Monitoring and Management of the Brown Marmorated Stink Bug: Edge Effects and Relation to Control Tactics

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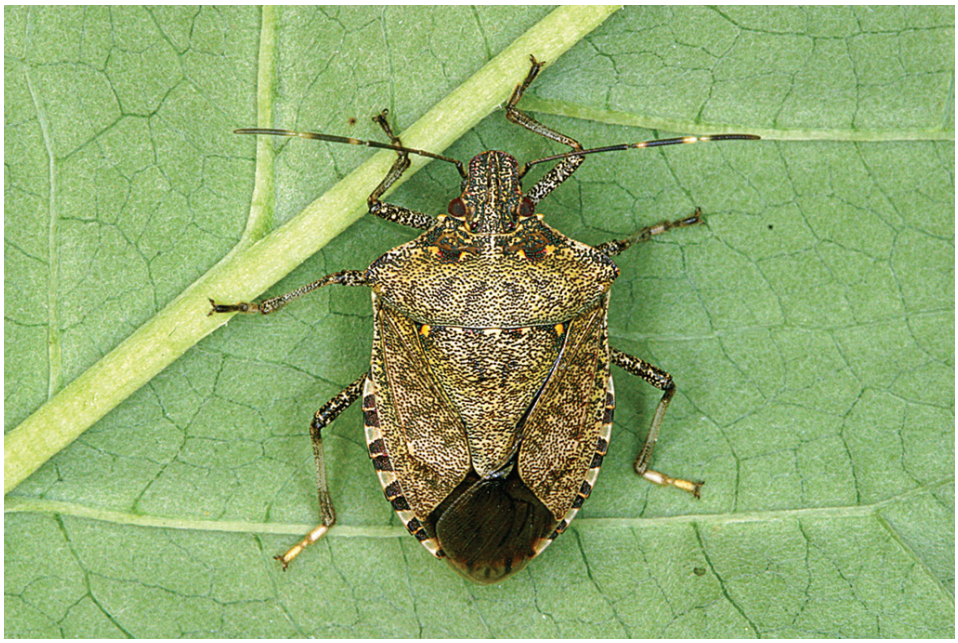
The invasive brown marmorated stink bug (BMSB) has developed into a key orchard pest that requires routine and regular targeted insecticides in most orchards in the mid-Atlantic area. After the watershed year of high populations and resulting damage in 2010, populations were lower in 2011 and 2012 throughout New Jersey. In 2013 BMSB populations were again problematic at significant levels on a number of farms that required increased use of insecticides.

There are 3 factors that make BMSB particularly challenging for orchardists. First, BMSB has a wide host range, and is a strong flier with strong dispersal behavior. Secondly, it feeds in virtually all life stages in the orchard. Third, once fruit is visibly fed on, it becomes unmarketable as fresh fruit. Apples will sustain some internal damage which increases in storage, and which is not immediately apparent at harvest. Peaches will also have some internal damage not immediately apparent, but most of the market impact is from external damage immediately visible at harvest.

BMSB has well over 300 hosts, and readily moves between alternate hosts and orchard crops at various times of the season. These alternate hosts include many ornamental plants around residential areas, as well as wild woody species in and around forests. Because of it's host range and dispersal behavior, BMSB has become known as a "border pest", in that populations will often be found on crop borders before being seen in the interior of the crop.

BMSB biology enables all life stages (except newly emerged nymphs), to feed on a preferred host crop throughout the life of the insect. Once eggs are laid on the leaf surface, the nymphs hatch (emerge). Newly emerged nymphs cluster around hatched eggs, then molt into second instars before dispersing to feed on the host, including developing fruit. There are 5 nymph instars plus the adult. All these stages feed on the host plant on which the eggs were laid, in this case apples and peaches. This is different from most other (native) stink bugs that reproduce on alternate hosts, before coming into the orchard to briefly feed, usually as adults. Once in the orchard, BMSB will feed continuously. Both nymphs and adults will



also disperse to other fruit varieties within the orchard as they ripen or as the original host is harvested.

Objectives

The objectives of this study were to:

1) Evaluate a BMSB trap use in commercial settings.
2) Evaluate the efficiency of transect sampling in commercial peach and apple plantings.
3) Determine if BMSB populations were greater on the orchard borders.
4) Determine the distribution of any resulting BMSB feeding.

