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Oxygen Absorption and Carbon Dioxide Production in Soils

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In a medium containing ammonium chloride the respiratory quotient was slightly less than 1.0.

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OXYGEN ABSORPTION AND CARBON DIOXIDE PRODUCTION IN SOILS

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Carbon dioxide production in the soil has long been regarded as a measure of biological activity. It has been suggested that oxygen absorption might give a more reliable measure of the total action of microorganisms than carbon dioxide production. Since the amount of oxygen consumed by aerobic organisms under constant environmental conditions bears a definite relation to the amount of carbon dioxide produced, it would seem that the ratio of carbon dioxide produced to oxygen consumed would show something concerning the nature of the organic matter of the soil, its composition and rate of decomposition and, therefore, be a better index of microbiological action than either alone.

Theoretically, the complete oxidation of a molecule of glucose yields 6 molecules of carbon dioxide and 6 molecules of oxygen are consumed in the process. The ratio of carbon dioxide produced to oxygen consumed is, in this case 1/1. This ratio referred to an organism on a given substrate is called the respiration quotient. The respiration quotient of an organism may vary widely with conditions but for a given set of conditions it is constant. The ratio of carbon dioxide produced to oxygen absorbed in the soil under aerobic and constant environmental conditions should represent the resultant of the respiration quotients of the heterogeneous population of aerobic soil microorganisms. This ratio might be called the respiration quotient of soils since we speak of soil respiration. The respiration quotient of a soil, then, should be characteristic and should reflect life conditions in the soil.

The respiration quotient of soils may vary widely. Results were secured in this laboratory with the Iwanoff fermentation manometer which indicated that the quotient was 1 for the particular case. The oxygen content and the carbon dioxide content of the soil air for various conditions have been determined and generally

the sum of oxygen and carbon dioxide was 20.9, the normal oxygen content of the atmosphere.

The respiration quotient of Carrington loam under various treatments was determined, using a Haldane microgas analysis apparatus for the measurements. The average respiration quotient for untreated Carrington loam was 0.87; for Carrington loam treated with cellulose 0.83; and for Carrington loam treated with dextrose 1.27.

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THE SOMATIC CHROMOSOMES OF CYPRIPEDIUM HIRSUTUM AND SIX SPECIES OF HABENARIA

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The chromosome numbers of eight species of the *Orchidaceae* were reported last year. The purpose of this paper is to report seven more species. The material was collected in Minnesota and Massachusetts. The following numbers were found: *Cypripedium hirsutum*, 2n = 20; *Habenaria blephariglottis*, 2n = 42; *H. clavellata*, 2n = 42; *H. dilatata*, 2n = 42; *H. Hookeri*, 2n = 42; *H. hyperborea*, 2n = 42; and *H. obtusata*, 2n = 42. The size relationships are the same as in the species studied last year. The Cypripedium has very large chromosomes, and the Habenarias relatively very small ones.

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THE EFFECTS OF EXFLORATION ON THE SOYBEAN

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Most of the literature on growth and reproduction in plants leaves the implication that cessation of vegetative activity in plants of an indeterminant type of growth is due to the drain of nutrient materials imposed on the plant by the developing fruits. This is not true for the soybean. The variety used in this investigation flowers early and continues to grow for some time afterward and