Grower Summary

PC/SF 276 (HL0184)

Pheromone technology for management of capsid pests to reduce pesticide use in horticultural crops – 2 year extension

Final Year

Disclaimer

AHDB, operating through its HDC division seeks to ensure that the information contained within this document is accurate at the time of printing. No warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

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.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

HDC is a division of the Agriculture and Horticulture Development Board.

The following are members of the Consortium for LINK project HL 0184:

East Malling Research

•

Natural Resources Institute

•

Agirsense BCS Ltd

•

Cucumber Growers Association

•

Nichol Farm

•

East Malling Ltd

•

Agriculture and Horticulture Development Board (via the HDC division)

•

East Malling Trust for Horticultural Research

•

Glaxosmithkline Plc

•

KG Growers Ltd

•

Project Number:	PC/SF 276
Project Title:	Pheromone technology for management of capsid pests to reduce pesticide use in horticultural crops – 2 year extension
Project Leader:	Mr Tom Maynard
Report:	Final Report 2012
Publication Date:	15th August 2012
Start Date:	01 April 2010
End Date:	31 March 2012
Project Cost:	£87,000

Headline

Traps are available from Agralan Ltd. to monitor European tarnished plant bug and common green capsid in a range of crops.

Background and expected deliverables

Capsid bugs are important pests of several high-value horticultural crops in the UK and many more worldwide. In the UK, the common green capsid, *Lygocoris pabulinus,* and the European tarnished plant bug, *Lygus rugulipennis* are the most important species. *L. pabulinus,* traditionally a pest of apples, pears and blackcurrants is an increasingly important pest of strawberries, blackberries and raspberries. *L. rugulipennis* is an important pest of late season strawberries and of various glasshouse salad crops, notably cucumber.

- Crop invasion by capsids is sporadic and unpredictable, and, in the absence of effective control measures, capsid bugs cause severe economic losses. They cause damage at low population densities and are difficult to detect at such levels in normal crop inspections.
- In conventional crops, capsids are controlled by sprays of broad-spectrum insecticides, organophosphorus insecticides being the most effective and frequently used in strawberry, while the anti-feedant, pymetrozine, is the most commonly used in cucumber. Neonicotinoids and other modern insecticide groups are only partially effective against capsids and insect growth regulators are totally ineffective. In the future chlorpyrifos and thiacloprid, two of the main control methods for capsids, are likely to be withdrawn from use in many edible crops.
- In organic crops the pests cause high levels of damage. The available insecticides (eg natural pyrethrins) have very short persistence and provide no residual effect. Capsids have few natural enemies and effective biocontrol methods have not been developed.
- Without accurate monitoring information, growers are forced to use remedial applications of broad spectrum insecticides. Although these treatments can be effective against capsids, they disrupt the biological control of other pests and can lead to the application of further sprays. The recent outbreaks of pesticide-resistant western flower thrips on strawberry are probably due, at least in part, to routine spraying against capsids.
- The need to use broad spectrum insecticides for control of capsid bugs is a major bottleneck to the implementation of IPM and the quest towards pesticide-free foods.
- Effective monitoring systems for capsid pests would help to ensure that pesticides are only used where necessary, so reducing routine applications of broad-spectrum

pesticides that disrupt IPM of these and other pests. They would also enable the use of more selective insecticides and biological approaches for which timing of sprays is critical.

Summary of the project and main conclusions

Progress on each objective of the project is summarised below;

1. *Improve and test the lure for L. rugulipennis so that it is long lasting and practical for use by growers (Yr 1)*

The life and release rate of pheromone components from the pipette tip lure have been enhanced. The lure now lasts over 4 weeks in the field having been shielded from sunlight and the use of larger pipette tips is giving a more consistent release rate. Wrapping the pipette tips in duct tape has provided effective screening from sunlight in the field.

In the laboratory wind-tunnel, the 1 ml pipette tips proved much more reliable than the 0.2 ml tips, releasing a blend very similar to that loaded into the dispenser for up to 2 months at 27°C and 8 km/h wind-speed. They also released at a higher rate than the 0.2 ml pipette tips. Furthermore, the 1 ml pipettes were easier to load with the pheromone blend and to seal with the crimp cap. The results have confirmed that disposable pipette tips are suitable dispensers for the three candidate pheromone components of the mirid bugs.

The Agrisense sachets proved unsatisfactory for dispensing the pheromone components. The components diffuse through a polyethylene disc such that release of the KA is proportionately faster than the HB and E2HB. This results in a very high relative amount of KA initially which dropped to a very low level within 10 days under wind-tunnel conditions. Thus, in the field the sachet performed well in comparison with the pipette tip during the first 5 days but much less well subsequently.

The pipette tip lure was also shown to be as attractive as live female *L. rugulipennis*. Improvements have been confirmed using field trapping tests.

