

Bulb mite, *Rhizoglyphus robini* Claparede (Astigmata: Acaridae), in Hudson Valley Onion.



**2014 Onion School
Middletown, NY**

Peter Jentsch
Senior Extension Associate



THE JENTSCH LAB

INSECT BIOLOGY, ECOLOGY, AND MANAGEMENT IN HUDSON VALLEY AGRICULTURAL COMMODITIES OF NY



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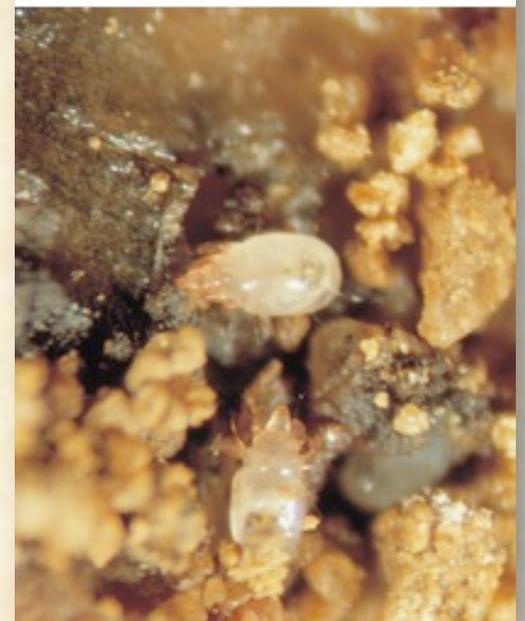
Onion Bulb Mite

- Its wide host range includes **onion, garlic**, lily, gladiolus, cereals and many other crops. It also feeds on organic matter in the soil.
- The first published record of *R. robini* as a pest of onion in the United States dates back to 1955, when it was briefly reported as a pest of commercial onion in New York.
- Since 1995, it has recurred sporadically in that state and has caused significant degrees of economic damage.



Onion Bulb Mite

- Most damage caused by bulb mite occurs at the **roots** and in the basal plate.
- Onion bulb mites have been found in **pockets within the growing bulb** tissue of otherwise healthy plants.



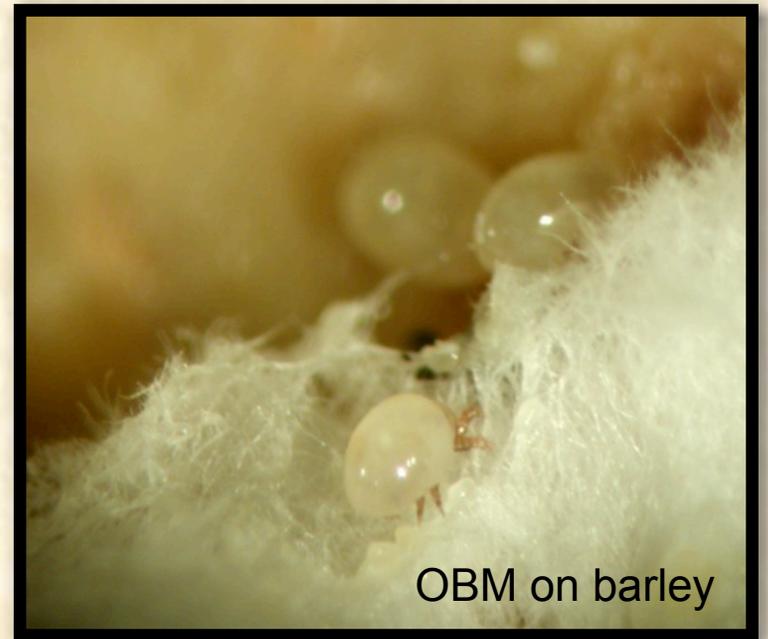
Onion Bulb Mite

- The above-ground symptoms of damage are quite similar to those of onion maggot, **most serious to seedling onions.**
- Heavily damaged plants eventually lose their roots and topple.



Onion Bulb Mite

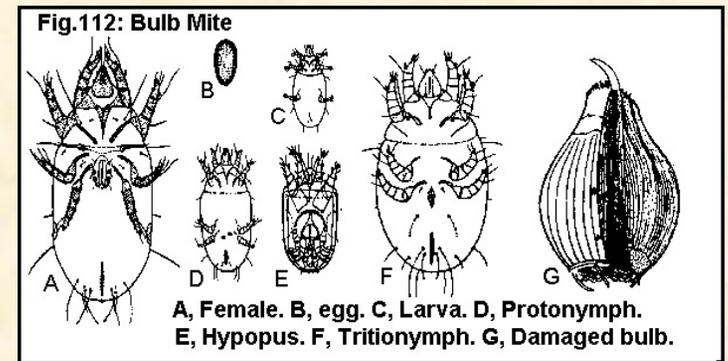
- Damage is also manifest in **infection** from bacterial and fungal pathogens that may enter through **mite-created wounds**.
- The bulb mite is extremely well adapted to its soil habitat: it prefers to feed on fresh tissue, but can **survive on many organic materials including dead plants, dead insects and manure**;
- It can survive up to five weeks submerged under water; **escapes drought and extreme cold by moving deeper into the soil**.



OBM on barley

Onion Bulb Mite

- The second nymphal stage, or hypopus, may use its specialized sucker plate to attach itself to flying and crawling animals or to equipment, and thus be **dispersed to new locations.**
- **Populations of the bulb mite can increase rapidly**
- Females can live up to 40 days and produce 700 eggs;
- A generation can be completed in approximately 4 weeks, producing **multiple generations leading to a high resistance potential**



Predatory Mite: *Gaeolaelaps aculeifer*



Onion Bulb Mite: HVL Studies

- **Overwinters in the soil with all three life stages (adult, egg & nymph) found throughout the year.**
- **Very abundant OW on volunteer field onion and cull piles**



OBM on volunteer onion



OBM on volunteer onion

Onion Bulb Mite: HVL Studies

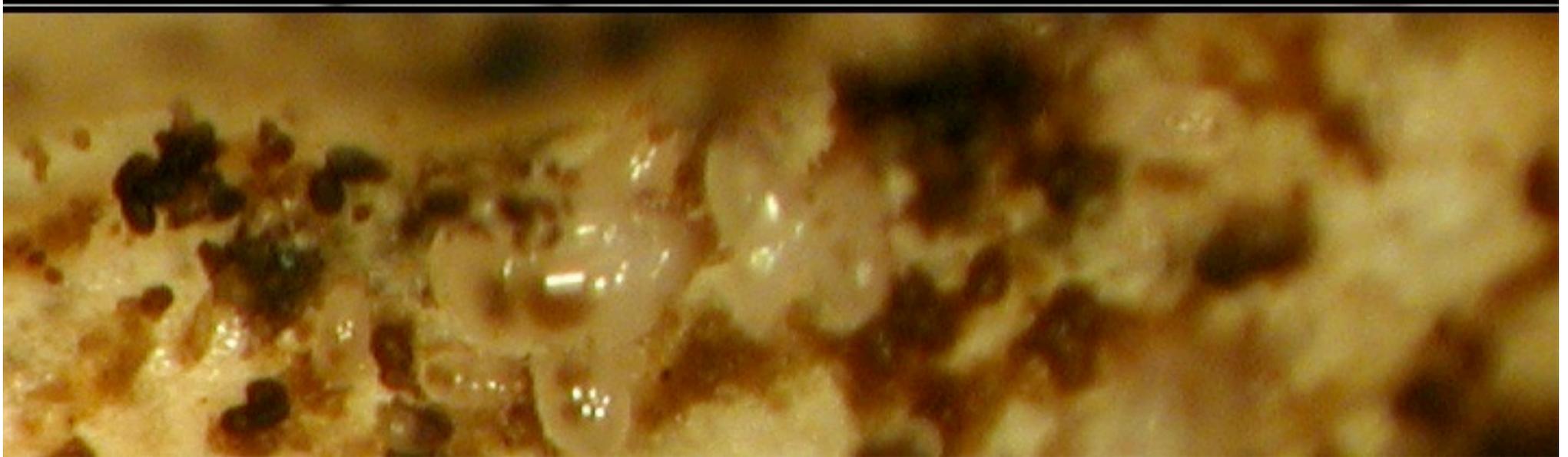
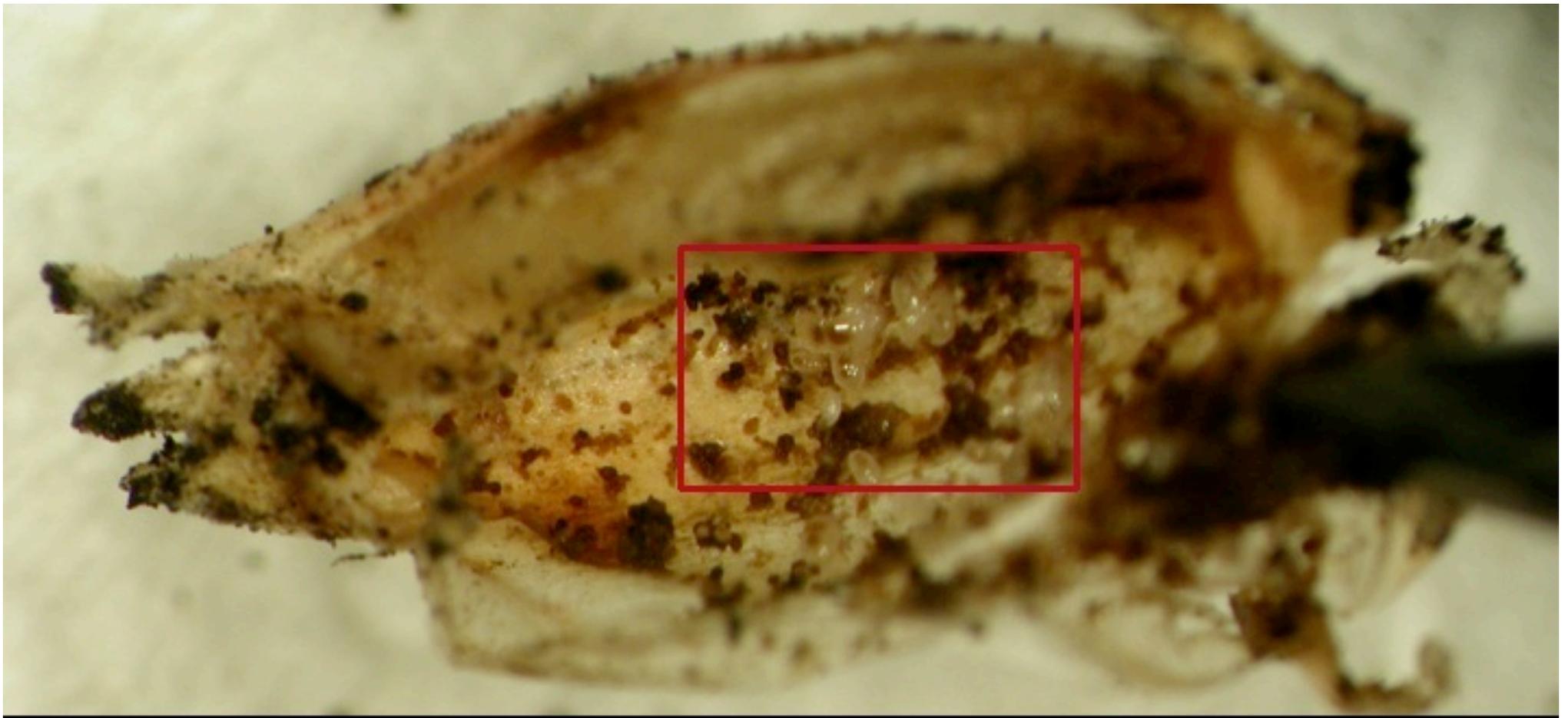
- Found in cover crop seed coat (barley) feeding on fungi.
- Can maintain OW populations on barley cover crops.



