Spotted Wing Drosophila and Brown Marmorated Stinkbug Update

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SWD was identified by the CDFA in 2008

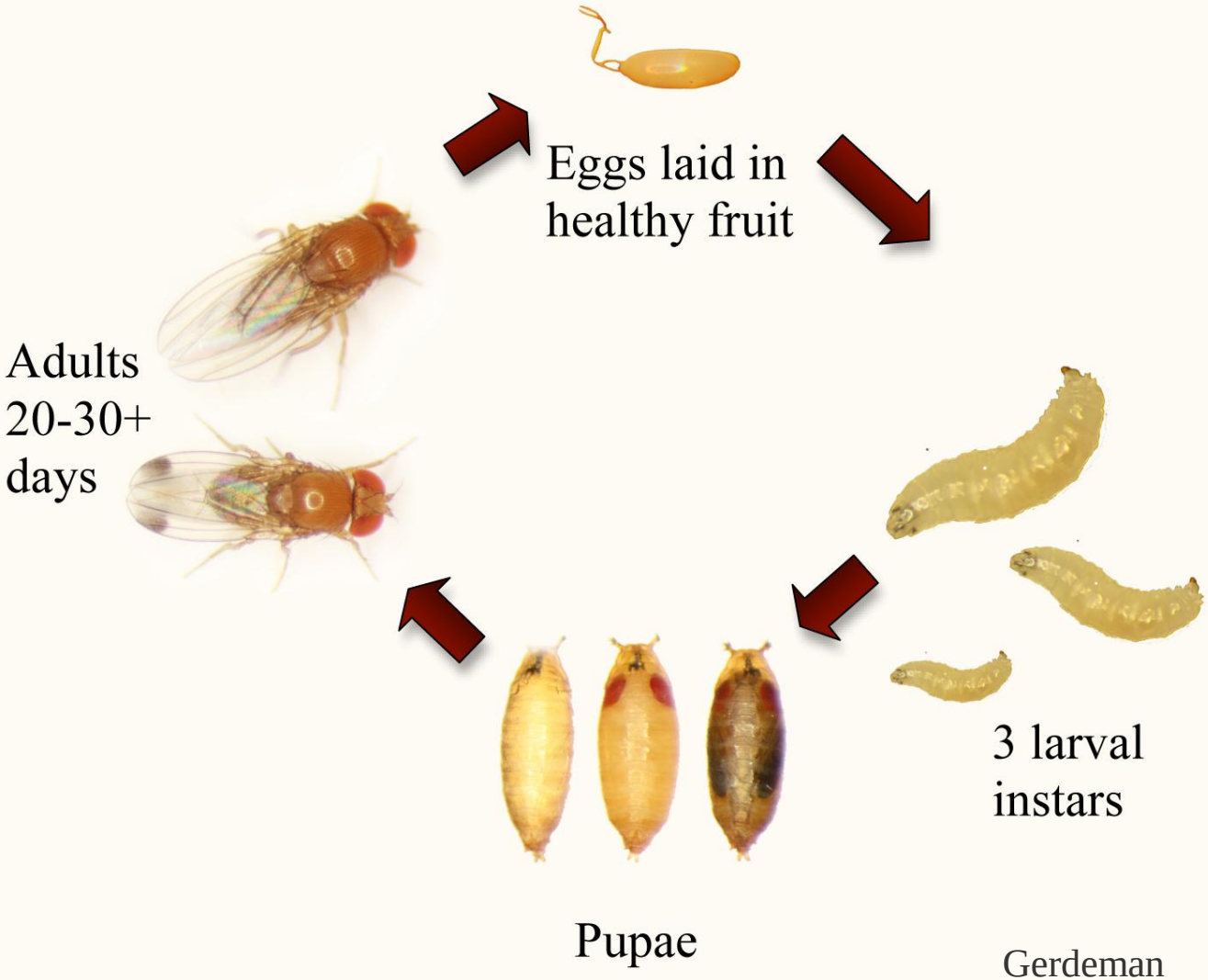
Originally from Japan, Korea, China, highlands of southeast Asia and foothills of the Himalayas

