Biocontrol of Thrips and Spider Mites in Peppers and Eggplants Using Guardian Plants

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Marigolds as Guardian Plants

Marigolds in bloom

- Pull thrips acting as indicator and trap plants
- Host Orius acting as habitat and banker plants

The term Guardian Plant includes all four functions

The Problem in Peppers

- Thrips in peppers: in 2010, 5 sprays were not adequate for field thrips control
- 8 – 18 thrips per pepper blossom on July 4 in 2010
- Orius, an important thrips predator will establish on flowers, but not on vegetative pepper plants

What we did in 2011

Started biocontrol in the GH

- Started marigolds in off-site greenhouse
- Released thrips and aphid natural enemies into pepper greenhouse
- Hypoaspis, soil predator: April 21, April 28
- N. cucumeris, foliar predator: same
- Aphidoletes, aphid midge, predator: April 21, 28, May 5
- Aphidius colemani, aphid parasite: April 21, May 5

Moved marigolds into pepper house

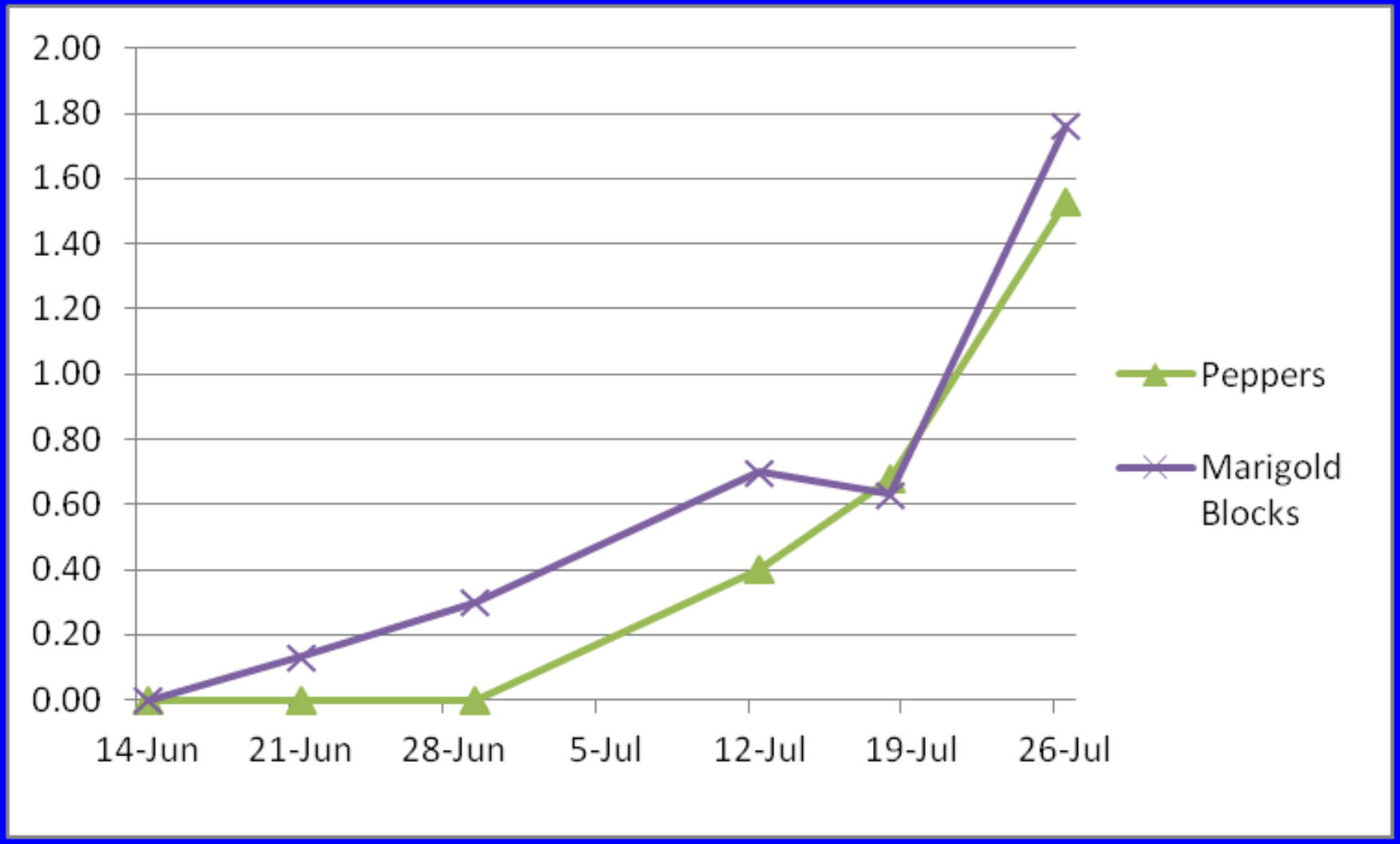
Released 500 Orius into greenhouse with marigolds and peppers : May 5 and May 12

