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A SIMPLE DEVICE TO ASSIST WITH PITFALL TRAP SAMPLING

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Pitfall traps are commonly used to sample ants and other ground-crawling arthropods. In some cropping systems, pitfalls are the best means of collecting arthropods such as red imported fire ants (*Solenopsis invicta* Buren) that are active on the soil surface (Kharboutli & Mack 1993). One interesting application for pitfall traps may be to collect ant species as biological indicators (Peck et al. 1998).

Pitfall traps usually consist of a vial or similar container buried up to the rim in the soil. A killing agent (e.g., ethanol or propylene glycol) is placed in the container to capture crawling insects for study. Pitfall traps can yield species richness, species composition, and relative abundance of foraging ants (Bestelmeyer et al. 2000).

Some pitfall traps consist of a container installed permanently (or semi-permanently) in the soil, into which the actual trapping container is placed for easy removal. In larger studies involving hundreds of pitfall traps, however, this may not be possible. For large-scale, area-wide studies of black imported fire ant (*Solenopsis richteri* Forel) and native ants in Mississippi, we use small (2.54 cm I.D.) plastic vials. A cordless drill with a 2.86 cm diameter auger bit is used to drill a hole into the soil, and the vial is placed snugly into the hole with the top flush to the soil surface. This method presents 3 problems. First, vials can be very difficult to remove when soil dries around them. Secondly, soil is frequently brushed into the vials during removal. Finally, stooping/kneeling is necessary to remove the vials.

A device was constructed to address the problems listed above (Fig. 1). A shaft (61 cm long), handle (14 cm long), and trigger (14 cm long) were constructed of 1.27 cm diameter stainless steel tubing. The lower handle was welded to the main shaft, and the trigger was articulated on a short, upright piece of tubing welded to the lower handle. The upright tubing was split and flattened at the top to accept the trigger. A hole was drilled through the upright tubing and the trigger at the point of articulation to accommodate a hex head cap screw. A threaded rod (0.48 cm diameter) was inserted into the main shaft and through a rubber head constructed of four, 0.64 cm thick rings cut from sheets of pure gum rubber. The upper end of the threaded rod was secured to a nut welded to the end of the trigger, and a second nut was used to lock the threaded rod into position once it was

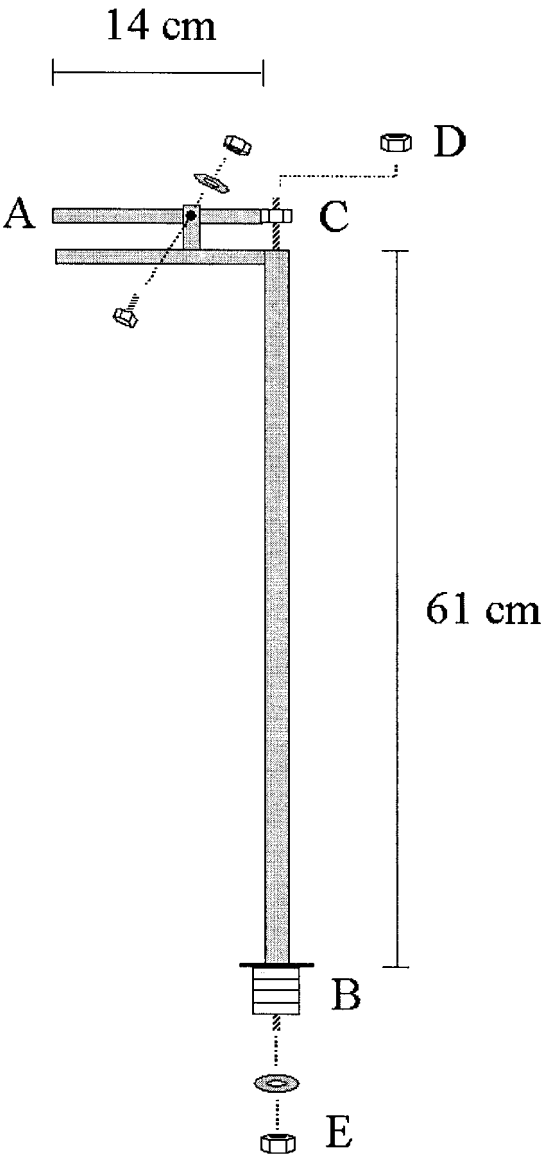

Fig. 1. Schematic of pitfall retriever. When the trigger (A) is depressed, the rubber head (B) expands to grip the inside of the pitfall trap. The trigger has a nut welded to one end (C), through which a threaded rod is placed, and locked in position with a second nut (D). An additional nut (E) secures the lower end of the threaded rod to the rubber head. Figure is not drawn to scale.

properly adjusted. A washer (1.8 cm diameter) secured with a nut to the bottom of the threaded rod and another washer (3.4 cm diameter) welded to the bottom of the shaft held the rubber head in place. The upper washer should be larger than the inner diameter of the pitfall trap to prevent the device from being inserted too far, and the lower washer must be smaller in diameter than the rubber head.

When the rubber head of the device is inserted into a pitfall trap, the trigger is squeezed, the head is compressed vertically and expands laterally, and the trap is pulled free. The rubber head expands and grips traps tightly without harming them, preventing debris from entering the trap during removal, and the 61 cm shaft reduces stooping and effort. The trigger is squeezed until the collector brings the trap up to grasp it, then the trigger is released, and the trap can be capped. Researchers interested in using this device for vials of different size could easily alter the diameter of the rubber head to fit their needs. Some adjustment may be necessary to get sufficient expansion and grip without cracking plastic vials. As configured, our device works well with 9-dram, crystal plastic vials (Bioquip, Gardena, CA, USA).

Other uses for this device might include placement and retrieval of traps in hard to reach places (e.g., below plant canopies, in crevices, etc.), provided a long drilling instrument could be used to drill an appropriate hole for placing the traps. The length of the device could be altered to suit the needs of the researcher.

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Summary

A device is described for rapid, easy removal of pitfall traps embedded in the soil. The device prevents debris from entering traps during removal and reduces stooping and effort involved in pitfall trap retrieval.

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