A DEVICE FOR SAMPLING THE DISTRIBUTION PATTERNS OF GRANULES DISPERSED FROM AIRCRAFT[1]

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ABSTRACT

A marble board cone was developed that proved to be a most efficient sampling device for determining the distribution patterns of granular bait dispersed from aircraft.

In any program in which chemical control agents are applied aerially, the swath width applied by the plane and the patterns of deposit of the chemical must be known. The normal way to obtain such information for granules is to place collecting devices in a straight line perpendicular to the line of flight of the aircraft (Agr. Res. Serv. 1965), and a variety of such devices have been used at this laboratory from 1958 to 1965 including metal dishpans, 9×9×2-in. metal pans, corrugated cardboard cones, boards covered with grease, wooden frames (1 yd^2) with canvas bottoms, and cake boxes with the tops propped open. Some had the advantage of being easy to handle, but all had one or more disadvantages; they were easily stolen, the bait bounced out, ants removed the bait, and the heat of the sun made the grease soft and fluid.

Therefore, in 1968, when we began to investigate more effective methods of applying mirex bait for control of the imported fire ant, we tested numerous devices before we chose a paper cone supported on a metal stand. This cone (Fig. 1) is constructed of 0.034-in. marble board as follows:

A flat piece of marble board (32 3/8 in.×21 3/16 in.) is marked as in Fig. 2, then paper is cut along lines A and B, and the 2 straight edges are overlapped until the upper edges of the cone form a 19-in.-diam circle. Thus we are insured that at the top of the cone (the sampling area) we will always have an area of 1.999 ft^2. Now the edges are secured with staples and covered with duct tape, and the cone is waterproofed with a coating of shellac. A 2 1/2-in.-diam polypropylene funnel with a l-dr vial is affixed to the bottom of the cone.

The mounting frame (Fig. 1) consists of the following:

(1) A black iron pipe (1/8 in.×5 ft) threaded on one end and flat on the other so the pipe is easy to push into the ground (called the standpipe).
(2) Two 14-in. rings of No. 4 galvanized wire welded to black iron pipe nipples (3/8 in.×2 in.) and attached to the standpipe by a tee (3/8 in.×3/8 in.×1/4 in.).

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[1]This paper reflects the results of research only. Mention of a pesticide or a commercial or proprietary product in this paper does not constitute a recommendation or an endorsement of this product by the U.S. Department of Agriculture.

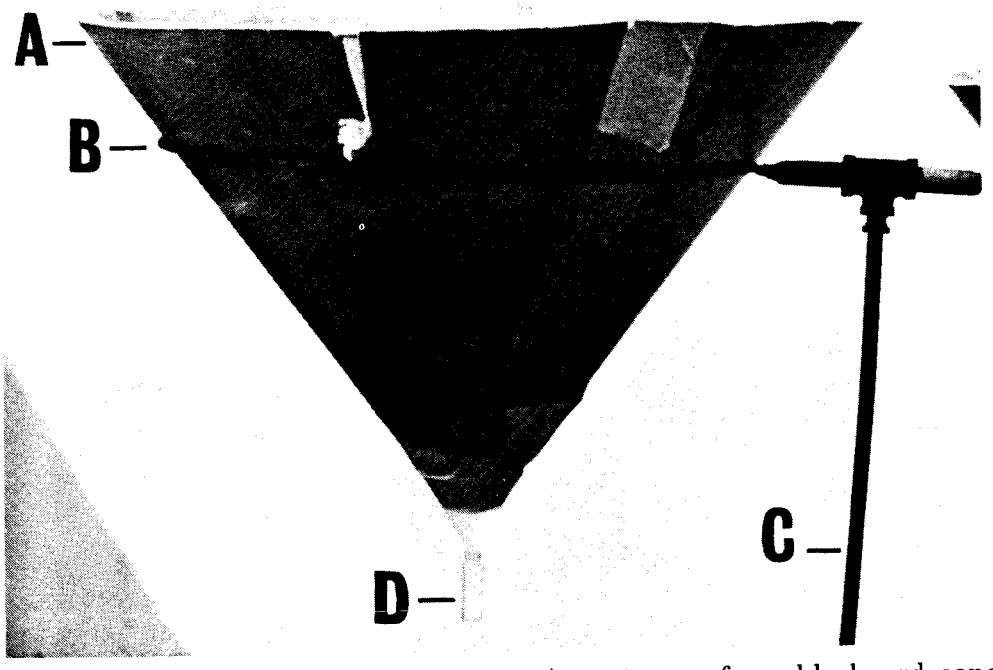

Fig. 1.—Closeup of collecting cone. A, waterproof marble board cone sampling ca. 2 ft²; B, galvanized ring welded into a nipple; C, 5-ft long standpipe; D, 1-dr vial.