Scouted weekly

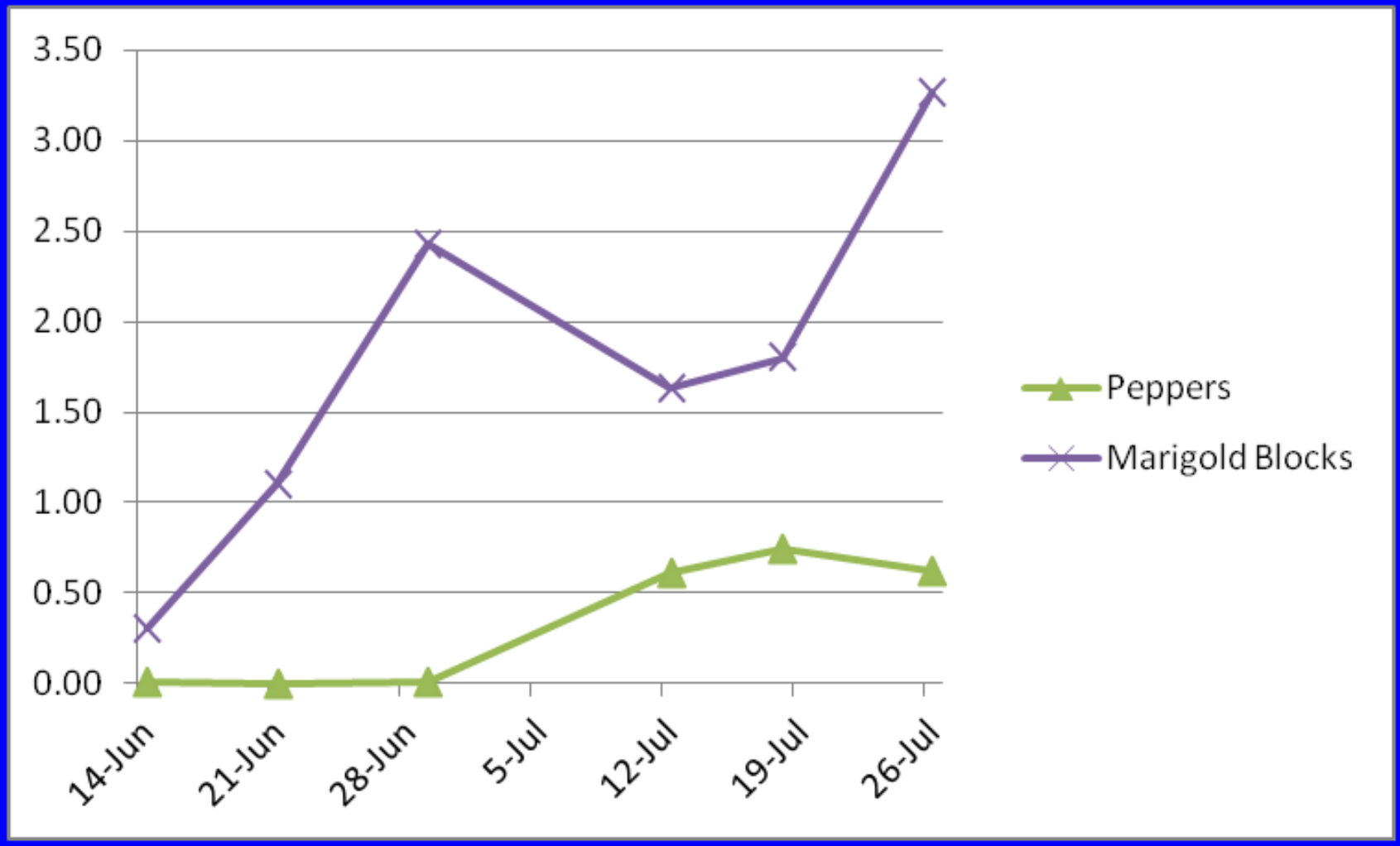
- sticky cards,
- beat samples on 30 marigolds,
- 50 peppers visually inspected

