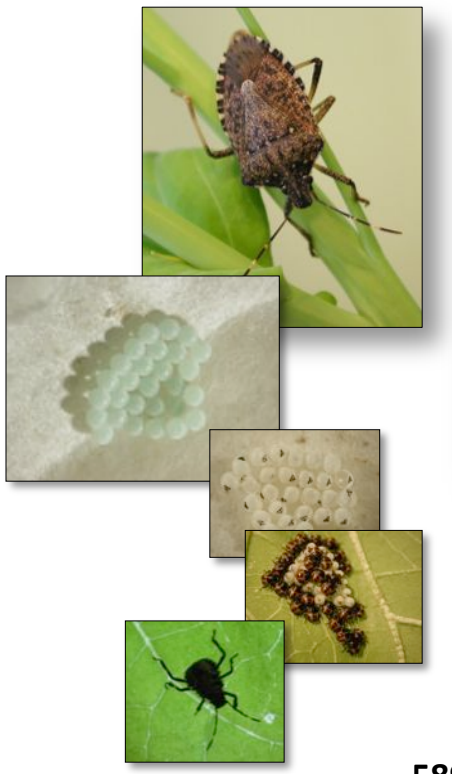
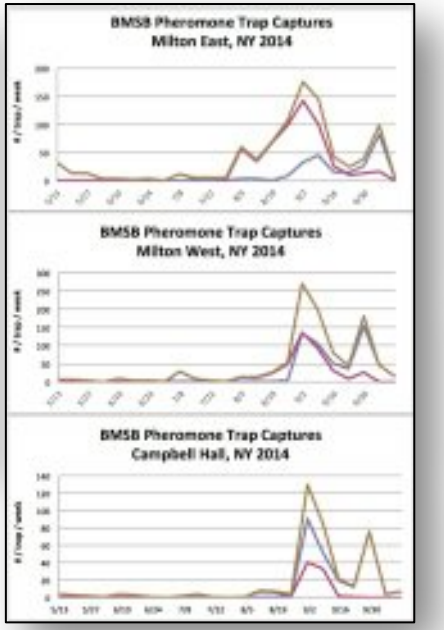
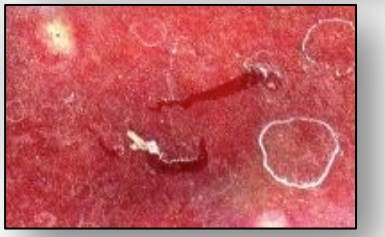
Managing the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) in New York State







589th Meeting of the New England Vegetable and Berry Growers' Association
And New England Cooperative Extension
Saturday, January 31, 2015
Hudson Lodge of Elks, Hudson, MA

Cornell University
College of Agriculture and Life Sciences
New York State Agricultural Experiment Station

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

Brown Marmorated Stink Bug: History

- Brown Marmorated Stink Bug first detected in Allentown, PA in 1998, confirmed in 2001.

- First NY BMSB confirmed in 2007, Hudson Valley in **December of 2008**.

- Economic injury caused by BMSB in the mid-Atlantic occurred in commercial apple in 2009; **extensive injury in 2010** causing 37 million dollars in pome fruit damage.

- **In 2012, economic damage to apple and pepper** was assessed on three Hudson Valley Farms in Ulster and Orange Counties.

- BMSB remains a significant urban pest

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Move Over, Bedbugs: Stink Bugs Have Landed

The New York Times

Published: September 26, 2010

Maryland 2010

Steve Ruark for The New York Times

Kelli Wilson and her father, Richard Lee Pry, cleared stink bugs from her porch Friday in Burkittsville, Md. The shield-shaped invaders have damaged fruit and vegetable crops.

By KEN MAGUIRE

Published: September 26, 2010

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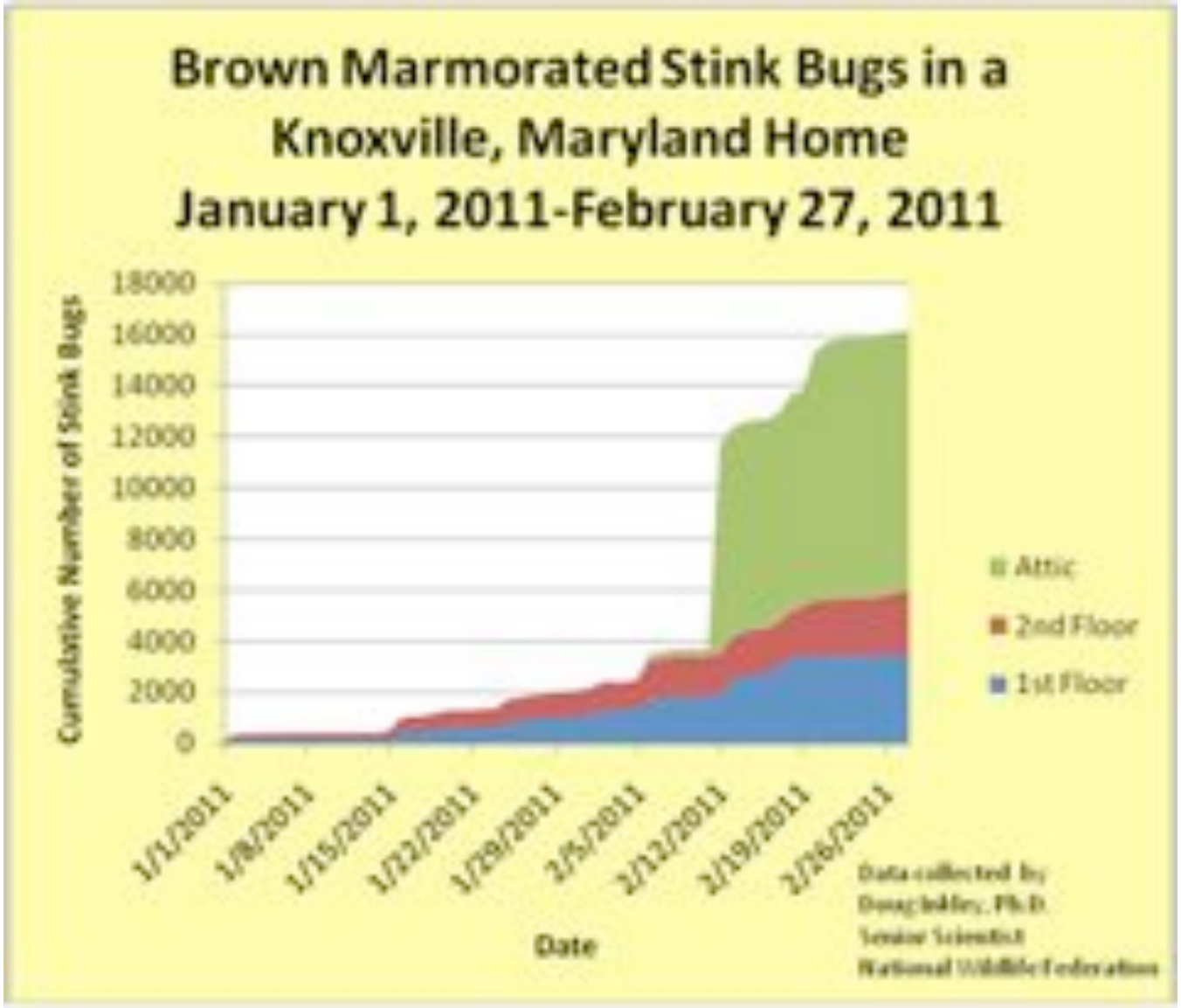
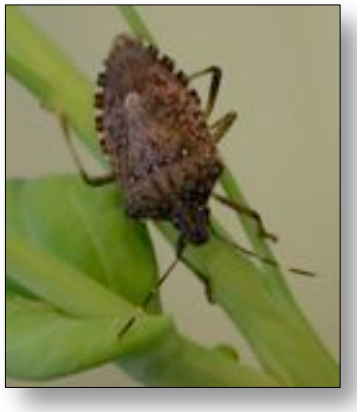
The Brown Marmorated Stink Bug in the Urban Environment





>22,000 BMSB collected from 1 home in Maryland 2011

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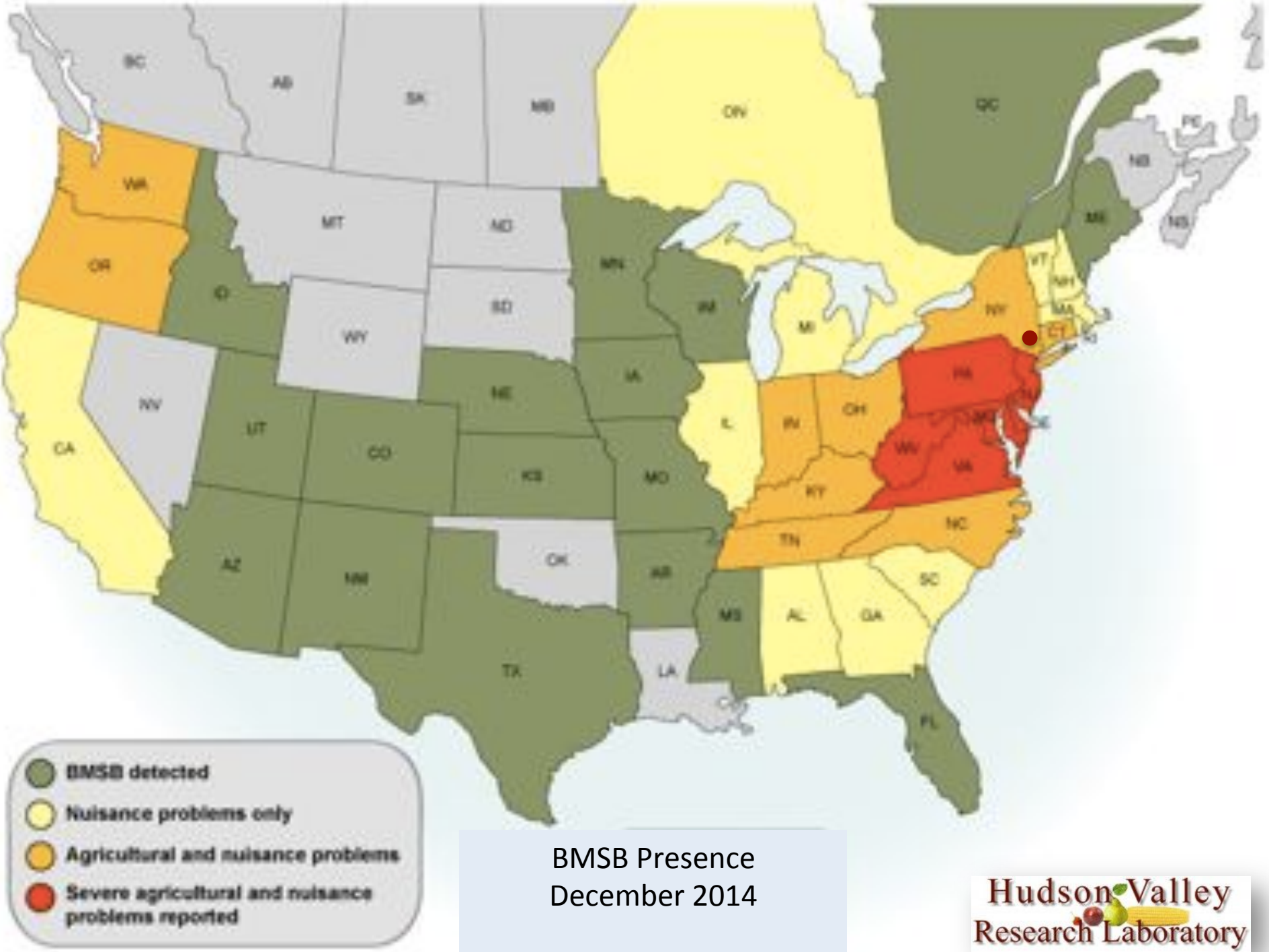


BMSB Presence
December 2014

Hudson Valley Research Laboratory

Brown Marmorated Stink Bug, Halyomorpha halys (Stal) in NY State

2 Generations in NYS

Overwintering adult

1st gen. mid-season adult

1st generation

Overwintering adult
Egg cluster (≅28)
1st instar
2nd instar
3rd instar
4th instar
5th instar
Adult

