

Biological control of the pepper weevil using the parasitoid wasp, *Jaliscoa hunteri*

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Abstract

The pepper weevil (PW) (*Anthonomus eugenii*) (Fig. 1B), is an economically important and cryptic invasive pest of pepper crops that can quickly devastate crops even with the regular use of insecticides. An additional pest management strategy involves the utilization of the parasitoid wasp - *Jaliscoa hunteri* (Fig. 1A and 1C) to target the immature life stages of the PW. This wasp is originally from Mexico but is now present in Canada. Our research investigates both the biology of *J. hunteri* as well as its potential to contribute to PW management in a greenhouse setting. For instance, we performed trials using ornamental pepper plants to better understand how *J. hunteri* attacks and kills PW at different life stages, and at different stages of fruit maturity. Along with further lab and greenhouse trials, this work serves to improve our understanding of the pest suppression potential of *J. hunteri*.

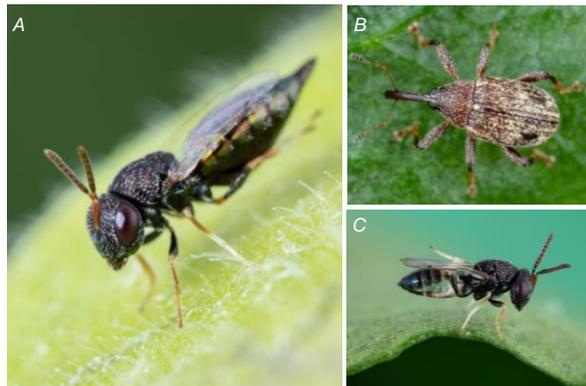


Figure 1. (A) *Jaliscoa hunteri* adult female. (B) Adult pepper weevil. (C) *Jaliscoa hunteri* adult male Photo Credit: Joseph Moisan Deserres, MAPAQ.

Materials & methods

Six ornamental pepper plants with buds of three varieties (Blaze, Medusa, and Wicked) were kept in a controlled environment cabinet at the Harrow Research and Development Centre at 27° C, RH 60% and 16 hour light cycle (Fig. 2). The plants were kept in Rockwool cubes and covered in a microperforated bag to keep the insects inside. The plants were infested with 3 ♂ and 3 ♀ 7 to 12 day old PW. Seven days later (PW larvae at third instar), 5 ♂ and 5 ♀ *J. hunteri* parasitoids were released into half of the plants. Three days after parasitoid release, buds were counted and removed from the plants and placed into lidded petri dishes to record emergence.

Eighteen Blaze variety ornamental pepper plants with buds, small fruit and large fruit were prepared as in the previous experiment, divided into three replicates with six plants each. *J. hunteri* wasps were released into half of each replicate. The number of buds, small fruit were counted before infestation and were separated when removed for emergence observations.



Figure 2. Six ornamental pepper plants with buds, small fruit and large fruit in a controlled environmental cabinet with microperforated bags.

Results

- Releases of *J. hunteri* successfully reduced the number of PW emerging out of infested ornamental pepper plants buds (ANOVA $p = 0.0152$), ~65% (Fig 3)
 - As well as a ~25% reduction in PW in three replicates in plants with buds, small and large fruit (Fig 4)
- PW were able to fully develop and emerge out of small aborted buds (as small as 3mm) as well as plant stems
- J. hunteri* was able to develop and emerge from large fruit
 - Increasing fruit size can be an impediment for wasp development and emergence
- A novel method of rearing and observing PW and *J. hunteri* using ornamental pepper plants was established

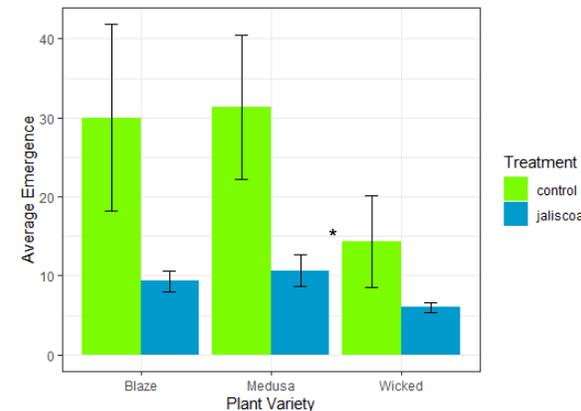


Figure 3: Average emergence of PW from infested ornamental plant buds with and without the release of *Jaliscoa hunteri* separated by variety (* ANOVA $p = 0.0152$).

Summary

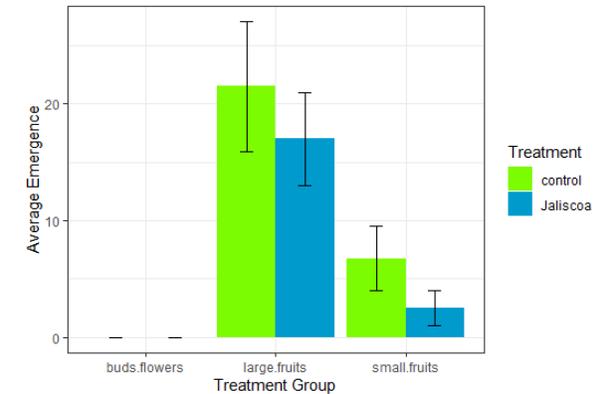


Figure 4. Average emergence of PW from infested ornamental plant buds, small fruit and large fruit with and without release of *J. hunteri*.

- The ornamental pepper rearing system has allowed us to study the parasitism of PW by *J. hunteri* and evaluate its biocontrol efficacy
- PW can develop on the stems, buds, small fruit, and large fruit of ornamental pepper plants
- Releases of *J. hunteri* significantly reduced the number of emerging PW from infested ornamental plant buds
- Further research is needed in order to increase the number of replicate trials and examine the long term relationship between parasitoid on PW populations especially in regards to host feeding.

Acknowledgements

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