Transplanted marigolds with peppers to field: in Blocks of 30 or “Singles”

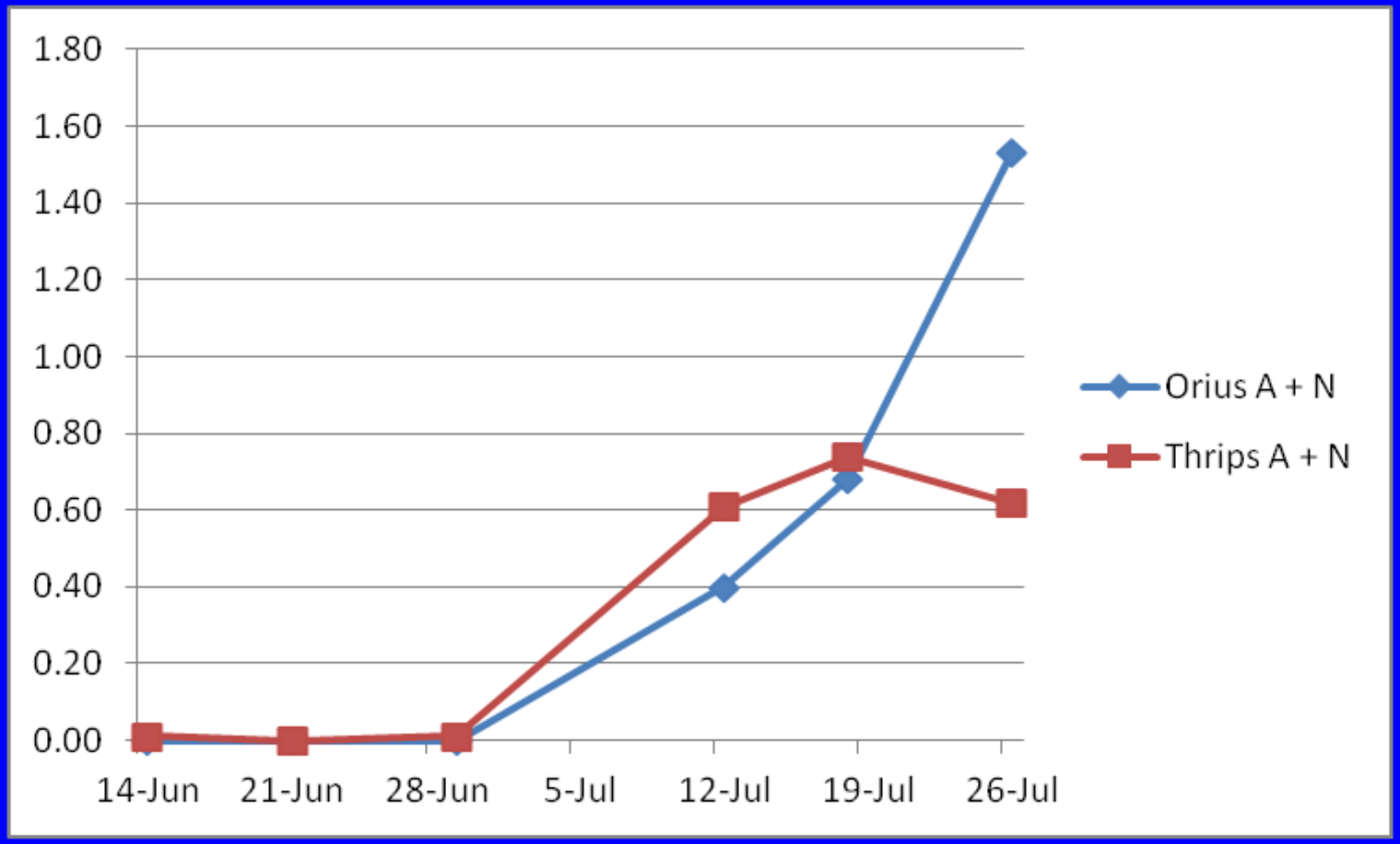
