TECHNICAL NOTES

A CORE SAMPLER FOR EXCAVATING GRASS ROOTS

JAMES E. BOWNS, JR.[2]
THADIS W. BOX[3]
Graduate Assistant, University of Saskatchewan, Saskatoon, Canada and Associate Professor of Range Management, Texas Technological College, Lubbock, Texas.

Sampling plant root systems is time consuminng and laborious. This paper describes a technique that is relatively rapid and requires little cost to build and operate. The "core sampler" described here has proved effective in studying the effects of grazing on seacoast bluestem in fine sandy soils (Bowns and Box, 1963).

Core samplers for sampling roots are not new. Laird (1930) used a cylinder eight inches in diameter for his pasture work in Florida. The core was driven into the soil and extracted by digging a hole next to the sampler. Weaver and Albertson (1943) also used a core that was driven into the soil and removed by digging around the metal core. Kinsinger (1955) and Ruby and Young (1953) used power driven machines to force tubes into the soil and remove the soil cylinders containing the roots. Digging out cores that have been driven into the soil is slow. Mechanized, power driven methods are too expensive to be justified on many studies.

A simple, effective, and inexpensive core sample technique has been developed for root research work on the Rob and Bessie Welder Wildlife Foundation Refuge near Sinton, Texas. The core consists of a section of six-inch oil well casing cut to a length that will reach the desired depth to be sampled and leave approximately six inches of the casing above the soil surface. The resulting section of the pipe is sharpened on one end to give a cutting edge. Handles are welded on the portion of the pipe that will remain above ground level. The sampler and its accessories are shown in Figure 1.

Accessories for use of the sampler include a protective cap for prevention of damage to the upper surface, a jack for removing the core, and a hammer for driving.

The protective cap (Figure 1)

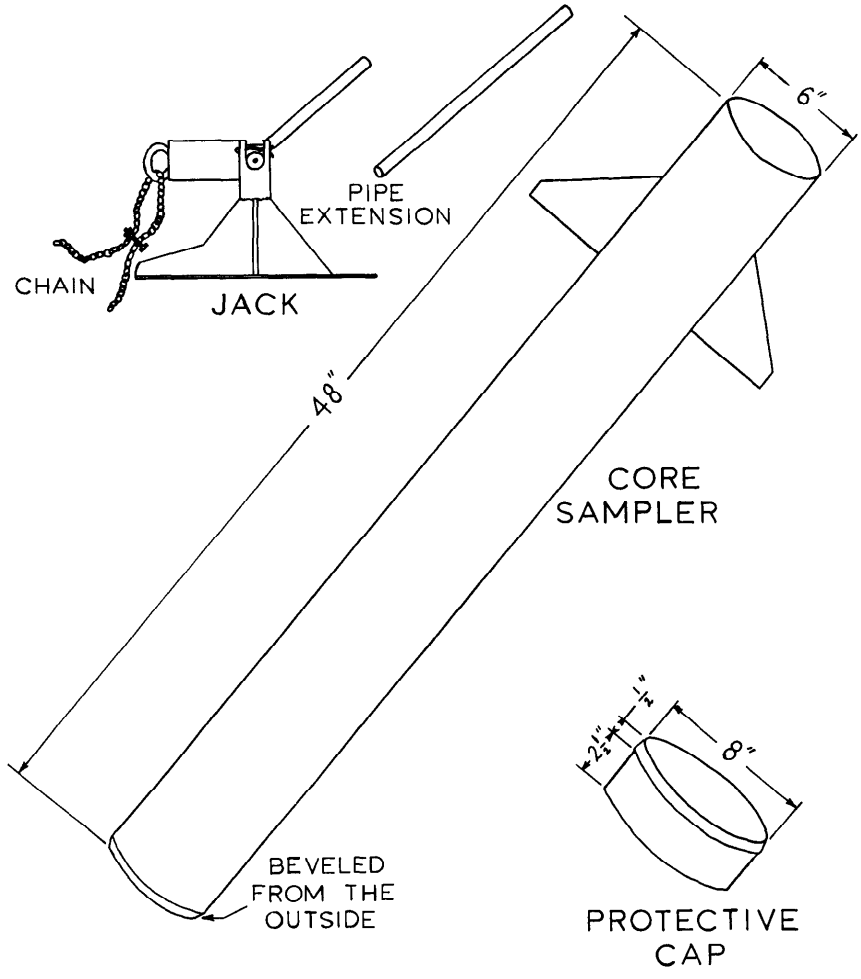

FIGURE 1. Sketch showing the construction of a simple core sampling device, its protective cap, and the jack for removal of cores from the soil.

[1] *This paper is contribution number 80 Rob and Bessie Welder Wildlife Foundation, Sinton, Texas.*

[2] *Formerly Research Assistant, Welder Wildlife Foundation.*

[3] *Also Range Research Scientist, Welder Wildlife Foundation.*

was made from a piece of ½-inch steel cut slightly larger than the outside diameter of the pipe. A cuff of ⅜-inch steel was welded onto the cap to prevent the driving cap from jumping off the core sampler when hit. When finished, the cuff of the cap will fit loosely over the top of the sampler. The sampler is driven into the soil by hitting the cap with a sledge hammer.

The core is removed from the soil with a simple jack (Figure 1). The jack is placed next to the core and the chain is fastened around the core immediately below the handles. The jack is then used to lift the core. Short cores may be lifted manually after they have been broken loose from the soil. Longer cores must be jacked out. This is accomplished by lifting the core, pushing the top of the cylinder against the the side of the hole to bind the core, dropping the chain to the soil surface and lifting the core again until the core is removed.

The cores may be hauled to a water source and the soil washed from the roots or the process may be completed in the field. The cores are placed on racks with the upper end of the sampling cylinder elevated. A very fine stream of water is directed at the lower end of the core and the soil is slowly washed from the roots. Care must be taken to use only a gentle washing action to prevent the breaking of roots.

A power operated cattle sprayere with a 250 gallon tank has proved effective for washing cores in the field. When cores are hauled to a water source, any system developing 15 pounds pressure per square inch is adequate.

The technique has been used effectively on both Nueces fine sand and Medio fine sand for sampling such plants as seacoast bluestem *(Andropogon scoparius* var. *littoralis* (Nash Hitchc.) and Pan American balsamscale *(Elyonurus tripsacoides)*. The method will probably be effective for sampling root systems of any plant where the majority of the roots grow vertically. Although the technique has been used extensively only on fine sands, a few test holes have been made on fine sandy loams, sandy loams, sandy clays, and clays. The method will probably work in any soil if there are no large roots, rocks, or other obstructions. However, in soils with appreciable amounts of clays, the labor involved in driving a core into the soil may be prohibitive.

Core samples have been taken using the above technique with four, six, eight and 12 inch casings. The soil would not remain in the 12″ sampler in fine sands. The eight-inch pipe could be used only when the soil was wet. It was also exceptionally heavy to handle. Both the four and six-inch sizes gave minimal amounts of trouble when used in the field. The six-inch size was selected because it gave a larger sample. In all cases, the technique works better when there is adequate moisture in the soil.

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