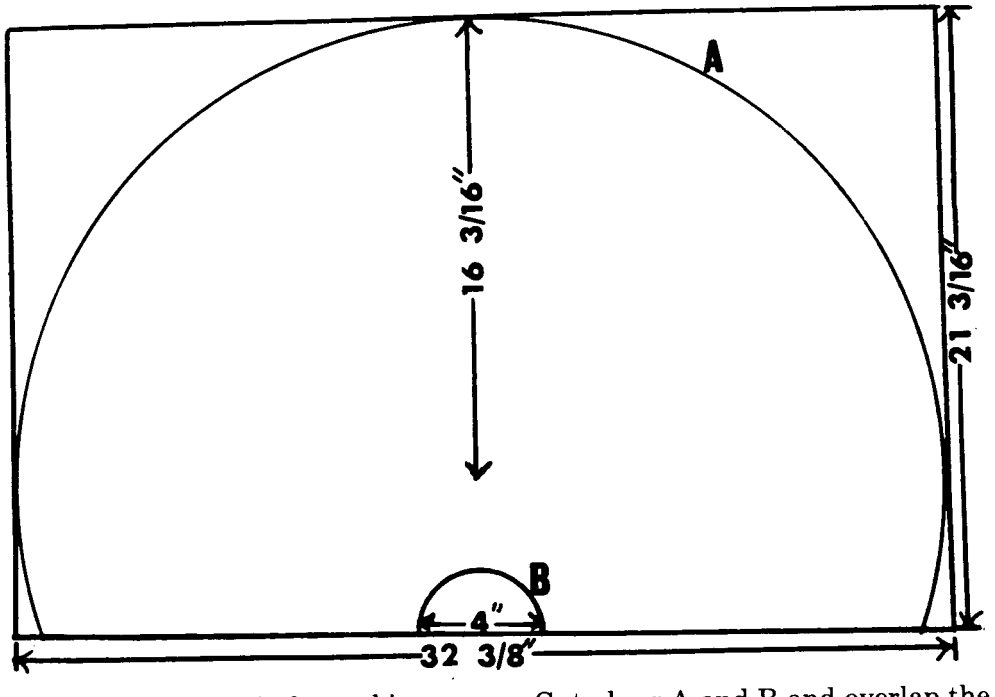

Fig. 2.—Schematic for making a cone. Cut along A and B and overlap the straight edges at the bottom to give a circle 19 in. diam. This adjustment produces an area at the top of the cone of approximately 2 ft².

To assemble the unit, we attach the rings to the standpipe and drive the pipe into the ground with a rubber-covered mallet. The standpipes may be placed in position in the field several days before application of the granular bait. When collections need to be made, all that is necessary is to place the cones in the rings. The cones are held in place in the rings with paper clips and a rubber band.

The effectiveness of the cones in collecting bait was determined by comparing the amount of bait collected in the cones with that collected in metal pans (9 in. × 9 in. × 2 in.). Thus, 11 stands each containing 2 cones were set 5 ft apart in a straight line in a field, 15 ft back from the edge of a road; the 11 pans were placed alternately between the standpipes. Then a jeep-mounted Buffalo turbine with the blower at an angle of almost 90° to the horizontal blew granular mirex bait (0.3%) toward the line of cones/pans as it was being driven parallel to the line at 4 mph. The experiment was replicated 3 times. The bait collected in the containers was returned to the laboratory for weighing. The values obtained were transformed into g/ft^2; the results are presented in Table 1.

TABLE 1. A COMPARISON OF BAIT CATCHES WITH PAPER CONES AND WITH 9 X 9 X 2-IN. METAL PANS. AVERAGE OF 11 CATCHPOINTS.

	Cones		Pans	
Replicate	Total (g)	g/ft^2	Total (g)	g/ft^2
A	20.0	0.45	5.91	0.25
B	16.22	.36	6.0	.26
C	22.65	.51	8.3	.37
		Mean = .44		Mean = .29

On the average, the cones caught almost 50% more bait than the pans (0.44 g/ft^2 compared with 0.29 g/ft^2), partly because the large particles were observed to bounce out of the pans and the fine chaff to pass over the pans.

More recently the cones were compared with aluminum dish pans and plastic dish tubs in a collection made under aircraft last year. In this test, little difference was observed in the catches by the cones and pans, but the tubs caught much less bait than the cones or pans. Also, the cones caught more chaff than either the pans or tubs.

The collecting cone is thus another tool that can be used to study aerially applied materials. They do require more work initially to set up, but they have the advantages of losing less bait to bounce or to insects, permitting less contamination of the bait with such materials as grass and seeds, and they are less apt to be stolen.

LITERATURE CITED

Agricultural Research Service. 1965. Aerial application of agricultural chemicals. USDA Agr. Handbook No. 287, 48 p.