



# Augmenting the apple canopy with earwigs to enhance woolly apple aphid control

**Adam Walker**, Michelle Fountain, Celine Silva, Greg Deakin, Francesca Elliott, David Harbour, Ali Vaughan, Natasha Tyndale, Kirsty Malpas, Samuel Fisher, Tanya Field, Joseph Brough, Saskia Lean, Rhys Wenborn and Rebecca Griffiths

# Woolly Apple aphid (WAA)

## Lifecycle



Winter



Spring



Autumn



Summer

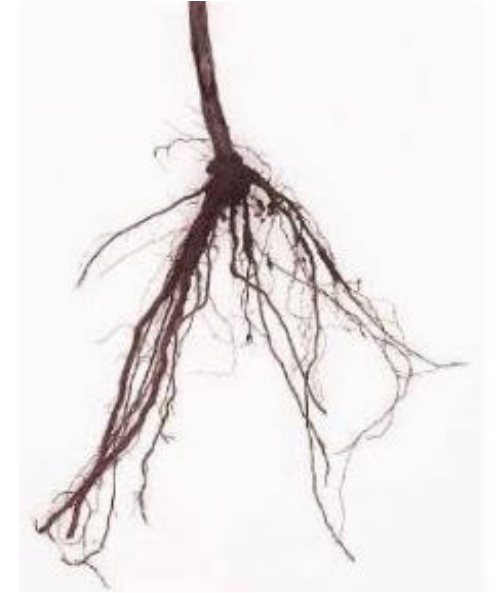


## Damage



# WAA control and limitations

- Pesticides: ongoing withdrawals (incl. spirotetramat), application timing key, consider impact on beneficials
- Resistant root stocks: evidence of resistance-breaking aphid biotypes
- EPFs and nematodes: temperature and humidity dependent, potentially costly
- Natural enemies: e.g. *Aphelinus mali*, need to understand ecology



# Earwigs and woolly apple aphid control

- Important generalist predator in apple and pear orchards
- Studies show earwigs can control WAA
- However, control unreliable: earwig numbers in orchards inconsistent
- One recommendation is to provide earwig refuges in the canopy of trees to improve pest control
- However, if no or few earwigs in orchard, unlikely to have significant impact



# Trial Aim

- Determine if releases of small numbers of earwigs to individual apple trees over two consecutive years can reduce the prevalence of WAA



