

## Introduction

*Aphidius rhopalosiphi* is already an established species used in risk assessment of plant protection products for non-target arthropods documents (Barrett *et al.*, 1994; Candolfi *et al.*, 2001). With the recent emphasis on biopesticides such as fungi and bacteria, there may be a need for an equivalent wasp species with a longer life span to assess the effects of products that may have a slower mode of action compared to conventional chemical pesticides. *Cotesia glomerata* (Hymenoptera: Braconidae) are important parasitoids and natural enemies of agricultural pests and therefore can serve as suitable organisms for determining the potential effects of pesticides on non-target species of arthropods within the agricultural ecosystem. These wasps may be a more robust species in terms of lifespan than *Aphidius rhopalosiphi* using the tier 1 methods described in the guideline of Mead-Briggs *et al.* (2000).

## Materials & Methods

A test was conducted to compare the two species in standard glass plate arenas treated with deionised water under laboratory conditions. The arenas comprised treated glass plates fitted to the floor and ceiling of a square frame (10 cm x 10 cm external dimensions) made from metal casing (1.8 cm x 0.5 cm in cross section). Into each, 10 wasps of mixed sexes were introduced (2 arenas per species). These were maintained at approximately 20°C and 60-90% relative humidity. For food, 1:3 honey:water was provided onto cotton wool bungs.

*Aphidius* is easily cultured in a laboratory environment and readily available to purchase from commercial suppliers. This is currently not the case for *Cotesia*. In this study, the *Cotesia* wasps were collected by gathering naturally occurring *Pieris brassicae* butterfly larvae from local organic garden plots and culturing them in the laboratory. *Cotesia glomerata* females had naturally parasitised some of the larvae by laying eggs inside the larvae, while they were feeding outside. At the laboratory, the larvae were contained in ventilated boxes and were provided with organic cabbage leaves as food. The boxes were checked daily for wasp pupae batches that had formed on the exterior of the butterfly larvae (Figure 1). *Aphidius* wasps were cultured by parasitising aphids that were infesting barley plants. Wasp pupae were placed under upturned glass funnels with a 9-cm deli pot at the top for collection of the adults, as they emerged. Once a batch was collected which provided sufficient numbers of wasps, these were used in the bioassay within 24 h of their emergence.



Figure 1. Pupa on caterpillar

## Conclusion

These results reinforce the theory that *Cotesia glomerata* may be a more suitable species than *Aphidius rhopalosiphi* for certain biopesticide testing methods in future if the effects of the test item are suspected to act more slowly (up to 9 days) than conventional products.

Development of a more efficient culturing method may be needed, instead of relying on wild-caught individuals, if *Cotesia* wasps are to be used regularly in laboratory tests. The bioassay using *Cotesia* may need to be ring-tested and validated using a biopesticide.



If you have any questions, please contact us.

## References & Acknowledgements

- Barrett, *et al.* (1994). Guidance document on regulatory testing procedures for pesticides with non-target arthropods. (ESCORT) 28 30 March 1994. SETAC Europe. ISBN 0 9522535 2 6.
- Candolfi, *et al.* (2001). Guidance document on regulatory testing and risk assessment procedures for plant protection products with non-target arthropods. (ESCORT 2), 21 23 March 2000. SETAC, USA. ISBN 1-880611-52-x.
- Mead-Briggs *et al.* (2000). A laboratory test for evaluating the effects of plant protection products on the parasitic wasp, *Aphidius rhopalosiphi*. IOBC Publication. ISBN 92-9067-129-7.
- Many thanks to Stephen Vinall for assistance with collection & rearing of wasps.

## Results & Discussion

The validity criterion for control mortality from the *Aphidius* guideline (20% mortality) was selected as a target value and the time taken to reach this was assessed. Mortality of *Cotesia glomerata* did not exceed 20% until 9 days, while *Aphidius rhopalosiphi* exceeded 20% mortality by 4 days, from the start of the bioassay (Figure 5). The larger size of the *Cotesia* wasps may partly explain the longer lifespan.



