

## 2014 Empire Producers EXPO SWD Session Presentation Summaries

**Year-round Spotted Wing Drosophila Monitoring and Fruit Damage Assessment** - Faruque U. Zaman<sup>1</sup> and Dan Gilrein<sup>2</sup>  
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Spotted wing drosophila (SWD) has emerged as a serious pest to many specialty crops in the United States. Since its detection in 2011 in New York, SWD is considered one of the major insects affecting small-fruit production on Long Island. Year-round monitoring of SWD populations and damage in cultivated and wild areas was done in 2012 and 2013. 20 monitoring traps were placed in raspberries, blackberries, peaches, apples, blueberries, grapes, and adjacent forests in eastern Long Island locations. Similar to 2012, first sustained SWD capture on Long Island occurred between 12 – 19 June in raspberries in 2013 (approx. 650 GDD from Jan 1). Combining trap data from all sites, adult numbers increased as the season progressed, dropping off with onset of cold weather (Figure 1). Very high trap counts in late fall may be related to both the very high population present particularly in protected forest areas, as well as the absence of hosts.

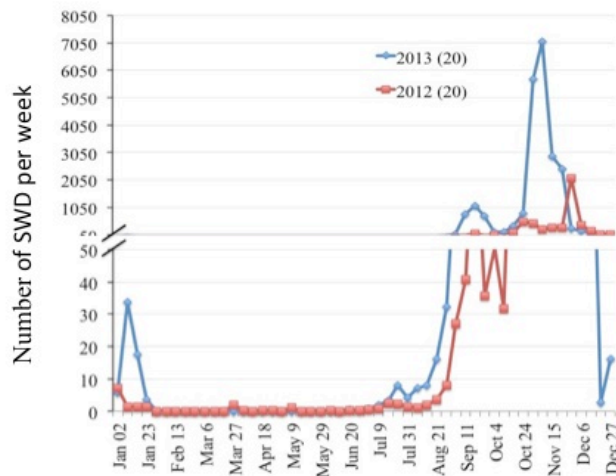


Figure 1: Average number of spotted wing drosophila adults captured per week in traps around eastern Long Island in 2012 and 2013. Numbers in parentheses are the number of monitoring traps placed in various locations.

Raspberries and blackberries were heavily damaged by SWD in 2013. Intensive fruit damage assessments were done weekly by holding samples from 3 commercial farms in the laboratory for rearing. Raspberry fruit infestation levels rose from about 10% in late July to 70% in August and 99% by September. Blackberries followed a similar pattern, increasing from 45% in July to 77% in mid-August and 100% from mid-August to onward. Blueberries were little affected by spotted wing drosophila until late July. Less than 1% blueberries were found infested in samples taken around July 17. The following week less than 2% were infested, but samples collected from July 31 – August 7 (harvest ends) found about 48% infestation. On Long Island blueberry acreage is small with 90% of fruit harvested by late July, when SWD pressure increased sharply. Raspberries, blackberries and blueberries ripening around late July or early August onwards appear to be at significant risk of SWD damage.

