Brown Marmorated Stink Bug (BMSB) was detected for the first time in Michigan in the summer of 2010. Specimens collected in Eaton and Berrien Counties were submitted to the Michigan Department of Agriculture and Rural Development, and experts confirmed their identification as BMSB in January 2011. This article provides background information and an update on the status of this new pest. For photographs and details please see articles on the website, http://news.msue.msu.edu/news/category/fruit.

Introduction and Life History

The Brown Marmorated Stink Bug is an exotic species native to Asia. Karen Bernhard of Pennsylvania State University Cooperative Extension first found specimens in Allentown, PA, in 1996. In 1999, a specimen was found in a Rutgers University blacklight trap about 30 miles east of Allentown in Milford, NJ. Since that time, specimens have been identified in 29 states, primarily in the Mid-Atlantic region but with additional populations in Oregon and Southern California. Midwestern populations of BMSB were found in Ohio in 2007, Illinois in 2009 and Michigan in 2010.

In northern regions, such as Michigan, BMSB will likely have one generation per year. It requires 538 degree days (DD – based 50 ºF) to develop from egg to adult. An additional 148 DD are required for female maturation at 77 ºF. In the eastern United States an appropriate biofix to begin DD accumulations is when an early non-crop host, the Princess Tree, is in full leaf. In northern states, adults emerge from overwintering sites in midspring, mate and begin ovipositing the first week of June. Where it has one generation, the nymphs develop and feed throughout the summer, molting to the adult stage at the end of July or beginning of August when there is a large peak in flight activity. High densities of the insect are very noticeable at this time as is feeding damage on susceptible plants. This “fall” generation continues to feed before moving to overwintering sites beginning in early September. Migration to overwintering sites is both temperature- and day length-induced.

Damage

Brown marmorated stink bug has a host range of more than 300 plants, including many agricultural and ornamental crops. Early-season hosts include apple, cherry, peach and pear, and it can affect late-harvested fruits such as grapes. This polyphagous pest is a sucking insect that inserts its proboscis into plant tissue to extract plant fluids. During feeding the surrounding cells are killed by digestive enzymes resulting in the formation of small necrotic areas at the feeding site. These areas appear corky, pithy or sunken, depending on crop phenology. In apples and peaches, feeding immediately following bloom causes the fruit to abort prematurely. Mid-season feeding can result in the characteristic “cat-facing” damage typical of plant bugs. Late-season feeding results in the pithy or sunken regions of mature fruit. This type of feeding damage makes the fruit unmarketable for fresh market sales, and contamination of grape clusters may impair the quality of grape juice or wine. Damage from the bug can be very extensive.

BMSB Management

A team of Michigan State University, Michigan fruit industry and MDARD personnel carried out an extensive survey and detection program for BMSB in 2011 and 2012. A total of 26 blacklight traps and a dozen attractant-baited pyramid traps were deployed, spread across the southeast, southwest, west-central and Fruit Ridge fruit production regions. Trapping was conducted from May through October. Traps were inspected biweekly and any stink bugs removed for subsequent identification by state experts. Trapping was supplemented with direct observation of characteristic signs of their presence, and beating tray and sweep net samples. A total of three BMSB were captured in traps this past summer, all in Berrien County. No BMSB have been detected in orchards, vineyards, or blueberry fields as of early October 2012. Thus, fruit growers should not abandon IPM programs, including mating disruption for codling moth and Oriental fruit moth, in anticipation of the need to manage BMSB.

Management of BMSB in Michigan at this time entails monitoring, identification and knowledge of current options for controlling this pest.

Monitoring

Brown marmorated stink bug can be monitored using attractant-baited traps, sweep net or beating tray samples, and blacklight traps. Adults and nymphs are attracted to an aggregation pheromone, which in combination with pyramid traps has potential to monitor densities and dispersal of existing populations. Sweep net and beat samples are efficient monitoring methods to identify seasonality and density in a crop. However, only blacklight traps were effective in New Jersey at detecting new populations before damage was apparent in crops.
Identification

Like all stink bugs, BMSB is shield-shaped and has long piercing-sucking mouthparts. It also exhibits incomplete metamorphosis such that nymphs resemble the adults except for color and wing length. Stink bugs are aptly named because they emit an odor if disturbed, and the ones found in Michigan are often less than three-quarter to 1 inch in size.

Identifying BMSB is a bit challenging due to the presence of some native look-alike stink bug species in Michigan. The characteristics that sets the BMSB apart from our other stink bugs are: 1) White (and alternating black) triangles on the abdomen, 2) The last two antennal segments have both white and black bands, and 3) The pronotum or the shield behind the insect's eyes is smooth and not toothed. This last trait is important and unfortunately difficult to see in the field. We recommend a 30X hand lens to aid in making out the shape of the pronotum: a 14X hand lens will work with good eyes, holding the insect at the correct angle, and in ample light. All three of these identifiers on one bug are critical for proper identification. BMSB are also brown-black in color as adults with a whitish underside. Unfortunately, a few of our other native stink bugs have similar traits. The pictures on this page should help in differentiating BMSB from other stink bug species.

Control

Tree fruit: Current programs implemented by Michigan tree fruit growers for control of apple maggot and other summer insect pests will provide some protection against BMSB. As mentioned previously, populations of this pest have not been found in Michigan orchards, thus control measures are not warranted. However, specific controls for this pest will be needed once BMSB has been detected at a site. At present entomologists are still developing control programs for BMSB. Selection of insecticides for BMSB should take into account other pests that are present, harvest date, re-entry restrictions and potential impacts on IPM programs.

A number of registered insecticides have shown high activity on BMSB. Methomyl (Lannate) and several pyrethroid insecticides, such as bifenthrin (Bifenture), lambda-cyhalothrin (Warrior) and fenpropathrin (Danitol) are highly effective as contact poisons against BMSB adults and nymphs. Neonicotinoid insecticides, such as thiamethoxam (Actara), acetamiprid (Assail), clothianidin (Belay) and imidacloprid (Admire) have also shown activity with a direct spray on BMSB adults or by ingestive exposure to nymphs. Some premixes, like Endigo and Leverage, can be expected to provide performance attributes of both pyrethroid and neonicotinoid classes for BMSB control. For full details, refer to the pre-harvest sections of this bulletin for the latest insecticide recommendations, and follow the MSU Extension News for Agriculture articles for timely updates during the season. Please follow label instructions, as well as proper safety and application procedures.

Small fruit: BMSB has not been detected in small fruit crops in Michigan. However, this insect has the potential to cause damage to berry crops, with the greatest risk for machine-harvested late-season berries such as grapes. Blueberries and raspberries may also be at risk. Contamination of harvested grape clusters leads to the release of the stink bugs’ defensive chemicals during crush, which can then contaminate juice and wine. Scouting vineyards in advance of harvest for this pest at the same time as scouting for MALB can be used to determine whether there is a contamination risk. While formal economic thresholds are currently being developed for this pest in grapes based on the risk of tainting the flavor of juice and wine, there are multiple insecticide options that can be used to control this insect with short pre-harvest intervals. Before any such applications are made, growers should confirm that the infestation is BMSB and not one of the many other species of stink bug, and check with the processor or winery about any restrictions on applications close to harvest.