Fruits Affected by SWD

Blueberries
Raspberries
Blackberries
Boysenberries
Strawberries
Cherries
Peaches
Asian Pears
Figs

Grapes
Nectarines
Asian Plums
Plumcots
Elderberry
Cold Hardy
Kiwi
Italian Prunes
Persimmons

SWD LIFE CYCLE



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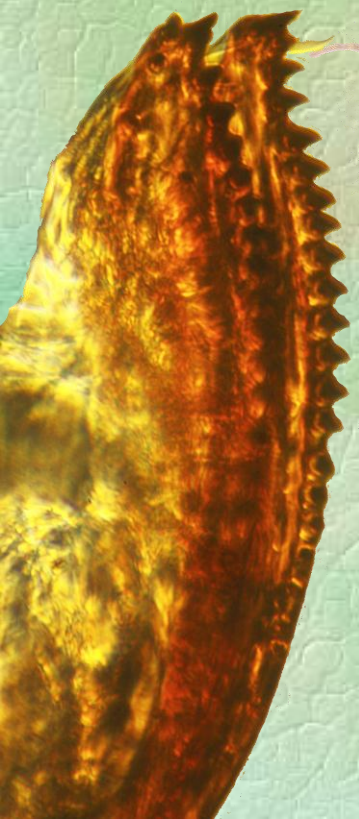
Spotted Wing Drosophila Adults

Females

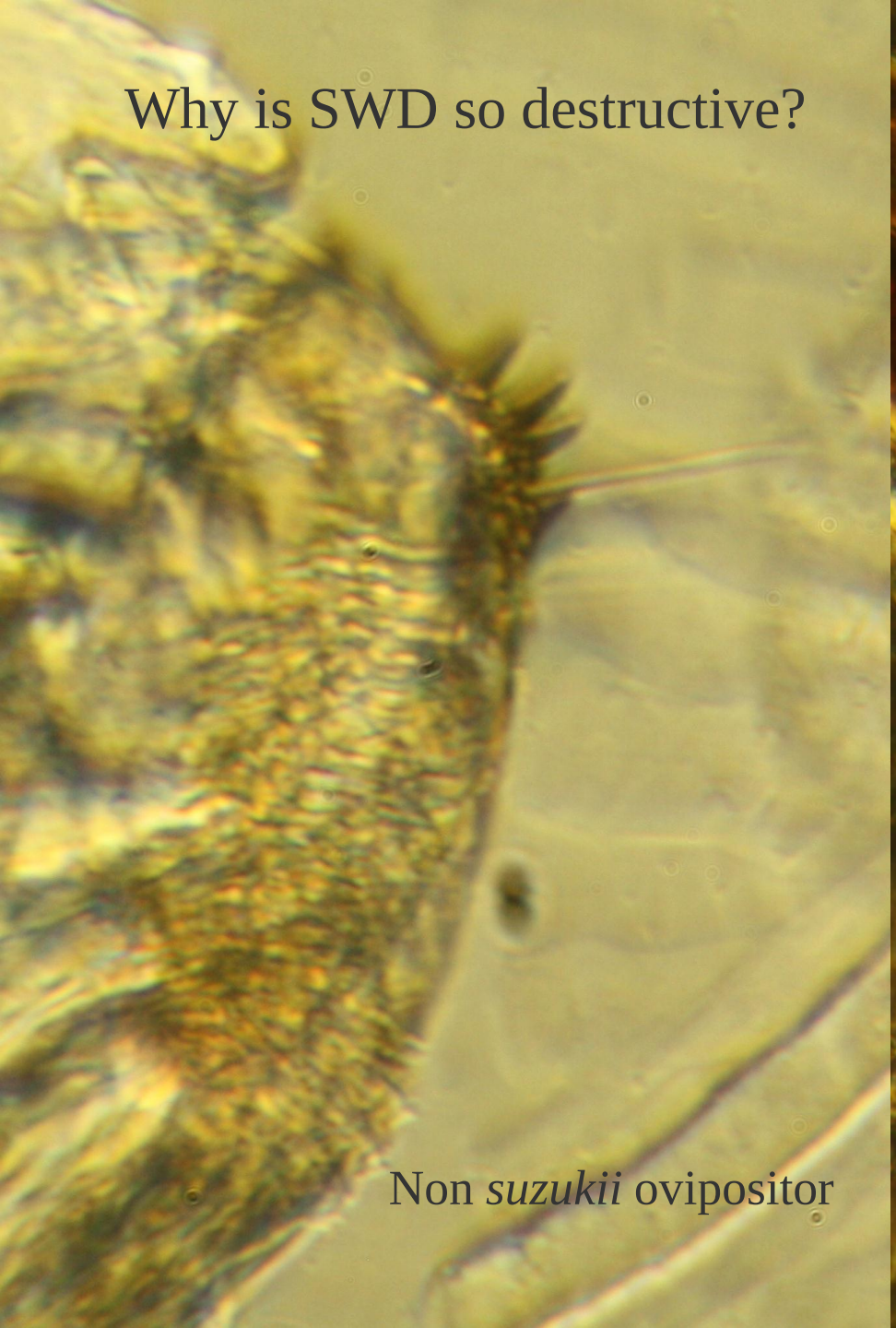
- Ovipositor easily observed in traps
- Lack wing spots



