Horticultural Development Company

Grower summary

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Pheromone technology for management of capsid pests to reduce pesticide use in horticultural crops

Annual Report 2009

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headline

Male European Tarnished Plant Bugs have been attracted into cross vane funnel traps baited with the female sex pheromone.

Background and expected deliverables

In the past, lack of an effective monitoring tool has prevented effective control of capsids in horticultural crops and has led to unnecessary use of pesticides. Building on previous research at East Malling Research (EMR) and Natural Resources Institute (NRI), this project aims to develop effective and practical pheromone lures and traps for monitoring three species of capsids. Effective pheromone traps will be useful for improving the timing of spray applications and lead to a reduction in the use of broad-spectrum insecticides to control capsid pests on a range of horticultural crops. This will help to maintain or improve the level of control in both conventional and organic produce.

A major objective is to identify and confirm the components of the female sex pheromones of the capsid species European Tarnished Plant Bug, Common Green Capsid and the Nettle Capsid. Laboratory work and field bioassays will be undertaken to produce artificial lures. The use of such lures will directly or indirectly help to:

- reduce the incidence of residues of broad-spectrum pesticides.
- substantially improve capsid control in organic crops.
- reduce the likelihood of resistance to insecticides developing.
- simplify implementation of biological control programmes for other pests.
- maintain and enhance biodiversity, including natural horticultural pest enemies.

The project will investigate the effects of host-plant volatiles on capsid behaviour and control. It is possible that the incorporation of host-plant volatiles into lures with pheromones could produce practical benefits in terms of enhancing the attractiveness and/or provide new attractants, particularly for female capsids.

Summary of the project and main conclusions

Volatile production

Volatiles were collected from individual females of European Tarnished Plant Bug and male and female Common Green Capsid and Nettle Capsid, at different times of day. This was conducted following field tests in 2007 which showed that female European Tarnished Plant Bug attracted males in the morning.

The collections of volatiles from **European Tarnished Plant Bug** in the morning resulted in a new ratio of the three main pheromone components (hexyl butyrate (HB), (*E*)-2-hexenyl butyrate (E2HB) and (*E*)-4-oxo-2-hexenal (KA)). When tested in field trials as a synthetic blend, released from microcapillary dispensers and a piezoelectric sprayer, it was apparent that the blend was attractive to males of the same species.

Volatiles collected from the **Common Green Capsid** were in the same order of magnitude and a similar ratio as that of the European Tarnished Plant Bug. The common Green Capsid appeared to produce the chemicals during the afternoon and evening period.

Both male and female **Nettle Capsids** produced HB, E2HB and KA but in very variable amounts. Attempts to determine the time of day of production of the potential pheromone components were rather inconclusive, although indications are that they are produced during the period 0000-0800 hrs.

Field trials

In field trials lasting several months, small numbers of female European Tarnished Plant Bug were attracted to lures containing phenyl acetaldehyde (PAA), but the plant volatile did not enhance the attraction of males to female sex pheromones. In shorter term field tests, females were not significantly attracted to lures containing the plant volatiles PAA, hexyl acetate, ocimene, methyl salicylate or (*E*)-β-caryophyllene.

No attraction of the Common Green Capsid to pheromone dispensers containing a 3 way mix of hexyl butyrate ('HB') : (*E*)-2-hexenyl butyrate ('E2HB') : (*E*)-4-oxo-2-hexenal ('KA') (1.0:0.7:1.0) was demonstrated in field trials. However, significant numbers of male *Lygus pratensis* (a closely related species to European Tarnished Plant Bug) along with a species

damaging to apple in North America and a predatory species in the UK, (*Atractotomus mali*), were attracted to the 3 way mix. Sunflower oil helped to stabilise KA relative to HB in the dispensers.

Experiments exposing the antennae of male or female Nettle Capsid to the three compounds (HB, E2HB and KA) followed by reading the electrical signal were largely inconclusive. A small antennal response was obtained from male Nettle Capsid to volatiles from a female insect. Male European Tarnished Plant Bug antennae responded to all three of the potential pheromone components, but never to all three in the same analysis.

Using field and laboratory tests, it is still unclear whether male Nettle Capsids are attracted to females or vise versa. Indeed, still air (as opposed to wind-tunnel) laboratory bioassays failed to show attraction of Nettle Capsid or European Tarnished Plant Bug to the opposite sex or to the pheromone blend attractive to European Tarnished Plant Bug.

Trap designs

In tests comparing trap designs, green pre-moulded cross vane funnel traps (Agralan) captured more capsids than various designs of delta trap and sticky stake traps and, therefore, are the best choice for monitoring capsids. Water and a drop of detergent are used as a trapping agent.

Season of activity

Field collections of the three species by sweep netting and trap sampling showed that Nettle Capsid females were abundant from May, increasing in number through to July (males, females and nymphs) on nettles. Common Green Capsid was present in small numbers (mainly nymphs) from May onwards on blackcurrant. European Tarnished Plant Bug was abundant in July and populations continued to grow until October in fields sown with fat hen and scented mayweed. Laboratory culturing of European Tarnished Plant Bug and Nettle Capsid was successful through the growing season and provided many unmated males and females for testing.

Future work

Future work in this project will include confirming the attractiveness of the modified blend to European Tarnished Plant Bug and designing a dispenser which is user friendly to growers.

In addition, we will explore the effects of release rate and blend ratio on attractiveness to male capsids. Nettle Capsid and Common Green Capsid will be further field tested, and volatiles collected in the laboratory, to determine the time of day females are releasing pheromone components, and reveal an accurate ratio and release rate of the 3 pheromone components.

Financial benefits

No direct financial benefits to growers resulted from the research this year, but the ability to monitor capsids in horticultural crops will result in better timing of pesticide applications in the future.

Action points for growers

No direct action points have arisen from this work to date.