

# Ohio Vegetable & Small Fruit Research & Development Program

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## Final Report, 12/26/2019

### Project Title:

Streamlined monitoring for spotted-wing *Drosophila* and brown marmorated stink bug

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**Other Key Personnel:** County Extension Educators, staff at OSU research farms, and members of Ohio's Master Gardener Volunteer Program

### Objectives of research project:

1. Monitor the arrival time of spotted-wing *Drosophila* on Ohio berry farms, with emphasis on counties that have not yet participated in our trap network.
2. Modify our trapping protocol for spotted-wing *Drosophila* to be a shorter period of time and with different cooperators for collecting the samples and examining the samples.
3. Continue to expand the stink bug trap network into counties not previously involved, with emphasis on the key 12-week period in early summer.
4. Design and test a trap reporting system that is more mobile-friendly than our current system.

### Overview

Spotted-wing *Drosophila* (SWD) is an invasive pest from China that was found in Ohio in 2011, causing small fruit growers of all sizes to completely revisit their approach to managing this crop. As a response to that initial invasion, members of the Dept. of Entomology and IPM Program have continuously conducted programs to educate growers on the identification, monitoring and management of this pest. Because SWD overwinters as an adult in cryptic locations around fields, such as treelines or wooded areas, monitoring to determine when they become active in these locations around the state and passing that information onto growers through our VegNet Blog is an important step in preparing growers for potential infestation at their farm.

### Objectives 1 & 2: Expand Network Using Master Gardener Volunteers, Document & Disseminate SWD Arrival, Alter Trap Deployment and Retrieval Times

In 2019, we focused again on working with counties that have not been confirmed positive in order to determine how widespread this invasive pest is in Ohio. By working with the Master Gardener Volunteer (MGV) network already established in most counties, we were able to recruit four new counties, Mercer, Shelby, Seneca, and Union, to participate in setting SWD traps. Based on previous feedback, we realized that identifying SWD is a barrier, so we had an agreement to identify captured insects from the traps, and we provided shipping materials to allow the samples to be mailed to Columbus. We established a protocol for the MG volunteers to follow, which included selecting a commercial small fruit site in their county, contacting the grower for permission to deploy traps, and then we scheduled a webinar in which we detailed how to deploy the traps in the crop, collect the weekly samples, and replenish the apple cider

vinegar drowning solution. A SWD kit was then sent to each MG volunteer containing all the necessary monitoring equipment such as traps, lures, vials, and labels.

Traps in Mercer, Seneca and Shelby Counties were deployed in strawberry, blackberry and black raspberry, respectively, during the week of June 16-22; traps in Union County were set in raspberry one week earlier, during June 9-15. Spotted-wing *Drosophila* trap contents for weeks 1 and 2 were packaged and sent to Columbus for identification during the third week of the study. The same was done for samples collected in weeks 3 and 4. After the fifth week, the traps were removed from the site and stored at the local Extension office for use in 2020.

Once the samples arrived in Columbus from the four locations, they were inspected for SWD adults within two days of arrival. If any SWD were found, that information was relayed back to the MG volunteers who were to contact the grower in case any management steps needed to be taken. Remarkably, SWD adults were detected from all four sites in every trap sample through all four weeks, thus we added four new SWD positive counties to the known distribution of this pest (Table 1).

Table 1. Average number of spotted-wing *Drosophila* adults per trap per week at sites in four counties that were new to our network in 2019.