Males

- Wing spots near bottom outside edge
- First legs have 2 rows of sex combs.

Why is SWD so destructive?



Non *suzukii* ovipositor

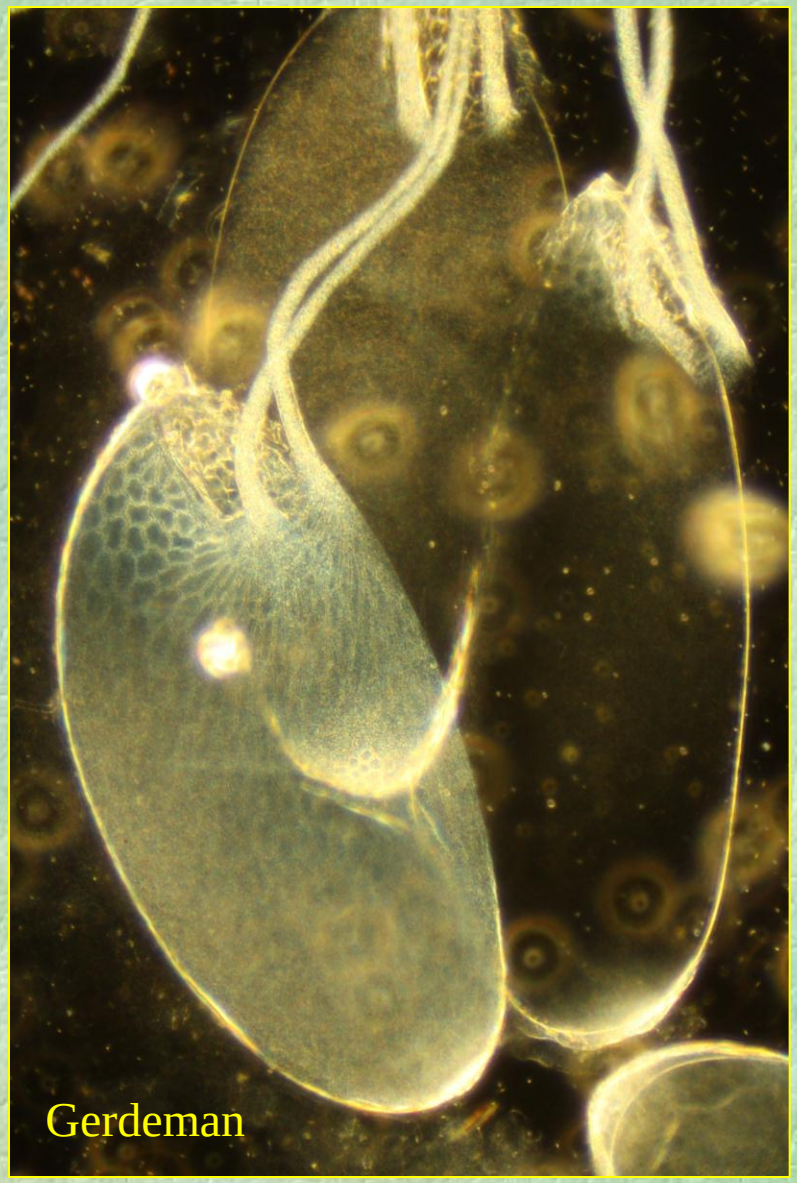
D. suzukii ovipositor
highly adapted for cutting.

