2017 Update on the Brown Marmorated Stink Bug

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Background – The Brown Marmorated Stink Bug, *Halyomorpha halys* (BMSB)

- BMSB was introduced from Asia to North America in the late 1990s
- In 2010, east coast apple industry alone loses $37 million in damage.
- Over 47 States have BMSB
- Pest of over 300 > hostplants
- www.STOPBMSB.org

Photo: J. Milnes

An Emerging Insect Pest of Concern

- Found on ornamental trees
- It will impact vegetable, fruit, berries, nuts, soybeans, maize hops production & grapes
- Emerge as a nuisance pest
- It will impact local residents as it invades homes in autumn.


Photo: M. Bush


Photo: J. Milnes

Stink Bug Damage to Fruit Crops

- **Fruit crops: apple, peach, Asian pear, pear, cherry, raspberry, blueberry, grape**
- **Vegetable crops: tomato, green beans, beans, pea, pepper, cabbage/cauliflower, cucumber, squash & pumpkin.**
- **Agronomic crops: hops, soybean, corn, sunflower**

Effects on Grapes


Photo: N. Wiman

- Feed on both concord and wine grapes[1]
- Can overwinter and survive in vineyards[2]
- Females feed more on grapes than males[3]
- Side effects = shriveled berries, mildew (mixed reports), brown necrotic spot from stylus that grows/deforms berry
- Border showed higher populations, especially near woods or houses

1. Bernon 2004, Wermelinger et al. 2008, Hamilton 2009, Pfeiffer et al. 2012, Smith et al. 2014
2. S. Basnet, T. P. Kuhar, C. A. Laub, and D. G. Pfeiffer. 2015. Seasonality and Distribution Pattern of Brown Marmorated Stink Bug (Hemiptera: Pentatomidae) in Virginia Vineyards. J of Econ Entomology. 108(4):1902-1909
3. Smith, J., S. Hesler, G. Loeb. 2014. Potential Impact of Halyomorpha halys (Hemiptera: Pentatomidae) on Grape Production in the Finger Lakes Region of New York. J. Entomol. Sci. 49(3): 1-14

An Emerging Insect Pest of Concern

- **Sample first! Pesticide applications effective when BMSB nymphs are present**
- **Why are pesticides not as effective as we hope?**
  - **Highly mobile adult**
  - **Numerous weed hosts**
  - **Urban = Reservoir**
  - **Feeding behavior reduces contact with pesticide residues. Bug does not ingest surface residues**


