

Spotted wing drosophila (SWD) monitoring

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Summary

Spotted wing drosophila (SWD) (*Drosophila suzukii*) was reared from elderberry and nightshade fruits. Locating and removing elderberry and nightshade from field edges may help reduce SWD populations. New, commercially-available attractants (Biobest Dros'Attract and Scentry Lure) captured more male and female SWD than a homemade combination of apple cider vinegar and beer. Using traps to determine where and when SWD are active will aid in making management decisions.

Methods

Trapping Systems - During winter 2015-2016, three SWD trapping systems (attractant + trap type): 1) Dros'Attract (Biobest®, Westerlo, Belgium) + DrosoTrap (Biobest®, Westerlo, Belgium), 2) Scentry Lure (single pouch) (Scentry Biologicals, Billings MO) with water as a drowning agent + homemade plastic jar trap (red, 1 L, eight 1.8 cm diameter openings) and 3) apple cider vinegar (ACV) (Publix Brand, Publix Super Market Inc.) and beer (Steel® Reserve 8.1% alcohol, Steel Brewing Company) in a 1:1 ratio + clear plastic jar (500 mL, 22 5mm diameter holes around the top) were compared at 5 Hillsborough County strawberry fields. Scentry Lures were hung with a plastic tie from the inside of trap lids 5 cm above the surface of the water. Unscented dish detergent was added to all liquids at a ratio of 1.5 mL to 4 L to reduce surface tension; each trap had 250 mL of liquid. The three systems are hereafter referred to as 1) 'Biobest', 2) 'Scentry' and 3) 'ACV & beer'.

Traps were hung on the edges of fields with twist-ties from bamboo garden stakes that were inserted on an angle near the ends of raised strawberry beds (Figure 1). Each trapping system was replicated 4 times at each field.



Figure 1. Biobest, Scentry, and ACV&beer trapping systems (in order) tested for spotted wing drosophila monitoring in Florida strawberry fields.

Traps were placed in fields in mid-December and removed in mid-March. Traps were checked and serviced approximately weekly. For traps with Scentry Lures or ACV and beer, contents were poured

into a collection container and liquids were replaced with fresh solutions. For Dros' Attract, liquid was entirely replaced every-other-week (per the manufacturer's recommendation). For the weeks in-between, trap contents were poured into a sieve above a graduated cylinder, trapped insects were washed into collection containers, and liquid replenished to 250 ml. Scentry Lures were replaced once on 26 January.

Wild Host Plants - Thirty-six strawberry fields in Hillsborough County were visited approximately weekly from 18 January to 20 March 2016. Field perimeters were walked, and fruiting plants that may serve as alternate hosts for SWD were identified using field reference guides. The geographic coordinates of each plant or group of plants of the same species was recorded (GNSS Surveyor, BE-GPS-3300). A sample of ripe fruit was collected weekly from a potential host plant into a 500 mL or 1 L plastic container with a lid containing fine mesh for ventilation. Fruit sampling occurred until no ripe fruits remained on a plant. Plastic containers were incubated at 25 °C for 2 weeks, after which emerged flies were identified as male or female SWD or other.

Potential SWD-host plants were located within different field perimeter vegetation-types, categorized as: woodland (large trees, few shrubs), partial-woodland (small trees, shrubs, vines, herbaceous plants, often in low-lying, wet areas), hedgerow (trees, bushes, other plants separating a strawberry field from other agricultural fields or pasture), open (immediately adjacent to agricultural fields, pasture, old fields, ponds, roads) and residential (frontyards, backyards, fences).

In 2017, ripe fruit samples from five large patches of elderberry (*Sambucus nigra*) and American black nightshade (*Solanum americanum*) were collected 6 times from 3 February to 9 March along edges of three contiguous fields where they were common. Fruits were counted and held as in 2016, and the number of emerged SWD flies counted.

