

Efficacy of organic insecticides for control of BMSB on pepper

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Study Design

- 13 treatments, replicated 4X; single row plots measuring 10 feet
- Applied with CO₂ backpack sprayer delivering 26 gal/acre at 40 psi.

Two manual infestations and application regimes:

First infestation made at crown fruit by placing 15 lab-reared 2nd instars on each plant. .

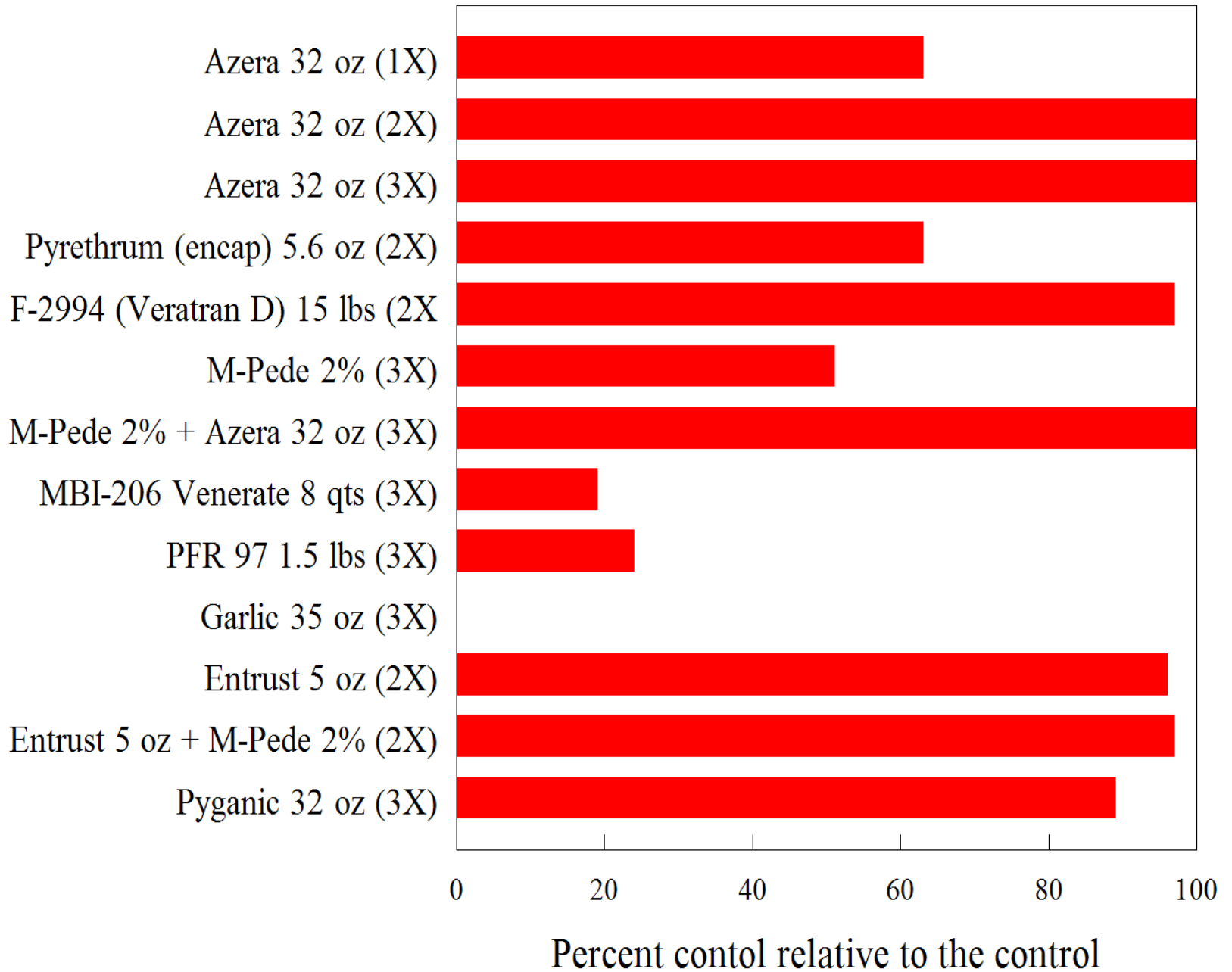
Several days later, treatments were applied 1-3 times.

