

Brown Marmorated Stink Bug

Grape Pest Management: Part VII, Lodi

March 17, 2015

Chuck Ingels

UC Cooperative Extension, Sacramento County

<http://cesacramento.ucanr.edu>

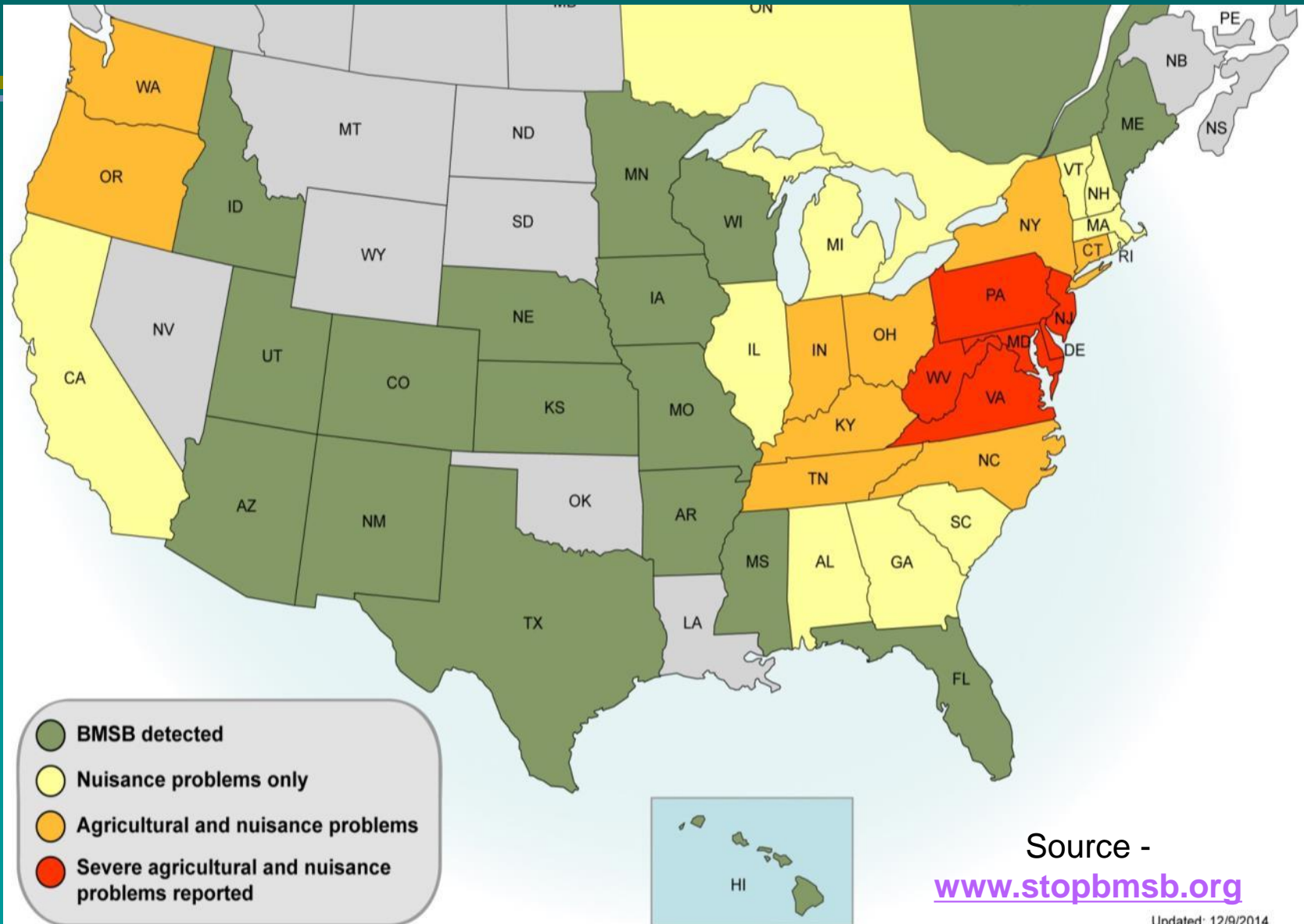
*Funding: Pear Pest Management Research Fund,
Lodi Winegrape Commission*



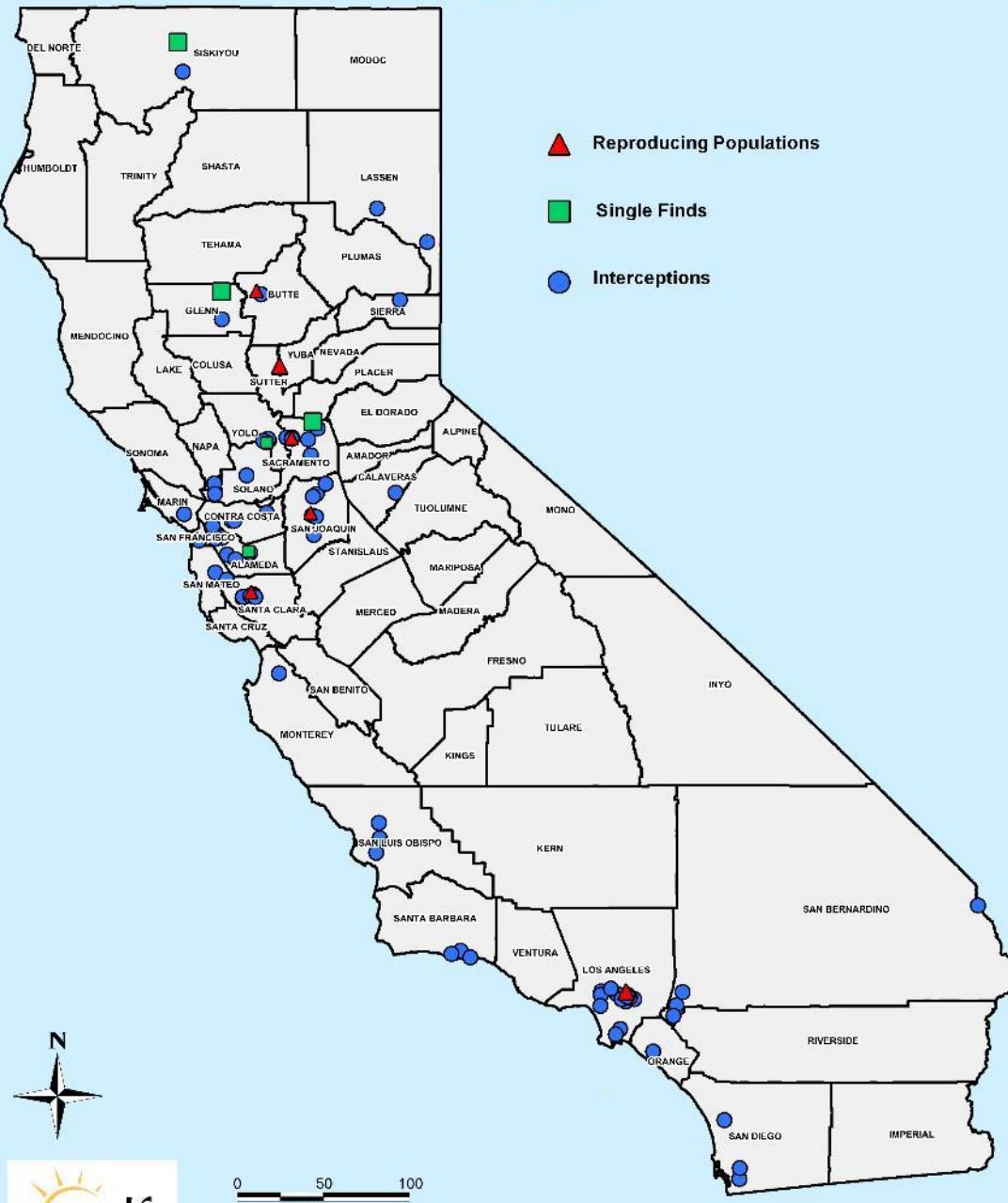
Brown Marmorated Stink Bug (*Halyomorpha halys*)

