Monitoring of Brown Marmorated Stink Bug (BMSB) in Lake and Mendocino County Pear Orchards

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ABSTRACT

The brown marmorated stink bug (*Halyomorpha halys*) (BMSB) is an invasive species that has a host range of over 170 plant species including fruit and nut crops, vegetables, and ornamentals. In addition to being an agricultural pest, BMSB are also a nuisance pest in urban areas where they aggregate to overwinter. BMSB was first detected in Northern California in 2013 and since pear is a preferred host in which they can cause economic damage, their spread to pear growing regions is of concern. Trapping for BMSB was conducted in 2024 in 6 Mendocino County and 4 Lake County pear orchards. In 2024, twenty-one adult BMSB were found in Mendocino County traps and 5 BMSB (4 adults and one 5th instar nymph) were found in Lake County traps. California Pear Board funded traps were the first documented detection of BMSB in Lake County in 2020, the first nymph detection in in Mendocino County in 2021 and the first nymph detection in Lake County in 2024. In addition to trapping, sentinel BMSB egg masses (previously frozen and nonviable) were deployed in Lake and Mendocino pear orchards to monitor for *Trissolcus japonicus* and native BMSB parasitoids.

INTRODUCTION

The brown marmorated stink bug (*Halyomorpha halys*) (BMSB) is native to East Asia and was first identified in the Pennsylvania in 2001. BMSB has since spread to 47 US states and 4 Canadian provinces (www.stopbmsb.org). In 2010, BMSB caused approximately $37 million in damage to fruit crops. BMSB has a host range of over 170 species, including virtually all fruit crops and vegetables with fruiting structures. Pear is one of their preferred hosts and rated as a high-risk crop (http://www.stopbmsb.org/where-is-bmsb/crops-at-risk/). Adult and all nymphal stages can cause damage to tree fruits exhibited by surface pitting, deformation/depression, and scarring that sometimes leads to a mealy texture in the fruit. BMSB feeding injury on young and mature pears can develop discolored necrotic regions inside the fruit resulting in unmarketable fruit.

In California, a large BMSB population was discovered in Midtown Sacramento in early Sept. 2013, and subsequent surveys showed that they infest downtown, midtown and several other locations in Sacramento County. Established populations have now been documented in Siskiyou, Butte, Glenn, Sutter, Nevada, Yolo, Sacramento, Solano, Napa, San Joaquin, Stanislaus, Santa Clara, Merced, Fresno, Los Angeles, and Orange Counties. In 2016, the first BMSB infestation was reported in peach in the northern San Joaquin Valley followed by almond in 2017. This is the clear indication that once population builds up in urban areas, crops nearby remain at risk. Trapping for BMSB in pear orchards located in Mendocino and Lake counties has occurred since 2014.

OBJECTIVES

- Conduct a BMSB monitoring survey in pear orchards in Mendocino and Lake counties using visual surveys and sticky panel traps
- Collaborate with USDA and CDFA on pear related projects that maximize the research knowledge gained from pear grant funds
- Disseminate the results to the growers, Pear Board, and pest control advisers.

PROCEDURES

In 2024, the California Pear Board funded 30 BMSB traps distributed between six locations in Mendocino County (Hopland, Potter Valley, four locations in Ukiah) and four locations in Lake County (Upper Lake, Scott's Valley, Finley, Kelseyville). Trap placement criteria required that traps be within close proximity of Pear orchards.

BMSB traps were deployed and checked weekly from April through October 2024. Clear sticky panel traps were baited with the BMSB aggregation pheromone + methyl decatrienoate (MDT) marketed by Trécé, Inc. All suspected BMSB stink bugs found in panel traps were submitted to the local Agricultural Commissioner's office and when deemed necessary, sent for final verification by CDFA.

During 2021-2024, I partnered with Ricky Lara, CDFA Senior Environmental Scientist, that supplied 68 sentinel BMSB egg masses comprising of 617 eggs (previously frozen and nonviable) in 2021, 72 sentinel BMSB egg masses comprising of 644 eggs in 2022, and 84 sentinel BMSB egg masses comprising of 674 eggs in 2023, and 84 sentinel BMSB egg masses comprising of 705 eggs in 2024 to deploy in Lake and Mendocino County pear orchards throughout the season (Photo 1). Egg masses were collected and shipped back to CDFA for evaluation of parasitism. Parasitoids that emerged from sentinel egg cards were given fresh BMSB eggs to see if they were able to parasitize them.

RESULTS

In 2024, 21 BMSB were found in Mendocino County traps and 5 BMSB were found in Lake County traps (Figure 1). All were adults except one 5th instar nymph was found in Lake County. Searches of the trees surrounding the trap where a nymph was found did not locate evidence of a reproducing population.

