A FUNNEL-TRAP FOR MONITORING FALLOUT FROM FOREST CANOPIES AFTER INSECTICIDE APPLICATIONS

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ABSTRACT

Descriptions of materials and methods used in designing a 1 m² trap for collecting fallout samples from forest canopies after treatment with insecticides are presented. These traps were quite effective in collecting the target caterpillars, non-target arthropods, frass, and plant material.

A simple collecting device was manufactured to sample fallout from forest canopies after aerial application of insecticides to forest environments. The device consists of a large hoop from which a polyethylene funnel is suspended, with a collecting container mounted in the funnel tip. This entire apparatus is suspended from the boles of 3 trees by cords attached to the hoop, providing a very stable collecting device (Fig. 1). Other drop traps have been described for similar purposes (Connola et al. 1966, Peterson 1934, Southwood 1966), but none have combined the stability, rigidity, ease of sample collection, protection of samples from molestation by scavengers and predators, and permanence that this trap provides.

Fig. 1. Three funnel traps positioned for collecting insects and frass in a forest insect control project.
The frame of the trap consists of a hoop manufactured from 1/2 in. ID flexible, black polyethylene pipe. Pipe was cut to a length of 3.545 m, and the hoop was formed by forcing each end of the tubing over a 1/2 in. dowel ca. 20 cm long. Two small nails were driven into the dowels at each end of the tube to prevent slippage. The completed hoop provided a collecting area of 1 m².

The funnel was made from 3-mil polyethylene film sheets. Our technique for cutting material for a funnel is illustrated in Fig. 2. Once cut, the funnel was formed by heat bonding the 2 straight edges together. A variety of sealers are available at relatively low cost for this purpose. The funnel was then attached to the hoop (seam edge to the outside) by lapping the top edge of the funnel over the hoop. The overlapped edge to the funnel was bonded by heat sealing, thus forming a tube around the hoop.

![Diagram of funnel cutting process](image)

Fig. 2. Method used to cut funnels from polyethylene film sheet. L-shaped piece in 2a is folded on the dotted lines to give the square in 2b. By cutting along the arc (dotted line) of 2b, the funnel blank (2c) is produced. The position of the center point is indicated by the circle.

The device for holding the collected material was constructed of a thin, molded plastic cup with a 40-mm hole cut in the bottom. The bottom of a 40-dr clear plastic prescription vial with a snap cap, which measured 50 x 80 mm, was cut off with a band saw. The cut end was then bonded to the bottom opening of the cup with ethyl acetate. A hole slightly smaller than the diameter of the lip of the cup was then cut in the bottom of the funnel. The entire retaining apparatus was then dropped into the hole and pulled into position. The polyethylene funnel stretched sufficiently to provide a tight, continuous surface with the cup lip, which was then taped to the funnel with duct tape applied to the outer surfaces of both funnel and cup. As seen in Fig. 3, this resulted in a funnel with simple accessibility at the bottom (via the snap cap). Prior to assembly, holes were drilled around the periphery of the cup to provide for escape of rain water which might fill the traps (Fig. 3).

In operation, these traps worked remarkably well for collecting dead caterpillars, frass, nontarget organisms, and plant material. The major problem in their use was provision for water drainage. Initially, 12 3-mm openings were drilled into the cups. These allowed the loss of 1 liter of
Fig. 3. Detail of the collecting device which is taped in the bottom of the funnel.

Water per min. In practice, small pieces of bark and other debris clogged these holes and prevented drainage. Enlarging them to 6 mm diam eliminated this problem. The traps were suspended by parachute cord and were able to hold several cubic feet of water without loss of samples when drainage failed. When this occurred the collected material was obtained by holding a fine sieve under the trap which allowed rapid discharge of water with complete sample retention when the snap cap was removed.

We tried 3 different polyethylene films: one was transparent, one translucent, and one was black. The transparent sheeting was sticky and less flexible than the other two. The black sheeting did not allow easy visual recognition of collected larvae or debris within the traps. The translucent material had neither problem and was judged best for our use.

The snap cap provided a very tight seal, allowing alcohol to be used as a collecting fluid. Dead insects slid or could be easily brushed down the smooth surfaces of the funnel into the collecting vial. Polypropylene squirt bottles containing alcohol were used to wash down any fine material into the collecting vial.

Approximately 300 of these traps were constructed at a material cost of $1.50 per trap. In addition, approximately 144 man-hours were required for their assembly, or approximately 0.5 hr per trap when made in an assembly line fashion.

LITERATURE CITED

PETERTSON, A. 1934. A manual of entomological equipment and methods—
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