Review of the 2015 Insect Pest Management Season in ENY

Dog Wood Borer

Brown Marmorated Stink Bug

Black Stem Beetle

San Jose Scale

2016 Northeastern NY Commercial Tree Fruit School

February 17, 2016

Best Western Plus Hotel

Kingston, NY

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Review of the 2015 Insect Pest Management Season in ENY

Insect Pest Observations 2015

I. **Tall Spindle Decline & Collapse (M.9 /)**
   - 2nd leaf Pink Lady (Ulster)
   - 4th leaf Zestar (Columbia)
   - 7th leaf Honeycrisp (Ulster)
   - 8th leaf Fuji, Ginger Gold (Ulster & Orange)

II. **San Jose Scale – 3rd generation injury**

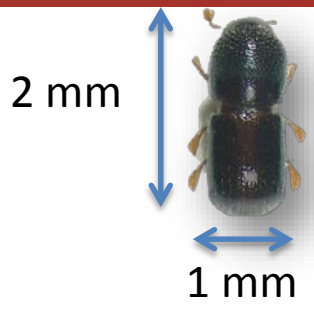
III. **Codling Moth Confusion**

IV. **Stinkbug in the Hudson Valley of NY**

Review of the 2015 Insect Pest Management Season in ENY

Black Stem Borer (BSB)

Xylosandrus germanus



- Forest Pest in the family of Ambrosia Beetles
- Attack trees under stress, under wet conditions and waterlogged soils, suffering injury from winter, fire blight, wounding from dogwood borer, emitting ETOH (ethyl alcohol) detected by the beetle.
- Females infest the tree, burrowing through bark into the heartwood; form gallaries for offspring which feed upon fungus carried in spores by adult.

Review of the 2015 Insect Pest Management Season in ENY

Insect Pest Observations 2015
BSB Monitoring: Anna Wallis / Dan Donahue

Black Stem Borer Trap Counts

Wood Line/ Orchard Edge					
Location	26-May	1-June	8-June	15-June	22-June
Schuyler Falls	22	8	1	1	1
Clifton Park	3	4	0	0	2
Peru	0	0	0	0	0
Chazy	Present	0	x	x	1
Granville	0	1	x	1	0
Saratoga	1	6	1	10	2
Peru	0	2	0	0	2
Schuylerville	x	1	x	0	0
Valcour	0	2	1	4	0
Claverack	x	x	0	0	1
Germantown	x	0	0	0	0
Tivoli	x	0	0	0	0
Highland	x	1	1	1	1
Milton	x	1	0	0	0
Marlboro	x	1	0	0	0
Highland—Lab	x	0	0	0	0
Walden	x	0	2	0	1
Fishkill	x	1	0	0	0
Salt Point	x	x	x	x	1

Within Commercial Orchard					
Location	26-May	1-June	8-June	15-June	22-June
Schuyler Falls	0	1	0	0	0
Clifton Park	0	0	0	0	0
Peru	4	0	0	0	0
Chazy	Present	0	0	0	1
Granville	0	1	x	0	0
Saratoga	6	0	0	0	0
Peru	7	0	0	0	0
Schuylerville	0	0	x	3	0
Valcour	10	0	0	0	0
Claverack	x	0	0	0	0
Germantown	x	0	0	0	0
Tivoli	x	0	0	0	0
Highland	x	0	0	0	1
Milton	x	1	0	0	0
Marlboro	x	0	0	0	0
Highland—Lab	x	0	0	0	0
Walden	x	0	3	1	0
Fishkill	x	0	2	0	0
Salt Point	x	x	x	x	0

- **All ENY trap sites captured BSB**
- **No infested trees observed in the north country**
- **Commercial orchards with BSB infestations causing tree decline and tree death.**

Tall Spindle Tree Decline on M.9

Lorsban / Chlorpyrifos (all formulations)

EPA issued a proposed revocation of Chlorpyrifos on Oct. 31, 2015, notifying the 9th Circuit Court of a **final rule in December 2016**.

(Chlorpyrifos levels found in drinking water, petition submitted by the Natural Resources Defense Council (NRDC) and Pesticide Action Network North America (PANNA)

Complete loss of Chlorpyrifos to the tree fruit industry: Pre-bloom mgt. of

- Dogwood Borer
- Black Stem Borer
- San Jose Scale
- Obliquebanded leafroller & green fruitworm complex

Tall Spindle Tree Decline on M.9

- **In May-November 2015, five commercial orchards were surveyed showing severe tree decline in the Hudson Valley**

Counties: Orange, Ulster & Columbia (totaling 1200 trees)

Varieties: Pink Lady, Fuji, Zestar, Ginger Gold, Empire

Systems: High Density Tall Spindle on M.9. (Pajam, Nic29, 337)

Tall Spindle Tree Decline on M.9

Orchards Symptoms / Observations included:

- (4) Tree yellowing, decline and death
- (1) Shoot dieback
- (3) Black Stem Borer, (BSB) *Xylosandrus germanus* boring
- (3) Dogwood Borer, (DWB) Synanthedon scitula presence
- (3) Trunk / Rootstock cambian / bark separation
- (1) Cankering on North face of trunk (Herbicide interaction?)
- (1) Slug feeding on decomposing roots
- (2) Tested positive **Apple Chlorotic Leaf Spot Virus** (ACLSV)

Tall Spindle Tree Decline on M.9

Orchard I: Pink Lady on M.9/Nic 29 rootstock in 2nd leaf

Highland, NY: 22nd of May 2015

- Tree decline in fall 2014; 15% of trees effected < 1% dead
- Purchased from Willow Drive Nursary, WA in 2014
- Evidence of **Black Stem Borer**, *Xylosandrus germanus* (Frass)
- No exposure to standing or excessive water
- 2014-15 season *without irrigation* on gravel loam.
- 300 yards from wooded edge

*(John Whiteman-CPS, Highland)

Tall Spindle Tree Decline on M.9

- **Shoot dieback**
- **Toothpick frass**

Tall Spindle Tree Decline on M.9

- **Cankering**
- **Rootstock frass in burrknots**

Tall Spindle Tree Decline on M.9

Single application of post bloom (May) Lorsban EC at 1.5 qt./A
Trees showed no signs of BSB activity on 11 Nov. 2015

Tall Spindle Tree Decline on M.9

Orchard II: Zestar 4th leaf on M.9 (337)
J**une 2015**, Columbia Co.