- 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

Current distribution in USA



BMSB in Calif. 2014



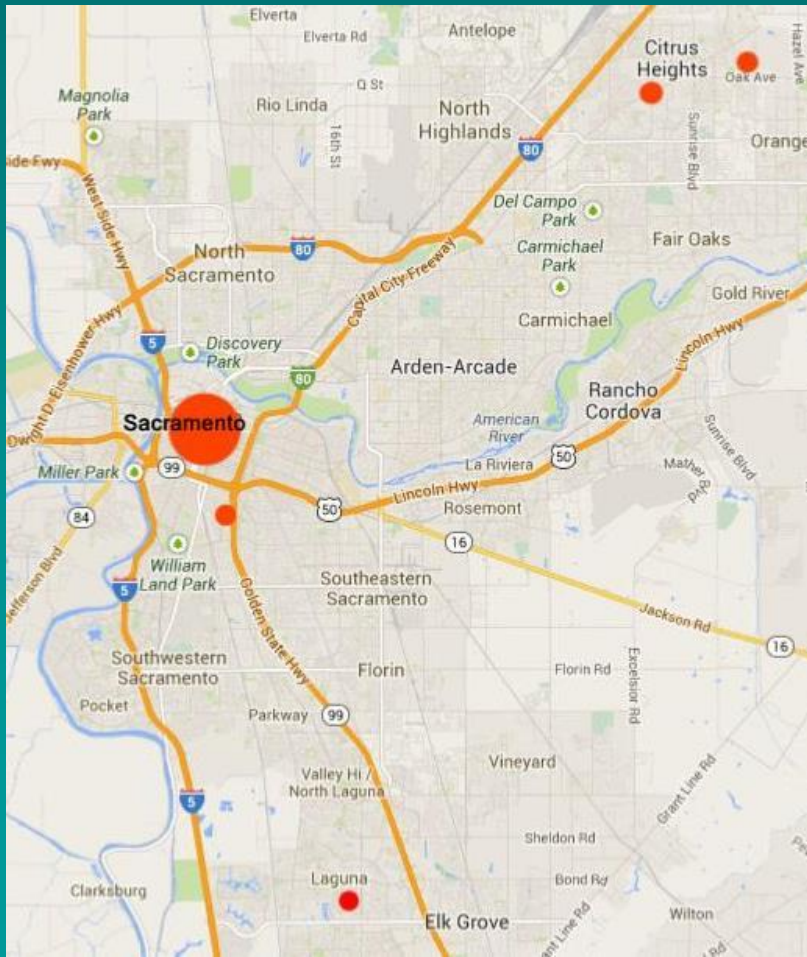
Established
populations in:

Butte
Los Angeles
Sacramento
San Joaquin
Santa Clara
Sutter
Yolo (new)

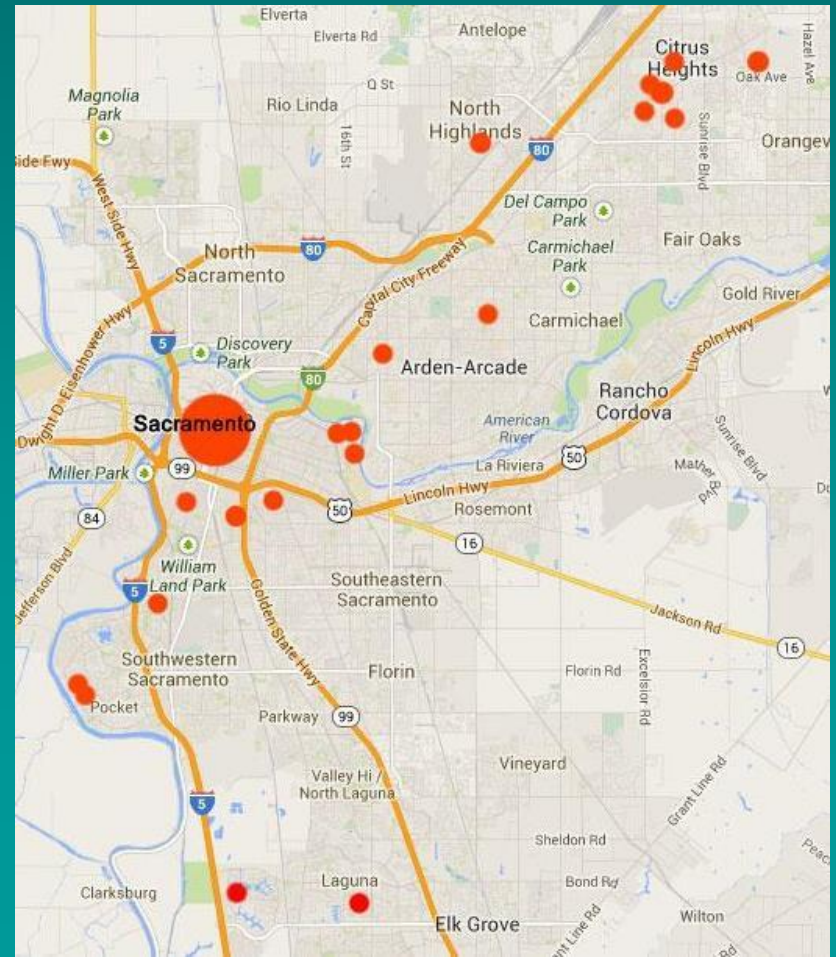


BMSB Finds Sacramento County

Jan. 1, 2014



Dec. 31, 2014



Adult

Smooth
“shoulder” edges

Banded
abdominal edge
extending
beyond wings

Mature nymph (5th instar)