May June July August September October

Brown Marmorated Stink Bug, Halyomorpha halys (Stal) in NY State

2 Generations in NYS

Overwintering adult

1st gen. mid-season adult

1st generation

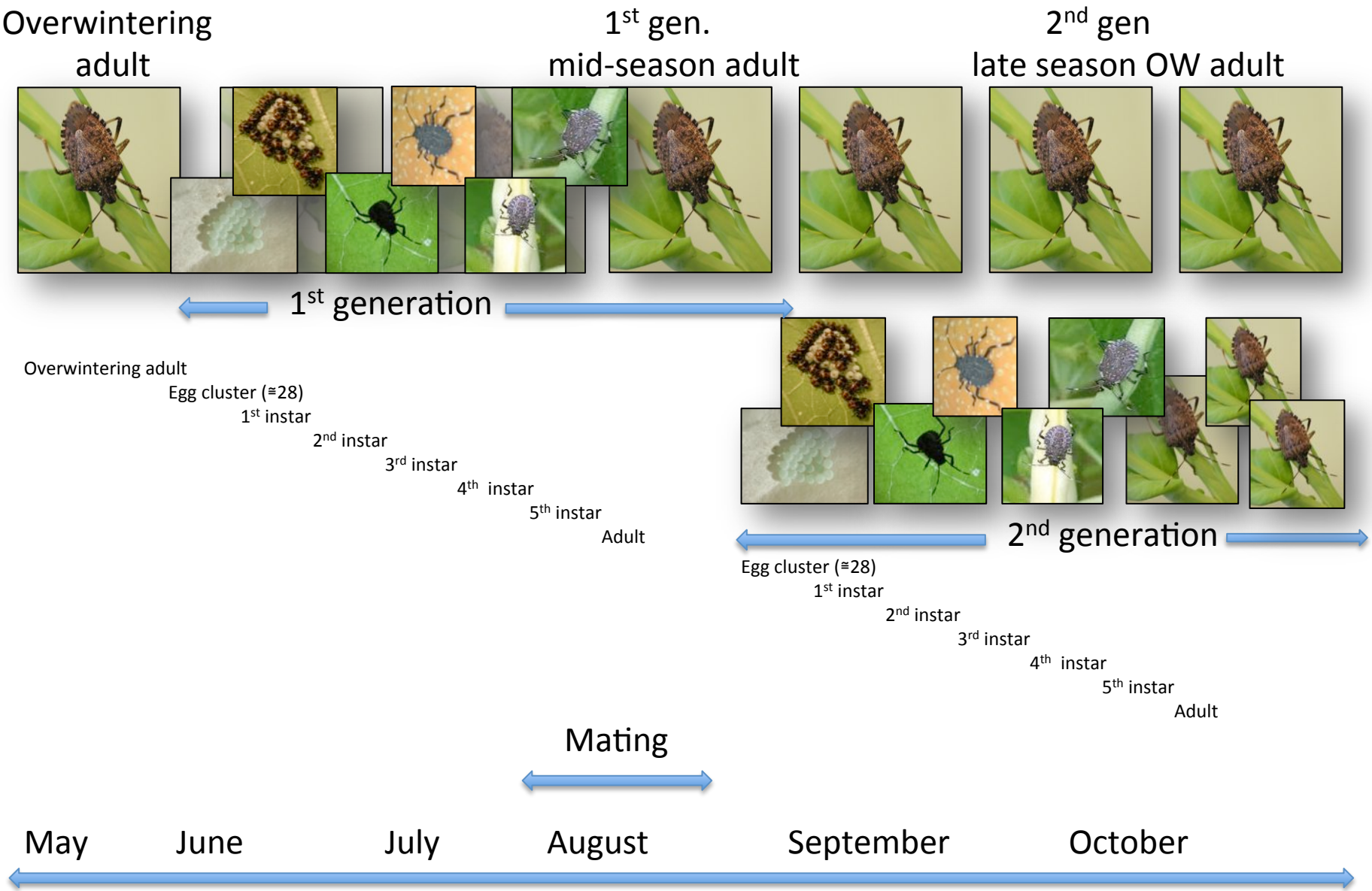
Overwintering adult
Egg cluster (≅28)
1st instar
2nd instar
3rd instar
4th instar
5th instar
Adult

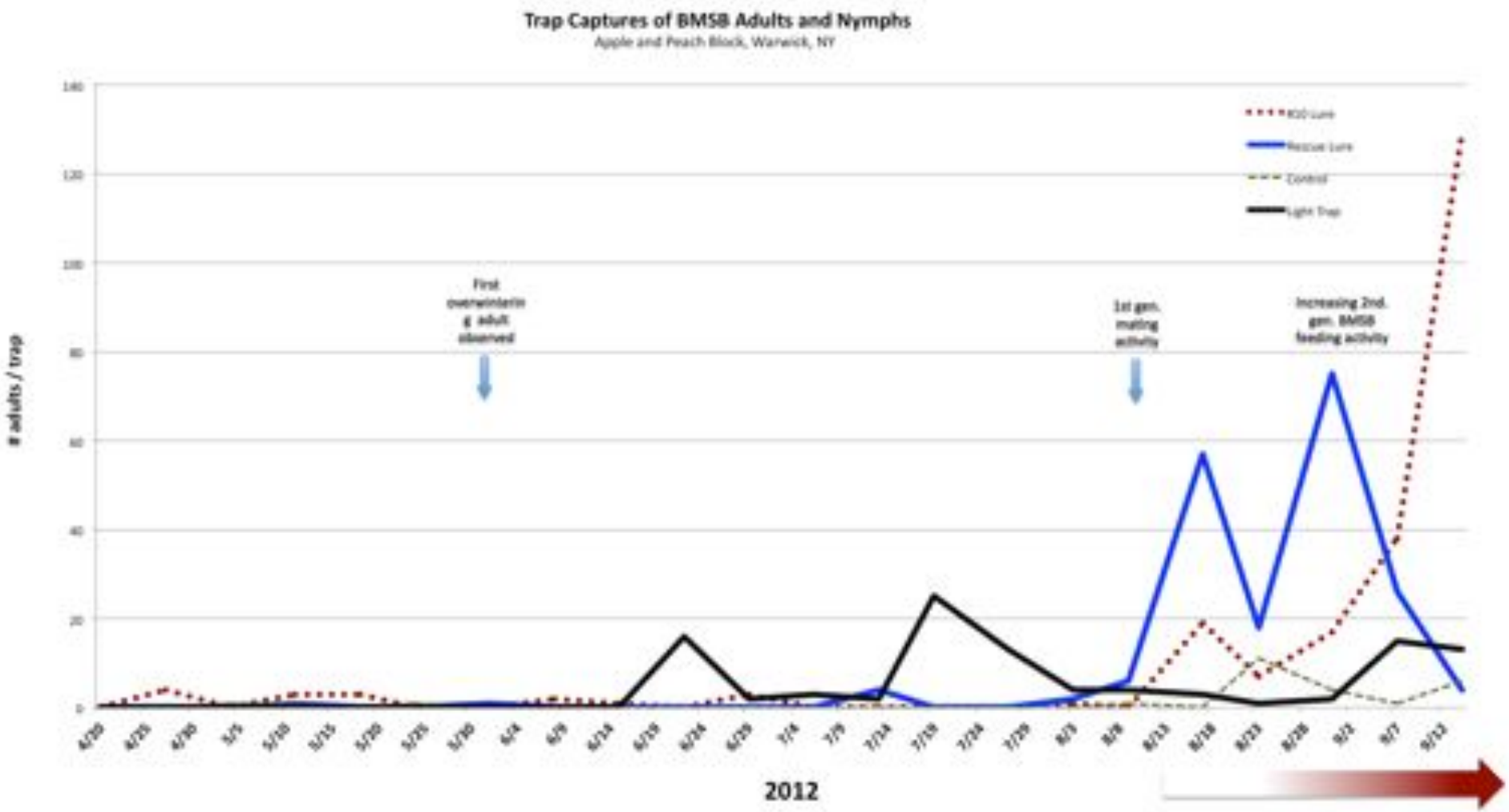
Mating

May June July August September October

Brown Marmorated Stink Bug, Halyomorpha halys (Stal) in NY State

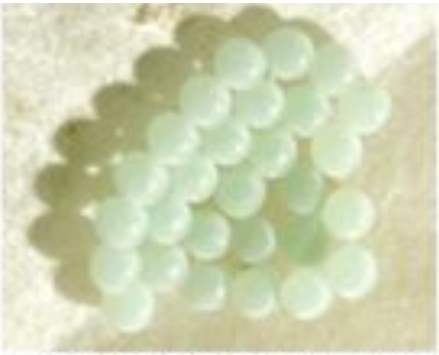
2 Generations in NYS





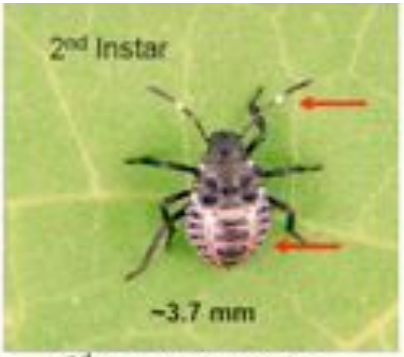
Overwintering……..1st generation ……..2nd generation…….
adults adults adults

Brown Marmorated Stink Bug: Identification of Life Stages



Eggs: Average 28/cluster; light green to white

1st instar: black & red; cluster near eggs

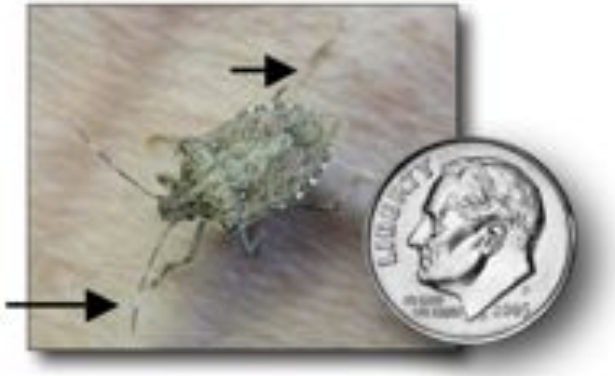


2nd instar: striped antennae

3rd instar: striped antennae and legs

4th instar: thoratic spur striped antennae & legs

5th instar: wing pads striped antennae & legs



BMSB Adults: red eyes, 4 cream colored dots on shoulders; banding on legs and antenna, smooth blunt shoulders. Banded abdomen; 14 -17 mm in length.

Hudson Valley Research Laboratory

Brown Marmorated Stink Bug: Adult Identification

Antenna:
light & dark
banding

2 sets of 4

Cream colored dots on thorax

Wing pads &
Legs:
light & dark banding

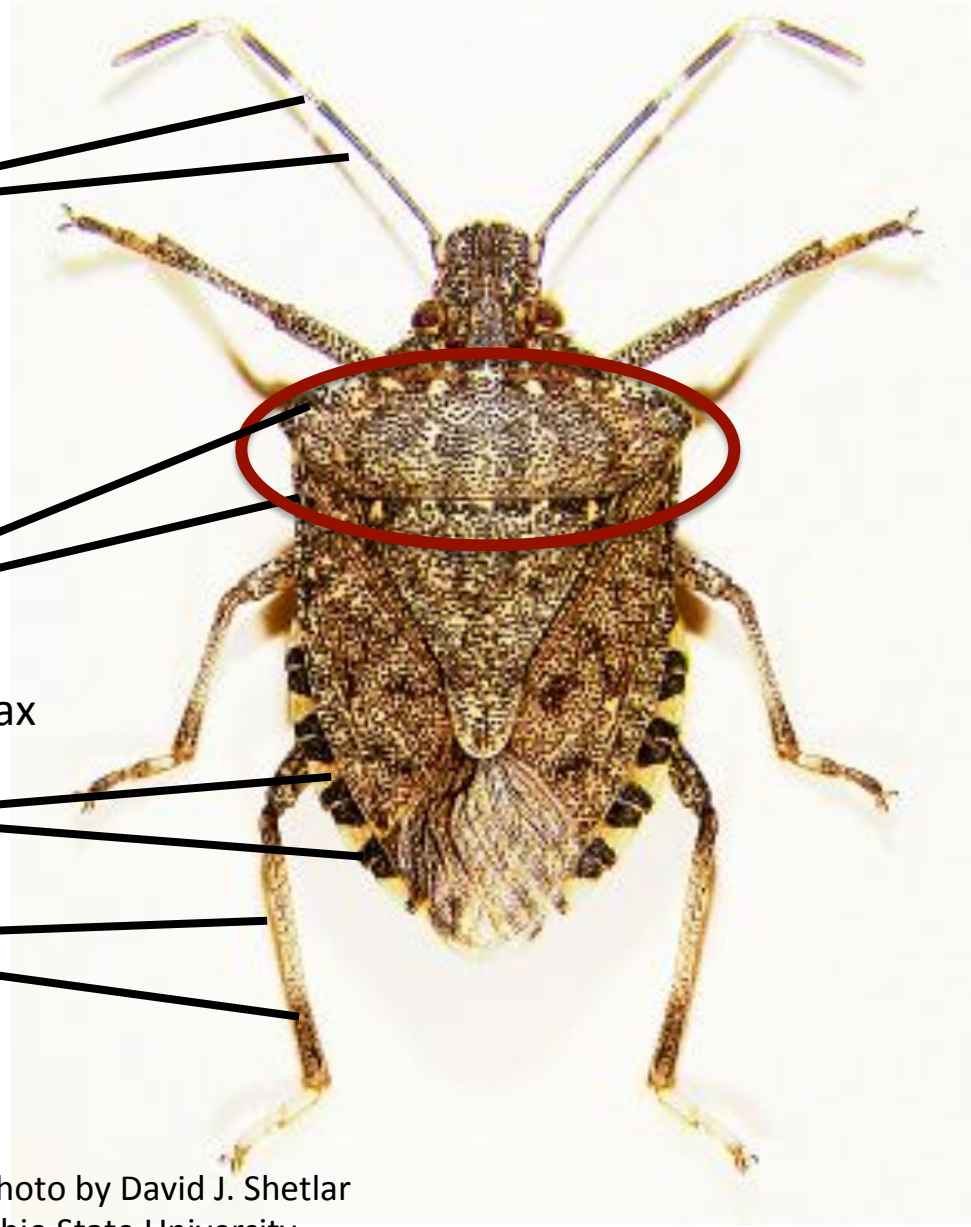
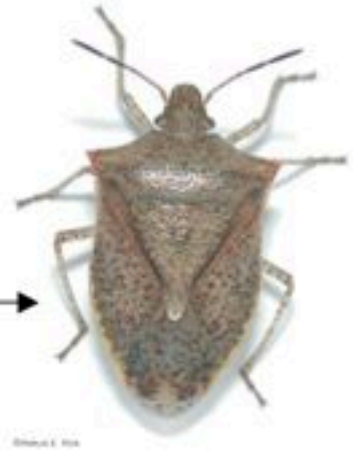


