

Identifying BMSB Damage on Tree Fruit

Tree Fruit IPM School, February 2, 2017

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Outline

- Where BMSB is being found in MI
 - 2016 Trapping Network
 - Citizen Science Reports
- When is the damage likely occur in MI
- When does the damage become apparent and what does it look like
- Resources
- **SAVE THE DATE!**





2016 Trapping Network

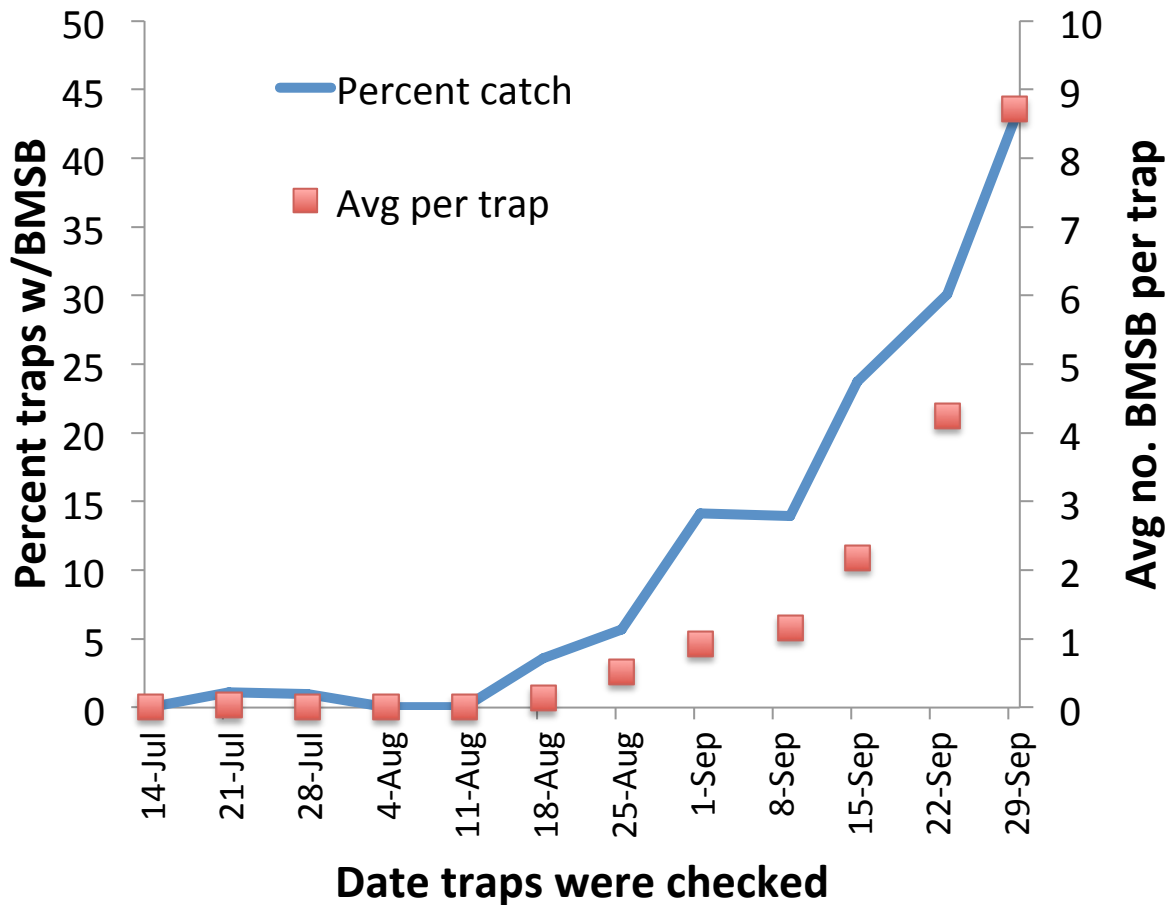


- 80 sites (58 tree fruit)
 - apple, peach, plum, sweet & tart cherry, blueberry, grape, strawberry, vegetables
- 21 Counties (all major fruit producing counties)
- Pyramid or Rescue[®] traps baited with commercial lures
- Checked weekly, July-October
- 9 reports posted online to MSU Extension News for Ag





