

Black cutworm pheromone trapping in strawberries

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A pheromone trap developed in the Corn Belt has found a place in southern California strawberry pest management.



The black cutworm (BCW) is a widely distributed insect that attacks several field and vegetable crops. In the U.S. Corn Belt, larvae of this insect, *Agrotis ipsilon* (Hufnagel), are of particular economic importance during May and June, when they cause damage to seedling corn. Near Oxnard (Ventura County) in southern California, BCW larvae occasionally injure summer-planted strawberry plants in late September and October. Proper timing of corn and strawberry pest management practices such as field scouting and insecticide applications depends on knowledge of the flight activities of BCW moths. Moths flying between late March and early June in the Corn Belt and in September and October in Ventura County are the ones that have to be monitored.

BCW sex pheromone traps can now provide pest management personnel in much of the Corn Belt with an accurate measure of early seasonal moth activity. In 1980 we began a study to determine if BCW sex pheromone traps could be used as a pest management tool during September and October in Ventura County strawberry production areas. We also wished to learn more about BCW flight and reproductive behavior in California.

Field tests

We conducted field tests between September and December on two Oxnard strawberry ranches. Two Pherocon 1C traps per ranch were suspended from wood posts at eye level (about 1.5 meters), spaced about 244 meters apart. The traps were readily accessible,

Larvae injure young strawberry plants by feeding on foliage, stems, and crowns. Most serious damage occurs when larvae cut through the stems just above or below the surface of the soil (arrow).

Pheromone traps in strawberry field near Oxnard in southern California captured male cutworm moths from early October to mid-December.



because they were placed along roads that paralleled the margins of strawberry fields. A 5- by 7-millimeter rubber septum, charged with 30 micrograms of (Z)-7-dodecen-1-yl acetate (I) and 10 micrograms of (Z)-9-tetradecen-1-yl acetate (II), dispensed the synthetic sex pheromone from each trap. Rubber septa remained in traps throughout each trapping period.

Research conducted in several Corn Belt states has shown that rubber septa loaded with 30 micrograms of I plus 10 micrograms of II are effective lures. Numerous tests conducted by the first author have shown that BCW moths are not caught in unbaited traps.

The pheromone traps were effective in capturing males from early October to mid-December 1980. During this time 22 to 39 BCW males were caught per trap when trapping periods varied from 2 to 17 nights (moths were counted and removed at the end of each trapping period). Moreover, in a test where the liner in a trap was changed daily for 7 days, a mean number of 22.8 (± 2.4) BCW males per night (total of 160) were trapped. The traps were equally effective in 1981; for example, one trap caught 58 males from September 5 to October 3.

In tests where trapping periods were 5 or more nights, most of the total BCW catch per trap was reached after 1 to 3 nights. One trap with a typical catch pattern, for example, caught 23, 1, 1, 0, and 0 BCW males per night

over 5 nights of trapping (October 30 to November 3, 1980). Thus, the traps should probably be cleared of moths after 1 to 3 nights of trapping.

Conclusion

BCW pheromone traps capture very few male moths (usually less than two per week) during the last 2½ months (mid-August to early November) of the flight season in the central Corn Belt. This low trap efficiency has been attributed to the fact that BCW moths enter a period of sexual inactivity after mid-August in this region. Traps baited with females or synthetic pheromone after mid-August failed to capture males, even though they were present and most females captured in light traps were unmated.

We have no data on the attraction of males to females and the mating status of females in Ventura County, but our results clearly show that the pheromone traps are capable of capturing large numbers of BCW males in late summer and fall. Some preliminary results also suggest that pheromone traps may prove to be an effective monitoring tool in some parts of northern California. Pheromone-baited traps in Watsonville (Santa Cruz County) captured good numbers of males in July, August, and September 1981, and 97 percent ($n = 30$) of the females captured in a Butte County light trap from July 1 to September 4, 1980, were mated. Thus, it would

appear that BCW moths are sexually active during late summer and fall in California.

To summarize, the BCW sex pheromone trap, which was developed for corn pest management in the Corn Belt, has been shown to have a place in strawberry pest management in Ventura County. To gain maximum benefit from use of Pherocon 1C baited traps in strawberries we recommend that they be set out in early September. After the traps are in operation, it may be necessary to count and remove moths from the traps after 1 to 3 nights. Only a week of monitoring may be required to remind growers that BCW moths are active and eggs are being deposited that may result in injurious larvae. We should mention that *Trichoplusia ni* (Hübner), *Spodoptera praefica* (Grote), and *S. exigua* (Hübner) moths were occasionally caught in BCW pheromone traps but these species can easily be distinguished from *A. ipsilon*.

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