



SMART ORCHARD CASE STUDY

Inspired innovations driven by growers, shared by BAPL



HARNESSING EARWIGS AS NATURAL PEST PREDATORS IN PEAR AND APPLE ORCHARDS

THE PEST PROBLEM IN TOP FRUIT PRODUCTION

Pear sucker and woolly aphid are persistent and damaging pests in apple and pear orchards across the UK. These pests weaken trees by feeding on sap, leading to distorted growth, reduced fruit quality, and the development of sooty mould due to honeydew secretion.

Managing these pests has traditionally relied on broad-spectrum insecticides. However, increasing regulatory restrictions on active substances and the desire to farm more sustainably are encouraging growers to seek alternative pest control strategies that are both effective and environmentally responsible.



RESEARCH AIMS

NATURAL PEST CONTROL WITH EARWIGS

As part of its broader Integrated Pest Management (IPM) strategy, ACH Farming partnered with NIAB researchers to explore the use of earwigs (*Forficula auricularia*) as a biological control agent for pear sucker and woolly aphid.

The goal was to encourage natural predator populations, reduce reliance on synthetic chemicals, and support biodiversity within commercial orchards.

Specifically, the study aimed to:

- Encourage and monitor earwig populations using innovative habitat features
- Assess the effectiveness of earwigs in reducing pest numbers
- Evaluate the impact on overall pest management outcomes and pesticide usage.

This project was funded by BAPL on behalf of growers as part of a wider R&D programme.



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STUDY ACTIONS

The study incorporated various habitat interventions, specifically:

- The installation of “**wignests**” and “**earwig hotels**” made from bamboo canes to provide refuge for earwigs and other beneficial insects. Details as follows:
 - 162 wignests were placed over three orchards.
 - One wignest per tree, with six plots of nine trees per orchard in the three orchards.
 - Wignests were first installed in the orchards in June 2023.
 - Each wignest had five earwigs in.
 - The wignests were attached to the tree mid canopy. They were left for the whole year, and wignests were only replaced if they contained less than five earwigs the following year.
- Maintenance of **hedgerows and complex windbreaks** (including willow) to support habitat for broader predator communities like spiders and ladybirds. Not only do they protect these habitats from the wind and rain which can reduce insect flight activity and dry out microhabitats, but they also buffer against any pesticide drift caused by the weather conditions.
- Leaving orchard alleyways unmown during the growing season to create “**insect motorways**” and support alternative hosts like nettles.
- **Wildflowers were also introduced into to our alleyways** to allow insects to move around more safely by providing a network of ‘stepping stones’ and continuous corridors. This also allows for shelter as well as a fuel source for the beneficial insects.

STUDY RESULTS

During the first year of the ACH Farming and NIAB study found:

- **Each orchard responded in a different way to the earwig introduction.** As the number of earwigs varied over time between the orchards, the team is considering the variable practices and conditions between the orchards to try to identify patterns.
- Where there was an increased presence of earwigs this correlated with **visible predation of woolly aphid colonies.**
- In some areas, ACH Farming has been able to **phase out broad spectrum insecticides** (e.g., Agrimec, Hallmark, Insegar). However, the reducing availability of actives is also a challenge. A key driver in the practical research on biologicals is the need to protect more beneficial insects.
- Gradually **enhanced predator-pest balance**, contributing to the long-term sustainability of the orchard ecosystem.



Wignest attached to the tree mid canopy



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PRACTICAL TAKEAWAYS FOR OTHER GROWERS

- **Habitat creation is key:** Providing shelter and alternative food sources for beneficial insects like earwigs enhances their ability to suppress pests naturally. The A C Hulme team would recommend:
 - Positioning wignests in trees that have a history or signs of woolly aphid infestation.
 - Targeting lower to mid canopy areas where aphids are commonly found as they colonise pruning wounds and branch joints.
 - Placing wignests in dark and protected areas sheltered from direct sunlight and wind and avoiding areas recently treated with broad spectrum insecticides.
- **Monitor predator impact:** Regular field monitoring allows growers to correlate pest reduction with predator presence. This can be resource intensive and requires a methodical approach. A C Hulme has engaged with the local community to support them with this monitoring and by making use of various apps which are free to use. E.g. POMS Flower Insect Timed Count
- **Be adaptable:** As pesticide regulations evolve, integrating natural pest control is not only sustainable it's becoming essential.
- **Reduce inputs strategically:** Encouraging natural predators helps lower chemical use without compromising crop quality. Choose selective insecticides that protect beneficials, spot treat rather than blanket spray the whole orchard and time sprays when the natural predators are least active

ABOUT THE GROWER

ACH Farming



ACH Farming is a progressive, family-run farming business in the UK, with operations spanning tree fruit, asparagus, grapes, cattle, and arable cropping. The farm's "Farming for Tomorrow" philosophy prioritizes biodiversity, innovation, and sustainability. Their integrated pest management programme exemplifies their commitment to reducing chemical dependency while maintaining high yields and fruit quality.

Their approach combines ecological practices, real-time data systems, and technology such as RimPro forecasting tools and BioScout spore monitoring to make precise, environmentally conscious decisions.

Tom Hulme, managing director, notes:

"Where we deployed the wignests it has clearly affected pest populations."



Earwig hotel made from bamboo canes

