You Ain't From Around Here! Exotic Invasive of the Quarter: Brown Marmorated Stink Bug (*Halymorpha halys*)

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The brown marmorated stink bug (BMSB) is an exotic invasive that has been in Virginia for quite a while now. I've put off writing about it because I traditionally focus on exotic invasives that damage forests. However, I suspect many woodland owners are like me, and not only have woods, but also have gardens and/or orchards. In which case, the BMSB is probably bugging you, even if it's not directly impacting your forest trees.

The other reason for my writing about BMSB is this was our first fall living on our woodland property – in an 1845 cabin. Which, as you might imagine, is far from hermetically-sealed. For a couple of months now, my husband, along with his ever-trusty Oreck hand-held vacuum, has been engaged in a battle with a ceaseless parade of BMSBs climbing in through the cracks. This battle is taking a toll on him - he has started laughing maniacally when they sense the vacuum approaching and try to scramble under the curtains. Because the vacuum always wins. Yet they keep coming. Watching his slow descent into BMSB-induced madness inspired me to learn more about his enemy.

Native to China, Japan, and South Korea, BMSB was accidentally introduced near Allentown, PA around 1996. Recent DNA analyses reveal these introduced BMSBs originated from a native population in Beijing, China. BMSB made its way to Virginia in 2004 and was found throughout most of the commonwealth by 2010. Both Asia and the US have native stink bug populations. Many of these, even though native, are considered agricultural pests.

Damage

Indoors - BMSBs don't like the cold. And while some do overwinter in dead standing trees, many spend the winter in our cozy homes. Typically, the infestation begins the first cold day in September with the bugs entering through cracks and crevices. Infestations can be up to 26,000 bugs in a single home. Fortunately, BMSBs do not mate, lay eggs, or feed indoors. They come inside simply to hibernate, although they will be active on particularly warm days. So if you can obtain some level of Zen with these critters (much like I try to do with I-81), you can cohabitate with them quite nicely. Of course, as my story about my husband demonstrates, not everyone can achieve this.

Things are a little different for business owners. BMSB may cause economic damage for businesses such as hotels and restaurants. Guests are not always happy to have bugs flying around their rooms at night or crawling on their dinner tables.

And let's not forget the stink! As a defensive mechanism, BMSBs release an odor from their stink glands, located on the underside of their bodies between the first and second pairs of legs. I think it smells like very potent citronella. Many describe it as smelling like cilantro. Interestingly, two of the compounds present in the odor are commonly used as food additives in bakery and dairy products.

My poor brother, who lives in Florida, was up visiting this fall and made the mistake of mentioning that he had never smelled a stink bug; something I quickly remedied by squeezing one in his face. He was not amused.

Outdoors - BMSBs are polyphagous – meaning they use many different species as host plants. In fact, they can use 100 different host plants, including apples, soybeans, tomatoes, peppers, sweet corn, sunflowers, and even hardwoods. They prefer to feed on reproductive structures and will move from one host species to the next as the growing season progresses. For example, a typical seasonal progression of BMSB feeding might be: emergence from over-winter dwelling (your house) – berries – tomatoes/apples – field crops (such as sweet corn). Typically crop edges are the first, and most severely, impacted areas. As such, BMSBs are known as perimeter invaders.

BMSB damage on fruit. Photo by: Gary Bernon, USDA APHIS.

BMSBs are sucking insects. To feed, they insert a straw-like mouthpart into a fruit or vegetable, and their digestive juices destroy the cells they contact. This causes sunken spots on fruit, white spots (halo spots) on peppers and tomatoes, aborted kernels on corn, and twisted okra pods. This damage decreases the value of the product in the marketplace. In Virginia, most of the economic damage has been on apples and peaches. In fact, in 2010, the Mid-Atlantic apple industry lost $37 million due to BMSB damage.

