

Future Orchards Trial: Final Report

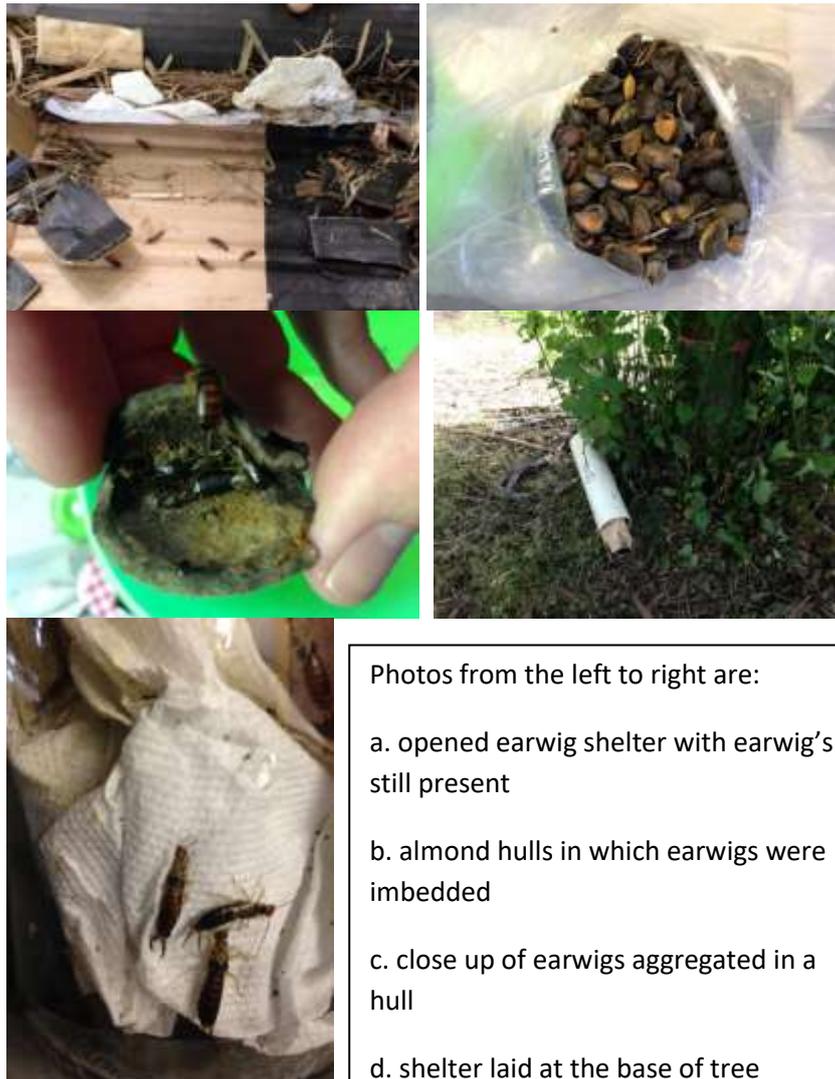
Project title:	Establishing a population of European Earwigs (<i>Forficula auricularia</i>) in a commercial apple orchard for the biological control of Woolly aphid (<i>Eriosoma lanigerum</i>).
Region:	Southern Victoria
Contact:	Jabbar Khan and Angus Crawford
Projective Objective:	To establish a population of European Earwigs (<i>forficula auricularia</i>) in a commercial apple orchard for the biological control of Woolly aphid (<i>Eriosoma lanigerum</i>).