Site	June 9-15	June 16-22	June 23-29	June 30-July 6	July 7-13	July 14-20
Mercer Co. 1		set	10	196	165	475
Mercer Co. 2		set	15	164	128	300
Seneca Co. 1		set	4	7	60	104
Seneca Co. 2		set	4	1	24	80
Shelby Co. 1		set	10	23	106	104
Shelby Co. 2		set	9	25	47	80
Union Co. 1	set	1	9	67	75	
Union Co. 2	set	0	9	65	57	

In the larger 2019 cooperator monitoring network, including the four sites mentioned above, we had a total of 14 counties and 39 sites participate in the survey program. As a general rule, the initial trap deployment was shifted to mid-June, when early detections were usually observed, which was two weeks later than previously used. The length of time SWD were monitored at a site varied from a suggested minimum of four weeks to a 20+ week season long duration, ending in early October. For the first four weeks of the study, cooperators used the Scentry lure as the attractant with a drowning solution of 25% apple cider vinegar (ACV) plus a drop of non-scented dish soap. If monitoring continued past four weeks, and if SWD had already been detected, cooperators switched to 100% ACV as the attractant and drowning solution.

There was one site in Franklin County at the Waterman Farm where two SWD traps were maintained outdoors near a treeline year-round in 2018 and 2019, which captured SWD adults during the week of January 20-26, 2019. The next SWD detection at that location was not found until June 23-29.

For all other sites, traps were deployed on various schedules based on the crop monitored and the cooperator's ability to monitor them, starting with the week of May 19-25. First detections ranged from May 26 until August 4 as listed in Table 2, with the average date of first detection in late June or early July.

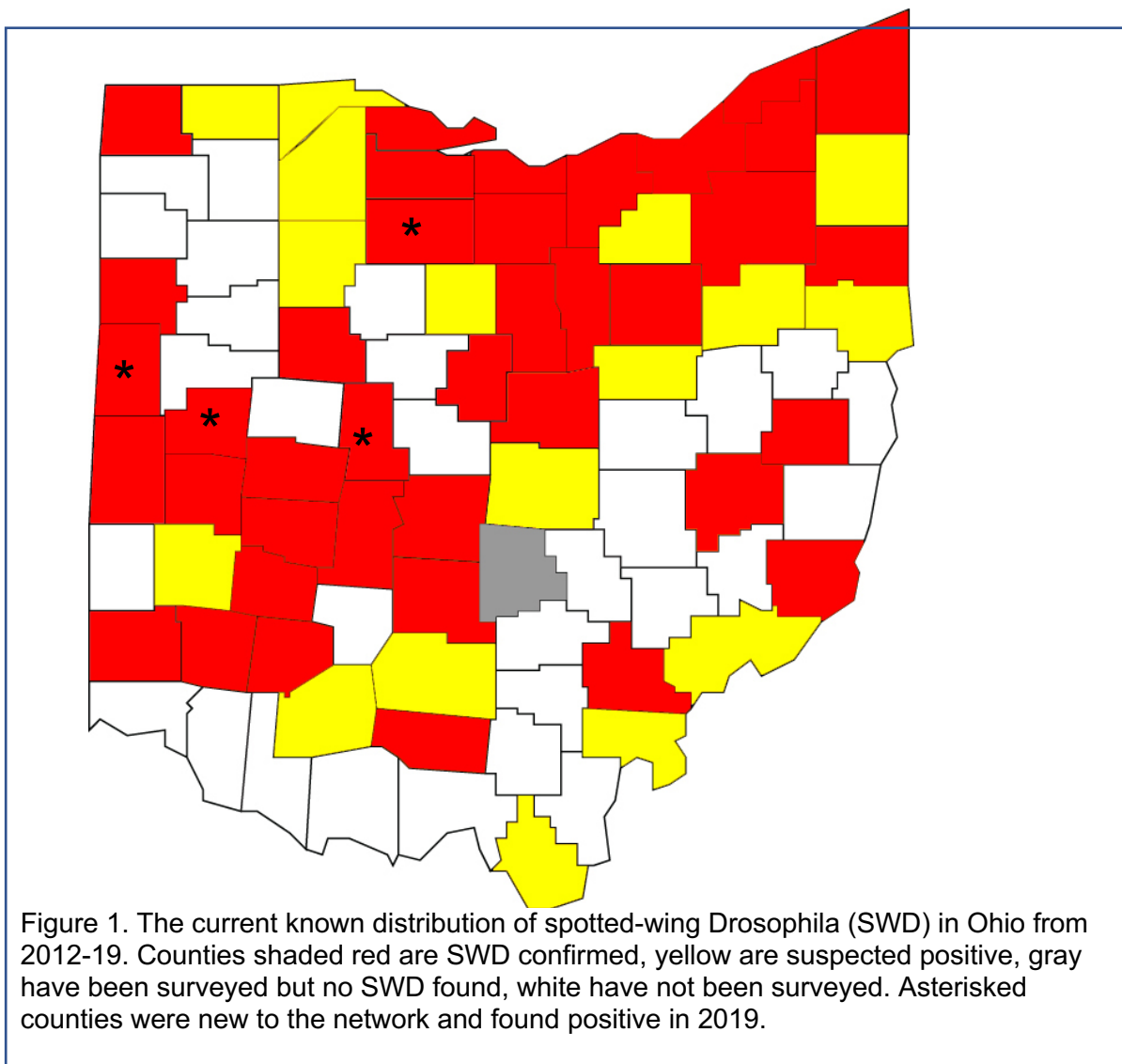
Table 2. Spotted-wing *Drosophila* monitoring network details, sorted by initial detection.

