The pepper weevil parasitoid *Jaliscoa hunteri* is attracted to volatiles released by host weevil pests

Serena Leo[1,2], Cynthia Scott-Dupree[1], Roselyne Labbé[2]
[1]University of Guelph, Guelph, ON, Canada
[2]Agriculture and Agri-Food Canada, Harrow, ON, Canada

Introduction

Jaliscoa hunteri is a parasitoid wasp (Fig. 1A) that attacks the pepper weevil (PW) (Fig. 1B). The wasp is native to Mexico but was detected in Canada in 2016, suggesting it has an expansive range across the continent. It is a generalist parasitoid that can effectively target multiple weevil pest species including the PW and cowpea weevil (CW) (Fig. 1C). **The objective of this study was to assess the olfactory capacity of the wasp in terms of its ability to detect and migrate to suitable PW hosts in crop fruits.** This research compliments prior findings that *J. hunteri* can significantly reduce larval PW numbers. It also serves an important role in the development of this species as a biological control agent for the integrated management of the PW in Canadian greenhouses.

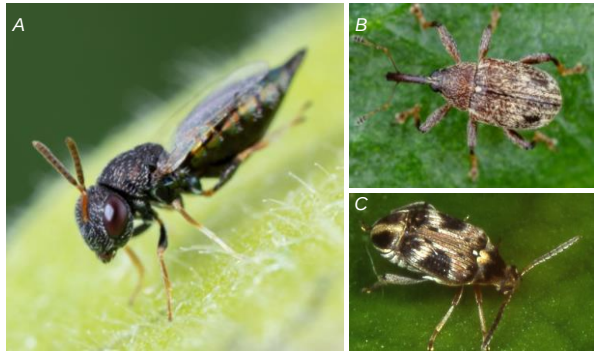

Figure 1. (A) *Jaliscoa hunteri* adult female; (B) Adult pepper weevil. Photo credit: Joseph Moisan Deserres, MAPAQ; (C) Adult cowpea weevil. Photo credit: Charles Fox

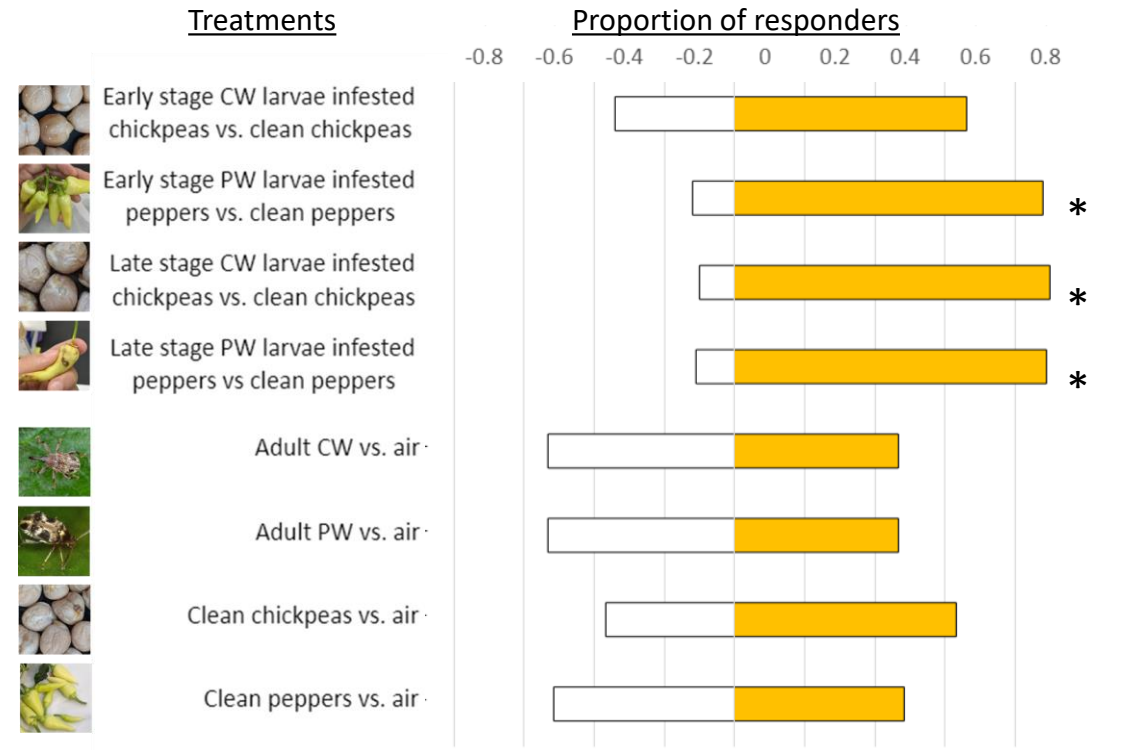

Figure 2. Proportion of female *Jaliscoa hunteri* wasps responding to either the attractants or controls in a Y-tube olfactometry assay. CW = cowpea weevil, PW = pepper weevil. The asterisk indicates a significant difference between treatments. Chi Square Analysis p = 0.05

Materials & Methods

Individuals were placed at the bottom of the Y and allowed to crawl upwards (Fig. 3). Crossing from the plastic Y piece to the Tygon tubes within 5 minutes was recorded as the wasp's first choice and the wasp recorded as a responder.

The Y tube consists of a plastic Y shaped component attached to Tygon tubes connected to a bench top vacuum. Air is pulled through a charcoal filter at the top of each attractant vial before entering the Y tube setup at 1L/min (Fig. 3).

For comparisons of *J. hunteri* wasp attraction to larvae, CW infested chickpeas and PW infested ornamental peppers (var. Blaze) were used. At least 50 individuals were used for each comparisons with a minimum of 50 responding wasps for larval comparisons. Wasps were 7 – 14 days old and isolated from infested fruits for at least 12 h before Y-tube comparisons.

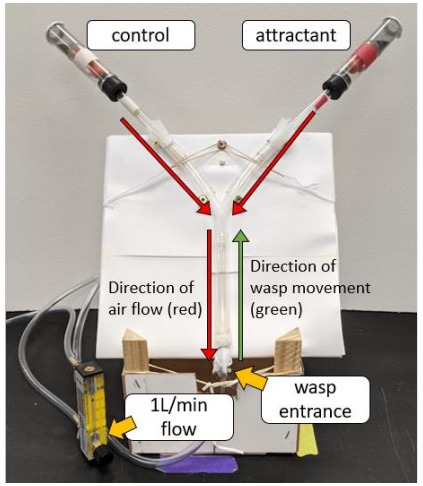

Figure 3. Y tube assay setup with peppers inside the vials.

Results

- Wasps chose to orient towards infested fruit over uninfested fruit in three of four comparisons using larvae infested fruit (Fig. 2). (Chi Squared analysis)
- Wasps did not exhibit a preference towards indirect attractants in any comparison (Fig. 2).
- Mean response rate to infested fruit ~78.8%
- Mean response rate to non-larval cues ~57.0%

Summary

- We established a novel approach to using *Jaliscoa hunteri* in a Y-tube olfactometry system.
- This study suggests that *J. hunteri* female wasps do use olfactory cues to find suitable hosts for parasitism.
- Despite the larvae being contained within fruit (a chickpea or pepper), their volatiles were able to escape to the surrounding environment.
- Results from this study help to understand the searching behaviour of *J. hunteri* and will be important in its effective use as a biological control agent for PW.

Acknowledgements

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Agriculture and Agri-Food Canada
University of Guelph
Canadian Horticultural Council | Conseil canadien de l'horticulture
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For more information, please email me:
sleo01@uoguelph.ca

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