Photo: E. Beers


Photo: G. Hoheisel

IPM Strategy: Attract-and-Kill

- Testing traps and pheromone
- Aggregation pheromones


Photo: J. Milnes

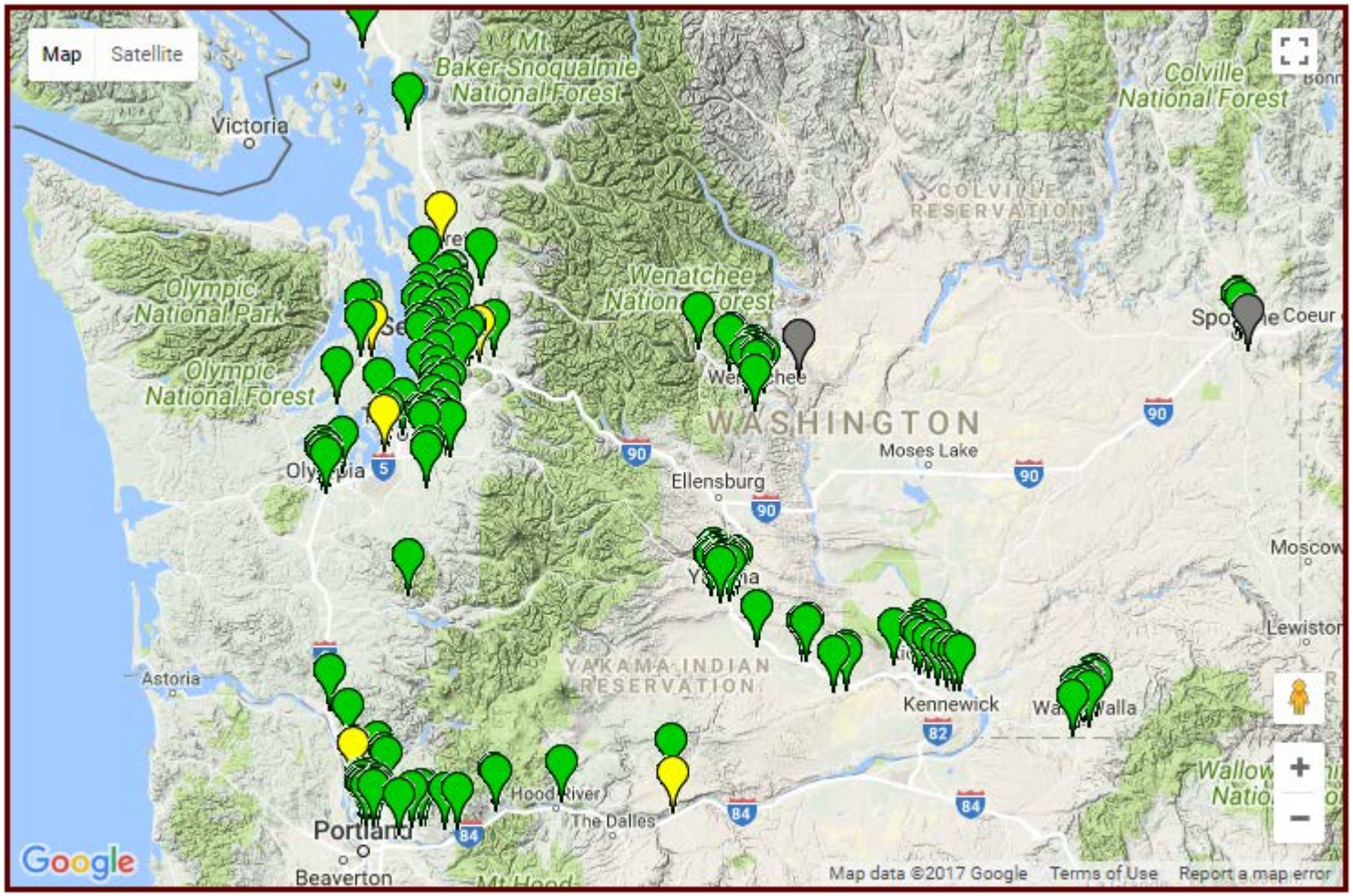

Photo: J. Milnes


Photo: J. Milnes

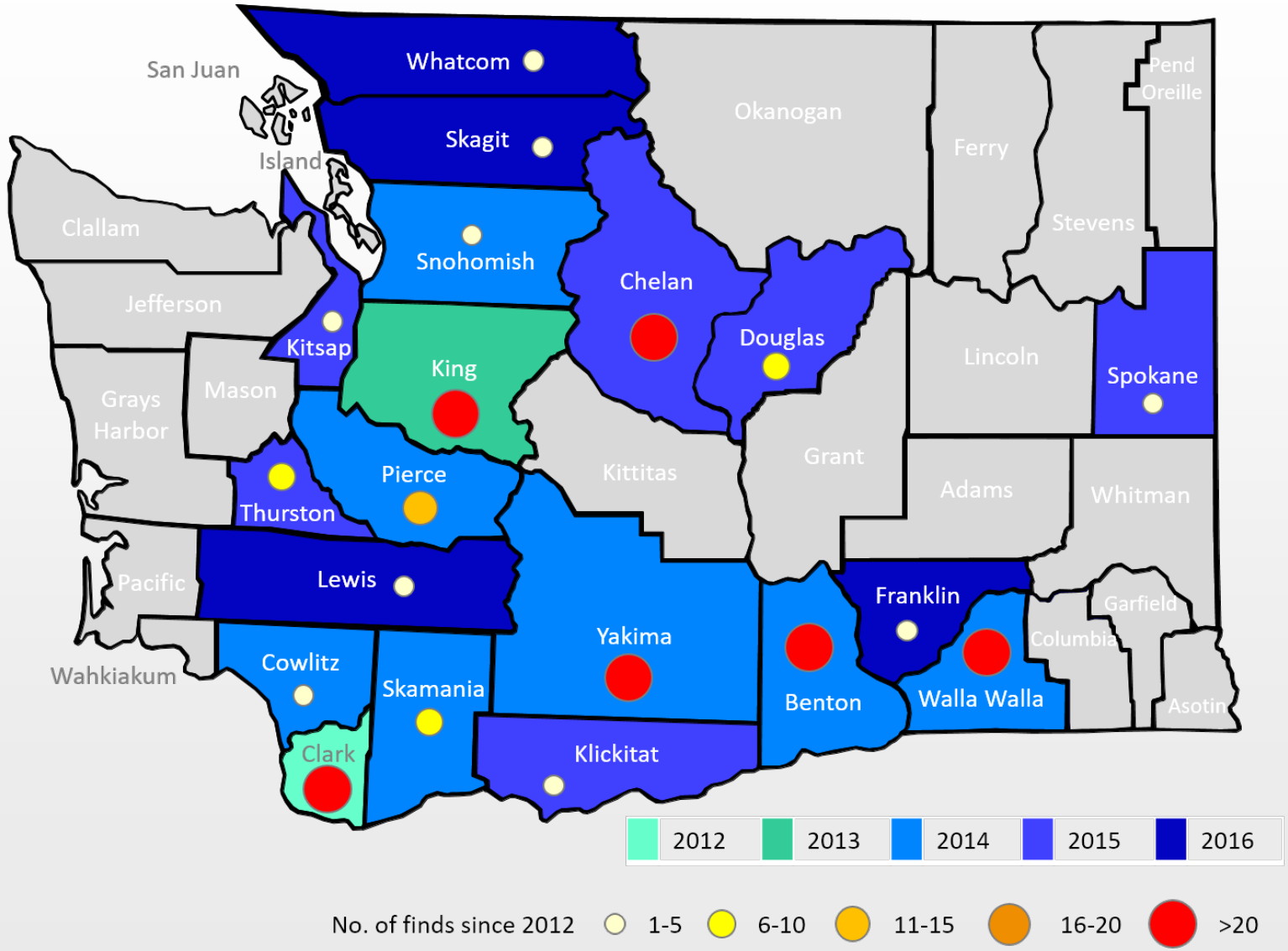
Distribution of BMSB in Washington 2012

WA Counties (2)
Clark
Skamania

www.tfrec.wsu.edu/pages/bmsb/Home



Current Distribution of BMSB in Washington 2017



Nov 13, 2017

Biological Control - Samurai Wasp

Biological Control of Pests Using Egg Parasitoids

- **Egg parasitoids are a major source of biological control for stink bugs.**
- **Sentinel egg mass surveys nation wide.**
- **Native egg parasitoids are tested to see if they will attack BMSB:**
  - **Super Family: *Eupelmidae*- Anastatus, Ooencyrtus**
  - **Super Family: *Scelionidae*- *Trissolcus*, *Telenomus.***

East Asia – Looking for a Solution to the BMSB Issue

- **2007, foreign exploration by Dr. Kim Hoelmer and associates.**
- **Locations: China, Japan and South Korea.**
- **In 2007, *Trissolcus japonicus* (Samurai wasp) was placed under quarantine in 5 locations across the USA.**

