Ohio Vegetable & Small Fruit Research & Development Program

Final Report

Establishing a Rapid Reaction Monitoring Team for Invasive Species

Principle Investigator(s): Jim Jasinski, Celeste Welty
Phone Number: 937-484-1526, 614-292-2803
Fax: 937-484-1540
E-mail: Jasinski.4@osu.edu, Welty.1@osu.edu
Cooperating Institution: Ohio State University
Mailing Address: 1512 S. US Highway 68, Suite B100, Urbana, OH 43078

Other Key Personnel: Gary Gao, County based Extension Educators, key growers

Introduction

In the past five years, several new major fruit and vegetable pests have become established in Ohio. Because we lack familiarity with these pests, the initial steps Extension specialists need to take include understanding their distribution around the state by setting up a monitoring network, followed by educating growers about pest identification, biology, and relevant pest management strategies. One of the key pests is the Brown Marmorated Stink Bug (BMSB), a new non-native pest of fruit and vegetable crops, field crops, and ornamental plants. It was first detected in Ohio in 2008, and has been slowly spreading across the state. Another new non-native pest, the Spotted Wing Drosophila (SWD), attacks small fruits, tree fruits, and tomatoes. It was first detected in Ohio in late 2011 and has increased its geographic range significantly though 2013. In response to these two new emerging pests, the OSU Extension fruit and vegetable entomologist cooperating with the OSU IPM program have developed and maintained a monitoring network to the track the spread of these invasive pests. The network allows us to understand the distribution of these pests around the state so we can educate growers about their identification and proper management.

Objectives of research proposal & work performed

1. Maintain the network of cooperators monitoring for Brown Marmorated Stink Bug.

In 2013, we had 12 cooperators monitoring a total of 13 sites in 12 counties (Clinton, Franklin, Greene, Mahoning, Meigs, Monroe, Morgan, Piketon, Sandusky, Van Wert, Wooster, Wayne) for BMSB in either sweet corn or raspberries using at least two large black or yellow pheromone baited pyramid traps at each site. The traps were checked weekly and any BMSB adults or nymphs captured were reported on the MyTraps.com website which we are piloting this year as an alternative to our standard online chart and graphs.

Like 2012, the BMSB pheromone lures were changed monthly in 2013, along with the kill strips in the top of the clear plastic collection jar. One difference this year from 2012 trapping was the addition of USDA ARS #20 lure which in combination with the original MDT lure has been shown to significantly enhance BMSB capture. All traps were deployed the first week in June except the Franklin county sites, which were deployed the first week

of May. All traps were removed from the field the last week of September except for the Franklin county sites which stayed in the field for an additional two weeks.

Overall, the trap catches remained relatively low with four sites catching zero BMSB and six sites catching under 20 bugs for the season (Table 1). Counties with significant catches were Franklin (apples) with 1100 bugs captured, Mahoning with 358 bugs captured in sweet corn, and Meigs with a total of 51 BMSB trapped for the season in sweet corn. For the third year running, the Waterman Farm on OSU's Columbus campus caught the most BMSB of any location, though most of them were caught in traps near apple not sweet corn. Economic damage caused by BMSB was documented on apples at the Waterman Farm (Franklin Co.) with 48% of apples damaged by stink bugs in unsprayed plots and 12 to 37% damage in sprayed plots. Damage caused by stink bugs in other locations or crops has not been documented quantitatively in Ohio.

Trap captures were low in June but began to pick up at a few sites by the end of July, with the highest numbers of BMSB caught between early August and late September (Figure 1). The lack of trap attraction and captures in pheromone traps early in the season is common for this species with the traps and lures currently available.

In a related study conducted for only four weeks in August at Waterman Farm in Columbus in both sweet corn and apple, over 6,000 nymphs and adults were captured in various experimental trap designs. This demonstrates that the right trap and lure combination placed in the vicinity of a high population of BMSB will produce significant captures.

As a side note, homeowner calls and website reports have significantly increased this fall compared to previous years, giving us yet another sign that this pest is still increasing its population and spreading in distribution.

Table 1. Total trap catch BMSB monitoring locations in 2013.