Actual adult size
5/8 inch

Two white bands
on antennae

Banded legs

Rust color with
broad brown
markings

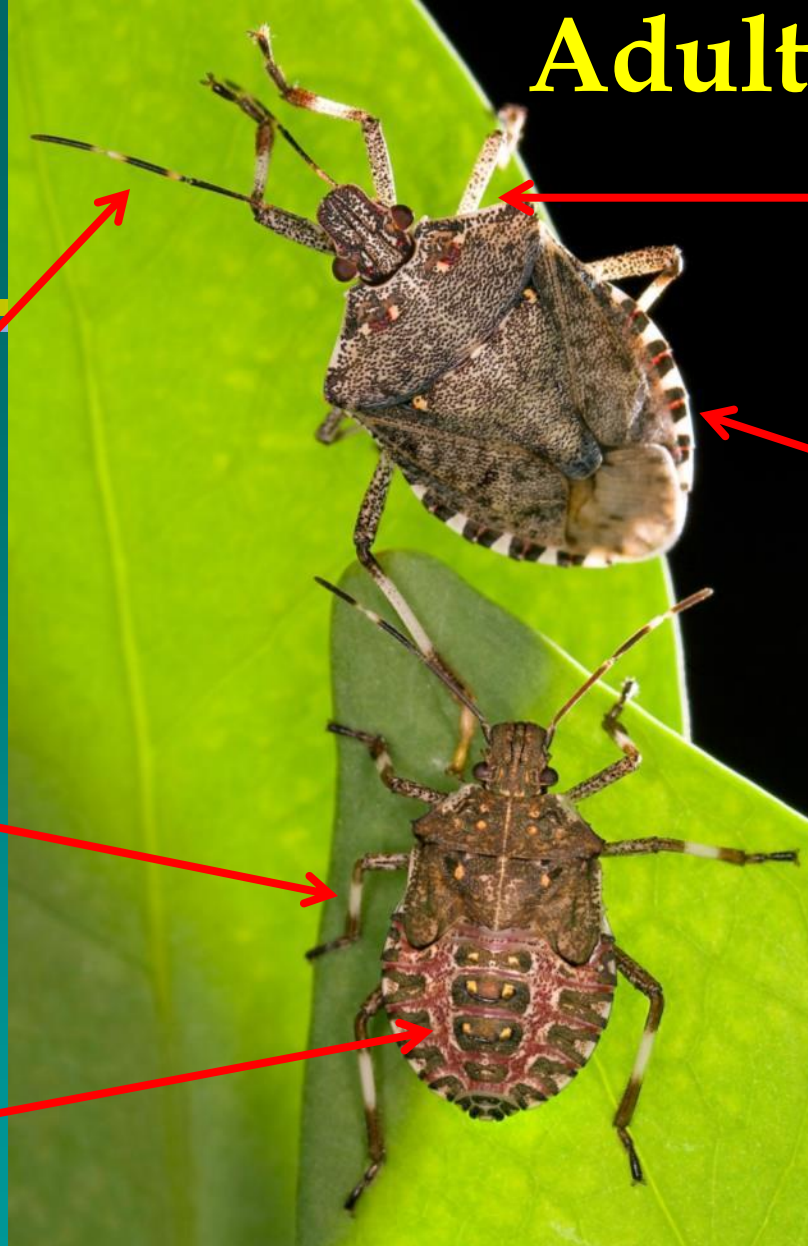


Photo: UC IPM



Eggs (20-30) & nymphs



Nymph (3rd of 5)



Adult



Photos: StopBMSB.org

5 Nymphal Instars

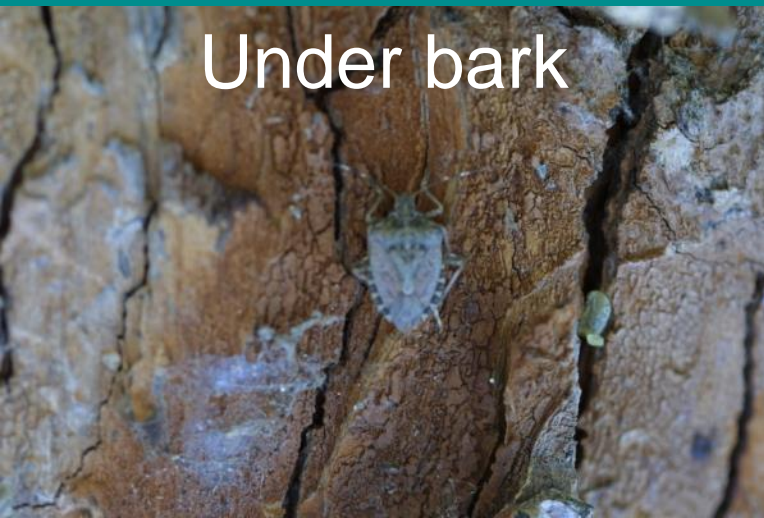
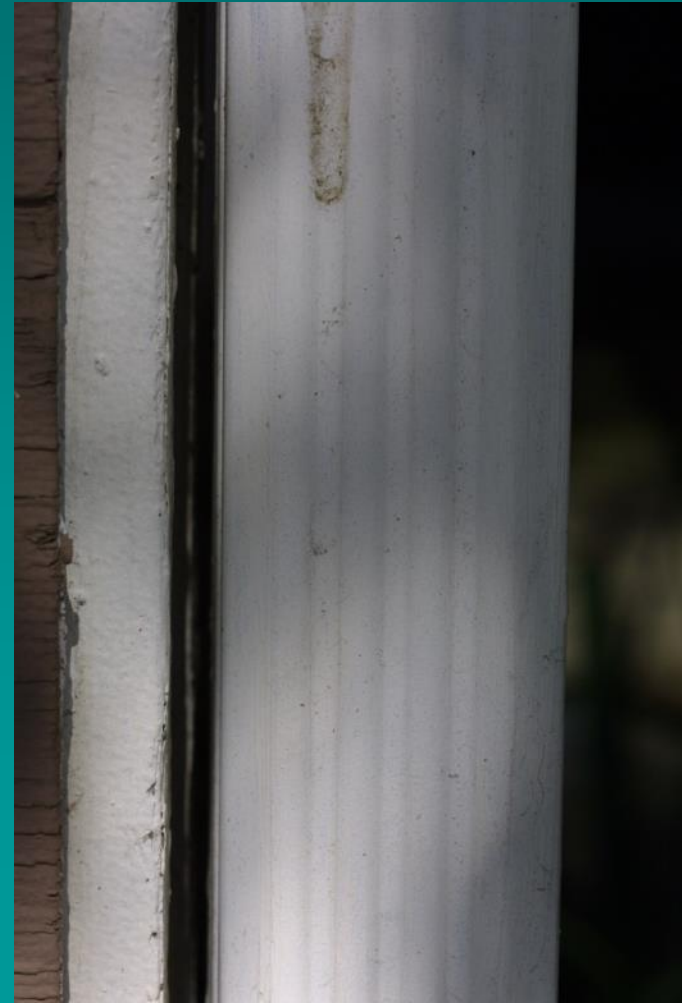
Male