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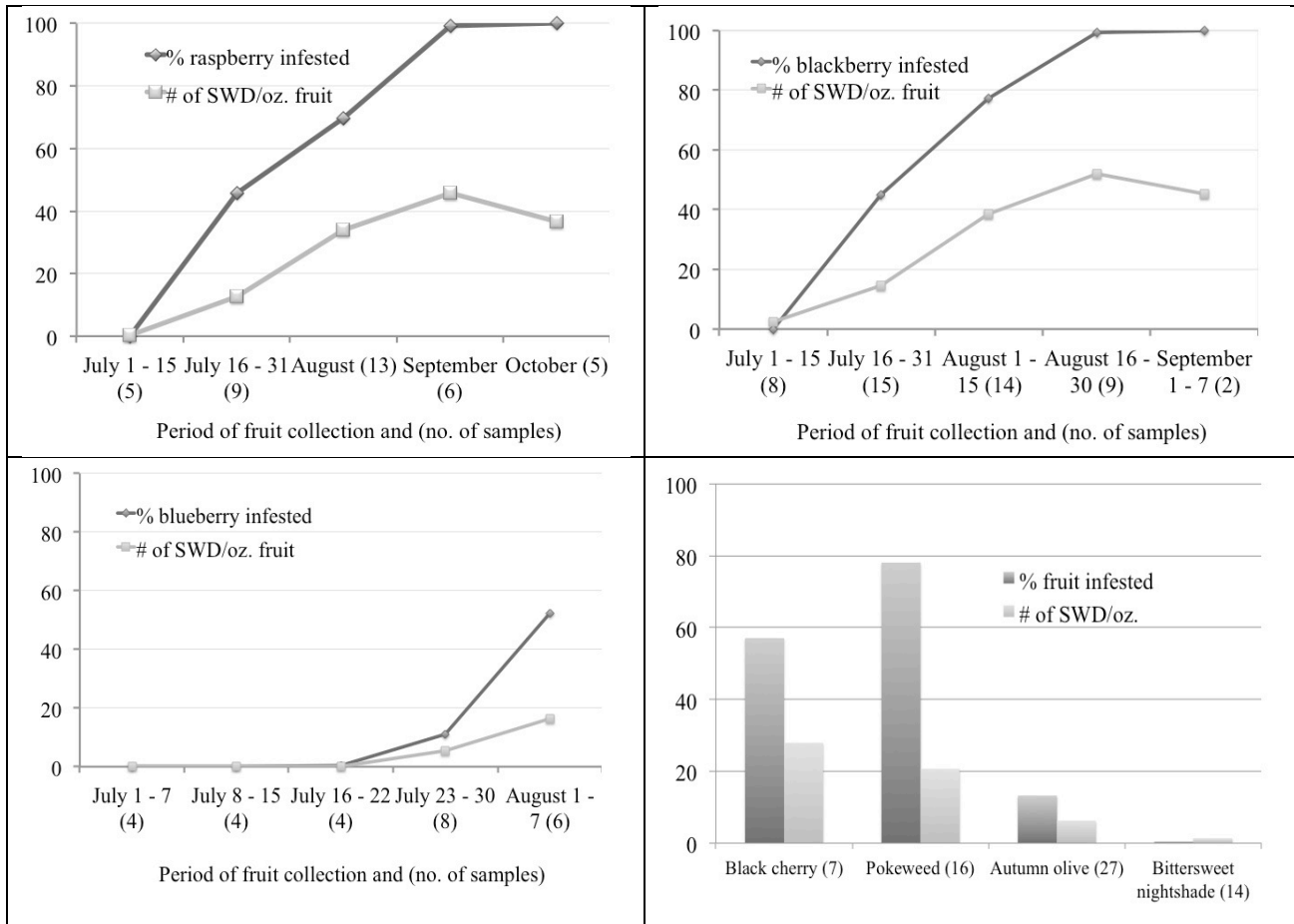


Figure 2. Percentage of spotted wing drosophila infested fruits and numbers of adults emerged per 4 oz. fruit sample collected from three berry farms and adjacent forest locations in 2013.

Grape damage was assessed intensively from just prior to 'Chardonnay' harvest to the end of the wine grape season. No SWD oviposition was observed on fruit in early September. However, after mid-September low level of SWD infestation was found in some red cultivars ('Pinot Noir,' 'Merlot,' and 'Cabernet Franc'). Some 'Merlot' samples collected from near forest borders have shown unusually high levels of SWD infestation. In early October, infestation levels as high as 50% were observed in both "merlot" and "cabernet" grapes in some samples from two vineyards. It should be noted that overall grape damage was less than 2% and infestation appears to be almost entirely limited to border rows and occurs very close to harvest, so we believe this level of damage has very minimal impact, if any, on fruit quality. Also, fruit infestation levels in red grapes in 2012 were much lower. Similar to last year, we did not find any infestation in 'Chardonnay' in 2013. It is clear that grape is significantly less preferred over other kinds of small fruit and lack of more preferred hosts in fall together with the very high SWD populations present might explain the limited infestation in grapes. We plan to continue monitoring grape infestation levels in 2014, to assess the consistency of our observations given normal variations in weather, crop condition and SWD population levels from year to year.