OBM on barley

Hull and Naked Barley Seed Cover Crop





Plumule withdrawn from
between cotyledons by
epicototyl

Epicotyl elongates

Testa splits Cotyledon

Radicle
emerges



a) 2nd day
after soaking

b) 5th day

c) 7th day

d) 9th day

Naked Barley

Hulled Barley



Treated

Treated



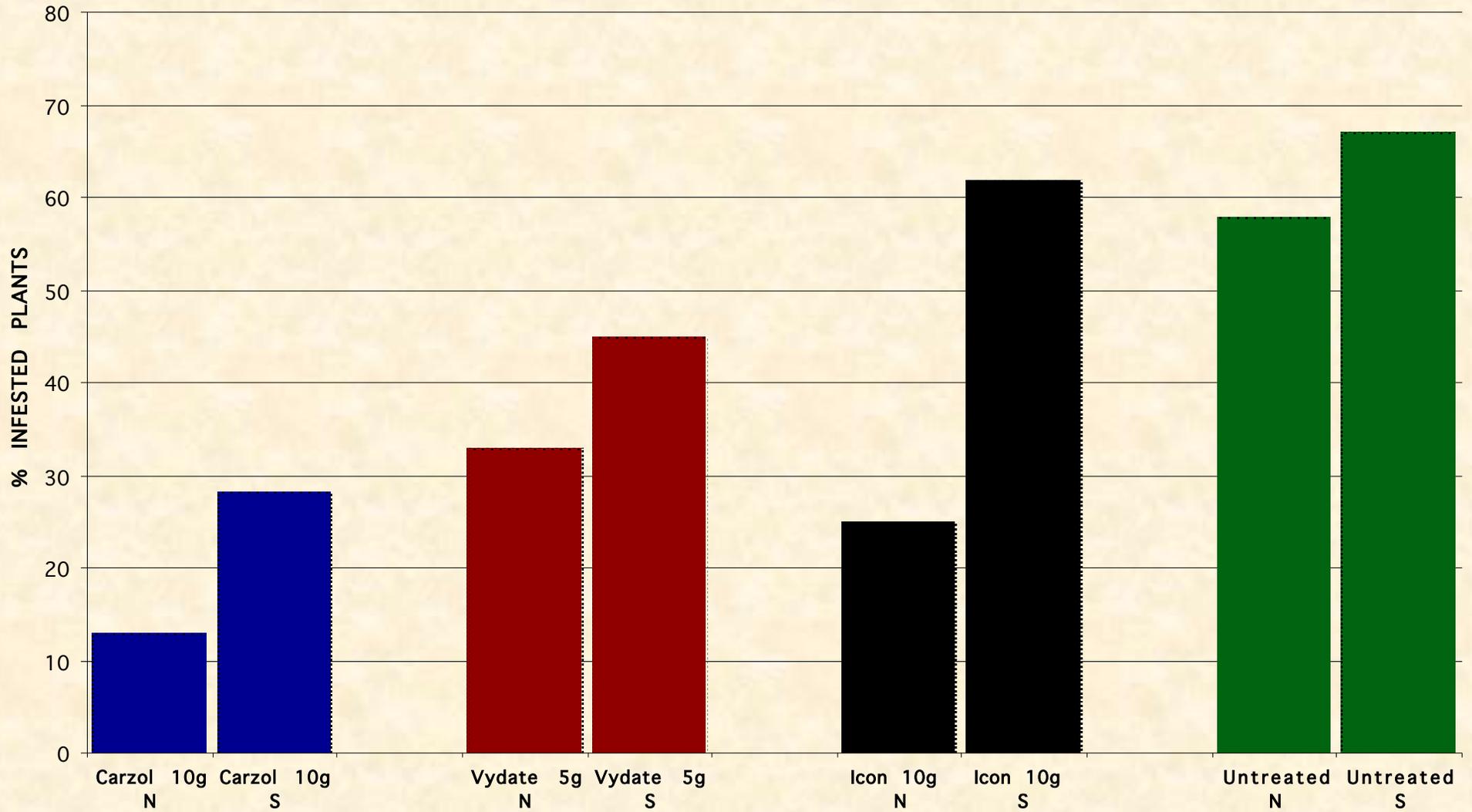
Untreated

Untreated

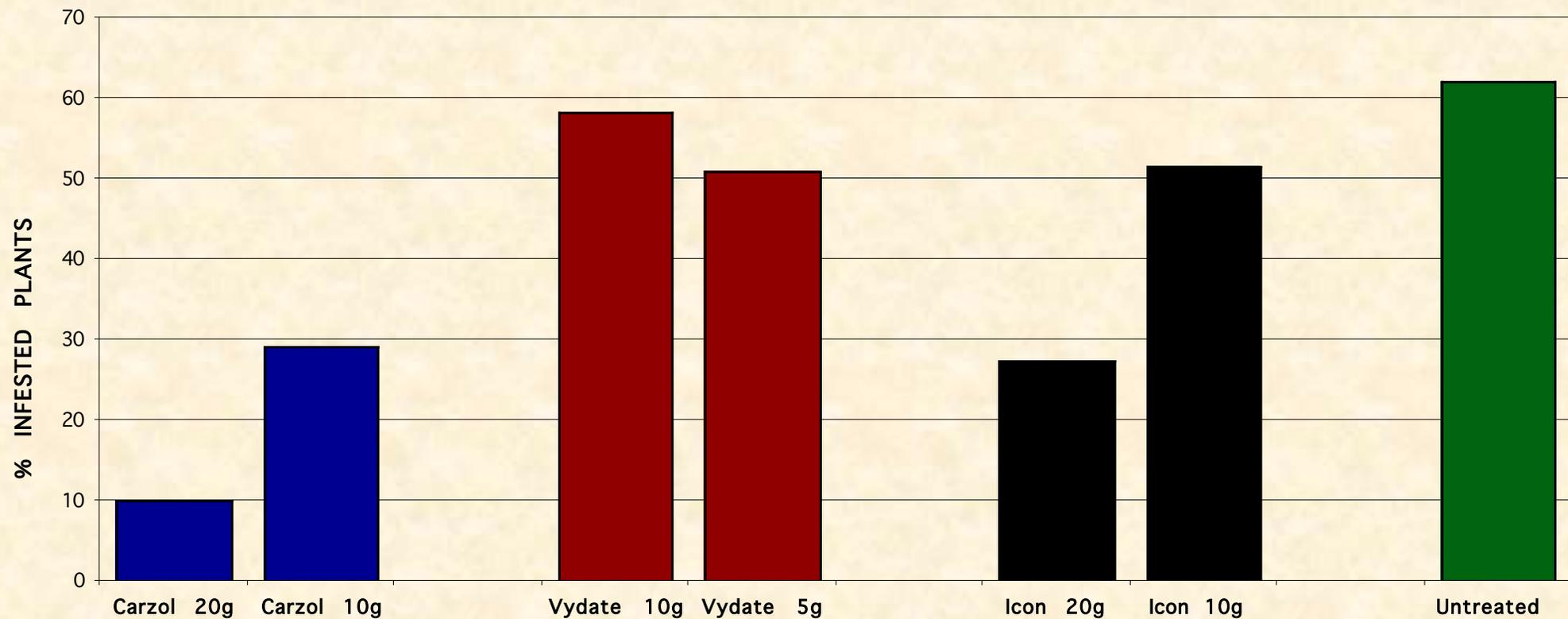
**Efficacy Against Bulb Mite of Seed Treatments on Standard and Naked Barley Planted as a Winter Cover Crop
Pine Island NY – September, 2002.**

Treatment/Rate	% infested plants (n=60)	
	9/30	10/8
UNTR, Naked	58.3	45.0
Standard	66.7	78.3
Carzol Naked @ 10g	13.3	-
Naked @ 20g	13.3	6.7
Stand. @ 10g	28.3	30.0
Vydate Naked @ 5g	33.3	-
Naked @ 10g	63.3	53.3
Stand. @ 5g	45.0	56.7
Icon Naked @ 10g	25.0	-
Naked @ 20g	35.0	20.0
Stand. @ 10g	61.7	35.0

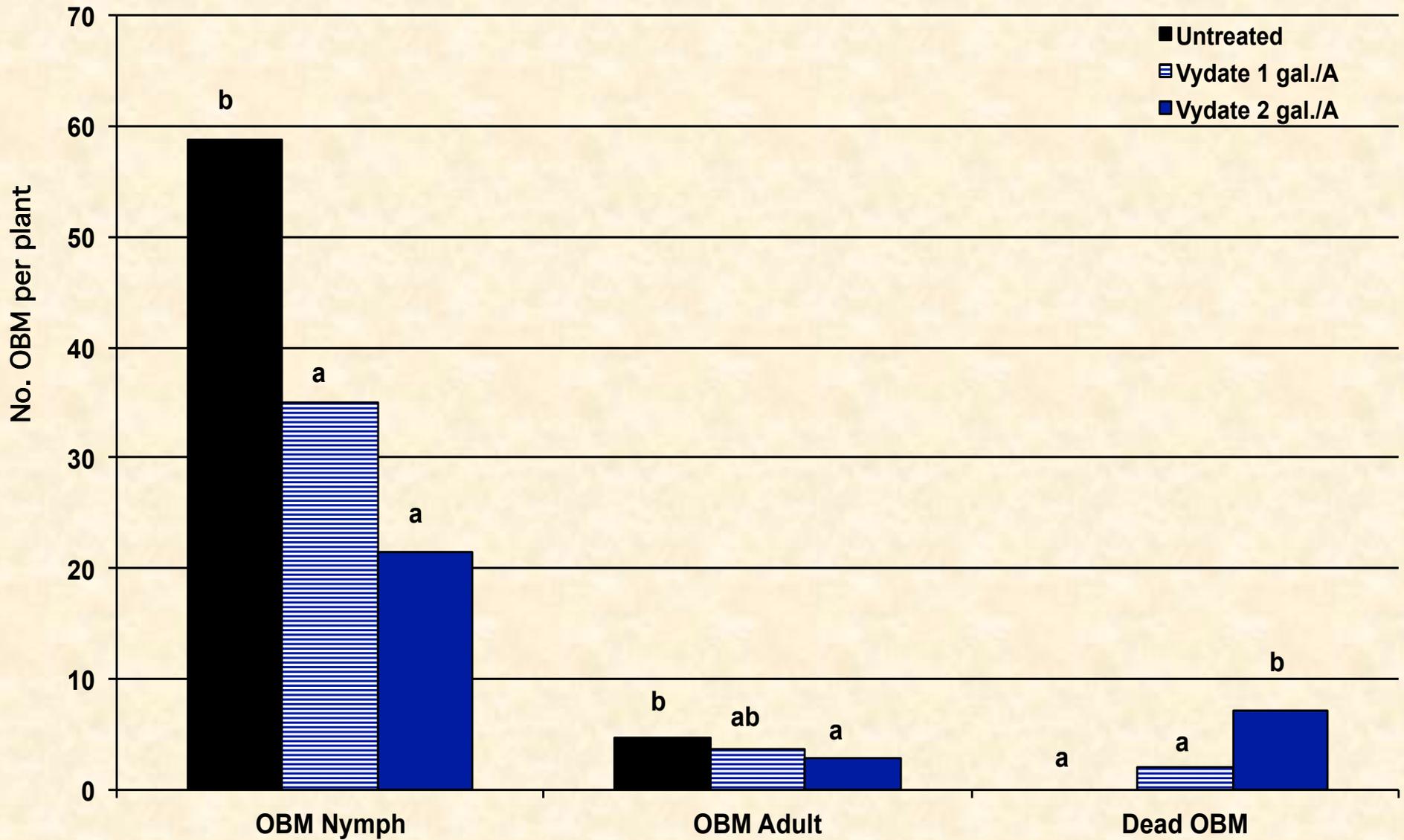
Efficacy of insecticide treated barley seed (naked vs / standard)
Pine Island, NY - 2002



**Efficacy against OBM of insecticide treated barley seed (1X rate vs. 2X rate).
Pine Island, NY - 2002**



Evaluation of onion bulb mite on Vydate treated barley plants.
Hudson Valley Lab - 2003



Preference Bioassays of OBM for Potential Cover Crops. Hudson Valley Lab., Highland NY – 2001

Ranked treatment	% infested plants	No. mites/plant
1. Oat	90.8	11.5
2. Soybean	65.8	10.1
3. Wheat	59.5	27.2
4. Barley	56.0	17.5
5. Annual rye	53.3	8.7
6. Proso millet	47.0	4.5
7. Pearl millet	44.0	10.6
8. Siberian millet	3.0	0.4

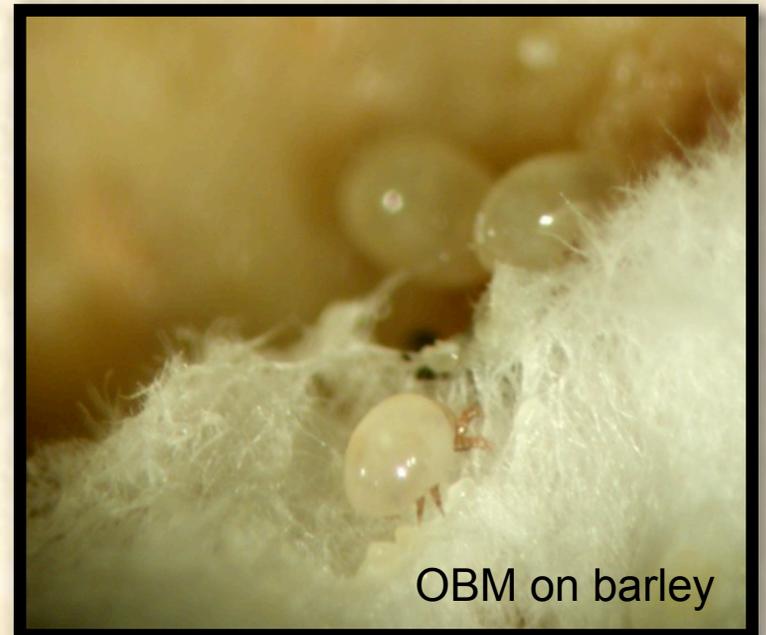
Onion Bulb Mite: HVL Studies

- Survives well in cold temperature.

LT50 OBM Adult ♀ = 17°F

LT50 OBM Egg = 10°F

Under ideal conditions OBM increase in number to feed on developing onion in early spring to reduce stand count.

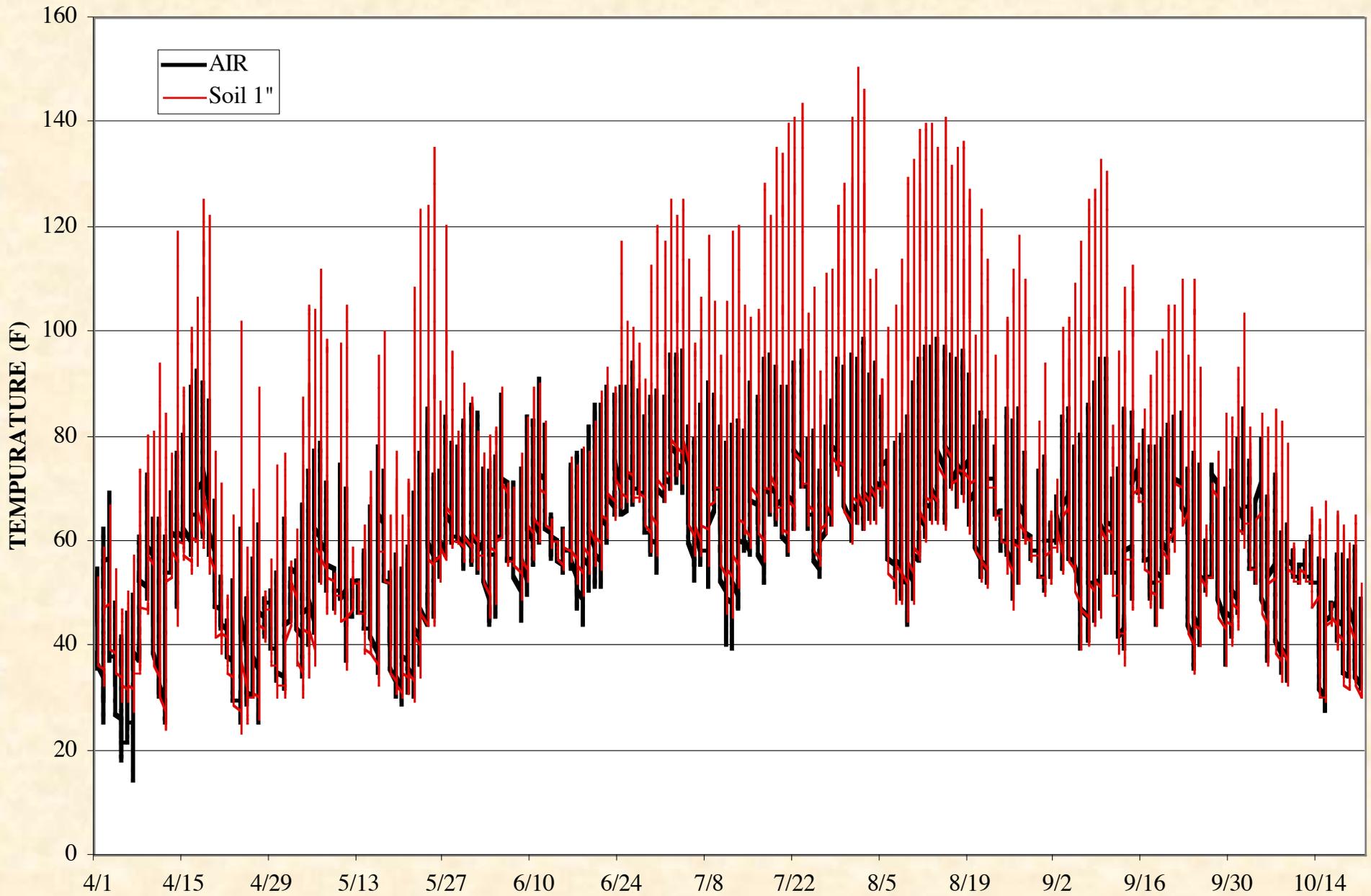


OBM on barley



OBM on volunteer onion

SUMMER AIR AND SOIL TEMPERATURES IN PINE ISLAND, NY - 2002



Impact of Seed Treatments on Onion Bulb Mite

Onion Seed-Treatments Efficacy against OMB
Cornell's Hudson Valley Lab, Highland NY, 1999.