2016 Trapping Network



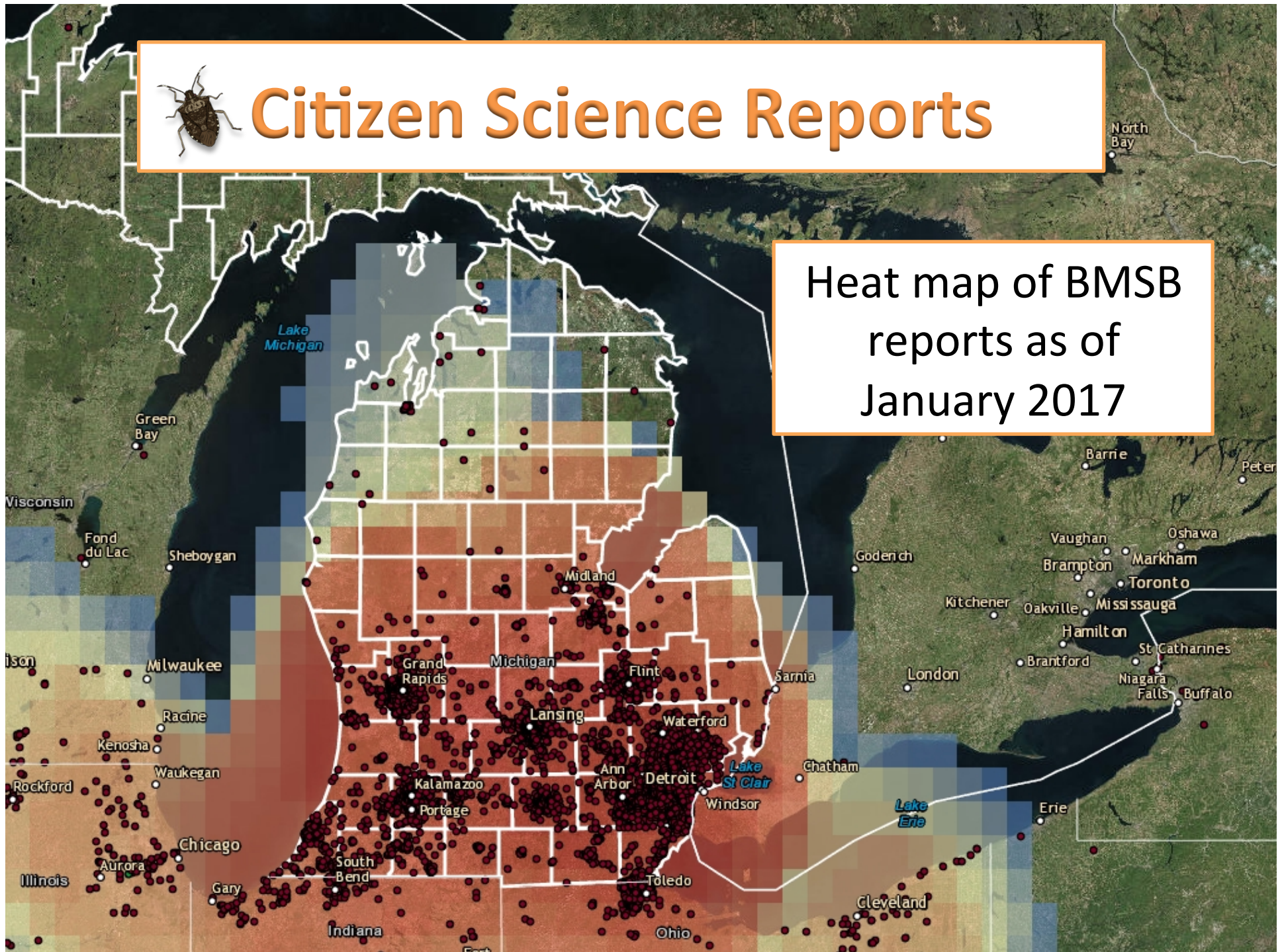
- 1,934 BMSB caught from 11 counties.
- 45% of traps caught at least 1 by Sept 2016.