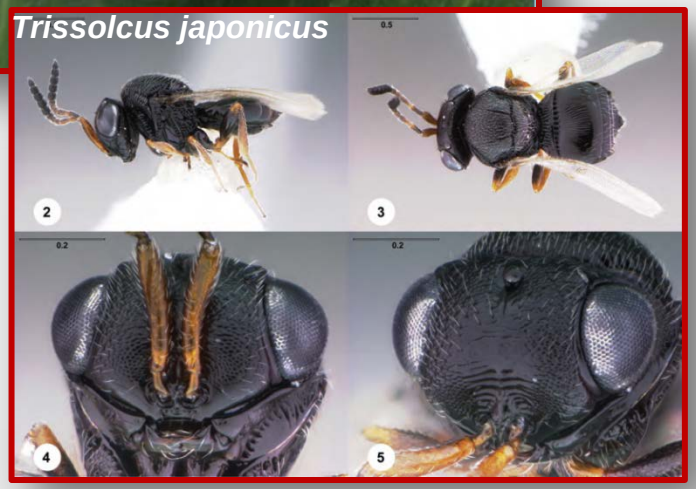


Photo: E. Talamas

Data by Dr. Kim Hoelmer. 2015 USDA-ARS-BIIRU-Newark.

- **Choice/No-choice tests preformed with different stink bug species egg masses to a mated female samurai wasp.**

No-Choice Test

24-h exposure to single egg mass of non-target host:

Control: another 24 hours with a single egg mass of the target host, *H. halys*:

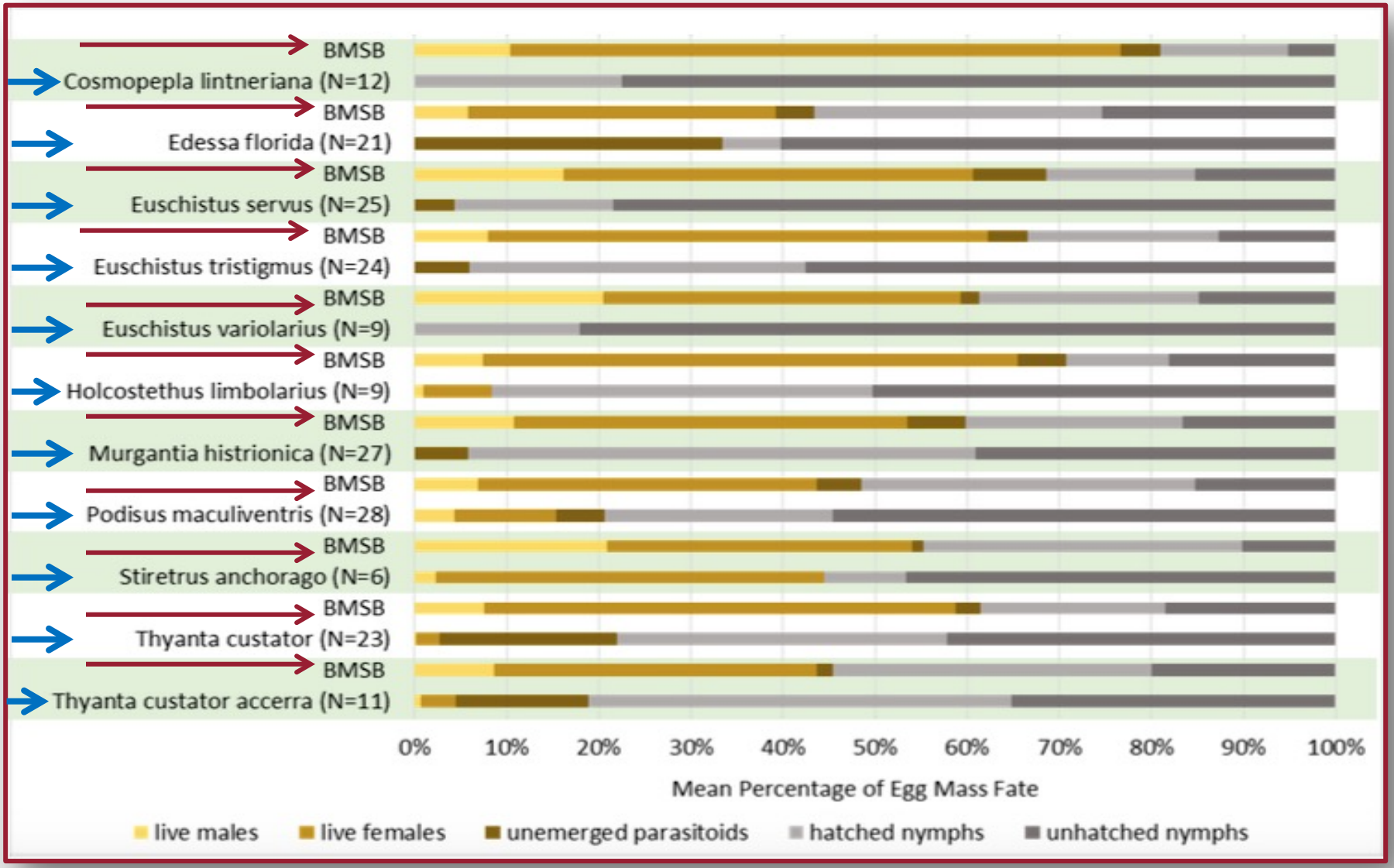
Choice Test

When no-choice tests show signs of parasitism, then submission to choice test

24-h exposure to both non-target and target host egg mass:

Data by Kim Hoelmer. 2015 USDA-ARS-BIIRU-Newark.

Host Range Test for the Samurai Wasp with Native Stink Bug Vs BMSB: Choice Test Outcomes



The Impact the Samurai Wasp has on BMSB

- Short development time
- 10 generations/year
- Female-biased sex ratio
- May attack all eggs in a host's egg mass
- Males emerge first and wait to mate with emerging females

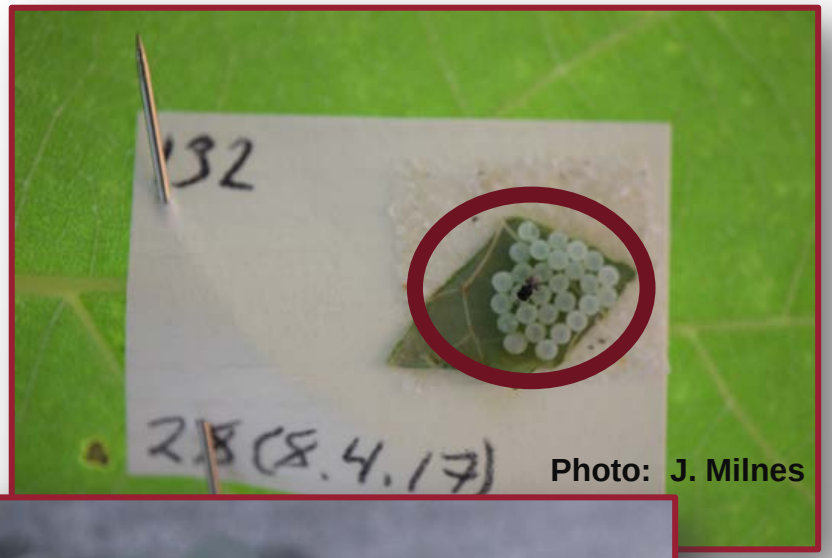


Photo: J. Milnes


Photo: J. Milnes

Data by Dr. Kim Hoelmer. 2015 USDA-ARS-BIIRU-Newark.

Sentinel Egg Masses Survey in Washington WA

Preparing BMSB egg masses (EM) for placement

- Checked BMSB colonies each morning for freshly-laid (<24h old) EMs.
- EMs transferred onto cardstock.
- SEM placed on the underside of a leaf for 2–3 days.