Treatment	Rate	Average number of bulb mite			
		20 DAP		30 DAP	40 DAP
		roots	bulb	bulb	bulb
Carzol	50g/kg	0.5b	0.2a	-	-
Vydate	50g/kg	0.2ab	<0.1a	0.5a	5.8b
Fipronil +Carzol	30g/kg 50g/kg	<0.1ab	<0.1a	0.0a	0.0a
Fipronil +Vydate	30g/kg 50g/kg	0.0a	0.0a	0.0a	0.0a
Fipronil	30g/kg	0.0a	0.0a	0.4a	0.2a
Untreated	-	3.4c	3.1b	-	-

Establishment and survival in greenhouse bioassays.

Summary of Insecticide Effects on Onion Bulb Mite

- **Insecticide drenches of some value (?)**
 - ~ Carzol > (fipronil ?) > Vydate
- **Seed treatments of onion**
 - ~ Carzol > fipronil > Vydate
- **Seed treatments of 'standard' barley**
 - ~ somewhat effective
 - ~ seed coat protection of OBM populations
- **Seed treatments of 'naked' barley**
 - ~ Carzol (86%) > fipronil (75%) > Vydate (21%)
- **Foliar Vydate treatments of barley seedlings**
 - ~ 2 gal (64%) > 1 gal (40%)

Agriculturally Invasive Insect Pests in NY State: Update on BMSB Management in Vegetable



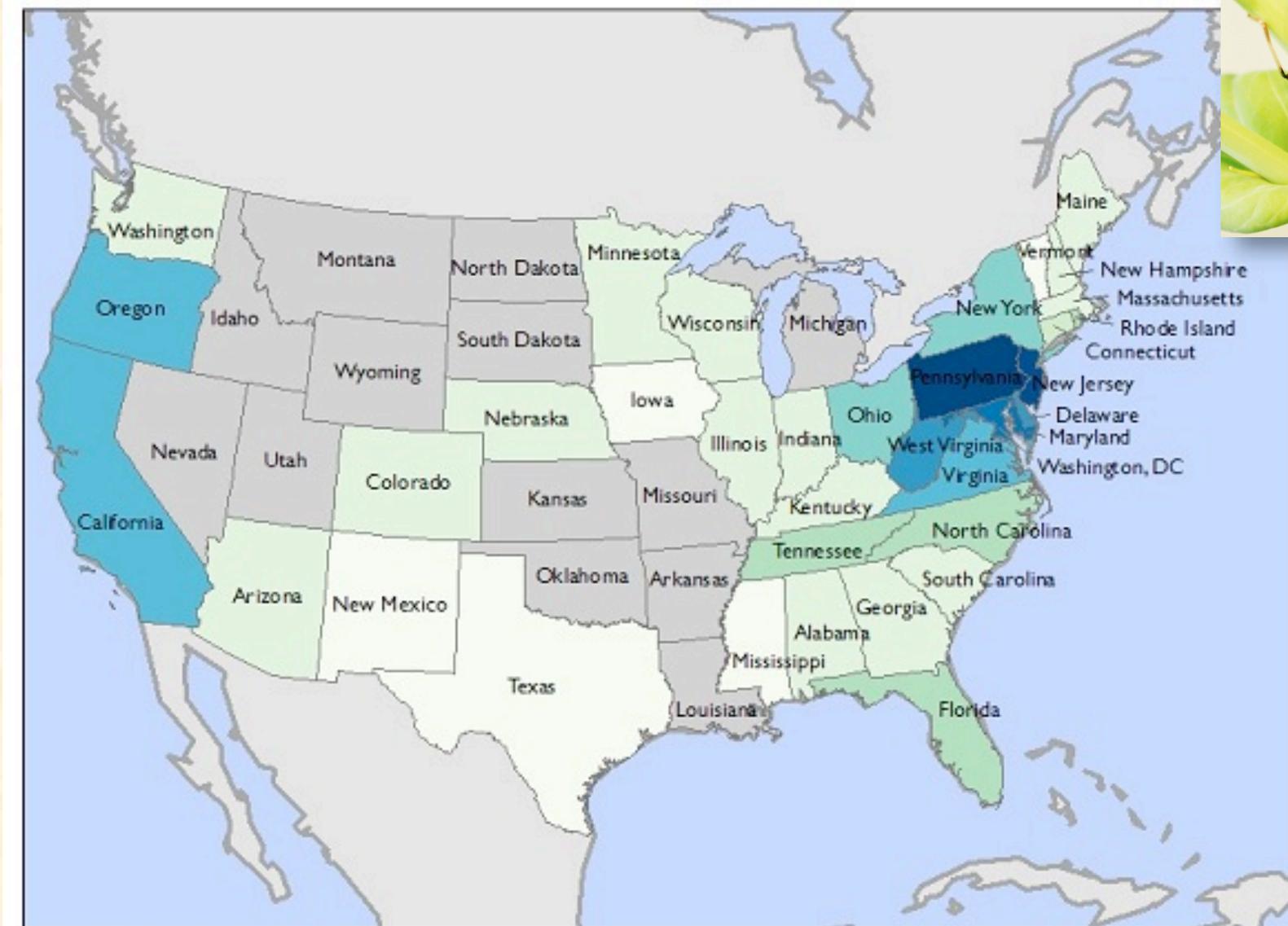
Brown Marmorated
Stink Bug

Tree of
Heaven
*Ailanthus
altissima*



Asian Invasive Brown Marmorated Stink Bug Spread in the US

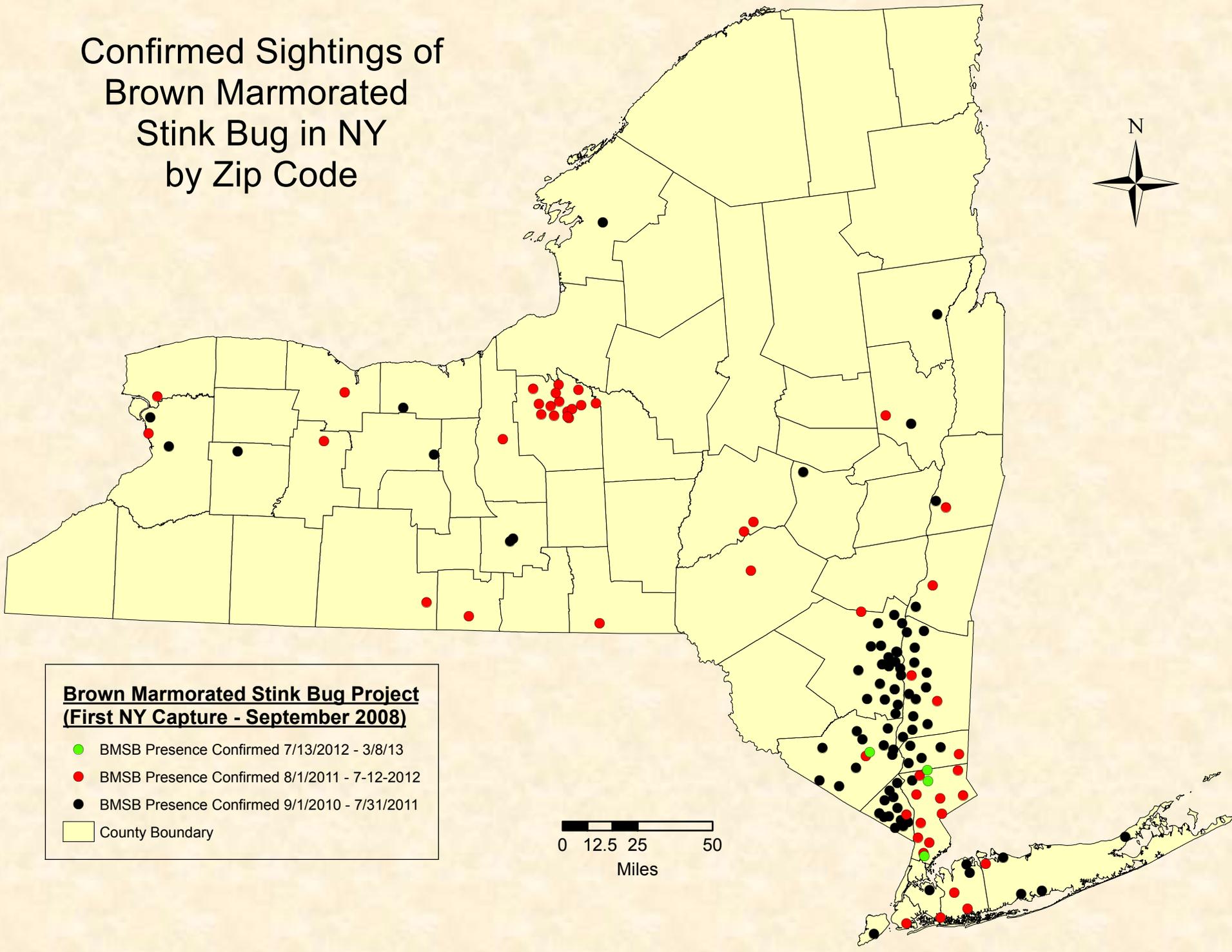
Halyomorpha halys



Year Brown Marmorated Stink Bug Detected

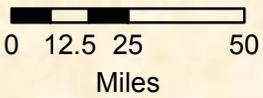


Confirmed Sightings of Brown Marmorated Stink Bug in NY by Zip Code



Brown Marmorated Stink Bug Project
(First NY Capture - September 2008)

- BMSB Presence Confirmed 7/13/2012 - 3/8/13
- BMSB Presence Confirmed 8/1/2011 - 7-12-2012
- BMSB Presence Confirmed 9/1/2010 - 7/31/2011
- County Boundary

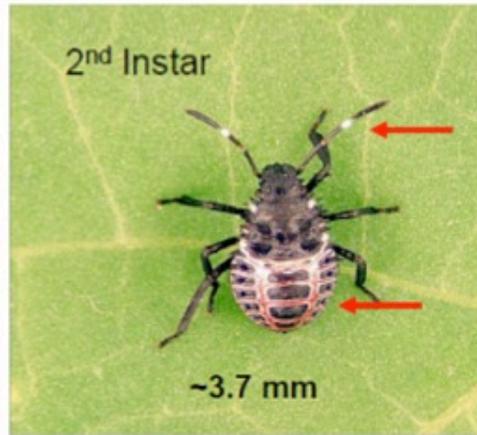




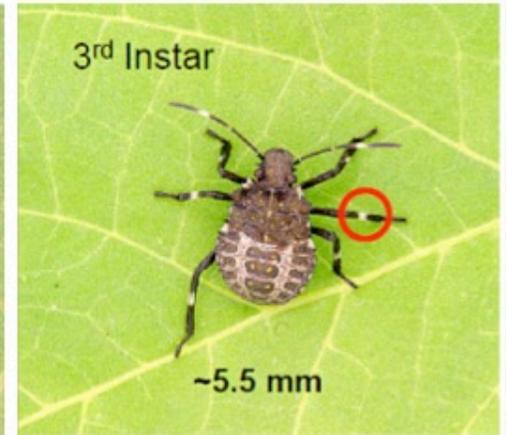
Eggs: Average 28/cluster; light green to white



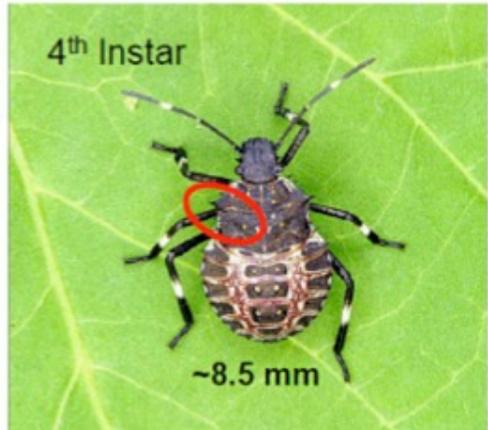
1st instar: black & red; cluster near eggs



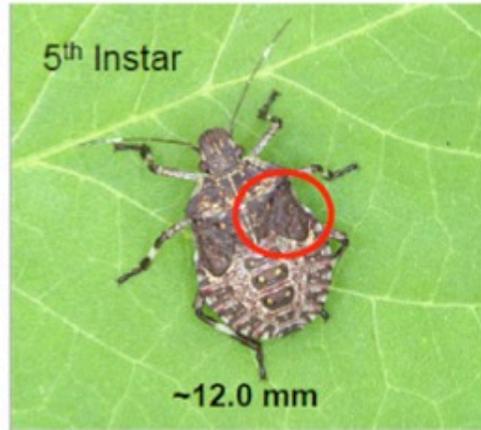
2nd instar: striped antennae
~3.7 mm



3rd instar: striped antennae and legs
~5.5 mm



4th instar: thoracic spur striped antennae & legs
~8.5 mm



5th instar: wing pads striped antennae & legs
~12.0 mm



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.



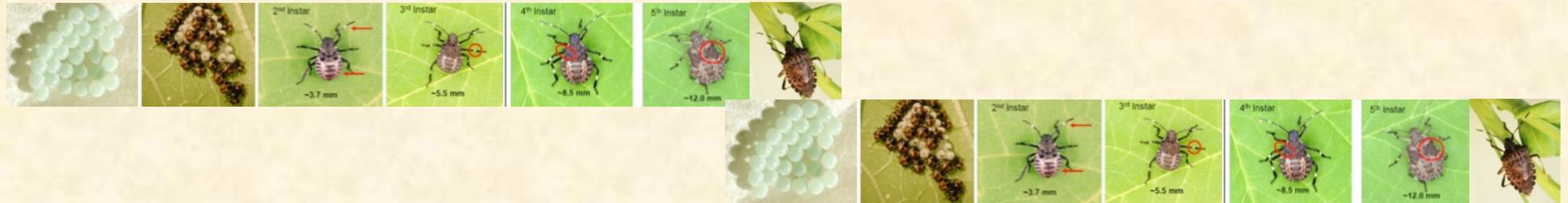
Adult BMSB

2 sets of
4 cream 'dots'

Along the
anterior edge of
the abdomen
and thorax

BMSB Voltinism

2 generations in the Mid-Hudson Valley of NY



Combined 1st & 2nd Generations

May June July August September Oct.