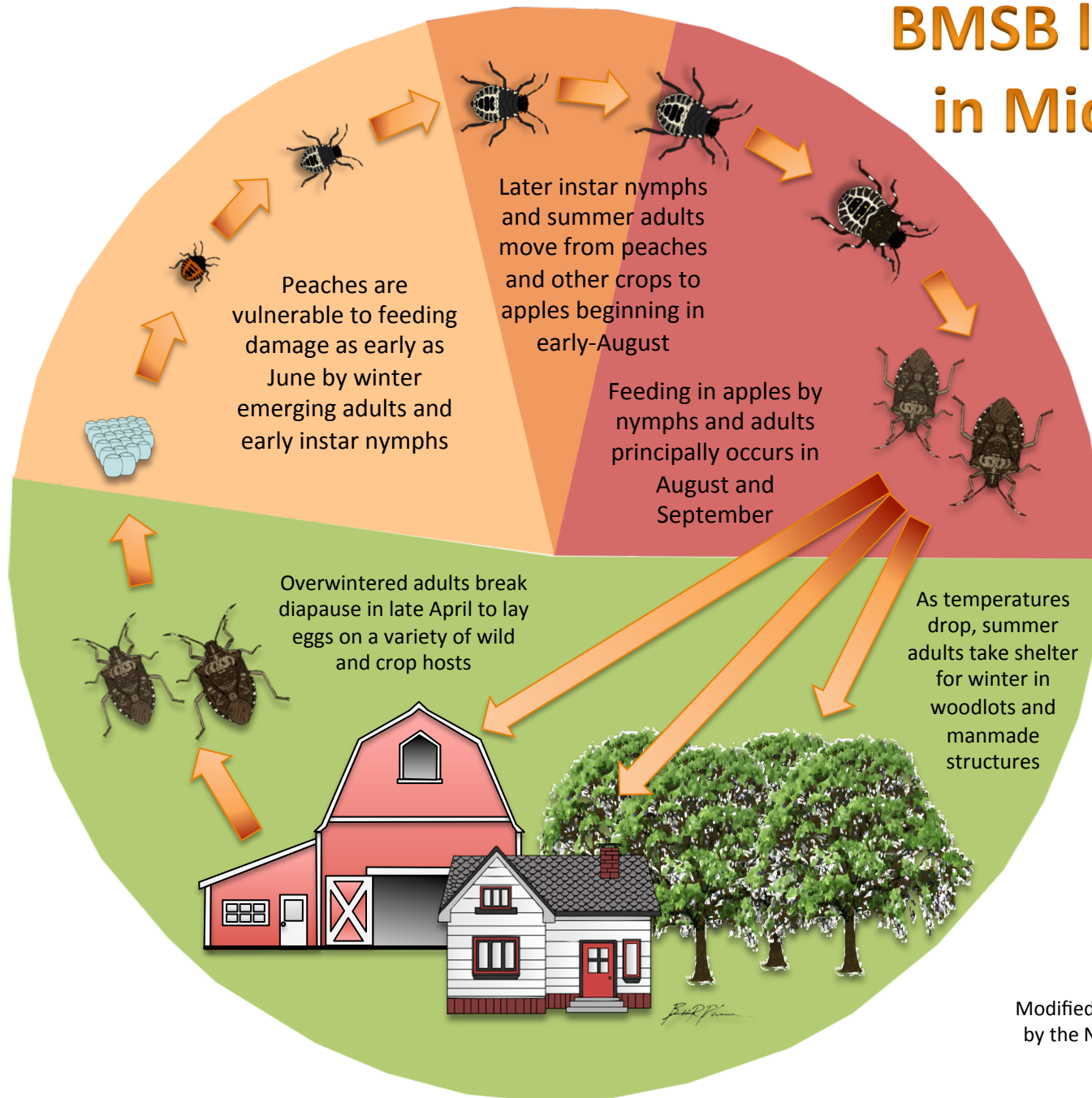


Citizen Science Reports

Heat map of BMSB reports as of January 2017



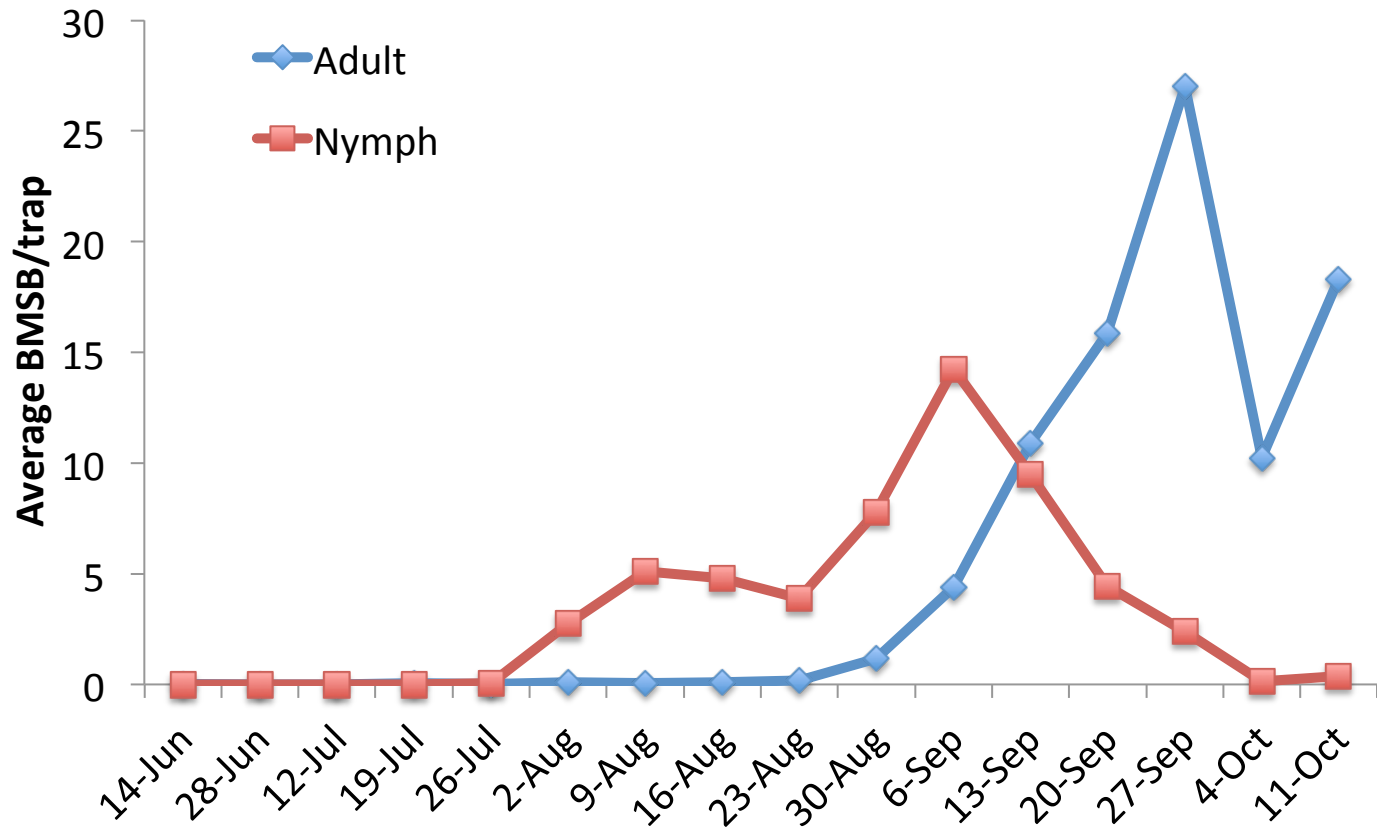
BMSB lifecycle in Michigan



Modified from an illustration created by the Nielsen Fruit Entomology Lab at Rutgers University; used by permission

