THE RHYTHMICAL NATURE OF MICROBIOLOGICAL ACTIVITY IN SOIL AS INDICATED BY THE EVOLUTION OF CARBON DIOXIDE

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The factors influencing the production of carbon dioxide in soils have been the subject of many investigations. The evolution of carbon dioxide from soils has long been regarded as a measure of microbiological action, although it is now recognized that this may be a rather liberal interpretation of the facts. However, numerous experiments have shown a fair degree of correlation between the amounts of carbon dioxide produced in soils and the numbers of micro-organisms present. Experiments have also shown a relationship between the evolution of carbon dioxide from soils and the activity of certain physiological groups of soil micro-organisms.

It is common knowledge that microbiological activity in soils may be increased at first and then decreased when field soils are brought into the laboratory. This stimulation is evidenced by an increase in numbers of organisms and also by an increase in the amount of carbon dioxide produced.

Johansson (3) observed a regular periodic fluctuation in the production of carbon dioxide in forest soils when the soils were incubated in the laboratory under control conditions. He also found that the amount of carbon dioxide produced during the day was often greater than the amount produced during the night.

The purpose of this investigation was to determine the rate of evolution of carbon dioxide from soils variously treated and to study the relationship of carbon dioxide production to microbiological activity in soils. The data reported in this paper are the results of preliminary work done on the first part of the problem.

METHODS OF PROCEDURE

The amount of carbon dioxide evolved from the soil was determined at 12-hour intervals for periods of 5 to 15 days. Duplicate samples of the moist soil which had been passed through the 2-mm sieve and thoroughly mixed were weighed out and placed in 400-cc beakers. Samples of the moist soil equivalent to 400 grams of the dry soil were used and the moisture content adjusted to 25% by the addition of distilled water. The beakers containing the soil were then placed in respiration chambers and incubated at 27° to 28°C.

The respiration chambers used in these experiments were made from 1-gallon tin buckets and are similar in principle to the apparatus described by Lundegardh (4), Fehér (2), and Johansson (3). A wire loop was soldered inside the bucket to support the beaker containing the sample of soil. A hole was cut in the

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2Associate Professor, Professor, and Fellow, respectively.

3Figures in parenthesis refer to "Literature Cited," p. 108.