Presence in Vegetable

Intensified Feeding

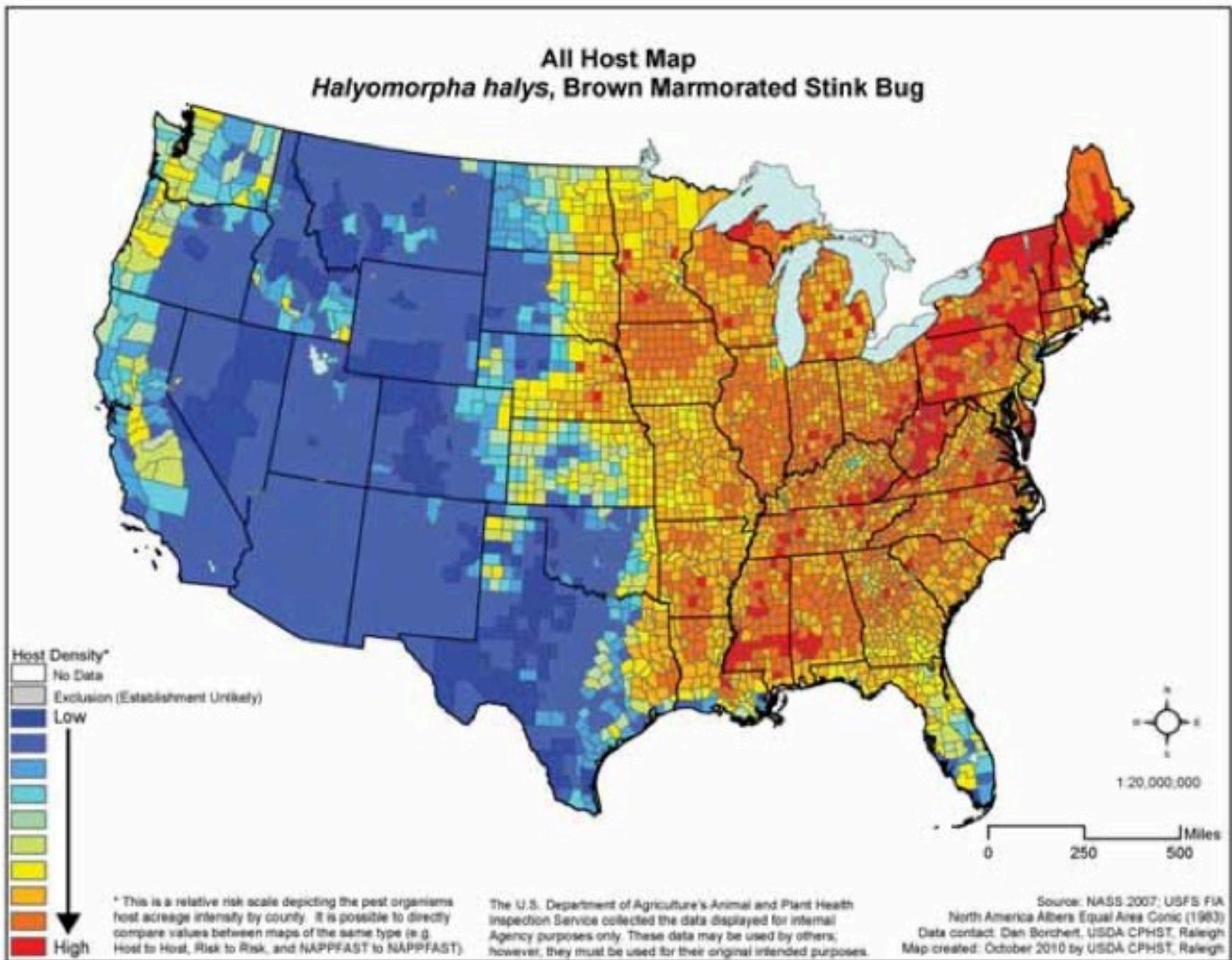


Figure 1: Risk maps displaying the relative density of field, vegetable, and fruit crop hosts plants of BMSB throughout the United States.

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

Host	Common name	Reference
<i>Tilia americana</i> L.	Linden	Bernon, 2004
<i>Tilia</i> spp.*	Basswood	Hoebcke and Carter, 2003
<i>Triticum aestivum</i> L.	Wheat	Hua, 2000
<i>Tropaeolum majus</i> L.		Wermelinger et al., 2008
<i>Ulmus</i> spp.	Elm	Hua, 2000
Uncultivated hedge		Nielsen and Hamilton, 2009
<i>Viburnum opulus</i> var. <i>americanum</i> Ait.	Highbush cranberry	Nielsen and Hamilton, 2009
<i>Viburnum prunifolium</i> L.	Blackhaw viburnum	Bernon, 2004; Nielsen and Hamilton, 2009
<i>Viburnum setigerum</i> Hance	Tea Viburnum	Bernon, 2004
<i>Viburnum</i> spp.	Cranberry bush	Bernon, 2004
<i>Vigna sesquipedalis</i> L.	Chinese long bean	Hoffman, 1931
<i>Vitis</i> spp.*	Grape	Bernon, 2004; Hamilton, 2009
<i>Vitis vinifera</i> L.	Grapevine	Wermelinger et al., 2008
<i>Zea mays</i> 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), *Halymorpha 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 trees, tree fruit, legume, vegetable

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

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



Gary Bern on, USDA-APHIS

Brown Marmorated Stink Bug on Tree Fruit, Small Fruit & Vegetable

Tree fruit (apple, pear, peaches,



Tracy Lesley - USDA-ARS



Deepak Magadha Rutgers University



Tracy Lesley - USDA-ARS



Tracy Lesley - USDA-ARS



Small fruit (grape, bramble fruit)

Doug Pfeiffer - Virginia Tech

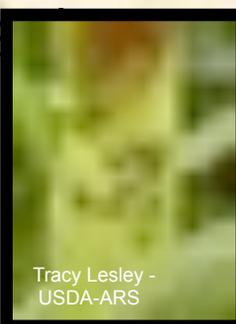
Vegetables (tomato, pepper, sweet corn, Lima



Tracy Lesley - USDA-ARS



Tracy Lesley - USDA-ARS



Tracy Lesley - USDA-ARS



Deepak Magadha Rutgers University

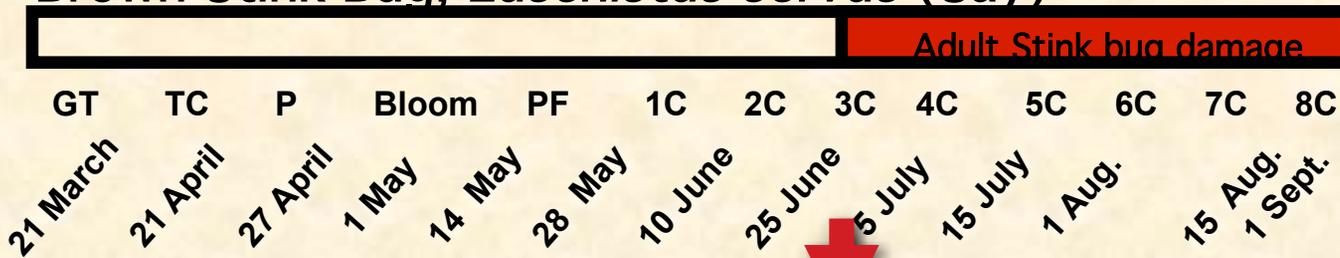


Tracy Lesley - USDA-ARS

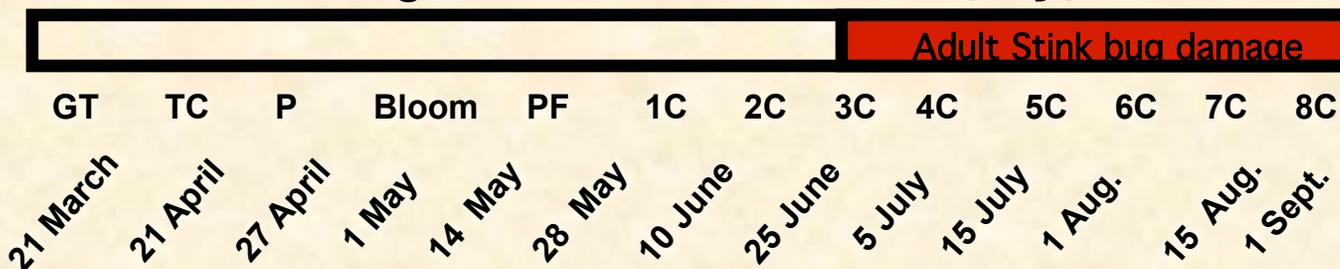
Hudson Valley Complex: SB species of economic importance



Brown Stink Bug, *Euschistus servus* (Say)



Green Stink Bug, *Acrosternum hilare* (Say).

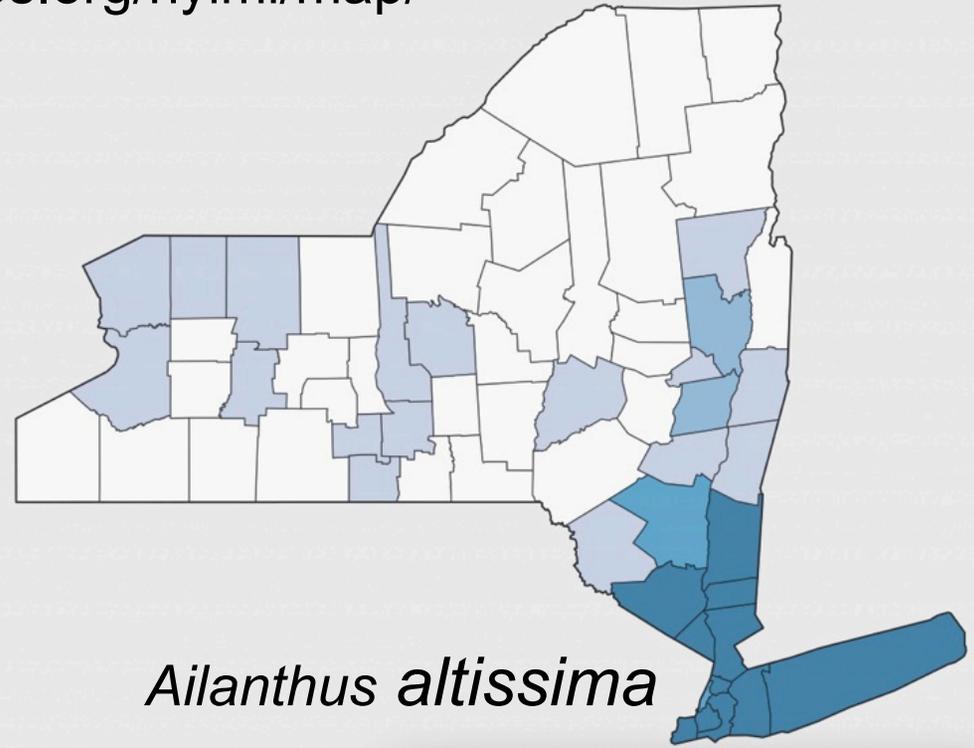
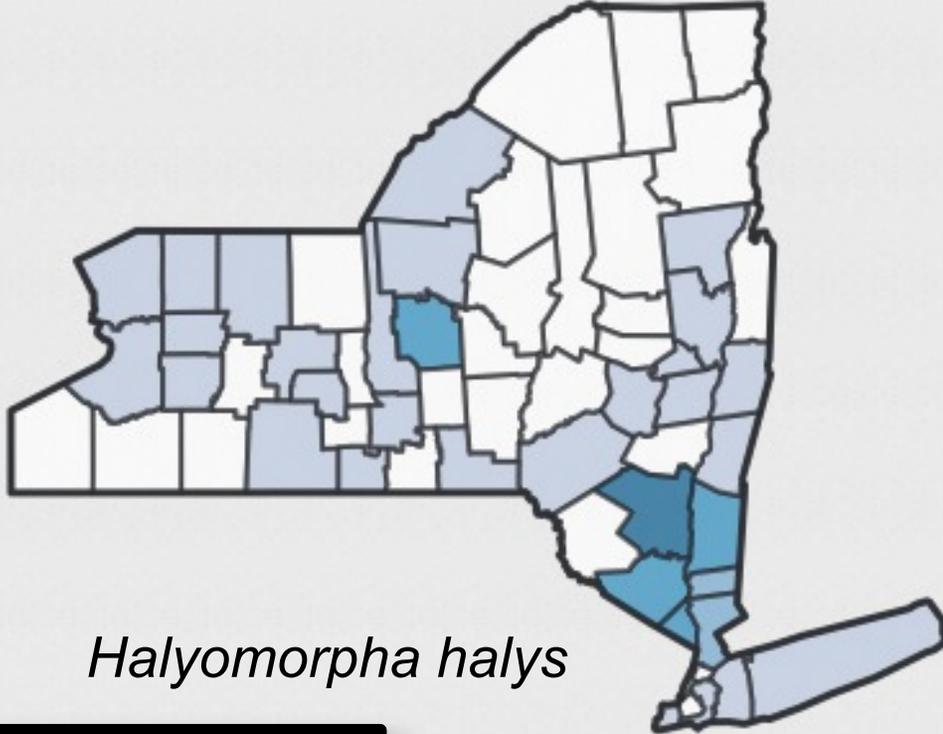


Brown marmorated stink bug, *Halyomorpha halys* (Stål)



iMapinvasive New York Invasive Species Public Map

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



- Use of invasive species maps help to better understand the ecological niche of newly introduced invasive species
- The BMSB utilizes the Tree of Heaven, *Ailanthus altissima* as an important food and reproductive resource.



Tree of Heaven, *A. altissima*.

Warwick, NY
September, 2012



***Ailanthus altissima* (Mill.)
Swingle 'Tree of Heaven'**

A. altissima has spread through the U.S. including NY.

Contributing to the increase of BMSB in this part of NY state?