Parasitoids that emerged from sentinel cards did not parasitize fresh BMSB eggs indicating that they were native parasitoid species instead of *Trissolcus japonicus*. These results still allowed us to validate field monitoring techniques for parasitism of BMSB and show that co-evolved parasitoids of BMSB are still lacking in Mendocino and Lake County pear orchards.

DISCUSSION

In 2021, California Pear Board funded traps detected the first BMSB nymph in Mendocino County and in 2024, the first BMSB nymph in Lake County. Since nymphs do not have wings and the ability to disperse long distances, the presence of a nymph indicates that either BMSB eggs were laid in the Pear orchard and successful progression from egg to

a later instar occurred or that a nymph hitchhiked on equipment or bins brought in from geographical areas that have reproducing populations of BMSB. Inspection of the surrounding trees both years did not yield any additional BMSB nymphs or adults. Since BMSB populations can build up in urban areas and move into pear orchards, a continued trapping effort by the California Pear Board and the county Agricultural commissioner's offices can assist in assessing the threat by BMSB in North Coast pear orchards.

In its native region of Asia, *Trissolcus japonicus* is BMSB's main parasitoid attacking 60-90% of BMSB eggs. It is unknown how *T. japonicus* arrived in the United States, but populations have been documented in Southern California. During 2022, *Trissolcus japonicus* was redistributed by CDFA in Siskiyou, Sacramento, and Santa Clara counties. Deployment of sentinel BMSB egg masses help monitor the potential spread and establishment of *Trissolcus japonicus* within California. If *T. japonicus* can be found to already exist in Lake and Mendocino counties, the possibility of releasing *T. japonicus* for control of BMSB is an option. In addition, documenting native parasitoid species that are attacking BMSB eggs may also be beneficial information in establishing biocontrol programs for BMSB.

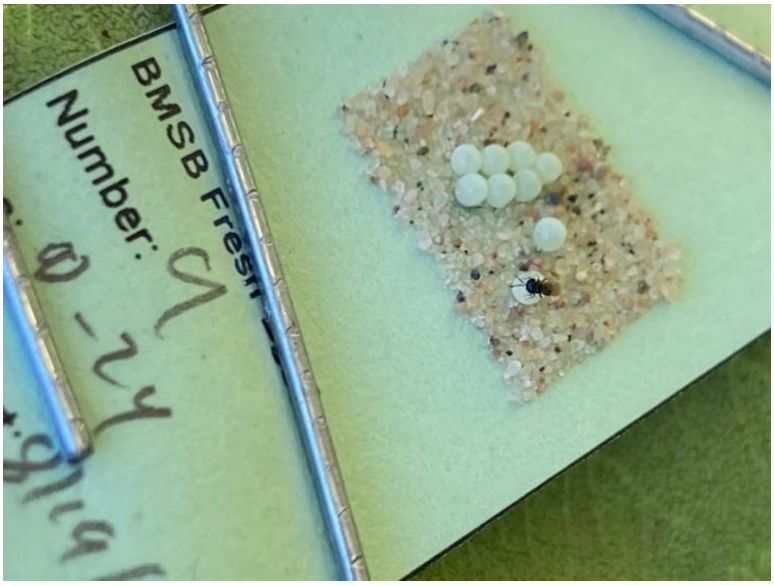

Photo 1. Parasitoid found assessing egg quality of a sentinel BMSB egg mass paperclipped to the underside of a pear leaf in Upper Lake, CA.

Date	Location	Number	Life Stage	Coordinates
5/14/24	Mendo	2	adult	39.1541035, -123.1964494
5/14/24	Mendo	2	adult	39.1571867, -123.1968276
5/14/24	Mendo	1	adult	39.1408493, -123.1919513
5/14/24	Mendo	1	adult	39.1414835, -123.1921096
5/16/24	Mendo	1	adult	39.1414757, -123.1920878
5/29/24	Mendo	1	adult	39.1331894, -123.1916378
5/29/24	Mendo	1	adult	39.1318496, -123.1935415
5/29/24	Mendo	1	adult	39.1408493, -123.1919513
5/30/24	Lake	2	adult	39.063961, -122.944724
6/17/24	Mendo	1	adult	39.1324209, -123.1814994
6/17/24	Mendo	2	adult	39.1408475, -123.1912466
6/24/24	Mendo	1	adult	39.1323676, -123.1814344
6/24/24	Mendo	1	adult	39.1324209, -123.1814994
6/26/24	Mendo	1	adult	39.1408488, -123.1919748
7/15/24	Mendo	1	adult	39.1331993, -123.1914796
7/15/24	Mendo	1	adult	39.1408488, -123.1919748
7/15/24	Mendo	1	adult	39.1351727, -123.1918652
8/9/24	Mendo	1	adult	39.1408488, -123.1919748
8/21/24	Lake	1	5th	39.063961, -122.944724
9/5/24	Lake	2	adult	39.064290, -122.94607
9/23/24	Mendo	1	adult	39.1351727, -123.1918652

Figure 1. 2024 BMSB trapping data.