Number of Orius per beat sample



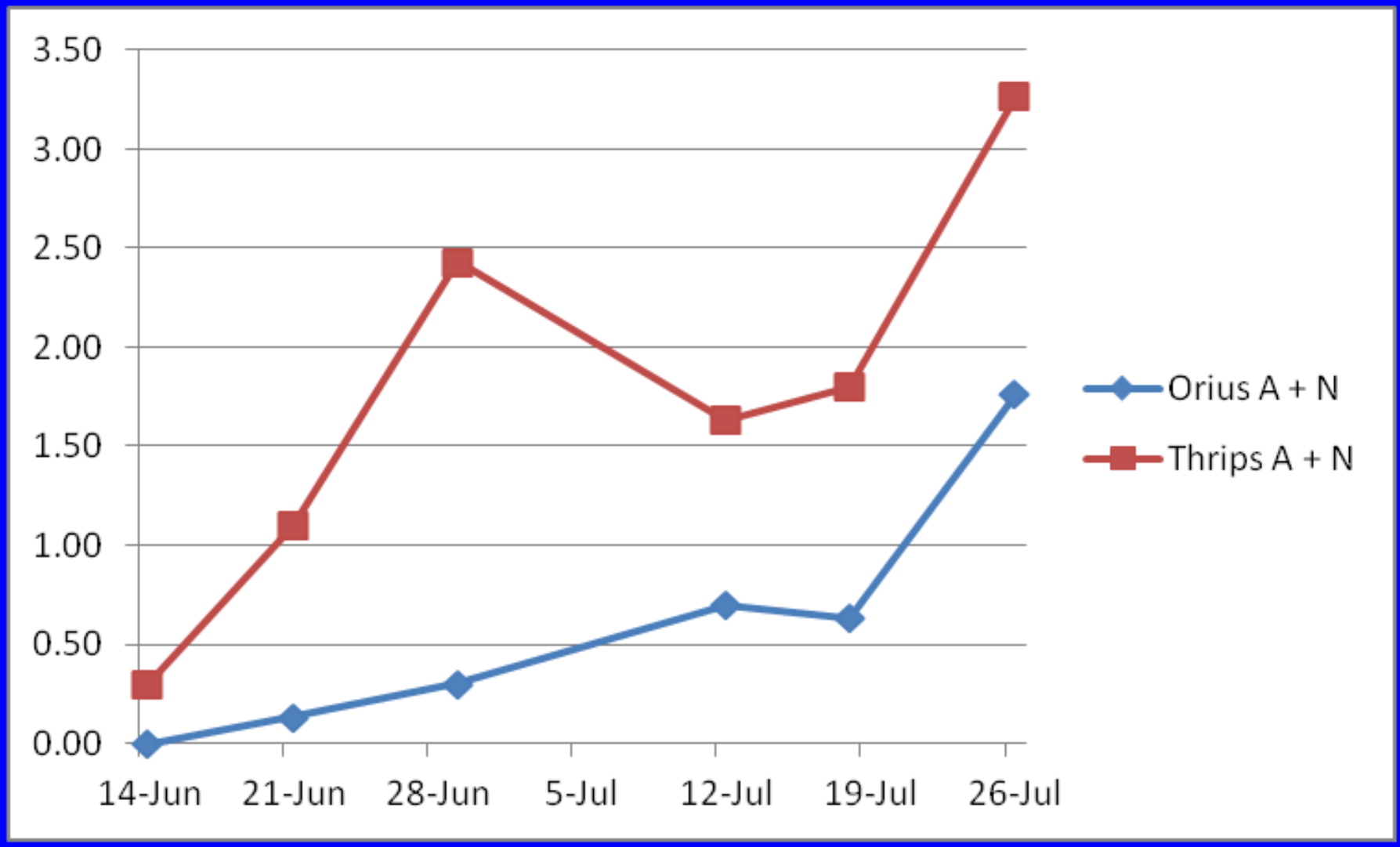
Thrips per beat sample in Peppers vs Marigold blocks