# Trial Spring 2023 – Autumn 2024

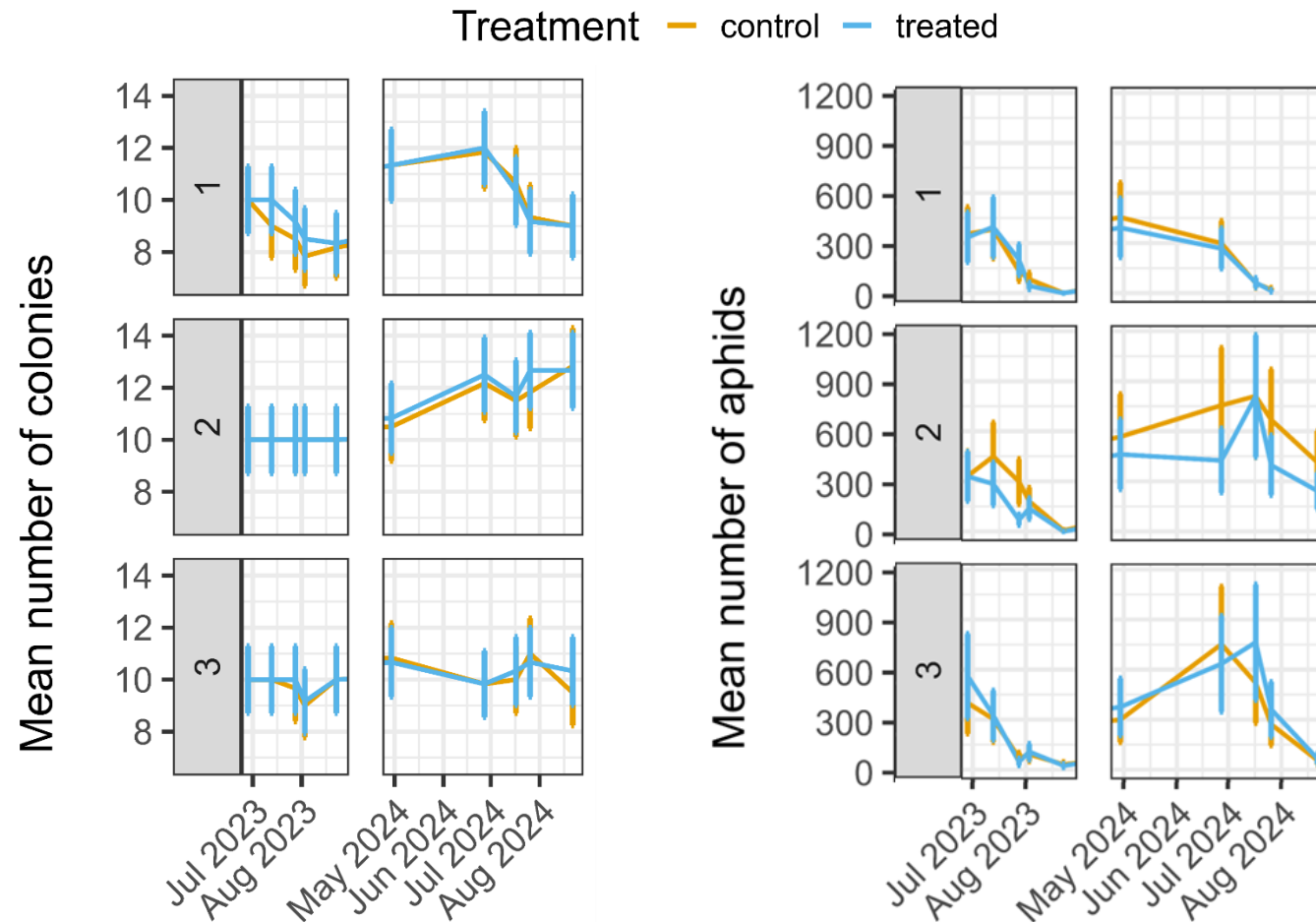
- Location: 3 apple orchards in Kent
- Treatment: groups of trees, each tree with a pre-loaded earwig refuge
- Control: groups of trees without earwig refuges
- Assess:
  - Impact on WAA numbers
  - Earwig numbers in refuges over time