Photo by David J. Shetlar
Ohio State University

Brown Marmorated Stink Bug: Identification of Look-A-Likes

Spined Soldier Bug
Pointed shoulders
No leg stripe



Brown stink bug
No leg stripe

Rough Stink Bug
'Teeth' along shoulders

Green Stink Bug
No leg stripe

Squash Bug
No leg stripe

Western conifer seed bug
'leaf footed'

Brown Marmorated Stink Bug: Host Plants - Food for Success

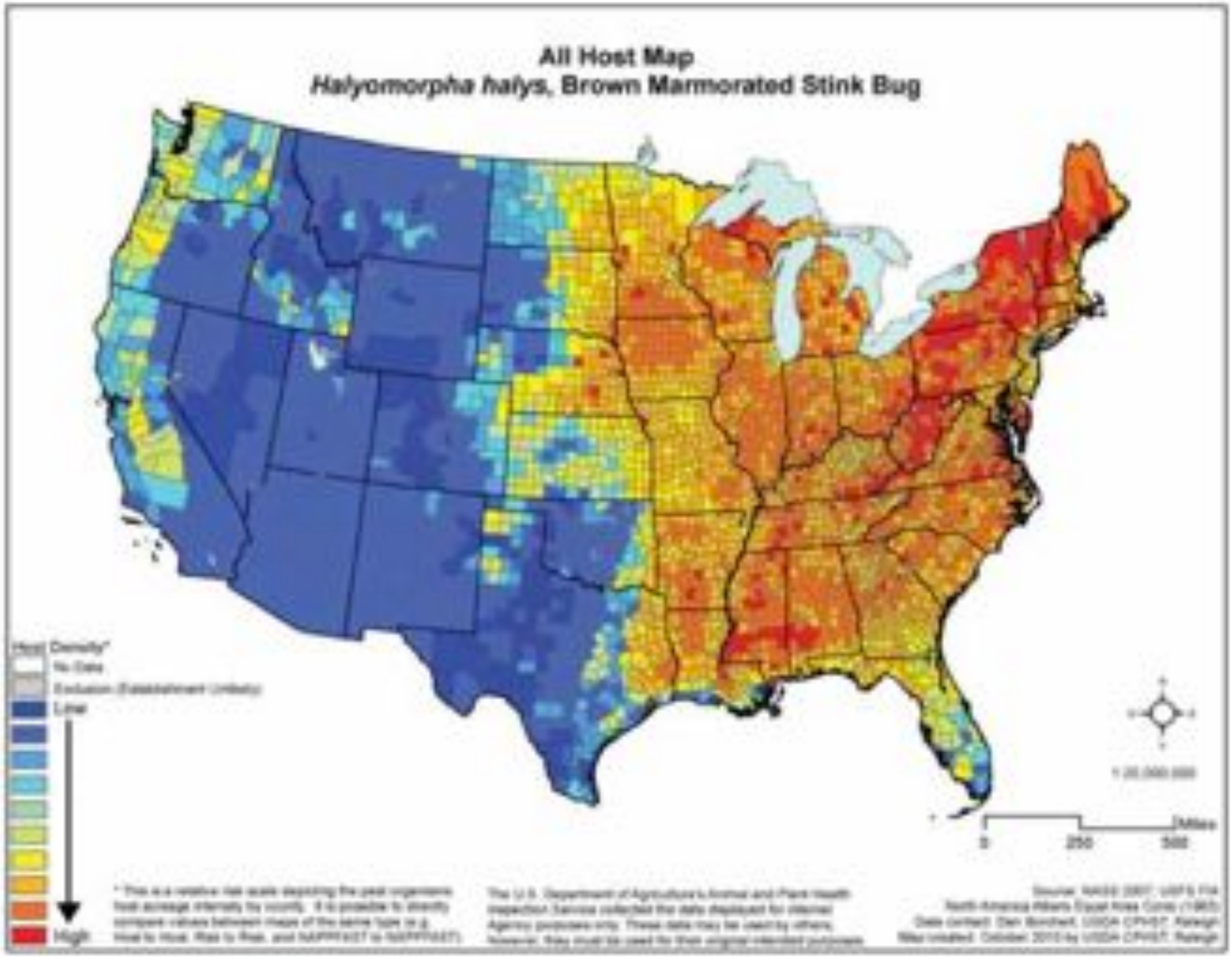


Figure 1: Risk maps displaying the relative density of field, vegetable, and fruit crop hosts plants of BMSB throughout the United States.

Brown Marmorated Stink Bug: Host Plants - Food for Success

Appendix A: BMSB Host List

Table 2: Reported host list for BMSB. This pest's host range is likely larger than what has been reported in the literature and likely includes a wide variety of ornamentals and weeds that have not been specifically documented in the literature. (* indicates hosts used to develop the risk maps in Figure 1 and 2).

Host	Common name	Reference
Abelia x *grandiflora* (André) Rehd	Glossy abelia	Bernon, 2004
Acer campestre L.	Hedge maple	Bernon, 2004
Acer palmatum Thunb.	Japanese maple	Bernon, 2004
Acer platanoides L.	Norway maple	Bernon, 2004; Hamilton and Shearer, 2003
Acer pseudoplatanus L.		Wermelinger et al., 2008
Acer rubrum L.	Red maple	Bernon, 2004
Acer spp.*	Maple	Hoebeke and Carter, 2003; Wermelinger et al., 2008
Amelanchier spp.	Shadbush	Bernon, 2004; Hoebeke and Carter, 2003
Arctium minus Bernh.	Burdock	Bernon, 2004
Arctium spp.		Wermelinger et al., 2008
Asparagus officinalis L.*	Asparagus	Hamilton and Shearer, 2003
Asparagus spp.		Bernon, 2004; Wermelinger et al., 2008
Basella rubra Linn.	T'ang ts'oi or Climbing spinach	Hoffman, 1931
Beta vulgaris L.	Beat Root	Hua, 2000
Betula spp.	Birch	Bernon, 2004
Buddleja davidii Franch.	Butterfly bush	Bernon, 2004; Wermelinger et al., 2008
Buddleia spp.	Butterfly bush	Hamilton and Shearer, 2003
Camellia oleifera C. Abel	Tea-oil camellia	Hua, 2000
Capsicum annuum L.*	Bell pepper	Bernon, 2004; Leskey, 2010a, 2010b
Caragana arborescens Lam.	Siberian pea shrub	Bernon, 2004; Nielsen and Hamilton, 2009
Carya spp.	Pecan	Bernon, 2004
Catalpa spp.*	Catalpa	Bernon, 2004; Hoebeke and Carter, 2003
Celastrus spp.	Bittersweet	Bernon, 2004
Celosia argentea L.	Princess feather or Cock's comb	Hoffman, 1931
Celtis occidentalis L.	Hackberry	Bernon, 2004
Cercis canadensis L.	Redbud	Bernon, 2004
Cleome spp.	Cleome	Bernon, 2004
Citrus spp.*	Citrus	Wermelinger et al., 2008; Hoebeke and Carter, 2003

Host	Common name	Reference
Tilia americana L.	Linden	Bernon, 2004
Tilia spp.*	Basswood	Hoebeke and Carter, 2003
Triticum aestivum L.	Wheat	Hua, 2000
Tropaeolum majus L.		Wermelinger et al., 2008
Ulmus spp.	Elm	Hua, 2000
Uncultivated hedge		Nielsen and Hamilton, 2009
Viburnum opulus var. *americanum* Ait.	Highbush cranberry	Nielsen and Hamilton, 2009
Viburnum prunifolium L.	Blackhaw viburnum	Bernon, 2004; Nielsen and Hamilton, 2009
Viburnum setigerum Hance	Tea Viburnum	Bernon, 2004
Vibernum spp.	Cranberry bush	Bernon, 2004
Vigna sesquipedalis L.	Chinese long bean	Hoffman, 1931
Vitis spp.*	Grape	Bernon, 2004; Hamilton, 2009
Vitis vinifera L.	Grapevine	Wermelinger et al., 2008
Zea mays L.*	Corn	Leskey, 2010a, 2010b

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine

Qualitative analysis of the pest risk potential of the brown marmorated stink bug (BMSB), *Halyomorpha halys* (Stål), in the United States

October 2010

Rev: Original

Polyphagous insect with an expansive host range

- 133 listed plant species hosts
- Observed on over 300 plants
- Deciduous tree, legumes and tree fruit

Host	Common name	Reference
Corylus colurna L.	Turkish filbert	Bernon, 2004
Crataegus spp.	Hawthorn	Bernon, 2004
Cryptomeria spp.	Japanese cedar	Wermelinger et al., 2008
Cucumis sativus L.	Cucumber	Bernon, 2004
Cupressus spp.	Cypress	Wermelinger et al., 2008
Decaisnea fargesii Franch.		Wermelinger et al., 2008
Diospyros kaki L.	Persimmon	Hoebeke and Carter, 2003
Diospyros kaki Thunb.	Japanese persimmon	Kawada and Kitamura, 1983
Diospyros spp.*	Persimmon	Bernon, 2004; Hoebeke and Carter, 2003; Wermelinger et al., 2008
Elaeagnus angustifolia L.	Russian olive	Nielsen and Hamilton, 2009
Euonymus alatus (Thunb.) Sieboid	Winged Euonymus	Bernon, 2004
Euonymus spp.	Euonymus	Bernon, 2004
Ficus spp.	Fig	Hoebeke and Carter, 2003
Fraxinus americana L.	White ash	Nielsen and Hamilton, 2009
Fraxinus spp.	Ash	Bernon, 2004
Glycine max Merrill	Soybean	Bernon, 2004; Hoebeke and Carter, 2003; Wermelinger et al., 2008 Hua, 2000; Sun et al., 2008
Gossypium spp.	Cotton	Hua, 2000
Helianthus spp.	Sunflower	Bernon, 2004
Hibiscus rosa-sinensis L.	Chinese hibiscus	Hoffman, 1931
Hibiscus spp.		Wermelinger et al., 2008
Ilex opaca Ait.	American holly	Bernon, 2004; Hamilton and Shearer, 2003
Ilex spp.*	Holly	Bernon, 2004
Ilex verticillata (L.) A. Gray	Winterberry holly	Bernon, 2004
Juglans nigra L.*	Walnut	Bernon, 2004
Koelreuteria spp.	Goldenrain Tree	Bernon, 2004
Ligustrum spp.	Privet	Bernon, 2004
Lonicera spp.	Honeysuckle	Bernon, 2004; Hoebeke and Carter, 2003; Wermelinger et al., 2008
Lycopersicon spp.	Tomato	Bernon, 2004
Magnolia stellata (Siebold & Zucc.) Maxim.	Star magnolia	Bernon, 2004
Malus domestica L. (or Brokh)*	Apple	Hua, 2000; Hoebeke and Carter, 2003
Malus spp.	Crabapple	Bernon, 2004; Hamilton and Shearer, 2003; Wermelinger et al., 2008
Morus spp.	Mulberry	Wermelinger et al., 2008; Bernon, 2004; Hoebeke and Carter, 2003
Paulownia spp.	Paulownia	Hoebeke and Carter, 2003
Paulownia tomentosa (Thunb.) Sieboid & Zucc. ex Steud.*	Princess Tree or Paulownia	Bernon, 2004; Hoebeke and Carter, 2003; Wermelinger et al., 2008
Phaseolus lunatus Linn.	Lima beans	Hoffman, 1931