Female

- 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

Sacramento March 2014

Downspout



Under bark

Aggregation Season – PA in Sept.
CA is not PA



Photos:
Tracy Leskey

Host Plants

Crops

- Stone fruits (esp. peach), pome fruits
- Berries
- Grapes (not a major host)
- Eggplant, tomato, okra, pepper, corn, beans, sunflower

- Little or no damage seen in Sacramento:
plum, citrus

Major Host Trees Observed in Sacramento, 2014

- Fruit trees
 - » Pome fruits, stone fruits (not plum), persimmon (late season)
 - » Not citrus
 - » Did not see nut crops
- Trident maple
- Waxleaf privet
- Chinese pistache
- Tree of heaven

Trident Maple *Acer buergerianum*



Waxleaf Privet

Ligustrum japonicum



Tree of Heaven *Ailanthus altissima*



Chinese Pistache

Pistachia chinensis



Stink Bug Feeding



Photo: Tracy Leskey



Photo: Jay Brunner

BMSB Damage



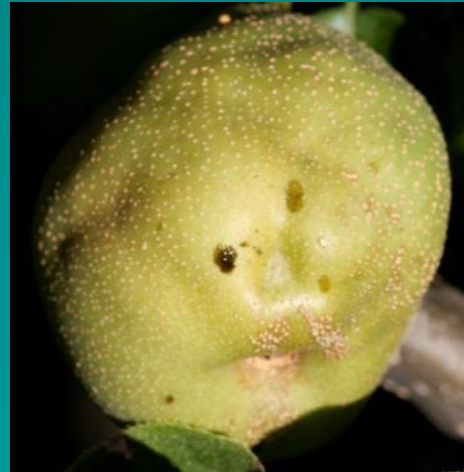
Peach 5/22



Nect. 6/3



6/11 Asian pear 7/2



Plum 7/2 (no damage)

Many Adults on Cherry Highest early season trap counts



3/16/2015

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)

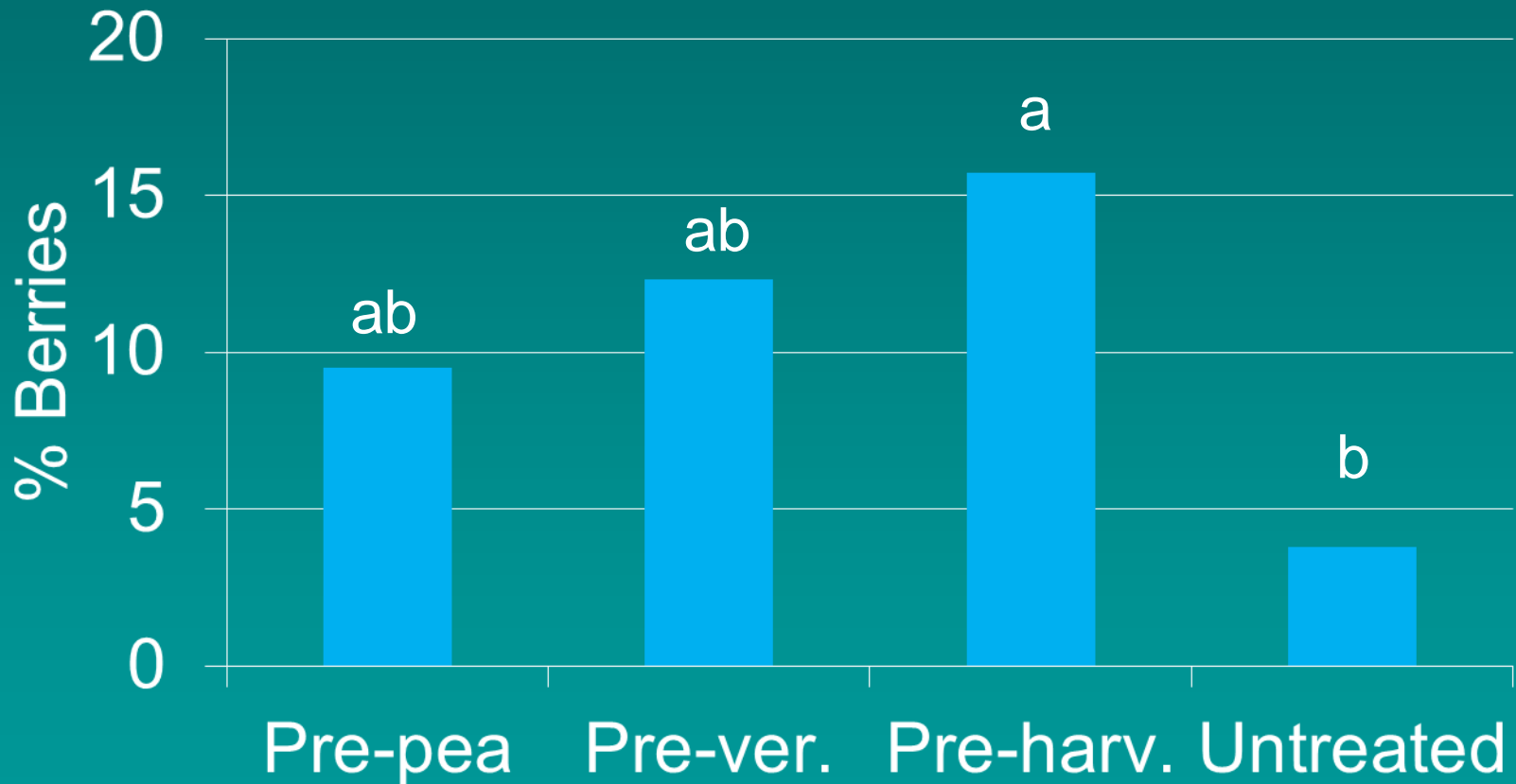


Photo: V. Walton

- 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

BMSB Traps

Dead-Inn Traps (AgBio, Inc.)

