Grower Summary

TF 209

Feasibility of developing a semiochemical based monitoring trap for the apple fruit rhynchites

Annual 2014

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

Read the label before use: use pesticides safely.

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Project Number:	TF 209
Project Title:	Feasibility of developing a semiochemical based monitoring trap for the apple fruit rhynchites
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Further information

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GROWER SUMMARY

Headline

Field and laboratory work have been started to determine whether apple fruit rhynchites produce pheromones.

Background and expected deliverables

Damage by apple fruit rhynchites (AFR), *Rhynchites aequatus,* (Fig. 1) has been increasing in UK apple orchards and sometimes pear orchards in recent years, probably due to changing patterns of insecticide use. Losses of 1% of fruit are common and losses >5% are not unusual. Hawthorn is the pest's normal host. Damage to apple is caused by feeding punctures in young developing fruitlets during and after blossom. However, egg laying and larval development inside apples (Massee 1954; Alford 1984) must be rare because it is never seen or reported by growers or advisors. The pest causes damage at low population densities and the weevils are difficult to spot whilst they are feeding or egg laying. The extent of damage only becomes apparent when the characteristic corky scars develop when it is too late to take action.

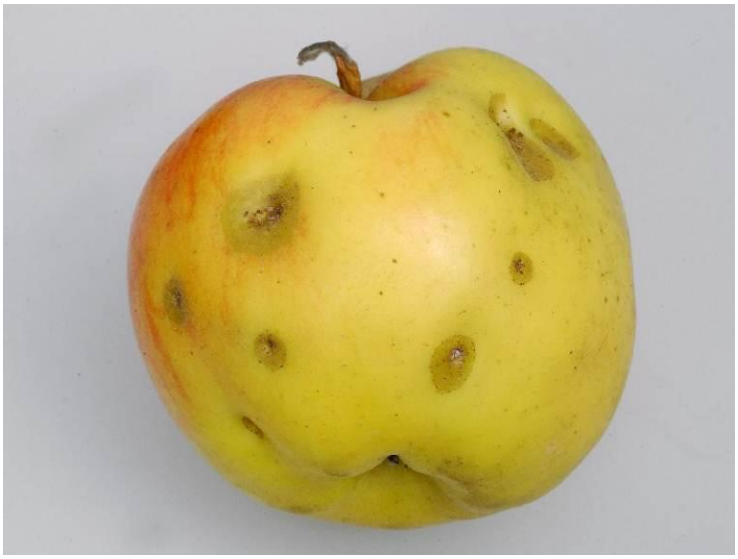

Figure 1. Damage by apple fruit weevil, *Rhynchites aequatus,* on apple

The weevil can be controlled by sprays of chlorpyrifos or thiacloprid (Calypso) but the former cannot be used during blossom because of its risk to bees and growers are reluctant to use thiacloprid during flowering for the same reason, even though the label indicates it can safely be applied during bloom. Chlorpyrifos is also broad spectrum and can damage other

beneficial insects in the orchard and both chlorpyrifos and thiacloprid are damaging to earwigs.

It would be beneficial to develop a sensitive, species-specific semiochemical based monitoring trap for this pest. However, it is not known whether *R. aequatus* produces a sex or aggregation pheromone, when it is produced or which sex produces it. Many weevils are known to produce sex or aggregation pheromones, e.g. strawberry blossom weevil and pepper weevil, but in others, pheromones do not seem to be so important, e.g. apple blossom weevil. Nothing is known about pheromones of Rhynchitidae and so it is important to demonstrate in preliminary studies whether or not semiochemical-mediated sexual attraction occurs before embarking on a major project to identify, synthesise and exploit it for pest monitoring or control.

Summary of the project and main conclusions

In Year 1 (2013) we aimed to determine whether sexual attraction occurs between male and female apple fruit rhynchites (AFR), which sex is attractive and the time that attraction occurs. We also conducted preliminary collections and analyses of volatiles from AFR to determine whether any candidate pheromone components can be readily detected and identified.

Live AFR were collected in the spring from several apple orchards and hawthorn trees and a method to determine the sex of the weevils was identified (previously alluded to by M. G. Morris, 1990). In the laboratory, males and females were able to identify each other and successfully mate resulting in eggs being laid. This indicated that the weevils were suitable for use in trapping experiments and for collection of volatiles to identify potential pheromone components.

These weevils were used as bait in trapping experiments deployed in an unsprayed apple orchard with a known AFR population. Traps were checked for weevils and trees were tap sampled over a tray. Data was collected weekly and the sex of the weevils was identified.

More AFR weevils were obtained by tap sampling than in the traps used in this trial which were white cross vane bucket traps and red delta traps with sticky bases. There was some evidence that male AFR maybe repelled by other male AFR and they were potentially attracted to female AFR. However, the method for sexing AFR was not developed until mid-way during this trial so some weevils could not be sexed initially. The trial should be repeated

with known sexes of all weevils using the tap sampling method with weevils of known mated status. This will provide more robust data on the interactions between the sexes.

Volatiles were collected from weevils of each sex with or without a food source as individuals or in groups of 2-8. Sixteen collections were made, but analyses of these collections by gas chromatography coupled to mass spectrometry (GC-MS) were unsuccessful and no sex specific compounds were identified. These collections and analyses will be repeated.

Financial benefits

This project could eventually lead to the development of a sensitive, specific, semiochemical-based monitoring trap for apple fruit rhynchites. This will enable growers to minimise losses due to the pest, which probably average >1% in apple, and direct sprays against it only when they are needed. This project is thus consistent with the industry's need to minimise and rationalise the use of pesticides.

Action points for growers

- Growers should monitor for AFR by tap sampling trees from early April.
- Orchards with high fruit damage the previous year should be treated in the spring avoiding bloom.