THE INFLUENCE OF ORGANIC MATTER ON NITRATE ACCUMULATION AND THE BASE EXCHANGE CAPACITY OF DICKINSON FINE SANDY LOAM

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A study of the decomposition of humus-forming materials in the soil is of large practical as well as technical value. Many investigations (13, 10, 9, 2, 5, 3, 7, 4, 12, 1, 8) have shown that a fairly close relationship exists between the rate of decomposition of organic matter in soils, the rate of carbon dioxide production, the accumulation of nitrates, and the numbers of bacteria. Comparisons of the rate of decomposition of some plant materials have been made but only for a small number of materials. The relation between nitrate accumulation in soils treated with plant materials and the nitrogen content of the materials added has been shown, therefore, only in a general way.

Base exchange studies on soils have shown that the organic matter fraction of a soil is responsible for a large part of its base exchange capacity. However, studies on the effect of specific plant materials on the base exchange capacity of soils are meager.

The purpose of the investigational work presented here was to determine the rate of decomposition of several humus-forming materials and to study the influence of these decomposing plant materials on the base exchange capacity of a Dickinson fine sandy loam.

METHODS OF PROCEDURE

The materials selected for the study were wheat straw, oat straw, sudan grass, cane sorghum, flax, cornstalks, millet, hemp, soybeans, alfalfa, sweet clover, and red clover. These crops were grown during the summer of 1934 and the tops (stems and leaves) of the plants only were taken for study. The crops were harvested, dried, and passed through a hammer mill. The materials were then brought to the laboratory and ground to pass a 40-mesh screen. Each sample was stored separately in large moisture-proof jars.

The effects of these materials on the nitrate accumulation in the soil, the exchange capacity of the soil, and the carbon and humus content of the soil were studied in three greenhouse and laboratory experiments.

The soil used in these experiments was a Dickinson fine sandy loam which had a pH of 6.33 and a lime requirement of 1 ton per acre.

EFFECT OF VARIOUS PLANT MATERIALS ON ACCUMULATION OF NITRATES IN SOIL

Twenty-six 9-gallon pots were filled with Dickinson fine sandy loam, and each of the plant materials was added to duplicate pots of

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3Figures in parenthesis refer to "Literature Cited", p. 865.