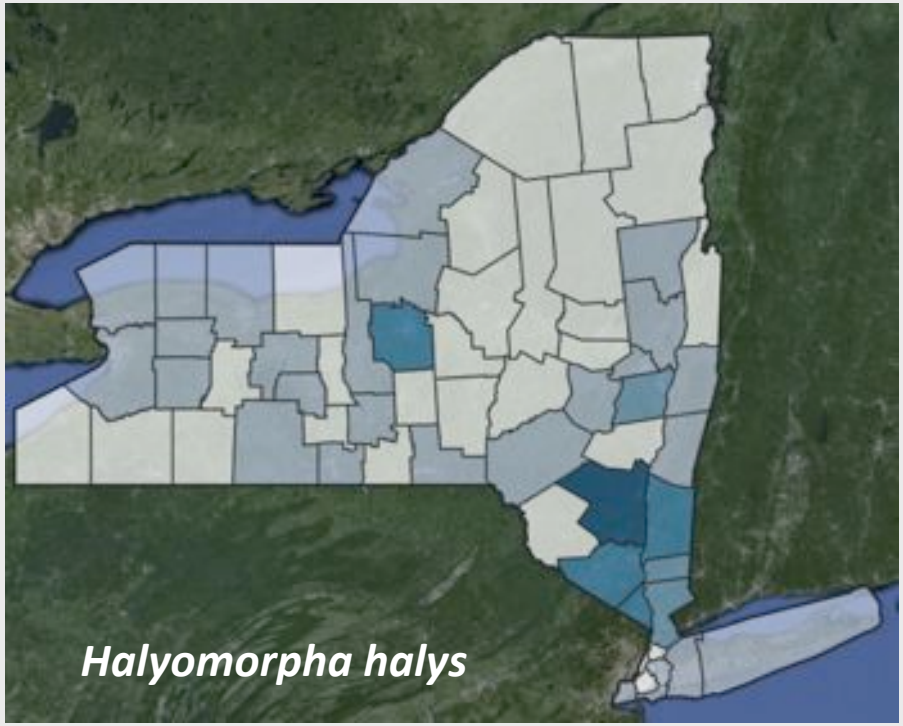
Host	Common name	Reference
Phaseolus spp.*	Pole bean, Bush bean	Bernon, 2004
Phaseolus vulgaris L.	String beans	Hamilton and Shearer, 2003; Wermelinger et al., 2008
Pisum sativum L.	Pea	Wermelinger et al., 2008
Platanus occidentalis L.	Sycamore	Bernon, 2004
Prunus armenica L.	Apricot	Bernon, 2004; Wermelinger et al., 2008
Prunus avium L.	Cherry	Wermelinger et al., 2008; Hoebeke and Carter, 2003
Prunus domestica L.	Plum	Bernon, 2004; Wermelinger et al., 2008
Prunus grayana Maxim.	Japanese bird cherry	Fatayama, 2007
Prunus mume Sieb. et Zucc	Japanese apricot	Hoebeke and Carter, 2003
Prunus persica Batsch	Japanese peach	Hoebeke and Carter, 2003; Wermelinger et al., 2008; Hua, 2000
Prunus spp.*	Peach,	Bernon, 2004; Leskey, 2010a, 2010b; Wermelinger et al., 2008
Prunus spp.	Ornamental plum, Sour cherry, Black cherry	Bernon, 2004
Pyracantha coccinea M. Roem	Firethorn	Wermelinger et al., 2008
Pyracantha spp.	Firethorn	Bernon, 2004; Hamilton and Shearer, 2003
Pyrus pyifolia Nakai	Japanese pear	Hoebeke and Carter, 2003
Pyrus pyrifolia (Burm. f.) Naki	Asian pear	Nielsen and Hamilton, 2009
Pyrus spp.*	Pear	Bernon, 2004; Nielsen and Hamilton, 2009; Hua, 2000;
Rhamnus spp.	Buckthorn	Bernon, 2004
Rhodotypos scandens (Thunb.) Makino	Jetbead	Bernon, 2004
Rhus spp.	Sumac	Bernon, 2004
Rosa rugosa Thunb.	Rugosa rosea	Bernon, 2004; Nielsen and Hamilton, 2009;
Rosa spp.	Rose	Hamilton, 2009
Rubus spp.*	Raspberry	Bernon, 2004; Hamilton and Shearer, 2003; Wermelinger et al., 2008
Salix spp.	Willow	Bernon, 2004; Wermelinger et al., 2008
Sambucus spp.	Elder	Bernon, 2004
Sicyos angulatus L.	Burcucumber	Bernon, 2004
Solanum nigrum L.	Black nightshade	Hoffman, 1931
Solanum spp.	Nightshade	Bernon, 2004
Solanum spp.*	Tomato	Hamilton, 2009; Leskey, 2010a, 2010b
Sorbus spp.	Mountainash	Bernon, 2004
Spiraea spp.	Spirea	Bernon, 2004
Stewartia pseudocamellia Maxim.		Wermelinger et al., 2008
Symphytum spp.	Comfrey	Bernon, 2004
Syringa spp.	Lilac	Bernon, 2004; Wermelinger et al., 2008

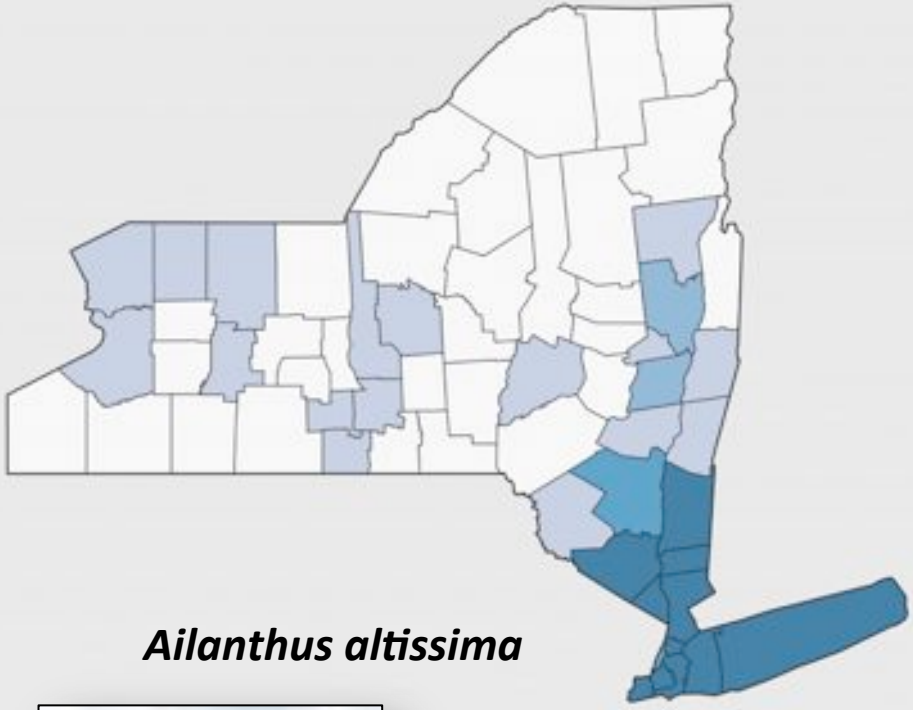
Tree of Heaven: *Ailanthus altissima*

A primary food and reporoductive host plant of brown marmorated stink bug in NY State

Hudson Valley Research Laboratory

Urban Monitoring BMSB: Citizen Scientist Submissions
iMapinvasive: New York Invasive Species Public Map



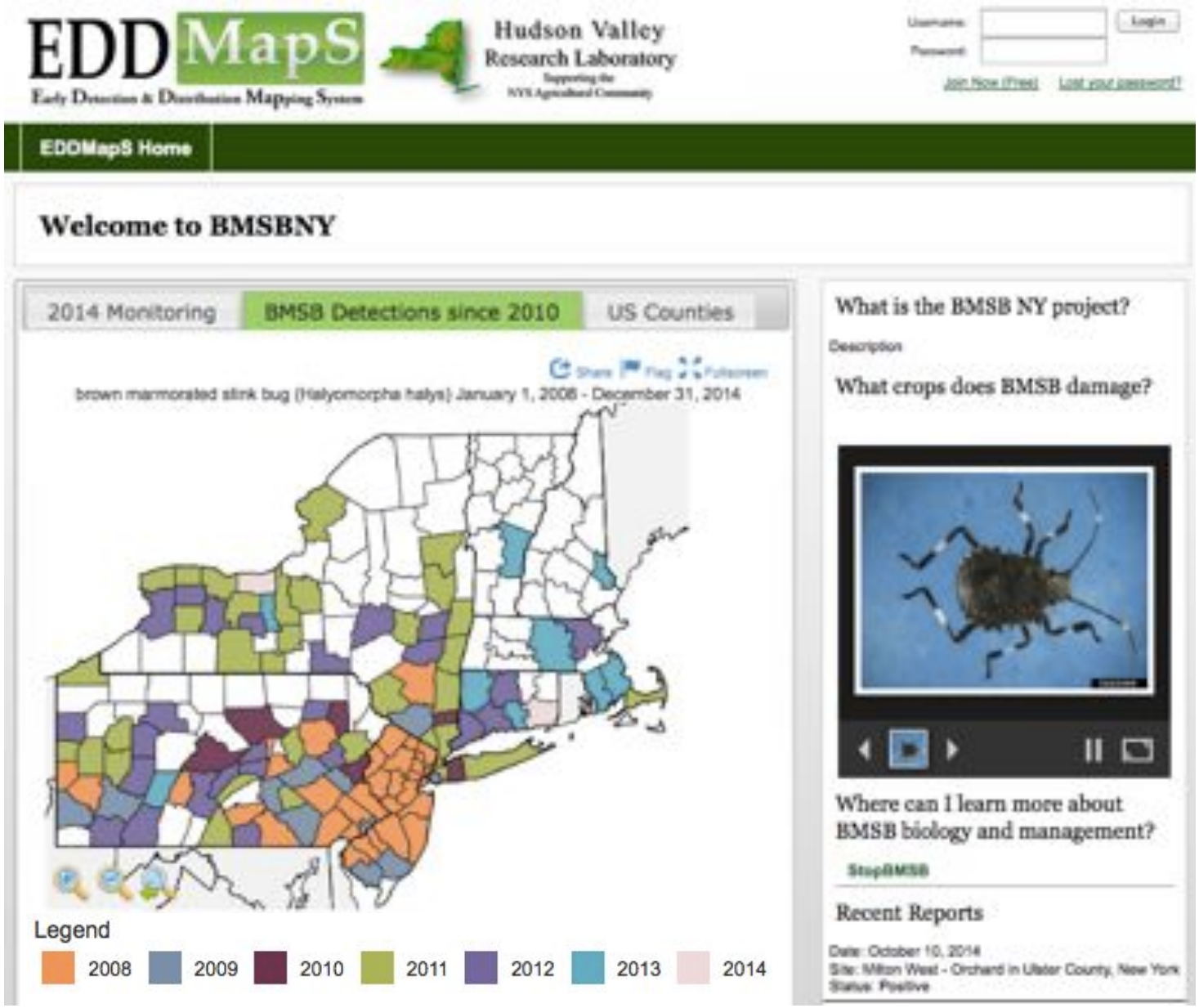


33 NY Counties

http://imapinvasives.org/nyimi/map/

32 NY Counties

Monitoring BMSB in Urban Agricultural Systems
EDDMapS: Early Detection Mapping System for Invasives



State-wide Trap Monitoring of BMSB in NY

USDA #10 Lure & MDT Using Tedders Traps

Vented trap container:

- clip holding 1 #10 & 1 MDT lure

Cone base

Killing strip of Vapona; bungi cord straps

Plywood triangle base painted black

Screened base to **reduce weeds** and provide contrast for crawling SB

NOT placed in the orchard but along decidious woodland

AgBio-inc.com

Trap, lures, kill strip

NYS BMSB Trap Locations: 2014
Tree Fruit, Vegetable / Sweet Corn, Grape

State-wide Trap Monitoring of BMSB in NY
USDA #10 Lure & MDT Using Tedders Traps

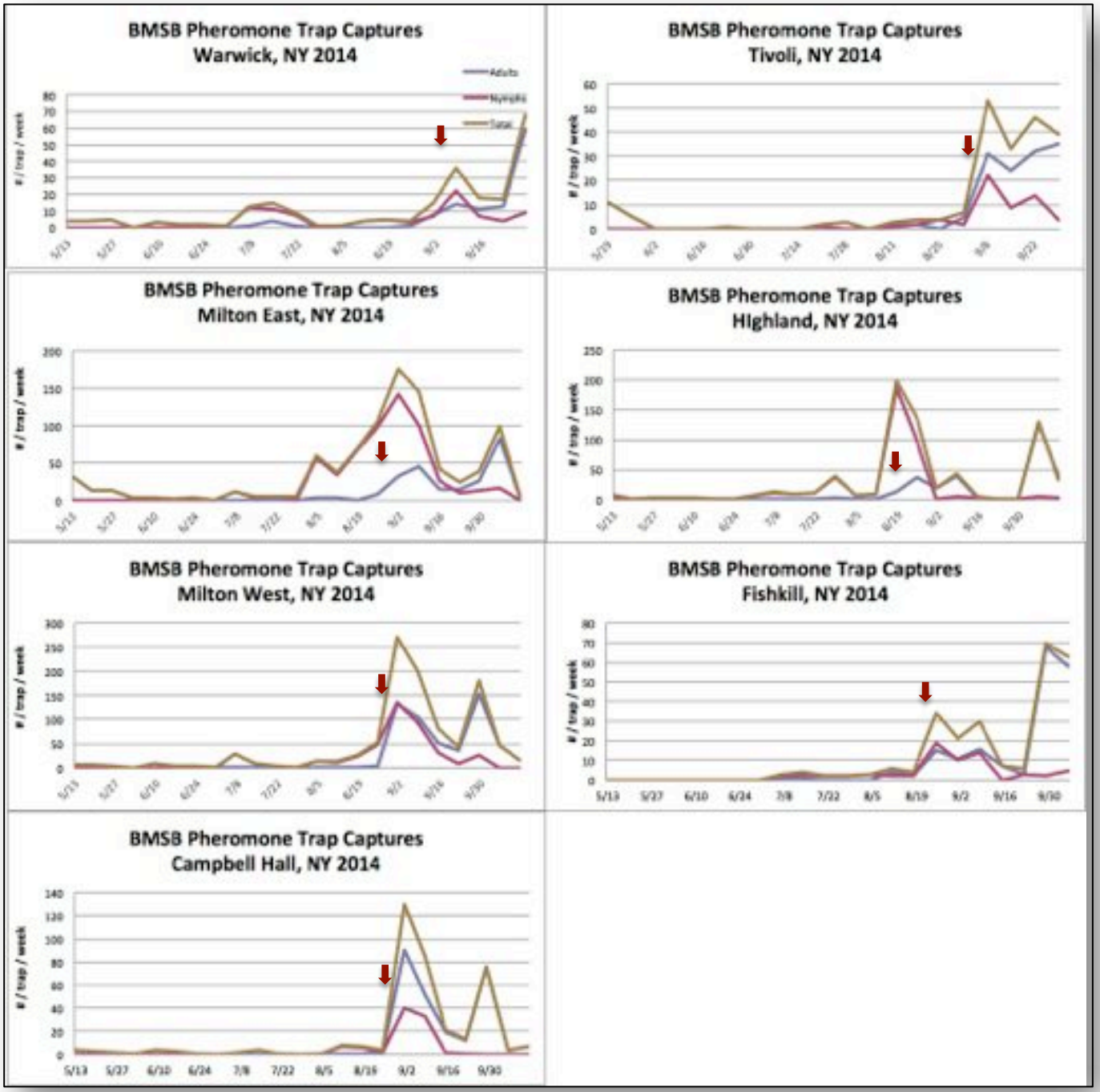
BMSB Trap Site	Lat	Long.	County	Crop
Bellona-Orchard	42.74786	-77.01583	Yates	Apple
Campbell Hall - Orchard	41.42821	-74.23972	Orange	Apple
Chazy-Orchard	44.90238	-73.43094	Clinton	Apple
Columbia-Orchard	42.19387	-73.82546	Columbia	Apple
Cutchogue-Peach Orchard	41.01231	-72.48331	Suffolk	Peach
Fishkill - Orchard	41.51773	-73.82363	Dutchess	Apple
Greenwich-Vegetable	43.0724	-73.5571	Washington	Corn
Hudson Valley Lab - Highland	41.74551	-73.96775	Ulster	Apple
K M Davies Co	43.23571	-77.18898	Wayne	Apple
Kinderhook-Orchard	42.39906	-73.70259	Columbia	Apple
Milton East - Vegetable	41.63812	-73.96396	Ulster	Organic Pepper
Milton West - Orchard	41.65032	-73.9931	Ulster	Apple
Montgomery-Veg	43.00424	-74.32636	Fulton	Bean
Motts	43.23399	-77.17352	Wayne	Apple
Orleans-Orchard	43.2575	-78.23857	Orleans	Apple
Red Jacket-Orchard	42.86137	-77.0256	Ontario	Apple
Rexford-Orchard	42.81575	-73.83824	Saratoga	Apple
Schoharie-Veg	42.75273	-74.45422	Schoharie	Apple
Tivoli - Orchard	42.04537	-73.85442	Dutchess	Apple
Warwick - Orchard	41.23259	-74.3873	Orange	Apple

- 20 Trap Sites in 14 NYS counties

State-wide Trap Monitoring of BMSB in NY
USDA #10 Lure & MDT Using Tedders Traps

BMSB Trap Site	Lat	Long.	County	Crop	BMSB Total
Bellona-Orchard	42.74786	-77.01583	Yates	Apple	**0**
Campbell Hall - Orchard	41.42821	-74.23972	Orange	Apple	370
Chazy-Orchard	44.90238	-73.43094	Clinton	Apple	0
Columbia-Orchard	42.19387	-73.82546	Columbia	Apple	-
Cutchogue-Peach Orchard	41.01231	-72.48331	Suffolk	Peach	8
Fishkill - Orchard	41.51773	-73.82363	Dutchess	Apple	192
Greenwich-Vegetable	43.0724	-73.5571	Washington	Corn	0
Hudson Valley Lab - Highland	41.74551	-73.96775	Ulster	Apple	510
K M Davies Co	43.23571	-77.18898	Wayne	Apple	**3**
Kinderhook-Orchard	42.39906	-73.70259	Columbia	Apple	0
Milton East - Vegetable	41.63812	-73.96396	Ulster	Organic Pepper	800
Milton West - Orchard	41.65032	-73.9931	Ulster	Apple	962
Montgomery-Veg	43.00424	-74.32636	Fulton	Bean	0
Motts	43.23399	-77.17352	Wayne	Apple	**0**
Orleans-Orchard	43.2575	-78.23857	Orleans	Apple	**0**
Red Jacket-Orchard	42.86137	-77.0256	Ontario	Apple	**2**
Rexford-Orchard	42.81575	-73.83824	Saratoga	Apple	0
Schoharie-Veg	42.75273	-74.45422	Schoharie	Apple	0
Tivoli - Orchard	42.04537	-73.85442	Dutchess	Apple	211
Warwick - Orchard	41.23259	-74.3873	Orange	Apple	227

- 20 Trap Sites in 14 NYS counties
- 7 Sites @ Threshold In 3 NY Counties



- 20 Trap Sites in 14 NYS counties

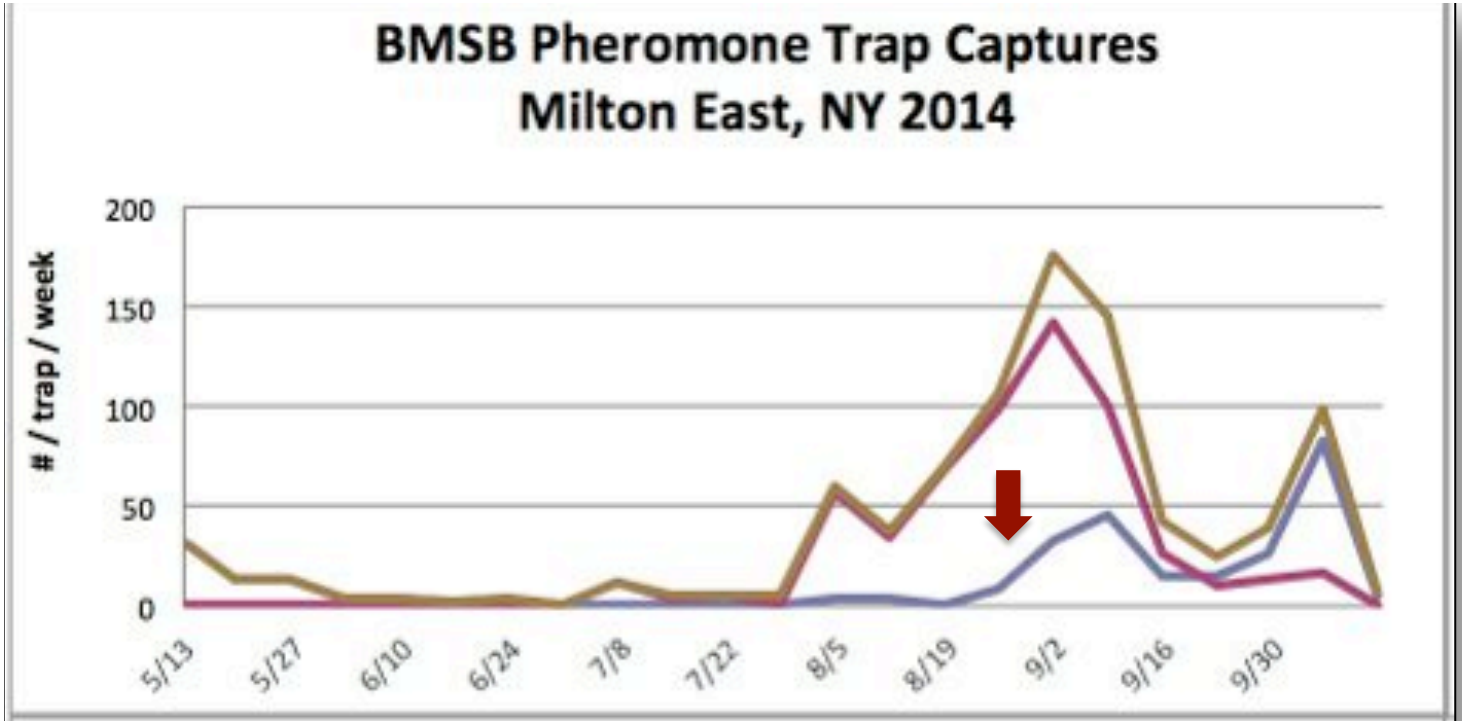
- 7 Sites @ Threshold In 3 NY Counties

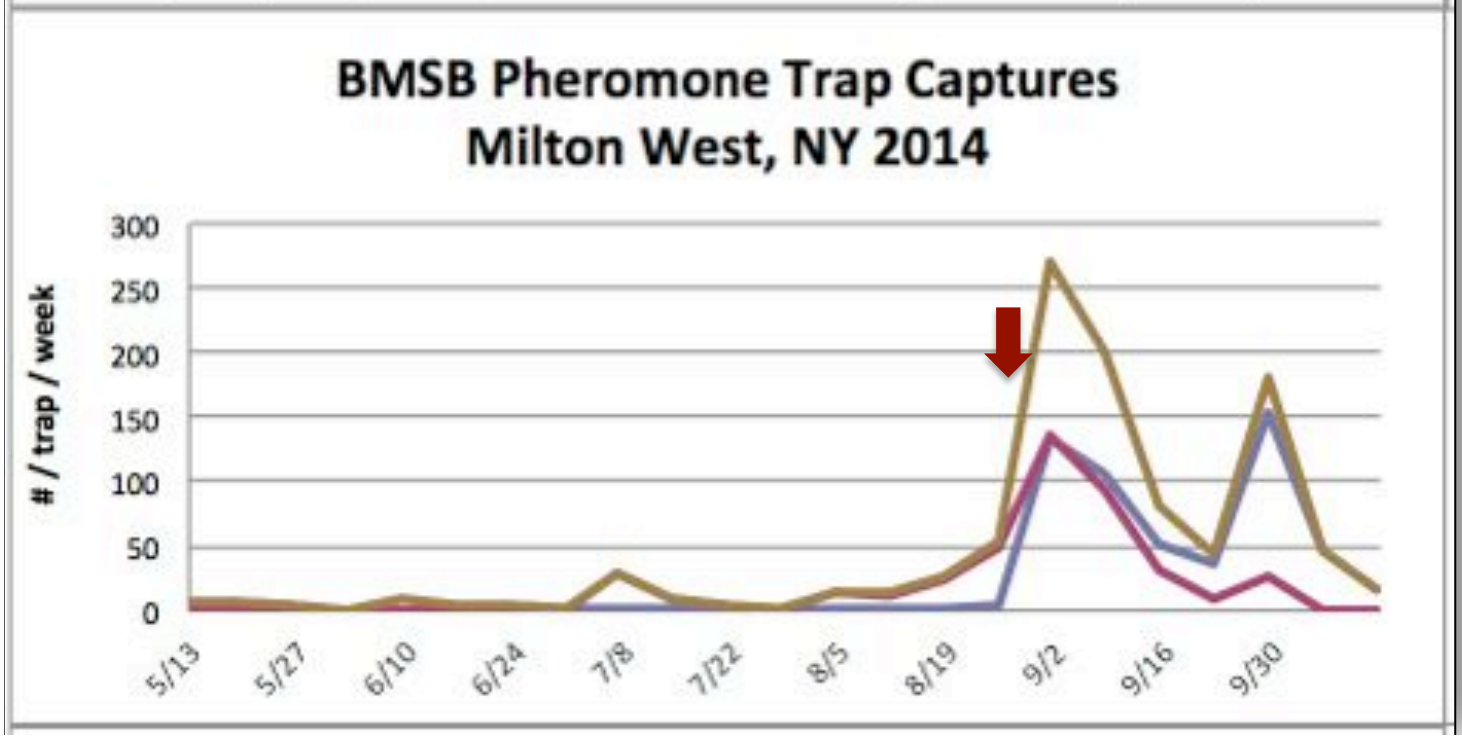
Management

Threshold 10 adult/trap

1st Threshold date ranged from 19 Aug. to 1 Sept.

Maintain coverage until harvest of each variety if traps ≥ 10/wk.