- Chlo*rotic foliage* in small numer of trees in 2014; 15-30% dead
- Nearby dead deciduous trees; *shale loam soil*
- Infestation of black stem borer: gallaries 3'' below the graft union, 5' above the soil line in lower scaffold limbs Sept. 2015.
- Apple Chlorotic Leaf Spot Virus (ACLSV) was detected from stem samples taken December 2015 (Marc Fuchs Lab-PPPM)

- Bark separationfrom trunk; Severe DWB injury

Black Stem Borer
Frass
Dogwood Borer
Frass

Tall Spindle Tree Decline on M.9

Orchard II: Fuji on M.9, 7th leaf on M.9 (337)
October 14, 2015. , Ulster Co.

500 Tree Block, 4 rows, 5’ x 14’, single wire

Symptoms included:

- Yellowing foliage, decline and death (chlorosis), bark scaling
- **Black Stem Borer**, (BSB) *Xylosandrus germanus* frass, gallaries in trunk
- **Dogwood Borer**, (DWB) *Synanthedon scitula,* larva & frass, bark loss and healing
- Trunk / Rootstock cambian / bark separation
- Cankering on North face of trunk (Herbicide interaction?)
- **ACLSV** in Fuji tested positive (chlorosis) and absence of chlorosis in adjacent rows of Camero (PCR-M.Fuch)

Tall Spindle Tree Decline on M.9

Injured

- Foliage Yellowing (September), browning, tree death
- Dogwood Borer
- Black Stem Borer
- Cankering
- Bark separation and cambium decline and death

Tall Spindle Tree Decline on M.9

Tall Spindle Tree Decline on M.9

Injured

- Yellowing
- Dogwood Borer (burr knot, bark scales & cambian feeding)
- Black Stem Borer
- Cankering

Tall Spindle Tree Decline on M.9

Injured

- Yellowing
- Dogwood Borer

Tall Spindle Tree Decline on M.9

DWB <u>Bark Scale Feeding</u>

- **Vascular cambium and wood interface**
- **Above and below graft union**
- **Larva over winter in webbed frass**

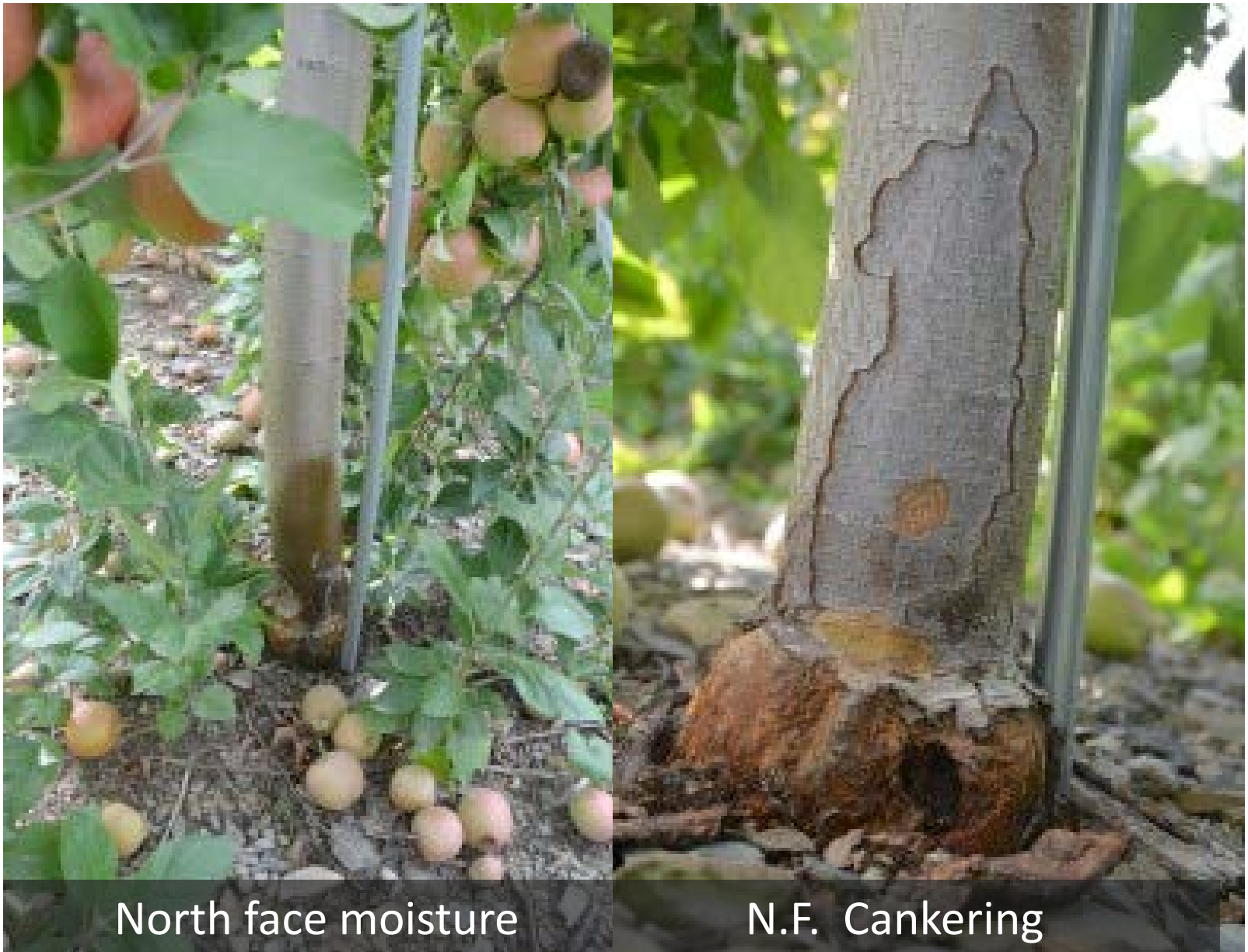
Dogwood Borer larva

Tall Spindle Tree Decline on M.9

Injury

- Yellowing
- Dogwood Borer
- Black Stem Borer
- Cankering

Tall Spindle Tree Decline on M.9



Tall Spindle Tree Decline on M.9

Injury

- Bark separation and cambium decline and death (Cankering?)