Location	**Crop**	**Traps / site**	**Total BMSB**
Clinton	Raspberry	8	19
Franklin	Sweet corn	3	20
Franklin	Apple	3	1100
Greene	Raspberry	8	8
Mahoning	Sweet corn	2	358
Meigs	Sweet corn	2	51
Monroe	Sweet corn	2	0
Morgan	Sweet corn	2	0
Sandusky	Sweet corn	2	17
Wayne	Raspberry	2	3
Wayne	Sweet corn	2	0
Wooster 1	-	1	0
Wooster 2	-	1	2

2. Identify and train a network of cooperators to monitor for Spotted Wing Drosophila.

To educate growers about this new pest, a workshop was conducted in Columbus for 18 growers, crop consultants, and Extension educators in April, 2013. The workshop included identification of SWD adults using microscopes, review of the pest's biology, and a review of the best management practices to help control this pest. Attendees were also trained on how to position the trap relative to the crop and service the apple cider vinegar (ACV) baited SWD traps.

At the end of the workshop, reference materials and a utility tote containing trapping supplies (plastic jar traps, a 30x hand magnifier, apple cider vinegar, detergent, ethanol wash bottle, glass vials, labels, fine strainer, funnel, small paintbrush, waste jug, salt, and plastic bags) were given to each participant. Although growers were initially concerned about the potential damage from this pest, they showed a strong increase in their confidence to monitor, identify, and manage SWD as a result of the workshop.

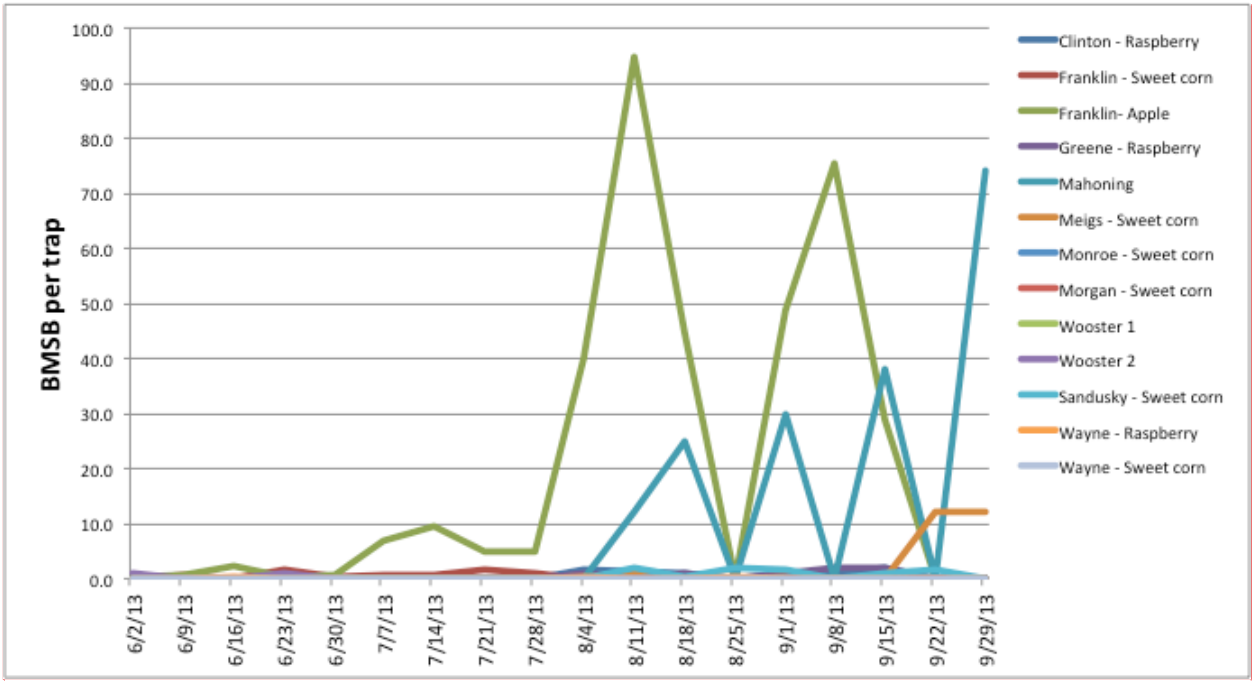

Figure 1. Average BMSB trap catch by monitoring location in 2013.

Most participants agreed to share their trapping results on MyTraps.com to keep other growers and Extension specialists informed of the pest's distribution during the season. To date, we have received SWD positive data from 26 traps within 14 counties (Ashland, Champaign, Clark, Clinton, Erie, Franklin, Greene, Holmes, Huron, Licking, Lorain, Portage, Warren, and Wayne) that were reported on MyTraps.com. We have also solicited other Extension educators statewide to for additional reports or confirmations of SWD in their county outside of the established monitoring sites. To date 37 counties have reported positive for SWD and two more are potentially positive for this pest (Figure 2).