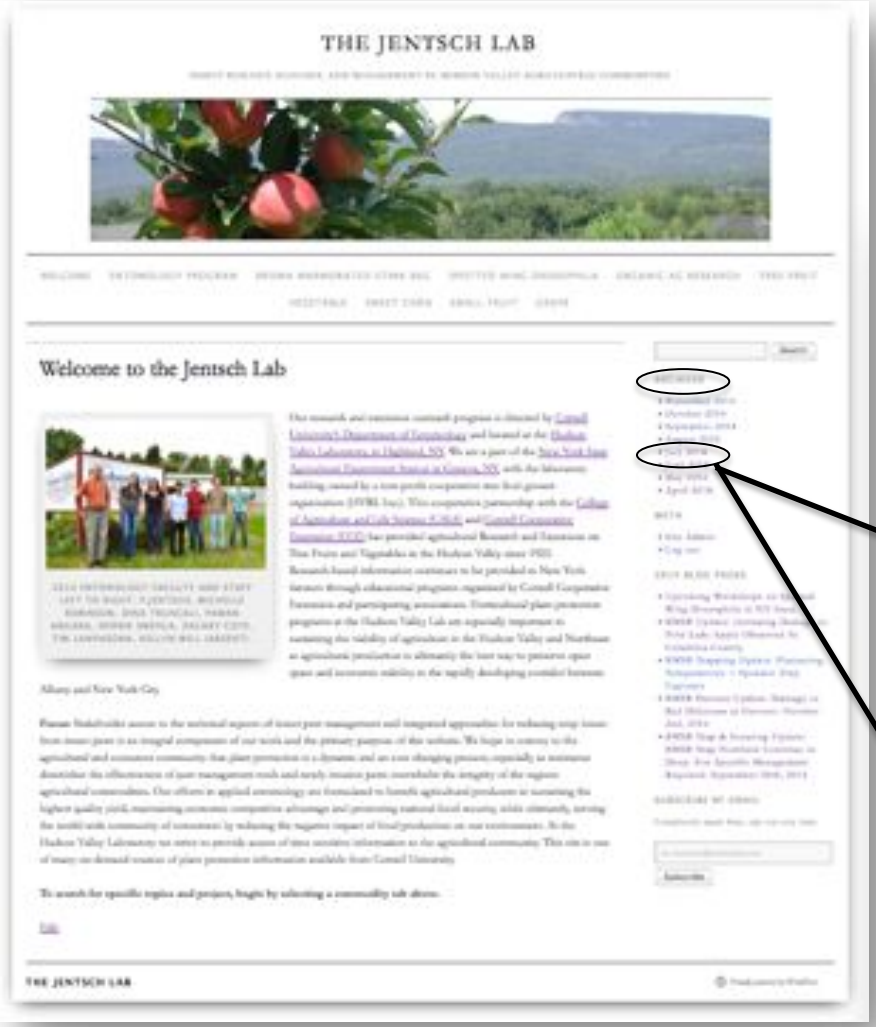
Adult
Nymph
Total

Threshold:
August 20th, 2014

1st application

BMSB Management Threshold: Communication

Jentsch Lab Site: Developed 2014



Insect Alerts & Recommendations
(E-mail Subscription)

BMSB Management Threshold: Communication

Jentsch Lab Site: Developed 2014

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ex: someone@mydomain.com

Subscribe

http://blogs.cornell.edu/jentsch/

BMSB Management Threshold: Communication

Timely Pest Management Updates

- Information to growers 'today'
  - Insect pest updates in tree fruit, veg, grape and small fruit
  - BMSB Biology
  - Trapping summary & Trends
  - Management Recommendation
  - Insecticide Efficacy Charts
  - Mapping

BMSB Management Threshold: Communication

Brown Marmorated Stink Bug: August 15th Update

by PJJ5@CORNELL.EDU posted on AUGUST 16, 2014

Brown Marmorated Stink Bug (BMSB) numbers last week show continued increase of late instar nymph movement to pheromone baited Tedders traps. The late start to the season may have pushed forward the emergence of the

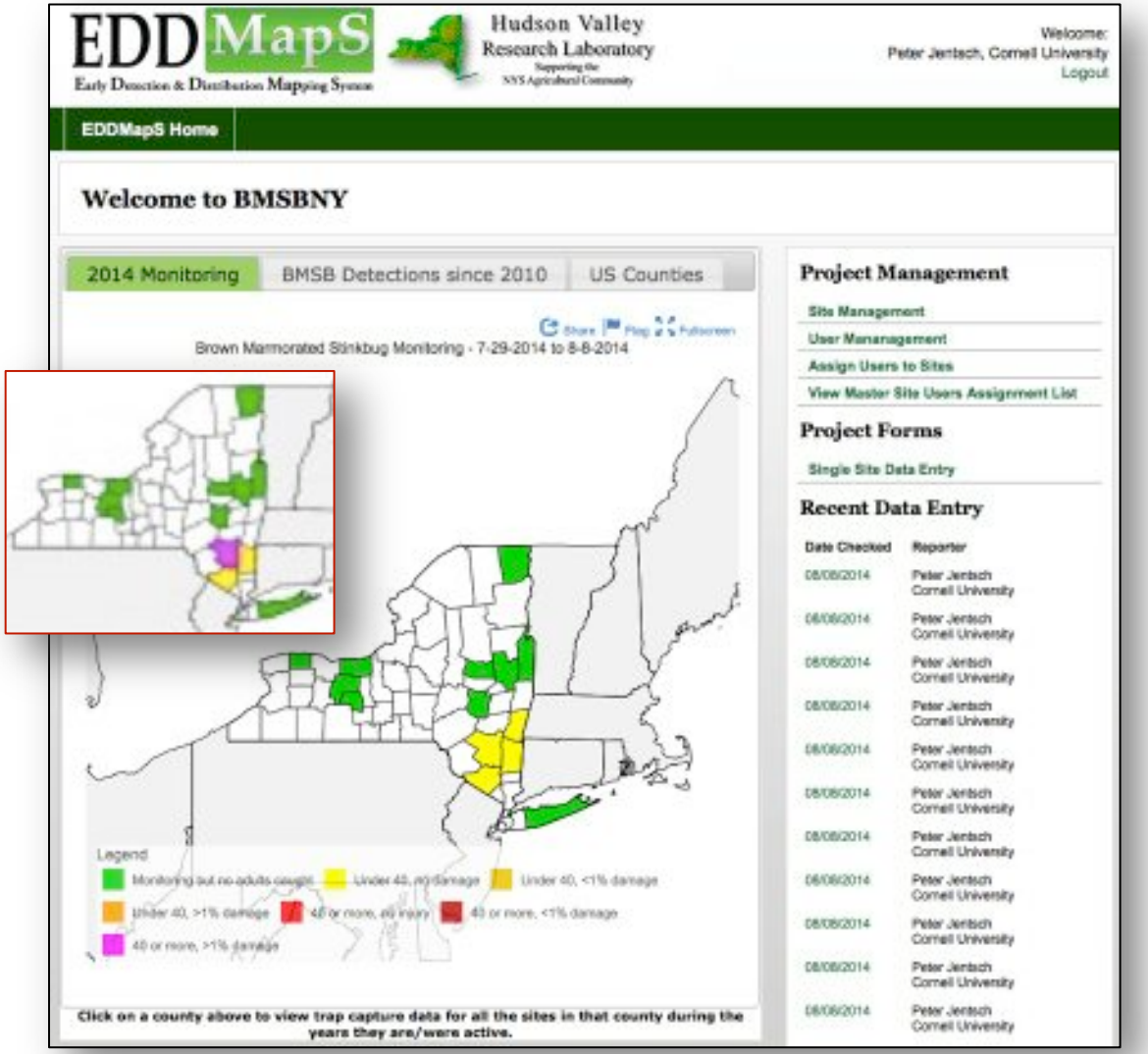
BMSB Update: August 20. Confirmed Late Season Feeding to Apple, Peach and Pepper

by PJJ5@CORNELL.EDU posted on AUGUST 20, 2014

Extensive damage from BMSB Observed On Peach in Highland, NY: August 25th

by PJJ5@CORNELL.EDU posted on AUGUST 25, 2014

BMSB Management Threshold: Communication



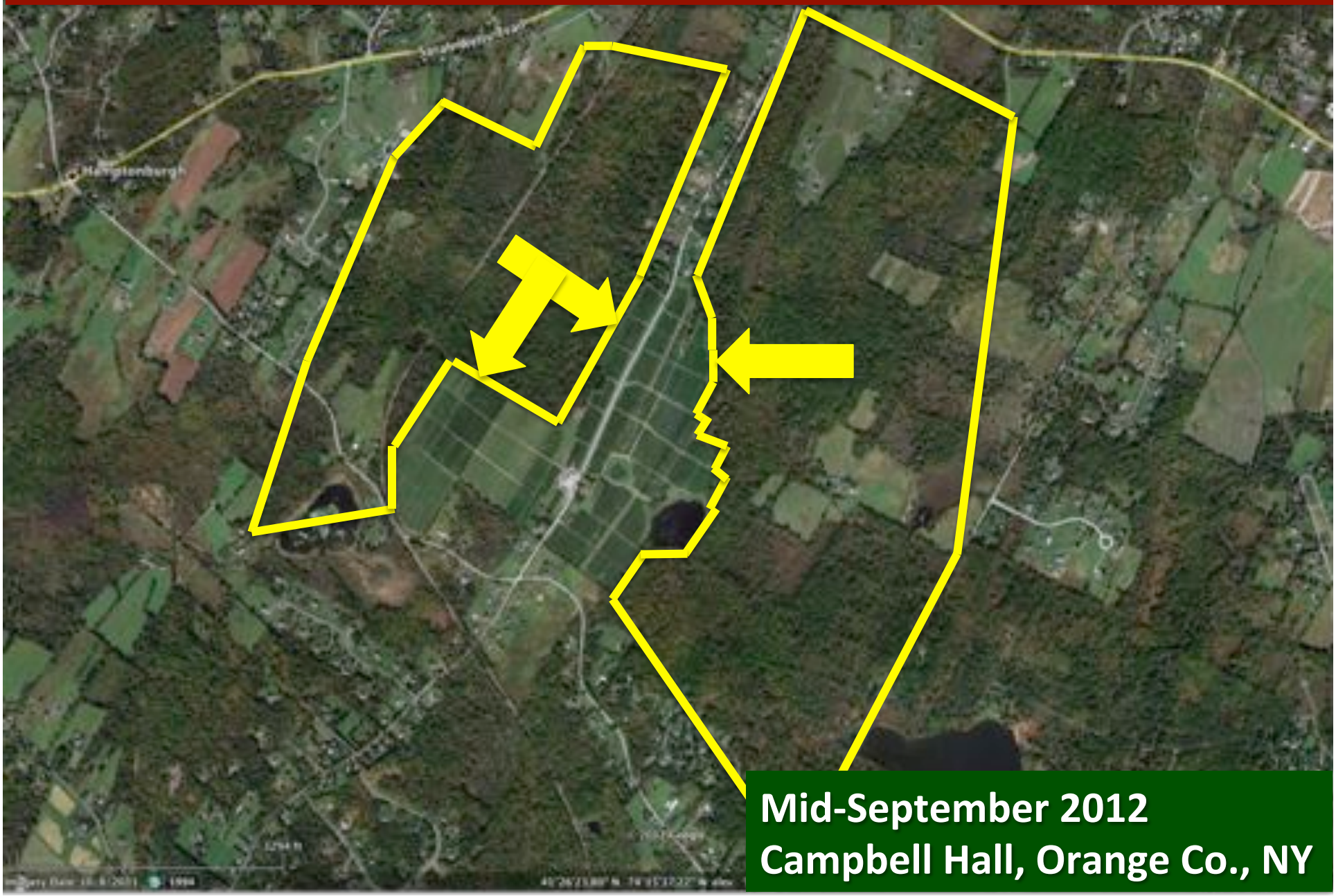
Partnered with EEDMaps to extend outreach

- Early Detection & Distribution Mapping of Invasive Insects
- Provide regional and nation invasive species tracking
- Provide customized data outputs for threshold development

By County: Weekly update
Trap data per county
Presence in degrees of risk
Threshold levels