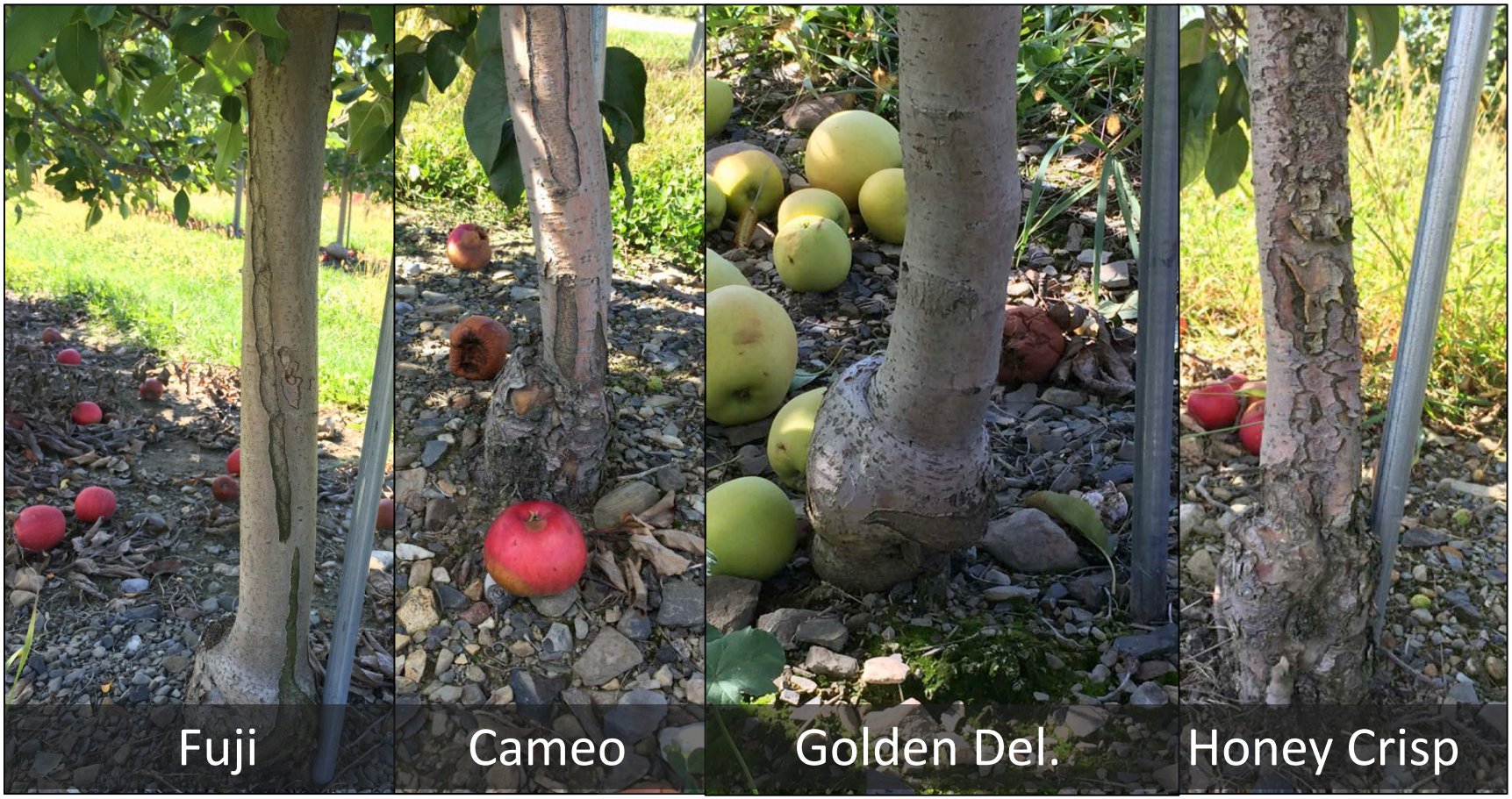
Tall Spindle Tree Decline on M.9

Cankering - bark separation

Tall Spindle Tree Decline on M.9

Healthy Trees: Growth Habit of Variety

- Bark Splitting
- Bark Flaking



Tall Spindle Tree Decline on M.9

Fuji M.9 Collapse

Tree Yellowing Associated to Dogwood and Black Stem Borer

No yellowing	% Yellowing	% Slight Yellowing	% Extreme Yellowing	% DWB	% BSB
41.8	58.2	46.7	11.5	52.0	26.0

Tall Spindle Tree Decline on M.9

Fuji M.9 Collapse

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No yellowing	% Yellowing	% Slight Yellowing	% Extreme Yellowing	% DWB	% BSB
41.8	58.2	46.7	11.5	52.0	26.0

Percentage of Trees in % Damage Rating Categories (DWB, BSB and or Dead Bark)

0 injury	0-60	61-80	81-90	100
9.0%	41.8%	8.2%	4.9%	30.3%
		43.4%		

Tall Spindle Tree Decline on M.9

Fuji M.9 Collapse

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0 injury	1-60	61-80	81-90	100
9.0%	41.8%	8.2%	4.9%	30.3%
		43.4%		

Percent of trees with visible canker

% Cankers	73.6
% Without Cankers	26.4

Canker Observations

Canker Location	# Trees	% Canker by Location
In Row	72	59.5
Out Row	17	14.0
None	32	26.4
Total Trees Assessed	121	

Tall Spindle Tree Decline on M.9

Lorsban / Chlorpyrifos (all formulations)

EPA issued a proposed revocation of Chlorpyrifos on Oct. 31, 2015, notifying the 9th Circuit Court of a final rule in December 2016.