Beside crop hosts we also checked wild fruit growing adjacent to fruit orchards. Black cherry, *Prunus serotina*, is a native plant commonly found in forest and landscapes around Long Island. It also appears to be among the earliest and most preferred wild hosts (90% fruit infested) of SWD, ripening around late July, followed by pokeweed berries (native, ripening around mid-August, 40-90% fruit infested), bittersweet nightshade (invasive, ripening around late August, <15% fruit infested), and autumn olive (invasive, ripening around mid-September, 10-80% fruit infested).

We are currently conducting an experiment on the effect of post-harvest cold treatment for SWD damage control in raspberries. Fresh SWD oviposited (0 - 48 hours old) raspberries (12 berries/condition) were held at 2C (36F) in growth chamber for various durations and compared SWD larval development with infested fruits held in room temperature (69 - 72 F). Preliminary findings from this trial have shown in figure 3. Further details will be presented in future meetings and publications.

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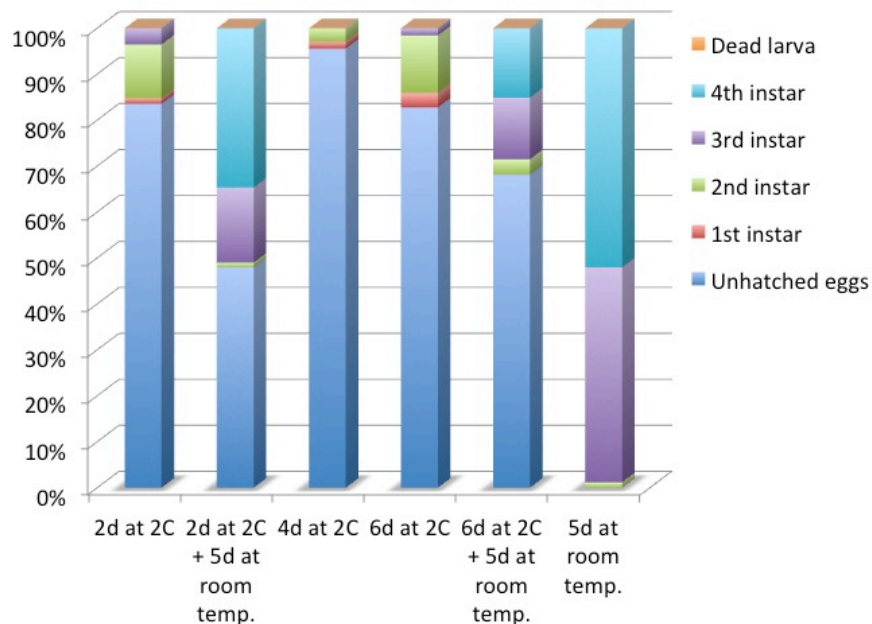


Figure 3. Development of spotted wing drosophila eggs after incubating infested raspberries at 2C (36F) in growth chamber for various durations.

Both trap and fruit infestation data collected since 2011 on Long Island, and information from studies done elsewhere, have shown more clearly what Long Island crops are at greatest risk of damage from this new invasive pest. Brambles and possibly blueberries harvested after late July have been most consistently and severely affected, wine grape fortunately do not appear to be at risk though a small amount of very late-season damage has been seen in some red varieties. **Acknowledgements:** Many thanks to Kevin Dichtl for his assistance with the study and The Friends of Long Island Horticulture for funding the work.