County	Cooperator	Crop	First Detect	Removed
Franklin	Welty	Near Treeline	January 20-26	still active
Greene	J. Jasinski	Blueberry	May 26-June 1	Sep. 29-Oct. 5
*Greene	J. Jasinski	Blueberry	May 26-June 1	June 9-15
Wayne	R. Lewandowski	Strawberries/brambles	June 9-15	July 14-20
Monroe	C. Turner	Blueberries	June 16-22	Aug. 18-24
Union	D. Juvarkar	Raspberry	June 16-22	July 7-13
Wayne	R. Lewandowski	Strawberry	June 16-22	June 30-July 6
Athens	E. Brown	Blackberry	June 23-29	July 7-13
Athens	E. Brown	Grape	June 23-29	July 7-13
Butler	J.T. Benitez	Blackberries	June 23-29	July 28-Aug 3
Franklin	C. Welty	Raspberry	June 23-29	still active
Mercer	H. Homan	Strawberry	June 23-29	July 14-20
Seneca	T. Andrews	Blackberry	June 23-29	July 14-20
Shelby	D. Benson	Black Raspberry	June 23-29	July 14-20
Warren	J. Jasinski	Grapes	June 23-29	Sep. 29-Oct. 5
Wayne	R. Lewandowski	Raspberry	June 23-29	July 21-27
Wayne	R. Lewandowski	Strawberry/raspberry	June 23-29	Aug. 4-10
Champaign	A. Douridas	Red Raspberry	June 30-July 6	July 14-20
Geauga	E. Draper	Blueberries	June 30-July 6	Sep. 15-21
Geauga	E. Draper	Raspberries	June 30-July 6	Sep. 15-21
Geauga	E. Draper	Raspberries	June 30-July 6	Sep. 15-21
Van Wert	C. Young	Blackberries	June 30-July 6	July 21-27
Van Wert	C. Young	Blueberries	June 30-July 6	July 21-27
Van Wert	C. Young	Grapes	June 30-July 6	July 21-27
Wayne	R. Lewandowski	Strawberries/blueberry	June 30-July 6	Aug. 4-10
Wayne	R. Lewandowski	Blueberries	June 30-July 6	Aug. 4-10
Wayne	E. Long	Grapes	June 30-July 6	July 14-20
Geauga	E. Draper	Blueberries	July 7-13	Aug. 11-17
Van Wert	C. Young	Black & Red Raspberries	July 7-13	July 14-20
Wayne	R. Lewandowski	Strawberry/blueberry	July 7-13	Aug. 4-10
Wayne	R. Lewandowski	Blueberry	July 7-13	Aug. 4-10
Wayne	R. Lewandowski	Peaches	July 14-20	Aug. 11-17
Wayne	R. Lewandowski	Peaches	Aug. 4-10	Aug. 18-24
Wayne	R. Lewandowski	Peaches	Aug. 4-10	Aug. 18-24
Wayne	R. Lewandowski	Grapes	Aug. 4-10	Aug. 11-17
Wayne	R. Lewandowski	Peaches	Aug. 4-10	Aug. 18-24
Wayne	R. Lewandowski	Blackberry/peach	Aug. 4-10	Aug. 18-24
Wayne	R. Lewandowski	Peaches	Aug. 4-10	Aug. 18-24
**Wayne	R. Lewandowski	Strawberry	(set June 2-8)	July 14-20
**Wayne	R. Lewandowski	Strawberry	(set June 2-8)	July 14-20