(Chlorpyrifos levels found in drinking water, petition submitted by the Natural Resources Defense Council (NRDC) and Pesticide Action Network North America (PANNA)

Loss of Chlorpyrifos to the tree fruit industry. Pre-bloom mgt. of

- Dogwood Borer
- Black Stem Borer
- San Jose Scale
- Obliquebanded leafroller & green fruitworm complex

Tall Spindle Tree Decline on M.9

Estimated costs of applying chlorpyrifos (Lorsban 4E) based on a plant density of 800 trees per acre. (Agnello)

- $8 per hour for labor
- $30 per gallon for Lorsban 4E
- 1.5 Qts./A; $25 per acre

Option I: Replacement Insecticides:
Assail 30SG, Delegate, Belt and Rynaxypyr WG options for DWB Mgt.

- Presently Assail 30SG is labeled in NY.

Tall Spindle Tree Decline on M.9

Option II: Mating disruption in blocks of 5 acres or more using Isomate (CBC (America) Corp.)

Treatment with Isomate-DWB dispensers

- 150 per acre the first season
- 100 per acre thereafter
- Labor $63.60 per acre for the first season
  $42.40 per acre in subsequent seasons.

- No special equipment is needed
- Improved worker safety? (Agnello)

Tall Spindle Tree Decline on M.9

2016 ARDP Funded Project:

Project Outline:

Mating Disruption (MD) on three farms

- Application on (3) 5 acre blocks
- Assess overwintering DWB population
- Monitor DWB adult trap shutdown in MD blocks
  - In non-MD blocks

On farm and HVRL plot efficacy evaluatiuon for DWB larva mgt:
Assail 30SG, Delegate, Belt and Rynaxypyr WG

Assess the importance of irrigation & herbicide in tree decline

Tall Spindle Tree Decline on M.9

Prevention of Tree Decline in Tall Spindle

- Reducing tree stress
  - Use of NEWA / orchard soil moisture data weekly
  - Irrigation is critical in well drained soils
  - Improve drainage in wet sites

- Monitoring trees for dogwood borer feeding & BSM holes and frass
  - Yearly dogwood borer management of infested blocks

- Lorsban pre-bloom for BSB Mgt in stressed trees with new infestations (post prolong rain and flooding)
  - High volume whole tree
  - Concentrate dilute at base of tree

San Jose Scale Management

San Jose Scale, *Quadraspidiotus perniciosus*,

- **2-3 generations / year in NY**
- **Feed on the sap of apple trees**

Adults overwinter on fruit trees.

- **Males and females under chitin 'scale' protection**
- **Respiration increases in spring**

  Males emerge to mate (May 10th 2015: biofix)

- **Crawler emergence 400 DD_{51}**
  - **1st Gen. June 6th 2015; 2nd Gen. Aug. 1st; 3rd Gen. Sept. 25th**

San Jose Scale Management

San Jose Scale, *Quadraspidiotus perniciosus*,

- **Increasing SJS at packout across NYS**
- **Tenacious pest if left unmanaged; 2-3 gen.**
- **Female scale produce approximately 400 live young, "crawlers", over a 6-week period**

- **Requires insecticide residue over two applications to manage the crawler population**
- **Extended period of emergence (mid-June HVRL)**
- **Insecticide shadowing post bloom (contact insecticides)**

San Jose Scale Management

San Jose Scale, *Quadraspidiotus perniciosus*,

- **Multiple tactics are needed for 100% clean fruit**
- **Pre-bloom**
  - **(Contact) Oil at 3% DD; 2% GT; or 1%**
  - **(IGR) Esteem 35WP (4-5 oz./A) @ P**
  - **(IGR) Centaur 0.7WDG (34.5 oz./A) @ P**
  - **(Contact) Lorsban 4^{E} (1.5 Qts./A) @ DD-P**
  - **Excellent coverage (higher volume, low wind, slow speed)**

San Jose Scale Management

San Jose Scale, *Quadraspidiotus perniciosus*,

- **Post-bloom**
  - **Oil at 1%**
  - **Esteem 35WP (4-5 oz./A) @ PF-1st C**
  - **Centaur 0.7WDG (34.5 oz./A) @ PF-1st C**
  - **Movento + 0.25% oil** or penetrant such as LI700 at a penetrating rate (≥20 oz./100)
  - **Contact insecticides: 2 Apps beginning at 1st emergence**
    1st crawler + 14d; pyrethroids, Imidan

San Jose Scale Management

San Jose Scale, *Quadraspidiotus perniciosus*,
HVRL 2013

Treatment / Rate	% Clean of SJS Infested Cluster Fruit Ginger Gold
1. Oil 1% (dilute handgun)	100.0 a
2. Esteem 35WP (4-5 oz./A) @ PF	95.5 a
3. Centaur 0.7WDG (34.5 oz./A) @ PF	100.0 a
4. Lorsban 4E (64.0 fl. oz./A) @ DD	97.8 a
5. Movento + 0.25% v/v LI700 @PF, 2C	91.7 a
6. UTC	26.8 b

Codling Moth Management

Codling Moth (CM): *Cydia pomonella*

- **2 – 3 generations/year**
- **1st gen. adults emerge during late bloom-PF** (11th May, 2015)
- **Larval emergence using 220 DD_{50} from CM biofix (**27th May)
- **1st gen. adults emerge** (13th July, 2015)
- **Larval emergence using 250 DD_{50}** (20th July)

Obliquebanded Leafroller (OBLR): *Choristoneura rosaceana*

- **2 generations/year**
- **Overwiner as 3rd instar larva**
- **Adults emerge early June** (June 8th 2015)
- **Larva emerge after 308 DD_{50}** (June 20th 2015)