Spotted Wing Drosophila Egg Deposition

Spotted Wing Drosophila Life Cycle

Eggs

- Laid in maturing fruit
- Hatches in 12-72 hours
- 350+ eggs/female



Respiratory filaments can be seen with a 10X hand lens and even the naked eye with training and sharp eyesight

Eggs

- Laid in maturing fruit
- Hatch in 12-72 hours
- 350+ eggs/female

Larvae

- 3 instars
- 5-7 days
- 3rd instar - wandering

Spotted Wing Drosophila Life Cycle

Pupae

- 3rd instar larval cuticle hardens to form puparium
- 4-15 days


B. S. Gerdeman


Gerdeman

Beginning on 9/7/2011 we ran a weekly series of no-choice field cage studies where we exposed *cvs*. ‘Reisling, Merlot, and Concord’ to SWD. Eggs and larva were detected on the caged fruit at dates near harvest, but no adults were detected indicating that SWD did not complete a generation in Washington grapes.

These results are nearly identical to 2010.

Concord Harvest Date October 31

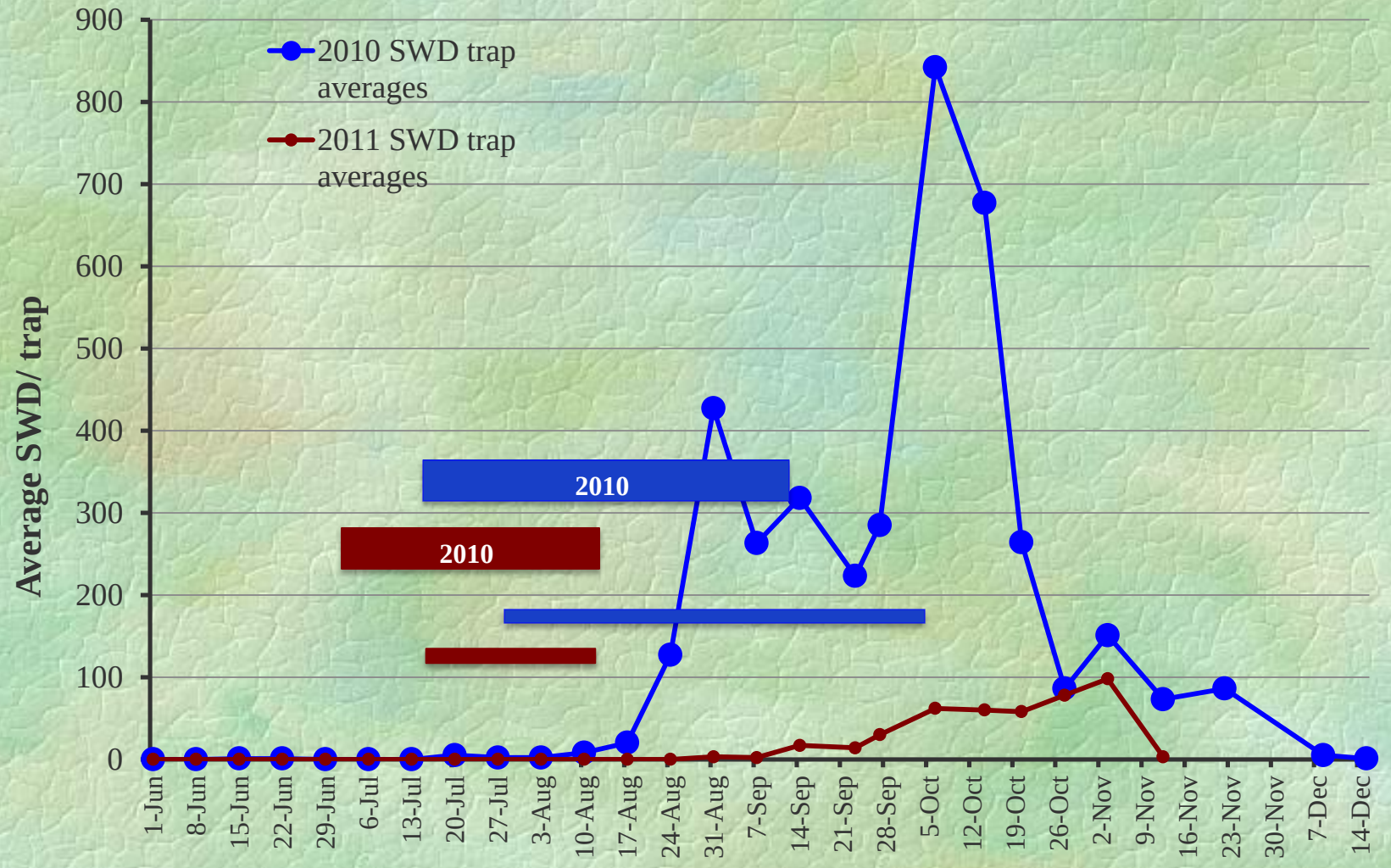
Date[1]	Brix	TA/l	pH	Eggs	Larva	Pupae	Adults
9/28	17.8	0.47	3.34	0	0	0	0
10/5	17.8	0.45	3.33	2	0	0	0
10/12	21.8	0.84	3.23	11	0	0	0
10/19	17.9	0.51	3.37	2	0	0	0
10/25	19.2	0.27	3.54	0	0	0	0

1/ Date shown indicates when fruit in cages were exposed to SWD. Cages were collected 7 days later and fruit was left on the lab bench to permit adult emergence

Overview remarks from entomologist, Doug Walsh, WSU, Prosser, WA.

1. Grapes are not a preferred host and grapes need to be way overripe before they get attacked by SWD.
2. Westside grape grower's viticultural challenge is just getting the grapes ripe.
3. Simple fact that we do not hear about any California coastal vineyards getting hit by SWD leads one to concude that wine grapes are not a preferred host.

SWD population trends in blueberry and red raspberry at the WSU NWREC for 2010 and 2011.



