

swamp was acid or sour. Sourness in our farm or orchard soils is a most injurious quality. For farm crops to thrive our soils must be neutral or alkaline, the opposite to acidity. It is by reason of its acidity that the application of the crude muck is of very little use and frequently injurious to the soil. When once the muck has been weathered and decomposed the acidity is corrected and its decomposition proceeds. A lack of proper drainage often tends to the production within our soils of certain organic acids; this acidity must be corrected if we expect to get the best results. How can we correct it? By drainage and by applying alkali in some form or other—say lime or wood ashes. That sourness may be due to a deficiency in lime, or to the fact that the water table has been too high; drainage, of course, will correct it in the latter case. If due to a deficiency in lime, you must apply that element in some form.

Perhaps you would like to know how you might get an approximate idea as to whether your soils are deficient in lime or not, whether they are acid or sour. Blue litmus paper will turn red in the presence of an acid; red litmus will turn blue in the presence of an alkali. Put a lump of soil in a tumbler; pour on water, stir, let it settle; put in a little bit of blue litmus paper, leaving it a minute or two partly submerged. If the part which has been under the water has turned red that soil is acid.

Now in reference to the lime in the soil. Free or caustic lime does not exist as such in a soil; but, owing to its strong affinity for carbonic acid (which, you will remember, is always present in the air), it will be found as carbonates. Carbonates in the presence of an acid effervesce. When we have tested for acidity and the soil is quite settled down, let us pour in carefully a teaspoonful of strong vinegar, or a small quantity of any other acid, and watch closely for any effervescence. If there is an effervescence that soil is all right and does not need the application of lime. If there is no effervescence, and the soil has already been proved by the litmus paper to be acid, then you may rest assured that it stands in need of lime and will give a profitable return for the application of lime in some form or other. These are trials with soils which you can all make.

It is really astonishing to find how many soils there are deficient in available lime. A good deal of work in this connection has been done at Rhode Island, and the large number of even upland soils which they have in that State deficient in lime is surprising. These soils are not absolutely lacking in lime, but it is not there in sufficient quantities for the best returns. When the element is not present in sufficient quantity to give the best returns then I call it deficient in lime, and it then becomes economic to supply it.

The useful functions of lime in the soil are many. It acts both chemically and mechanically. On heavy, plastic, cloddy clay it renders the soil mellow, so that it does not bind or puddle when wet. On the other hand it helps to bind and cement the loose, friable, sandy soils. It helps to liberate or push out, from locked-up combinations, potash and, possibly, other mineral food; so that while in itself it is an element of plant food it is indirectly the source of others. It is for this reason known as an indirect fertilizer. Then again, it corrects acidity, a matter already referred to. It favours the nitrification of the humus. Nitrates are not formed in acid soils; the germs which form these compounds only flourish in soils that are slightly alkaline, as when lime is present.

There is an old saying that lime, while it makes the father rich it makes the son poor. Now, there is truth in that; because the excessive use of lime, unaccompanied by nitrogen and potash and phosphoric acid, tends to exhaust the soil. The exclusive use of lime tends to render available, as fast as possible, such resources as the soil contains. The constant and sole use of lime, therefore, is wrong. The use of lime must be accompanied with the application of organic manure, such as I have spoken of, barnyard manure, clover turned under, sea weed, etc., then you will obtain good results and improve the soil.

On conclusion of the foregoing, a number of those present in the audience asked questions of the speaker and discussed the address. Among those who did so were Mr. Sharpe, of the Experimental Farm at Agassiz, and Mr. H. E. Hutcherson, Ladners.

One member asked for a formula for a fertilizer useful to an orchard soil. Mr. Shutt suggested the following:—

100 lbs. bone meal; 100 lbs. superphosphate; 100 lbs. muriate of potash,
per acre.

Or the following mixture:—

150 lbs. bone meal; 100 lbs. muriate of potash per acre.