**Strategies for Late Season SWD Management** - Peter J. Jentsch, Senior Extension Associate, Department of Entomology, Cornell University's Hudson Valley Lab, P.O. Box 727, 3357 Rt. 9W, Highland, NY 12528, Office: 845-691-7151, E-mail: pjj5@cornell.edu

Native to southeast Asia, the spotted-wing drosophila (SWD), *Drosophila suzukii* (Matsumura 1931), was widely observed throughout parts of Korea, and China prior to its identification in Japan in 1913. Its 1980 arrival into the United States as an invasive pest threat began in Hawaii, appearing in central California by August of 2008, spreading into Washington, Oregon and Florida the following year. By 2011 the SWD has become widespread, captured in Utah, Louisiana, Arkansas, Kentucky, Tennessee, North and South Carolina, Wisconsin, Michigan, West Virginia and Virginia, Maryland, Pennsylvania, New Jersey, New York and all of the New England States (Image 1). The pest has also been found in Europe, including the countries of Italy, France, and Spain. In NY the first SWD flies were captured in apple cider vinegar traps in the experimental vineyard at the Hudson Valley Laboratory in Highland late in August of 2011. Damage to small fruit was first reported in late raspberry grown organically in Ancram, NY, by Laura McDermott, a Regional CCE Specialist in the Capital District.

The SWD female differs from other vinegar flies in possessing a unique ovipositor, capable of inserting eggs into un-ripened fruit, which gives them a biological advantage over other *Drosophila*. Thus the SWD can reproduce on fruit earlier in the season to outcompete other fly species, producing as many as 13 generations per year in Asia, with 6-9 generations predicted for NY depending on the season. Another advantage this fly has is its use of multiple hosts including *Cornus kousa*, dogwood, *Eugenia uniflora*, Surinam cherry, *Fragaria ananassa*, strawberries, *Morus spp.*, mulberry, *Murraya paniculata*, orange jasmine, *Myrica rubra*, Chinese bayberry, *Prunus spp.* - *P. avium*, sweet cherries; *P. domestica*, plums; *P. persica*, peaches, *Pyrus pyrifolia*, Asian pears, *Ribes spp.*, currants, *Rubus spp.* - *R. armeniacus*, Himalayan blackberries; *R. loganobaccus*, loganberries; *R. idaeus*, raspberries; *R. laciniatus*, evergreen blackberries; *R. ursinus*, marionberries, *Vaccinium spp.*, blueberry, cranberry, *Vitis vinifera*, wine grape. In NY it has been reared from The tartarian honeysuckle, *Lonicera tatarica*, is an invasive plant that also hails from Asia and Siberia. It grows along the wooded edges of agricultural crops, carrying red berries in pairs that become heavily infested with SWD by early July. In the Hudson Valley, SWD developed in very high numbers on this host in the spring of 2013, providing an ideal reproductive site for the fly to disperse to small fruit later in the month as fruit became available (Image 2). The black cherry, *Prunus serotina*, a woodland tree species, is also a preferred wild host for SWD. This tree grows in forests and landscapes throughout the Northeast

