Help or Hindrance: interactions of aphid biological control agents

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Introduction

Biological control of pests is an attractive alternative to using chemical pesticides and aphids are very difficult to control with just one biological control agent [1].

But do the control agents work together? To test this we used ladybirds and fungi to see whether they would work better together or alone in control of aphids (greenfly).

Aims

- To investigate whether the fungus helps or hinders the control of aphids by ladybirds.
- To see whether ladybird feeding behaviour is affected by fungus infected aphids.

Methods

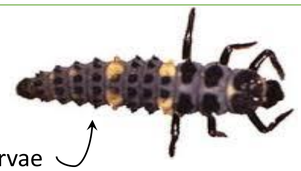
Peach-Potato aphids (*Myzus persicae*) were sprayed with fungus spores (*Verticillium lecanii* - Mycotal™).
After one day they were placed in a Petri dish with a ladybird larva or adult (*Adalia bipunctata* - the two-spot ladybird).

Behaviour recorded:
* Time to find an aphid (Fig. 1)
- Time taken to eat the aphid (Fig. 2)
- Number of attacks that failed (Fig. 3)

* Number of aphids partially eaten (Fig. 3)

This was repeated with aphids not treated with fungus.
This was repeated with aphids not treated with *V.lecanii*

Adult Ladybird



Ladybird Larvae

Aphid

Results

There was no effect of fungus on the time taken by ladybird adults or larvae to eat aphids (Fig. 2) or to first encounter aphids (Fig. 1).
There was no effect of fungus on the numbers of aphids that were attacked, partially eaten or eaten by ladybird adults or larvae (Fig. 3).

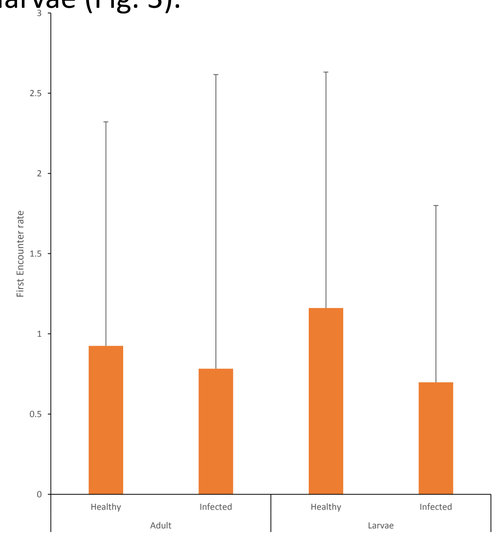


Figure 1. Error bars indicate standard deviation from the mean. Minus bars are not shown due to extending across the x axis.

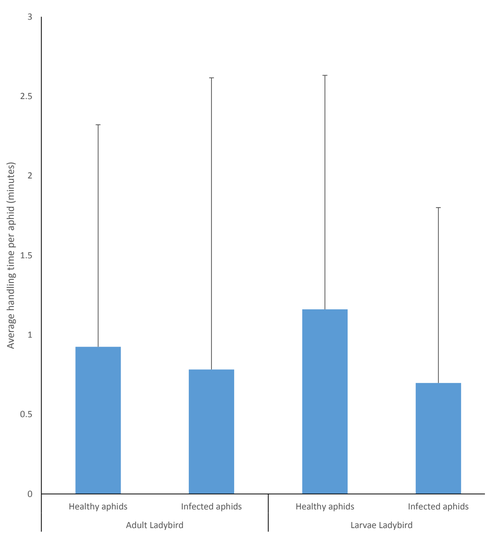


Figure 2. Error bars indicate standard deviation from the mean. Minus bars are not shown due to extending across the x axis.

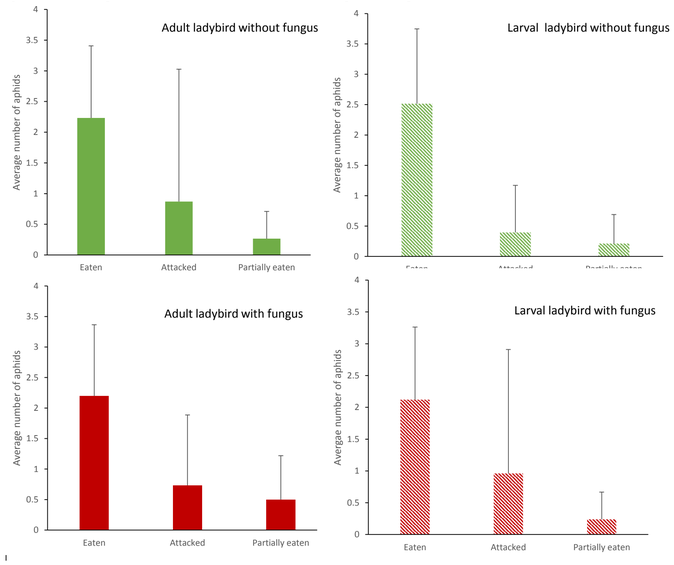


Figure 3. Average number of aphids eaten, partially eaten or attacked not resulting in consumption. Error bars indicate standard deviation from the mean. Minus bars are not shown due to extending across the x axis.

Discussion

The control agents do work together. Attacks by the ladybirds were not affected by the presence of the fungus.
Good news: Both fungus and ladybirds can be used to control aphids without reduction of impact.
Bad news: There is no positive interaction between the control agents giving some synergy.
Future work: Further research is needed on the reproduction, spread of infection and deaths of the insects to show how this combination of biological control agents can reduce aphid numbers.

Acknowledgements

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References 1. Gullino ML, Albajes R, Van Lenteren JC (1999) Setting the stage: Characteristics of protected cultivation and tools for sustainable crop protection. Developments in Plant Pathology 14: 1-15
Images sourced from Rothamstead Research and Google Images