mixed with small limestone gravel, a large portion of which adhered to the superstratum. The gravel appeared to be mixed with the clay in the subsoil in about the same proportion that the raisins in a poor man's pudding bear to the pudding itself.

We saw that the land generally, although it appeared rich, and was all covered with the best hardwood, was what is called "cradle-knolly," and at that time we did not understand the quality so developed. We now know that "cradle knolls" are a sure sign of a poor, wet subsoil, no matter how rich the surface may appear to be, as otherwise the trees would have gone deeply into it, and by consequence would not have been so readily uprooted in previous years. For the fact is that the roots of trees do not like to penetrate into such a sour, hard, uncongenial portion of the land, and consequently, by spreading out on the surface, and not penetrating deeply, they were continually being uprooted in all directions. Year after year, as the timber had attained its growth, and each uprooted tree had drawn with its roots the surface soil, and with it some subsoil adhering—the roots themselves, meanwhile, decaying in their turn—the earth so gathered had accumulated into heaps or knolls, to be again occupied with a new growth of timber. And so these cradle knolls are formed, and the subsoil, thus drawn into heaps, has left deep depressions or hollows in the intervals. These intervals were very rich, as the wind had many a time drifted them full of leaves, and of course had denuded the higher spots in the same ratio, thus leaving the elevated spots poor, and the lower ones too rich and wet.

When, therefore, in subsequent years, we succeeded in ploughing away the high spots, and thus levelling the land, we actually in the process covered up the best soil with the poor and exhausted knolls; and thus we found to our cost that "cradle-knolly" land must necessarily be comparatiually poor for some years, and until the gradual mixture of hillock and dale was ultimately equalized by cultivation.

Here is an explanation to emigrants coming to Canada well worth their careful attention, as, independently of the causes above stated, the "cradle-knolly" land should be taken up with caution. The extreme roughness of its surface renders it three times as difficult to plough before the roots are decayed; and during wet seasons the water is sure to lie in the hollows, to the injury of the crop. And again, the roots of trees in the kind of land above described, which do not go deeply into the soil, but rather creep about near the surface, offer a terrible obstruction to ploughing during the first six years after clearing. We have often, since those days, seen land where the tree roots penetrated the subsoil so nearly to the stump that the plough could be conveniently used years before it could in our case.

Surface Application of Manure.

It is now becoming generally understood that the old plan of ploughing barnyard manure into the soil is not the most advantageous plan that can be adopted to secure its being eliminated as plant food by the crops to be grown on the land. As years pass on, and more experimental observation is taking the place of old faith in the doings of our forefathers, among the agriculturists, it is being demonstrated by practical experience that much of the success in applying manures to the soil will be dependent upon the art used in adapting the method of application to the circumstances of the case. The natural tendency of all manures applied to the soil is to work downwards; that is, the elements of plant food contained in them, as soon as set free by the action of water, which in all cases is the greatest resolvent, are carried beyond the reach of the roots of plants, unless they can be placed in a position to be made immediately available as plant food, by being taken up by the roots of the crop as fast as they become resolved into their chemical constituents. This course of action is constantly going on from the time the manure is first deposited in the yard, until it is finally taken up as food by the plants in the soil to which it is applied. This action may be accelerated or retarded, according to the method adopted in managing the material of which the manure is composed.

Now, if we apply the manure in a long undecomposed state to a stiff clay soil, and turn it under deeply with the plough, it will remain inert in the ground for a length of time, perhaps for years, according as the soil is worked or not afterwards, and its good effects will be divided over several successive crops, giving but a small proportion to each, as being deeply buried in a compact soil, it will not quickly be changed into plant food. Suppose, instead of being so buried, it was spread over the land late in the fall, and allowed to remain all winter, to be turned under with the plough early in the spring. The fall rains and winter's snows would wash every particle of available plant-food then in it into the surface soil, for some distance down, where it would be retained in solution, and go to help forward the crop to be grown in the succeeding summer, during its early stages. The inert material then left to be turned under by the plough in spring would be gradually decomposed under the surface, and become available either for the crop in its later stages of growth, as its roots penetrated into the soil, or for the succeeding crop, when the reversal of the soil would throw the partly or wholly decomposed materials again towards the surface.

Now, if we have the ground prepared and ready for a crop, and have on hand some barn-yard manure already in a state in which a large proportion can be readily dissolved by rain and washed into the soil, it would be of vastly more benefit to that crop if the manure were spread over the surface, and harrowed in with the seed, than if it were buried out of sight with the plough. What would remain on the surface of undecomposed elements would be of no more value were they buried out of reach of the roots of the crop to be grown, but on being turned under at the next ploughing, and again turned back before the next crop is sown, they would become converted into available plant food for that crop. In applying barn-yard manure to the turnip crop, it is found the best plan to run furrows with the plough, fill them with green manure, and cover that with a light coat of earth, on which the turnip seed is sown. The roots of the turnips penetrate to the manure, and extract all the then available plant food in it, leaving the remainder to be decomposed by time and fermentation, to be made available for the next crop, when most of the manure will be turned up towards the surface, in a condition ready to have the fertilizers contained in it washed by rain back into the soil, among the roots of the grain crop that usually (under a proper system of rotation) succeeds a root-crop.

It is an old fallacy that by applying manure on the soil, much of its fertility is wasted by evaporation. This is not, and cannot be the case, unless to a very limited extent with a single constituent, namely, ammonia, and it may be questioned if anything more than the water contained in the manure can be evaporated, leaving the salts held in solution by it behind, to enrich the soil, when again dissolved.

The only advantage gained by turning under manure with the plough is the acceleration of the decomposition of the straw and other fibrous material contained in it, which in course of time become gradually resolved into plant food by the chemical action of the mineral salts contained in the soil.

Superphosphate of Lime.

W. G. S., of Toronto, wishes to know how to make superphosphate of lime. We presume he refers to the home-made article, and not to the commercial fertilizer. A ready way of manufacturing this important manure is to break up the bones as fine as possible, and then place them in a wooden box or barrel. Water, equal to about one-sixth the weight of the bones, may next be added, well stirred in, and left for a day or two, to heat and ferment. Boiling water would be best for this purpose. Then add sulphuric acid, mixing well with a wooden spade (no metal should come in contact with the mixture) in the proportion of about forty pounds of acid to one hundred pounds of bones. Let it stand for about two weeks, stirring daily. If the mass is not then dry, add some absorbent, such as sawdust, dry