\*Traps deployed at this location used an alternative AlphaScents red sticky trap baited with the standard Scentry lure.

\*\*Traps deployed at this location caught zero SWD adults.

While we suspect that SWD can be found in every county in Ohio if we had the resources and time to monitor extensively for this pest, the current known distribution map of confirmed SWD positive counties from 2012-2019 is shown in Figure 1.



**Objective 3. Continue to expand the stink bug trap network into counties not previously involved, with emphasis on the key 12-week period in early summer.**

In 2019, we deployed pheromone traps for brown marmorated stink bug (BMSB) at 34 sites in 30 counties, including four new cooperators, in Coshocton, Harrison, Monroe, and Ross Counties. The traps were clear sticky panels mounted on wooden posts, with a dual lure that lasted for 12 weeks. At 19 sites, traps were deployed for a target period of 24 weeks from May through October, while at 15 sites, traps were deployed for a target period of 12 weeks from June through August. The date of first capture of BMSB at each site ranged from 7<sup>th</sup> May to 17<sup>th</sup> August. The median date for first catch of BMSB was 29<sup>th</sup> May for the long-season sites, and 17<sup>th</sup> June for the short-season sites. The date of peak catch of adult BMSB ranged from 8<sup>th</sup> June to 14<sup>th</sup> October. The median date for peak catch of adults was 16<sup>th</sup> September for the long-season sites and 19<sup>th</sup> August for the short-season sites. The average number of BMSB caught per trap per week throughout the trapping season ranged from 0.03 to 7.4 (Table 3). This range can be divided into three categories: 1.0 or fewer BMSB per trap per week is low density, 1.1 to 3.0 BMSB per trap per week is moderate density, and 3.1 to 10 BMSB per trap per week is high density. As shown in the map in Figure 2, we had 18 low density sites, 11 moderate density sites, and five high density sites. The five high density sites were in Butler, Jefferson, Warren, Greene, and Muskingum Counties.

Table 3. Key results of brown marmorated stink bug (BMSB) monitoring by pheromone traps at Ohio farms, by county, Ohio, 2019. County names shaded in yellow were added to the network in 2019. Data in cells shaded blue were for sites monitored for a longer (ca. 24-week) duration, sites not shaded blue were monitored for a shorter (ca. 12-week) duration.

