



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

SF 117

Sex Pheromone Trap For
Monitoring Blackberry Leaf
Midge

Annual Report 2011

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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.

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Headline

- The female sex pheromone of the blackberry leaf midge has been identified and synthesized.

Background and expected deliverables

Blackberry leaf midge (*Dasineura plicatrix*) has recently developed as a serious pest of blackberry and has now spread to raspberry in the UK and elsewhere in Europe. It attacks and kills the shoot tips of primocanes leading to growth stunting and cane branching. Growers consider that it significantly affects yield in both crops, although no crop damage assessments have yet been made. Growers currently have no method of predicting or monitoring attacks or timing sprays to control it. Timing of application is critical with midge pests as the larvae quickly become protected within the leaf rolls and it is important not to disrupt natural biocontrol mechanisms.

The female midge produces a powerful sex pheromone which attracts males. Identification of the pheromone would enable the development of sex pheromone traps for monitoring the pest and timing measures for its control. Such traps have already been developed for the raspberry cane midge and blackcurrant leaf midge. The traps will be ideal for timing application of control programmes which have been developed by ADAS in project SF102.

Furthermore, recent work by EMR has shown that a new insecticide being developed by Bayer is effective for control of blackcurrant and apple leaf midges, providing sex pheromone monitoring traps are used for timing sprays at the start of emergence of the midges. It is likely that this same insecticide will be effective against blackberry midge. The novel insecticide is systemic/translaminar as well as being selective and compatible with IPM programmes.

Summary

The female-produced sex pheromone of blackberry leaf midge was partially identified in HDC-funded PhD project CP38 ('The Chemical Diversity of Midge Pheromones'). This project aims to complete identification of the chemical structures of the components of the pheromone, to synthesise them and develop effective lures and traps for use by growers. It is anticipated that the traps will be invaluable in monitoring the pest to assess the need for control measures and to time the application of these more effectively.

Previous results indicated that the female-produced sex pheromone of the blackberry midge, *D. plicatrix*, consists of two components and that these were 15-carbon compounds with an acetate group at C-2 and two and one double bonds respectively. The current work provides good evidence that these are (2*R*,Z6,Z9)-2-acetoxy-6,9-pentadecadiene as the major component and (2*R*,Z6)-2-acetoxy-6-pentadecene as the minor.

When the synthetic compounds were tested in the field, the minor component alone was unattractive to male blackberry leaf midges when tested as the racemic or the separate enantiomers at two different loadings. In contrast, the (*R*)-enantiomer of the major component was highly attractive. The (*S*)-enantiomer and racemic mixture were completely unattractive, indicating that the (*S*)-enantiomer actually inhibits the attractiveness of the (*R*)-

enantiomer. Moreover, adding the minor component to the major at a 1:3 ratio significantly increased the attractiveness of the major component.

Thus the two components of the female sex pheromone of the blackberry midge, *D. plicatrix*, have been identified and a blend of the synthetic compounds is highly attractive to male midges in field trapping tests. In the second year of the project the blend ratio and loading of pheromone in the lure will be optimised and the attractiveness of the most effective synthetic lure compared to that of a virgin female midge. Lures and traps will also be made available to a sample of growers for evaluation for monitoring the pest.

Financial benefits

No reliable figures are available but these will be investigated during the second year of the project.

Action points for growers

- Lures and traps for blackberry midge will be made available to selected growers for evaluation as monitoring tools in the second year of the project.