‘Wignest’ <https://russellipm.com/product/11622-2/>



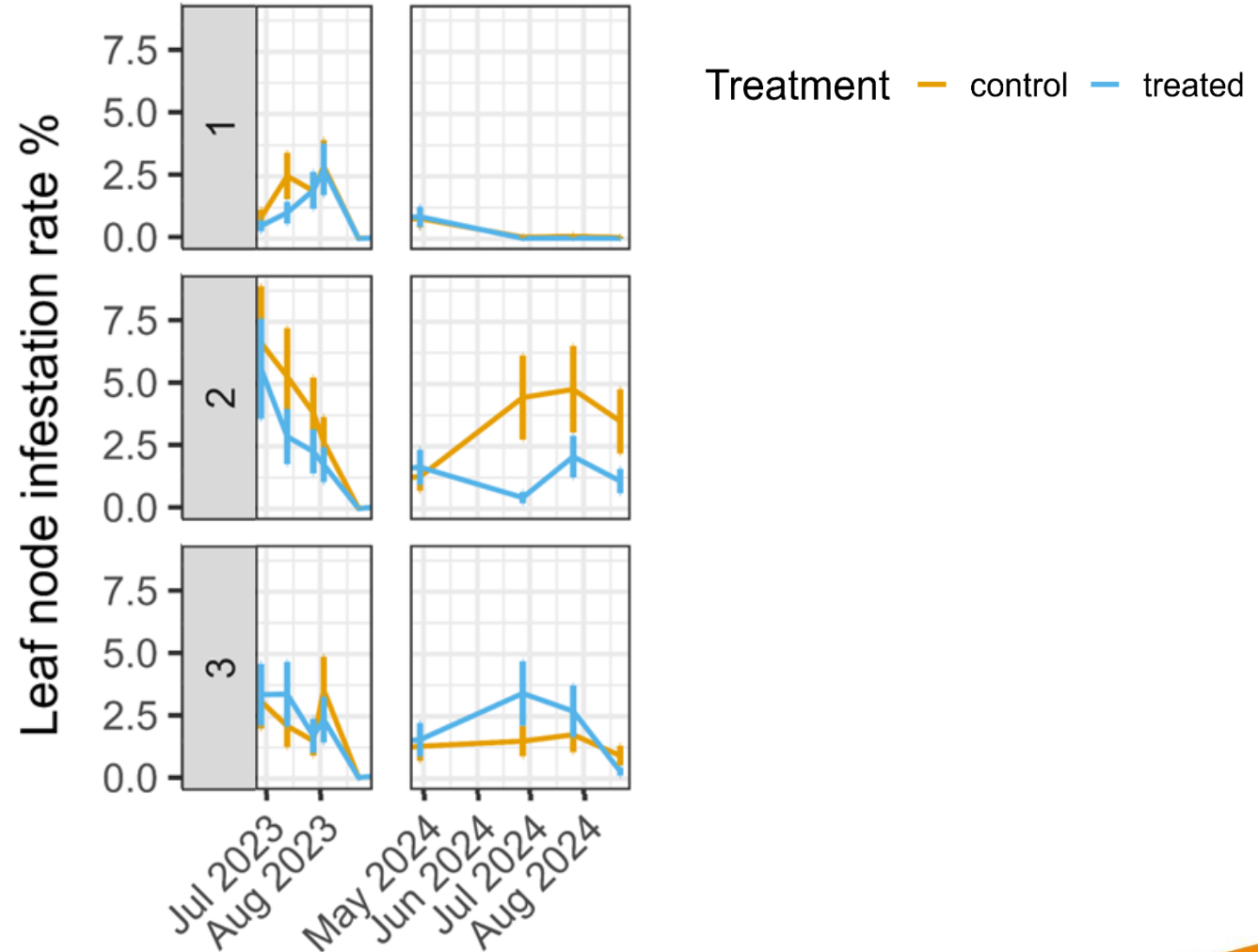
# Results: Numbers of WAA Colonies and Aphids per Colony, on Tree Bark

- No significant differences between earwig treated and earwig untreated trees overall:



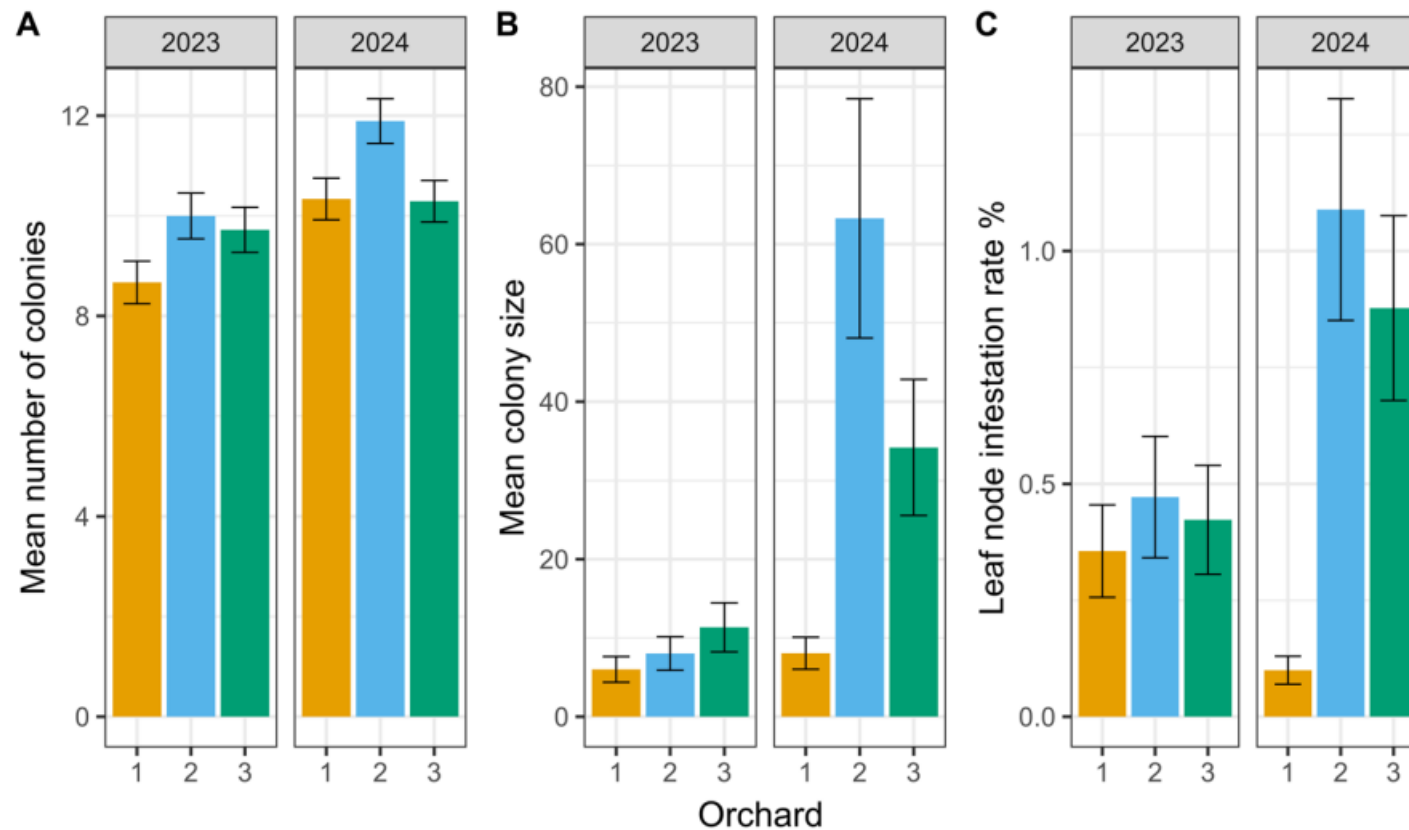
# Results: Number of WAA Colonies on Young Shoots (Leaf Nodes)

- No significant differences between earwig treated and earwig untreated trees:



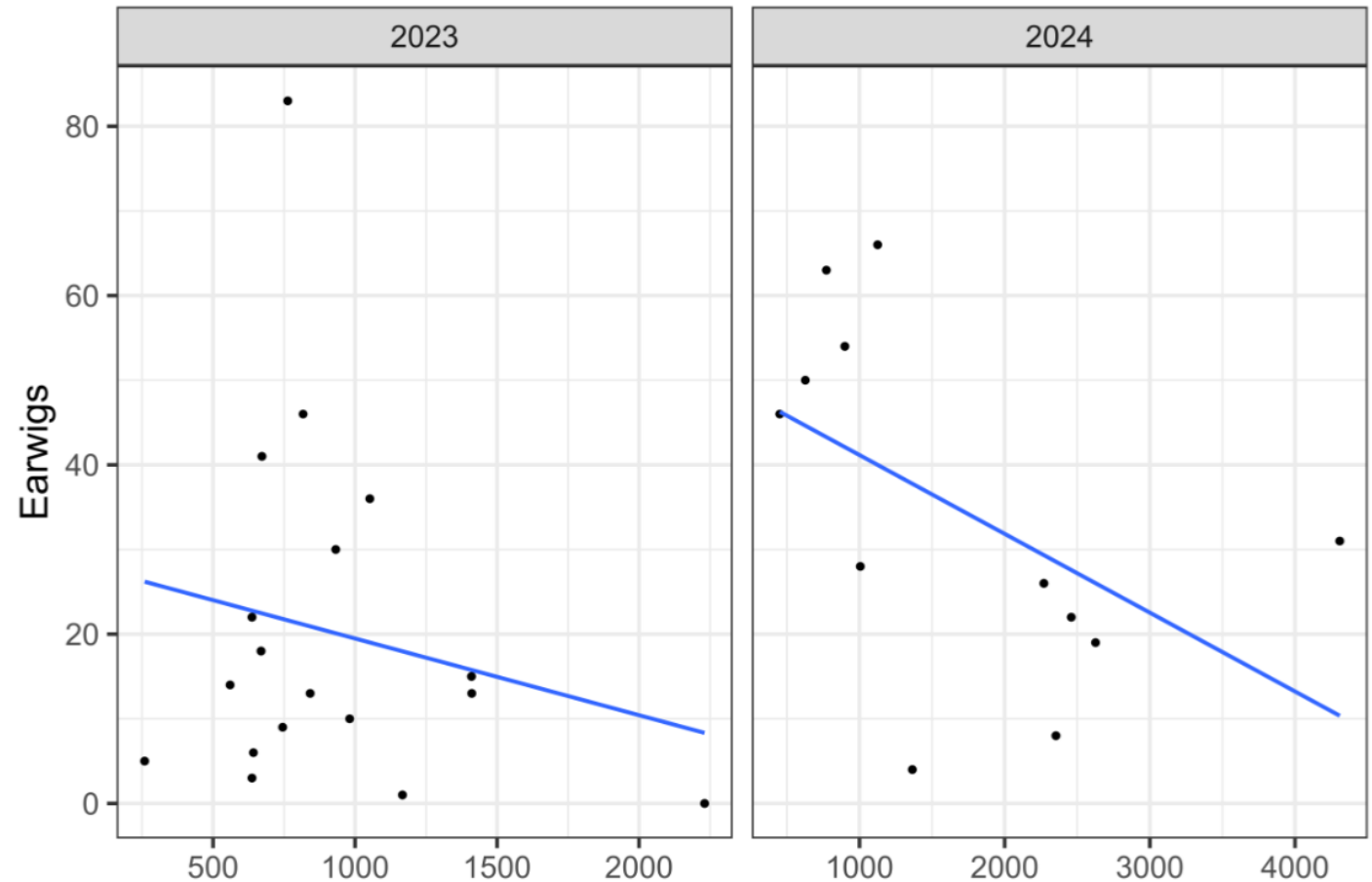
# Results: Numbers of WAA in each Orchard each Year

- More aphids and colonies on young shoots in orchards 2 and 3 compared with 1 in the second year:



# Results: Numbers of WAA per Colony and Numbers of Earwigs in Refuges 2023 and 2024

- No significant correlation between numbers of earwigs in refuges and numbers of WAA in colonies
- Although trend for fewer aphids where more earwigs
- Indication that earwig introductions were increasing earwigs in trees over time



# Conclusions

- Earwig introductions to apple trees did not significantly impact WAA abundance or population growth through the season in this trial
- However, generally less WAA infestation where more earwigs, as seen in research elsewhere
- This correlation increased between years, suggesting another year of release and monitoring needed for measurable impact
- Numbers of WAA inconsistent between orchards and years
- Tree architecture, soil drainage and availability of alternative food sources likely influence earwig predation
- Relying on earwigs alone to control WAA likely not entirely successful

# Recommendations

- Research still needed to identify causes of low and inconsistent earwig numbers in apple orchards
- Keep monitoring levels of earwigs and other natural enemies
- Pesticides can disrupt earwigs and parasitoids
- Insecticide treatments for WAA should only be applied in combination with predictive models that include *Aphelinus mali* and earwigs
- Hedgerow and flower cover can promote natural enemy richness and aphid control in orchards
- Useful to look for complementary generalist natural enemies for WAA

## **Control of Woolly Apple Aphid (*Eriosoma lanigerum*) by Augmenting Earwigs (*Forficula auricularia*) in the Canopy of Apple Trees**

M. T. Fountain  | A. Walker | C. X. Silva | G. Deakin

Niab East Malling, East Malling, UK

**Correspondence:** M. T. Fountain ([michelle.fountain@niab.com](mailto:michelle.fountain@niab.com))

**Received:** 31 March 2025 | **Revised:** 5 September 2025 | **Accepted:** 11 October 2025

**Funding:** This work was supported by the British Apples and Pears Limited and the East Malling Trust.



Thank you.



niab.com

