Grower Summary

TF 220

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

Final 2017

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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 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 3 final report, 2016
Previous report:	Year 2 report, 2015
Key staff:	Adrian Harris, Maddie Cannon, Alvaro Delgado Dr Philip Brain (Biometrician)
Location of project:	NIAB EMR, 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

- The effects on earwigs of commonly used pest control products in orchards are revealed.

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 NIAB EMR and experiments by other European scientists have indicated that several commonly used insecticides 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 EMR in AHDB Project TF 196, which showed that earwigs can be disrupted by routine crop protection programmes. It tested how to integrate key crop protection products into pest management programmes without causing harm to earwig populations in orchards. It also investigated the sub-lethal effects (growth and reproduction) that these products have on nymph and adult earwigs in highly replicated laboratory trials.

Summary of the project and main conclusions

In the first year of the project (2014) nymph and adult earwigs exposed to acetamaprid (Gazelle), thiacloprid (Calypso), abamectin (Agrimec) or spirodiclofen (Envidor) and compared to a water only control in laboratory tests, demonstrated that earwig nymphs avoid 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. The tests suggested that in the short term Gazelle, Envidor and Agrimec appeared to be safe to earwig nymphs and adults.

Adult earwigs exposed to one of 4 orchard insecticides 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 taken 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. 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 Agrimec treatments.

In 2015, a replicated field trial was done to assess the impacts of Calypso and Gazelle at recommended field rates on earwig numbers in a Gala apple orchard. 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. Differences may have been due to canopy density and hence spray coverage or earwig population levels.

In 2016, a replicated field trial was done to assess the impacts of Calypso, Envidor or Agrimec at recommended field rates on earwig numbers in a Conference pear orchard. The plots were blocks of 60-360 trees. Blocks were sprayed with the grower's own commercial equipment at pre-blossom (21 March), early summer (08 June), mid-summer (21 July) or post-harvest (18 October) and compared to an untreated control. No significant effects of Calypso were found on earwig populations with either the pre-blossom or post-harvest sprays. An early summer (08 June) foliar application of Envidor or Agrimec reduced the numbers of earwig nymphs significantly. However, by mid-summer (21 July), when the earwigs were fully mature, Envidor and Agrimec had no discernible effect on the numbers of adult earwigs in pear trees.

The results of these experiments suggest that an occasional application of Gazelle or Calypso targeted to control pests which reach threshold are unlikely to have long term effects on earwig populations if earwig populations are already high in the orchard. It should be noted that Agrimec is no longer approved for use on pear. Early summer applications of Envidor in pear orchards should be avoided where possible as young earwigs appear to decline in trees treated at this time.

Building up earwig populations in orchards by selective use of crop protection products will firstly increase natural control of many major orchards pests, but secondly allow occasional sprays of more earwig harmful products when they are needed to control early spring or sporadic pests.

Financial benefits

- This research has provided the industry with independently obtained information on the relative safety of critical orchard insecticides on earwigs; important natural enemies of several damaging pests.
- Growers and agronomists will be able to judge when best to use which products for essential control of aphids, weevils, capsids, pear sucker and sawfly.
- There will be fewer problems with many important orchard pests if earwig populations are allowed to thrive.

Action points for growers

- Growers should make considered choices of pest control products based on the knowledge of important predators in the orchard at the time of spraying.
- Growers can consult agronomists to determine which products are safe to apply at key times of the earwig lifecycle and check correct application rates.
- 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.
- Growers should avoid early summer applications of Envidor where possible, when earwig nymphs seem to be susceptible to these products.
- At the time of writing, the approval for Agrimec for use on pear was nearing expiry.