Number of Insects per Sample on Peppers



Number of Insects per Sample on Marigolds



Pepper Summary

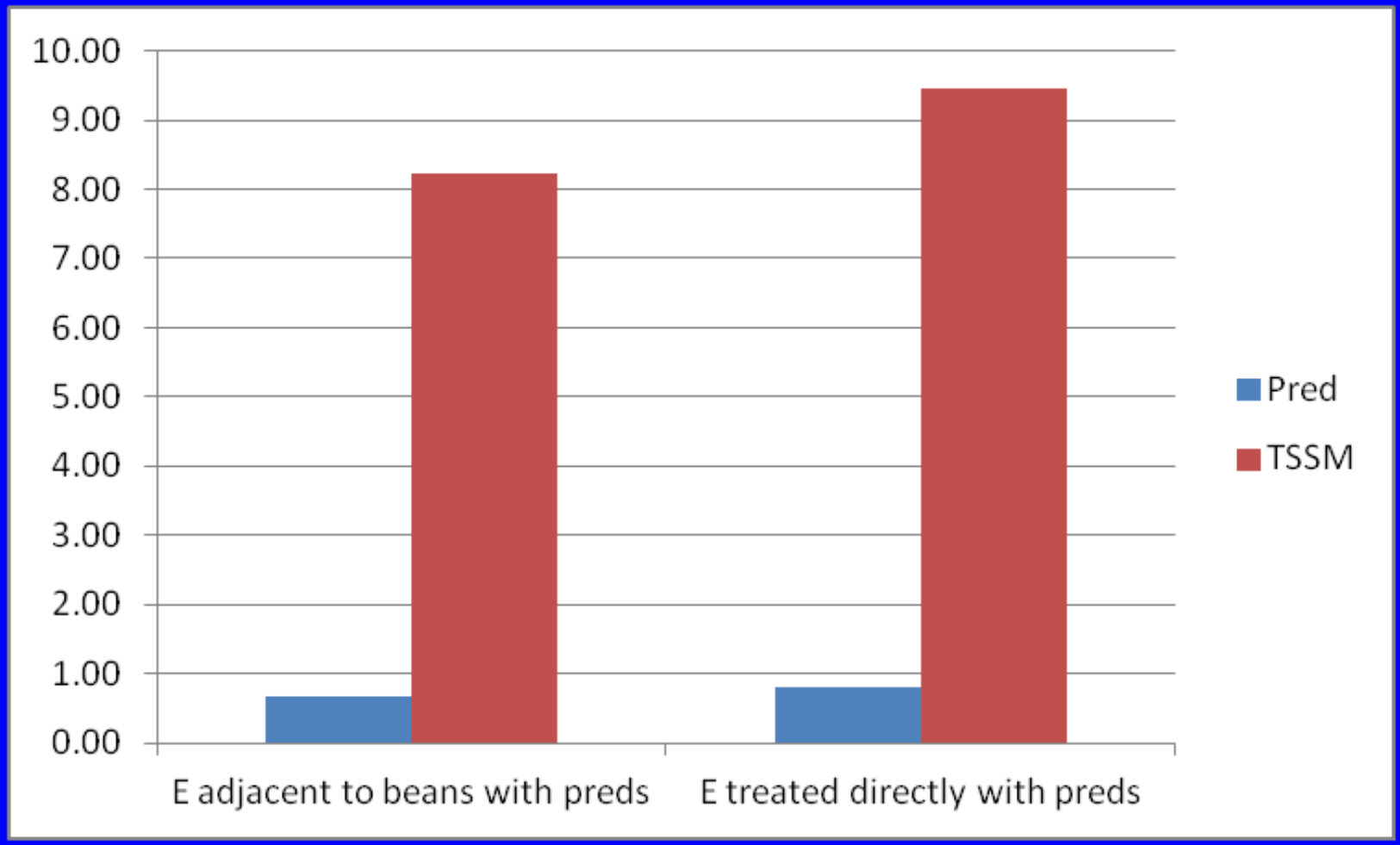
- Quit spraying Orthene in greenhouse
- Choose softer chemicals
- Blocks of marigolds retained Orius and thrips more in the early season
- SUCCESS!!! More than 1 Orius per sample and less than one thrips per sample
- No thrips sprays on peppers in 2011

