Brown Marmorated Stink Bugs: ID, Effects On Grapes And Wine, Monitoring, And Control

Current Issues in Vineyard Health
Nov. 22, 2013

Chuck Ingels
UC Cooperative Extension, Sacramento County

http://cesacramento.ucanr.edu
Brown Marmorated Stink Bug
(Halyomorpha halys)

Acknowledgments

• Tracy Leskey, USDA-ARS
• Joe Fiola, Univ. of Maryland
• Frank Zalom, UC Davis
  Entomology Specialist
• UC IPM
• Charlie Pickett, CDFA
• Baldo Villegas
Brown Marmorated Stink Bug
Topics to Be Covered

● Background information
● Monitoring
● BMSB in grapes
● Control strategies
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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
- Considered a nuisance pest when it overwinters in large numbers inside houses
- Host list currently 170 spp., likely up to 300
  - Vitis rarely reported, but it is a feeding, developmental, and reproductive host
Brown Marmorated Stink Bug
(*Halyomorpha halys*)

- First found in Allentown, PA in 2001
- Serious fruit pest in 2010 ($37M, 90% damage in some orchards), not as bad 2011-12
- Has now spread to 40+ states
- Found in Midtown Sacramento Sept. 4, 2013 in large numbers
- Major infestation now in Yuba City
- Additional finds in many other counties
History of BMSB in the United States

- **1996**: First suspected specimens collected in Allentown, PA.
- **1997**: First properly identified specimen in the USA. Collected in Allentown, PA.
- **1998**: First confirmed MD specimen Hagerstown, MD.
- **1999**: First confirmed WV specimen Falling Waters, WV.
- **2000**: First reports of late season injury in tree fruit in WV.
- **2001**: Localized reports of injury in Allentown area.
- **2002**: Severe crop injury in WV, MD, NJ, DE, VA and PA in tree fruit, small fruit, vegetables, row crops, and vineyards.
- **2003**: Serious late season injury in tree fruit observed in WV.
- **2004**: Severe late season injury in tree fruit in WV.
- **2005**: First confirmed NJ specimen.
- **2006**: First confirmed WV specimen.
- **2007**: Season-long pressure throughout the region. Aggressive chemically-based management programs undertaken.
- **2008**
- **2009**
- **2010**
- **2011**

Current distribution in USA

Source - http://www.stopbmsb.org
T. Leskey, USDA-ARS May, 2012
BMSB Finds in California

Also:
Butte
Monterey
Yolo
San Luis Obispo
Siskiyou
Sutter

Source - CDFA Plant Health and Pest Prevention Services Database, 2010
BMSB Finds in Sacramento County

Oct. 15

Nov. 15

cesacramento.ucanr.edu
Pest Status in California

- “B” pest rating
- Nursery stock found infested must be cleaned before it can be sold
- Border stations can require treatment or reject infested shipments
- No additional quarantine regulations
- CDFA is not conducting any surveys or treatments
Actual adult size 1/2 to 5/8 inch

Two white bands on antennae

Banded abdominal edge extending beyond wings

Banded legs

Rust color with broad brown markings

Smooth “shoulder” edges

Mature nymph (5th instar)

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

Nymph (3rd of 5)

Adult
5 Nymphal Instars

- All stages have been found in orchards at the same time, all instars feed on host
- Each adult lives 6-8 months
- Female can lay ~ 250 (up to 485) eggs
- Females mate multiple times
- ~2 generations in eastern states, 4-6 in China
Some Other True Bugs

- Rough stink bug
- Red shouldered stink bugs
- BMSB
- Consperse stink bug

Photos: UC IPM
Rough Stink Bug vs. BMSB

Rough stink bug

BMSB
Rough Stink Bug vs. BMSB

Rough stink bug vs. BMSB

Rough

Narrower angle

Wider angle

Smooth
Host Plants
Agricultural Crops

- Grapes (rarely reported as host)
- Apple, apricot, cherry, peach, pear, hazelnut
- Blackberry, blueberry, raspberry
- Eggplant, tomato, okra, pepper, corn, beans, cucurbits
- Others mentioned in literature - Persimmon, citrus, fig
Host Plants
Selected Ornamentals

- Catalpa
- Chinese pistache
- Maple
- Holly
- Mulberry
- Princess tree (*Paulownia*)
- Pyracantha
- Rose
- Tree-of-heaven
Damage
Midtown Sacramento

Photos: Charlie Pickett
Adult Aggregation

- In cooler months, adults overwinter by aggregating in houses, underneath the eaves, or in leaf litter
- Similar to box elder bug and the Asian ladybird beetle
- Annoys residents, especially due to their offensive odor when disturbed and spotting by defecation
Aggregation Behavior

