

pheromone in all *Heliothis* species studies so far – is needed in combination with one or more other components. A synthetic pheromone mixture of *H. zea* is attractive to *H. armigera*, while that of *H. virescens* is inhibitory due to the presence of Z-9-tetradecenol and Z-11-hexadecenol. Traps baited with rubber septa impregnated with 2 mg of a mixture of Z-11-hexadecenol and Z-9-hexadecenol (97:3) plus 0.2 mg of an antioxidant, are currently used to monitor populations of *H. armigera* in cotton fields in Israel.

## FIELD STUDIES WITH SEX PHEROMONES IN *SPODOPTERA LITTORALIS* AND *EARIAS INSULANA*

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The major attractant of *Spodoptera littoralis*, Z,E-9,11-tetradecadienyl acetate (Z,E-9,11-14:Ac), alone or in combination with other components identified in the female sex pheromone complex, was tested in a cotton field. Z,E-9,11-14:Ac alone was significantly less attractive to males than virgin females; the addition of small amounts (0.1 – 1.0%) of Z,E-9,12-tetradecadienyl acetate (Z,E-9,12-14:Ac) enhanced the attraction and the combination was as effective as virgin females. Most samples of “purified” synthetic pheromone (Z,E-9,11-14:Ac) obtained from different sources usually contained over 0.1% Z,E-9,12-14:Ac, and were therefore effective.

Z-9-tetradecenyl formate (Z-9-14:Fo) did not have any disruptive effect on *S. littoralis* when released at high rates from four evaporators located at points 3.5 m from the attractant. At this distance, Z-9-tetradecenyl acetate (Z-9-14:Ac) was an effective disruptant, but somewhat less effective at 7 m and totally ineffective at 32 m. At 32 m, Z,E-9,12-14:Ac was also ineffective. However, Z,E-9,11-14:Ac, the synthetic sex pheromone of *S. littoralis*, was an effective disruptant even when released 44.5 m away from the attractant: 80-90% disruption was achieved at release rates of 2 to 4 mg/h/ha.

E,E-10,12-hexadecadienal (E,E-10,12-16:Ald) effectively attracted *Earias insulana* males when released from polyethylene vials but not from rubber dispensers. Trapping efficiency was not improved by increasing pheromone loading above 1 mg/trap. Although pheromone loadings of 1 and 3 mg were equally attractive to males, catches with 6 mg were significantly reduced. Funnel traps containing either E,E-10,12-16:Ald or virgin females captured significantly more males than water traps, and traps baited with three virgin females captured significantly more males than the synthetic pheromone. Additional, still unidentified pheromonal component(s), may play a role in attracting *E. insulana* males.

## FIELD TRIALS FOR THE CONTROL OF THE EGYPTIAN COTTON LEAFWORM (*SPODOPTERA LITTORALIS*) WITH PHEROMONE TRAPS

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Irrigated cotton fields (totaling 4,587 ha) in five different regions of Israel were baited with pheromone traps. The aim was to trap *Spodoptera littoralis* males, thus reducing the number of fertilized females and, hence, the pest population. The pheromone-protected fields received on the average 45% fewer insecticidal treatments against *S. littoralis* than non-protected cotton fields, with identical conditions.

Within the pheromone-protected area in one region, egg clusters were reduced by 47% in August and by 58% in September, as compared with the non-protected fields. The fertility of egg clusters in the pheromone-protected fields was 66% vs. 97% in the non-protected fields.