Integrated Trap Crop and Pheromone Trap System for Organic Management of Brown Marmorated Stink Bug: Preliminary Results[1]

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This project tested a chemical-free approach combining a trap crop border with commercially available pheromone traps to manage the invasive Brown Marmorated Stink Bug (BMSB). We tested this system on four cash crops with high BMSB susceptibility: okra, sweet pepper, tomato and summer squash, in replicated field plots under USDA certified organic production in 2012. We observed increased squash yields and reduced stink bug damage to tomatoes and sweet peppers in the plots surrounded by the sunflower trap crop, but no differences in yield or damage for okra. Our preliminary results indicate that this system is effective for organic production of summer squash, sweet potatoes and tomatoes but not for okra.

Methods

Field Sites & Crop Production. Four study plots (900 sq ft each, in hay the previous year) at Redbud Farm (Berkeley County, WV) were established with 4 linear crop rows (each 3 x 36 ft) covered with black plastic (1 ml embossed) and 3 ft wide bare aisles in between (Figure 1). Sweet pepper ('Red Ace') and tomato ('Big Boy') seedlings were transplanted 18 May; Okra ('Clemson Spineless,' 4/hole) and squash ('Zephyr,' 2/hole) were direct seeded 21 May. All crops were spaced 24 in within rows, and aisles were mulched with straw (22 May).

Figure 1. One field plot shown after application of straw mulch (May, 2012).

The 3 ft wide trap crop perimeter was direct seeded 23 May with amaranth (green variety from saved seed, 4 oz/plot) and sunflower (open pollinated mix, 24 oz/plot) seeds broadcast by hand. No insect or disease control was applied. Four 'RESCUE' stinkbug traps baited with dual pheromone lures were placed on wooden stakes (3 ft high) located on each side (N, E, S, W) of the trap crop border of each treatment plot (6 June; Figure 2). Lures were replaced 12 July and 9 August.

Figure 2. One field plot with trap crop perimeter established and four pheromone traps in place (June, 2012).

Sampling. BMSB (adult, nymph and egg) densities were estimated in each crop (3 plants/row) at weekly intervals 4 June – 21 August) via visual examination. BMSB (adult and nymph) in traps also were removed weekly. Crop damage and yields (lbs/row) were assessed weekly, beginning 4 July, with yield by crop type totaled across the season.

Results

The amaranth in the trap crop perimeter did not establish due to competition with the sunflowers. However, the sunflowers were highly attractive to the BMSB and remained so through August.

[1] This bulletin was produced August, 2012; final results for sweet pepper, okra and tomato crops are pending project completion.

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BMSB Density. BMSB nymphs entered the traps in trap crop borders during the first week of July (Figure 3), but were not detected on the cash crops until the second week of July (okra only). BMSB adults were found in trap crop borders and on the okra plants of both control and trap crop plots during the 3rd week of July (Figure 3) but did not move to tomatoes until the 4th week of July. No adult BMSB were found on summer squash plants during the growing season.