How to Identify the BMSB

Most of us know a BMSB when we see one in our house. No doubt about it. However, as I mentioned earlier, out of doors we have native stink bugs, some of which look similar. BMSBs are grayish-brown shield-backed bugs about ¾" long with white bands on their antennae and legs, and alternating black and white spots on their abdomens. The stripes on the antennae are the best clue for properly identifying a BMSB – other stink bugs do not

have these. Another good clue is their shoulders. The BMSB has a smooth shoulder, while similar-looking native stink bugs have serrated shoulders.

Adult BMSB. Notice the white stripes on the antennae and the smooth shoulder edges. Photo by: Steven Valley, OR Dept. of Agriculture.

Life Cycle

When BMSBs emerge from our homes in the spring, the females become reproductively mature within 1-2 weeks, at which time they begin mating. Females lay their eggs on the undersides of leaves in triangular-shaped masses of about 28. A single female can lay 4-10 egg masses over her life. It takes about 35 days for a BMSB to go from egg to adult.

Once the eggs hatch, there are between 3-5 instar or nymph stages. The nymphs develop on tree fruit, are hungry and highly mobile, and move from crop to crop over the course of the growing season. Nymphs in various stages are present throughout the entire growing season – maximizing the damage they are able to inflict on crops. The adults are also highly mobile, easily flying up to 2 km (with reports as high as 50 km). In Virginia, BMSBs most likely have 2 generations per year.

Triangular pattern of eggs on underside of a leaf (top) and newly hatched nymphs (bottom). Photos by: David R. Lance, USDA APHIS PPQ.

Control

Indoors - As a home dweller, your best move is to prevent BMSBs from entering your abode. Take preventive measures during the summer, before the invasion. Concentrate your efforts on the west- and south-facing sides of the home, where BMSBs tend to congregate. Try to seal up all potential entry points – fill in cracks around windows, doors, chimneys, sidings, trim, and caulk; cover vents with wire mesh screening.

If the invasion has already occurred, vacuuming best controls individual insects (so my husband chose the correct method!). Spraying stink bugs with insecticide after they get inside still obligates you to vacuum up their dead bodies, which can attract carpet beetles. So skip the insecticide and go straight to the vacuum. We took the added precaution of taping up the end of the hose to prevent escape. But be aware that your vacuum cleaner will stink.

Outdoors - In general, controlling BMSBs using pesticides is tricky. The insecticides that work tend to have a short window of effectiveness. And with over 100 host species, adequate control may require quite a bit of pesticide application. If you are willing to give pesticides a try, spot treatments using a microencapsulated or wettable powder can be applied in the early fall around windows, doors, attic vents and other locations on the south and west walls of the structure. Timing is critical. Applying too early will allow the insecticide to degrade before the stink bugs begin trying to enter your home. Applying after the stink bugs have arrived will be useless as they will already be in your home. For recommendations on protecting specific plants or crops, please refer to the appropriate version of Virginia Cooperative Extension's Pest Management Guides. There are three versions that can be found at:
https://pubs.ext.vt.edu/456/456-018/456-018.htm

- Home, Grounds and Animals
- Horticultural and Forest Crops
- Field Crops

In addition to the use of pesticides, research into controlling BMSBs organically with various management strategies is underway. One such approach is called trap cropping. This approach capitalizes on the idea of BMSBs invading crop perimeters first. Species that are highly attractive to BMSBs throughout the growing season, like sunflowers, are planted along the perimeter of cash crops. This trap crop area is then baited with attractant pheromones. BMSBs will invade these areas and stay there through the growing season, reducing the number that enter neighboring cash crops. Proper placement of trap crops is essential to this method's success.

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Biological control methods are also being explored. Most of our native stink bug populations are kept in check by egg parasites. Unfortunately, egg parasitism in BMSBs is low. Researchers are working on bringing in parasites from Asia. The general consensus is that multiple tactics will be required to adequately protect cash crops from BMSBs.

As winter approaches, I hope my husband's descent into madness comes to an end. But I'm skeptical - even now, as I write this in December, we find at least 2 BMSBs every evening. Walking slowing across the wall. Tormenting my spouse.

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