Grower
48" tall, \$30



Professional
24" tall, \$20



Homeowner
16" tall, \$17



Pheromone Traps Rocket Trap (Rescue)

\$17



Lures (MDT) and Insecticide Strips

Lures:

AgBio Combo lure (6 wks.) – \$7.95
Rescue (2 lures) (9 wks.) – \$10
Alpha Scents (4 wks., low rate)

Vaportape (kill bugs in trap): \$2.85



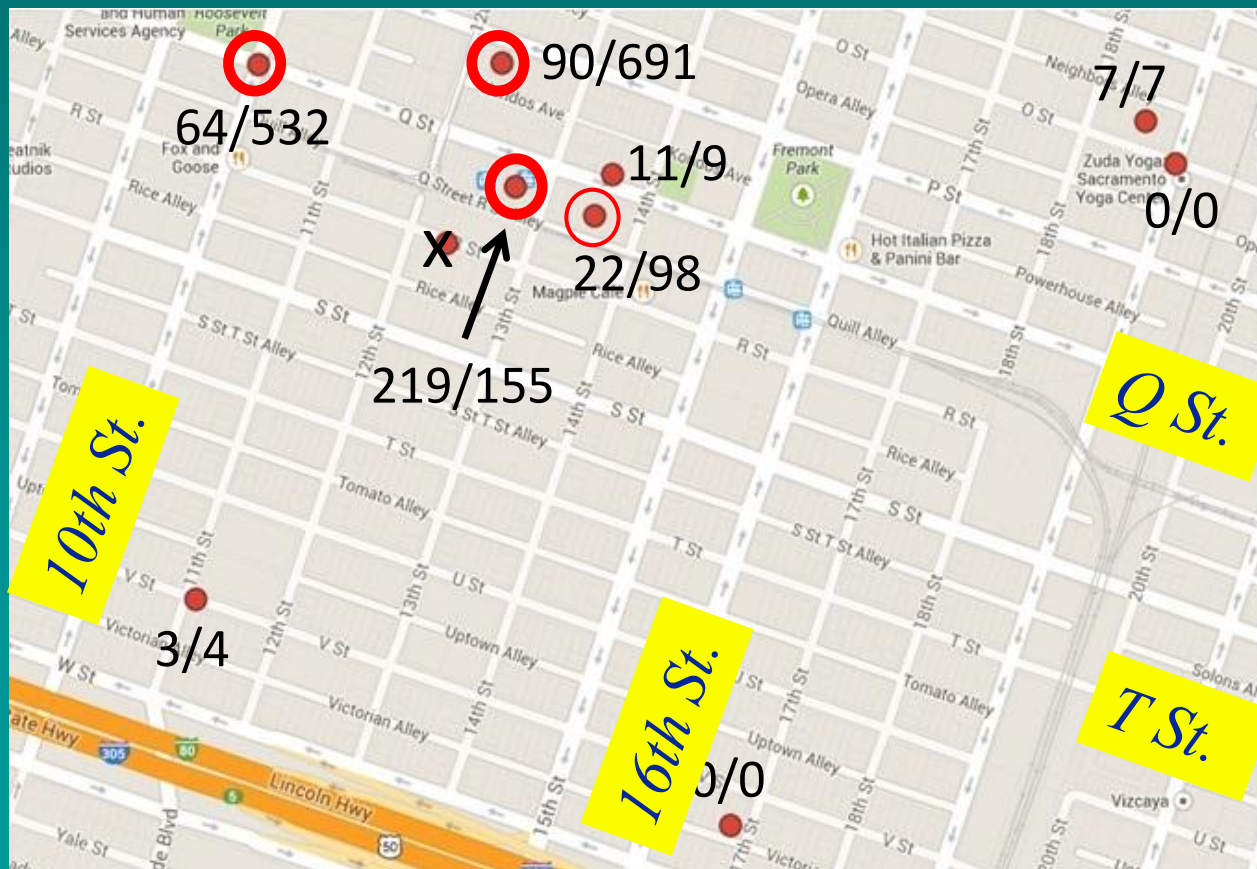
Understanding BMSB Pheromones

Two Main Lure Types

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

2014 Trap Locations & Counts Midtown Sacramento

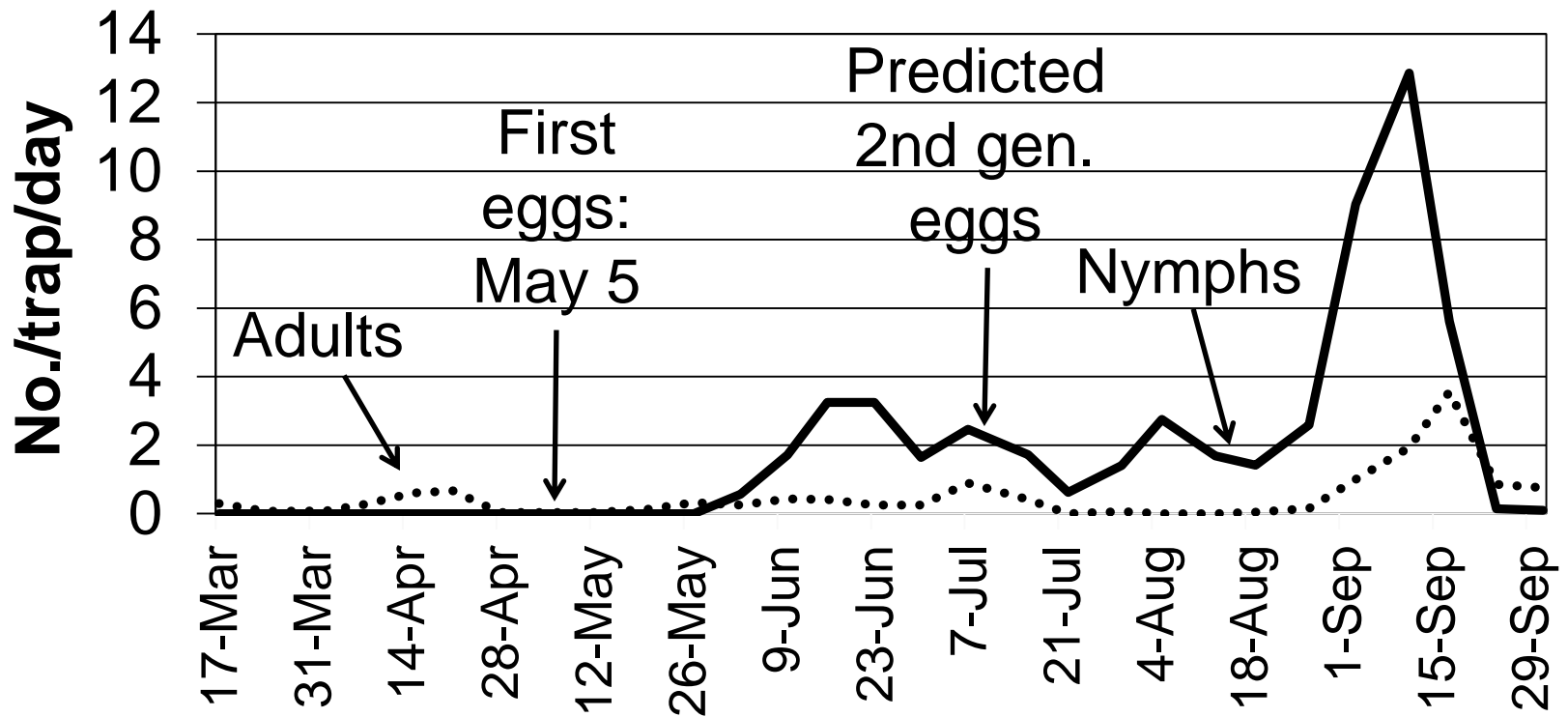
Adults/Nymphs



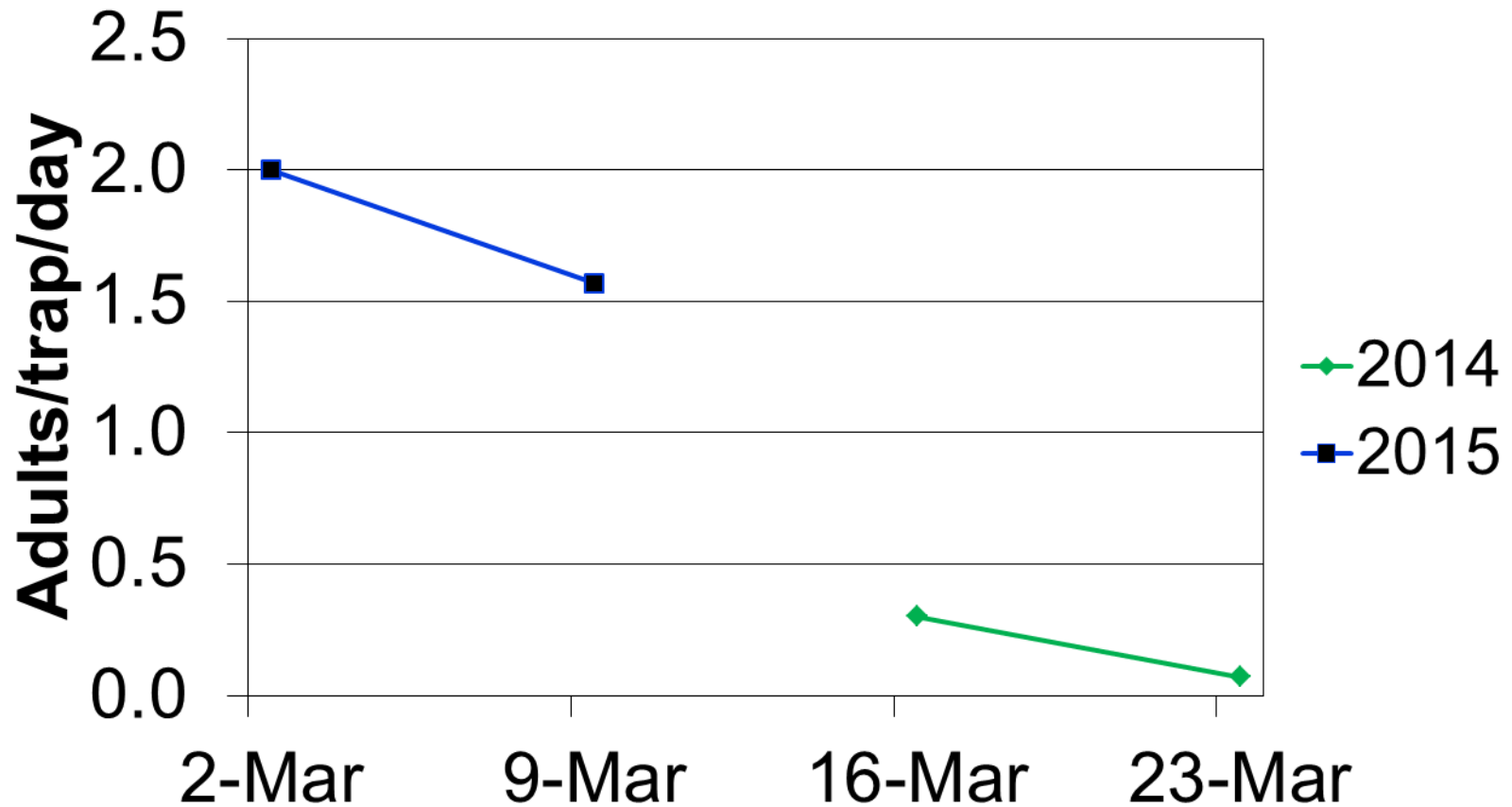
Adults and Nymphs Trapped Sacramento, 2014

