UTAH PESTS fact sheet

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Brown Marmorated Stink Bug
[*Halyomorpha halys (Stål)*]

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Do You Know?

- Brown marmorated stink bug was introduced into the U.S. from eastern Asia in the late 1990s, and has since spread to the East, upper Midwest, and Northwest regions.
- It feeds on a broad range of plants including fruits, vegetables, field crops, ornamentals, weeds, and native species.
- Adult- and nymph-feeding causes light-colored stippling and lesions on leaves, necrotic lesions and scars on fruits, and deformed pods and seeds on legumes.
- Adults can be a major nuisance pest by overwintering inside buildings.
- This insect has not yet been reported in Utah. Please report suspected specimens or crop injury to USU Extension or the Utah Department of Agriculture and Food.

Brown marmorated stink bug (Order Hemiptera: Family Pentatomidae) (BMSB) (Fig. 1) was accidentally introduced into the eastern U.S. from Asia in the late 1990s. In 2001 it was officially identified in Pennsylvania, and has since spread along the eastern seaboard and westward into the Great Lakes region. In 2002 it was found in Portland, Oregon, and has since spread to localized areas in Washington and California. It has not yet been found in Utah, but it is likely only a matter of time before it will occur in most states due to its rapid adaptation to a wide range of climates. Since 2004, BMSB has gained notoriety as a major nuisance due to large aggregations of the bugs invading buildings in the fall to overwinter, attracted to the protective warmth.

Fig. 1. Adults are shield-shaped, brown, and 5⁄8 inch long.[1]

Commercial growers were caught by surprise during the 2009 growing season when they began to see crop damage inflicted by BMSB. Since then an increasing number of farms and gardens have experienced extensive crop damage (high levels of crop damage were experienced in 2010, especially in the Mid-Atlantic region), and researchers have intensified efforts to develop effective management tactics.

Adult BMSB are strong fliers and adept hitchhikers. They can move from one host site to another in just a few hours. Like other "true bugs," they feed by inserting their straw-like mouthparts into the plant to suck out the sap. BMSB will feed on leaves, seeds, fruits, and even through the bark of young trees. Feeding causes areas of collapsed tissue that becomes dried and necrotic (dark colored), and can also introduce disease pathogens into the plant. On crops such as tree fruits and some vegetables this damage is generally visible on the surface as necrotic lesions (Fig. 2), but BMSB feeding can also cause deeper, less obvious damage. Some growers have found that a crop that was seemingly clean at harvest will show damage after 4-5 weeks in storage.

Fig. 2. Feeding causes necrotic lesions and pits.[2]

Researchers have observed that unlike the native stink bug species that generally migrate into crop areas from surrounding vegetation, BMSB will remain and reproduce within fields. The young (nymphs) begin feeding immediately after hatching from the egg and through adulthood. High populations of BMSB have been a nuisance to crop pickers and can contaminate the harvested crop. The defensive chemical released by BMSB which causes the characteristic "stink," is released when the bugs are disturbed. This can be a particular problem for grape growers as the chemical can affect the flavor of juice or wine. It has also been a problem in forage crops as livestock may not eat hay or silage tainted with the chemical.

Biological control and insecticides are two primary control tactics under evaluation. Entomologists have explored its native range for natural enemies, and a few are under further study for potential release in the U.S. Many of the synthetic pyrethroid-type insecticides are efficacious in rapid knockdown of adults and nymphs; however, this group of insecticides has a major negative side-effect of high toxicity to many beneficial insects, mites, and spiders. Research to develop effective traps and lures is underway, with the release of a killing station pending (Alpha Scents Inc.).

HOST PLANTS

BMSB has been found feeding on over 60 plant species. Crop plants which host BMSB include tree fruits and nuts such as peach, apricot, cherry, apple, pear, Asian pear, filbert, and cane and vine fruits including berries and grape. The most preferred vegetable and field crops include pepper, tomato, green bean, soybean, field and sweet corn. BMSB also feeds on ornamental plants such as butterfly bush, some rose species, honeysuckle, catalpa and Norway maple. Native and weed species are hosts which can act as reservoirs to perpetuate populations.

LIFE HISTORY

In the temperate regions of the U.S. there appears to be one to two generations per season. In the warmer areas of its native range there can be up to six generations per year. Therefore, it is likely that two or more generations will occur in warmer areas of the U.S. as its range expands. Adults have an extended egg-laying period. Adults and nymphs have been observed in the field up through September.

