Design, dispenser size and type, and trap placement are important factors influencing pink bollworm trap efficiency. Omnidirectional traps are essential for maximum efficiency, and the new cone trap meets this requirement. It does not require any sticky or poisonous substance and is easy to operate. Catches on fallow land may be increased by placing the trap on a silhouette, or close to the ground surface.

Techniques for

TRAPPING PINK BOLLWORM MALES

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TABLE 1. EFFECT OF THE TYPE OF DISPENSER ON CATCHES OF PINK BOLLWORM MALES IN THE CONE TRAP

Type of dispenser	Mean no. of males captured/ replicate (± SE)
Filter paper	104.4 ± 24.97[a]
Glass	51.6 ± 17.23[b]
Stainless steel	47.8 ± 16.98[b]
Plastic	42.2 ± 12.17[b]

TABLE 2. SIZE OF HEXALURE DISPENSER AND CATCHES OF PIN BOLLWORM MALES IN THE OMNIDIRECTIONAL TRAP

Area of filter paper (mm^2)	Mean No. ♂ Captured/ Replicate (+SE)
6.2	12.9 ± 3.23
62	31.6 ± 8.63
625	56.4 ± 16.73
3125	38.4 ± 15.01

TABLE 3. CAPTURES OF PINK BOLLWORM MALES ON FALLOW GROUND AND POTTED COTTON

Trap Location	Total Pink Bollworm ♂ Captured
Fallow ground	13
Potted cotton	75*

* A paired "t" test is significant at 5% probability level.

PHEROMONE TRAPS are of value in surveying the present or the magnitude of pink bollworm infestations. They also have potential value in direct control of certain insect populations. Pheromone traps are necessary to study the relative effectiveness of various chemical attractants in the field—and efficient trapping techniques are esential for all these programs.

One technique for survey and detection of the pink bollworm in Southern California is the use of a modified Frick trap (photo) consisting of a 1 quart ice cream carton coated inside with Stickem and baited with hexalure, a synthetic sex attractant for pink bollworm males. Preliminary experiments with such a modified Frick trap indicated that the gradual accumulation of captured moths and scales reduces the efficiency of this trap.

Omnidirectional trap on fallow ground (left) and potted cotton to right.

A new cone trap was designed (photo) to eliminate the use of any sticky or poisonous substances. This trap is simple and easy to operate. It consists of a conical cylinder with 16 holes around the base for moth entry. Hexalure is dispensed on a filter paper which is suspended on a cork from the center of the trap. When attracted moths are in the trap, they migrate upwards through a conical screen into the jar where they are trapped alive. The trap is suspended just above the cotton plants on an adjustable pole. Factors which influence the efficiency of sex lure traps include: trap design, dispenser type and size, trap placement and environmental conditions.

Trap design

Several types of traps have been tested for capturing pink bollworm males. Various Frick trap modifications containing sticky substances were used in field trials. It was found that these traps operate successfully only during the first night. After that, the sticky substance becomes contaminated by dust particles, insects, scales and other debris.

Efficiency is increased by making the traps omnidirectional. Openings all around the trap are necessary for maximum moth captures. When only two openings were left in the cone trap, the efficiency was reduced by 50%. Since all other traps tested had two openings of the same size, this may be one factor contributing to the reduced efficiency of these traps.

Dispenser type

In tests, hexalure was released from flat nonabsorbant surfaces like glass, plastic,

and stainless steel as well as several types of filter papers. Results (table 1) show that more moths were trapped with filter paper (no. 617 Eaton and Dikeman) than the other materials tested. Trap efficiency was reduced by almost 50% when hexalure was dispensed from glass, plastic and stainless steel planchets.

Dispenser size

Hexalure was released from various sizes of the filter paper (no. 617 Eaton and Dikeman), in the omnidirectional trap. The omnidirectional trap consisted of a large sticky base with eight holes on the sides and a roof over it. Both very low and extremely high release rates of hexalure caused a reduction in catches of the pink bollworm males. Optimum catches were obtained with 625 mm^2 filter paper. Efficiency was reduced with the smallest and the largest size of the filter paper (table 2).

The best trap will not capture pink bollworm males successfully unless placed at the right location. Results indicate that traps placed in the center of cotton fields catch more moths than those placed on the border, and on fallow ground near the cotton fields. Maximum efficiency was obtained when traps were placed just above cotton foliage.

