FIGURE 4. Using the holder while standing. (*Amram Kadish*)

EXTRACTING PLANT ROOT SAMPLES WITH THE KELLY CORE SAMPLER

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Over the years, plant researchers have sought a simple, easy means of extracting roots from the soil. Numerous mechanical innovations have been tested with various degrees of success. One of the machines which appears to have possibilities is the Kelly Core Sampler. This trailer-mounted, motor-driven core cutter was designed by Dr. Omar J. Kelly, for use in soil sampling where an undisturbed soil core was required.

The Kelly Core Sampler consists of a 4-inch tube which cuts into the soil when turned by an auxiliary motor, operating through a chain driven gear box (see photo).

Under ideal conditions it will penetrate to a maximum depth of 6 feet, and lift a core of essentially undisturbed soil from that depth to the surface. However, there are certain limitations inherent in the machine. The soil must not be rocky or gravelly and must not contain large roots. The presence of hardpan inhibits penetration and withdrawal of the sampling tube. Soil moisture should vary only slightly from the optimum at which the machine operates smoothly. Soil which is too wet will compress due to pressure exerted on the metal core. Dry soil resists penetration and crumbles. Soil moisture content for best operation of the machine will depend upon soil type, texture and structure. Operation of the sampler in sandy soils is hazardous. Without care, sand may get into gears and other working parts causing expensive breakdowns and repairs. Despite these restrictions, the core sampler is effective under many conditions found in the field.

The author tested the efficiency of the core cutter for taking root samples in a grass-clipping experiment. In this study roots were sampled at various depths to determine root sugar content as influenced by several intensities and seasons of clipping. It was found that if roots are to be analyzed chemically, the 4-inch core does not provide an adequate sample, except possibly in the first few inches below the crown where the roots are concentrated. This objection can be overcome if enough sample plants are present. Several sub-samples can then be composited to obtain enough root material. However, in a clipping experiment, it may be impractical to include enough plants to provide the necessary sample size. If root samples are desired at greater depths where roots are less abundant, the number of samples necessary will be even larger.

FIGURE 1. The Kelly Core Sampler in operation. The core is approximately two feet down in the soil. One man can operate it efficiently although two may be needed to handle the core after extraction.

A further investigation was made to determine the difference in depth of root penetration under different clipping treatments. The core cutter proved unsatisfactory for this use also. The soil under the experimental area contained gravel layers at various depths which prevented the cutting of satisfactory samples.

It was concluded that the Kelly Core Sampling machine at 4-inch core size is not of practical use for collecting root samples from grass clipping studies.