The Problem in Eggplants

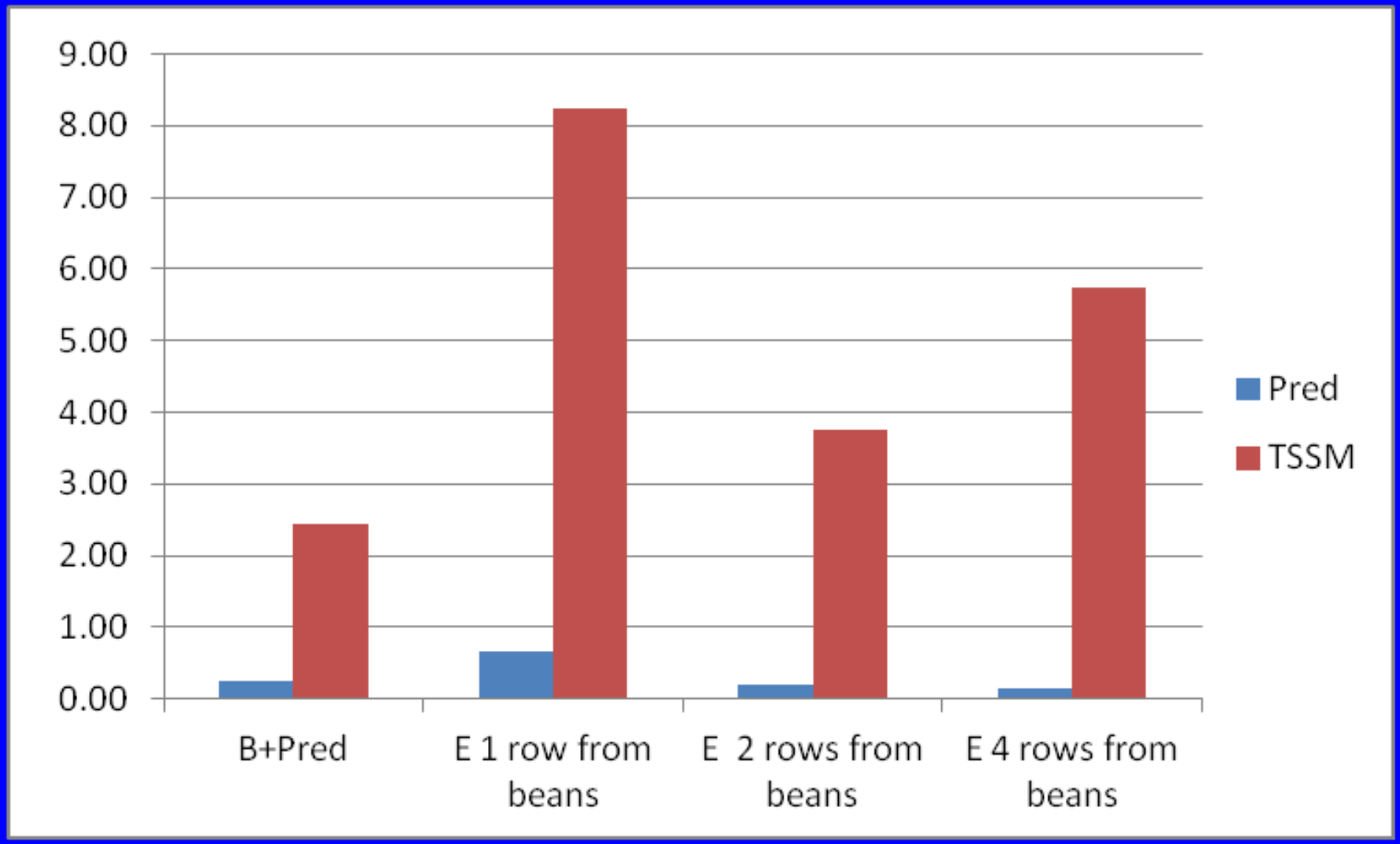
- Used to treat 3 – 5 times per year for spider mites (2011: half the field once only)
- 7 day reentry problem
- Natural spider mite predators are killed by Colorado Potato Beetle pesticides
- Can we support the predators on bean plants in the driving rows? (no imidicloprid there)
- 2010 pretrial: as many spider mites in sprayed eggplants as in predator rows