Second infestation made 15 days later, introducing 5 field-collected late instars per plant.

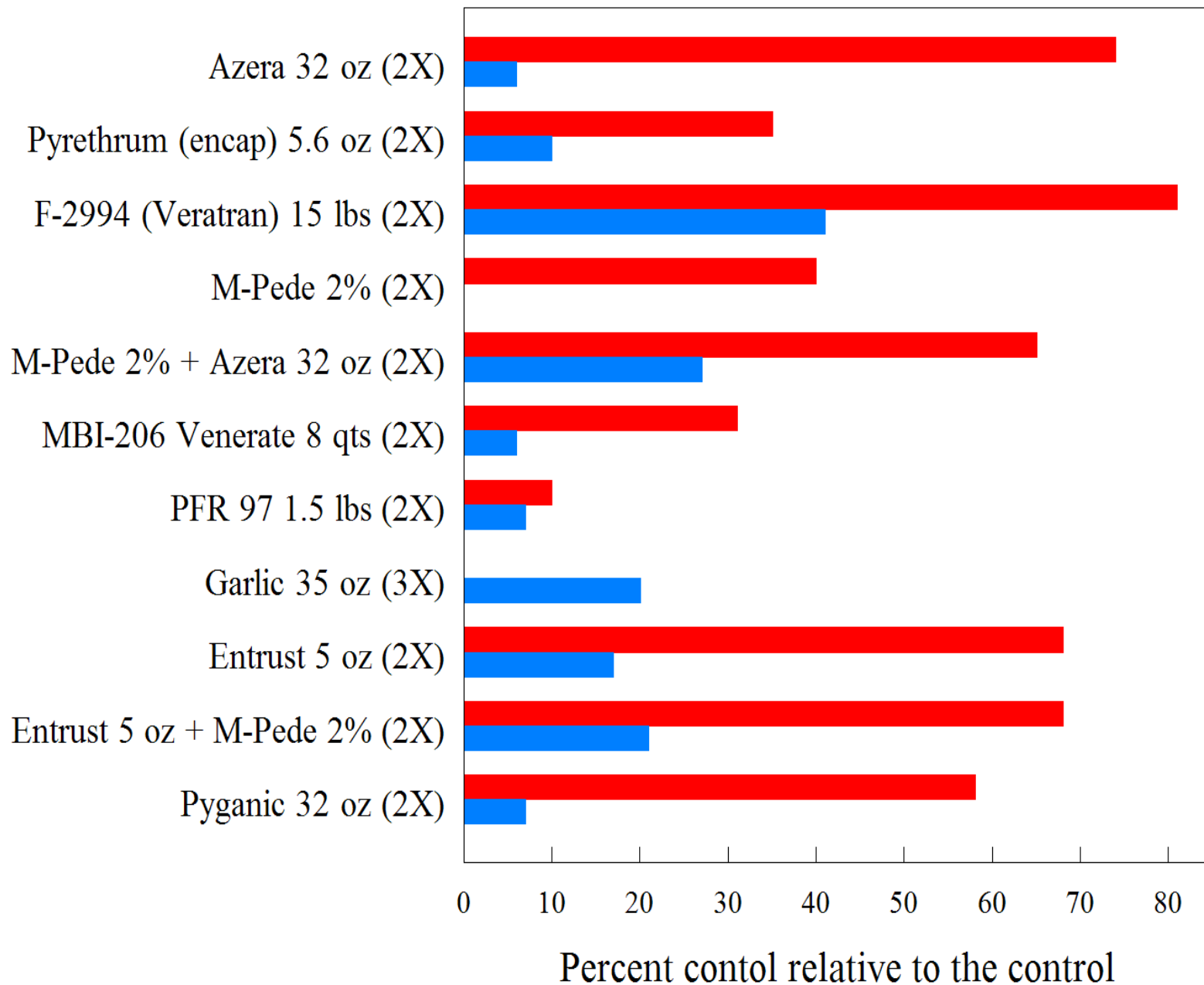
One day later, treatments were applied twice, 4 days apart.

