

Artificial Manure

There has been for some time a scarcity of farm manure for agricultural purposes which has been felt even by golf clubs. Since the desirable farm manures are no longer obtainable, various methods have been devised to manufacture "artificial manure" by a process of rapid decomposition of such rough organic material as straw, leaves, cornstalks, and grass clippings. Most of these methods are dependent upon a plentiful supply of moisture and nitrogen in an available form to assist in the decomposition process. The organic material is saturated and nitrogen in a soluble form is mixed through it as it is piled. Lime and superphosphate are sometimes added. The lime (calcium carbonate) in some cases hastens decomposition, and the superphosphate increases the phosphoric acid content of the manure and also assists in decreasing the loss of ammonia during decomposition.

The Bulletin of the United States Golf Association Green Section has from time to time referred to these processes, and in the Bulletin for June, 1924, and September, 1930, methods are described in sufficient detail to enable the greenkeeper to apply them on the course. The Bulletin for November, 1929, contains a brief review of Bulletin No. 573, entitled "Artificial Manure from Straw," issued by the New York State Agricultural Experiment Station, Geneva, N. Y.

Two bulletins have recently been published by the Iowa Agricultural Experiment Station, Ames, Iowa, dealing with the production of artificial manures, and with the effects of the manures on the soil and crops. The bulletins are technical in character, but the results of the work, from which we will quote, have considerable practical value. In fact they are, on the whole, of more value to the greenkeeper than to the farmer, because the large amount of water required in the process of decomposition is often more readily available on the golf course than on the farm.

Credit for the first practical work in composting raw organic materials with chemicals and water is given to Hutchinson and Richards in the following quotation from Iowa State College Research Bulletin No. 126, "The Production of Artificial Farm Manure," by F. B. Smith, W. H. Stevenson, and P. E. Brown:

"Hutchinson and Richards in England were the first to develop a really practical method for the production of an artificial farm manure. They treated alternate layers of straw with ammonium sulphate and limestone, making heaps 10 feet square and 5 feet high for each ton of straw. Water was added in sufficient amounts to bring about thorough decomposition of the straw in a minimum period of time. The process was later improved by the use of a phosphate with the ammonium sulphate and lime. It was patented and is now controlled in this country by the American Adco Company."

By their own experiments Smith, Stevenson, and Brown found that it was desirable to provide soluble nitrogen in some form to hasten decomposition. "It seems very desirable," the bulletin states, "that some reagent supplying soluble nitrogen be employed in preparing composts from straw, cornstalks, or other similar materials, in order to hasten the decomposition processes, and permit of the earlier production of a well-decomposed manure. Such a reagent will also increase the fertilizing value of the manure produced because

of the nitrogen added. Artificial farm manure may be produced by composting straw and such materials without the addition of any reagents, but the process advances much slower and the manure formed is of less value when applied to the soil."

These investigators call attention to the necessity of keeping the piles moist. "These experiments on the production of artificial farm manure," they write, "show that a good grade of well-decomposed manure may be made by composting straw or cornstalks with certain chemicals, provided a sufficient supply of water is added to keep the compost heap moist. The addition of a proper amount of water is essential for the best decomposition of the materials and for the production of the best grade of manure."

Even though the manufacture of artificial manure has been practiced for some time, there still remains a doubt in the minds of many as to its value compared with farm manure. In the second Iowa State College Bulletin referred to above, Research Bulletin No. 127, the research workers, F. B. Smith and P. E. Brown, show that similar results may be expected from the use of artificial manure and farm manure. The results of their work are shown in the following quotation from this bulletin:

"From the results as a whole it is apparent that the proper composting of straw and cellulose residues may permit the production of artificial manures which will give similar effects on bacteriological conditions in the soil and on crop yields to those occasioned by farm manure. There is a similar stimulation in the nitrification process and in the numbers of organisms, and while nitrate assimilation is also stimulated by the artificial manures, the influence on this process is no greater than that produced by farm manure. While, therefore, there may be a reduced content of nitrates in the soils following the addition of these artificial manures, there is no greater reduction than that brought about by farm manure. As farm manure has a well-known beneficial effect on crop growth, it is apparent that there need be no deleterious effect from well-decomposed artificial manures either on crop yields or on soil conditions in general. In fact it would seem that quite as large beneficial effects should be exerted, and any increase in nitrate assimilation and decrease in nitrate content is more than offset, from a crop production standpoint, by the increased nitrification which is occasioned."

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