Summary Insights on SWD Management, 2011

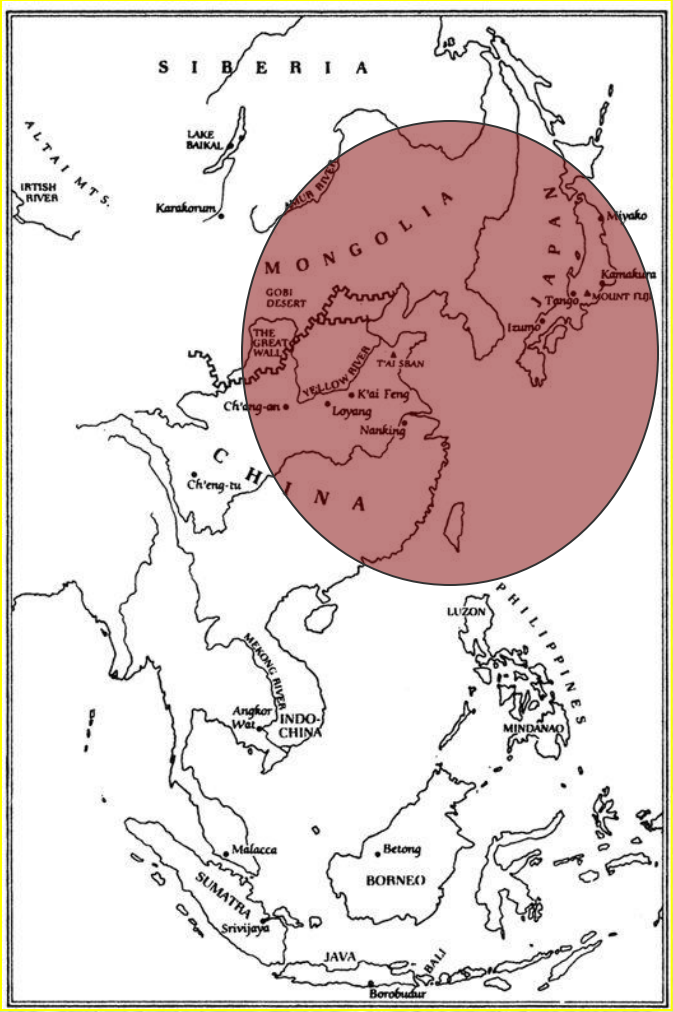
- Monitor ACV traps closely as small fruit approach ripening/increased fruit ripening volatile/odor cues for SWD females.
- Critical treatment threshold is first presence of SWD in traps or fruits (reproductive capacity, eggs in fruit, migration).
- Difficult to clean-up SWD if the first contact, cover applications is late (e.g. 1-3 days).
- A rescue cover application by helicopter or chemigation can effectively knockdown immigrating adult SWD at first fruit ripening.
- With the exception of the neonicotinoids, all of the commercially registered insecticides are effective contact/stomach poison chemistries.

- Good coverage of the foliage and fruit is key for effective contact activity to prevent egg laying in maturing fruit (gallonage/ac, pressure and speed).
- Rotate MOA insecticides to delay onset of tolerance and cross-resistance.
- Apply full labeled rate of each insecticide and consider PHIs and REIs of each when formulating your pest management program.
- Use enough monitoring traps along perimeter and within-in field to calibrate each application for immigrating flies from outside the crop. These observations will provide growers with insights about the protective residual of each insecticides.
- This knowledge about field residual is critical to SWD management for not leaving fruit unprotected between rotations.

Distribution and Host Range of the BMSB

- Brown marmorated stink bug (BMSB), *Halyomorpha halys*, invasive insect native to Japan, Korea, Taiwan and China.
- BMSB officially identified in 2001, Allentown, PA, established throughout the mid-Atlantic region and officially detected in 30 states.
- Severe pest in PA, NJ, DE, MD, WV and VA. Recorded in OR, 2004 and easily collected in Vancouver, WA, fall of 2010.
- Within Asia, 300 host plant recorded. US surveys identified apple, plum, peach, pear, cherry, raspberry, blueberry, grape, pecan, bell pepper, tomato, pole/bush beans, cucumber, sweet/field corn, soybean ornamental trees and shrubs (maple, dogwood, crabapple, hawthorne, elm, sycamore, serviceberry and magnolia.