Codling Moth Management

Codling Moth vs OBLR-Leafroller Damage

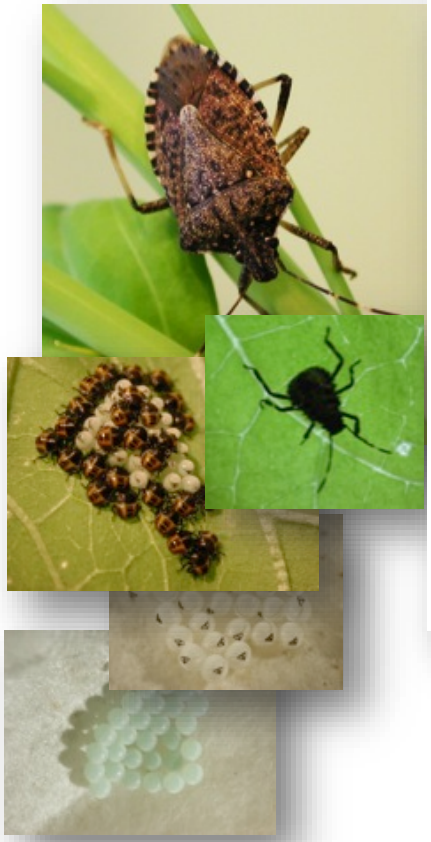
OBLR: Webbing, surface feeding only

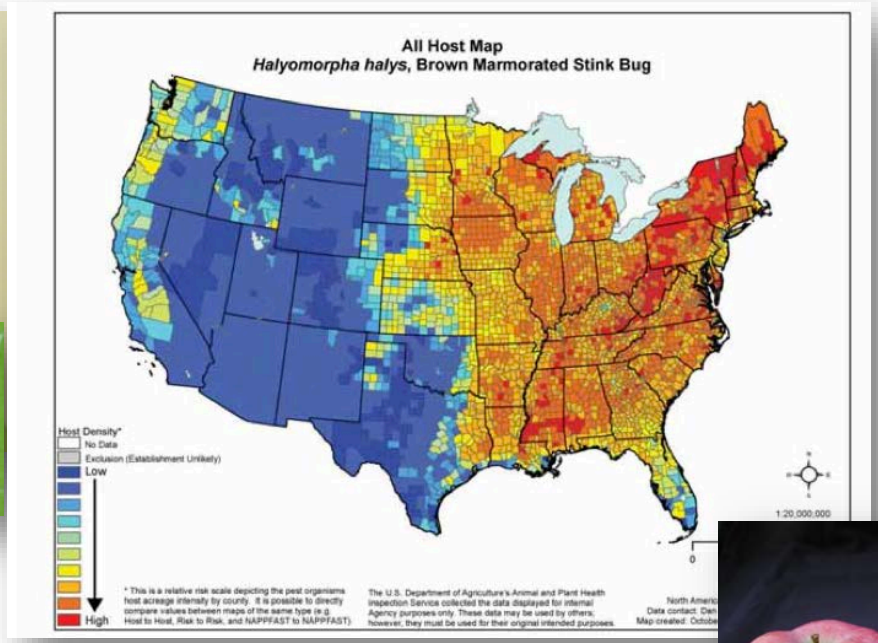
CM : Single hole in fruit
frass at calyx end
feed on seeds

Management timing is specific for each pest
CM: 1st – 2nd Cover & early July
OBLR late June & mid August

CM & OBLR Imidan, Intrepid, Proclaim, Altacor, Delegate
(OBLR- Bt yound larva, low rates @5d, Belt)

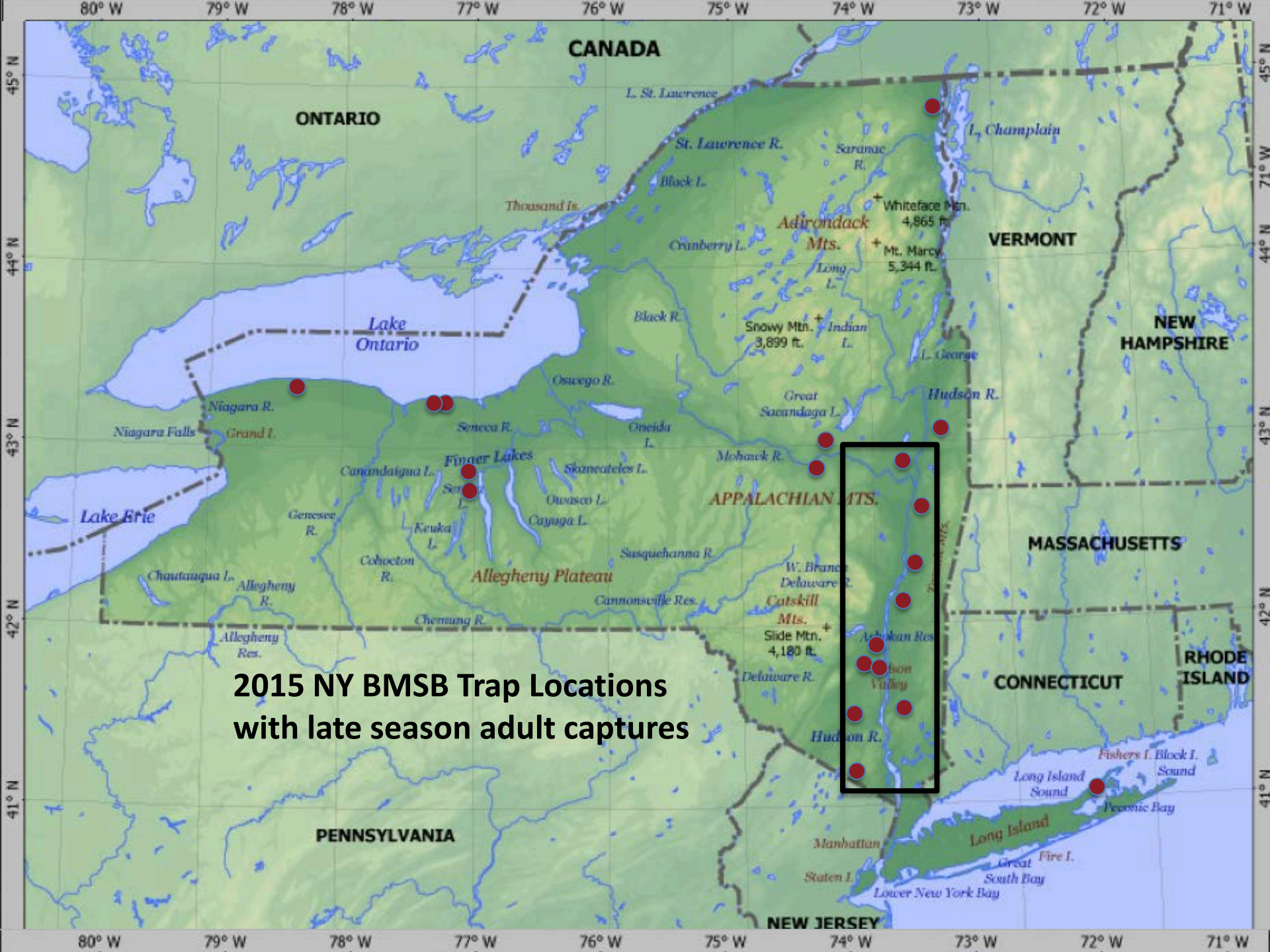
Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål): What Can We Expect in WNY Tree Fruit in 2016.