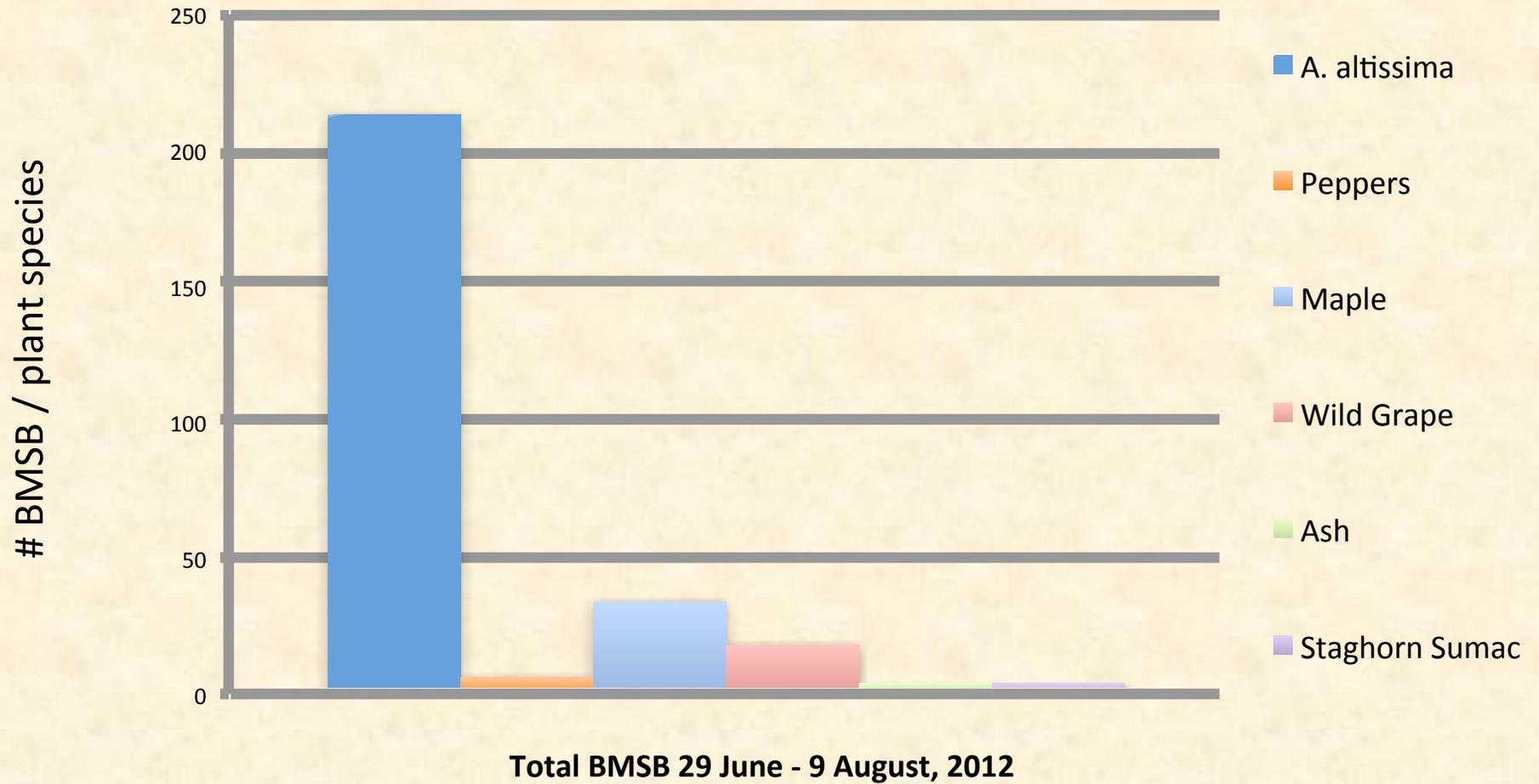
The 'Tree of Heaven' is a primary food source for BMSB.

Feeding occurs on foliage and seed while it also acts as a site for reproduction of 2 BMSB generations in NY.

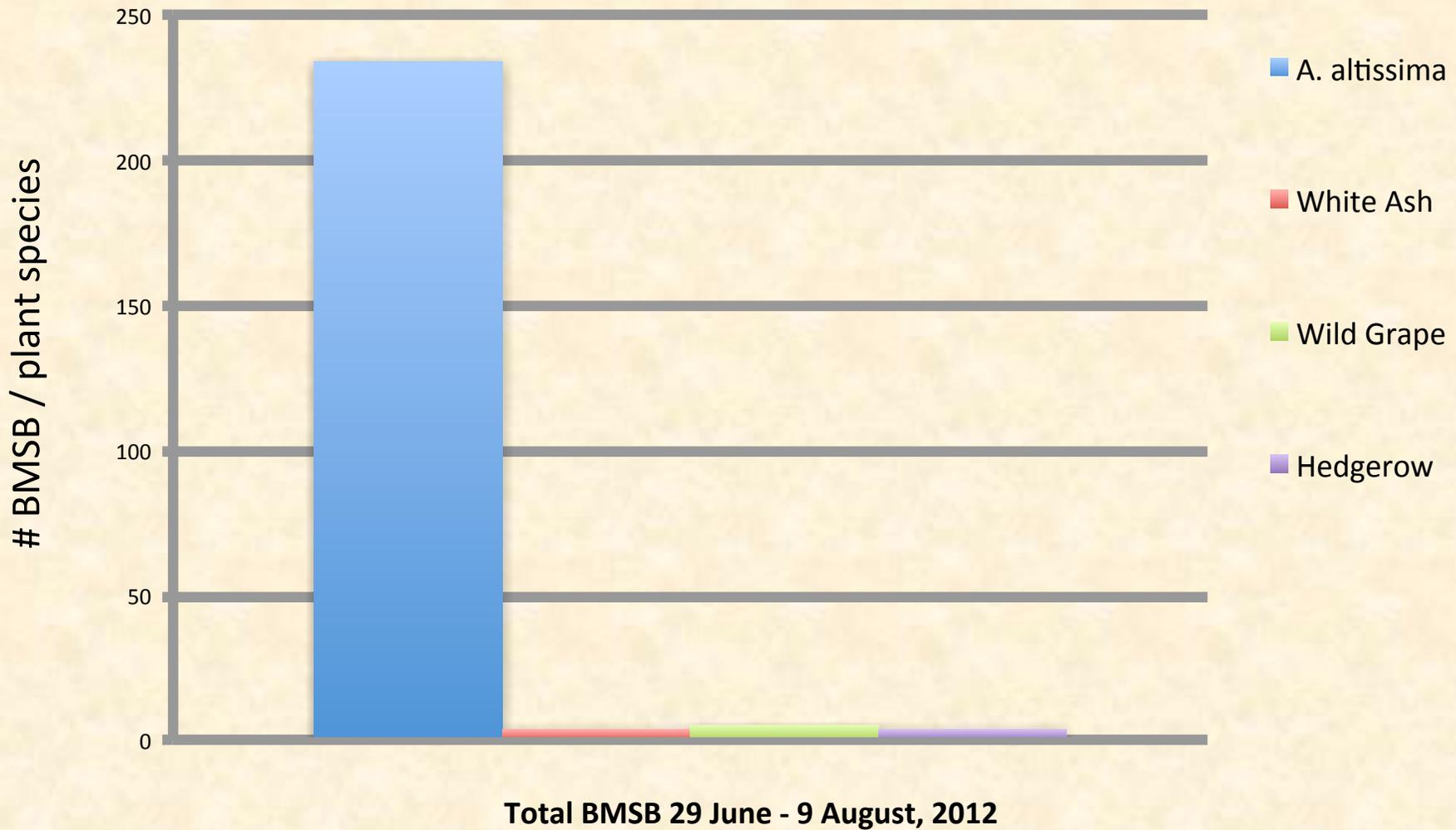
Very present in 'undesirable' urban niches.



Observations of BMSB on Border Plants Marlboro, NY 2012



Observations of BMSB on Border Plants Warwick, NY 2012

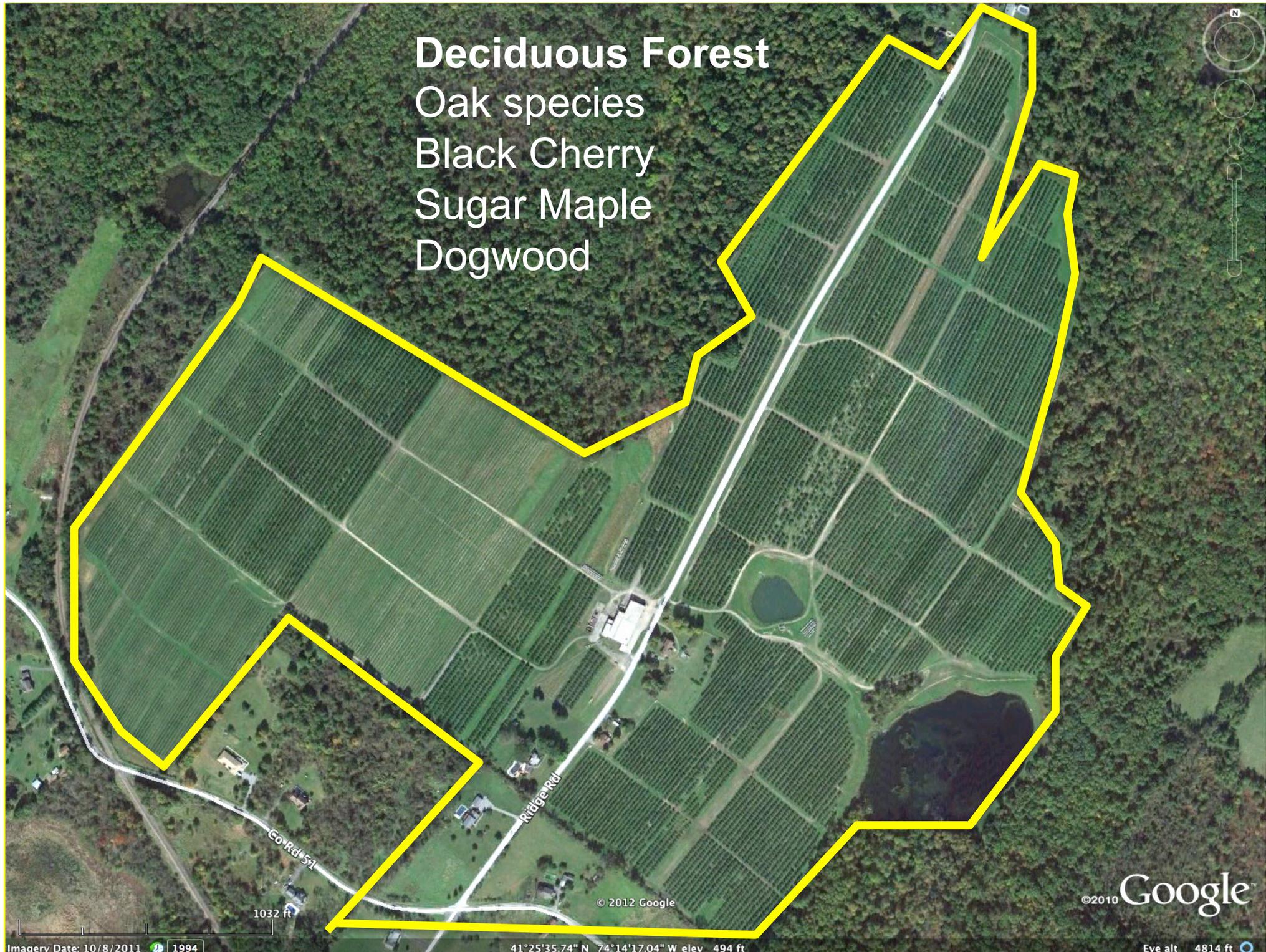


9 October, 2012
Milton, NY



Stink Bug injury to Golden Delicious
5 bins: Range from 38 – 57% damage
9 October, 2012; Milton, NY

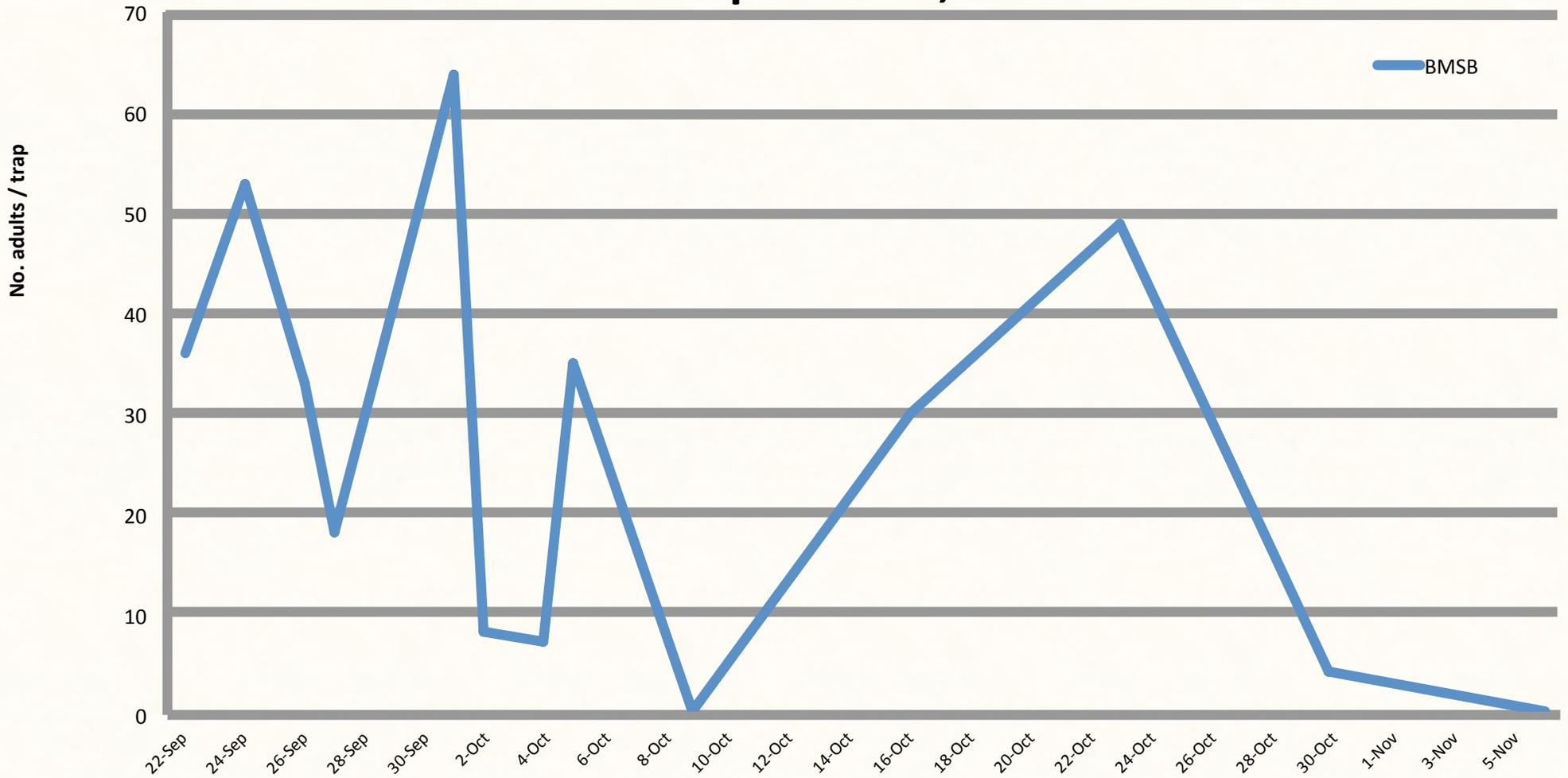
Deciduous Forest
Oak species
Black Cherry
Sugar Maple
Dogwood