Results

Trapping Systems – Over the entire trapping period (mid-December to mid-March), the commercial Biobest and Scentry trapping systems captured about 3X more SWD than the homemade ACV and beer system (Figure 2). Biobest and Scentry systems were equally effective at capturing male SWD, but Biobest captured more female SWD than Scentry systems (Figure 2). The percent of SWD out of all vinegar flies in the Biobest and Scentry trapping systems was higher than in the ACV and beer system (Figure 2).

Wild Host Plants – In 2016, the only two plant species from which SWD were reared were elderberry and nightshade (Figure 3). Nine SWD flies were reared from one samples of elderberry, and eight SWD flies were reared from 3 samples of nightshade. Plant species (total of 26) from which no SWD were reared are listed in Table 1.

Elderberry was found mainly in field edge vegetation categorized as partial-woodland or hedgerow, but nightshade was found in nearly equal proportions in all vegetation categories.

In 2017, low numbers of SWD were reared from nightshade during all weeks sampled (Table 2). More SWD were reared from elderberry than nightshade for the two sample weeks in March; however, no SWD were reared from elderberry collected in February (Table 2). In addition, the percent of

elderberry plants with ripe fruit was lower for most sample dates than the percent of nightshade plants with ripe fruit (Table 2).



Figure 3. Elderberry (*Sambucus nigra*) and American black nightshade (*Solanum americanum*), two wild host plants common on edges of some strawberry fields in Hillsborough County, Florida.

Additional Information

Spotted wing drosophila: <http://edis.ifas.ufl.edu/in839>

Biobest Dros' Attract and traps: <http://www.biobestgroup.com/en/biobest/products/monitoring-and-scouting-4464/pheromone-lures-and-attractants-4502/dros-attract-4826/>

Scentry Lure: <http://www.greatlakesipm.com/SCENTRY%20SPOTTED%20WING%20DROSPHOLIA.html>

Elderberry: <http://edis.ifas.ufl.edu/st578>

Nightshade: <http://edis.ifas.ufl.edu/hs1176>

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Table 1. Plants with ripe fruits on perimeters of 36 strawberry fields in Hillsborough Cty., 18 January – 20 March 2016, that were sampled for the presence of spotted wing drosophila. Asterisks denote two species from which spotted wing drosophila were reared.

Family Species	Common name
Adoxaceae	
<i>Sambucus nigra</i>	Elderberry*
Anacardiaceae	
<i>Schinus terebinthifolius</i>	Brazilian pepper
Apocynaceae	
<i>Morrenia odorata</i>	Milkweed vine
Aquifoliaceae	
<i>Ilex cassine</i>	Dahoon holly
Arecaceae	
<i>Syagrus romanzoffiana</i>	Queen palm
Asparagaceae	
<i>Asparagus densiflorus</i>	Asparagus fern
Caricaceae	
<i>Carica papaya</i>	Papaya
Cucurbitaceae	
<i>Momordica charantia</i>	Balsam apple
Lamiaceae	
<i>Callicarpa americana</i>	American beauty berry
<i>Clerodendrum indicum</i>	Tube-flower
Meliaceae	
<i>Melia azedarach</i>	China berry
Petiveriaceae	
<i>Rivina humilis</i>	Rouge plant
Primulaceae	
<i>Ardisia crenata</i>	Coral ardisia
Roseaceae	
<i>Eriobotrya japonica</i>	Loquat
<i>Prunus caroliniana</i>	Carolina laurelcherry
Rutaceae	
<i>Citrus limon</i>	Lemon
<i>Citrus reticulata</i>	Clementine
<i>Citrus</i> spp.	Wild orange
<i>Citrus x sinensis, Citrus x aurantium</i>	Cultivated orange
<i>Citrus x paradisi</i>	Grapefruit
Smilacaceae	
<i>Smilax</i> spp.	Greenbrier
Solanaceae	
<i>Physalis angulata</i>	Cutleaf groundcherry
<i>Solanum americanum</i>	American black nightshade*
<i>Solanum diphyllum</i>	Twoleaf nightshade
<i>Solanum viarum</i>	Tropical soda apple
Verbenaceae	
<i>Lantana camara</i>	Lantana
Vitaceae	
<i>Vitis</i> spp.	Wild grape

Table 2. Fruit abundance and spotted wing drosophila infestation rates in five patches of American black nightshade and elderberry sampled from three strawberry field margins in Hillsborough Cty., 2017.