	County	Cooperator	Crop(s)	Number of weeks	Total number BMSB in 3 traps	Average number BMSB per trap per week	Date of first capture	Date of peak capture
1	Athens	E. Brown	blueberry, veg, apple, peach	11	33	1.00	6/27/19	8/26/19
2	Auglaize	J. Stachler	soybean	22	25	0.38	6/21/19	10/6/19
3	Butler	J. Benitez	corn	12	268	7.44	6/14/19	8/21/19
4	Champaign	A. Douridas	berries, peach	12	3	0.08	7/16/19	7/30/19
5	Clermont	G. Neal	okra	17	43	0.84	-	-
6	Clinton	T. Nye	soybeans	12	22	0.61	6/17/19	7/22/19
7	Coshocton	D. Marrison	peach, apple, plum	12	94	2.61	6/17/19	8/30/19
8	Crawford	J. Hartschuh	corn	23	2	0.03	8/17/19	8/17/19
9	Darke	S. Custer	soybeans	22	8	0.12	6/12/19	8/19/19
10	Franklin	C. Welty	corn	28	219	2.61	5/10/19	9/13/19
	Franklin	C. Welty	apple	28	58	0.69	5/24/19	10/4/19
	Franklin	C. Welty	sweet corn	18	107	1.98	7/3/19	9/13/19
11	Greene	J. Jasinski	blueberry, blackberry	23	377	5.46	5/7/19	10/1/19
12	Harrison	E. Lyon	grape	14	40	0.95	5/29/19	8/30/19
13	Henry	G. Ruff	soybean, green bean	7	1	0.05	7/3/19	7/3/19
14	Huron	B. Filbrun	mixed vegetables	17	4	0.08	6/21/19	6/21/19
15	Jefferson	E. Lyon	black raspberry	14	297	7.07	5/29/19	8/30/19
16	Knox	S. Schirtzinger	sweet corn, beans, peppers, apple/peach	14	33	0.79	6/14/19	9/5/19
17	Lake	T. DeHaas	apple, blackberry	12	10	0.28	6/8/19	6/8/19
18	Licking	D. Kreager	raspberry, peach, apple, cherry	24	79	1.10	6/4/19	10/4/19
19	Lorain	A. Chanon	grape, apple, peach	21	74	1.17	5/28/19	9/20/19
20	Lucas	A. Stone	mixed veg	12	5	0.14	6/10/19	8/19/19
21	Miami	A. Bennett	corn	8	50	2.08	7/3/19	8/19/19
22	Monroe	C. Turner	apples	11	46	1.39	6/23/19	9/4/19
23	Morrow	C. Jagger	soybean	24	150	2.08	5/15/19	10/14/19
24	Muskingum	C. Martin	corn	24	305	4.24	5/29/19	9/20/19
25	Perry	T. Wiseman	soybean	25	204	2.72	5/26/19	10/2/19
26	Putnam	B. Scheckelhoff	sweet corn	18	21	0.39	7/10/19	9/4/19
27	Ross	C. Bruynis	black raspberry	6	20	1.11	6/10/19	7/2/19
28	Warren	J. Jasinski	grapes	23	468	6.78	5/7/19	9/24/19
29	Wayne	R. Lewandowski	peach, blueberry, blackberry	19	64	1.12	6/17/19	9/16/19
	Wayne	E. Long	grapes	12	16	0.44	6/10/19	7/1/19
	Wayne	A. Raudenbush	soybean	23	47	0.68	5/8/19	8/26/19
30	Wood	A. Sundermeier	soybean	6	6	0.33	7/2/19	7/2/19