Pheromone Tedders Trap Captures of BMSB Using MDT & USDA #10 lures

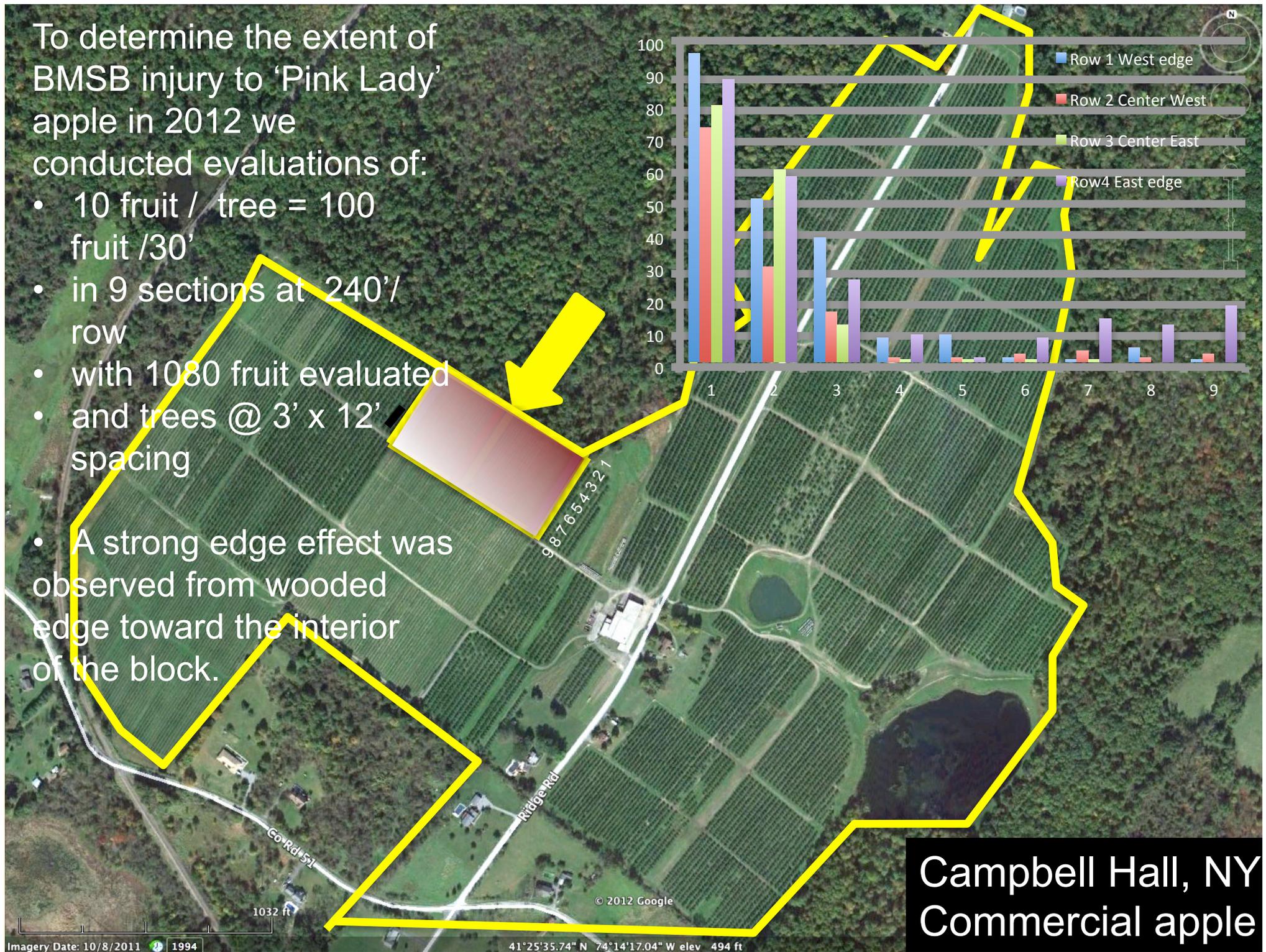
Red Delicious & Rome Apple

Campbell Hall, NY 2012



To determine the extent of BMSB injury to 'Pink Lady' apple in 2012 we conducted evaluations of:

- 10 fruit / tree = 100 fruit /30'
- in 9 sections at 240' / row
- with 1080 fruit evaluated
- and trees @ 3' x 12' spacing
- A strong edge effect was observed from wooded edge toward the interior of the block.



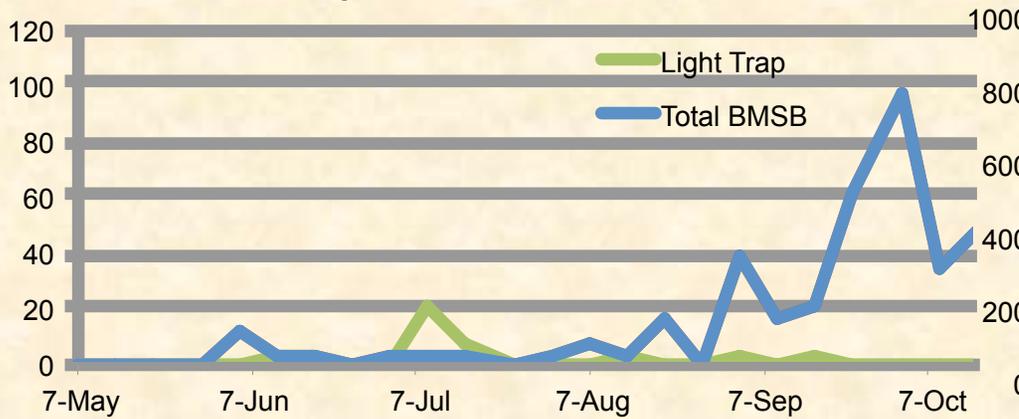
Campbell Hall, NY
Commercial apple



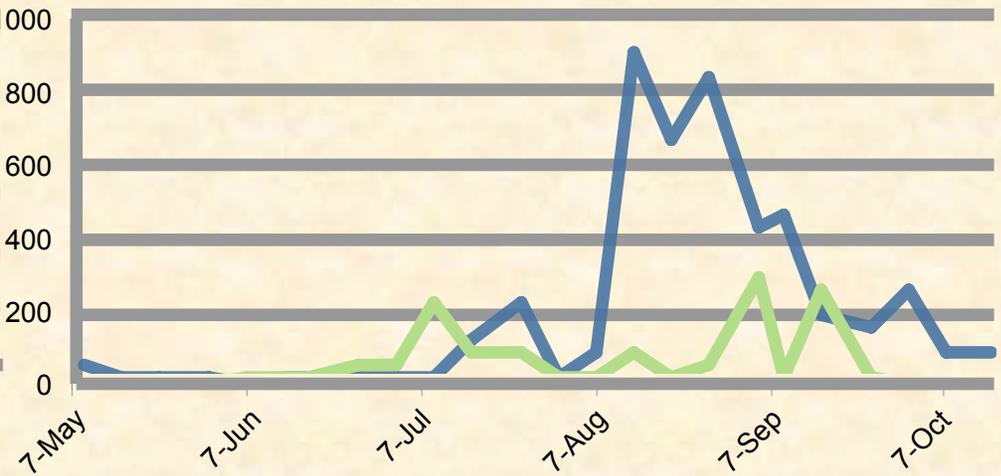
Studies of the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål), in New York State

- 2013: Early trap captures with the use of #10 + MDT synergist

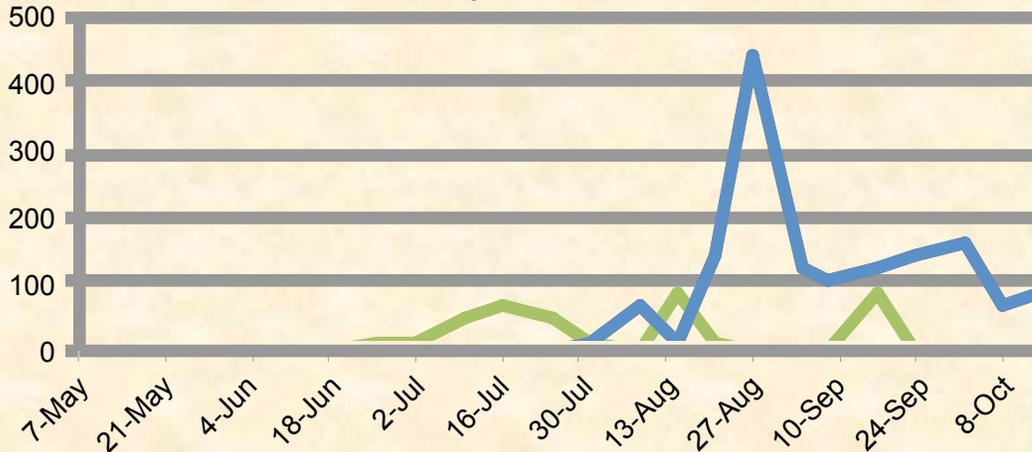
**BMSB Trap Captures; #10 + MDT & Black Light
Campbell Hall, NY 2013**



**BMSB Trap Captures; #10+MDT & Black Light
Marlboro, NY 2013**



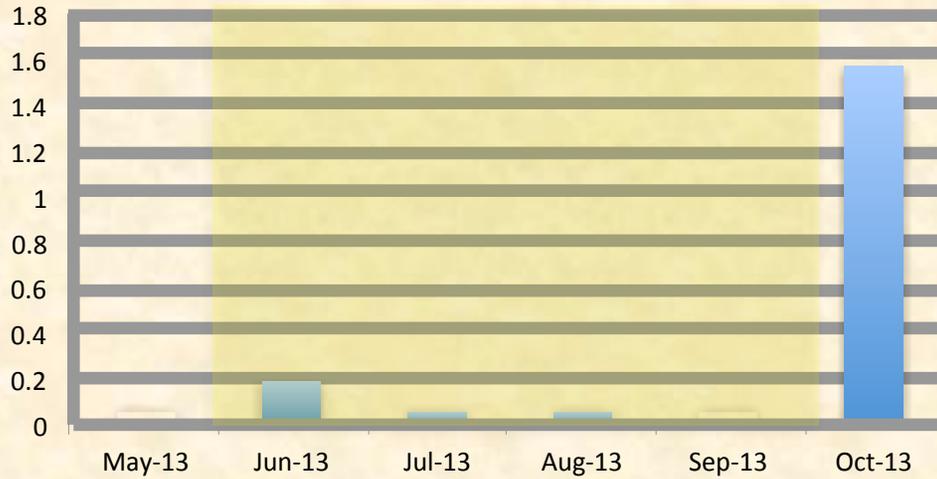
**BMSB Trap Captures; #10+MDT & Black Light
Milton, NY 2013**



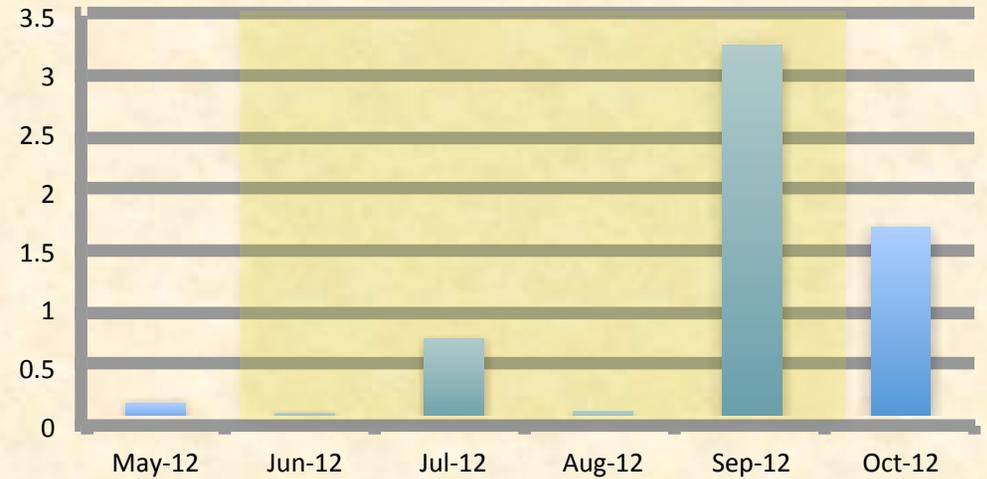
Injury >20% BMSB Studies Campbell Hall, NY 2012

**Injury
0.1%**

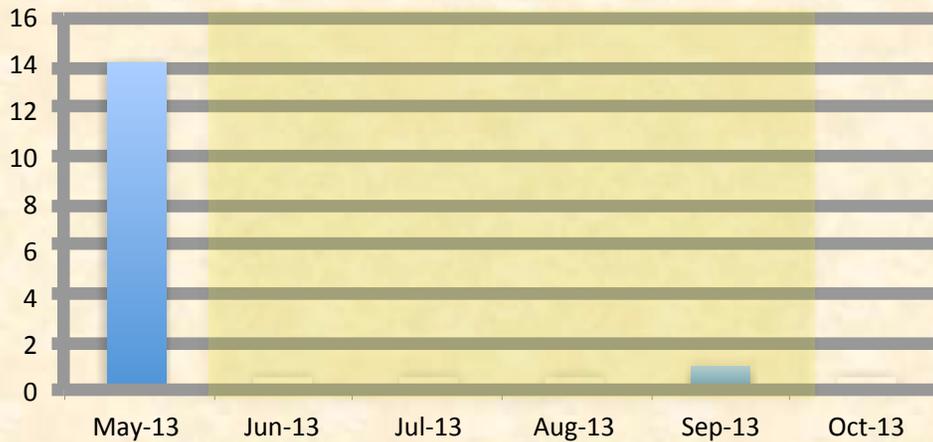
Total Rain (1.8 in.)