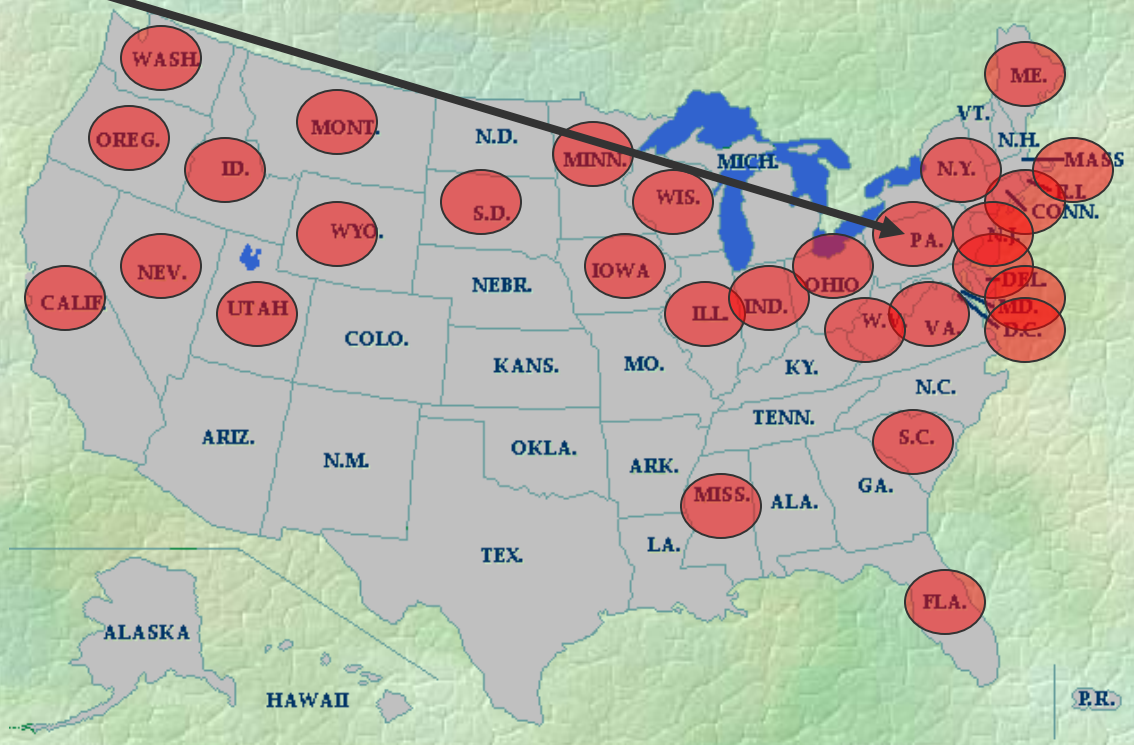
Brown Marmorated Stink Bug – Native Range



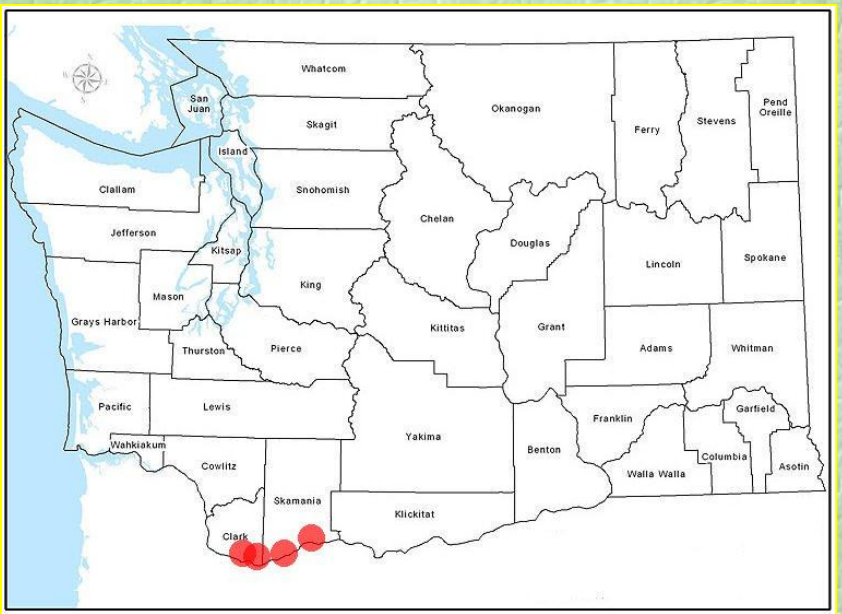
Japan, Korea, Taiwan and China

Brown Marmorated Stink Bug – North America

2001, Allentown PA



Report New Infestations



Collect the sample!

