

Brown Marmorated Stink Bug (BMSB)

Halyomorpha halys Stål, 1855, order Hemiptera, family Pentatomidae

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The name “marmorated” is from the Latin word for marble, “marmor.” The back of the adult has a marble-like pattern, hence the name. The mouthparts, typical of the Hemiptera (true bug) order, are modified for piercing and sucking in order to penetrate and feed on plant tissue. BMSB is native to China, Japan, Korea and Taiwan. It may have been introduced to the US by way of cargo shipments from Asia. It is considered a major economic pest in Asia attacking a variety of high value crops, including tree fruit. This insect has made its presence known by causing losses in eastern stone fruit and apples and by becoming a late season pest in urban areas. The devastating potential of this insect has triggered a flurry of activity by state and federal agricultural researchers. They have initiated standardized sampling studies to determine best traps, lures, their placement and timing.

The first discovery of Brown Marmorated Stink Bug (BMSB) in the US was in Allentown, PA where it quickly spread to other Mid-Atlantic states. It is now found in 29 states across the US. Although there are no confirmed detections in WA, BMSB appears to now be resident in northwest OR (Portland south to Corvallis and east to Hood River). It was intercepted by the California Department of Food and Agriculture (CDFA) in a storage facility in Vallejo, CA in March 2005. A family had just moved to Vallejo from Allentown PA. BMSB was first found established in California in 2006. It is currently only known to be established in Los Angeles County, specifically in the cities of Pasadena (2006), San Marino (2006), Alhambra (2007), Los Angeles (2008), and Temple City (2008). The area in Los Angeles County where it is known to occur is highly urbanized.

Recently, a pest control operator (PCO) turned in a specimen reportedly found outdoors in northern Monterey County, but the PCO could not remember the locality.



BMSB eggs hatching on underside of leaf
Photo by David R. Lance



BMSB mating
Photo by Yurika Alexander

BMSB has been turned in by residents or collected by agricultural inspectors 14 times in nine other counties (Alameda, Contra Costa, Riverside, Sacramento, San Diego, San Francisco, San Joaquin, Santa Clara, and Solano) from 2002 to 2010, associated with articles or vehicles that had recently been in infested areas in the eastern U.S. However, it is unknown whether or not any of these introductions have resulted in new establishments.

The CDFA border stations on major highways into the state have intercepted BMSB 24 times from 2006 to 2010 in vehicles coming from the eastern U.S.

BMSB currently has a pest rating of B, which means that nursery stock found infested must be cleaned before it can be sold, and our border stations can require treatment or reject shipments which are infested. However, CDFA has not enacted any additional quarantine regulations for BMSB.

As for damage, Gevork Arakelian, the Los Angeles County entomologist has reported that in infested areas some discoloration and pitting has been observed on peach, nectarine, fig and apple fruit and also on the leaves of these trees. This damage was noticeable only when large congregations of nymphs were present.

BMSB may affect wine quality. BMSB does feed grapes. In an August 2011 interview by *Wines & Vines* with Dr. Joseph A. Fiola, extension specialist in viticulture and small fruit at Western Maryland Research and Education Center in Keedysville, Md., it reports that he did some testing in the past several weeks to determine how many bugs it takes per lug to affect the aromas and flavors in juice samples. He added controlled numbers of the BMSB to juice from 25-pound lugs of grapes and then evaluated the aroma of the juice. “The smell added by the stink bugs is a crushed cilantro smell,” Fiola told *Wines & Vines*. “I could detect it at five bugs per lug; and at 10 bugs per lug, there was no doubt about the off-*aroma*.” Other descriptors used for the stink bug taint are “skunky,” “citrusy” and “piney.” The odor from the BMSB is due to trans-2-decenal and trans-2-octenal. At low levels, these aromas may not make the resulting wine unusable, but they may reduce a wine’s varietal character sufficiently that the wine would have to be used in a blend rather than bottled as a varietal wine [1]. Read more at: <http://www.winesandvines.com/template.cfm?section=news&content=79437&htitle=How%20Many%20Stink%20Bugs%20to%20Ruin%20Wine%3F>

