NOWHERE in the country have hydrologic processes in the soil been altered by past land use to a greater extent than in the South Carolina Piedmont. Cultivation and erosion have so changed the surface soil horizons that they have lost much of their former capacity for absorbing and storing rainfall. Because a larger proportion of rainfall now runs off over the land surface and less is stored within the soil, sloping lands are severely eroded and once farmed bottom lands are frequently flooded. There is a general recognition of the erosion problem in this region but little thought has been given to the changes in soil hydrology which are responsible for the erosion and which now make its control difficult. At the Calhoun Experimental Forest we have recently commenced to study these changes in soil hydrology. This forest, in Union County, S. C., was set up on abandoned cotton lands by the Southeastern Forest Experiment Station, U. S. Forest Service, to explore the role of trees in restoring depleted Piedmont lands.

In a previous article (3) the part played by the soil in regulating the hydrologic cycle was discussed and the importance of pore space relationships and percolation rates within the soil profile was emphasized. It was shown that the way in which man used the soil could greatly alter the characteristics of the surface soil horizons and that it is primarily through this control of soil properties that man exerts an influence upon the water cycle. The type of pore space largely determines the rate at which water will move through the soil and the amount that will be stored. Water in the capillary pore space is held against the force of gravity and remains to be used by plants or is lost to evaporation. The non-capillary pore spaces hold water only temporarily, but the amount of this storage is of great hydrological importance. These larger pores also regulate the percolation rates, because it is only through them that water can move freely in response to gravity. The amount of pore space is determined by draining saturated samples at a tension of 60 centimeters for 4 hours. The water drained by this tension is considered to have occupied the noncapillary pore space while the water remaining in the sample is held by the capillary pore space. Percolation rates are obtained as shown by Fig. 1. Samples are saturated by closing the outflow tube and adding water to the cup which holds the sample. When saturation is complete, the head ring is connected to the constant level tank and the outflow tube is opened. Ten minutes are allowed to drain excess water and for the rate of outflow to stabilize. The percolation rate is based on the next 10- or 20-minute period. Twenty samples are run at one time by use of this equipment. The head on the sample may be controlled by regulating the water level in the tank or by raising the outflow tube.

**ORIGINAL PROFILE CHARACTERISTICS**

On what few areas of undisturbed upland soils remain in this region we find little difference in pore space relationships between different soil series for the surface 24 inches. Through the past centuries under forest cover, roots have thoroughly occupied the soil, and insect activity has made the upper horizons about equally porous and permeable.

Fig. 2A gives the volume of noncapillary and capillary pore space for the upper 2 feet of a Vance soil which has never been cultivated and is under a mixed hardwood forest. Water drained from saturated samples at a tension of 60 centimeters for 4 hours is the measure of noncapillary pore space. Water that drains at this tension is considered to be occupying capillary pores.

Because rainfall is measured by depth, it is useful to convert pore space volumes to a similar inch-depth unit for purposes of comparison. Multiplication of the per...