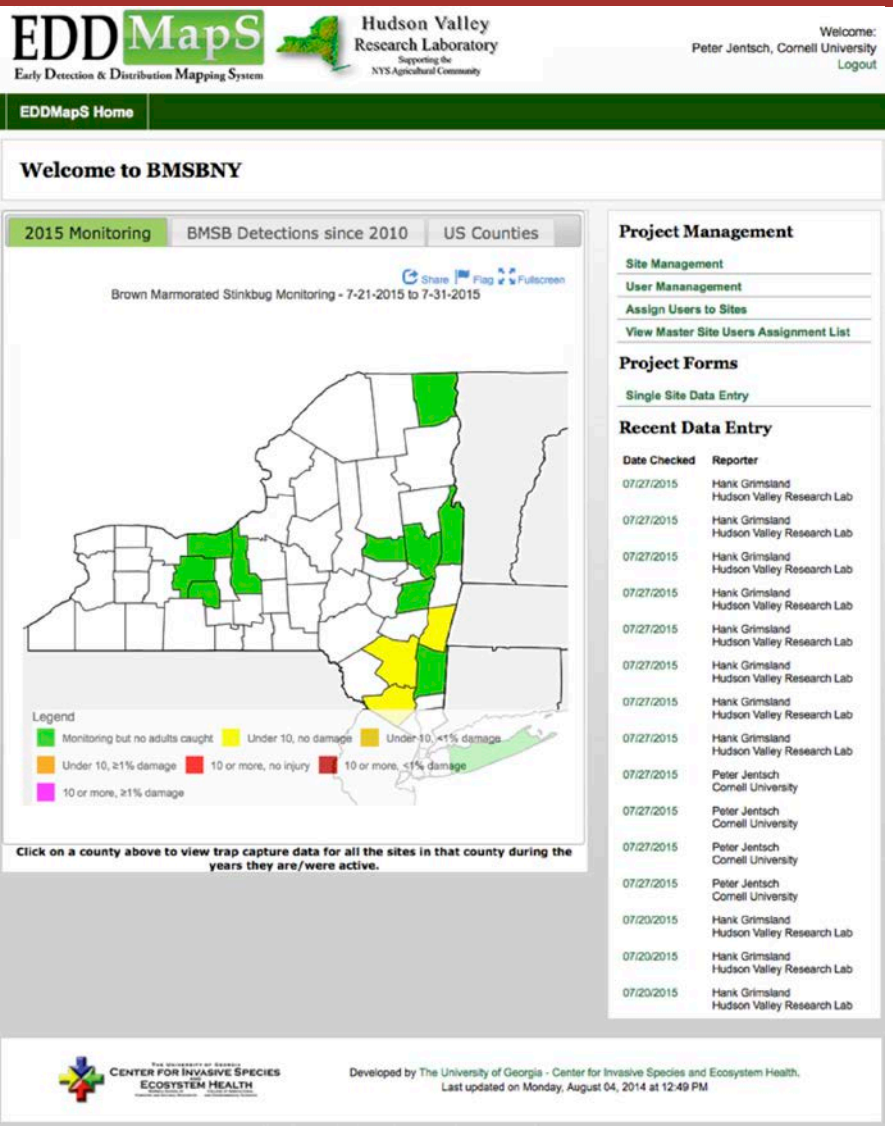


Golden Delicious Apple With BMSB Feeding Injury, Campbell Hall, NY October - 2012

5 bins: Range from 38 – 57% damage


2015 NY BMSB Trap Locations
with late season adult captures
CANADA
ONTARIO
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
CONNECTICUT
RHODE ISLAND
PENNSYLVANIA
NEW JERSEY
Lake Ontario
Lake Erie
L. St. Lawrence
St. Lawrence R.
Black L.
Thousand Is.
Saranac R.
L. Champlain
Whiteface Mtn. 4,865 ft.
Adirondack Mts.
Mt. Marcy 5,344 ft.
Cranberry L.
Long L.
Black R.
Snowy Mtn. 3,899 ft.
Indian L.
L. George
Hudson R.
Great Sacandaga L.
Oswego R.
Niagara R.
Niagara Falls
Grand I.
Seneca R.
Oneida L.
Finger Lakes
Canandaigua L.
Skaneateles L.
Mohawk R.
APPALACHIAN MTS.
Owasco L.
Cayuga L.
Genesee R.
Keuka L.
Chautauqua L.
Allegheny R.
Allegheny Plateau
Susquehanna R.
Cannonsville Res.
Catskill Mts.
Side Mtn. 4,180 ft.
Delaware R.
Allegheny Res.
Long Island Sound
Fishers I.
Block I. Sound
Peconic Bay
Long Island
Manhattan
Staten I.
Great South Bay
Lower New York Bay
Fire I.
80° W
79° W
78° W
77° W
76° W
75° W
74° W
73° W
72° W
71° W
45° N
44° N
43° N
42° N
41° N