Methods

This work summarizes the work done in 2013 in 6 peach and 3 apple blocks. In each block a pair of transect sampling lines was established. One transect, called "TT" transect, had under the first tree, a standard 3' black pyramid trap baited with ARS#20 BMSB aggregation pheromone + an MDT adjuvant (ChemTica). The other transect was marked as "NT" for "no trap" transect. Sampling trees, one at each sampling point, were marked at 4 locations along each transect point starting at the woods border tree and extending in for 3 more trees every 120'. Trees were sampled starting in early June with 3 minute timed counts for BMSB adults and nymphs. An at harvest count was done at first picking by looking at 100 fruit per sample tree for the number of BMSB and catfacing damaged fruit, plum curculio (PC) damaged fruit and the number of clean fruit.

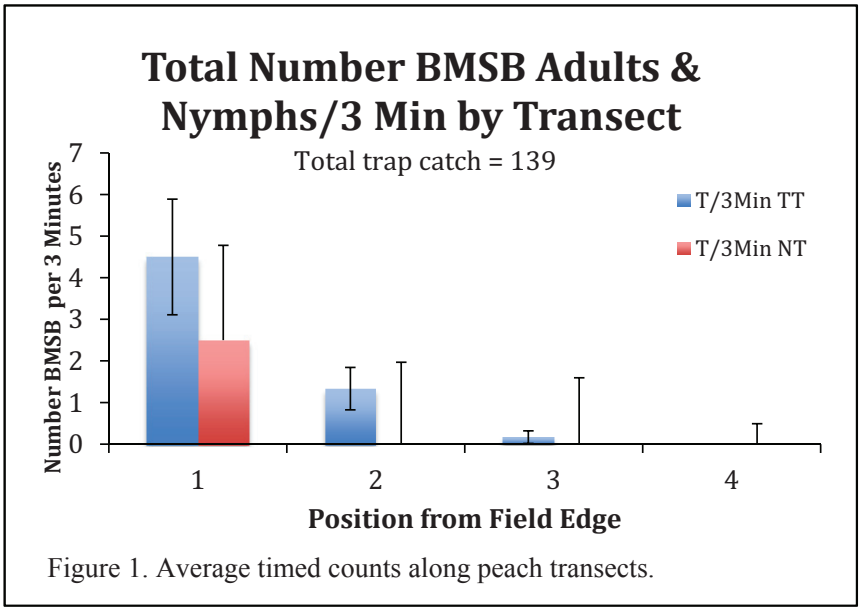


Figure 1. Average timed counts along peach transects.

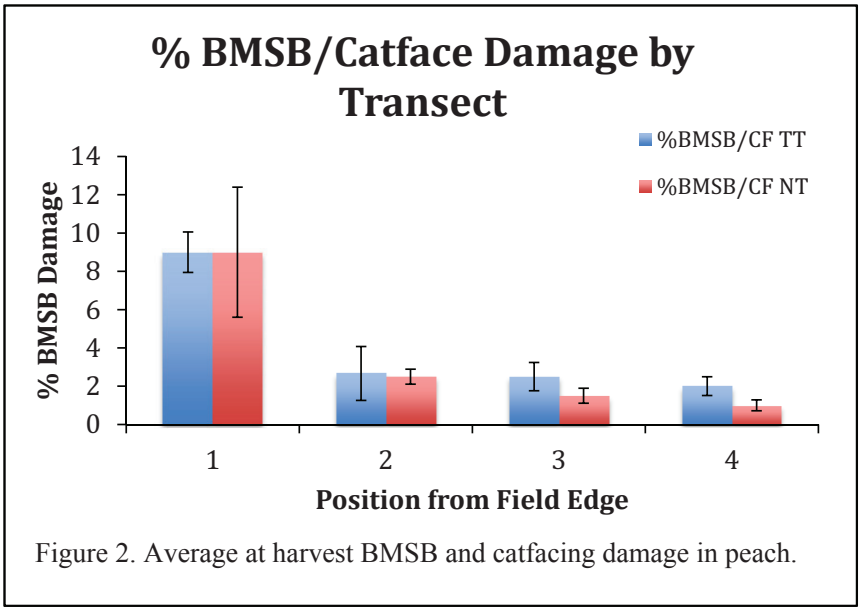


Figure 2. Average at harvest BMSB and catfacing damage in peach.