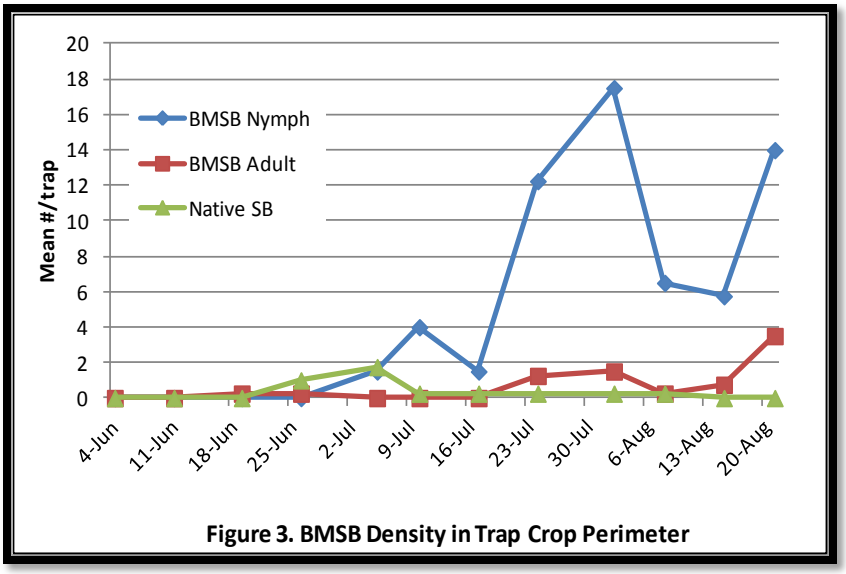

Figure 3. BMSB Density in Trap Crop Perimeter

Crop Damage. Stink bug damage was more than doubled for tomatoes harvested from the control plots, as compared to the trap crop plots (Figure 4). However, no stink bug damage was found on summer squash fruits though out the crop's productive lifecycle. (BMSB nymphs were observed feeding only on stems of the squash plants.) The predominant pest observed feeding on squash fruits was squash bugs. We observed minimal stink bug damage to the sweet peppers. For okra, we found an average of 3.0 and 3.5 damaged fruits/plant in the control and trap crop plots, respectively (Figure 4).

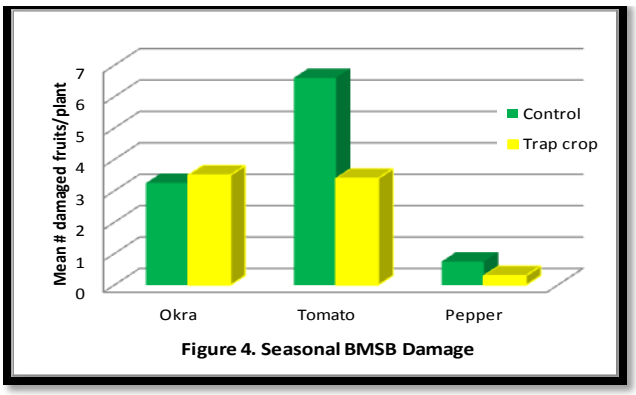

Figure 4. Seasonal BMSB Damage

Crop Yields. On average, summer squash yields were substantially higher in the plots surrounded by the sunflower trap crop (Figure 5). The okra, tomatoes and sweet peppers are still being harvested at the time of this publication, but to date there appears to be no substantial difference in yield for these crops in the controls plots as compared to the plots surrounded by the sunflower trap crop (Figure 5).

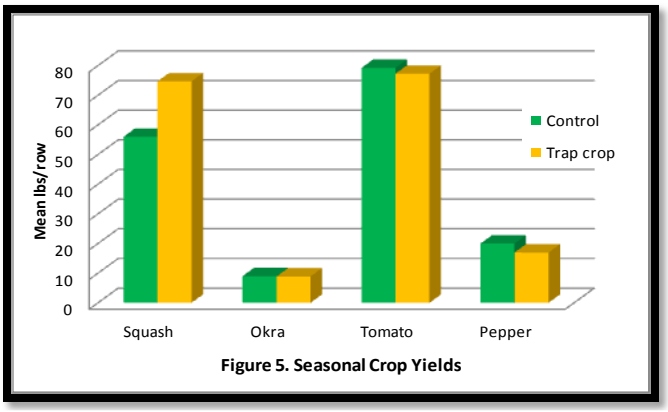

Figure 5. Seasonal Crop Yields

Conclusions

The combination trap crop/pheromone trap system appeared to be effective at attracting and trapping BMSB, particularly in the nymph stage, apparently reducing BMSB incidence in the cash crops later in the season. However, the system did not work for okra, which was highly attractive to the stink bugs. We suggest further investigation of okra as a trap crop to enhance this system.

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