Check your ID resources or drop off at your local extension office

All new records will be reported to WSDA

Only known to occur in Clark and Skamania counties in Washington State.

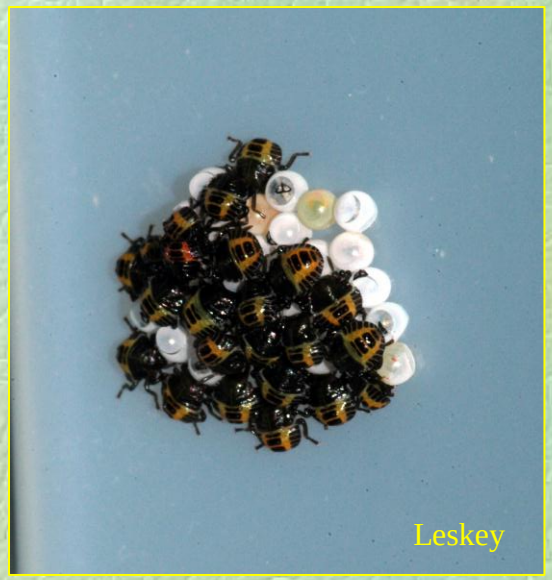
Brown Marmorated Stink Bug

Halyomorpha halys (Hemiptera: Pentatomidae)

Biology

- Overwinter as adults, emerge in spring and begin mating two weeks later. 1-6 generation/year. Between 200-500 egg/female.
- Eggs are laid in egg masses/clusters containing 25-30 eggs on the underside of leaves.
- Life stages: egg, 5 instar nymphs (wingless versions of the adult) and adult (male & female).
- Called stink bugs because they produce a disagreeable odor from specialized body glands when disturbed.
- Piercing-sucking mouthparts, slender beak-like structure.

Life stages - mid-April to October, WV



Brown Marmorated Stink Bug - Life Cycle

- 200-500 egg/female
- Eggs laid in clusters of 25-30
- 1-2 generations per year ??
- Up to 6 in warm climates

Brown Marmorated Stink Bug - Life Cycle

Winter aggregations

BMSB feeding damage

Brown Marmorated Stink Bug – Damage

Brown Marmorated Stink Bug – Hosts

Paulownia tomentosa

Royal Princess or Empress Tree

Brown Marmorated Stink Bug-Pest Status

- Severe damage in Mid-Atlantic states in 2009-2010. $37 million in damages to apple growers in MD, PA, and WV
- 20%-100% crop loss

USDA/ARS AFRS, Leskey 2010

- Pyrethroid Brigade, carbamate Lannate, organochlorine Thiodan, OPs Lorsban, Malathion, Cygon and Supracide showed good activity as direct contact on dried insecticide residues.
- Many newer “reduced-risk” insecticides proved far less efficacious under laboratory conditions.
- All registered neonicotinoids, Agri-Mek, Beleaf, Avaunt, Movento, Cyazypyr are not effective.
- Biological control: egg and adult parasitoids attacked BMSB at less than 5%. China, *Trissolcus* species caused 50-80% egg parasitism and adapted to BMSB. Years away from being implemented.

Chemical Management

- No system to effectively/reliably monitor BMSB in any cropping system.
- Newly established invasive pest, insecticides are needed to manage BMSB on specialty crops in the short term.
- Newer reduced-risk and OP-replacement insecticides are generally NOT effective against BMSB.
- 2010, no field-based management recommendations.
- Pyrethroids proved problematic because many recovered after initial knock-down; >33% moribund BMSB recovered after direct exposure to cyfluthrin.
- Commercial orchards, 80% recovery rate for insecticide exposure reported.

Prototype BMSB Monitoring Traps

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