See also Joseph A. Fiola's 2010 articles on BMSB in the vineyard in the University of Maryland Extension newsletter <http://www.grapesandfruit.umd.edu/TimelyVit2/TimelyVitBMSB1.pdf> and <http://www.grapesandfruit.umd.edu/TimelyVit2/TimelyVitBMSB2.pdf>. A delightful and informative video on BMSB is available on this Rutgers site at <http://ncsmallfruitsipm.blogspot.com/2011/2/brown-marmorated-stink-bug.html>


Tracy Leskey's BMSB presentation at Foundation Plant Services can be viewed at: http://stream.ucanr.org/fps_stinkbug/index.html

POPULATION BIOLOGY OF THE BMSB

Most members of the Pentatomidae family mate only once a year. The BMSB mates continually throughout the spring, summer, and early fall. Populations build up very quickly.

Elliptical eggs are laid in clusters, often on the underside of leaves. Five instars (nymphal stages) take about a week each; the nymphs typically being brightly colored with red and black. Hemiptera undergoes incomplete metamorphosis.

In PA, the BMSB has only one generation a year, like in the northern part of its native range. However, in southern China up to five generations occur each year, and the same pattern can be expected as the bug spreads south. The adults mate in the spring about two weeks after emerging from diapause or the resting phase. The females soon begin laying egg masses (at weekly intervals); a female lays about 400 eggs in her lifetime. In PA, the egg-laying was observed from June to September, so different instars can be present on the same plant. Eggs hatch after 4-5 days. Nymphs are solitary feeders, but occasionally aggregate between overlapping leaves or leaf folds. Adults are sexually mature two weeks after the final molt.

USDA-ARS researchers in WV have observed that there are two full generations of BMSB beginning with the previous year's overwintered adults in the spring. These become active, move into orchards and start to feed and mate. Egg masses are laid with nymphs hatching soon afterwards. The nymphs feed voraciously while undergoing five nymphal stages before developing into adults, ending the first cycle of the year. By September the second generation of adults is present and may begin to leave the orchard to overwinter. 

WORKS CITED

1. McKee, L.J., How Many Stink Bugs to Ruin Wine, in Wines and Vines. 2010.

From the Director's Desk...continued from front page
under a Memorandum of Understanding between USDA's three participating agencies: APHIS, ARS, and NIFA. Now in the third year, this funding was allocated to be spent over 4 years by a competitive grants process overseen by USDA-APHIS. We received \$1,141,438 in this year's funding budget from our USDA Governing Board. With all of the other financial bad news of the last few years, the NCPN funding has been essential to FPS.

With support from NCPN, we have modernized our laboratory equipment; refurbished growth chambers and greenhouses; largely expanded our grape importation, quarantine and therapy programs; increased pathogen testing for tree and grape collections; organized and hosted NCPN stakeholder meetings; and initiated work on a new grape Foundation standard. And, perhaps most important, we have made the Grape Foundation Vineyard at Russell Ranch a reality. You can read more about the vineyard and our first planting on the back page.

Varied sources of income support FPS: the list includes sales of plant materials; custom lab services; funds from the Fruit Tree, Nut Tree, and Grapevine Improvement Advisory Board (IAB); grape user fees, gifts, and grants. Research grants support our scientists and staff. It may be a surprise that only a small portion of our funding comes from the University of California; UC supports two faculty positions (Dr. Adib Rowhani and I), but all other positions rely on income from our self-supporting projects.

Research grant funding has taken a big hit. The Viticulture Consortium West (VCW) received no federal funding, and the California state legislature withdrew funding from the California Competitive Grant Program for Research in Viticulture and Enology (CCGPVE). Many research groups on campus scrambled to find alternate funding or new jobs.

At the same time, income from the IAB and our FPS grape user fees have declined. The IAB is funded by an industry assessment of 1% of gross sales on all deciduous pome and stone fruit trees, nut trees, and grapevines including seeds, seedlings, rootstocks and topstock. This funding is key to the nursery services at CDFA, and FPS, each essential to the Registration and Certification programs for these crops. IAB funding for research projects was likewise reduced due to the economic downturn.

The net result was the loss of some permanent FPS staff positions. It has been hard to say "good-bye" to people who have done excellent work, but we are pleased that there are good jobs for scientific staff at UC Davis and in the private sector, making this transition easier to bear.

Thank you to all who make our grape program possible and work to keep our funding secure. We couldn't do it without you, and look forward to further improvements. 