

Invasion of Brown Marmorated Stink Bug

Orchard Pest Update – Peach Growers Beware

By Jhalendra Rijal, Ph.D., UCCE Area IPM Advisor – San Joaquin, Stanislaus, Merced Counties

Brown marmorated stink bug (BMSB), is an invasive stink bug species, causing significant economic damage to several crops including tree fruits, vegetable and field crops in much of the US in the past 7-8 years. Although BMSB was detected in Allentown, Pennsylvania in the late 1990s, a major attention was given to this pest in 2010 when significant crop loss (~\$37 million by the apple industry alone) was reported in the Mid-Atlantic states. Currently, BMSB has been spread to more than 43 States from east to west including California. BMSB is a type of stink bug with size ~5/8 inch long, and marmorated (i.e., marble) brown color. Males are slightly smaller than the females, and lack of ‘claspers’ at



to find early-season hosts commonly. BMSB prefers to feed on reproductive structures that include fruits and seeds. BMSB females deposit light-green eggs on the underside of leaves (**Fig. 1**). BMSB has five nymphal stages. All life stages, except the first instar, actively feed on fruits by inserting their straw-like mouth part, injecting the salivary enzyme into the fruit and sucking the softened content from the fruits. Unlike other stink bugs, BMSB is active in orchards throughout the growing season and has one or two generations per year in cooler climates and more generations in warmer climates. Direct feeding damage on fruits is characterized by the presence of a depressed area, discolored surface and necrotic spots typically beneath the fruit surface. Peaches and nectarines are considered ‘high risk’ crops to BMSB attack from fruit set through harvest. Feeding can cause significant damage on young and mature peaches by developing necrotic areas inside the fruit, which results in unmarketable fruits for both fresh and canning purposes. See some feeding damage in **Fig 2 (page 10)**.

the end of the abdomen. Although there are few characteristics to look at, the presence of two white bands in the antennae of BMSB adults is the most typical to distinguish from other similar looking stink bugs such as rough stink bug and conperse stink bug.

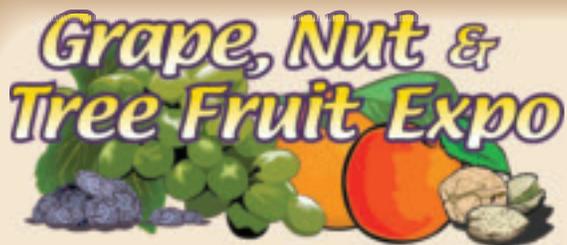
The trend of establishing BMSB has been that they invade first in urban areas where they find a diversity of food sources such as fruit trees of different kinds, landscape and ornamental trees such as trees of heaven, Chinese pistache, catalpa, several species of the ash tree, Eastern redbud, English holy, etc. BMSB can be a significant nuisance pest during the winter due to their mass movement into houses. During the late Fall and early Winter, BMSB adults seek overwintering sites, predominately houses, barns, old trees and other enclosed structures, and that’s the time when the residents notice the BMSB activity. In Spring, adults disperse from the overwintering shelters

In California, although BMSB was first detected in Los Angeles County in 2002, a large population of BMSB has been discovered in Midtown Sacramento in Fall 2013, and since then BMSB has been showing up in many community gardens and parks, other business and residential areas of the Sacramento metropolitan area. To date, there are 9 Counties (Butte, Sutter, Yolo, Sacramento, San Joaquin, Santa Clara, Los Angeles, Siskiyou, and Stanislaus) with an established BMSB population. The reproducing population of BMSB was detected for the first time in Stanislaus County in the summer of 2015 near freeway-99 in Modesto. Since then, residents from

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Figure 1. BMSB first instar nymphs surrounding the egg mass after hatching (on a nectarine leaf)



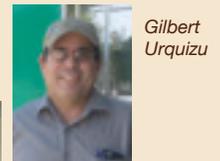
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Kurt Hembree, UCCE Fresno County Weed Management Farm Advisor



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David Kratville, CDFA Vertebrate Program Manager



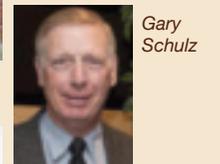
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Modesto metropolitan area reported sightings of BMSB in their houses, backyard fruit and ornamental trees, and parks. However, BMSB has not been reported in the agricultural area in California until recently.

Given the indication of spreading BMSB in Modesto and nearby areas, and having commercial agriculture as close as a few miles from the infested residential area, BMSB potentially poses a serious threat to several crops including peach, one of the favorite hosts of BMSB.

In 2016, we conducted detection monitoring in several peach orchards in Stanislaus and Merced Counties using standard BMSB pyramid traps and captured more than 30 BMSB adults from one of the peach orchards located about 8 miles east of Highway-99. This was the first report of BMSB infestation in an agricultural area of California.