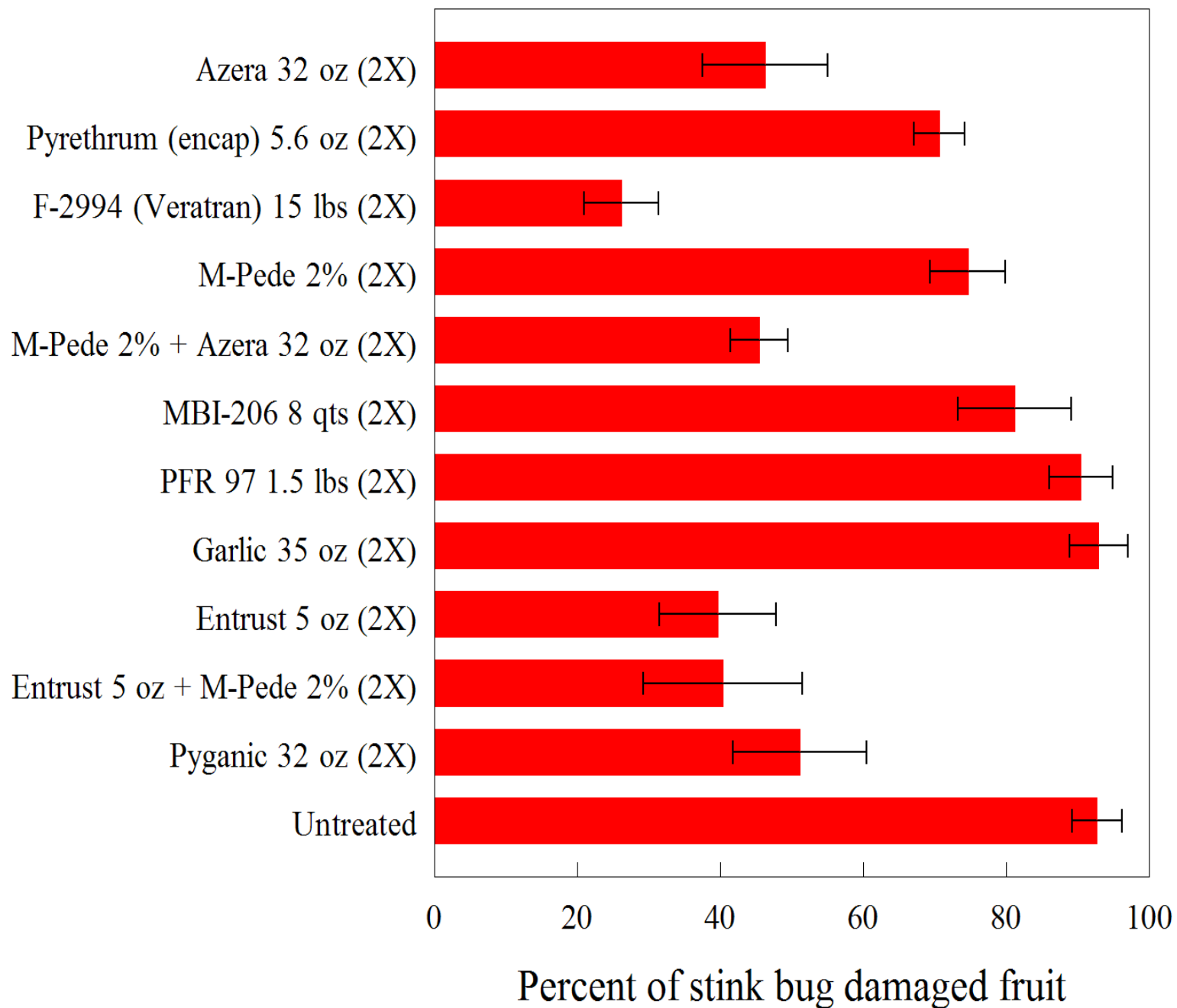
Visual counts recorded the number of bugs by stage after each treatment regime.

Relative effectiveness against early BMSB nymphs



Relative effectiveness against late nymphs (red) and adults (blue)





Summary

Only effective against nymphs and relatively poor control of adults.

