Brown Marmorated Stink Bug
(Halyomorpha halys)

Integrated Grape Workgroup Meeting
Dec. 4, 2014

Chuck Ingels
UC Cooperative Extension, Sacramento County
http://cesacramento.ucanr.edu

Funding: Calif. Pear Advisory Board, Lodi Winegrape Commission
Brown Marmorated Stink Bug

(Halyomorpha halys)

Photos: Baldo Villegas
Brown Marmorated Stink Bug
(*Halyomorpha halys*)

- Native to East Asia (China, Japan, Korea, Taiwan)
- A crop pest in its native range and here
- ID’d in Allentown, PA 2001
- Household nuisance pest in fall, winter
- Host list currently 170 spp., likely to rise
Established populations in:
Butte
Los Angeles
Sacramento
San Joaquin
Santa Clara
Sutter
Yolo (new)
BMSB Finds in Sacramento County

Oct. 15, 2013

Nov. 2014

cesacramento.ucanr.edu
Actual adult size 5/8 inch

Two white bands on antennae

Banded legs

Rust color with broad brown markings

Smooth “shoulder” edges

Banded abdominal edge extending beyond wings

Mature nymph (5th instar)

Photo: UC IPM
Eggs (20-30) & nymphs

Nymph (3rd of 5)

Adult
5 Nymphal Instars

- Overwinters as adult in sheltered areas
  - Tree crevices and homes, barns, other structures
- Each adult lives 6-8 months
- Female lays about 250 eggs, mates multiple times
  - Each female can lay up to 9 egg clusters
- 1-2 generations in Mid-Atlantic states
Host Plants
Selected Crops

- Stone fruits (esp. peach), pome fruits
- Berries
- Grapes (not a preferred host)
- Eggplant, tomato, okra, pepper, corn, beans, sunflower
Host Plants
Selected Ornamentals

- Catalpa
- Chinese pistache
- Elm
- Maple
- Holly
- Princess tree (*Paulownia*)

- Pyracantha
- Redbud
- Rose
- Tree of heaven
- Waxleaf privet
Stink Bug Feeding

Photo: Jay Brunner

Photo: Tracy Leskey
BMSB Traps
Dead-Inn Traps (AgBio, Inc.)

Grower
48” tall, $30

Professional
24” tall, $20

Homeowner
16” tall, $17
Phermone Traps
Rocket Trap (Rescue)

$17
Pheromone Traps & Lures

AgBio, Inc.: $4.25
Rescue: $6 (4 wks.), $10 (9 wks.)
Alpha Scents $4.40 (4 wks.)
Trece – Coming soon

Vaportape (kill bugs in trap)
Understanding BMSB Pheromones

Two Main Lure Types

1. Pheromone lures (USDA #10 and #20)
   » Harlequin bug pheromone – nearly identical
2. “Synergist” = methyl decatrienoate (MDT)

bullet Best used in combination
<table>
<thead>
<tr>
<th>Location</th>
<th>Adults</th>
<th>Nymphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midtown Sacramento</td>
<td>64/532</td>
<td>90/691</td>
</tr>
<tr>
<td>Adults/Nymphs</td>
<td>219/155</td>
<td>3/4</td>
</tr>
<tr>
<td>T St.</td>
<td>11/9</td>
<td>7/7</td>
</tr>
<tr>
<td>10th St.</td>
<td>22/98</td>
<td>0/0</td>
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<tr>
<td>16th St.</td>
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</table>
Adults Trapped
Sacramento, 2014

Adult BMSB/day/trap
Avg. of 4 traps, 2014

First eggs

Predicted 2nd gen. eggs
Nymphs Trapped
Sacramento, 2014

BMSB Nymph Trap Catches
Avg. of 4 traps, 2014

- First eggs
- Predicted 2nd gen. eggs

No. of Nymphs/trap/day

BMSB in Grape
Early September 2010

Photos courtesy of Doug Pfeiffer and Dean Polk
BMSB eggs on Cabernet Sauvignon in Maryland

Photo: J. Fiola
9/2010
BMSB in Vineyards
Avenues of Potential Economic Impact

- Direct injury to grapes
  - Introduction of rots, other pathogens
    » Aborted berries, necrosis
- Contamination of wine at crush
- Nuisance in wine tasting rooms
BMSB in Vineyards

- Enter vineyards from forests or riparian areas
- Harvest of nearby crops may force migration to vineyards
- Monitor vineyard edges
- Both adults and nymphs cause damage
- Hard to find in clusters
- Worst damage after veraison
BMSB Grape Damage Trial
Vaughn Walton, OSU (2012)

- Pinot Noir
- Exclusion cages
- 0, 1, and 2 adult males/cage
- 1 wk. of feeding – 3 feeding periods
- 10 replicates

- Mean of 14% crop wt. reduction
- Berry abscission with early feeding
Percent Berries Compromised
Vaughn Walton, OSU (2012)
Will BMSB be Problematic in Calif. Vineyards?