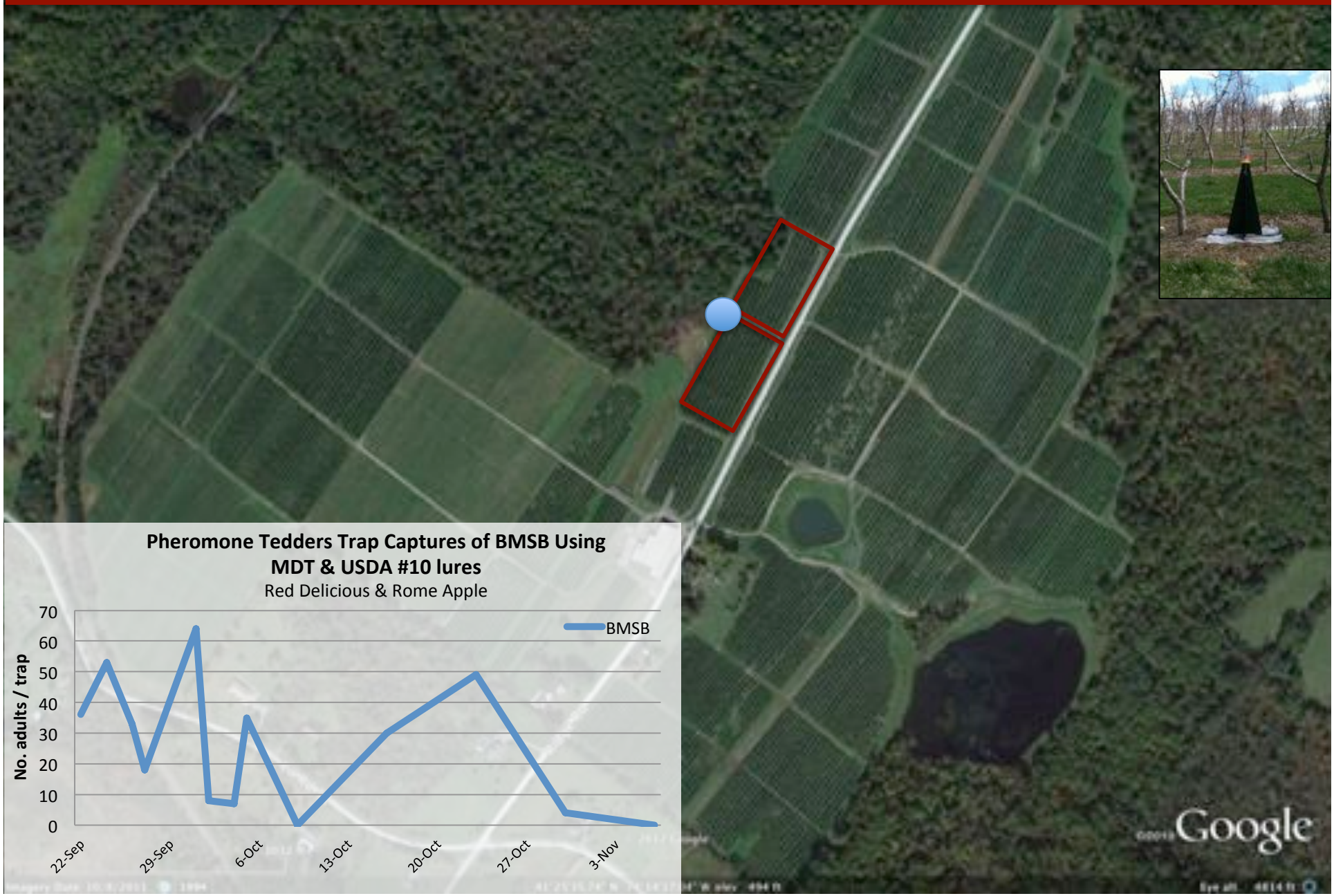
BMSB Management: Migration to Orchard

BMSB Management: Migration from Deciduous Trees



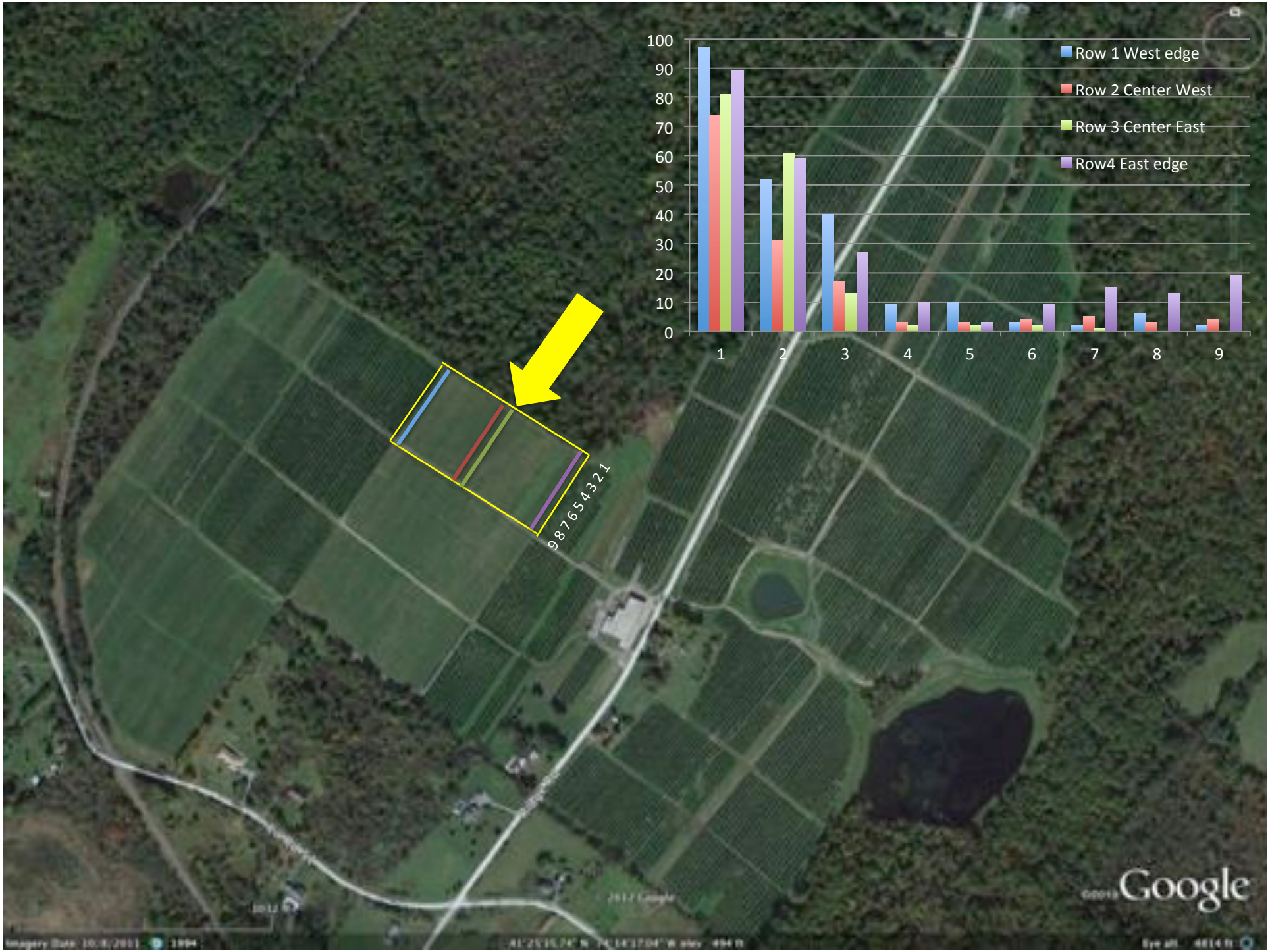

Scouting Observation
Mid-September 2012
Campbell Hall, Orange Co., NY

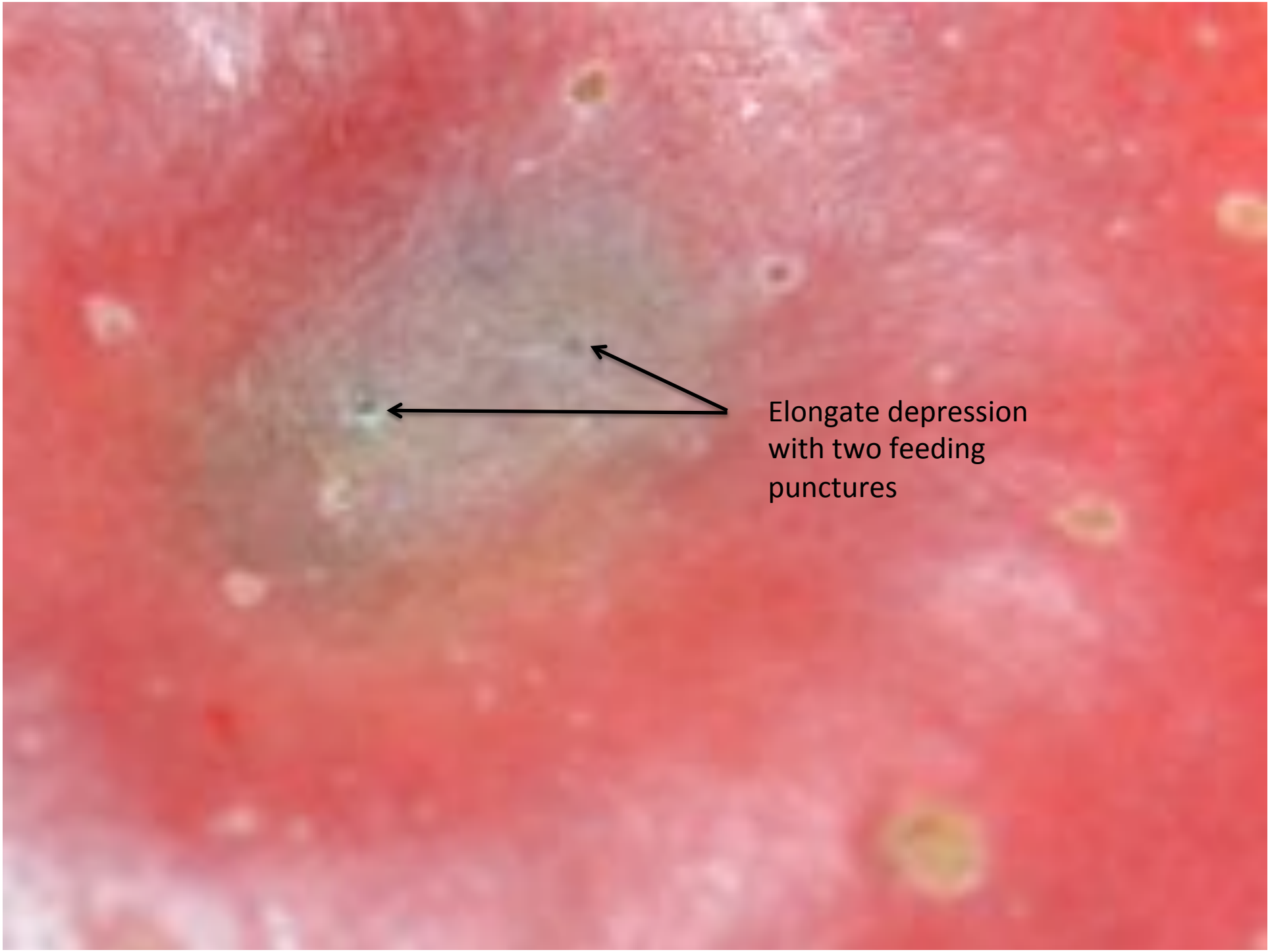
BMSB Management: Monitoring



Evaluation of var. 'Pink Lady'

- Trees @ 3' x 12' spacing
- 10 fruit / tree = 100 fruit /30'
- Wooded edge toward the interior
- 9 sections; 240' row


100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
Row 1 West edge
Row 2 Center West
Row 3 Center East
Row4 East edge
987654321
Google


Elongate depression
with two feeding
punctures

Degrees of stink bug feeding injury and corking beneath the skin.

Bitter Pit

Stink Bug Injury


Bitter Pit
CORNELL'S
Hudson Valley
LABORATORY


Bitter Pit


Bitter Pit


Hail Injury

BMSB Management: Insecticide Control

- Employ traps determine presence of BMSB on the farm
- **AND scout** to determine presence of BMSB in crop
- Use 1 adult / 100' of crop edge as *treatment threshold* **and or** 10 adults / trap using #10 plus MDT
- Applications will be needed upon reaching *weekly treatment threshold (reset trap and scouting observations to 0 after Trmt.)*
- **Employ the most effective insecticide available**
  - 1st application: perimeter tree row applications
  - 2nd application: alternate row middle
  - 3rd application: Whole orchard
  - Repeat
- **Maintain coverage through to harvest if populations are present as late varieties increase in risk as crop diminishes.**

BMSB Management: Insecticide Control

Product	Active Ingredient	Rate / A	REI Hrs.	PHI Days	Efficacy (USDA)	Max. per crop / season	App. Interval
Actara 25WDG	Thiamethoxam	2.0-5.5 oz/A	12	35	+++	16.5 oz./A (0.258 lb. a.i./A)	10d
Asana XL 0.66EC	Esfenvalerate	4.8-14.5 fl oz/A	12	21	++	101 fl oz/A (0.525 lb AI/A).	NA
Baythroid XL 1EC	Beta-Cyfluthrin	1.4-2.8 fl oz/A	12	7	++	2.8 fl oz/A (0.022 lb AI/A).	14d
Bifenture EC	Bifenthrin	5.2-12.8 fl oz/A	12	14	++++	32 fl ozs (0.50 lbs ai)	30d
Bifenture 10DF	Bifenthrin	12.8-32.0 oz/A	12	14	++++	80 ozs (0.50 lbs ai)	30d
Brigade WSB	Bifenthrin	12.8-32.0 oz/A	12	14	++++	80 ozs (0.50 lbs ai)	30d
Danitol 2.4EC	Fenpropathrin	10.66-21.33 fl oz/A	24	14	+++	42.56 fl ozs (0.80 lbs ai)	10d
Endigo ZC	Thiamethoxam / Lambda-cyhalothrin	5-6 fl fl oz/A	24	35	++++	19 fl oz./A (0.172 lb ai) NY	10d
Lannate 2.4LV*	Methomyl	2.25 pt/A	72	14	++++	240 ozs (0.50 lbs ai)	7d
Lannate 90SP*	Methomyl	8-16 oz/A	72	14	++++	5.0 lbs	7d
Leverage 360	Beta-Cyfluthrin / Imidacloprid	2.4-2.8 fl oz/A	12	7	+++	2.8 fl oz/A	14d
Surround 95WP	Kaolin	25-50 lb/A	4	0	+	NA	0d
Thionex 50WP	Endosulfan	Max. 5 lb/A	20 days	21	++++	6.0 lbs	NA
Thionex EC	Endosulfan	1.33-2.67 qts./A	7 days	21	++++	2-2/3 qts (2.0 lbs ai)	NA
Voliam Xpress EC	Chlorantraniliprole / Lambda-cyhalothrin	6-12 fl oz/A	24	21	+++	31.0 fl oz/A	10d
Vydate 2L*	Oxamyl	4-8 pt/A	48	14	++	281 fl oz/A (128 oz AI/A).	7d
Warrior 1CS	Lambda-cyhalothrin	2.56-5.12 fl oz/A	24	21	++	20.48 fl. oz. (0.28 lb. a.i.)**	5d
Warrior II 2.08CS	Lambda-cyhalothrin	1.28-2.56 fl oz/A	24	21	++	10.24 fl. oz. (0.28 lb. a.i.)**	5d

* Although these materials have excellent topical ratings in lab bioassay studies, field efficacy studies have shown economic fruit injury from BMSB feeding, suggesting low residual levels.