Photo: J. Milnes

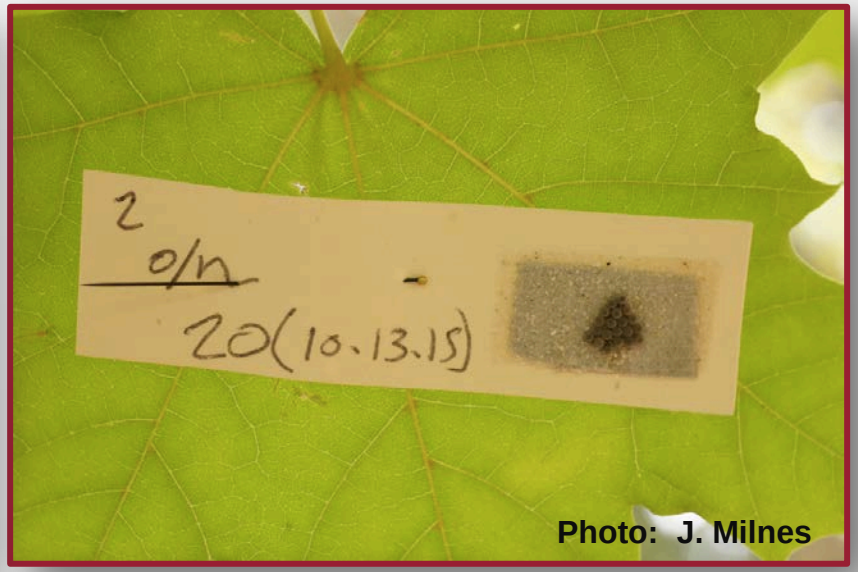


Photo: J. Milnes

SEM Incubation Process

- Predators observed attacking the BMSB eggs:
  - Earwigs, flies, spiders, big-eyed bugs, lacewings instars.
- Eggs collected from the field were placed in a small petri-dish and put in the incubator at room temperature.
- Observed for any egg parasitoids to emerge from native and non-native stink bug eggs.


Photo: J. Milnes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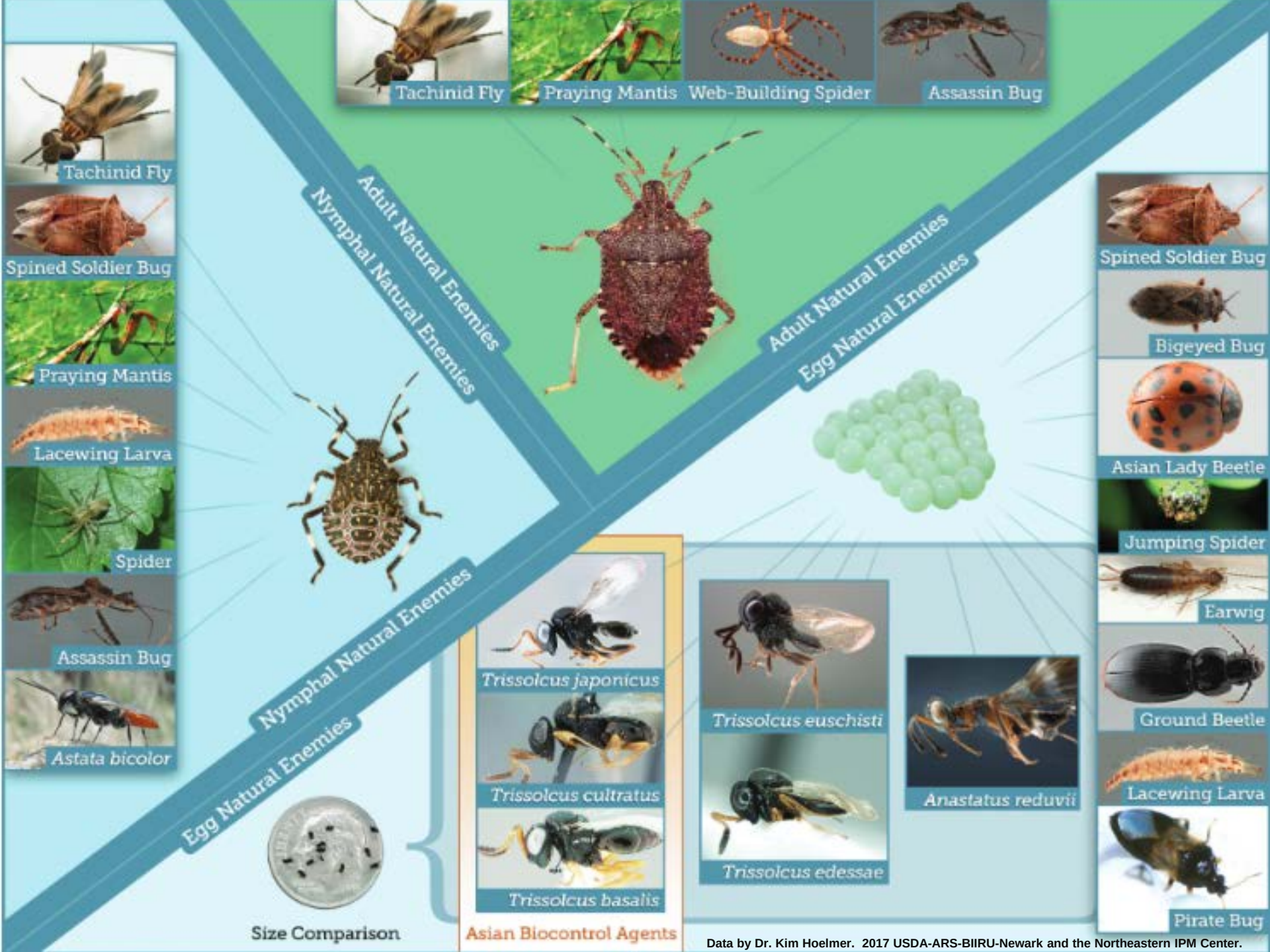