Outline/method:	<p>Location: Fankhauser Apples, Drouin, Victoria</p> <p>Introduction of trial design: The trial was set up in a large block of older vase 20 years old trees Fuji apple variety which has a history of Woolly Aphid pressure.</p> <p>This trial was established using information in the literature from Australian sources as well as overseas where there is also interest in this topic.</p> <p>European Earwigs <i>Forficula auricularia</i>:</p>  <p>European Earwigs are a biological control of woolly aphid which is a major pest of apples. One Australian study in particular by Nicolas published in 2005 found that European Earwigs were the most effective biological control agent of the woolly aphids, when compared to <i>Aphelinus mali</i> wasp, lady birds, lacewings and hoverflies.</p> <p>Additional control is achieved where both <i>A mali</i> and earwigs are both present. However, earwigs we found in practice were not easy to establish and likely depends very much on the amount of food available to them in the orchard during the season.</p> <p>Earwigs are a pest of cherries and stonefruit and therefore not recommended for these crops. Earwigs are highly mobile so there must not be stonefruit or cherries nearby when releasing into apples.</p> <p>Earwigs are not considered a pest of apples because apple skins are too hard to penetrate. If there is an open wound or injury through puncturing small holes in the fruit earwigs will feed on this and it may appear the earwig had caused this damage.</p>
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Trial demonstration set up:

For set up of the trial for Earwigs to control the Woolly Aphid, we needed decent populations to establish from the start. After investigation we found large numbers can be sourced by collecting almonds hulls containing overwintering earwigs.

Earwigs were collected by Agriculture Victoria from an almond orchard. To prevent potential pest and diseases spread prior to release the almond hulls were manually separated from hulls and placed in containers with damp paper towelling and mixes of plant food prior to release.



Photos from the left to right are:

- a. opened earwig shelter with earwig's still present
- b. almond hulls in which earwigs were imbedded
- c. close up of earwigs aggregated in a hull
- d. shelter laid at the base of tree
- e. container containing some extracted earwigs

On 06 October 2016 we were prepared the earwigs shelters and released the earwigs in the orchard. Earwig shelters were made from the discarded storm water pipes and cut to various length 15 cm, 20 cm and 30 cm. A total of 10 lengths of pipe were prepared with rolled cardboard inserted inside providing small cavities for earwigs to rest.

To take advantage of the earwigs aggregation behaviour the paper towels from the plastic containers containing the earwigs originally were also inserted into the shelters. These paper towels would potentially be impregnated with an aggregation pheromones which is the released pheromone which enables them to find each other or encourage them to locate the shelter.

Aggregation behaviour requires at least 20 earwigs per shelter and 40 or more earwigs is desirable.

Releasing and monitoring Earwigs shelters:

The earwig shelters were placed on the ground near tree trunk and few tied on the branches. We released the earwigs twice to establish the population in the shelters to control the woolly aphids.



Picture: typical shelter position for the traps

Firstly we released on 06 October 2016 about 250 Earwigs all stages (adult, nymphs) in total. Site was monitored on a weekly basis during day time when they are likely to shelter. Over the week following the release it was found that the earwig had mostly disappeared.

The reason for the disappearing of the earwig population is likely due to the lack of food. Woolly aphid also was not seen during this period.

Due to the reduction of earwig population a second lot of earwigs were released 17 November 2016. This new lot of earwigs was received from Agriculture Victoria and IPM Technologies and placed again into the orchard.

This second time some of the earwigs were placed in the same cardboard stormwater pipe shelter but had also loose hay and fresh lettuce leaves added which seemed more effective. Also some bathroom tiles were placed into the block to see if that is what the earwigs preferred.

Results Summary

Final results shows that, after preliminary monitoring of the European earwigs shelters to introduce and establish a population in a commercial apple orchard to be successful is a big challenge. Growers world wide are still looking finding ways to establish and control of woolly aphids in apple and pear orchards.

The first release in October may have been too early but the second release should have been more successful as signs of woolly aphid were beginning to appear. However this still may not have been enough to keep the earwigs satisfied.

The cooperating grower has continued to leave the traps in the orchard and will use the second season to confirm whether or not the earwigs are present in the orchard.



Picture: Woolly aphid ended up being well established in the orchard yet the earwigs did not appear to have any impact in this case.

Implications

While earwigs have great potential as a biological control of woolly aphid and other pests from this demonstration they seem unreliable and with their high mobility can quickly disappear probably to another food source.

We have gained practical knowledge about earwig aggregation and behaviour around the environment. But it so far the trial was unsuccessful to make up the population.