EDDMaps.org/bmsbny/
BMSB Distribution in NYS Tree Fruit Orchards



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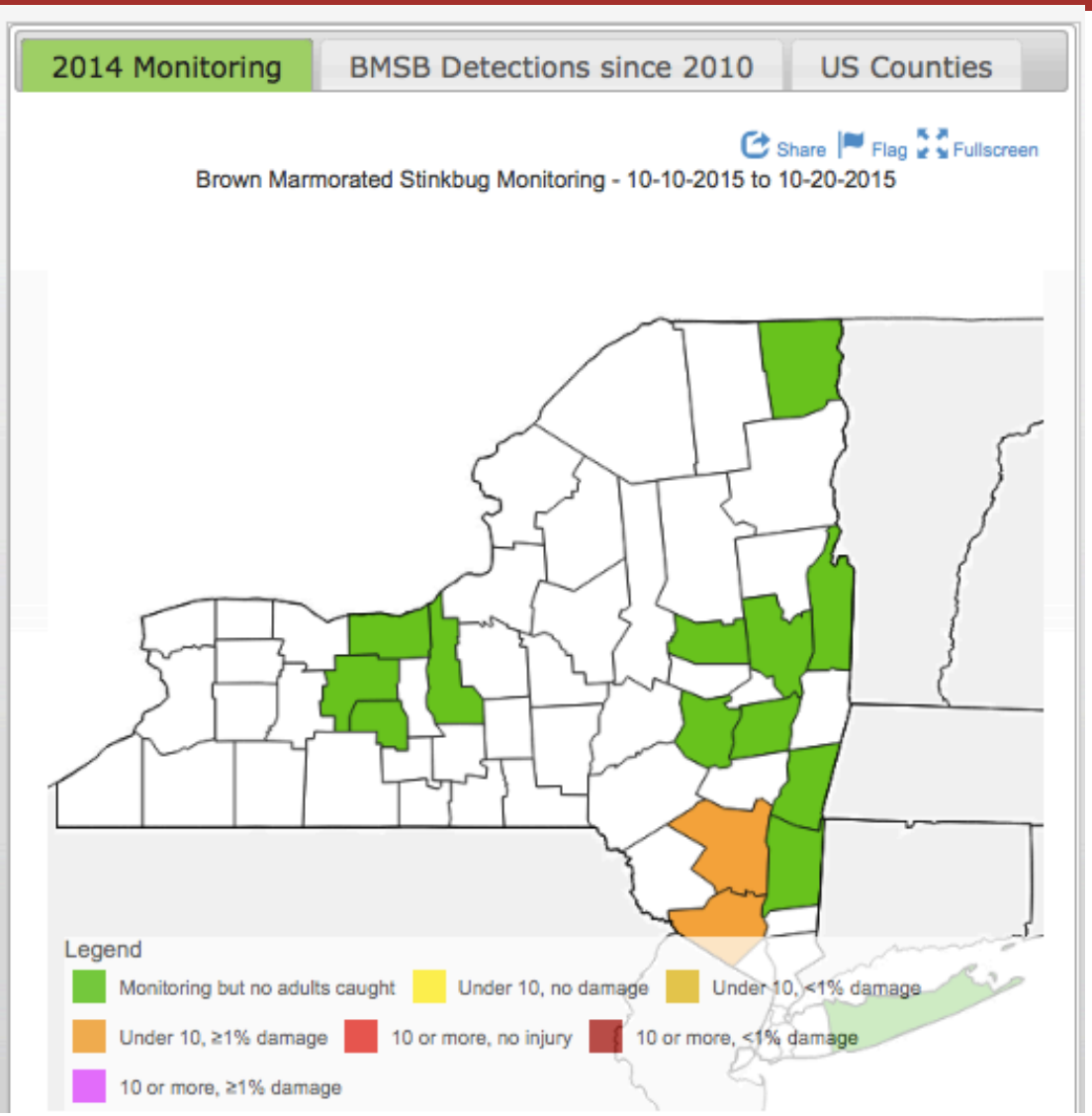
BMSB Distribution in NYS Tree Fruit Orchards