Data by Dr. Kim Hoelmer. 2017 USDA-ARS-BIIRU-Newark and the Northeastern IPM Center.

Discovery of the Samurai Wasp in Vancouver 2015 and in Walla Walla 2017

- First sighting of Samurai wasp in a park in Vancouver WA.
- Second sighting of Samurai wasp in a park in Walla Walla WA.

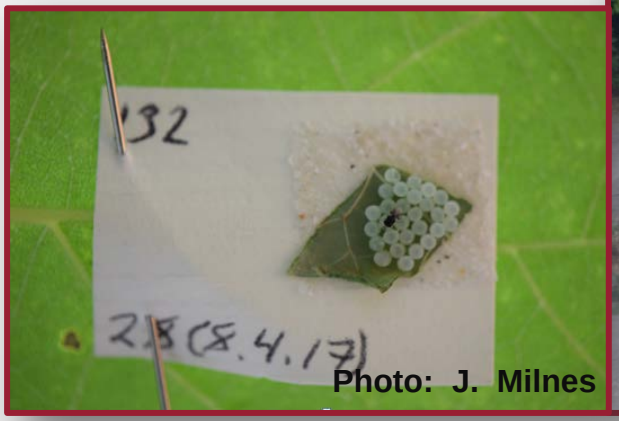

Photo: J. Milnes


Vine Maple

Photo: J. Milnes

Choice Tests in the Field Comparing EM of Native Stink Bugs Vs BMSB in Vancouver WA

Release of Samurai Wasp in Washington State 2017!

- **Release of the samurai wasp in Yakima WA.**
- **21 parasitized EMs were placed in the field.**

Photo: J. Milnes

Photo: J. Milnes

What does the Future Hold for the Samurai Wasp

- 1) More release of the samurai wasp in new areas.
- 2) Looking at 'non-target effects' (eg. could the samurai wasp attack US native stink bug eggs?).
- 3) Looking at the samurai wasp host plant range in urban areas in Washington state. (eg. Would there be enough diversity in nectar host plants to support the wasp population?).
- 4) Native and introduced enemies may provide the most promising long-term solutions for landscape-level reduction of BMSB population in Washington.

Acknowledgements

- Gwen Hoheisel WSU Extension and Dr. Michael Bush WSU Extension for their advice and help along the way.

Teneral Adult BMSB

WASHINGTON TREE FRUIT RESEARCH COMMISSION


A fully developed female parasitoid, ready to emerge
Questions?
Photo: Ashley Colavecchio