Most effective available insecticides (% control):

Azera alone (74-84%)

Azera + M-Pede (65-90%)

Entrust (68-89%)

Entrust + M-Pede (68-92%)

PyGanic (58-79%)

F-2994 product (**Veratran D**, sabadilla alkaloids, MGK Co.) looks promising and further refinement should increase its efficacy against nymphs and adults.

Control will be expensive, given that two or three applications of product mixtures may be needed.

Bacterial symbionts of the invasive brown marmorated stink bug, *Halyomorpha halys*

by Bridget DeLay, Chris Taylor, Bill Lamp and Galen Dively

- Two taxa of bacterial symbionts detected from BMSB culture by 16S rDNA:
 - *Wolbachia*
 - *Pantoea agglomerans*
- Detected in:
 - 4th crypt-bearing region of midgut (verified by FISH)
 - Salivary glands
 - Surface of egg mass (PCR)
- *Pantoea* is deposited on surface of eggs; *Wolbachia* through transovarial transmission

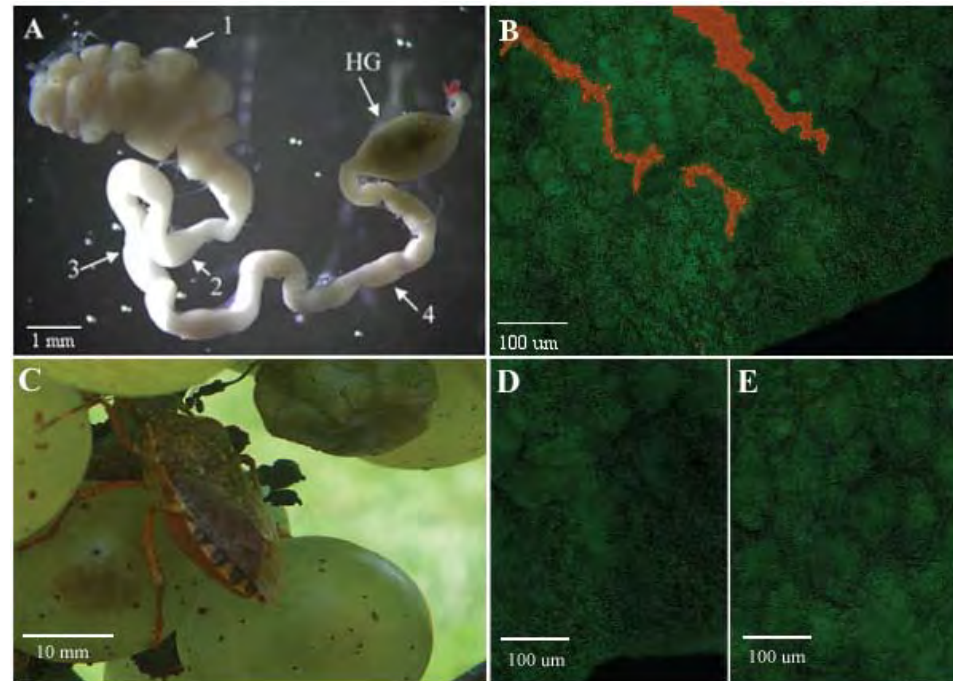


Figure 5. Midgut microscopy of *Halyomorpha halys*. (A) Midgut dissected from an adult female *H. halys*. 1, first midgut section; 2, second midgut section; 3, third midgut section; 4, fourth midgut section; HG, hindgut. (B) FISH of fourth midgut section with red signals indicating *Pantoea agglomerans*. (C) Adult brown marmorated stink bug feeding on grapes. (D) No probe negative control FISH of fourth midgut section. (E) Competitive inhibition negative control FISH of fourth midgut section.

Bacterial symbionts of the invasive brown marmorated stink bug, *Halyomorpha halys*

Continuing Research

- *Pantoea agglomerans* has potential to cause rot disease in plants, but many strains occur.
- We plan to:
 - identity of the strain in BMSB and compare with the strain in host plants.
 - examine effects of high temperatures (C. Taylor).
 - test adjuvants, competitive replacement products, and antibiotics for suppression (C. Taylor).
- Future suppression of BMSB populations or injury may be possible by manipulating the symbionts.