

ing the soil's fertility. We must not tell farmers that the yields are absolutely, entirely and exclusively dependent upon the plant food in the soil, or even upon the available plant food in the soil; there are other factors, the moisture in the soil, the temperature and a number of other conditions which go to make the crop a success or failure. Nevertheless, the amount of plant food in the soil which is available is a prime factor in determining the yield. That is the question to emphasize, we urge our farmers as a fundamental proposition to increase the plant food in the soil by every legitimate, economic means, and we will now discuss some of our teachings in that direction. Thorough tillage, the growing of legumes, more manure and its care and proper application; these are the means at our command.

FARMYARD MANURES.

All our work has emphasized the value of farmyard manures as the most effective fertilizer that we can apply. The explanation, we think, is readily found. We make this statement that manure has a greater productive value than can be attributed to it from the plant food that it contains, than is indicated by its percentages of nitrogen, phosphoric acid and potash. Commercial fertilizers are bought, or ought to be bought, on the basis of potash, nitrogen and phosphoric acid that they contain. If we know the percentages of these in the fertilizer, and their availability, and we know the market price of these materials, we can calculate the exact value of the particular brand and say it is worth \$25 or \$35 a ton. We may take a sample of the manure and analyze it. We ascertain the percentages that are present of these various plant foods, and from them we calculate that at the present time such a sample of barnyard manure should be worth, say, \$2.50 a ton. Then this manure has a greater value than can be attributed to it from the amount of its plant food content, that is, over and above \$2.50 per ton.

MANURE A SOURCE OF HUMUS.

The explanation is that manure furnishes humus-forming material. It is not necessary, perhaps, to go into any lengthy definition of humus. Humus, for our purposes, is simply semi-decomposed organic matter, and it is probably the most valuable of all our soil constituents.

HUMUS A SOURCE OF NITROGEN.

We find that all our virgin soils of extraordinary richness and fertility are well supplied with this vegetable matter, this humus-forming material, and soils exhausted by cropping and irrational systems of farming have had this material dissipated, destroyed. Moreover, humus is important because it is the storehouse of nitrogen. Nitrogen is an important element of plant food, not merely because it is essential to the life of the plant, but because it is a very expensive form of plant life when we have to buy it for fertilizing purposes, something like three times the price of phosphoric acid and potash, weight for weight. When the humus is burned out of the soil by irrational methods of farming the nitrogen goes with it, for this humus is nature's guardian for this important element. We have, therefore, to consider the humus content of the soil as indicative in a very large measure its relative fertility.

PHYSICAL EFFECTS OF HUMUS.

Further, humus has a very remarkable influence upon the mechanical texture of the soil. As we said a moment ago, the fertility of the soil does not depend altogether on the amount and availability of the plant food present; productiveness depends in large measure upon the physical or mechanical condition of a soil. It must offer a