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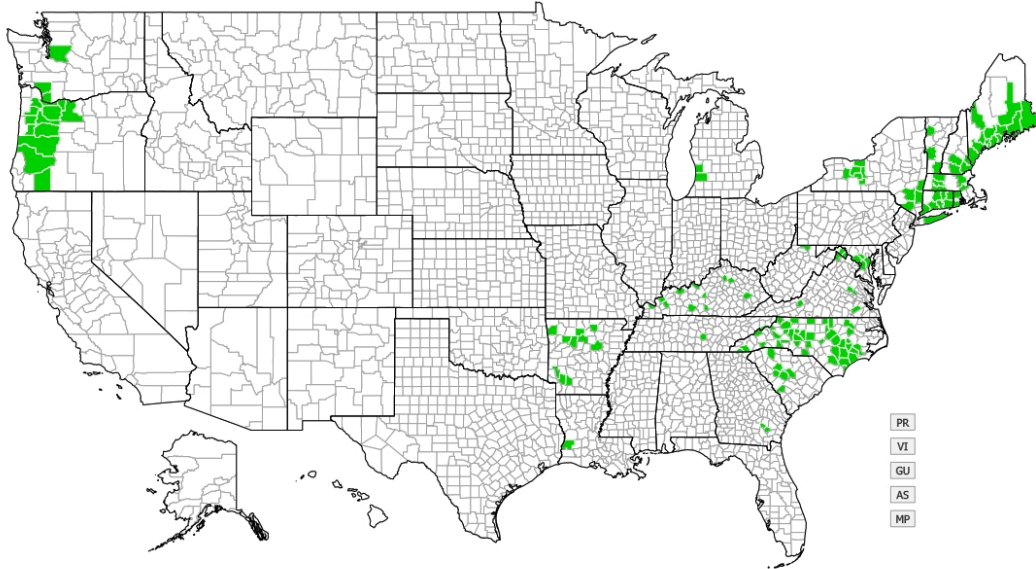
and is native to North America. On Long Island, recent observations by Faruque Zaman, Suffolk County Cornell Cooperative Extension, showed 90% infested fruit with SWD. On average, 112 adult SWD emerged after incubating 4 oz. samples of black cherry fruit in the lab. In Long Island, it appears that black cherry is the earliest wild host utilized by SWD. Pokeweed, *Phytolacca acinosa*, another known wild host of SWD, is found to have 80% infested fruit in late August. Fruit of these two wild hosts appear to be the most preferred in late summer and early fall, providing an additional point source of SWD along agricultural edge late into the growing season.

Over the past two years we have seen SWD spread throughout the fruit growing regions of the Hudson Valley and Lake Champlain in western NY in 26 NY counties (<http://www.fruit.cornell.edu/spottedwing/dist.html>). Across the Hudson Valley of NY, Suffolk County of Long Island and Hampshire County, Massachusetts, the first SWD captures occurred during the week of June 10<sup>th</sup>. Through the use of yeast and vinegar baited traps we have observed the fly nearly one month earlier than in 2012. Traps hung on 1 May in small fruit plantings of raspberry and blackberry throughout the lower Hudson Valley captured SWD 2 weeks prior to fruit infestations. The sustained capture of SWD flies prior to egg laying provided growers with a pest management start date to initiate preventative treatment. However, under the best of pest management programs in raspberry and blackberry, following a 3 to 4 day application schedule, rain events combined with pick-your-own weekend schedules forced application delays of up to 7-days, allowing SWD to infest fruit beyond rescue. All growers in the programs monitored by the ENY Fruit Team had infestation levels exceeding 17% using the best materials under tight treatment protocols.

Given the need for very tight insecticide schedules, insecticide labeled constraints and the need for resistance management strategies, it is likely that complete control of the SWD is unlikely, even under the most diligent of management programs. The perpetual regenerations and presence of all stages of the SWD life cycle provides insulation, in the form of egg, larva and pupa within the host fruit, to escape most insecticide applications. Under the best scenario, infestations can be significantly reduced by tight management intervals, with commitment to using a 3-4 day pest management program being the essential component to success. To improve on this strategy, cultural management considerations should also be undertaken. Creating a less favorable environment for SWD reproduction should begin by maintaining an open canopy through pruning to increase sunlight and reduce humidity while improving spray coverage. Drip lines should be installed 'in-ground' instead of using overhead irrigation when possible. Removal of infested fruit through cane and ground sanitation will reduce SWD emergence, reducing fly populations. Harvesting frequently and completely will prevent the buildup of ripe and over-ripe fruit. Unmarketable fruit should be removed from the field and either frozen, "baked" in clear plastic bags placed in the sun, or disposed of in bags off-site, killing the larvae and preventing adult emergence. Insecticide sprays directed at the SWD adults will reduce egg laying. Begin insecticide treatments at the first SWD trap catch prior to fruit ripening. Treatments should be applied on a 3 to 4 day schedule, repeated after 1 inch of rain. During July and August the insect can reproduce quite quickly, every 10 to 14 days. Select only the most effective insecticides, rotating insecticide modes of action on a 10-14 day interval during peak flight periods.