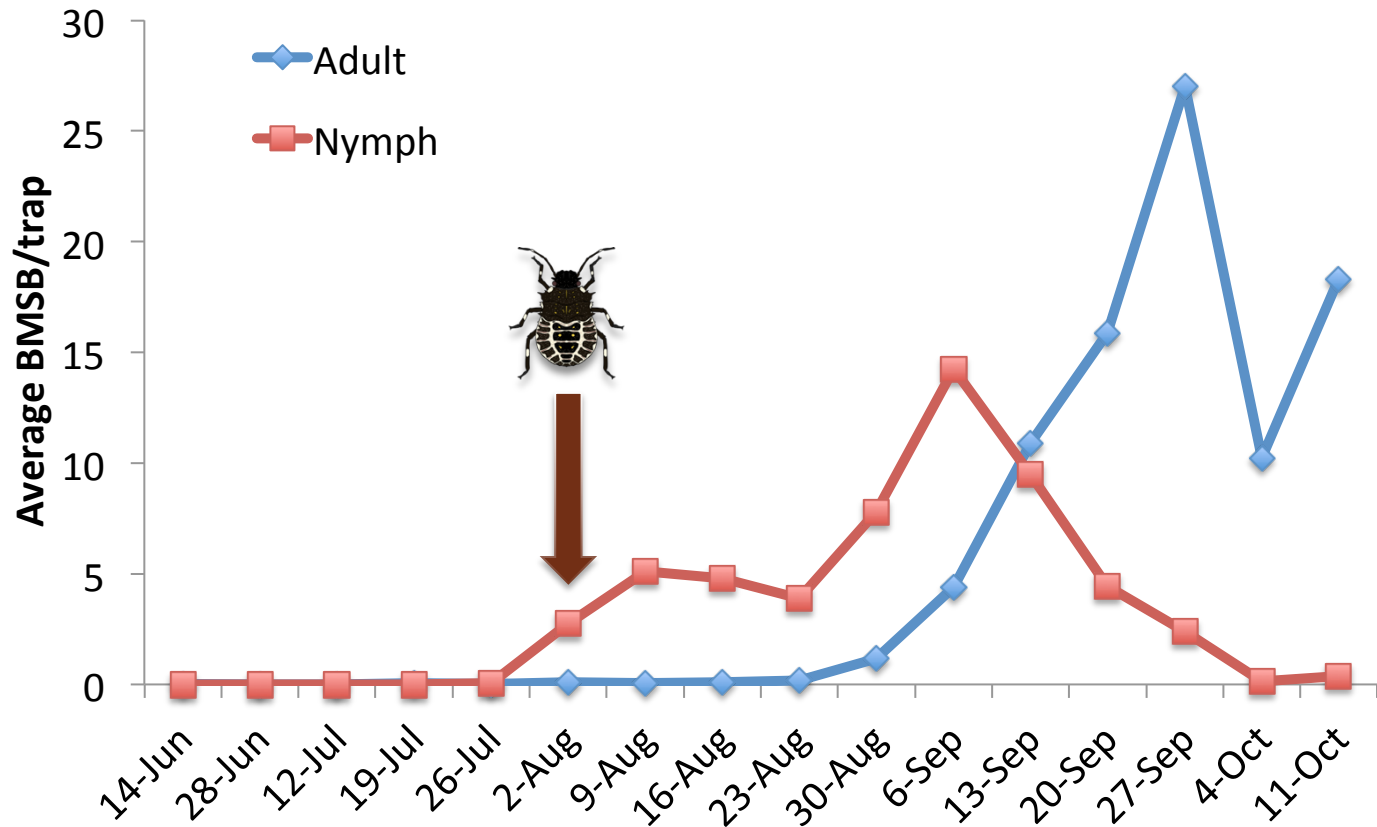


BMSB Seasonal Pattern in MI



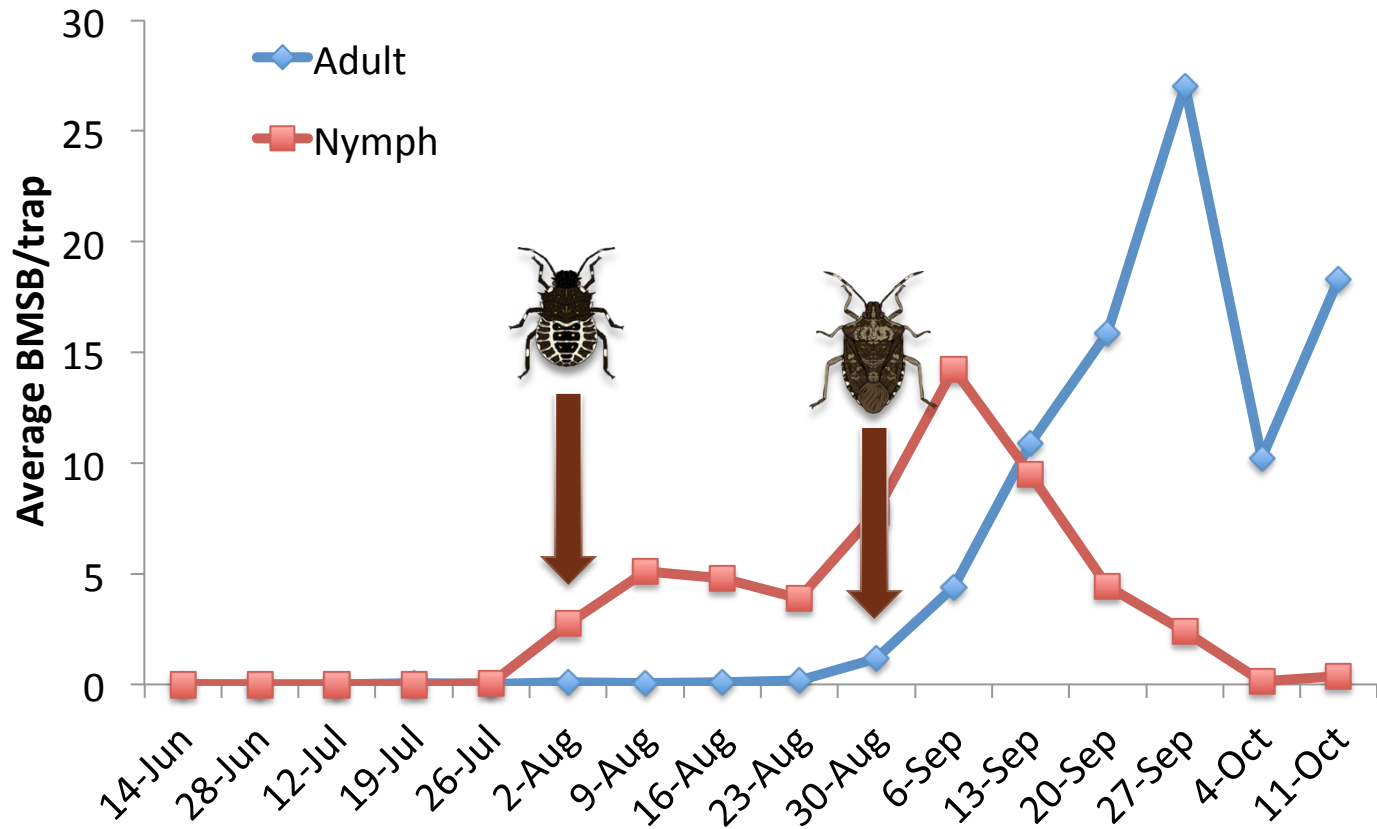


BMSB Seasonal Pattern in MI



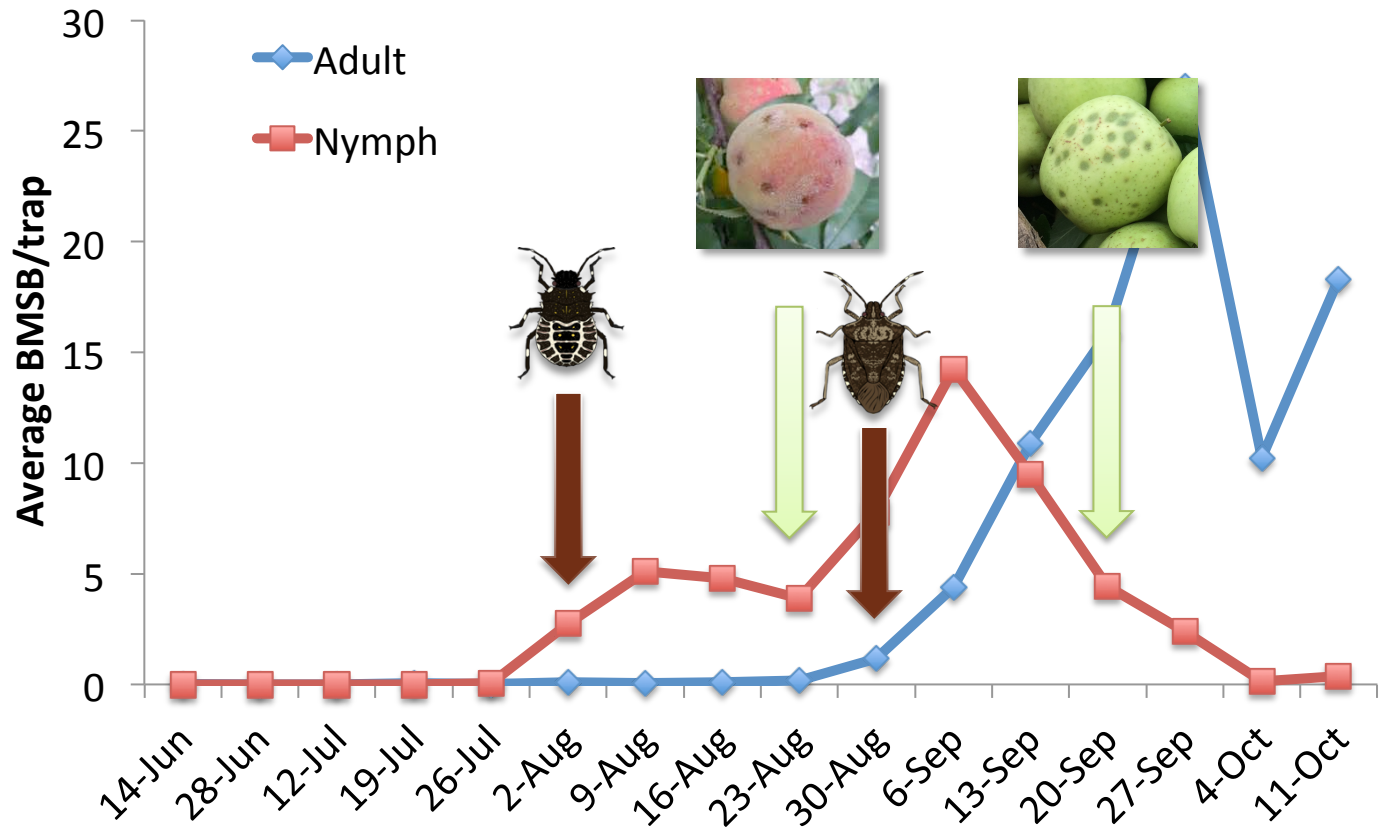


BMSB Seasonal Pattern in MI





BMSB Seasonal Pattern in MI



3+ week delay in detectable damage!



BMSB Susceptible Crops

Table 2. Relative risk of damage by brown marmorated stinks bugs to Michigan specialty crops, field crops, and ornamentals.

| Risk Level | Tree Fruit & Nuts | Berries & Grapes | Vegetables | Field crops | Ornamentals |
|------------|--|--|---|---|--|
