An Improved Method for Determining the Water Permeability of Forest Soils

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The permeability of the soil to water influences the content of soil moisture, rate of runoff, and degree of erosion. The direct determination of the rate of water permeability requires sampling of soil in an undisturbed condition. This is a prerequisite which is difficult to fulfill in forest soils because of the occurrence of worm passages, large roots, and stones. The procedure reported in this paper first of all aims to minimize the disturbance of soil in sampling.

The suggested sampling equipment is a modification of the device introduced by Gaiser (1). It consists of a hollow brass cylinder with four rectangular brass plates attached to the base. The plates are provided with 2- and 3-inch steel spikes which serve to anchor the cylinder. The inner spikes facilitate detection of rocks and large roots that would interfere with sampling. A removable plunger is bored to accommodate the shoulder of the sampling can and is drilled to allow insertion of a 1/2-inch hardwood dowel that terminates the sampling at 2, 2 1/2, or 3 inches. The maximum depth (3 inches) yields a core of 292 cc volume. The plunger is fitted with a heavy steel cap strong enough to withstand hammer blows.

The sample container is a 12-ounce seamless can manufactured by the Crown Can Company of Philadelphia. It has a sloping shoulder with a mouth diameter, a constant outside diameter of 70 mm, and height of 85 mm. The bottom of the can is means of a carborundum wheel and the edges sharpened.

The soil is cleaned of twigs, grass, stems, and coarse material that may interfere with sampling. The sampler is firmly pressed into the soil, a can placed in the cylinder, and the plunger inserted (Fig. 1). The plunger is driven downward to the required depth by sharp blows of a hammer with a hard rubber head.

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