

Grower Summary

SF 139

Semiochemical control of
raspberry cane midge

Final 2016

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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

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Project title:	Semiochemical control of raspberry cane midge
Project number:	SF 139
Project leader:	Prof. Jerry Cross, NIAB EMR
Report:	Final Report, 2016
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Key staff:	Prof. Jerry Cross Dr Chantelle Jay Zeus Mateos Fierro
Location of project:	NIAB EMR, New Road, East Malling, Kent, ME16 9DY
Industry Representative:	Ross Mitchell, Castleton Farm
Date project commenced:	1 January 2013
Date project completed (or expected completion date):	31 March 2016

GROWER SUMMARY

Headline

- A Natural Product Matrix formulation containing a synthetic pyrethroid product and incorporating raspberry cane midge or blackberry leaf midge sex pheromone is promising for use for attract and kill of the target pests.

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. They are a significant cause of the use of traditional crop protection products. Raspberry cane midge is an important pest of raspberry, an important and valuable crop in the UK, and it can only be controlled currently with chlorpyrifos which has recently been withdrawn from use. 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 Defra Horticulture LINK 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 was 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 pest. 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 Defra Horticulture LINK project HL0175 (Cross *et al.*, 2011) and a studentship funded by AHDB Horticulture, significant progress has been made in the 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 was 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. It was decided that parallel work would be done on the blackberry leaf midge, which is also a serious pest of raspberry, to increase the productivity of the work and the chances of success.

Summary of the project and main conclusions

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, were developed, in collaboration with Bayer CropScience. We targeted 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 male midges of the respective species and kill in seconds, a big improvement on wax emulsion formulations (e.g. SPLAT) which were too slow acting. Disappointingly, we were not able to demonstrate their efficacy for control of their target pests on raspberry in replicated experiments in large field cages in the final year of the work, possibly because dose rates and/or density of deployment were too low. However, the formulations are promising, and further work is needed to explore rates of use and method of deployment.

Artificial sachet dispensers of the volatiles produced by splits in raspberry canes were produced during the project. However a reduction in egg laying by females was not proven where sachets were deployed in the field.

The Natural Product Matrix formulation has great potential for attract and kill of numerous other pests internationally.

Financial benefits

Raspberry cane midge is an important pest of raspberry, an important and valuable crop in the UK, and it can only be controlled currently with chlorpyrifos, which has been withdrawn from use. 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 A&K approach also has the advantages that comparatively small amounts of pheromone and crop protection product are likely to be required and that the pheromone is regarded as a co-formulant of the control product employed, considerably simplifying and reducing the cost of registration procedures.

Action points for growers

- No changes to growing practice are being advised.