AVAILABILITY OF SOIL MOISTURE, PARTICULARLY AS AFFECTED BY DEPTH, IN THE SOIL OF THE KENTUCKY EXPERIMENT STATION FARM AT LEXINGTON

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In Bulletin 272 of the Kentucky Agricultural Experiment Station, data are given showing that in many years lack of moisture prevents corn yields on the Experiment Station farm from reaching the level made possible by the fertility of the soil and that the reason for this is the poor distribution of rainfall during the growing season. Obviously this moisture limit to crop yields also is affected by the extent to which crops can utilize water held in the soil at different depths.

The general belief probably is that most crops obtain water from the first 5 to 6 feet of soil mainly by penetration of roots into the deeper layers, capillary movement no longer being thought of much importance in this connection. The basis for believing that crops root effectively at 4 to 5 feet, as pointed out by other writers is the result of extensive studies of root development made by Weaver and co-workers in soils of the subhumid section of the United States where, because of the open nature of the subsoil, it is to be expected that crops would root deeper than in most soils in the eastern part of the country.

By considering the amount of water the soil on the Experiment Station farm will hold in relation to the crop requirement, it is apparent either that the crop can use water only from a comparatively shallow surface layer or that most of the water in the soil is held so firmly that crops cannot get it. Assuming the capacity of the soil of the surface foot to hold and deliver water to the crop to be 20% of its dry weight (maximum field capacity, about 30%), the surface foot layer (weight per acre, 4,000,000 pounds) would furnish water equal to approximately 2.6 surface inches. Seemingly it should be able to deliver 2 inches of this amount sufficiently rapidly so that the crop would suffer very little for water during the time this is being used. Since during the period of greatest use by the corn crop probably not over 1 inch of water is being removed from the soil per week, the surface foot alone should furnish the crop with enough water for almost 2 weeks, which is approximately the length of time the corn crop at this state of growth will go without injury in fair weather.

The soil used for the agronomy work is Maury silt loam. The surface soil works as a mellow silt loam and the subsoil is friable and well drained. Limestone rock is reached at from 6 to 10 feet, openings into

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