A Soil-Sampling Machine for Obtaining Two-, Three-, and Four-Inch Diameter Cores of Undisturbed Soil to a Depth of Six Feet

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A recent paper describes the construction of a soil sampler that will obtain undisturbed cores of 2 inches in diameter to a depth of 30 inches. A review of the literature on the art of obtaining undisturbed soil samples was given in that paper. While the machine reported could take undisturbed soil samples of 2 inches in diameter to a depth of 30 inches, it was not adaptable to larger diameters or to deeper depths. In addition to this, there was still a considerable amount of manual labor connected with the obtaining of soil cores.

The information obtained in the development of this machine led the authors to believe that a soil-sampling machine could be built that would be capable of taking cores of various diameters up to 6 or 8 inches and to varying depths. The authors, therefore, commenced work on a soil-sampling machine with the intention that the completed machine would be capable of taking 2- and 4-inch diameter cores to varying depths up to 6 feet. This work was commenced in the summer of 1946, and was made possible through a cooperative arrangement among the Utah State Agricultural College and Experiment Station, the Utah Scientific Research Foundation, and the Bureau of Plant Industry, Soils, and Agricultural Engineering of the U.S. Dept. of Agriculture.

Fig. 1A shows the soil-sampling machine attached to a pickup truck. The machine weighs about 2,200 pounds and is exceptionally mobile. It can be moved over rough terrain without damage or can be towed on a highway at relatively high speeds — 50 to 60 miles per hour. Fig. 1A and B shows the machine with the sampling tube in the vertical position in the process of taking a core sample. Fig. 1C gives a view of the cutting head which augers the tubes into the soil.

Fig. 2A shows a core 4 inches in diameter and 6 feet in length of undisturbed soil immediately after it has been removed from the machine with one of the halves of the split tube removed. Measurements of these cores have been made and no vertical compression has been found. A core taken from a 6-foot hole has measured 6 feet in length. The length of time required to obtain a core of soil such as that shown varies from about 5 to 30 minutes. If the soil is moist and relatively friable throughout the depth of sampling, the time will vary from 5 to 8 minutes. If the soil is dry, but without a hardpan development, the time may vary from 10 to 20 minutes. If hardpans or caliche are present, the time will depend upon the nature of these layers, unless they are exceptionally thick and hard and do not interfere seriously in obtaining the soil. Fig. 2B shows a 6-foot soil core 4 inches in diameter from a different soil type than is shown in Fig. 2A. Note the graduations in organic matter.