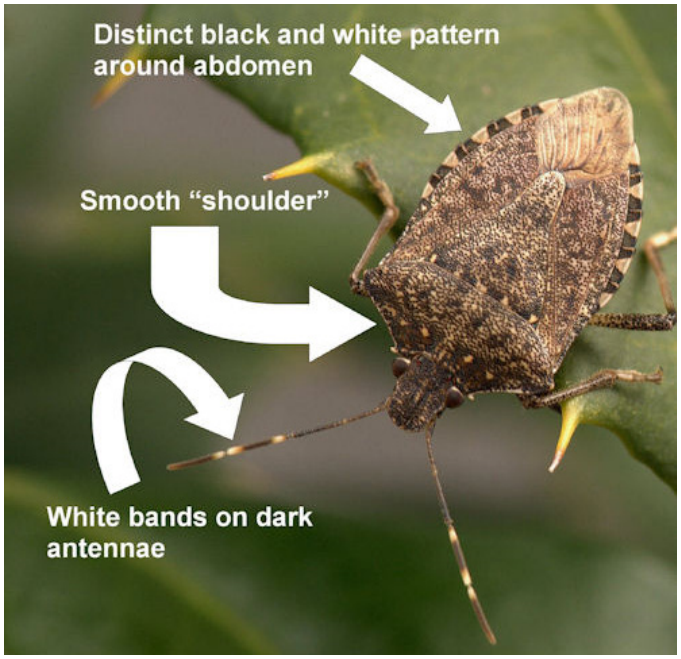

Fig. 3. Identifying characteristics of adult.[3]

Adult - Overwintering, Dispersal, and Damaging Stage

- A 5-sided, shield-shaped body; approx. 17 mm (⅝ inch) long.
- Brown, gray, and black marbled (marmorated) upperside; white underside; abdominal segments protruding from beneath the wings are alternatively banded with black and white; next to last (4th) antennal segment has a white band; legs white and brown banded (Fig. 3).
- Seeks protected sites to spend the winter: under rocks, logs and leaves, and enters buildings.
- Releases a pheromone that attracts other adults to congregate (Fig. 4).
- During the winter, adults go into a hibernation-like state called diapause; they don't feed, bite or sting, but wander inside buildings and if disturbed can release a noxious defense chemical that can cause blisters if trapped next to the skin.
- Becomes active in the spring (April to May); spends about 2 weeks feeding before becoming reproductively mature, and then mates.
- A female will lay eggs throughout the growing season in approximately 1-week intervals and can lay up to 400 eggs per female.

Fig. 4. Adults congregate using a pheromone cue.[4]

Egg

- Eggs are laid in clusters of 20-30 on the underside of leaves.
- Eggs are barrel shaped, about 1.6 mm (1/16 inch) wide, and pale green (Fig. 5).
- Hatch in 3-7 days.

Fig. 5. Eggs are pale green and laid in a cluster.[5]

Nymph – Damaging Stage

- There are five nymphal instars (stages of the young that molt, or shed their skin, to increase in size and move to the next stage), each one lasting about 1 week; 2.4 – 12 mm (1/10 – ½ inch) long.
- First instars tend to remain near the egg mass and are "tick-like" in appearance.

Fig. 6. Early nymphs are black, yellow and red in color.[6]

- Early nymphs are brightly colored with red and black and a yellowish-red and black striped abdomen (Fig. 6).
- Later nymphs are darker, almost black (Fig. 7).

Fig. 7. Late nymphs are almost black in color.[7]

CROP INJURY AND NUISANCE PEST

BMSB feeding on plant leaves causes a light colored stippling and/or crows-foot shaped lesions. Feeding on immature fruits can cause distorted growth known as cat facing, while on mature fruits, damage can be dry and sunken areas that become necrotic and lead to rot. Cutting the fruit open may reveal deeper areas of brown tissue. BMSB feeding on grapes causes the berry to collapse and has been implicated in high levels of rot after harvest. Some growers of tomato and pepper have seen high levels of damage as BMSB feeding deforms these fruits more severely than other stink bug species. The feeding can also readily introduce yeast contaminants which further degrade the fruit. BMSB feeds on both field and sweet corn through the husk and may also feed on the silk and disrupt pollination. Feeding damage on corn can result in small and brown kernels (Fig. 8). On soybean, BMSB damages pods causing deformation and shriveled seeds, and may also delay maturation so that plants remain vegetative.

