

valuable forms. Composting air-dried or weathered muck with barnyard manure will make its nitrogen as valuable as that which we might buy in the form of nitrate of soda. I am often asked, "Do you think it would be of any value to me if I were to take this swamp muck as it is dug and put it upon the ground?" I answer, from our experience in the majority of instances, I do not think there would be any adequate return for the same. But dig and pile it and let it dry out, and when you have it in that condition you will find it an excellent absorbent. You can use it in the pig-pen or wherever there is liquid manure to absorb. It thus serves two purposes: it will prevent from going to waste the most valuable part of the manure, for the liquid portion is worth a great deal more than the solid; it is worth more by three times at least, weight for weight, than the solid portion of the manure. It not only contains a larger percentage of nitrogen and potash, but these are in an immediately soluble condition.

You will remember that I have emphasized the fact that plant food must be soluble before plants can utilize it. For this reason we place a very high value upon the liquid manure. We want to prevent its waste on the farm. It is something sinful to see the waste of good manurial elements from many barnyards in Ontario and in the East. After this muck is air dried it acts just like a sponge. When you subsequently compost or ferment it there will be a setting free of the inert nitrogen of the muck. This is the third source of nitrogen. There are other sources.

In many places you can get fish offal. That contains a large amount of nitrogen, more or less readily convertible into material valuable as plant food, more especially nitrogen and phosphoric acid. The same is true as regards sea weed, which contains a certain amount of nitrogen but potash particularly. It is specially a potash fertilizer. Reverting for a moment to fish offal we may say, if it is largely made up of the back bones and the heads of the fishes it will probably be richer in phosphoric acid than in nitrogen; if made up of the entrails of the fishes there will be more nitrogen than phosphoric acid, so that the composition of it will be determined by the nature of the materials.

As the fertility of the soil so will the product be, not only in quantity but in quality. Not only can you increase the crop of fruit of your trees but you can improve the quality by having an abundance of the right kind of plant food in the soil.

Then there are mechanical methods which it is necessary for us to consider, one of which is the matter of drainage. This is a question which should receive your very careful attention in British Columbia. Light, gravelly soils on the slopes will not require drainage; but it does seem to me, from what I saw—of course I speak subject to correction—that certain of the bottom lands will only do their best when subjected to proper drainage. For heavy soils, whether you have a dry season or a wet one, drainage will be of advantage. In a dry season the drained soils will be more moist and in a wet season the soils will be drier. You cannot get the best results from a heavy soil unless it is drained. We did not work that out yesterday. We have the experience of generations of good farming back to support this statement. I spoke of the plants taking their food from the atmosphere through their leaves; but do you know the roots also require air? We must have air in our soils if our trees are to thrive. If a soil is water-logged, water-clogged, there is no air in it and the trees are not in a normal condition and they will surely die. They must have a moist but also an aerated soil. Drainage leaves the right amount of moisture in a soil.

Let me illustrate that point: suppose I take a glass and half fill it with marbles, cover them with water, and then pour the water off; you could not see any water, still every marble there would be covered with a thin film of water. Break these marbles up into a thousand pieces and you have, as it were, the particles of a soil. Each particle is moist all over. You cannot wring any water from them, but they are nevertheless moist.

This is the kind of moisture we want for our tree roots, and it is obtained by drainage. Film moisture, not free water, is what we must aim at, if we wish our crops to thrive. What I say is, that film moisture is obtained by drainage, and that the same method lowers the water table, or, in other words, gets rid of free water. You cannot find any plants, except swamp plants, that will grow and thrive in water; for all farm crops the water level or table must be at some distance from the surface of the soil. Further, as I have said, a soil should be well ventilated. Air is not present in a soil unless the water that has fallen upon it is passing through and into the subsoil.

But I must not omit one point. You all know what is meant by the term sourness or acidity. Were we to test it we would find that nearly all peat or muck as it came from the

swamp was a For farm crop by reason of frequently in the acidity i tends to the j if we expect alkali in son deficiency in will correct it in some form.

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