1970 experiment

An experiment was designed to capture spring-emerging pink bollworm males on fallow ground which had been planted in cotton the previous year. Two enclosed omnidirectional traps with a large trapping surface were used. One trap was placed over 6 to 12 potted cotton plants that had been greenhouse grown. Green bolls, squares and blooms were usually present on these plants. The other trap was situated 7.5 m away at the same height (1.2 m) over the fallow ground without the plants (photo). These treatments were replicated three times each week, 25 m apart in the north, south and east end of the field for a period of four weeks. Captured moths were identified, sexed and counted. Results (table 3) showed a significantly greater number of males were captured in a trap placed above cotton plants than on fallow ground.

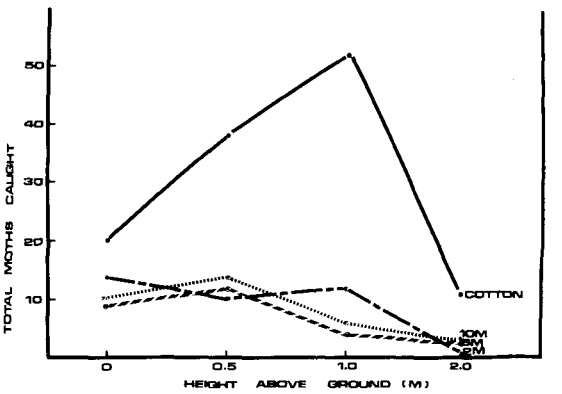
A preliminary experiment was later designed to study whether nonspecific plant factors such as visual stimuli may be involved in concentrating male moth populations in traps placed over potted cotton plants. The potted plants were confined in black plastic with an exposed top and an octagonal trap placed above this opening so that the plants could not be seen from the outside. The second trap was placed on black plastic wrapped around the 3 legs of the trap stand without cotton plants, and the third trap was used without plants or black plastic. These traps were spaced 7.5 m apart and randomized within the trap line for five weeks. The trap over cotton plants confined in black plastic caught a total of 16 males; the trap with only black plastic caught a total of 15 males; and the trap without any plastic or cotton plants caught a total of 5 pink bollworm males. A relatively low spring-emerging population at this time prevented continuation of this experiment.

This behavior of pink bollworm adults is interesting in that the pheromone-stimulated moths seem to orient themselves towards traps in relation to an object which in our experiments was either a potted cotton plant or simply black plastic. We also hypothesize that adult pink bollworms may fly close to the horizontal surface on the fallow ground and are unable to respond to traps at higher elevations, unless they are guided by silhouettes to the traps. Therefore, the vision of pink bollworm appears to be an important factor which possibly assists in short-range orientation to hexalure traps.

1971 experiment

Traps were placed 0, 0.5, 1.0 and 2 m above the ground 2, 6 and 10 meters away from the cotton border on fallow ground. Traps at similar heights were also placed on cotton borders. The traps were operated for seven days and their positions

EFFECT OF TRAP PLACEMENT IN FALLOW GROUND AND COTTON AT VARIOUS HEIGHTS ABOVE THE GROUND.



were changed at random daily. Results (graph) indicated that fewer moths were captured on fallow ground than over the cotton borders. Trap efficiency was reduced when placed 2 m above the ground. However, traps placed on fallow ground at 0 and .5 m height above ground surface caught more moths than traps placed on higher elevations. This experiment somewhat proves our hypothesis that pink bollworm males fly close to horizontal surfaces—in this case the tops of cotton foliage, or fallow ground. However, more behavioral experiments are required to demonstrate this fully.

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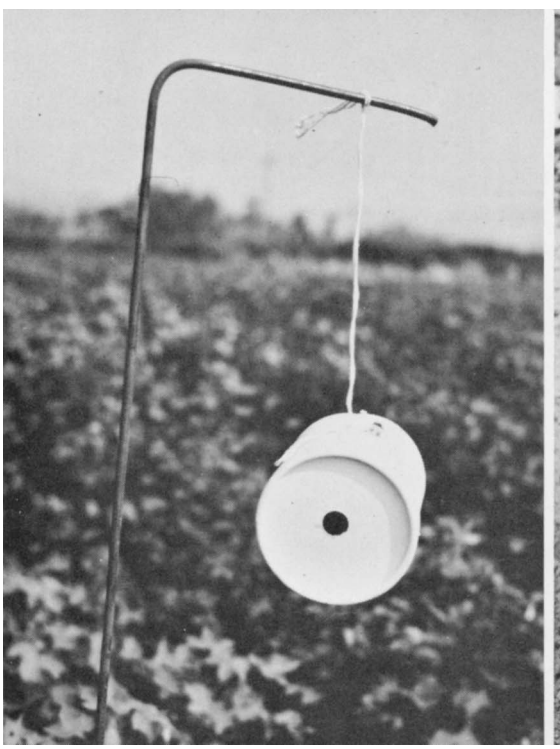
Modified Frick trap



Cone trap