2013 Total Rain (6.0 in.)



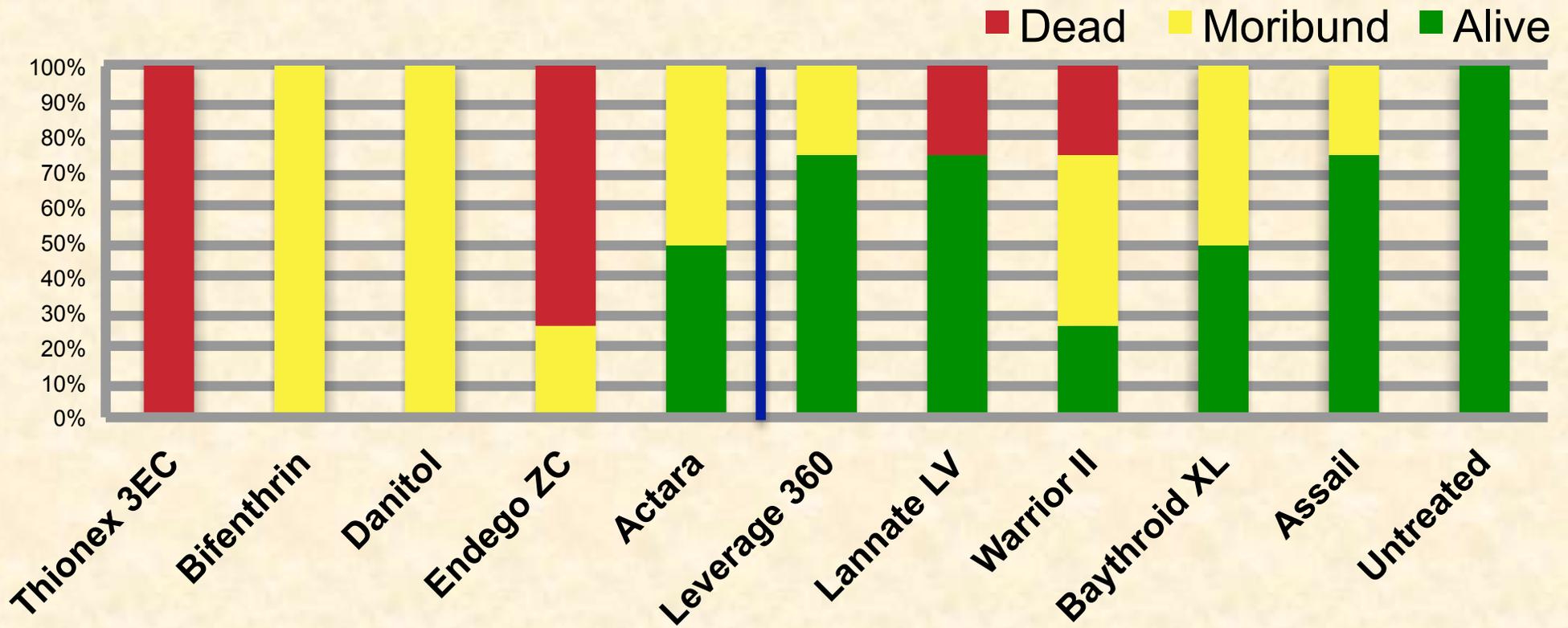
RH Hrs >= 90% (15 hrs.)



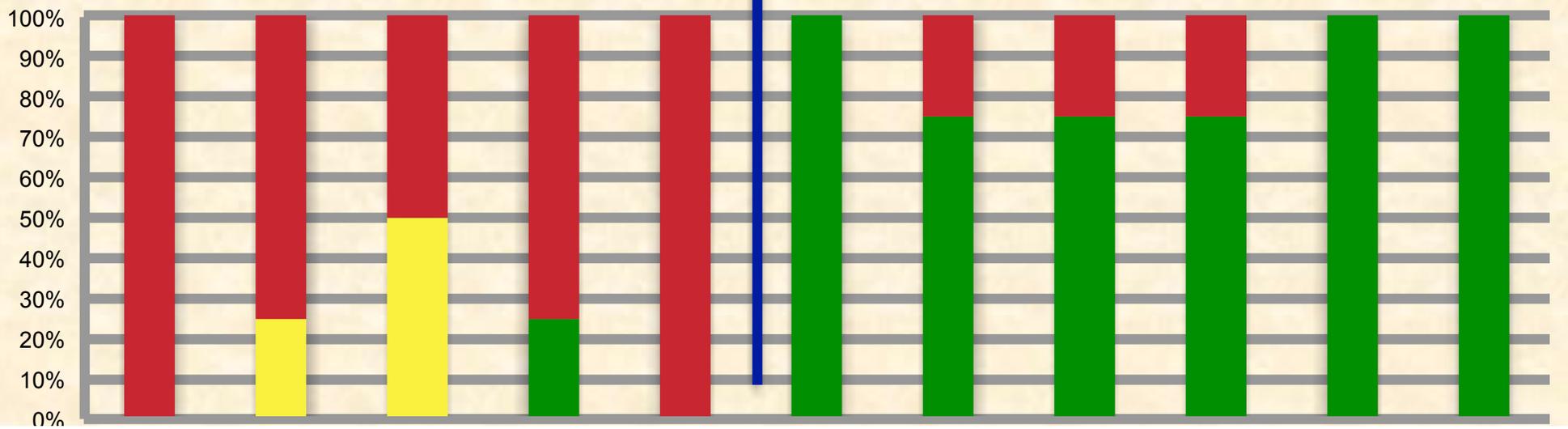
RH Hrs >= 90% (1122 hrs.)



BMSB Adult Exposure to Insecticide Residue of Apple Foliage 24h Old Residue @ 1 d



24h Old Residue @ 3 d

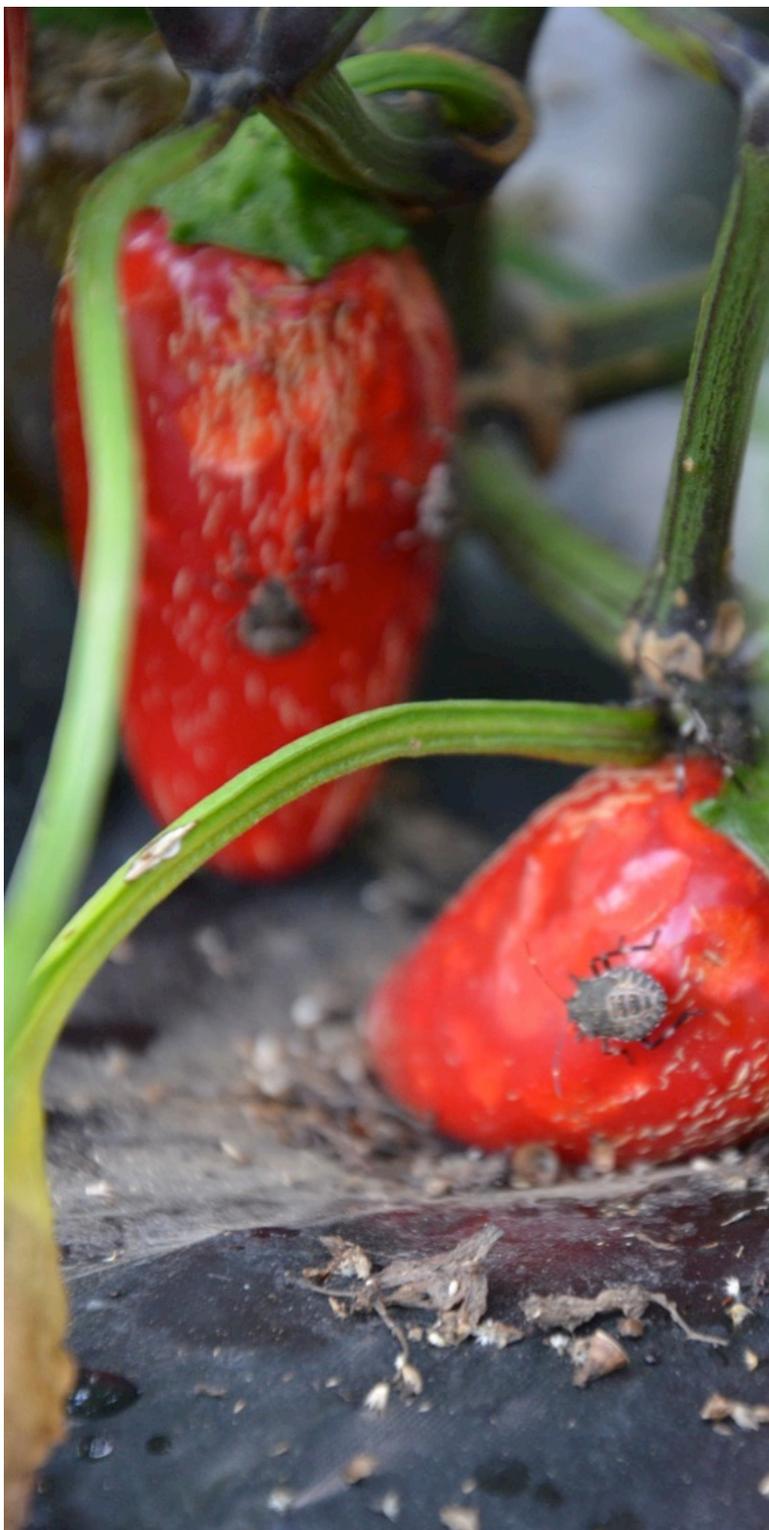


2013 BMSB Injury to Organic Pepper Marlboro, NY

- On August 12th, 15% injury was observed in a 1 acre organic planting of Jalapeno Pepper.







BMSB in Jalapeno Pepper
12th August, Marlboro, NY
15% feeding injury
Averaging 4 nymphs per plant

2013 BMSB Injury to Pepper Marlboro, NY



- On August 12th, 15% injury was observed in a 1 acre organic planting of Jalapeno Pepper.

- Applications of Mycotrol-O @ 16 oz./A on 14 August, 1 & 14 September.
- Set up integrated pest management approach to reduce BMSB field populations

2013 BMSB Injury to Pepper

- Employing pheromone baited insecticide treated netting traps
- High intensity lighting





