PHEROMONE MONITORING OF *SCELIODES CORDALIS*, A PEST OF PEPINO

R.A. GALBREATH and J.R. CLEARWATER

Entomology Division, DSIR, Private Bag, Auckland

SUMMARY

Synthetic sex pheromone of *Sceliodes cordalis*, the major pest of pepino (*Solanum muricatum*), provides a very specific and effective lure for trapping this species. With further testing and development it could be incorporated into a pest control programme.

INTRODUCTION

The pepino is a subtropical fruit with good potential for production in New Zealand. A serious insect pest here is the pyralid moth *Sceliodes cordalis*, which is common on poroporo (*Solanum aviculare*) and some other *Solanum* species throughout the country. As in many moths, female *S. cordalis* attract males for mating by the scent of a specific sex pheromone, which we have identified as a mixture of two compounds: (E)-11-hexadecen-1-ol and the corresponding acetate, in approximately 1:1 ratio (Clearwater *et al* unpublished data). In this paper we describe tests of the effectiveness of synthetic pheromone and discuss its potential for use in pest control.

METHODS

Comparison of synthetic and natural pheromone

Three triangular traps (Lewis and Macaulay 1976) with a sticky bottom liner were each baited with a reared virgin female *S. cordalis* contained in a 5 cm cube wire-mesh cage, and three other traps were baited with 100 μ g of a 1:1 mixture of the pheromone compounds on a rubber sleeve stopper (No. 1780-B10, Arthur H. Thomas Co.). The traps were held on stakes just above the plant canopy in areas of poroporo with a few pepino and eggplant (*Solanum melongena*) at Pukekohe Research Station for 3 weeks (11.3.81 to 1.4.81). Trap positions were assigned randomly and re-randomised each time the traps were cleared, twice a week. The female moths were replaced each week.

Pheromone trap effectiveness

This was assessed by determining the proportion of released moths recaptured in pheromone traps. Male moths reared in the lab on poroporo berries were marked by dusting them with fluorescent powder ("Dayglo" saturn yellow) and released in March 1982 either in an area of poroporo at Mt Albert Research Centre, or in a 2.1 x 10.6 x 7.2 m mesh-covered field cage. Three traps baited with synthetic pheromone as above were placed in the poroporo about 20 m from the release point and two were placed in the cage and the catches recorded until captures of marked moths ceased.

Monitoring population trends

Two traps baited with synthetic pheromone as above were maintained in poroporo at Mt Albert Research Centre from October 1981 to May 1983. They were cleared weekly and the pheromone caps replaced monthly.

RESULTS

Comparison of synthetic and natural pheromone

Initial experiments had shown that no more males were caught by two or three females per trap than by one (though six/trap caught significantly fewer), so one female per trap was used. The traps baited with virgin female *S. cordalis* caught 39, 37 and 16 (mean = 30.7) males, while those baited with synthetic pheromone caught 45, 43 and 31 (mean = 39.7). The difference is not statistically significant.

Proc. 36th N.Z. Weed and Pest Control Conf.

Pheromone trap effectiveness

Of 213 marked males released in the field, 22 (10.3%) were recaptured the following night (along with 14 wild males), and a total of 43 (20.2%) after a week. In the cage, of 60 males released, 15 (25%) were recaptured within three nights. It was clear from the traces of fluorescent powder on the adhesive of the traps that some marked moths had escaped, thus these recapture figures could be increased by improvements in trap design.

Monitoring population trends

Weekly catches of male *S. cordalis* at Mt Albert Research Centre are shown in Fig. 1. The number declined in April each year as larvae entered prepupal diapause to overwinter until October. A few other species were occasionally trapped — mainly a common pyralid, *Mnesictena flavidalis*, and also a few cosmopolitan armyworm moths (*Mythimna separata*).

Fig. 1: Weekly totals of male *Sceliodes cordalis* caught in 2 pheromone traps at Mt Albert.

DISCUSSION

The results showed that the synthetic mixture is a potent attractant for male *S. cordalis*, at least as effective in traps as the female-produced sex pheromone. Even using pheromone loadings and a trap design which had not been optimised, the efficiency of trapping marked moths was high enough to suggest that significant depletion of males in wild populations could be achieved. Pheromone traps provide the simplest and most effective method for detecting the presence of *S. cordalis* during the flight season — the larval stages are hidden, while the adult moths are normally rarely seen, as they are active only at night and are not attracted to lights. The traps are cheap and convenient for long term monitoring, requiring little maintenance, or skill in identifying the catches. The pheromone compounds are also relatively inexpensive, especially in the minute quantities used in traps.

These are positive features for the use of the pheromone in control programmes for *S. cordalis* in pepino or other *Solanum* crops. There are however some possible shortcomings to consider. Most pepino production is likely to be under shelter, which might affect the performance of pheromone traps, though the recapture results in the cage suggest this should not be a problem. The pheromone acts only on the male, so gravid females entering the crop would not be trapped. Eggs are usually laid on the fruit and after hatching the larvae quickly burrow into the fruit, often leaving little trace of their entry. Rather like codling moth in apples, one larva feeding in a fruit leaves it unsaleable but is difficult to detect even at harvesting. Spray schedules will therefore be designed to maintain sufficient insecticide coverage on the fruit surface to kill any *S. cordalis* larva before it enters. Whether monitoring by pheromone traps would be sufficiently reliable to allow delaying the first spray application until moths begin to appear in the traps, requires testing. This strategy has been successfully used for instance with the boll weevil (*Anthonomus grandis*) in cotton (Hardee 1981) and in New

Zealand with codling moth in apples for gate sales (Wearing and Charles 1978), although in these cases some insect damage was tolerable and insecticides made up a larger proportion of production costs than seems likely for pepino. Other control methods employing pheromones could also be investigated: the mating disruption method used successfully with the pink bollworm (*Pectinophora gossypiella*) in cotton (Doane *et al* 1982), or mass trapping to reduce pest populations, though this has had little success with other horticultural pests (Thomas and Shaw 1982).

However, the availability of the synthetic pheromone does allow monitoring of male *S. cordalis* and there is potential for further development of pest control programmes utilising the pheromone if required.

ACKNOWLEDGEMENTS

We thank A. Atkins for technical assistance and N.A. Martin for helpful advice.

REFERENCES

- Doane, C.C., Brooks, T.W. and Weatherston, J., 1982. Insect control through mating disruption with pheromones. *DSIR Entomology Div. Report 2*: 89-97
- Hardee, D.D., 1981. Monitoring the boll weevil in technical and commercial operations. pp. 13-17 in Mitchell, E.R. (ed.) *Management of Insect Pests with Semiochemicals*. Plenum, New York.
- Lewis, T and Macaulay, E.D.M., 1976. Design and evaluation of sex-attractant traps for pea moth, *Cydia nigricana* (Steph.) and the effect of plume shape on catches. *Ecol. Entomol. 1*: 175-187
- Thomas, W.P. and Shaw, P.W., 1982. An attempt to control the light brown apple moth, *Epiphyas postvittana* (Walk.) (Lepidoptera: Tortricinae) by male removal. *DSIR Entomology Div. Report 2*: 71-78
- Wearing, C.H. and Charles, J.G., 1978. Integrated control of apple pests in New Zealand 14. Sex pheromone traps to determine applications of azinphos-methyl for codling moth control. *Proc. 31st N.Z. Weed and Pest Control Conf*: 229-235