| High | apple, hazelnut, nectarine, peach ¹ , pear (Asian and European) | grape ² | beans (green, pole, snap), edamame, eggplant, okra, pepper, sweet corn, Swiss chard, tomato | dry beans, field corn, soybeans, sunflowers | bee-bee tree, black cherry, catalpa, crab apple, English holly (female), Japanese pagoda tree, multiflora rose ⁴ , Peking lilac tree, redbud, tree of heaven ⁴ , wild raspberry ⁴ |
| Moderate | apricot, cherry ² (sweet and tart), plum, walnut | blackberry, blueberry ^{2,3} , raspberry | asparagus, broccoli, cauliflower, collard, cucumber, horseradish, lima bean, tomatillo | winter wheat ⁵ | black walnut, flowering dogwood, littleleaf linden, maples, serviceberry |
| Low | | cranberry, strawberry | carrot, garlic, kohlrabi, leeks, lettuce, onion, potato, spinach, sweet potato, turnip | | blackgum, ginkgo, Japanese maple, kousa dogwood |

1 – Additional risk potential due to bark feeding. 2 – Potential risk of taint/contamination. 3 – Considered moderate to high risk. 4 – Considered to be a particularly attractive and important host plant. 5 – Considered to be a population source more than a crop damaged by BMSB.

From page 3 of *Managing BMSB in Michigan Orchards*, modified from a table on the www.stopbmsb.org to include only Michigan relevant plants.





