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MANUFACTURE AND USE OF A TRAP TO ASSESS *HELIOTHIS VIRESCENS* AND *HELICOVERPA ZEA* (LEPIDOPTERA: NOCTUIDAE) ADULT EMERGENCE

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Sampling arthropods in the soil is difficult and time consuming. Additionally, sampling methods can disturb much of the soil and plants, altering the outcome or the site for further evaluations. Placing an emergence trap in the field can allow accurate assessment of population numbers of different arthropod taxa, but its potential effect needs to be investigated.

The basic manufacturing of a light weight, relatively inexpensive, weather-resistant conical trap is described here. Although several types of traps have been utilized in the past to record the emergence of *Heliothis virescens* L. and *Helicoverpa zea* (Boddie) moths from agricultural fields (Raulston et al. 1979, 1990; Hartstack et al. 1982; Lopez et al. 1984; Rummel et al. 1986; Laster et al. 1987; Bell & Hayes 1994), these reports lack detailed information of the materials, dimensions, and method of construction to accurately manufacture them. Also, the potential effect of the trap on the emergence of *H. virescens* and/or *H. zea* adults was not assessed in those studies. The trap described in this report is similar in construction to those described in Hartstack et al. (1979). It is constructed from a 4.26-m mild steel hot roll (0.60 cm = 1/4-inch diameter) that is bent to create a 1.35-m diameter circle. The circle ends are welded together. Four 0.91-m straight pieces of the same material were welded at 1.06-m intervals along the circumference of the circle at ca. 42° angle relative to a horizontal plane forming a conical structure. The arms were welded to the base perimeter of a 5.0-cm long (2.0-cm internal diameter, 2.5-cm external diameter) metal pipe (Fig. 1). A coated fiberglass screen (2.03-m diameter circle with an 85-degree wedge cutout) was used to cover the structure. The fiberglass screen was secured with 50 c-rings (Stanley-Bostitch® 16 gauge, 40 around the base and 10 on the arm joining the ends of the net). The top of the trap was provisioned with a 3.65-L plastic jar (Consolidated Plastic Company, Inc. part number 41342LL) placed upside down. A 2.5-cm diameter hole was drilled in the center of the 8.5-cm diameter cap to screw the collection jar to the metal structure. Six 0.2-cm holes were also drilled around the perimeter of the cap to allow for water

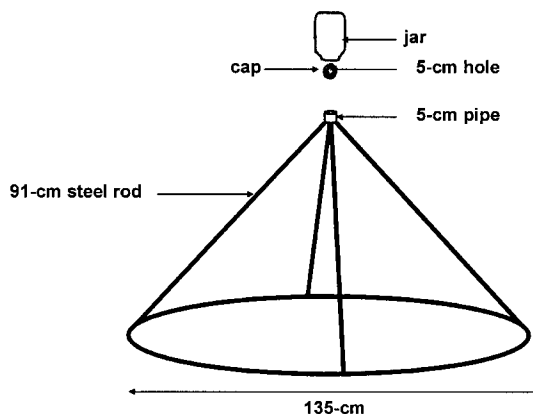


Fig. 1. Dimensions and parts (fiberglass net not shown) of the emergence trap.

drainage. Assemblage of trap components is illustrated in Fig. 1.

Humidity, temperature, and luminosity conditions were compared inside and outside four test traps. Two Hobo® H8 loggers (Onset Computer Corporation) set to record at 1-h intervals were used at each trap—one hanging inside and one outside the trap. After recording these conditions for 96 h, the interior of the traps averaged 1.8% less relative humidity, 1.6% higher temperature, and 39.8% less luminosity.

In order to assess the potential negative effects that traps may have on pupae in the soil, four holes 30 × 30 × 8 (depth) cm were dug in an agricultural field. Four groups each of 16 laboratory-reared same-age *H. virescens* and *H. zea* pupae of both sexes were placed individually in 25-ml glass vials with the cap loosely tightened. The 64 glass vials were placed in each hole. Holes were covered with a plastic tray (35 × 70 × 3 cm) containing ≈7 L of soil on top. Trays on top of holes were covered with one of the following treatments: (a) trap over bare soil, (b) trap with 8-9 chopped cotton plants inside, (c) 8-9 chopped cotton plants (no trap) or (d) bare soil. Emergence of moths in vials was checked daily and data recorded for 5 consecutive d after the first moth emerged. This procedure was repeated 3 times at different dates switching the arrangement of traps or plants for every hole. No differences were found with laboratory-reared *H. virescens* females ($P = 0.95$, $F = 0.11$, $df = 3$), *H. virescens* males ($P = 0.98$, $F = 0.05$, $df = 3$),