N. fallacis applied July 26 and August 10, 2000 per row

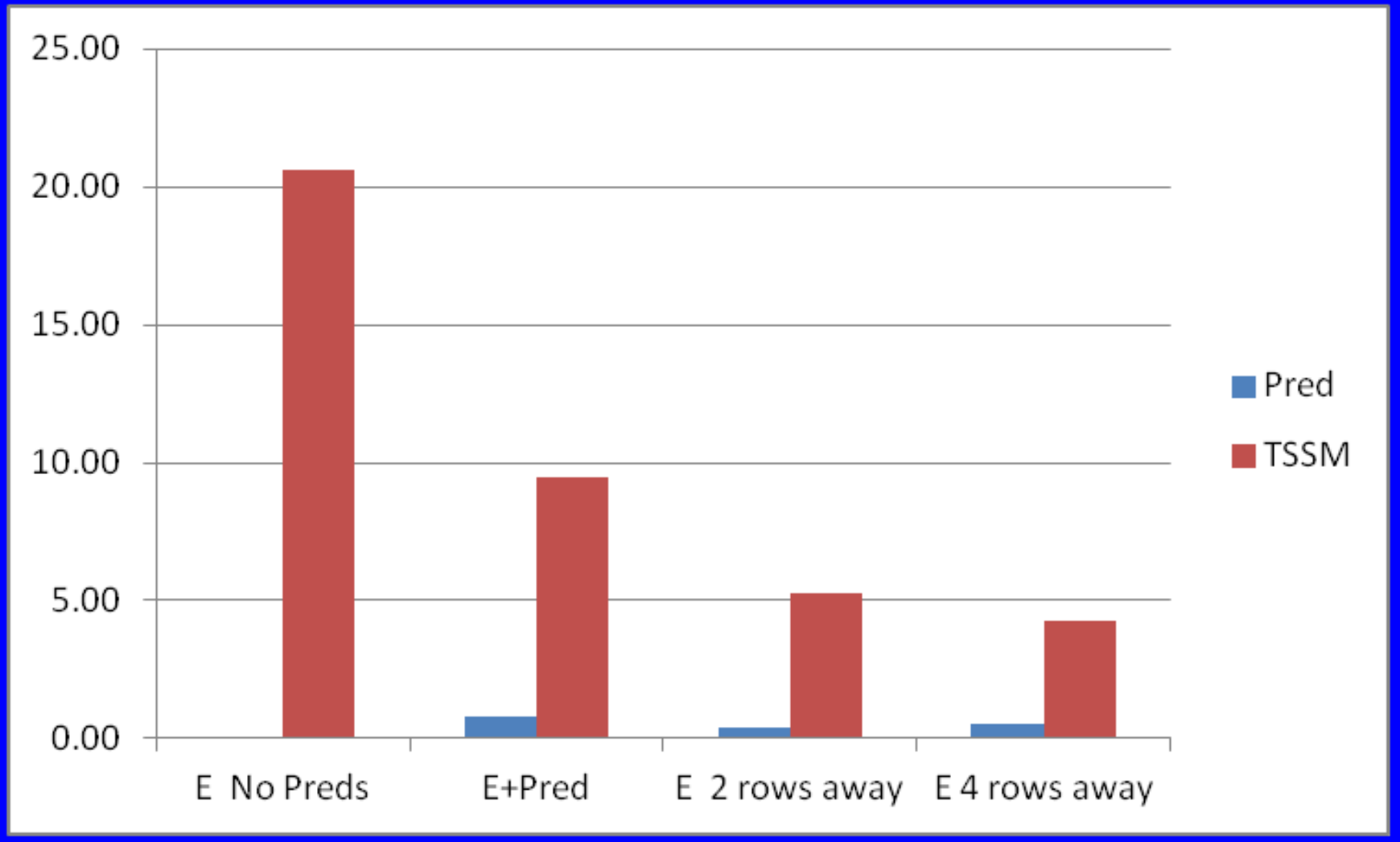
Eggplant/Bean Exit Survey Sept. 12 and 13, 2011



Eggplant/Bean Exit Survey Sept. 12 and 13, 2011 on eggplants adjacent to beans where predators were released



Eggplant/Bean Exit Survey Sept. 12 and 13, 2011 on eggplants with predators released on them (no beans)



Eggplant Summary

- Predators established on beans and on eggplants with or without beans
- Should have had more spider mites production on the beans than on the eggplants (earlier plant date in 2012)
- Are bean rows necessary?
- Less than one miticide with IPM practices

What is the Guardian Plant ideal?

- Pests are rare, only concentrated on Guardian Plants which act as an early warning system.
- There is a steady supply of natural enemies that find and reduce pest hot spots before they flare up high enough to require pesticides.
- Guardian Plants offer support for natural enemy reproduction and establishment in the greenhouse so that weekly purchases of fresh natural enemies are not required.
- Scouting can easily evaluate whether the natural enemies have established in the crop and are reproducing in high enough numbers to do their job.

Challenges

- Labor for care in special watering and grooming marigolds (beans on drip)

Collaborators

Robert Hadad, Cornell Vegetable Program Fresh Market Specialist

Jarmila Haseler, Garden Roots Designs

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