Photos: G. Hamilton
Aggregation Season, Pennsylvania

Photos: Tracy Leskey
Aggregation Behavior

Photos: Tracy Leskey
Brown Marmorated Stink Bug
Topics to Be Covered

- Background information
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Monitoring BMSB

- Attractant-baited traps, sweep nets, beating trays, blacklight traps
- Foliage counts
  » They crawl to the back side of leaf and hide
- Currently no effective way to predict when treatments should be applied
Pheromones

- Aggregation pheromone attracts males, females and nymphs
  - Being patented by USDA-ARS
- Also sex pheromone (= harlequin bug)
- Both being used together now
Phermone Trap
Traps & Lures (AgBio)

Lures:  Aggregation (USDA): $4.25
Harlequin bug (sex pher.): $5.00
(both last 30 days)

Vaportape (kill bugs in trap)
Phermone Trap
Dead-Inn Traps (AgBio)

Grower
48” tall, $30

Professional
24” tall, $20

Homeowner
16” tall, $17
Phermone Traps
Rocket Trap (Rescue)
Experimental Light Traps
USDA-ARS
Experimental Light Traps
USDA-ARS
Experimental Light Traps
USDA-ARS

- Traps with white light captured more BMSBs and more non-targets
- Traps with blue light captured fewer BMSBs, but also fewer nontargets
Strube’s Trap
The Predator
Brown Marmorated Stink Bug
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Proprietary vineyard and juice/wine taint slides from Joe Fiola have been removed. Please contact Joe for more information (previous slide)
Brown Marmorated Stink Bug
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Problems Related to Chemical Control

- Lack of efficacy in field
- Moribundity – Drop & recover
- Movement into & out of vineyards
- Buildup of secondary pests
  - Mites, leafhoppers, etc.
Insecticide Bioassay Results

- BMSB lethality
  - 4.5 hrs. exposure to dry residue, glass containers
  - Field efficacy may differ

- Not a recommendation!
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Time-Phased BMSB Condition
4.5-Hour Exposure Period In Glass Arenas

Bifenthrin (Brigade WSB) @ 32 oz/100 gal

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Days After Exposure

Alive Moribund Dead

Glass

Bifenthrin

Fenpropathrin (Danitol 2.4 EC) @ 18.0 oz/100 gal

Cyfluthrin (Tombstone 2.0 EC) @ 2.6 oz/100 gal

Esfenvalerate (Asana XL EC) @ 14.5 oz/100 gal

Bifenthrin Brigade Fenpropathrin Danitol Cyfluthrin Baythroid Esfenvalerate Asana
OPs – methomyl (Lannate) and endosulfan (Thionex)

Pyrethroids
  » bifenthrin (Brigade), fenpropathrin (Danitol)

Neonicotinoids
  » dinotefuran (Venom), clothianidin (Clutch), thiamethoxam (Actara)

Combination of groups – additional or synergistic
  » bifenthrin + acetamiprid (Assail), thiamethoxam and chlorantraniliprole (Voliam Flexi), imidacloprid and β-cyfluthrin (Leverage 360)

Many are rate dependent – higher labeled rates needed
Pesticide Efficacy
Conclusions

- Wide range of effects within chemical classes
  » No chemical class outperformed all others
- Even at highest rates, BMSB very hard to kill via incidental/walking contact
- Success in laboratory evaluations does not always translate to field…but failure does
Alternative BMSB Management
Penn. State Univ. Extension

● Border applications
  ➢ Use strong residual products

● Treat surrounding vegetation, if feasible
  ➢ Monitor surrounding vegetation, especially late season

● Alternative crop plantings
  ➢ Possible trap crops (e.g., beans, Paulownia trees)
  ➢ Others to be determined; spray trap crops

● Exclusion, trap crops, and light traps
Biological Control?

- Prospects may be good since it’s an exotic insect
- Foreign exploration done by USDA
- Egg parasitoids - *Trissolcus* spp.
- Expected release in Calif. in 2016
- Native Tachinid fly found on BMSB on East Coast
Parasitoid Testing

USDA – Delaware Calif. – UC Riverside (2016 release)

BMSB rearing cages

Parasitoid colonies in quarantine

Photos: K. Tatman, C. Dieckhoff, K. Hoelmer
Predators
Not well studied

of eggs:
ants, earwings, lacewings

of nymphs & adults:
assassin bugs, predatory stink bugs, spiders, birds (starlings, chickens, geese)
Questions?

Important Web Sites

www.StopBMSB.org

www.ucipm.ucdavis.edu

cesacramento.ucanr.edu