The emergence of the brown marmorated stink bug as a significant pest in several fruit and vegetable crops has kept researchers busy identifying management strategies. This pest, which first began making headlines as a nuisance for homeowners, has since contributed to millions of dollars in crop losses for the Mid-Atlantic tree fruit industry.

The brown marmorated stink bug (BMSB, *Halyomorpha halys*) is an invasive insect native to China, Taiwan, Korea and Japan. It was introduced into the U.S. in the mid- to late 1990s and was first properly identified in Allentown, PA, in 2001. The first reports of late-season injury in tree fruit came from West Virginia in 2008. By 2010, growers were reporting serious injury and losses across a wide range of crops.

BMSB targets a wide range of host crops. While it has caused the most damage in apples and peaches, it has also been found in grapes, berries, pears, tomatoes, peppers, sweet corn, soybeans and even some ornamentals.
As of early 2012, BMSB has become well-established in commercial tree fruit crops in Pennsylvania, Delaware, Maryland, New Jersey, Virginia and West Virginia. It has been officially detected in 33 states as well as the District of Columbia.

In 2010, BMSB populations increased dramatically and attacked many crops in the Mid-Atlantic region. Damage in commercial orchard crops reached critical levels with some growers losing entire blocks of stone and pome fruit. In 2011, overwintering survivorship from human-made structures and from wild or natural overwintering sites was substantial. Significant problems occurred in late May-early June in stone fruit orchards as overwintered adults invaded and fed on immature fruit.

According to researchers at the USDA-Agricultural Research Service Appalachian Fruit Research Station in Kearneysville, WV, growers who maintained a vigilant spray schedule in 2011 minimized damage, whereas those who did not observed increases in injury. Economic injury begins to appear in mid-late June (depending on the cultivar), and BMSB pressure on apples is likely to increase from mid-August through harvest, as the population of BMSB builds and other commercial hosts are harvested or wild hosts senesce. Though growers have been able to reduce injury, this has come at a substantial price due to costs associated with increased insecticide applications and labor.

There are a number of issues that make BMSB a particularly difficult pest to control, according to USDA-ARS entomologist Tracy Leskey.

- Multiple generations: up to six generations per year have been reported in Asia
- Unlike native stink bug species, both adults and nymphs have been found to feed on fruit
- BMSB not only damages fresh fruit; it burrows

Identification and Lifecycle

**Egg** - BMSB eggs are elliptical (1.6 x 1.3 mm), light yellow to yellow-red with minute spines forming fine lines. They are attached, side-by-side, to the underside of leaves in masses of 20 to 30 eggs.

**Nymph** - There are five nymphal instars (immature stages). They range in size from the first instar at 2.4 mm to the fifth instar that is 12 mm in length. The eyes are a deep red. The abdomen is a yellowish red in the first instar and progresses to off-white with reddish spots in the fifth instar. Protuberances are found before each of the abdominal scent glands on the dorsal surface. The legs, head and thorax are black. Spines are located on the femur, before each eye, and several on the lateral margins of the thorax.

**Adult** - Adults are approximately 17 mm long (25 mm = one inch) and are shades of brown on both the upper and lower body surfaces. They are the typical “shield” shape of other stink bugs, almost as wide as they are long. To distinguish them from other stink bugs, look for lighter bands on the antennae and darker bands on the membranous, overlapping part at the rear of the front pair of wings. They have patches of coppery or bluish-metallic colored punctures (small rounded depressions) on the head and pronotum. The name “stink bug” refers to the scent glands located on the dorsal surface of the abdomen and the underside of the thorax.
deeply into the flesh, which can make processors reject the fruit as well.

BSMB often emerges from surrounding orchard vegetation, although reproduction can occur within the orchard. Even if growers are able to control a current population, the next wave may soon follow. Only a small portion of the damaging population is likely exposed to spray material.

**Monitoring**

Adults will emerge sometime in the spring (late April to mid-May), and they mate and deposit eggs from May through August. The eggs hatch into small black and red nymphs that go through five molts. Adults begin to search for overwintering sites starting in September through the first half of October.

USDA researchers have been working on studying the movement patterns of BMSB in order to come up with the most effective trapping systems. In the meantime, the most critical element for successful BMSB management is the development of a reliable pest detection and monitoring strategy, according to Penn State entomologists Larry Hull and Greg Krawczyk. “In every orchard, due to the ability of adult BMSB to move quickly among various hosts, a constant and vigilant monitoring program is the very basis for successful management.”

Overcoming the challenges of effective and sustainable BMSB control will not be an easy task in the near term. Much research needs to be done in order to develop the most effective management program for the long-term control of this pest. However, if growers are not careful in how they manage BMSB, they may be causing many future pest problems by destroying the natural enemies that help keep many of the other pests of tree fruit in balance.
As the battle against the costly brown marmorated stink bug (BMSB) ramps up for 2012, experts encourage growers to prepare scouting and treatment programs to ensure they have a strong IPM plan for the duration of the season.

Preparing for Battle
Valent U.S.A. Corporation Field Market Development Specialist Gary Kirfman said now is the time when growers should consider their season-long approach to managing BMSB.

“The brown marmorated stink bug overwinters in woods and outbuildings, and attacks a variety of crops including apples, peaches, grapes, peppers, sweet corn, beans, soybeans, cotton, peas, okra, tomatoes and eggplant. Growers have to constantly scout and monitor pressure in neighboring areas to be ready in their own fields,” Kirfman said.

Selecting the Weapon
Experts often recommend Belay®, Danitol® and Venom® Insecticides to provide excellent stink bug protection across a variety of crops. In lab bioassays and real-world field situations, each of these insecticides is proven to quickly and effectively control stink bugs, including BMSB.

“Data show Belay, Danitol and Venom are all highly effective against BMSB and fit well into the season-long IPM strategy it will take to manage this pest,” Kirfman added.

Kirfman said each of the Valent products brings unique benefits to growers:
• Belay: The active ingredient in Belay has reliable and fast activity against adult and nymph stink bugs and other key insects, including aphids.
• Danitol: Registered in more than 120 crops, Danitol also works quickly on stink bugs and, unlike many other pyrethroid materials, won’t flare mites.
• Venom: Venom brings the powerful active ingredient of one of the most-used products in Asia home to the invasive BMSB.

Regardless of the approach, Kirfman encouraged growers to understand their options and remain vigilant.

For more information on the entire Valent vegetable portfolio, please visit www.valent.com/bmsb.