A 2013 farm success story: SWD was first found in Orange county, NY on 10 June, 2013. A successful pick-your-own operation in that county was able to keep infestation levels down to levels below 2% through to the end of July, then below 17% to the end of the season using a 3 to 7 day spray interval (as weather and pick-your-own scheduling would allow). Management was combined with near daily picking, often clean picking on weekends reducing the SWD population potential. Products were employed in 14-day rotational scheduling beginning with Malathion, and followed using alternations of Delegate, Danitol 2.4 EC, Triple Crown and Brigade WSB. His recommendation to the consumers, upon harvesting berries, was to keep fruit cold during storage, which successfully retained fruit quality. Success in this case was not defined by achieving complete control of the pest but by achieving customer satisfaction in fruit quality and an enjoyable farm / tourism experience.

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Last observation: July 25, 2013 - Map generated: July 26, 2013

**EDDMapS**  
Early Detection & Distribution Mapping System

Image 1.

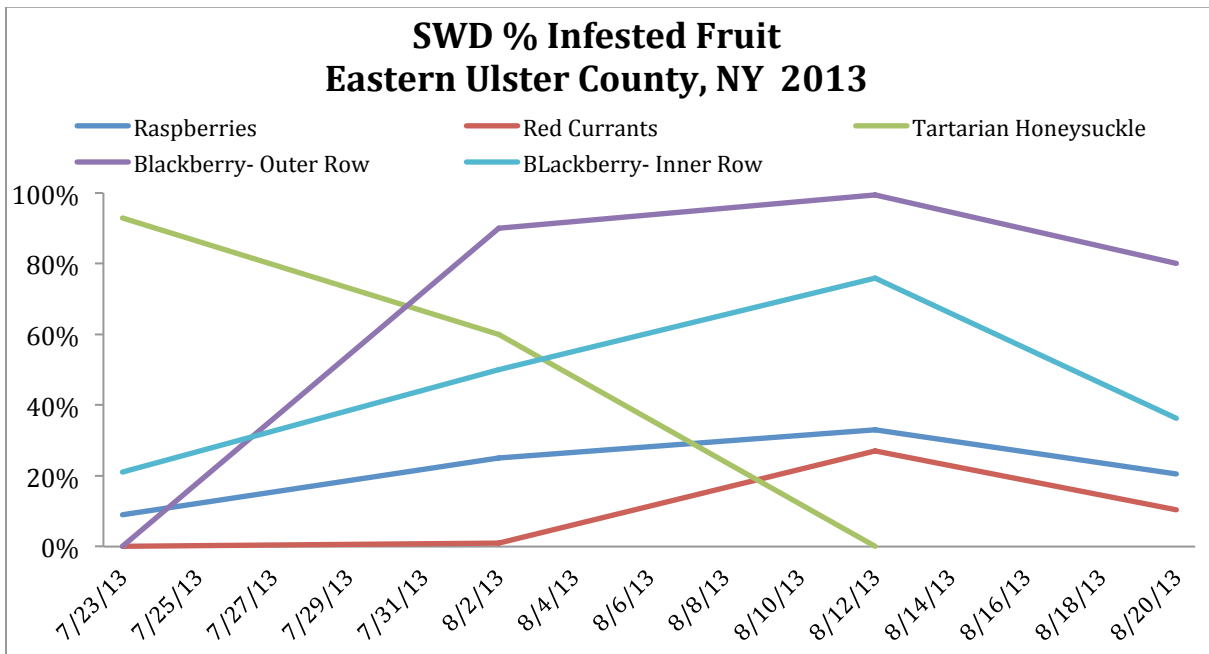


Image 2. Chart representing field collected small fruit from a commercial berry patch and the boarder host Tartarian Honeysuckle, *Lonicera tatarica*, Marlboro, NY 2013.