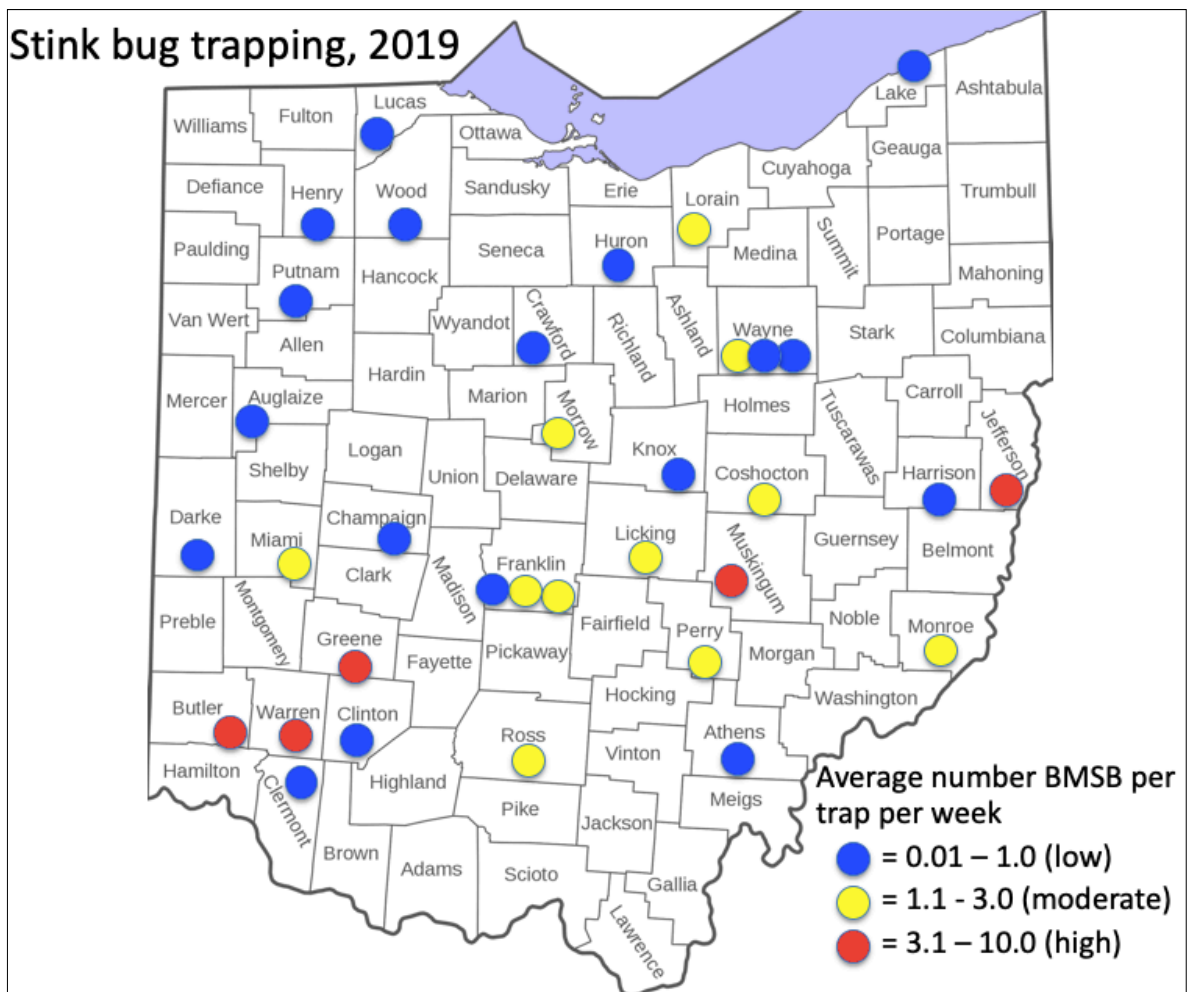


Figure 2. Relative density of brown marmorated stink bug (BMSB) caught in pheromone traps at Ohio sites, 2019.

General trends in BMSB density over the three years (2017-2019) that the same trap type and same lure have been used are that we are finding increasing density in 13 counties, decreasing density in 15 counties, and steady density in 5 counties; we have data from 15 additional counties where traps have been used for only one year, thus trends can not yet be determined. Decreasing density at sites such as Franklin County is likely due to the presence of the samurai wasp, a natural enemy of BMSB that was first detected in Franklin County in late summer of 2017 and which is likely to spread into other parts of Ohio.

#### **Objective 4. Design and test a trap reporting system that is more mobile-friendly**

Both the SWD and BMSB trap counts were entered weekly in a publicly available website (<https://u.osu.edu/pestmanagement/trap-reports/>). Highlights of the SWD trap catch information generated through this year's network was put into the VegNet blog online for growers to access and raise awareness when this pest was active in their area. Although we built a prototype for making the observations easier to read on mobile devices, we did not successfully migrate our traditional spread sheet data entry format to this new system. We hope to roll out this enhanced viewing system retroactively later this winter.