to their roots, entirely corroded or rusted off by some cause to me then inexplicable. I think the crop was less than 80 bushels per acre. The part planted with corn amounted to nothing except for fodder. The next year, (38) all except one-tenth of an acre was manured with four cart-loads of coarse manure, ploughed twice, and sowed with ruta baga, about 20th of June—harvested 1st of November, trimmed close, and accurately measured, and the yield was 100 bushels—or 1000 per acre. In '39, the produce of turnips was very good. The years '40 and '41, in consequence of drought, the turnip seed most failed to vegetate, and what few did, the insects destroyed. The past season, (42) I planted three small pieces of land with squashes and pumpkins. They were destroyed by the black bug; one of the pieces was set out with ruta baga plants in July, several very warm days succeeded, and the tops were killed to the surface of the ground, and it was many days before they showed any signs of life. When they were harvested in November, many of them were the largest turnips I ever saw. The other pieces were sowed late in July with English turnip seed, by merely hoeing them in, and nothing farther was done to them till they