Grower Summary

Project number SF 139

Semiochemical control of raspberry cane midge

Annual 2015

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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 AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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Project Number:	SF 139
Project Title:	Semiochemical control of raspberry cane midge
Project Leader:	Prof. Jerry Cross, East Malling Research
Contractor:	
Industry Representative:	**Ross Mitchell, Castleton Farm**
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Previous report/(s):	Annual 2014
Start Date:	1 January 2013
End Date:	31 March 2016
Project Cost:	£50,000

Headline

- Raspberry cane midge or blackberry leaf midge pheromone incorporated with a Natural Product Matrix plus pesticide look promising in the laboratory for use as an attract and kill formulation.

Background and expected deliverables

Plant feeding gall midges (Cecidomyiidae) are important pests of agricultural and horticultural crops in the UK and worldwide, often causing injury and serious crop losses. Their presence incurs significant use of crop protection products. Raspberry cane midge is an important pest of raspberry, an important and valuable crop in the UK, and at present, it can only be satisfactorily controlled with chlorpyrifos. Developing an alternative control method is therefore important.

Gall midges have powerful female-produced sex pheromones. The chemical structures of 17 species have been identified to date, including six of the most important pests of fruit crops in the UK identified by the EMR/NRI team (Hall et al., 2012). Many of these sex pheromones are successfully exploited for pest monitoring in commercial practice. However, there is also great potential to exploit them for control. We have identified the raspberry cane midge's sex pheromone (Hall et al., 2009), determined the optimum release rate for competitive attraction and have already demonstrated that it is possible to use it for control of the midge. In HortLINK project HL0175 (SF 74 – *Integrated pest and disease management for high quality raspberry production*) preliminary work was done to develop methods for controlling the raspberry cane midge using its sex pheromone (Cross et al., 2011). These trials indicated that Mating Disruption (MD) or Attract and Kill (A&K) with a high density of low dose sources was the most promising approach. Further work is needed to develop a suitable formulation for economic and practical use.

Female-produced sex pheromones attract only conspecific males. Attractants for the females, particularly mated females, would potentially be valuable for both monitoring and control of the pests. Traps baited with the attractants would give a better prediction of the laying of eggs and the appearance of larvae. There is good evidence for attraction of females of at least four species of midge – apple leaf midge, blackcurrant leaf midge, raspberry cane midge and wheat blossom midge – to volatiles from their host plants for oviposition. In previous work, in LINK project HL0175 (Cross et al., 2011) and a studentship funded by AHDB Horticulture, significant progress has been made in identification of chemicals released when raspberry canes split and become attractive to females of raspberry cane midge (Hall et al., 2011). There is clearly great potential to exploit host plant volatiles for control of gall midge pests.

The overall aim of this project is to develop an effective semiochemical-based control method for raspberry cane midge utilising the midge's sex pheromone and/or the host volatiles from cane splits.

Summary of the project and main conclusions

We have developed two promising new Natural Product Matrix amorphous flowable Attract and Kill (A&K) formulations containing the insecticide deltamethrin, which dispense the pheromones of the raspberry cane midge and the blackberry leaf midge, respectively, at suitable release rates. We have decided to work on the two midge species, which are both important pests of raspberry, to improve the chances of getting good results in efficacy trials. The formulations are highly attractive to midge males of the respective species and kill in seconds, a big improvement on wax emulsion formulations which were too slow. The next step of the project in the final year (2015-16) is to test their efficacy for control of their target pests on raspberry in replicated experiments in large field cages. We have also developed artificial sachet dispensers of the volatiles produced by splits in raspberry canes. The splits are attractive to raspberry cane midge females which use them to locate oviposition sites. Their efficacy for control of the midge by disruption of host finding is also being evaluated.

Financial benefits

Raspberry cane midge is an important pest of raspberry, an important and valuable crop in the UK, and at present, it can only be satisfactorily controlled with chlorpyrifos. Developing an alternative control method is therefore important. We have identified the midge's sex pheromone (Hall *et al*., 2009), determined the optimum release rate for competitive attraction, and have already demonstrated that it is possible to use it for control of the midge. Some midge sex pheromones have relatively complicated chemical structures and would be difficult and very costly to produce, but those of the raspberry cane midge could conceivably be produced on a large scale at comparatively low cost. The Attract & Kill approach also has the advantages that comparatively small amounts of pheromone and pesticide are likely to be required and that the pheromone is regarded as a co-formulant of the pesticide employed, considerably simplifying registration procedures.

Action points for growers

- At this stage of the project, no changes to growing practice are being advised.