- Presence / absence
- Population Threshold
  + Damage Levels

EDD MapS
Early Detection & Distribution Mapping System

Hudson Valley Research Laboratory
Supporting the NYS Agricultural Community

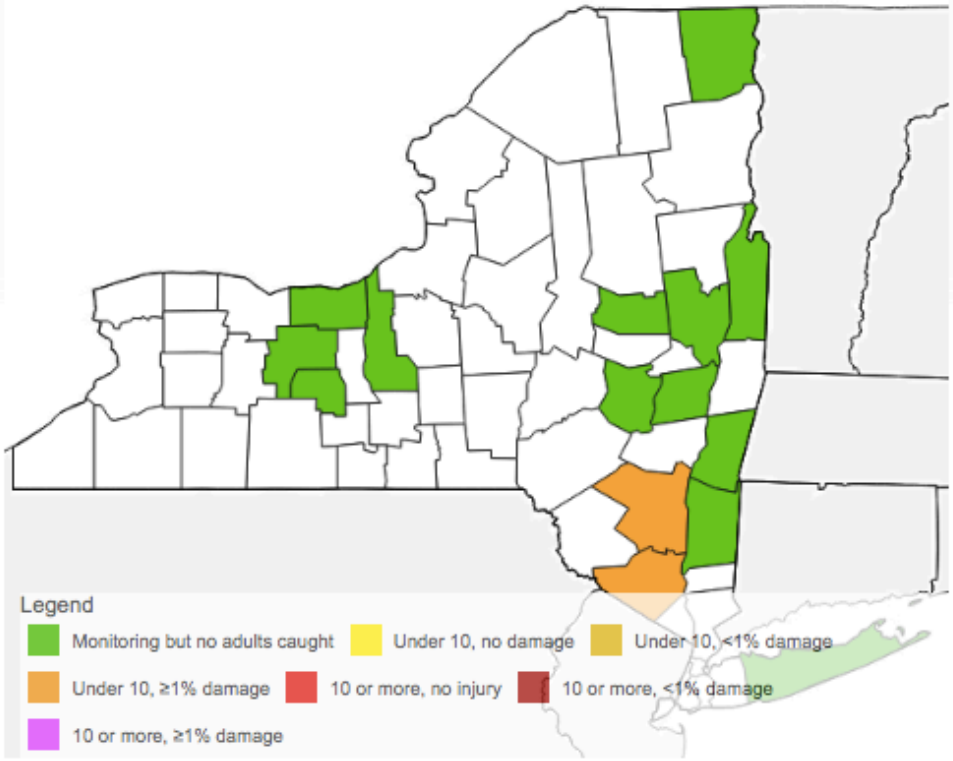
EDDMapS Home

Welcome to BMSBNY

2014 Monitoring | BMSB Detections since 2010 | US Counties

Share Flag Fullscreen

Brown Marmorated Stinkbug Monitoring - 10-10-2015 to 10-20-2015



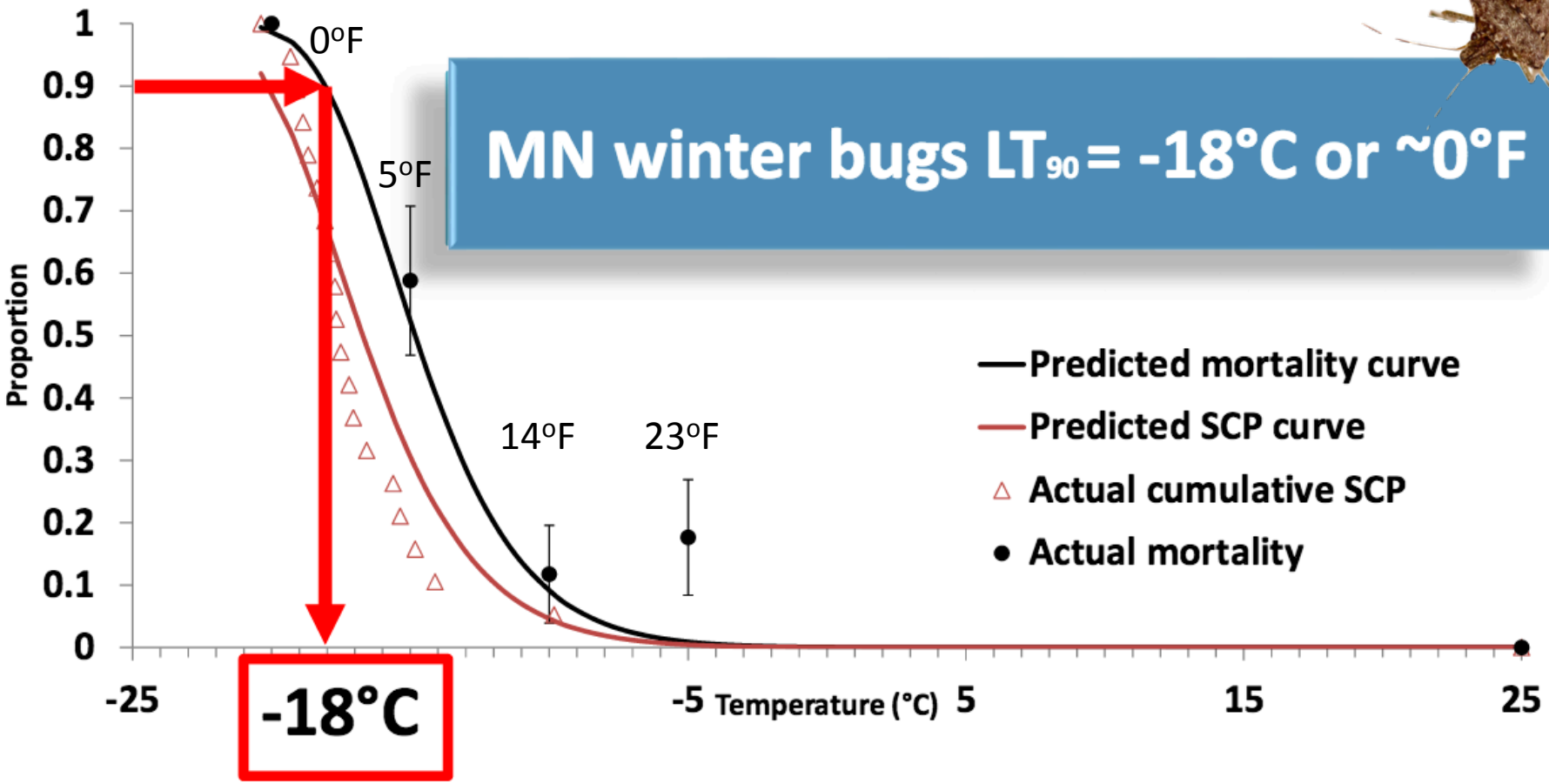
15 NYS counties / 44 Sites

- Absence (Green)
  Monitoring but no adults caught
- Presence (Yellow)
  Under 10, no damage
- Presence + Damage Levels
  Under 10, <1% damage
- Presence + Damage Levels
  Under 10, ≥1% damage
- BMSB Threshold + Damage Levels
  10 or more, no injury
- BMSB Threshold + Damage Levels
  10 or more, <1% damage
- BMSB Threshold + Damage Levels
  10 or more, ≥1% damage

Factors for BMSB Success: Overwintering

Predicted and observed BMSB: Cumulative SCP & proportion mortality

MN winter bugs LT_{90} = -18°C or ~0°F



SCP: n=19 bugs
Mortality: n=17 bugs/each temp (mean ± 95% confidence interval)
Regression curves fitted with a Weibull distribution

BMSB Management Threshold: Communication

- **2015: Employed a 10 Adult / Trap Threshold**
- **ENY CCE Hort News / Scaffolds: to disseminate recommendations**
- **Growers who suscribed to receive email Internet based link for BMSB mgt. recommendations as BMSB traps and damage levels are assessed**
- **Hudson Valley Research Lab: Blog site**
- **https://blogs.cornell.edu/jentsch/**