Host plant	Sample date	Plants with ripe fruit (%)	Mean (\pm SEM) fruits/plant	Total SWD
American black nightshade	Feb 3	100	58 \pm 17	4
	8	80	65 \pm 14	1
	16	100	44 \pm 13	6
	23	80	57 \pm 8	2
	Mar 3	100	39 \pm 17	3
	9	60	42 \pm 4	1
Elderberry	Feb 3	20	100 \pm 0	0
	8	0	-	-
	16	20	100 \pm 0	0
	23	0	-	-
	Mar 3	80	90 \pm 10	125
	9	20	100 \pm 0	71

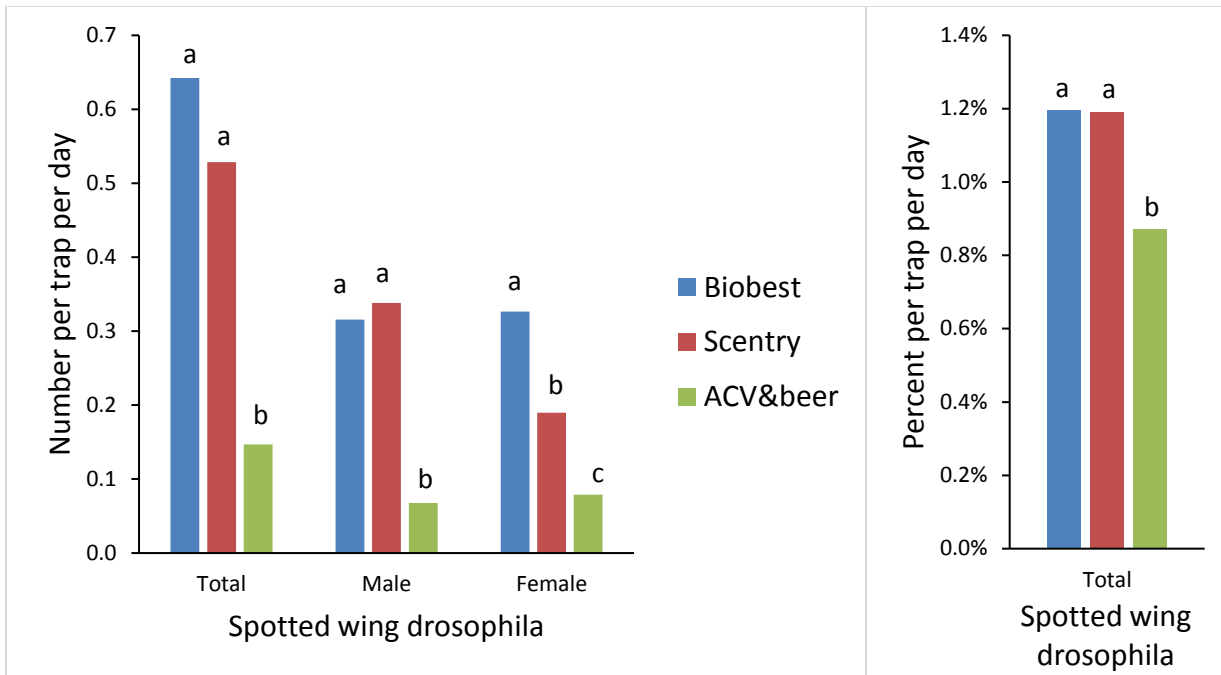


Figure 2. Mean number of spotted wing drosophila captured in three trapping systems (Biobest, Scentry, ACV&beer) and percent SWD out of all vinegar flies in 5 Hillsborough Cty. strawberry fields, mid December-mid March 2015-2016. Bars with different letters are significantly different.