Tarnished Plant Bug

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Tarnished plant bug nymph (left) and adult (right)
Why Has TPB Been Such a Tough Pest?

- Abundant
- Wide host range
- Highly mobile and hides well
- Causes visible, cosmetic damage to highly valued fruit, vegetables, flowers
- Focuses on tender new growth, buds, flowers, and developing fruit – most vulnerable parts
Life Cycle

- Overwinters as adult on field edges
- Becomes active early in spring (e.g. end of April in New York).
- Multiple generations per year
- Stages: eggs (inserted into plant material), five nymphal stages, adults
- Nymphal development at temperatures between 50° and 94° F. Takes between 12 and 40 days to develop from hatching to adult, depending on temperature and suitability of host plant
Host Plants

- The tarnished plant bug has a huge host range – about 385 species.
- Many families of broad leaf plants, few grasses or other monocots
- Adults tend to colonize hosts as they approach reproductive stage, and they feed and lay eggs in stems, leaves, buds, flowers, and developing fruit. They leave as fruit matures and the plants begin to senesce.
Cultivated Plants (Partial List)

- Field crops: alfalfa, amaranth, soybeans, cotton
- Cover crops: vetch, clovers
- Fruit: strawberries, raspberries, apples, peaches
- Vegetables: lettuce, celery, cauliflower, broccoli, Asian greens, tomatoes, eggplant, peppers, potatoes, beans, carrot, dill, chard, beets, asparagus
- Nursery stock
- Cut flowers: especially composites
Favorite Weed Hosts (Partial List)

- Many composites: fleabanes, horseweed, ox-eye daisy, goldenrod, asters, ragweed, knapweeds, dandelion
- Many others, too: vetch, crown vetch, clover, evening primrose, St. John’s wort, winter cress, wild radish, mustards, smartweed, curly dock, wild carrot, pigweed, lamb’s quarters, chickweed
Damage to Plants

- Damage from feeding – bugs damage structures with stylets, inject digestive enzymes into the plant and liquefy an area, then suck the liquid up
- Damage from oviposition – egg laid in the plant tissue, often in a bud or developing fruit
Plant Symptoms

- Abortion of young fruit or buds (e.g. peppers, eggplant)
- Deformation of fruit (strawberries, apples)
- Cloud-spotting of fruit (tomatoes)
- Death around the feeding site (e.g. necrotic lesions on lettuce, celery)
- Damage to seeds (amaranth, canola, carrots grown for seed)
- Deformation of vegetative growth. When feeding is on buds or young stems – tip die-back. (e.g. dill, centers of lettuce, celery, peach trees)
Natural Enemies

- General predators: damsel bugs, stink bugs, assassin bugs, spiders, big-eyed bugs
- Parasitoids of eggs: 4 species (all native, only *A. iole* commercially available)
- Parasitoids of nymphs: 4 species of native braconid wasps, 2 introduced species of braconid wasps, 4 species of native tachinid flies (none are commercially available)
Problems in Biological Control (1)

• Parasitoid species only look for TPB on certain host plants. The native parasitoids of nymphs are very effective on fleabane, but not effective in alfalfa or strawberries. Dr. William Day brought in a new species from Europe to attack TPB in alfalfa.
Problems in Biological Control (2)

• Many parasitoids of nymphs spend the winter as pupae in the soil. Thus, they can only overwinter in places where the soil is not tilled from early fall until late spring.
Good News in Biological Control

- Rates of parasitism with this new species are high in alfalfa, low-spray strawberries, and rye-vetch cover crops as well as in fleabane.
- Dr. Day found a new parasitoid attacking TPB in alfalfa in Idaho, at rates up to 85%. He is introducing this species in the east.
Strategies for Control of TPB

- Timely mowing of host crops and weeds
- Putting barrier plantings (e.g. grasses) between sensitive crops (e.g. strawberries) and other hosts
- Row covers until flowering
- Botanical insecticides and/or insecticidal soap against nymphs
- *Beauveria bassiana* (Mycotrol O, Naturalis) against nymphs – slow acting, so get them early
- Choosing varieties less susceptible to TPB damage
Tarnished plant bug adults 2001

Mowed 5/11 and 6/6, then allowed to regrow

Number per 10 sweeps

- crimson clover
- oats/annual ryegrass
- oats/bare
- oats/oats
- oats/oat-field pea
- oats/rape
- none (weeds)
- rye
- rye/vetch
- wheat

Plots for:
- Rye/vetch
- wheat
- rye

Date Range: 6/1 to 7/3
Tarnished plant bug nymphs
2001

No cover planted (weeds)

Rye/vetch

number per 10 sweeps

6/1 6/6 6/11 6/16 6/21 6/26 7/1
How the Nordells adapted their rotation for tarnished plant bug:

• Moved clover in the rotation so that it was no longer flowering and being mowed during the summer lettuce crop (crop to be protected from TPB).

• Planted single rows of buckwheat in-between lettuce rows to flower and attract TPB during susceptible period for lettuce crops
Did it work?

- Nordells believe it did – it decreased their observed TPB damage to lettuce.
- No way for us to prove it. Observational study, not an experiment.
- TPB damage to lettuce was low on all NEON farms throughout the study. We are wondering if biological control is reducing lettuce damage regionally.
Unanswered Questions

- Are there any effective feeding repellents for TPB? (E.g. hot pepper wax, garlic, neem)
- Will the introduction of more natural enemies reduce the overall populations of TPB and damage to high-value crops?
- What can be done to enhance existing biological control?