Variable Leaf Punch

improved foliage sampling tool aid in studies with unit leaf sections

Gordon L. Smith and Donald E. Little

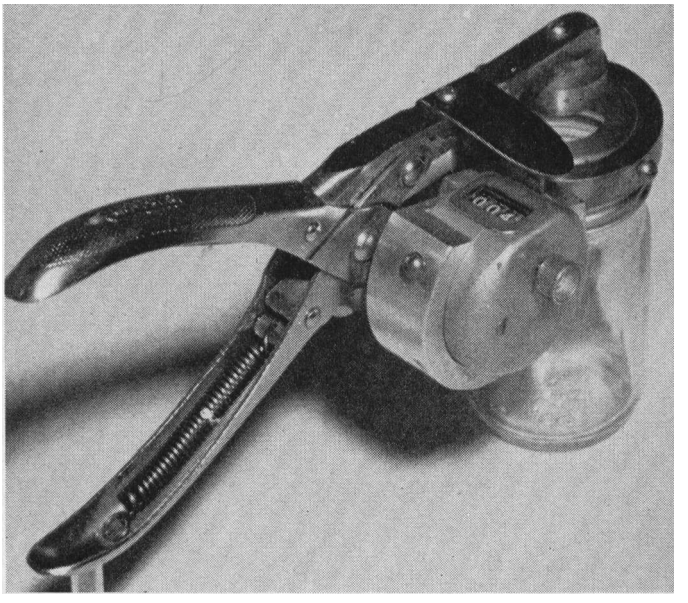
Developed for taking unit area samples of cotton leaves, an improved leaf punch has advantages for the entomologist, the plant pathologist, and for others working in plant sciences.

The new leaf punch has interchangeable cutting dies that are variable in diameter from 1.0 centimeter to 3.2 cm. The dies are so constructed that they make no contact with either surface of the leaf section, except for a 0.5-millimeter-wide rim of the inner knife, which has a one-sixteenth-inch recessed face. The opening between the knives, or dies, is three eighths of an inch—sufficient for leaves to be inserted without scraping the surfaces—so deposits such as insecticides or mite populations are not disturbed. In some work it might be necessary to have more than three eights of an inch between knives. The leaf sections fall freely into a screw-cap glass jar which can be removed and sealed tightly against dehydration of the samples or leakage of fluids in which the sections may be collected or stored. The jars are compact and suitable for storage or transportation of the samples.

The punch—as illustrated—weighs 1.5 pounds with jar and removable tally, and is 9″ long.

Accumulation of plant sap and tissue, which occasionally cause the knives to stick, can be reduced if the thrust or overlap of the cutting edges is just enough to complete the circular cut. A cloth moistened with water will clean off any accumulation.

Variable leaf punch.



The new leaf section sampler was adapted from a heavy-duty, single—one hole—handgrip paper punch, with a double-action hinge. The punch die in the lower jaw was rounded at the tip and retained to serve as a guide for the parallel movement of the jaws.

An extension was welded to the upper jaw to increase its length 1¾ inches beyond the guide. A hole drilled in the extension—½″ from the end—is slightly larger than the screw holding the upper knife die in place. This allows for centering the upper knife with the lower die.

A ring of three-eighths-inch thickness and two and three-sixteenths-inch outside diameter was welded to the lower jaw. The ring extends two and three-eighths inches beyond the guide and is recessed to hold the lower knife of one and five-eighths-inch outside diameter and ¼″ thick. The inner circular opening is made the size of the desired leaf area but is relieved by one sixteenth of an inch to the lower opening. The shoulder within the ring, supporting the knife, extends about one-eighth inch. The knife is held in the recessed ring by a set screw.

If the knives are made of stainless steel and the extensions are plated, corrosion will be prevented.

A tally counter mounted on the side of the punch in an aluminum cup or receptacle is held by a set screw. A small strip of spring steel extends from the upper jaw and strikes the plunger of the counter when the upper jaw is depressed.

The variable leaf punch is useful for sampling foliage when unit leaf sections are required for determining chemical deposits, insects, mites, eggs, disease organisms, or for leaf tissue analyses, or other data.

Gordon L. Smith is Associate Entomologist, University of California, Berkeley.

Donald E. Little is Laboratory Mechanic, University of California, and Agent, U.S.D.A. Shafter.

---

were mixed and returned to the pots. Large roots and root masses were chopped so that they would mix more readily with the soil.

The soil-root mixtures were kept moist for about three months to allow the roots to decay. At this time, all the soil from a single treatment—four pots—was combined, mixed, and returned to the pots. Inorganic nitrogen in all treatments was adjusted to 80 ppm—parts per million—and each pot received a small amount of potassium and phosphorus fertilizer.

The soils were next uniformly cropped to sour orange seedlings for eight months, after which the plants were harvested and dry weights obtained.

The effect of the various crop rotation sequences on growth of the sour orange seedlings is indicated in the table and pictures on page 12. Some of the rotation crops greatly improved subsequent growth of the citrus while others had little or no effect.

In general, the nonlegumes produced a much more favorable effect than the legumes but there was some overlapping. Among the legumes, the trefoils increased growth the most and the cowpeas the least; the nonlegumes, Rhodesgrass produced the greatest growth stimulation, and white mustard the least.

That the increased growth of the citrus following the Rhodesgrass, and other crops, was a biological control effect is supported by the fact that fumigation of the citrus-sick soil—a process which kills soil organisms and changes the microbial population—also increases growth of the citrus plants.

However, crop rotation or additions of organic materials will not always aid in the control of detrimental soil organisms. In many instances benefit does occur but in others, the detrimental organisms may be favored. In this study, the cowpeas and mustard had little or no effect on seedling growth. In a previous study, a variety of organic residues were applied to an old citrus soil. All plants died in the soil treated with ground alfalfa. Examination of the soil for fungi showed that *Phytophthora*

Concluded on page 16