In addition to monitoring for adults, salt water floatation tests were used at a few locations to determine the level of larval infestation in raspberries, blackberries, and blueberries (Figures 3 & 4). The saltwater test is a good test to perform on fruit to quickly check the efficacy of an insecticide spray program. Growers can pick a quart of berries and within 5 minutes be able to determine if larval infestation in ripe fruit is occurring.

3. *Implement a 24-48 hour rapid response protocol for Spotted Wing Drosophila cooperators.*

Twenty-six traps were set up to monitor SWD in 14 counties by Extension educators, consultants, and growers. The crops monitored included red and black raspberries, blueberries, blackberries, strawberries, grapes, serviceberry, and cherries. At each site, between one and three apple ACV baited traps were placed in the crop row, separated by at least 20 meters. The ACV baited traps were deployed in the first week of June and retrieved the first week of October. The traps were serviced weekly, with any insects captured placed in labeled vials and the trap refilled with ACV and a drop of dish soap.

Early in the season, all insects collected from ACV traps were sorted using a microscope to identify male and female SWD within 48 hours of being removed from the field. Any positive findings were immediately reported on MyTraps.com and the grower was also notified so that appropriate management options could be enacted. Once a site was identified as positive for SWD, the site was assumed infested for the rest of the fruit bearing season, and no further attempt was made to count and ID SWD adults within 48 hours at those sites, though the traps were still serviced on a weekly basis. Any insects caught in the traps were placed in labeled vials for future sorting and identification.

The rapid response concept could be summarized as working well for the first few weeks when there were few fruit fly specimens to sort through. As the season progressed, both the number of SWD flies and the different species of fruit flies captured in each trap increased to the point where identification and full counting of collected vial samples was abandoned until after the season was over due to a shortage of technical labor. All samples collected from the monitoring sites have now been processed and entered into MyTraps.com.

4. *Display monitoring data on new MyTraps.com website for easy access by all fruit and vegetable growers.*

The MyTraps.com website was unveiled to the cooperators both through the SWD workshop and VegNet articles. Although it is a different way to enter data from last year, most growers and cooperators seemed to adapt to using the site to enter and view data. There are still a few minor issues to work out with MyTraps, but overall the user experience and data collection was much better than the previous method. We will most likely continue to use this service in 2014.

5. *Develop a Spotted Wing Drosophila recommendation fact sheet based on crop, fruit stage, and insecticide options.*

Several SWD factsheets were produced and updated by Celeste Welty this year that show all the life stages (egg, larva, adult), damaged berries, and outline the monitoring protocol. Most importantly the updated fact sheets contains information on pesticide

recommendations for seven crops, for both commercial and backyard growers. These factsheets and several about BMSB can be found at http://bugs.osu.edu/welty/fruit_info1/Fruit_info.html.

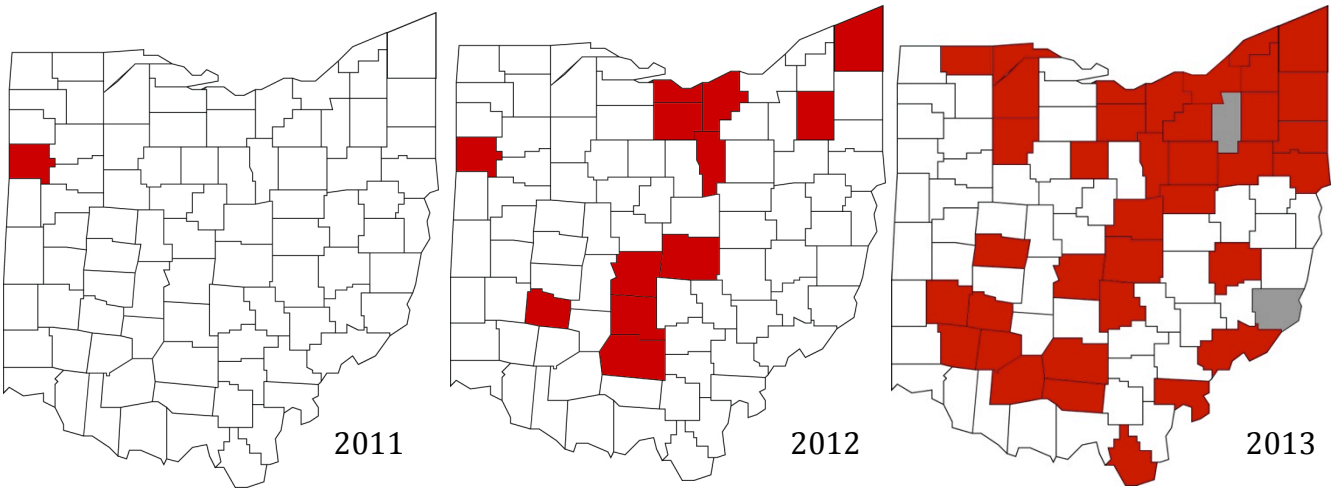

Figure 2. SWD fly detections from 2011 – 2013 by county. Red counties are positive, gray are suspected but not confirmed.