BMSB/day/trap

Avg. of 4 traps, 2014



Adults Trapped Avg. of 4 traps

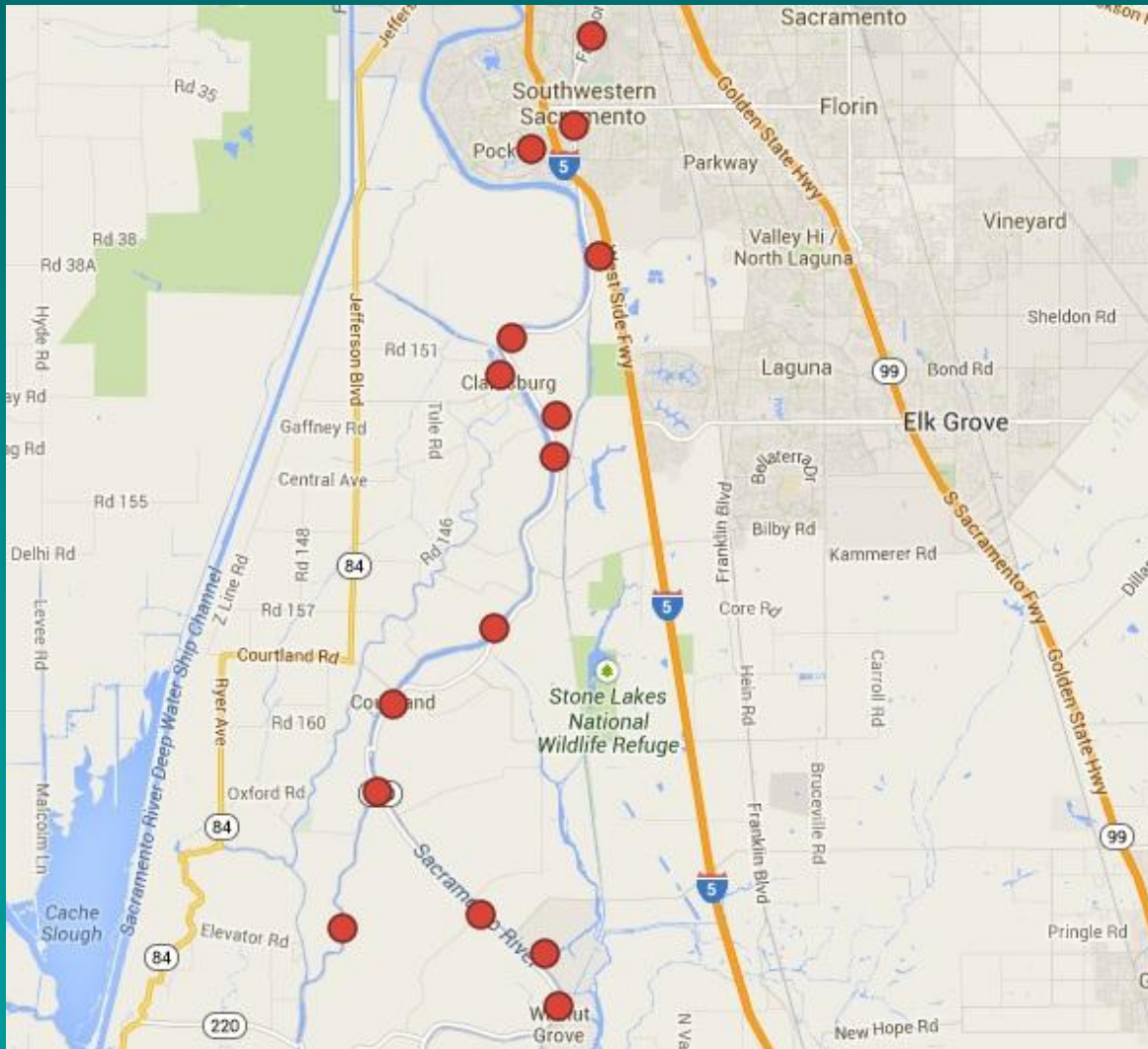


Trap Placement Locations So. Sacramento County, 2014

- South of Sacramento (4)
- Pear orchards near residence of a Sacramento commuter (6)
- Farms that host visitors (5)
 - » Wine tasting, agritourism, schools



Trap Placement Locations So. Sacramento County, 2014



No
BMSB
found

Problems Related to Chemical Control

- Lack of efficacy in field
- Moribundity – Drop & recover
- Movement into & out of orchards
- Buildup of secondary pests
 - » Mites, leafhoppers, etc.

Insecticide Bioassay Results

- BMSB “lethality index” (immediate mortality with little or no recovery)
 - » 4.5 hrs. exposure to dry residue, glass containers
 - » Field efficacy may differ

Active Ingredient	Lethality Index	Active Ingredient	Lethality Index
Dimethoate	93.3	Cyfluthrin	49.0
Malathion	92.5	Oxamyl	46.8
Bifenthrin	91.5	Esfenvalerate	43.3
Methidathion	90.4	Imidacloprid	40.0
Endosulfan	90.4	Tolfenpyrad (SC)	36.5
Methomyl	90.1	Tolfenpyrad (EC)	33.3
Chlorpyrifos	89.0	Pyrifluquinazon	28.3
Acephate	87.5	Kaolin Clay	23.1
Fenpropathrin	78.3	Diazinon	20.4
Permethrin	77.1	Phosmet	20.0
Azinphosmethyl	71.3	Acetamiprid	18.8
Dinotefuran	67.3	Thiacloprid	18.3
Kaolin Clay + Thiamethoxam	66.7	Abamectin	16.3
Formetanate HCl	63.5	Indoxacarb	11.3
Gamma-cyhalothrin	59.0	Spirotetramat	9.8
Thiamethoxam	56.3	Carbaryl	9.2
Clothianidin	55.6	Flonicamid	7.7
Beta-cyfluthrin	54.8	Water (Control)	5.8
Lambda-cyhalothrin	52.9	Cyantranilprole	1.7
Zeta-cypermethrin	52.1		

Tracy Leskey. 2011. The Challenges Posed by the Invasive Brown Marmorated Stink Bug, *Halyomorpha halys* (Stal), to U.S. Agriculture. USDA-ARS Appalachian Fruit Research Station, Kearneysville, WV

Insecticide Bioassay Results – Top 10

Active Ingredient	Trade Name (Example)	Insecticide Class	Lethality Index
Dimethoate	Dimethoate	OP	93.3
Malathion	Malathion	OP	92.5
Bifenthrin	Brigade	Pyrethroid	91.5
Methidathion	Supracide	OP	90.4
Endosulfan	Thiodan	Organochlor.	90.4
Methomyl	Lannate	Carbamate	90.1
Chlorpyrifos	Lorsban	OP	89.0
Acephate	Orthene	OP	87.5
Fenpropathrin	Danitol	Pyrethroid	78.3
Permethrin	Pounce	Pyrethroid	77.1

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): not mortality, but strong anti-feeding effect for 7+ days
 - Effective insecticides in lab: only 60% average mortality in the field when applied late early July, 40% in Aug., and 20% in September
-
- Peaches in Mid-Atlantic: 10-12 weekly applications, alternate-row, late May-harvest using pyrethroids and neonicotinoids

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



Gymnosoma par

Assassin bug



Predators Seen in 2014

Praying mantis



Spiders





Questions?