Figure 2. *Aphidius rhopalosiphi*



Figure 3. *Cotesia glomerata*



Figure 4. Test arenas

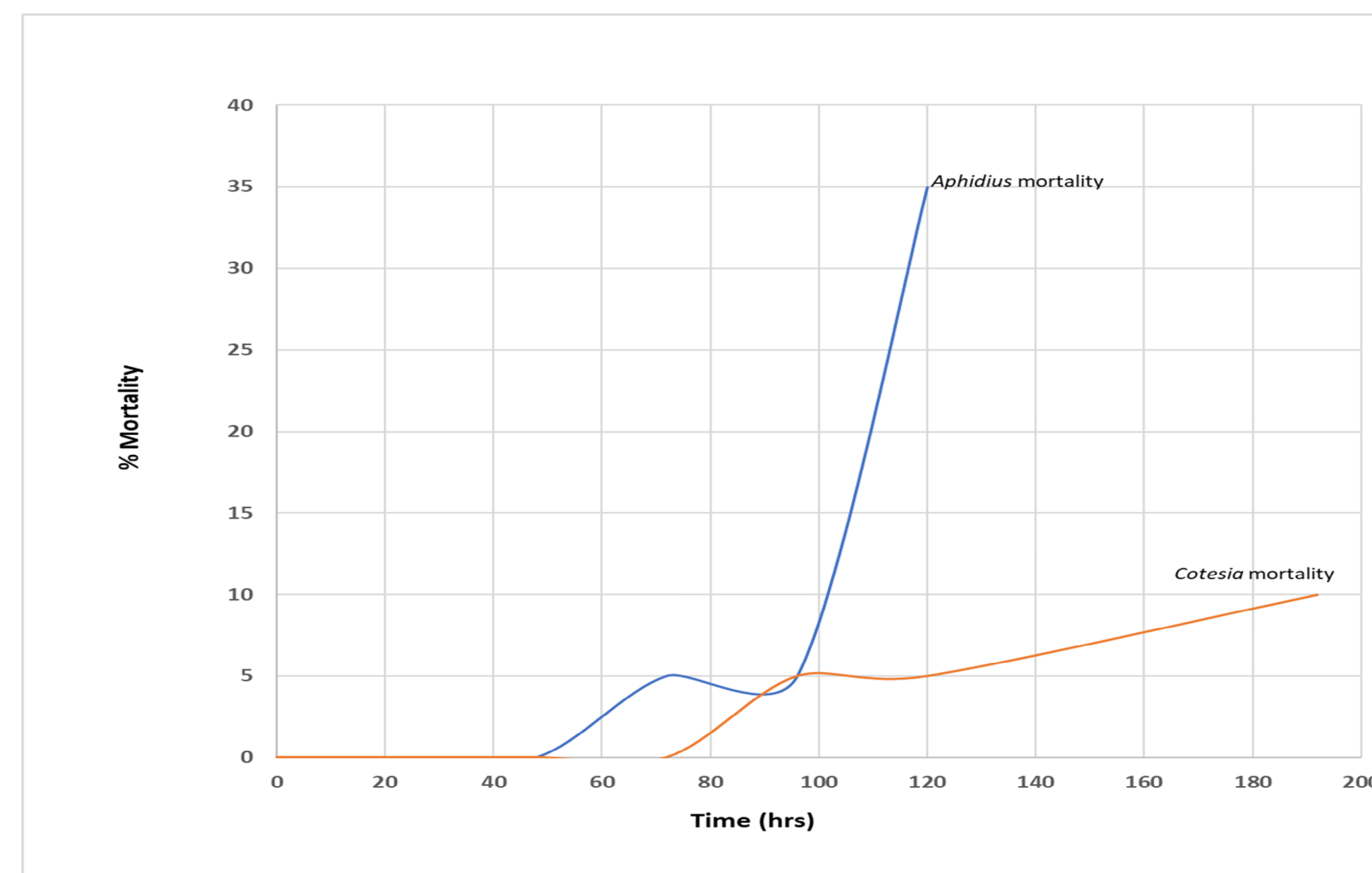


Figure 5. Comparison of wasp mortality *Aphidius* vs. *Cotesia*

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- Barrett, *et al.* (1994). Guidance document on regulatory testing procedures for pesticides with non-target arthropods. (ESCORT) 28 30 March 1994. SETAC Europe. ISBN 0 9522535 2 6.
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