Fig 2 External feeding damage on peaches

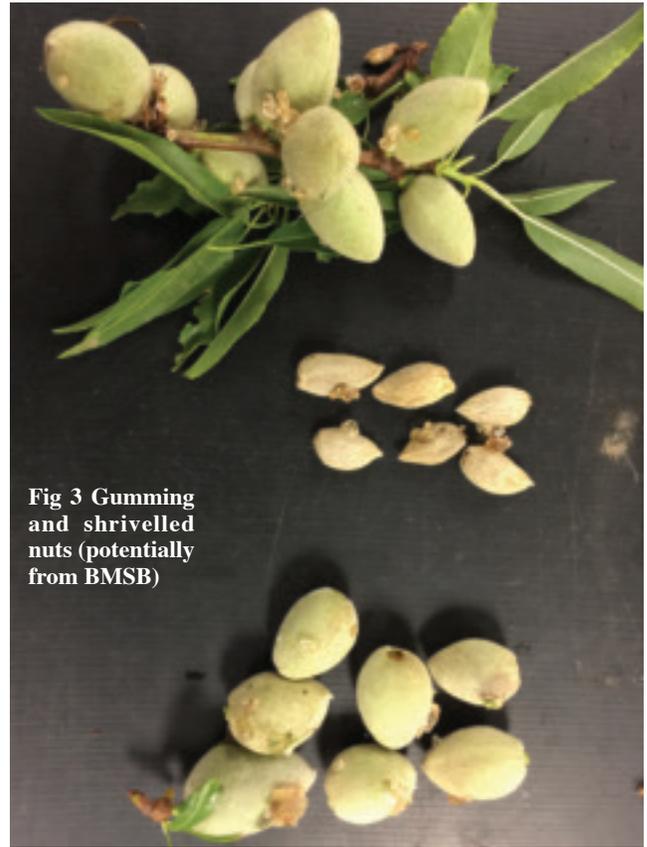


Fig 3 Gumming and shrivelled nuts (potentially from BMSB)

The highest capture was recorded around mid-October. In 2017, we deployed traps in different host crops (peaches, almonds, walnuts) and began capturing BMSB adults in mid-March, likely an overwintering generation. Some of these orchards, especially in walnuts, traps were placed based on the growers' report of BMSB invading their houses next to the orchard during the winter; we have not noticed any BMSB live stage or feeding activity on walnut trees and fruits during our sampling.

In mid-June, BMSB adults, nymphs, and egg masses were found in almond trees in one orchard located in the same general area. At that site, we recorded a significant number of green nuts with clear gumming, a sign of stink bug feeding. BMSB feeding can be confused with



Fig 4 Internal feeding damage on peach

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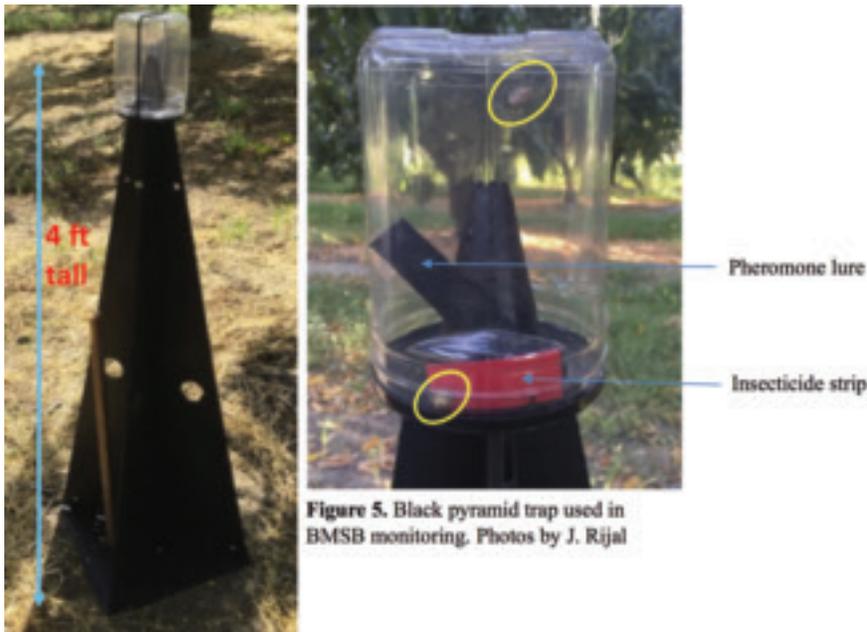


Figure 5. Black pyramid trap used in BMSB monitoring. Photos by J. Rijal



Figure 6. Clear 'sticky panel' trap used in BMSB monitoring. Photos by J. Rijal

that of leaffooted plant bug and other common stink bugs externally. However, excessive gumming and a high number of feeding sites into the nuts with internal necrotic spots (Fig.3) were closely associated with the BMSB feeding signs to young peaches (Fig 4).

In some of the sample nut collected, we can see some evidence that BMSB can penetrate to the nut and inside nut meat, but at this point, we don't have enough data to know the extent of damage BMSB can do in almonds.

Based on BMSB monitoring studies and our observations, and reports from growers, there is a clear indication that BMSB has been moving to the agricultural area. At this point, we urge growers and pest control advisers to pay close attention to this stink bug in orchards particularly peaches and almonds. Visual observation in different parts of the orchard is recommended

especially border rows and trees.

Monitoring is critical, especially if the orchard is near urban areas with known tree hosts such as the tree of heaven. Visual observations of egg masses, live insects and damaged fruit (deformed fruits, fruits exuding gum) and beat tray sampling (i.e., shaking branches/twigs to dislodge insects) are early BMSB detection methods. Also, placement of BMSB-specific lures in black pyramid traps (Fig 5) and/or in sticky panel traps (Fig 6), in the border rows of the orchard is recommended to detect BMSB activity and infestation.

The 'sticky panel trap' seems to be equally effective in catching BMSB, based on our short-term observation. This trap is much easier to use and less expensive. Although may be too early to discuss details about options to control BMSB in California, it is good to have information on what's available to use when needed.

Insecticide has been the primary line of defense for BMSB in other States particularly on the mid-Atlantic States where the problem has been the most severe. Although insecticide related data generated from other States may be extrapolated and used in California conditions, the field efficacy data of BMSB targeted insecticides in California is not available, simply due to a low and sporadic presence of BMSB population in California cropping areas. **CFE**