

FRESH VERSUS ROTTED MANURE.

Weight for weight, fresh manure has given crop yields almost equal to those from rotted manure. Since the latter, under careful conditions of rotting, contains larger percentages of plant food constituents, this seems surprising. It is nevertheless the case, for it is the result of many repeated experiments, extending over a long period of years. Explanations might be offered from the standpoint of chemistry, of biology, and of physics, but they would be largely conjectural and their discussion would not serve any useful purpose in this brief review. The fact remains.

The losses that occur in the rotting of manure have been carefully and repeatedly determined. Under the very best practice—that of keeping the heap *compact and moist and protected from leaching rains*, the losses are considerable; under careless methods involving excessive fermentation or leaching, or both, they may be enormous. The losses due to high fermentation fall on the organic matter and nitrogen; those due to leaching are chiefly in nitrogen and potash. Our experiments would go to show that, under the conditions as found on the ordinary farm, the loss in rotting is from one-third to two-thirds of the initial value of the manure.

All this emphasizes the economy of applying manure to the land as soon as possible after its production, fresh and direct from the barn and stable, so far as that may be practicable. The soil is its best storehouse. The products of its decomposition, if formed within the soil, are held therein for soil improvement and future crop use.

MANURE HAS A GREATER VALUE THAN INDICATED BY ITS PERCENTAGES OF PLANT FOOD.

Manure has a much higher crop-producing power than would be indicated by its percentages of nitrogen, phosphoric acid and potash. This has been abundantly shown by the larger yields from the plots receiving their quota of plant food partly in manure and partly in fertilizer as compared with those receiving it entirely as fertilizer.

This is readily explained. Manure furnishes humus-forming material. Humus is probably the most valuable of all soil constituents, improving its tilth, increasing its water-holding capacity, supporting its microbial life and by its decay acting as the direct source of available plant food. In these particulars, fertilizers play no part for they do not furnish any humus-forming material. In a word, fertilizers are no substitute for manure; to be used profitably we conclude they must be employed to supplement the stock of manure. We cannot hope to carry on farming profitably by the exclusive use of fertilizers.

THE MANURIAL VALUE OF CLOVER.

The value of clover and other legumes for increasing the fertility of the soil has been exhaustively studied. The unique property of appropriating atmospheric nitrogen through the agency of bacteria residing in the nodules attached to their roots, has been abundantly emphasized by our investigations. By this means from 50 to 100 pounds of nitrogen per acre may be added to the soil that will subsequently be available for crop use. In field demonstration it has been repeatedly shown that crop yields, after turning under an aftermath of clover, fully equalled those from land dressed with manure at the rate of 10 tons per acre. The high manurial value of the legumes has been well established, and all our work in this connection has been most satisfactory, encouraging and conclusive.

FERTILIZERS: THEIR VALUE AND FUNCTION.

It would seem impossible to predict with any certainty the return from fertilizers. The results are most erratic, depending not only on the character of the land and the nature of the crop but also in a large degree upon the season. It has been shown, how-