BMSB Damage in Apple

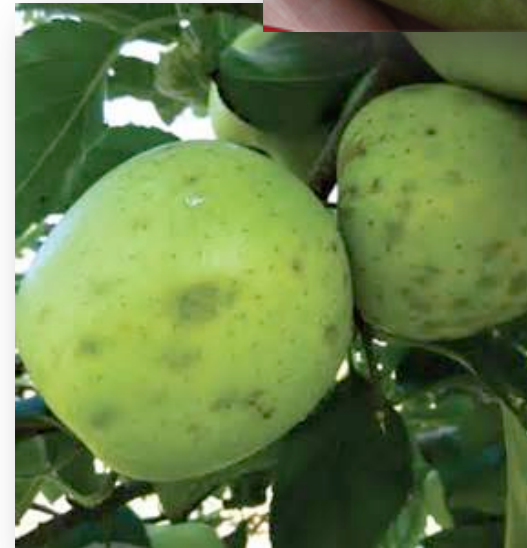
Pitter Pit



BMSB



| | Pitter Pit | BMSB |
|----------------------------|-------------|--------------------|
| Location of surface damage | Calyx end | Shoulder or random |
| Location of corking | Sub-surface | Meets the skin |





BMSB Damage in Pear

Bosch



Bartlett





BMSB Damage in Peach

Early season



Late season





BMSB Damage in Cherry



Tart cherry?



Damage in sweet cherry, Oregon

Resources



Managing Brown Marmorated Stink Bug in Michigan Orchards

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 MICHIGAN STATE UNIVERSITY
 Last updated December 2016

KEY POINTS:

- Adult BMSB hibernate in manmade structures, woodlots, and other places outdoors; it is a nuisance pest in many MI homes.
- First suspected commercial fruit damage in the state by BMSB was in southwest MI beginning in 2014.
- BMSB produces one generation per season in Michigan.
- Each BMSB female lays eggs in clusters on leaves of one of many different host plants.
- Adults and nymphs cause fruit damage when they feed, but the damage only becomes apparent weeks later or after fruit are brought out of storage.
- Peaches are attractive at any stage when fruit is present; apples become attractive mid-season.
- Use on-farm monitoring to assess BMSB populations and when to begin management.
- Fruit can be protected from damage with effective registered insecticides.
- Target insecticide applications at the tops of trees and orchard edges.

DISTRIBUTION, BIOLOGY, KEY CHARACTERISTICS

Distribution of BMSB in Michigan

Brown marmorated stink bug (BMSB), *Halyomorpha halys*, is a tree-loving pest native to Asia. It was first detected in the U.S. mainland in Pennsylvania in 1996. By 2006, it was causing major damage to apple and peach crops in the mid-Atlantic region. The first Michigan detection was in Berrien County in 2010, followed several years later by reports of suspected BMSB fruit damage. Nuisance reports from several thousand Michigan residents as of Spring 2016 indicate that BMSB populations are well-established in the southern Lower Peninsula. All together BMSB has been reported in 55 Michigan Counties, including two counties in the Upper Peninsula.

Key features for identification

Adult BMSB have several key features to help distinguish them from native brown stink bugs (Fig. 1). Adults are ½ inch long by 5/8 inch wide, with a banded pattern along the margin of their abdomen and banding on their antennae and legs; they also have smooth shoulders rather than toothed like some of our native species. Eggs are greenish-white in color and laid in a cluster of up to 28 eggs on a leaf of a preferred host. There are five nymphal stages. The first nymphal stage is black and red. The other four nymphal stages are brown like the adult (Fig. 2).

Biology and lifecycle

BMSB adults emerge from overwintering sites (e.g. woodlots, manmade structures) in response to a day length of 13.5 hours, which is late April in Michigan (Table 1). Egg laying begins after 135 degree days (DD = base 57.2°F) have accumulated, around the end of May. Females lay clusters of up to 28 greenish-white eggs on the undersides of leaves of preferred host plants, and between 10-20 egg clusters in their lifetime. Feeding and development continue through five nymphal stages before molting into the adult stage in late July or early August. High densities of BMSB and the potential for damage become more likely at this time. The summer generation continues to feed before moving to overwintering sites beginning in early September through November. The adult produces an attractant, called an aggregation pheromone, which attracts other adults to the same location. This is why clusters of adults can be found gathering on buildings. One generation is thought to occur in Michigan (Fig. 2).

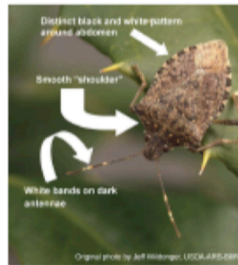


Fig. 1. Key identifying features of brown marmorated stink bug adults include a banded pattern along the abdomen and antennae with smooth, rounded shoulders.

Effective insecticides for controlling BMSB in orchards.