Figure 3. SWD larvae floating among raspberries and blackberries after being subjected to the saltwater test.

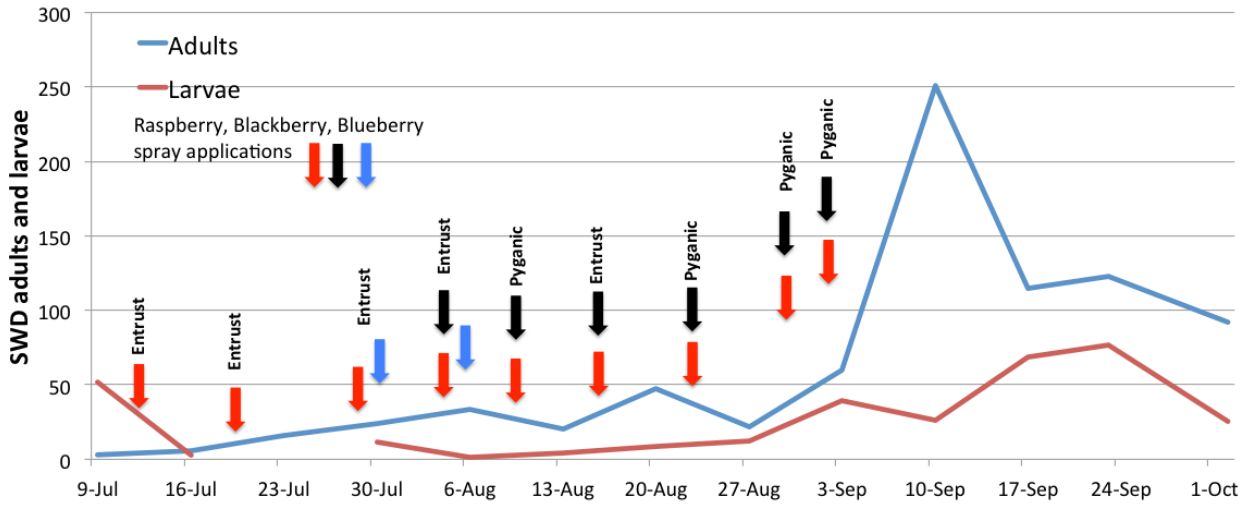

Figure 4. Average SWD adult trap captures and larvae found in raspberries, blackberries and blueberries after Entrust and Pyganic treatments at a monitoring site in southwest Ohio.

Conclusions

Brown Marmorated Stink Bug populations as monitored by pheromone traps are increasing in several counties such as Mahoning and Meigs. In Franklin County on the Waterman Farm these bugs are increasing dramatically, leading to the first documented case BMSB economic injury on apples in the state. No other economic injury to fruit or vegetable by BMSB has been documented in the state. We are also seeing a sharp increase in the overall number of complaints about this bug entering homes in the autumn.

Spotted Wing Drosophila has spread from 1 county in 2011 to 37 counties in 2013; and is now thought to be generally ubiquitous in Ohio. The use of ACV baited traps in the monitoring network revealed SWD adults in at least 14 counties on multiple crops. Reporting SWD counts within 48 hours of trap checks early in the season is a realistic goal but during the season when fly populations begin to climb is difficult to accomplish and perhaps unnecessary once SWD is identified on that farm. Due to the extremely small size of the characteristics that need to be seen to confirm this pest, the biggest hurdle is being able to clearly see the serrated ovipositor and hairs on the front leg of the fly. In response to grower requests for recommendations for a reliable inexpensive microscope, we are evaluating a range of microscopes and hand lenses to ease identification and improve accuracy.

At a handful of locations, ripe fruit were picked throughout the season and subjected to the saltwater test, revealing the level of larval infestations. It is recommended that growers use a saltwater test periodically to verify the timing and efficacy of their insecticide control program is appropriate to control this pest. This pest is affecting both small backyard growers as well as commercial growers. Anecdotal evidence from most growers suggests they can manage the problem with insecticides but this increases their input costs and causes them to re-assess re-entry intervals, harvest intervals, u-pick scheduling, insecticide

rotation and resistance, and impact on non-targets such as pollinators and other beneficial arthropods.