Grower Summary

TF 220

Further development of earwig-safe spray programmes for apple and pear orchards

Annual 2016

Disclaimer

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

AHDB Horticulture,
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

Project title:	Further development of earwig-safe spray programmes for apple and pear orchards
Project number:	TF 220
Project leader:	Dr Michelle Fountain, East Malling Research, New Road, East Malling, Kent, ME19 6BJ Tel: 01732 843833; Fax: 01732 849067
Report:	Year 2 report, 2015
Previous report:	Year 1 report, 2014
Key staff:	Dr Michelle Fountain, Mr Adrian Harris Dr Philip Brain (Biometrician)
Location of project:	East Malling Research, New Road, East Malling, Kent, ME19 6BJ
Industry Representative:	Dr Oliver Doubleday DPhil FRAgS, G H Dean & Co Ltd, Hempstead Farm, Tonge, Sittingbourne, Kent, ME9 9BJ. Tel: 01795 423981, email: oliver@ghdean.co.uk
Date project commenced:	1 April 2014
Date project completed (or expected completion date):	31 March 2017

GROWER SUMMARY

Headline

- In field trials significant effects of Calypso and Gazelle were not detected in an orchard with abundant earwig populations.

Background and expected deliverables

Earwigs are important generalist predators in both apple and pear orchards. They play a key part in regulating populations of several highly damaging pests including woolly aphid and other aphid pests, mussel scale, codling moth and pear sucker. Recent laboratory tests and field experiments by EMR and experiments by other European scientists have indicated that several commonly used crop protection products including thiacloprid (Calypso), indoxacarb (Steward), chlorpyrifos and spinosad (Tracer) have harmful effects on earwigs and could be responsible for low populations in some orchards. However, growers need to be able to use products containing acetamaprid (Gazelle), thiacloprid (Calypso), abamectin (Agrimec) and spirodiclofen (Envidor) for control of aphids, mussel scale, weevils, capsids, pear sucker and sawfly.

This project builds on research carried out by NIAB EMR in AHDB Horticulture Project TF 196, which showed that earwigs can be disrupted by routine crop protection programmes. It tests how to integrate key products into pest management programmes without causing harm to earwig populations in orchards and further investigates the sub-lethal effects (growth and reproduction) that these products have on nymph and adult earwigs in highly replicated laboratory trials.

In the first year of the project laboratory tests on nymph and adult earwigs exposed to acetamaprid (Gazelle), thiacloprid (Calypso), abamectin (Agrimec) or spirodiclofen (Envidor) compared to a water only control, demonstrated that earwig nymphs avoided feeding on bean leaves sprayed with Calypso, but Envidor appeared to stimulate adult earwig feeding. Calypso also slowed the growth of earwig nymphs and male adults. In the short term Gazelle, Envidor and Agrimec appeared to be safe to earwig nymphs and adults.

Summary of the project and main conclusions

In the second year of the project, adult earwigs exposed to one of four of the products tested in the laboratory in 2014 were maintained as paired males and females, kept in cool conditions over the winter and then allowed to reproduce in the spring of 2015. Fecundity measurements were recorded to determine long-term effects of exposure to acetamaprid (Gazelle), thiacloprid (Calypso), abamectin (Agrimec) or spirodiclofen (Envidor) in comparison to a water only control.

There was significant female earwig mortality with previous exposure to Agrimec and Envidor residues compared to the water only control. In addition, Envidor significantly delayed egg laying by a month compared to the control. It was noted, in the previous year, that Envidor stimulated feeding of residue contaminated bean leaves. How these effects are manifested in commercial orchards was beyond the scope of this project. However, the combined effects of autumn and spring earwig mortality and delayed egg laying meant there were a third more eggs laid in the water only control, overall, compared to the Envidor, Calypso and Abamectin treatments.

A replicated field trial was done to assess the impacts of Calypso and Gazelle at recommended field rates on earwig numbers in apple trees. The orchard used was a Gala apple orchard in Kent. The plots were blocks of 24 trees sprayed with an air assisted knapsack sprayer either pre-blossom or mid-season with one or two applications of Calypso or Gazelle compared to unsprayed blocks of trees.

No significant effects of either Calypso or Gazelle were found on earwig populations with either one or two spray applications in the spring or mid-season. In previous field tests (Project TF 196), foliar applications of Calypso reduced the numbers of earwigs in trees. Differences may be due to canopy density and hence spray coverage or earwig population levels in the orchards.

The results of these experiments suggest that an occasional application of Gazelle, or, potentially, Calypso, to control early season pests are unlikely to have long term effects on earwig populations if earwig populations are already high in the orchard and the application is made in response to pest thresholds as part of Integrated Pest Management.

Future research will test Envidor and Agrimec in pear orchards in the early- and mid-growing season, and 1-2 applications.

Financial benefits

- The industry had been provided with independently obtained information on the relative safety of critical orchard crop protection products on earwigs; important natural enemies of several damaging pests.
- Growers will be able to judge when best to use which products for essential pest control tasks such as control of aphids, weevils, capsids, pear sucker and sawfly.
- There will be fewer problems with many important pests if earwig populations are allowed to thrive.

Action points for growers

- Growers should make considered choices of products based on the knowledge of important predators in the orchard at the time of spraying (see Table 6 in the Science Section of this report).
- Growers can consult agronomists to determine which products are safe to apply at key times of the earwig lifecycle.
- Gazelle could be an alternative to Calypso for sawfly, muscle scale or weevil control, but further work is needed on Gazelle efficacy for this purpose.