

stand *facile princeps*. They constitute the basis of fertility for soils under cultivation; they are at once the most effective fertilizers and best "soil improvers" known.

The function of manure in the soil may be said to be threefold: the supplying of the three essential elements of plant food, nitrogen, phosphoric acid and potash; the inoculation of the soil with micro-organisms, bacteria, which give "life" to the soil and which prepare crop food from the store in the soil and are more especially useful in the development of the nitrates, the chief form of nitrogenous food for all crops other than the legumes; and lastly the physical improvement of the soil, making it mellower, warmer, better aerated and increasing its water-holding capacity.

Mixed manures, that is the excreta plus the litter, of average quality will contain approximately per ton, 10 lbs. of nitrogen, 5 lbs. phosphoric acid and 10 lbs. of potash, and such manure would be worth to-day for its plant food about \$2.50 per ton. But from what has been said as to the several functions of manure we must ascribe to it a greater value than that calculated from its plant food content. The chief reason for this lies in the fact that it furnishes a large amount of humus-forming material. Humus is a very important constituent of soils, not merely because of its physical effect in mellowing soils and its large moisture-holding capacity, but because it is the natural storehouse of nitrogen, the most costly of all plant food elements; and because it furnishes the food upon which the soil bacteria thrive and develop. The colloidal properties of humus in holding mineral plant food that would otherwise be leached away to depths below the root system is also an important and valuable function.

Our virgin soils of extraordinary richness and fertility, as found for instance in the prairie provinces, are well supplied with this humus-forming material; soils exhausted by cropping and irrational methods of farming have been depleted of this material and herein lies their poverty, their low productiveness, for as the humus is "burnt" out, so the nitrogen of which it was the storehouse is dissipated. The humus content, we may therefore conclude, is a fair measure of the nitrogen content and of a soil's productiveness. Light soils lose their humus and nitrogen more quickly than strong heavy loams and therefore require more frequent replenishment with manure or other humus furnishing material to maintain their fertility. If time permitted we might well dwell at greater length on the functions of humus, so important is its rôle in maintaining soil fertility. Our campaign has endeavoured to emphasize the necessity of keeping the soil constantly and well supplied with this natural builder of soils.