MDT

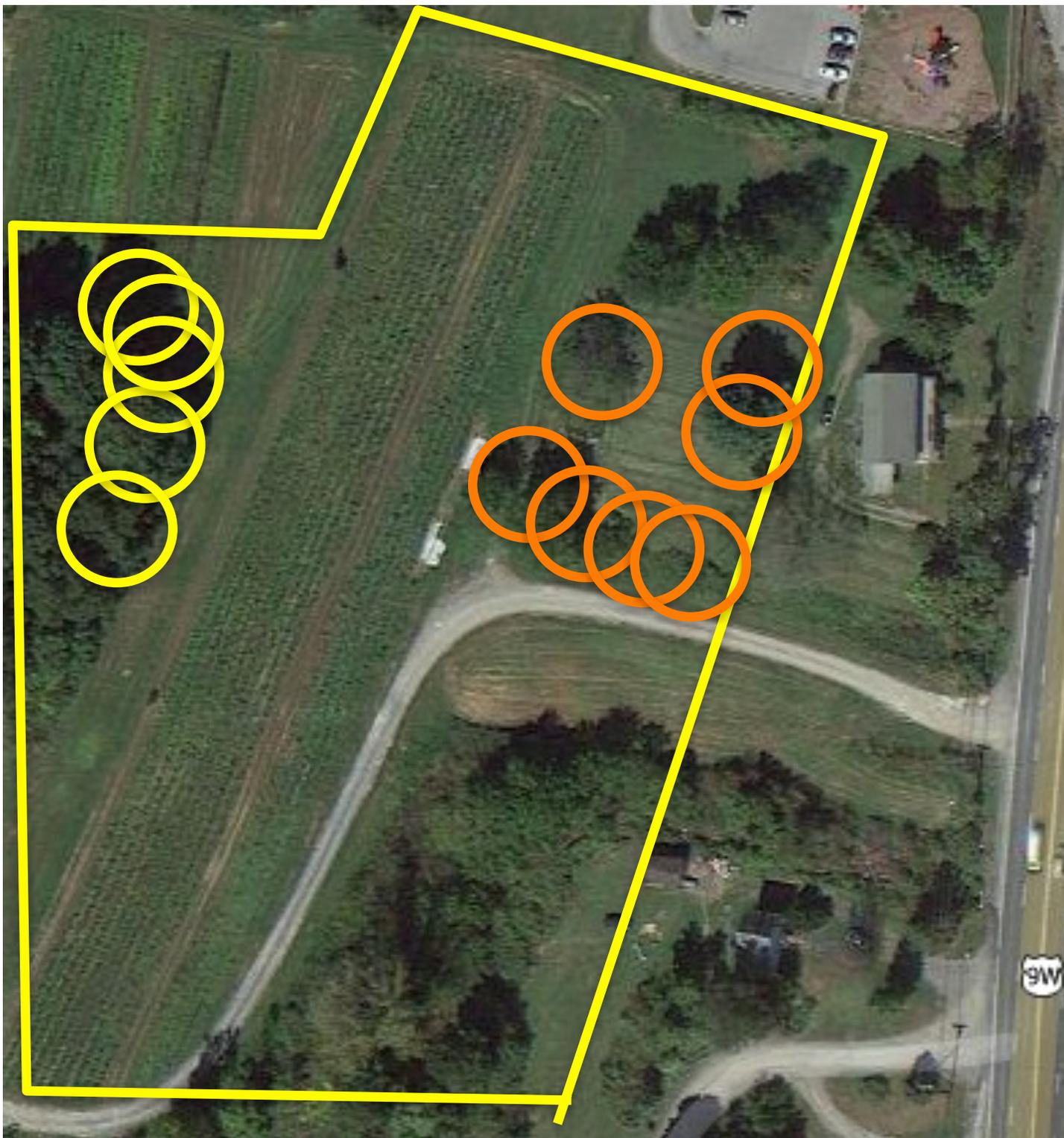


USDA #10









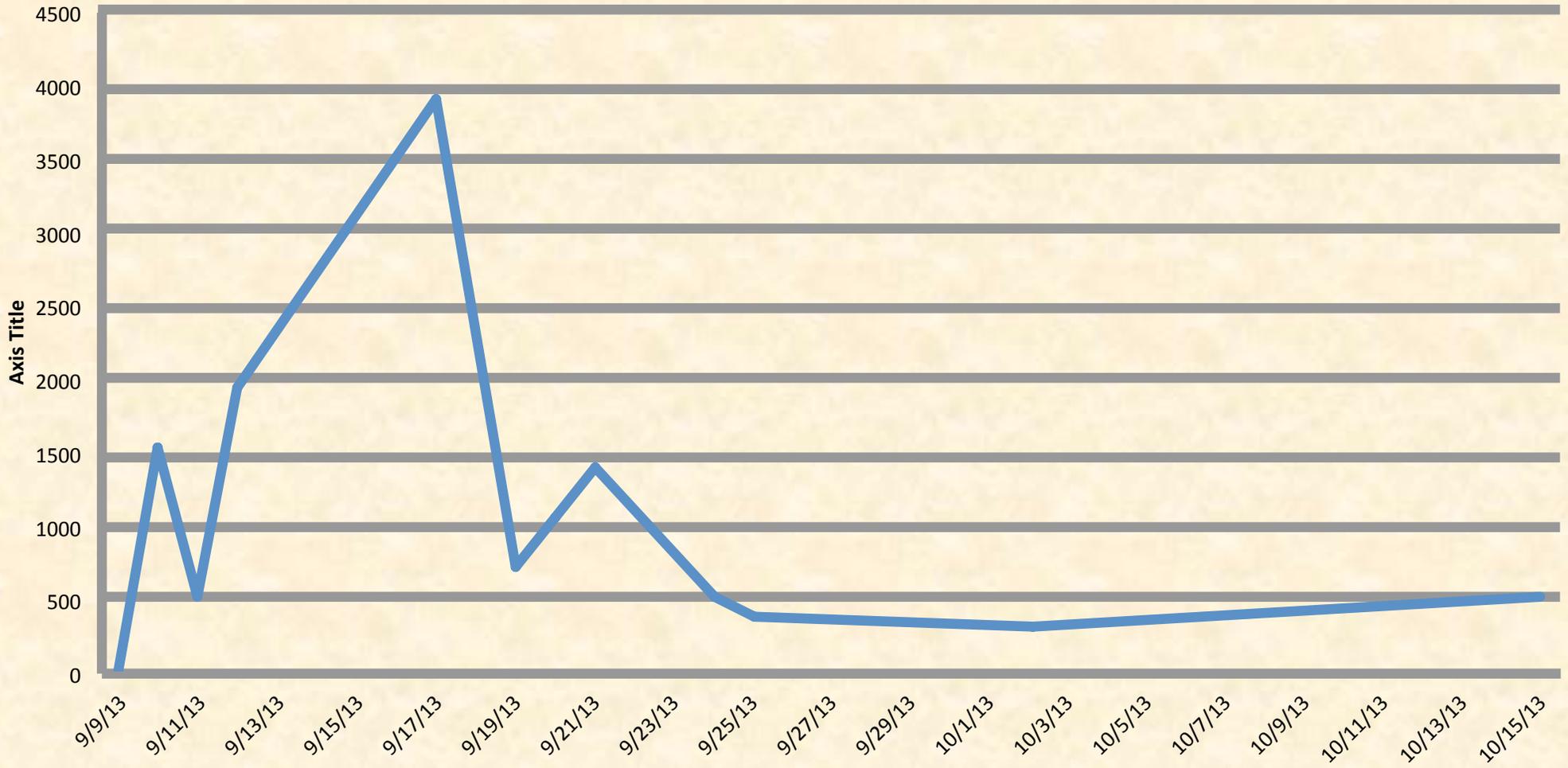
Ailanthus altissima



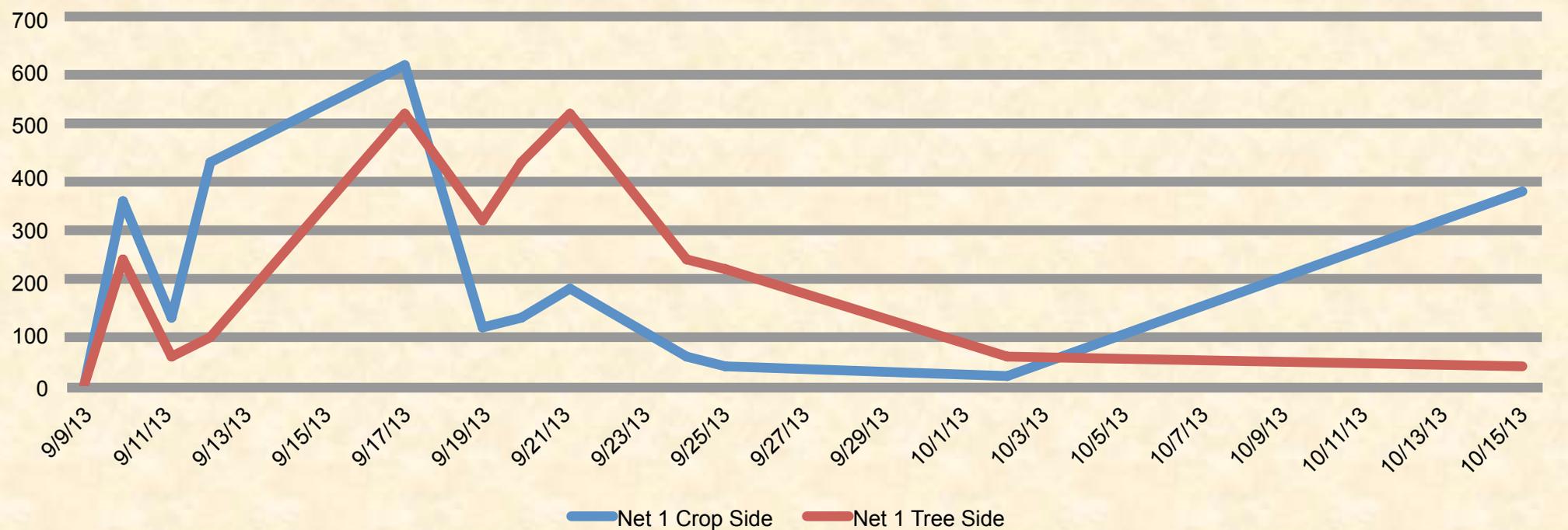
Juglans nigra

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

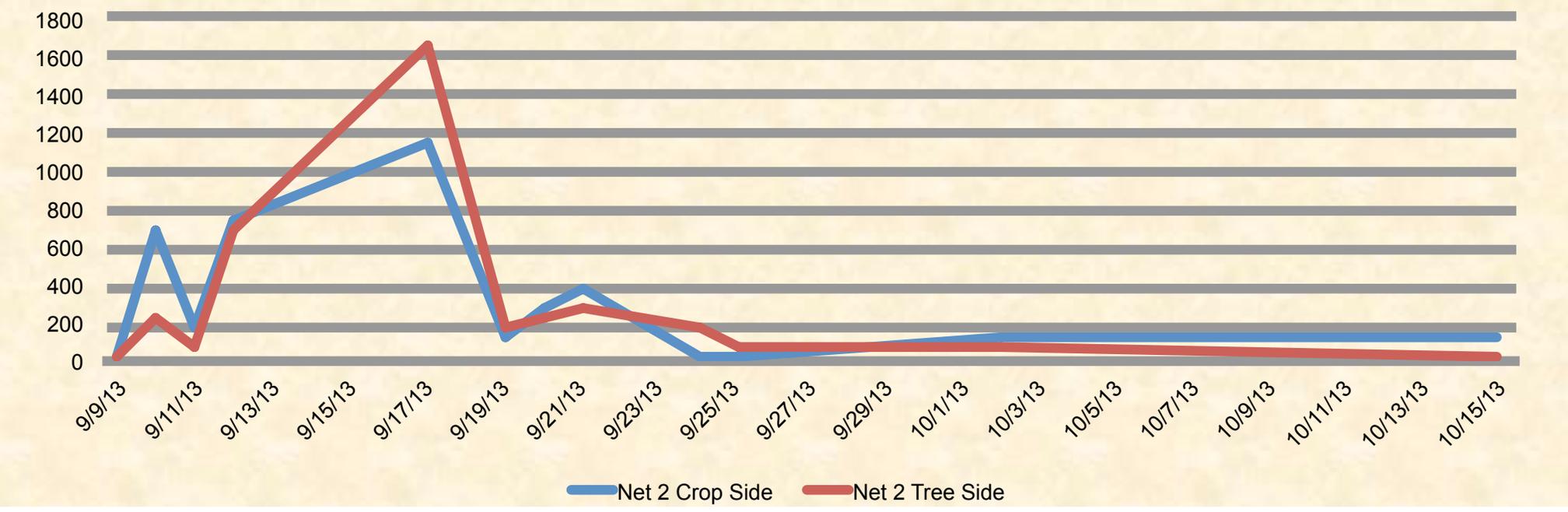
Total Seasonal Trap Captures



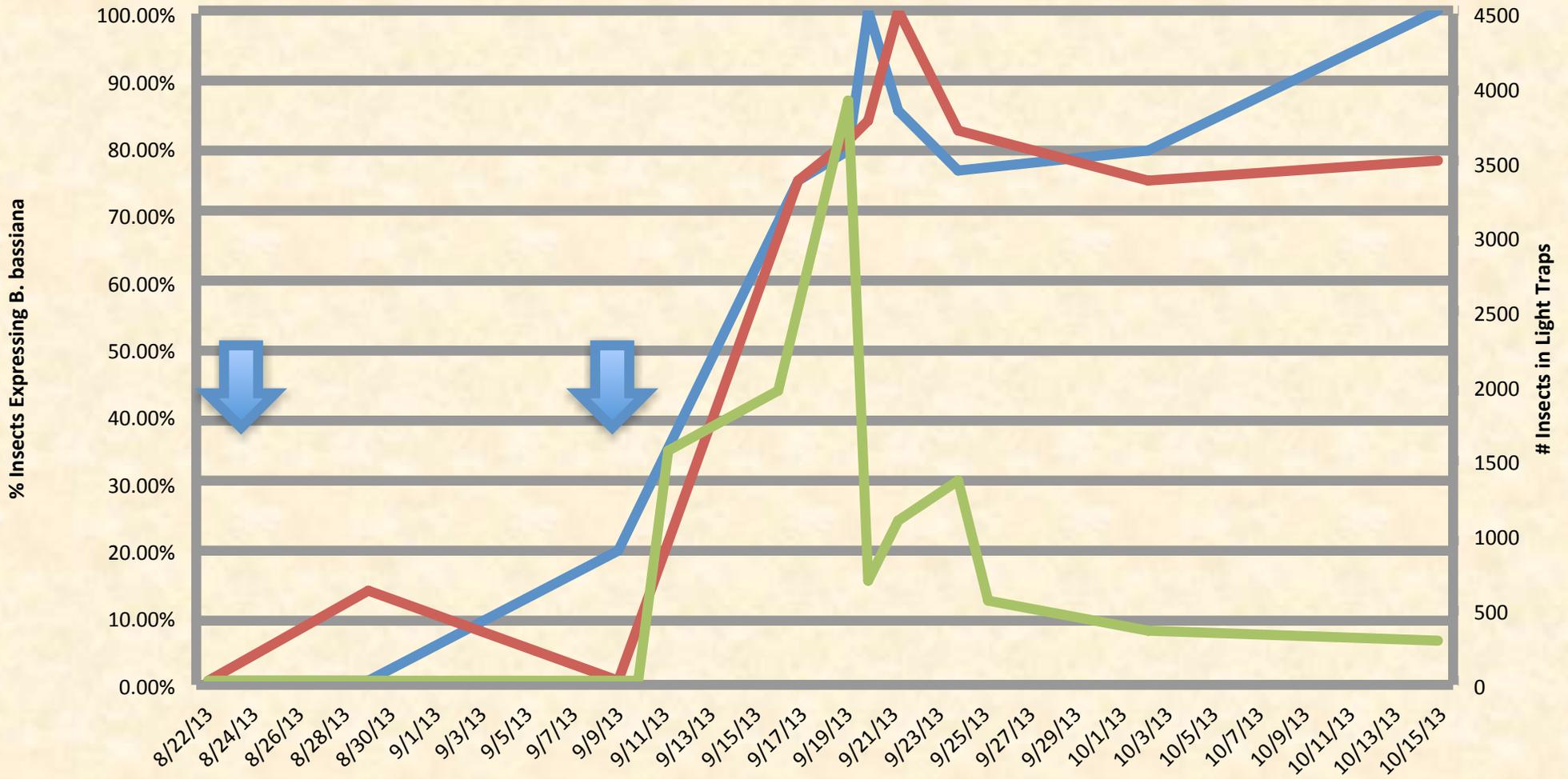
Pheremone only Net



Pheremone + Lighted Net



B. bassiana expression over Time



	8/22/13	8/29/13	9/9/13	9/10/13	9/11/13	9/16/13	9/17/13	9/19/13	9/20/13	9/21/13	9/24/13	9/25/13	10/2/13	10/15/13	
Net 1 infection	0.00%	0.00%	20.00%			73.66%		75.00%	80.00%	100.00%	85.71%	76.92%		80.00%	100.00%
Net 2 infection	0.00%	14.29%	0.00%			82.95%		75.00%	80.95%	84.62%	100.00%	82.76%		75.00%	78.57%
Population	0			0	1556	521	1954		3935	708	1090	1392	545	375	287



- *Beauveria bassiana* strain GHA applications
(Mycotrol-O @ 16 oz./A)



Key points to remember

- BMSB is arboreal, forest pest, very mobile to and out of agricultural crops
- Fruit damage takes 2-3 weeks for expression mid-late season.
- Low populations can equate to high feeding injury levels

Strategies for control: Conventional

1. Early trapping **with Tedders trap + #10 and MDT combo lure**
2. **Scouting** crop **at first trap capture**
3. Perimeter applications of field at first observation
4. Maintain perimeter applications alternating with whole field applications if BMSB presence continues

: Organic

5. Applications at 90% rH (48 hrs) Mycotrol-O at 1st BMSB

Insecticide efficacy is critical

- Use materials **with greatest efficacy & longest residual**
- Maintain 'fresh' residue every 4-5 days when needed



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

- | | |
|--|--------------------------|
| <i>Summer Research Assistant</i> | Tim Lamposona |
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| <i>PT Summer Research Assistant</i> | Henry Grimsland |
| <i>Summer Research Assistant</i> | Susan Weibman |
| <i>Summer Research Intern (CCE BMSB)</i> | Kaitlyn Kelder |
| <i>Summer Intern</i> | Brianna Flonc |
|
 | |
| <i>Farm Manager</i> | Albert Woelfersheim |
| <i>Administrative Assistant</i> | Donna Clark |
| <i>HVL & NEWA Weather Data</i> | Anne Rugh,
Joe Whalon |