In addition to feeding on a wide range of plants, BMSB adults seek shelter to spend the winter. Very large numbers congregating on and inside homes, schools, office buildings and other structures have caused a major nuisance to humans (Fig. 9).

Fig. 8. Injury to corn and tomato.[8]

MANAGEMENT

Monitoring

Research is underway to develop effective traps and lures for monitoring and an attract-and-kill management approach. A BMSB pheromone lure was recently released by Alpha Scents Inc., and they are close to releasing a killing station design. To date, research has shown that tall, pyramid shaped, ground-level traps colored dark brown or black rather than yellow are more attractive to BMSB. In addition, researchers found that BMSB adults frequently escape from traps, so that placing a quick knockdown insecticide device in the trap such as vaportape or a ¼ piece of cattle ear tag improved trap capture.

Biological Control

Insect natural enemies (insect-attacking predators, parasitoids, and pathogens) that will kill BMSB also attack many other species of insects, but so far none have been effective at limiting rapid population growth of BMSB. *Trissolucus halymorphae* Yang (Order Hymenoptera: Family Scelionidae) is an egg parasitoid and the principal natural enemy of BMSB in China, with average parasitism rates of 50% in its native range. This and other natural enemies have been collected in Asia and are currently under evaluation in quarantine for their potential as biological control agents for release in the U.S.

Exclusion

BMSB can squeeze into narrow cracks and crevices, so seal entry points into homes and other buildings with caulking. Place and repair screens on windows, doors and vents; and remove or seal around window air conditioner units. Mechanically remove adults congregating on exterior surfaces or within buildings with a vacuum or broom (Fig. 9).

Fig. 9. Cleaning up BMSB from a home porch in Maryland.[9]

Insecticides

Evaluation of insecticide effectiveness has shown that BMSB can be more difficult to kill than other stink bug species. Insecticides were most effective when BMSB were directly contacted with the spray as compared to walking on dried residues on plant foliage (Leskey 2010). While a number of insecticides initially disabled BMSB, the effect was temporary and a high percentage of the population recovered and returned to feeding.

In laboratory and field studies, the following active ingredients were found to cause high mortality of BMSB: acephate, bifenthrin, chlorpyrifos, dimethoate, endosulfan, malathion, methidathion, and methomyl (Leskey and Dively 2011). For treatment of building exteriors and non-edible ornamentals, a number of synthetic pyrethroid insecticide active ingredients are registered, such as bifenthrin (Talstar), cyfluthrin (Tempo), and deltamethrin (EniroMax, Suspend). For vegetable and fruit crops, acetamiprid (Assail, Ortho*), dinotefuran (Green Light*,Safari), lambda-cyhalothrin (Karate, Warrior), and zeta-cypermethrin (Mustang) are available (New Jersey Agricultural Experiment Station 2011). On a small scale or for those using organic management, insecticidal soap* may be effective on young nymphs or to temporarily knockdown adults congregating on outdoor surfaces.

*Homeowner formulations available.

Pesticides are poisons. Read and follow directions and safety precautions on labels. Handle carefully and store in original labeled containers out of the reach of children, pets, and livestock. Dispose of empty containers right away, in a safe manner and place. Do not contaminate the environment. All brands are registered trademarks. Examples of brands may not be all-inclusive, but are meant to provide examples of products registered for specified sites in Utah. Always check the label for registered uses, application and safety information, and protection, re-entry, and pre-harvest intervals.

ADDITIONAL RESOURCES

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- Northeastern IPM Center, Nov. 2010, Brown Marmorated Stink Bug IPM Working Group Report, http://www.northeastipm.org/work_bmsbreports.cfm.

[1]Image courtesy of David R. Lance, (www. insectimages.org).
[2]Image courtesy of Doug Pfeiffer, Virginia Cooperative Extension.
[3]Image courtesy of Jeff Wildonger, USDA-ARS-BIIR.
[4]Image courtesy of George Hamilton, Rutgers University.
[5]Image courtesy of David R. Lance, (www.insectimages.org).
[6]Image courtesy of David R. Lance, (www.insectimages.org).
[7]Image courtesy of David R. Lance, (www.insectimages.org).
[8]Image courtesy of David Wright and Eric Day, Virginia Cooperative Extension.
[9]Image courtesy of Steve Ruark for The New York Times, published September 26, 2010: (http://www.nytimes.com/2010/09/27/us/27stinkbug.html?_r=1&ref=general&src=me&pagewanted=all)