Table 3. Insecticides that are effective against stink bugs in Michigan PEACHES.

| Trade Name | Active Ingredient | Class | PHI (days) | Relative efficacy against BMSB | Max rate per acre |
|----------------------|--|----------------------------|------------|--------------------------------|---|
| Actara | thiamethoxam | neonicotinoid | 14 | E | 4.5-5.5 oz |
| Admire Pro | imidacloprid | neonicotinoid | 0 | G | 2.8 oz |
| Assail 30 SG | acetamiprid | neonicotinoid | 7 | G | 8 oz |
| Aza-Direct* | Azadirachtin | botanical | 0 | G | 1-2 pints; 3.5 pints under heavy pest pressure |
| Belay 2.13 SC | clothianidin | neonicotinoid | 21 | G | 6 oz |
| Danitol 2.4 EC | fenprothrin | pyrethroid | 3 | E | 21.3 oz |
| Endigo ZC | lambda-cyhalothrin & thiamethoxam | pyrethroid & neonicotinoid | 14 | E | 5-5.5 fl oz |
| Lannate 90 SP | methomyl | carbamate | 4 | E | 2 lbs |
| Leverage 360 SE | imidacloprid & beta-cyfluthrin | neonicotinoid & pyrethroid | 7 | E | 2.8 oz |
| Pounce 25 WG | permethrin | pyrethroid | 14 | E | 6.4-16 oz |
| Scorpion 35 SL** | dinotefuran | neonicotinoid | 3 | E | 5.25-7 oz |
| Vollam Xpress 112 SC | lambda-cyhalothrin & chlorantraniliprole | pyrethroid & diamide | 14 | G | 6-12 oz |
| Warrior II 2CS | lambda-cyhalothrin | pyrethroid | 14 | E | 1.28-2.56 fl oz |

Table 4. Insecticides that are effective against stink bugs in Michigan APPLES.

| Trade Name | Active Ingredient | Class | PHI (days) | Relative efficacy against BMSB | Rate per acre |
|-----------------|--|----------------------------|------------|--------------------------------|-----------------|
| Actara | thiamethoxam | neonicotinoid | 14 | E | 4.5-5.5 oz |
| Admire Pro | imidacloprid | neonicotinoid | 7 | G | 2.8 oz |
| Assail 30 SG | acetamiprid | neonicotinoid | 7 | G | 2.5 oz |
| Belay 2.13 SC | clothianidin | neonicotinoid | 7 | G | 6-12 oz |
| Danitol 2.4 EC | fenprothrin | pyrethroid | 14 | E | 16-21.3 oz |
| Endigo ZC | lambda-cyhalothrin & thiamethoxam | pyrethroid & neonicotinoid | 35 | E | 5-6 oz |
| Lannate 90 SP | methomyl | carbamate | 14 | E | 1 lb |
| Leverage 360 SE | imidacloprid & beta-cyfluthrin | neonicotinoid & pyrethroid | 7 | E | 2.8 oz |
| Vollam Xpress | lambda-cyhalothrin & chlorantraniliprole | pyrethroid & diamide | 21 | G | 6-12 fl oz |
| Warrior II 2CS | lambda-cyhalothrin | pyrethroid | 21 | E | 1.28-2.56 fl oz |

Notes: Aza-Direct is also labeled for use on apple and pear, but not after the pink stage as it can result in phytotoxicity; tank mixing with oil-based products will also cause plant injury. For more information, please refer to the specimen label for each material (<http://www.cdms.net/Label-Database>). See also the 2016 Michigan Fruit Management Guide E-0154. Although products listed in these tables are labeled for use in these crops, not all have BMSB listed on the label. * OMRI registered product. ** There is a supplemental label for use of Scorpion on peach and nectarine.

Resources

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Michigan brown marmorated stink bug report for July 29, 2016

Fruit and vegetable growers in the southern Lower Peninsula should be scouting for brown marmorated stink bug this season.

Posted on **July 29, 2016** by [Julianna Wilson](#), Michigan State University, Department of Entomology

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This is the first weekly report of the [Michigan State University Extension brown marmorated stink bug](#) (BMSB) monitoring network. For the last 3-4 weeks we have been monitoring more than 80 sites for BMSB nymphs and adults using pyramid or Rescue style traps baited with Agbio lures. Traps are set up near apples, stone fruits (peaches, plums and sweet and tart cherries), blueberries, grapes, strawberries, a variety of vegetable crops and at several urban locations considered to be hotspots. So far we have captured a total of 30 BMSB, the majority of which came from some vineyards early in the season in southwest Michigan.

We have been encouraging growers in the southern part of the Lower Peninsula to scout for this pest this season – if they haven't in the past – based on where we know it to be well-established as a nuisance pest in homes (Figure 2). Traps are easy to deploy and check, but the area of influence for a single baited trap appears to be relatively small. Therefore, it is important to place them near the crop and to combine trapping with other sampling methods



Figure 1. Brown marmorated stink bug adult. Photo by David R. Lance, USDA APHIS PPQ, Bugwood.org

SAVE THE DATE!

1-Day BMSB Workshop for Fruit Growers

June 22, 2017

Grand Rapids area



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