** Post bloom applications

(+) low to (++++) high efficacy

http://blogs.cornell.edu/jentsch/

- BMSB Resources page

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Leverage 360	Beta-Cyfluthrin / Imidacloprid	2.4-2.8 fl oz/A	12	7	+++	2.8 fl oz/A	14d
Surround 95WP	Kaolin	25-50 lb/A	4	0	+	NA	0d
Thionex 50WP	Endosulfan	Max. 5 lb/A	20 days	21	++++	6.0 lbs	NA
Thionex EC	Endosulfan	1.33-2.67 qts./A	7 days	21	++++	2-2/3 qts (2.0 lbs ai)	NA
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* Although these materials have excellent topical ratings in lab bioassay studies, field efficacy studies have shown economic fruit injury from BMSB feeding, suggesting low residual levels.

** Post bloom applications

(+) low to (++++) high efficacy

Scorpian & Venom (dinoteferan; neonic) labeled in MA ****

http://blogs.cornell.edu/jentsch/

- BMSB Resources page

BMSB Management: Insecticide Control

BMSB Field-Based Residual Trials
Lethality Indices

Trial	Chemical	0 DAT	3(4)* DAT	7 DAT	Code
1*	Actara (24 h)	91.0	38.5	40.8	O, E, r
1	Actara (4.5 h)	54.2	25.6	6.7	O, e, r
1	Control (24 h)	20.0	15.8	26.7	O, E, r
1	Control (4.5 h)	18.3	35.7	13.4	O, e, r
1	Lannate SP (24 h)	96.9	23.9	22.3	O, E, r
1	Lannate SP (4.5 h)	45.8	26.7	7.1	O, e, r

O = Overwintering Adult BMSB more susceptible

BMSB Management: Insecticide Control

Trial	Chemical	0 DAT	3(4)* DAT	7 DAT	Code
1*	Actara (24 h)	91.0	38.5	40.8	O, E, r
1	Actara (4.5 h)	54.2	25.6	6.7	O, e, r
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1	Lannate SP (24 h)	96.9	23.9	22.3	O, E, r
1	Lannate SP (4.5 h)	45.8	26.7	7.1	O, e, r
2	Actara	21.9	14.8	0.5	N, E, r
2	Brigade	88.8	27.7	14.6	N, E, r
2	Control	0	3.3	0	N, E, r
2	Endigo	64.8	19.8	12.5	N, E, r
2	Lannate SP	40.6	0.8	0	N, E, r
2	Scorpion	76.6	9.8	23.8	N, E, r
2	Warrior II	29.2	5.4	0	N, E, r
3	Belay	62.3	6.9	5.4	N, E, R
3	Brigadier	90.6	11.0	6.7	N, E, R
3	Control	0	0	0.8	N, E, R
3	Danitol	29.0	5.8	0	N, E, R
3	Malathion	59.6	0.8	0.8	N, E, R
3	Thionex 50W	89.2	2.5	0	N, E, R
3	Thionex EC	94.0	5.6	17.7	N, E, R
3	Tombstone	14.6	0.8	0	N, E, R

N = 1st and 2nd Gen Adult BMSB much less susceptible

BMSB Field-Based Residual Trials
Lethality Indices

Trial	Chemical	0 DAT	3(4)* DAT	7 DAT	Code
1*	Actara (24 h)	91.0	38.5	40.8	O, E, r
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2	Warrior II	29.2	5.4	0	N, E, r
3	Belay	62.3	6.9	5.4	N, E, R
3	Brigadier	90.6	11.0	6.7	N, E, R
3	Control	0	0	0.8	N, E, R
3	Danitol	29.0	5.8	0	N, E, R
3	Malathion	59.6	0.8	0.8	N, E, R
3	Thionex 50W	89.2	2.5	0	N, E, R
3	Thionex EC	94.0	5.6	17.7	N, E, R
3	Tombstone	14.6	0.8	0	N, E, R

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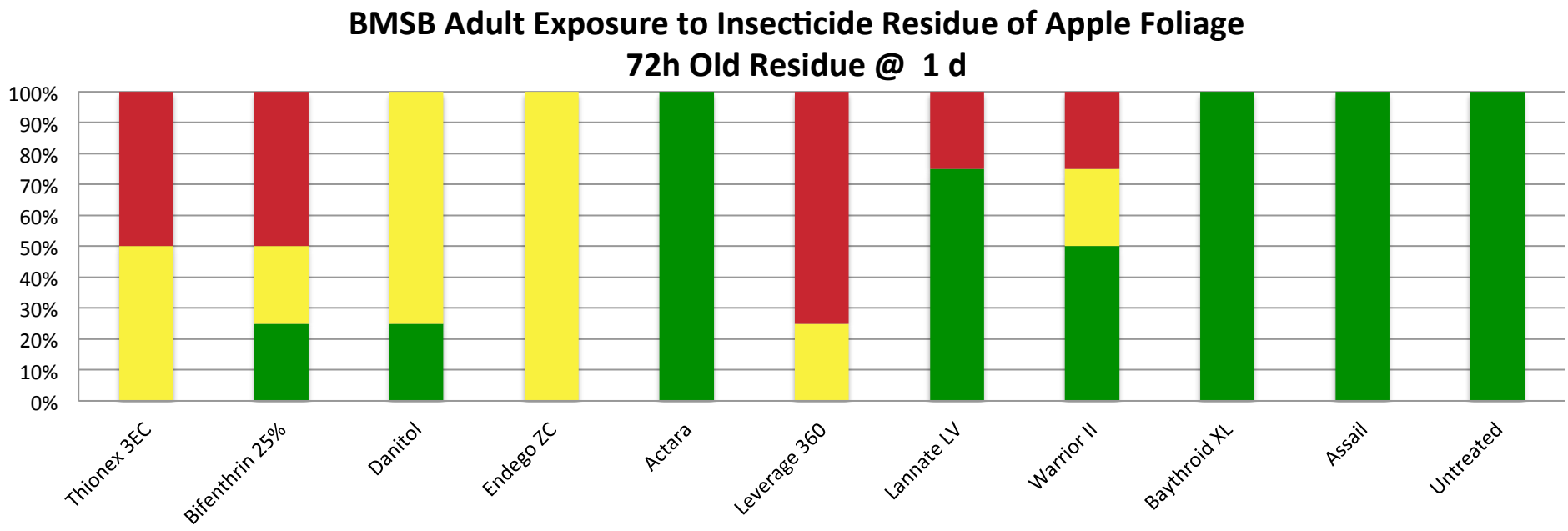
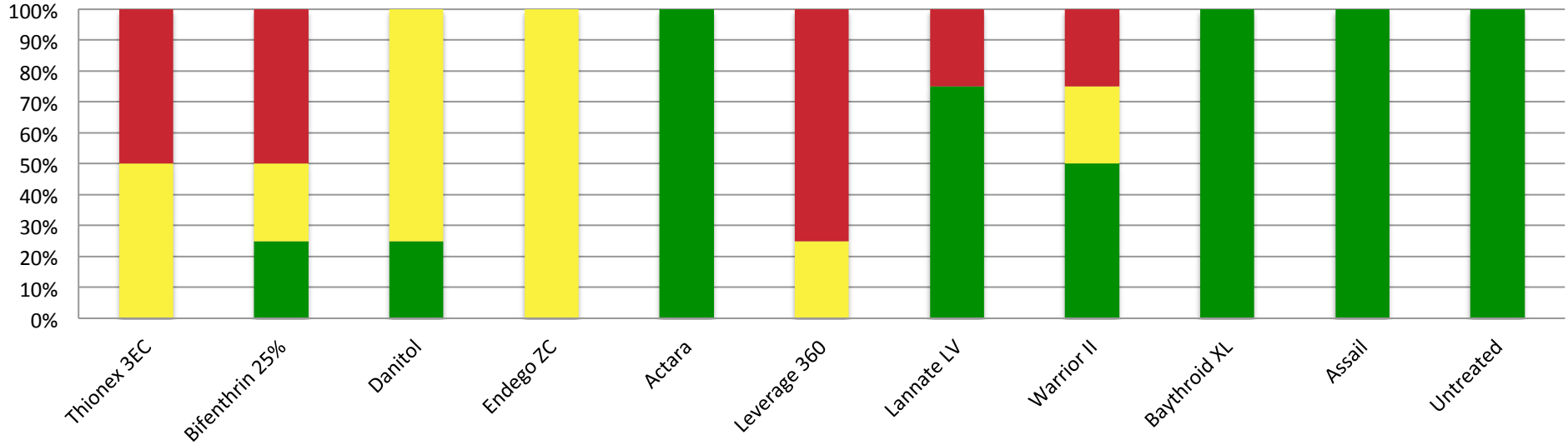
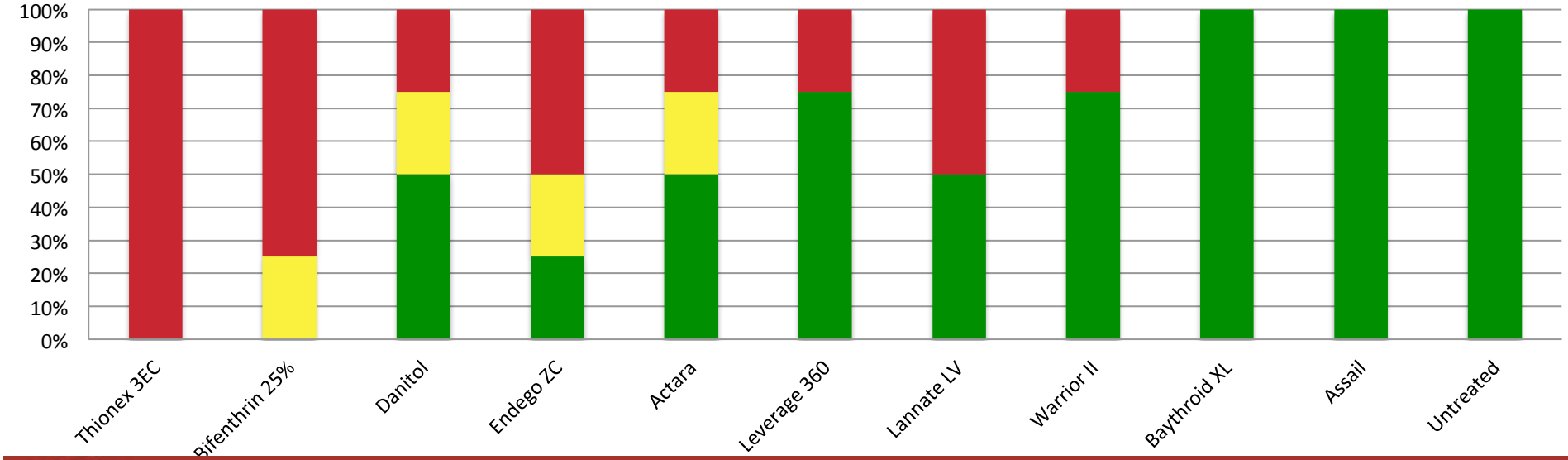

BMSB Adult Exposure to Insecticide Residue of Apple Foliage
72h Old Residue @ 1 d
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Thionex 3EC
Bifenthrin 25%
Danitol
Endego ZC
Actara
Leverage 360
Lannate LV
Warrior II
Baythroid XL
Assail
Untreated

BMSB Adult Exposure to Insecticide Residue of Apple Foliage
72h Old Residue @ 1 d



BMSB Adult Exposure to Insecticide Residue of Apple Foliage
72h Old Residue @ 3 d



Brown Marmorated Stink Bug: Conclusion

- Brown Marmorated Stink Bug in low urban populations have not caused significant or economic agricultural injury

- However, BMSB observed in low numbers in Ag crops (tree fruit, pepper and tomato) have caused economic injury.

- Identification of the stink bug is critical in management

- Traps are necessary to determine presence prior to economic injury as scouting alone is ineffective

- Perimeter applications to the crop are effective in reducing BMSB damage

- Maintain insecticide residue if traps are above threshold AND observed in trees

Thanks to the staff at the HVL for all their support:

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PT Summer Intern ..... Pawan Angara
Farm Manager ..... Albert Woelfersheim
Administrative Assistant ..... Donna Clark
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