



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

TF 196

**Investigation of the effects
of commonly used
insecticides on earwigs,
important predators in
apple and pear**

Annual 2011

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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 HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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| Project Number: | TF 196 |
| Project Title: | Investigation of the effects of commonly used insecticides on earwigs, important predators in apple and pear |
| Project Leader: | Dr Michelle Fountain, EMR |
| Industry Representative: | Peter Checkley, Howard Chapman Ltd |
| Report: | Annual 2011 |
| Publication Date: | 09/08/2012 |
| Previous report/(s): | None |
| Start Date: | 1st April 2011 |
| End Date: | 31 st March 2014 |
| Project Cost (Total project Cost): | £30,600 (£31,600) |

Headline

- Earwigs are very important predators in top fruit crops, but are sensitive to insecticide products.

Background and expected deliverables

Earwigs are very 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 in other European countries indicate that several very commonly used insecticides including thiacloprid (Calypso), indoxacarb (Steward) and spinosad (Tracer) have harmful effects on earwigs and could be responsible for the low populations of these important predators in some orchards. This project is further investigating the lethal and sub-lethal effects of these and other commonly used insecticides on different earwig life stages.

In the first year it was intended to screen a range of commonly used insecticides in the laboratory, including; abamectin (Agrimec), acetamiprid (Gazelle), chlorantraniliprole (Coragen), chlorpyrifos, flonicamid (Mainman), indoxacarb (Steward), methoxyfenozide (Runner), spinosad (Tracer), spiroticlofen (Envidor), thiacloprid (Calypso) and a coded product, and to compare these to an untreated control. The short-term and long-term sub-lethal effects on feeding, development, longevity and reproduction will be measured. The effects of typical programmes of insecticide sprays used in UK apple and pear production will be investigated in years 2 and 3.

Summary of the project and main conclusions

In laboratory tests, adult male adult female (27 day exposure) and nymph stage (7 day exposure) earwigs were exposed to one application of each pesticide sprayed onto a leaf disk in a Petri dish. Chlorpyrifos was by far the most toxic insecticide for earwigs with most dying within a couple of days. In order of decreasing toxicity, Tracer (spinosad) > Runner (methoxyfenozide) > Calypso (thiacloprid) > Steward (indoxacarb)/Envidor (spirotetramat)/Gazelle (acetamiprid) were also harmful. Abamectin (Agrimec), chlorantraniliprole (Coragen), flonicamid (Mainman), thiacloprid (Calypso) and the coded product showed very few signs of toxicity. Runner was toxic to nymphs, but less so to adult earwigs.

It is well known that laboratory tests may overestimate the toxicity of insecticides, but these tests were used to screen the most commonly used products for field testing in 2012. This study did not take into consideration mixtures or repeated exposures to plant protection products. However, combined with data from other researchers it acts as a baseline for field studies in the coming growing seasons.

In field studies by other workers (Vogt *et al.* 2009), flonicamid (Tepekki) resulted in fewer earwigs in trees. A recent review of the literature by Logan *et al.* (2011) rated residues of chlorpyrifos, spinosad, bifenthrin, diazinon and thiacloprid as highly toxic (>50% mortality) to earwigs. Abamectin, methoxyfenozide, spirotetramat, tebufenozide and thiamethoxam were noted as low toxicity to earwigs. An older field study by Sauphanor *et al.* (1993) demonstrated that diflubenzuron (Dimilin Flo) was highly toxic to earwigs in pear orchards causing a subsequent rise in pear sucker numbers.

Based on the findings from this experiment and other researchers, the most toxic products will be tested in the field in 2012 to ascertain a more realistic field exposure and assess the resulting effects.

Financial benefits

The industry will be provided with independently obtained vital information on the relative safety of the most commonly used insecticides in UK apple and pear production on earwigs, an important natural enemy of several damaging pests.

Growers will be better able to judge which insecticides to use for vital pest control tasks such as control of codling moth, aphids, mussel scale and pear sucker.

Action points for growers

- Growers should make considered choices of pesticide products based on the knowledge of important predators in the orchard at the time of spraying.
- In particular, growers should use the precautionary principle in pear orchards and only use products known to be harmless to important pear sucker predators, including anthocorids, earwigs, ladybirds and spiders.