- Grapes not a preferred host
- Mainly edge effect
- Where they may be worse:
  - Small blocks (large area/edge ratio)
  - Bordered by forest or susceptible crops/species
  - Harvest of nearby infested crops
  - Later varieties (esp. late Sept. on)
  - White varieties worse than reds
  - Mechanical harvest worse than hand picked
BMSB in Wine

- All instars have a distinct odor that can taint wine
- Smells like fresh cilantro
  - Other descriptors: “skunky,” “citrusy”, “piney”
Research on stink bug taint in juice/wine
Summary of Sensory on Stink Bug Taint
Univ. of Maryland and OSU

- 5-10 BMSB/lug can impart a perceptible taint (aroma) in juice
- No distinguishable taint in juice after 4 months
- 10-20 BMSB per lug (25 lbs) can impart a perceptible taint (aroma) during red fermentation
- No distinguishable taint (aroma) in wine following fermentation and racking

- Research at OSU did find perceptible taint
  - Longer fermentation with skins
Questions?

Important Web Sites

StopBMSB.org

ucipm.ucdavis.edu

cesacramento.ucanr.edu
BMSB “lethality index” (immediate mortality with little or no recovery)

4.5 hrs. exposure to dry residue, glass containers
<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Lethality Index</th>
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<th>Lethality Index</th>
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<tbody>
<tr>
<td>Dimethoate</td>
<td>93.3</td>
<td>Cyfluthrin</td>
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<td>Malathion</td>
<td>92.5</td>
<td>Oxamyl</td>
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<td>Bifenthrin</td>
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<td>Endosulfan</td>
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<td>Tolfenpyrad (SC)</td>
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<td>Methomyl</td>
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<td>Tolfenpyrad (EC)</td>
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<td>Chlorpyrifos</td>
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<td>Acephate</td>
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<td>Kaolin Clay</td>
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<td>Fenpropathrin</td>
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<td>Diazinon</td>
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<td>Permethrin</td>
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<td>Phosmet</td>
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<td>Azinphosmethyl</td>
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<td>Acetamiprid</td>
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<td>Dinotefuran</td>
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<tr>
<td>Kaolin Clay + Thiamethoxam</td>
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<td>Abamectin</td>
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<td>Gamma-cyhalothrin</td>
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<tr>
<td>Thiamethoxam</td>
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<td>Beta-cyfluthrin</td>
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<td>Water (Control)</td>
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<th>Active Ingredient</th>
<th>Trade Name (Example)</th>
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<td>Permethrin</td>
<td>Pounce</td>
<td>Pyrethroid</td>
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Insecticide Efficacy
Field Study (Leskey et al., 2013)

- High mortality on day of application: Endosulfan (e.g., Thiodan), methomyl (Lannate), thiamethoxam (Actara), and bifenthrin (e.g., Brigade)

- Fenpropathrin (Danitol) and dinetofuran (Venom, Scorpion): strong anti-feeding effect for 7+ days

- Peaches in Mid-Atlantic: 10-12 weekly applications, alternate-row, late May-harvest using pyrethroids and neonicotinoids

- Effective insecticides in lab: only 60% average mortality in the field when applied late early July, 40% in Aug., and 20% in September
Products that have shown good effectiveness against BMSB include:

- **Pyrethroids**: Baythroid XL (B-cyfluthrin), Danitol (fenpropathrin), Warrior II (Beta-cyfluthrin), products containing permethrin (e.g. Pounce)
- **Neonicotinoid**: Belay (clothianidin)
- **Carbamate**: Lannate (methomyl)
- **Premixtures**: Endigo ZC (Beta-cyfluthrin + thiamethoxam) and Leverage 360 (imidaclopid + cyfluthrin)
Alternative BMSB Management
Penn. State Univ., Rutgers Univ.

- Border applications
  - Use strong residual products
- Treat surrounding vegetation, if feasible
- Trap cropping
  - e.g., beans, sunflowers
  - Spray trap crops
Organically Acceptable Insecticides

Partial to fairly good control of nymphs only:

- **Pyrethrum**
- Azadirachtin
- Spinosad
- Sabadilla
- Insecticidal soap
- Combinations
Biological Control?

- Foreign exploration done by USDA
- Egg parasitoids - *Trissolcus* spp.
- Possible release in Calif. in 2016