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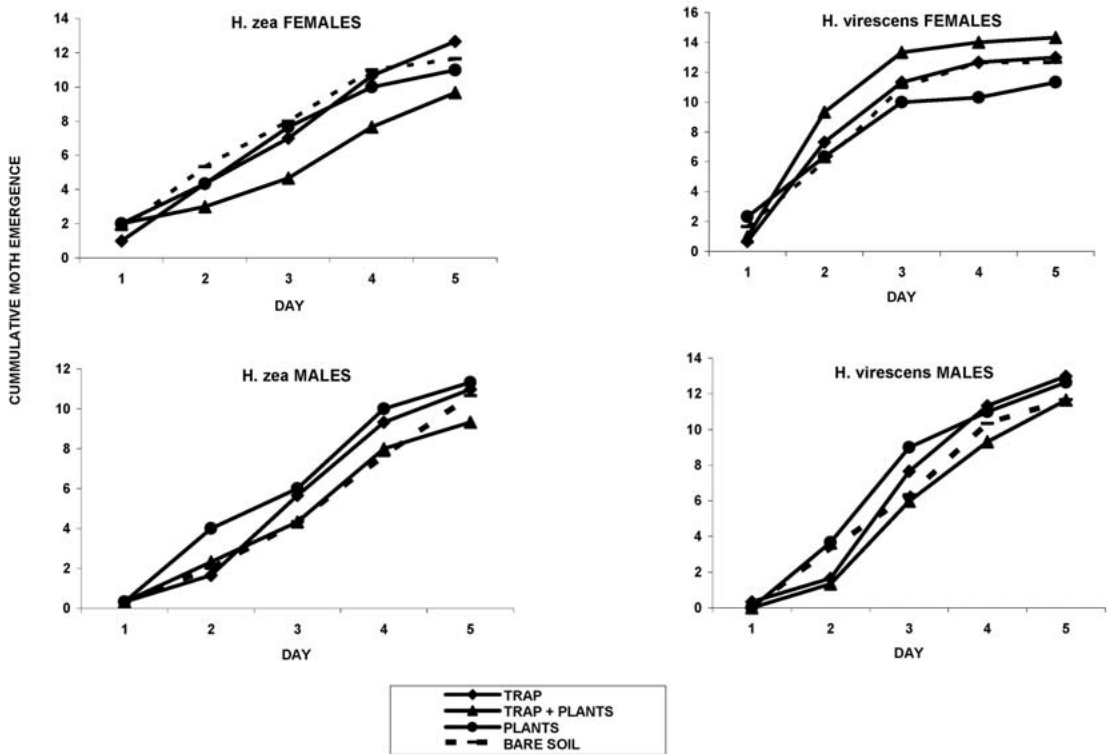


Fig. 2. Trap effect on cumulative moth emergence.

H. zea females ($P = 0.79$, $F = 0.34$, $df = 3$) or *H. zea* males ($P = 0.80$, $F = 0.15$, $df = 3$), or between *H. virescens* ($P = 0.80$, $F = 0.06$, $df = 3$) or *H. zea* ($P = 0.67$, $F = 0.18$, $df = 3$) sexes emerging from under these traps. More than 80% of both species and sexes emerged as adults under field conditions (Fig. 2).

Advantages of this design are (1) relatively low cost, (2) ease of installation, (3) simple to install, remove, and transport, and (4) lack of adverse effects on *H. virescens* or *H. zea* adult emergence. The price of materials to construct 140 of these traps, in 2003, in Northwest Mississippi was \$10.68 per trap (\$1.72 for the metal, \$6.42 for plastic screen, \$0.14 for metal pipe, \$0.52 for c-rings and \$1.88 for the plastic jar). Traps have been utilized continuously in the field for the past 48 months with minimal repairs on the fiberglass screen and replacement of the collection jars after >1 yr. Soil had to be added to seal the trap edges, especially after rain and/or irrigation. Taxa collected throughout the year include Noctuidae, Braconidae, Ichneumonidae, Coccinellidae, Staphylinidae, Pentatomidae, Lygaeidae, Rhopalidae, Miridae, Lycosidae and Thomisidae. Field-collected heliothines have aided us in determining the contribution of different host plants to the overall heliothine population in MS (Blanco et al., unpublished data).

SUMMARY

The construction of a light weight, relatively inexpensive, weather-resistant conical trap is described that has no observed adverse effects on *Heliothis virescens* or *Helicoverpa zea* moth emergence.

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