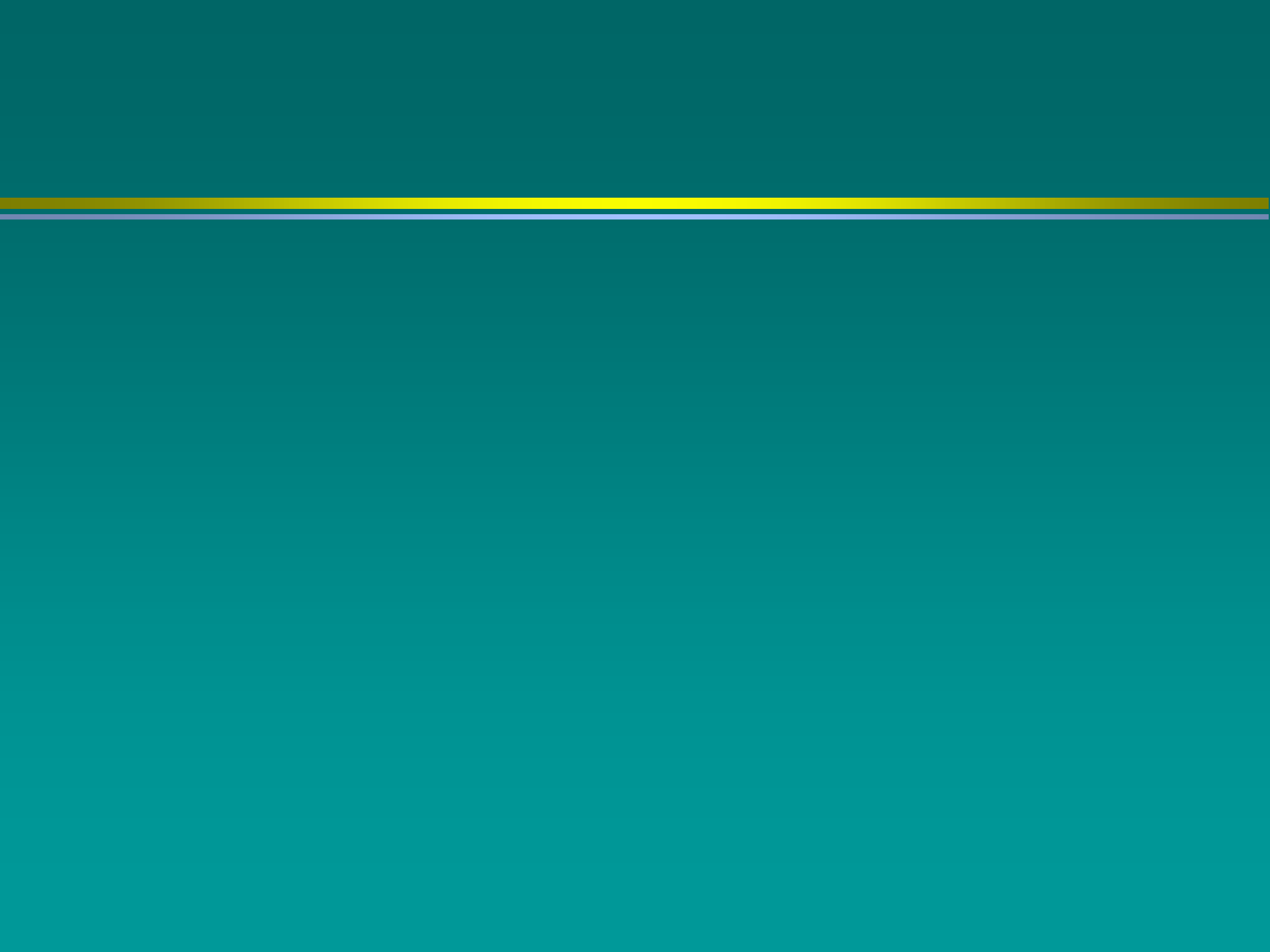


Important Web Sites

StopBMSB.org

ucipm.ucdavis.edu

cesacramento.ucanr.edu



Rough Stink Bug vs. BMSB

Rough stink bug

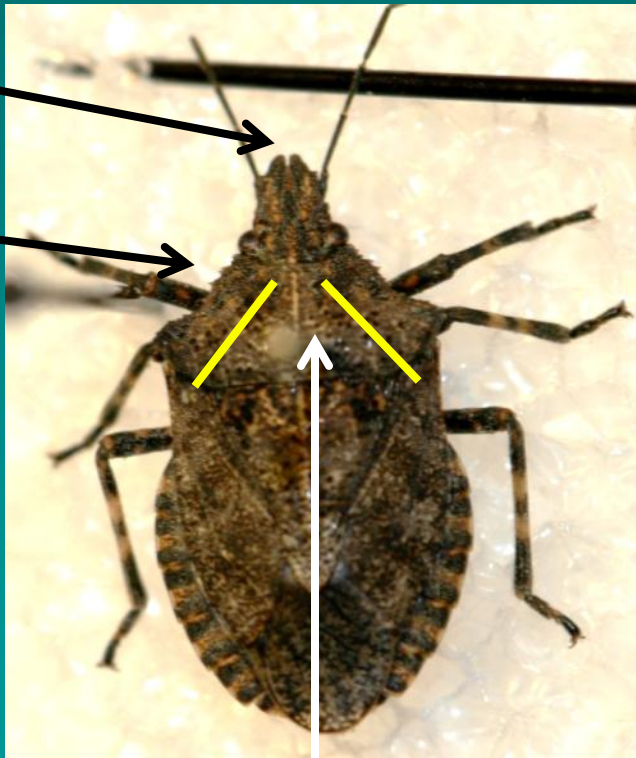


BMSB



Rough Stink Bug vs. BMSB

Rough stink bug



Narrower angle

BMSB



Wider angle

Conspere Stink Bug vs. BMSB

Conspere stink bug



Solid
brown

1/2 inch

BMSB



Marble
color

5/8 inch