CAPILLARY CONDUCTIVITY OF PEAT SOILS AT DIFFERENT CAPILLARY TENSIONS

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CAPILLARY conductivity is a convenient term for expressing the ability of an unsaturated soil to conduct water. The term is defined as the amount of water which in unit time crosses a unit area perpendicular to the direction of flow when the water-moving force is unity. The capillary conductivity of a soil depends not only on the type of soil but also on the moisture content.

In a previous report from this laboratory, Richards and Wilson presented measurements of capillary conductivity for two peat soils. One of the soils was taken from the surface zone of a virgin deposit of woody peat. The other soil was collected from a cultivated area of the same deposit. The area had been tilled annually for a period of about 50 years. In the present report capillary conductivity values are recorded for four other peat soils under varying conditions of moisture. The moisture conditions of the soils are expressed in terms of capillary tension. Embodied in the report is a comparison of the values obtained for the peat soils used in this investigation with the values reported by Richards for three mineral soils of different textures.

METHOD OF PROCEDURE

The method employed in measuring the capillary conductivity of the soils is described in the article by Richards and Wilson, referred to above, hence only a brief description of the method will be given here. The soil to be studied was placed in telescoping brass cylinders between two hollow porous cells. The flow of water to and from the soil took place through the walls of the cells at pressures less than atmospheric pressure. Such pressures are commonly referred to as capillary tensions. Enough soil was placed in the cylinders to form a column of soil about 12 cm in length and 12.1 cm in diameter. In no case during the tests did the soil expand or contract sufficiently to change the length of the column 0.1 cm. The force causing water to move through the soil was supplied by controlling the capillary tensions at the two ends of the soil column at different values. The column of soil was placed horizontally making a consideration of gravitational forces unnecessary. Evaporation of water from the soil was prevented by placing the cylinder containing the soil in an air chamber saturated with water vapor. Burette tubes were employed for reading the flow of water to and from the soil. During the experiments room temperature was controlled automatically at 24.8° ± 0.1° C. Two complete units of the apparatus were available for the work, making it possible to procure individual records for two soils simultaneously.

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