Results

The number of BMSB was greater before harvest along the woods border and decreased quickly in interior trees (Figure1). The pattern of at harvest damage matched that of the timed counts in that more damage was present along the woods edge (Figure 2). At various times of the season greater numbers of BMSB were seen in the

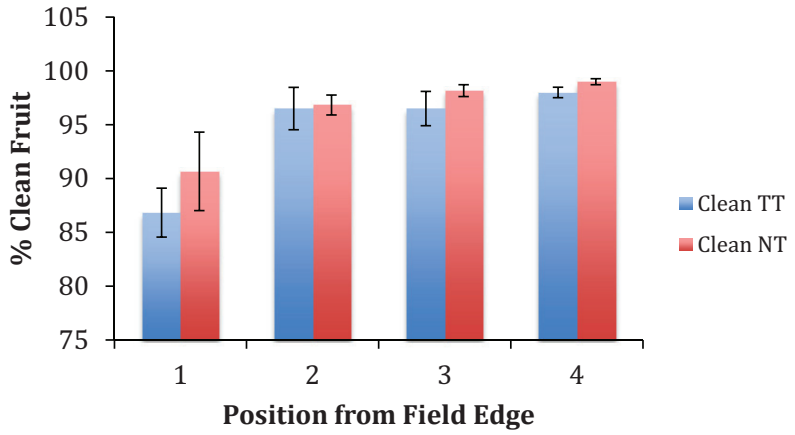


Figure 3. Percent clean fruit along peach transects.

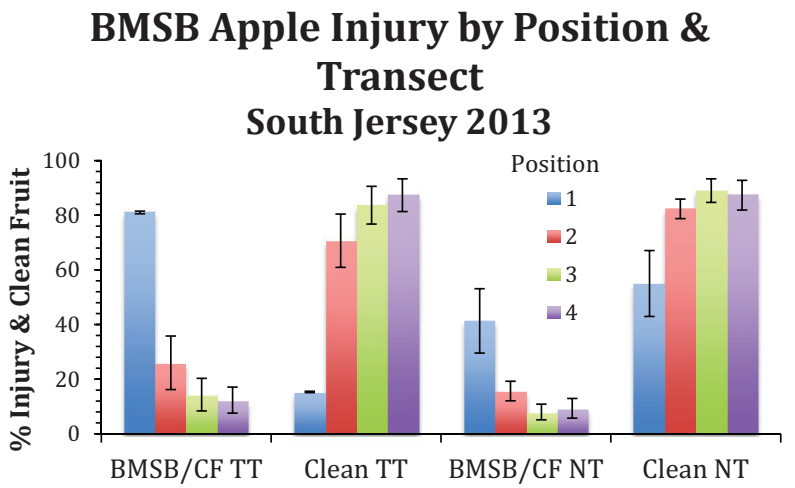


Figure 4. Catfacing damage and clean fruit by position, trap transect (TT) and no trap (NT) transects.

trees where the traps were placed, but there was little difference in the BMSB damage the fruit in those trees sustained compared to the other border trees where no traps were placed. The percent clean fruit was lower on the border trees compared to all interior trees (locations 2-4) (Figure 3). Similar patterns in BMSB distribution and damage were seen in apples (Figure 4.)

Discussion

All orchard blocks used in this work were being commercially treated. These means that in some cases, the grower would have likely benefited from either supplemental border treatments, or by having a tighter spray interval when BMSB were present. Given the distribution of damage, it shows the importance of orchard borders and their relationship to BMSB damage. It appears that the most important locations for monitoring BMSB populations and feeding injury are at orchard borders. In this case it was defined as a woods edge. However edges bordered by maturing grain or corn have also shown to be more highly damaged than interior trees. Timed counts were low throughout the season, and may not be the best way to assess BMSB populations. Since the traps caught significant numbers of stink bugs, they will likely be more reliable as we continue work on how to use them.