The trap was further tested by adding Fluon to the cross vanes. This increased the catch by more than a third in week one, but catches of males decreased subsequently – probably because of contamination by debris on the cross vanes over time (enables the insects to grip

the surface more easily). Products such as Teflon should be considered as an alternative coating for the cross vanes.

2. *Calibrate the trap for L. rugulipennis for use in pest monitoring to establish a treatment threshold for its use in late season strawberry and/or cucumber (Yrs 1 and 2)*

Extensive trapping in both cucumber and strawberry crops by growers, advisers and science staff has proven the *L. rugulipennis* monitoring trap to be an excellent early warning system of invasion into the crops. The pest was detected in high numbers in pheromone traps 7-10 days before detection on cucumber plants and 4 weeks in strawberry compared to using traditional monitoring methods. In strawberry, it is suggested that treatments targeted at the pest are applied 2 weeks after a significant rise in trap catches of capsids – typically 10 per trap. It is recommended that 2 traps per plantation are placed at the ends of strawberry beds in areas considered vulnerable from immigrating capsids. The study in 2011 highlighted the importance of counting only *L. rugulipennis* in the traps and not confusing the species with other similar sized insects. The traps in strawberry should be placed on the ground. Traps placed higher are less sensitive to numbers of *L. rugulipennis*. Pheromone baited traps positioned outside cucumber greenhouses provided useful prior warning of crop invasion by *L. rugulipennis*. However, informed interpretation of the size and timing of the catch, relative to the growth stage of the crop, was required to predict the risk of crop damage. In contrast, traps placed within the greenhouse were of little value regardless of their position within the crop canopy.

The species specificity of the synthetic pheromone lures was tested using standard sticky stake traps (*L. pabulinus* is known not to be attracted into green cross vane bucket traps). The specificity was good for *L. pratensis*, however, this lure also attracted *Capsus ater* (feeds on grasses) early on in the season (June), indicating that these two species may have similar ratios of pheromone components. *L. rugulipennis* and *L. pabulinus* were equally attracted to the lure of either species. No *L. tripustulatus* were captured on the baited traps even though they were known to be in the surrounding nettles.

Traps that combined the lures of *L. rugulipennis* and/or *Anthonomus rubi* with either white or green cross vanes showed that white cross vanes cannot be used as they reduce the catch of *L. rugulipennis* in the traps. In addition, the grid designed for preventing capture of bees attracted to white cross vanes prevents the *Lygus* bugs falling into the bucket of the trap.

Any future combined monitoring/mass trap for *L. rugulipennis* and *A. rubi* should have green cross vane, no grid and both pheromone lures.

3. *Develop an effective lure and trap for L. pabulinus with associated data for pest monitoring (Yrs 1 and 2)*

Trap design is of major importance and the green cross vane and delta traps were found to be ineffective at catching males. The lure was more attractive than caged virgin females at attracting males to sticky stake traps. These traps are not practical for use by growers. Sticky platform and water traps were also tested, but were not found to be more effective than sticky stake traps.

Using remote cameras (wide angle and macro) and a hard drive recorder a series of experiments was set up to observe the behaviour of male *L. pabulinus* approaching pheromone lures. Only one adult *L. pabulinus* was observed attracted to the synthetic *L. pabulinus* sex pheromone lure. There was also significant attraction of *L. rugulipennis/pratensis* to the lure. This supports data found in the 4 species test in Objective 2.

In 2011, 18 trap designs were tested, including bucket traps and various sticky traps with wet and dry glue. The most successful trap, and indeed better than the sticky stake trap, was a dry glue blue sticky card trap. This was 12.25 x 10 cm and the lure was suspended from a twist tie pointing downward so that the tip was in the centre of the card.

4. *Encourage commercial production of traps and lures and produce grower information sheets on the use of the traps for monitoring capsids*

Agralan Ltd. will be collaborating to take up commercial production of traps and lures in 2012. An information sheet for growers on the use of the traps for pest monitoring has been produced by HDC, EMR and Agralan and is now included in the trap package sold by Agralan.

Future research

Although this project has come to an end, the scope to use the synthetic sex pheromones in IPM for control of capsid bugs is worth consideration. Future research should concentrate on mass trapping (in combination with *A. rubi* traps) or mating disruption techniques.

Financial benefits

The financial benefits for growers will be realised in more accurate predictions of a capsid attack and more focused, non prophylactic, control measures.

Action points for growers

- Target sprays of insecticides active against capsids 2 weeks after the population shows a sharp increase in number or if more than 10 capsids per trap per week are observed.

- Growers interested in monitoring for European tarnished plant bug or common green capsid in their crops should contact Michelle Fountain at michelle.fountain@emr.ac.uk. Traps and lures are available from Agralan Ltd at sales@agralan.co.uk or on 01285 860015.