Annual Report for Smith-Lever Funded Projects

Project Title: SWD Trap Network

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Project Start: 10/1/2014
Project Term: 9/30/2017

Report Year: 2016-2017

Executive Summary:

A New York State monitoring network for the invasive insect spotted wing Drosophila (SWD) will be set in June and monitored each year by Extension educators and faculty until first sustained trap catch is noted. Results from the trap network will be uploaded to a NY distribution map, the SWD blog, and in newsletters to inform fruit farmers of risk to fruit crops.

Progress Summary:

In 2017, 98 traps were monitored by 13 cooperators in 32 sites in 21 NY counties. Most locations had four traps, two in the crop and two on the crop edge. The traps used to catch the spotted wing Drosophila flies were manufactured by Scentry and included the trap and a lure to be used with unscented soapy water as a drowning solution. Research in NY on traps and lures had identified Scentry as the best to use in 2016 and we wanted another year of data using these traps. Traps were set in early to mid-June. Within the 32 sites in the network, diverse crops were monitored, though mainly raspberry and blueberry: 13 sites included raspberry, 10 blueberry, two blackberry, one grape, one strawberry, and five sites both raspberry and blueberry.

First trap catch and sustained trap catch were reported in June 2017 from a majority, 24 (75%), of sites in the network. Earlier than in 2016, which had been the earliest detection of SWD in NY since SWD was verified in fall 2011. Coincident with these reports, research sites also reported very early catch, in late May. Some of the monitoring network sites caught SWD in the first week traps were set out, making it impossible to determine the first detection of SWD might have occurred earlier.

Earliest catch occurred during the week ending on June 7 in an Orleans County raspberry planting and on June 8 in a Suffolk County blueberry planting. The latest first catch report was in the week ending August 1 in a Herkimer County raspberry and blueberry planting. All but the Herkimer County site had reported first catch of SWD by July 11, compressing first detections across NY mainly into a relatively short span of 35 days, whereas in prior years this would span 56 to 76 days.

Cooperators reported trap catch data to a mapping site, www.eddmaps.org/swd/, which generated a NY distribution map for SWD findings. SWD trap catch reports were posted routinely on the SWD blog, blogs.cornell.edu/swd1/. New subscribers to the SWD blog were added during workshops and presentations on SWD throughout the year. Current subscribers total 254, primarily growers. Extension educators included SWD trap catch information in their newsletters.

The early arrival of SWD and favorable warm, cloudy and humid weather this summer favored SWD oviposition behavior and fruit infestation. Significant infestations were present in summer raspberry and early varieties of blueberries on farms where chemical management tactics are not used. Some blueberry farms that are no spray or organic shut down operations early. Growers were using salt flotation to assess fruit infestation in sampled fruit. Reports came in from growers stunned by the level of damage that SWD can cause to their crops, especially blueberries and raspberries. In early August, reports of tart cherry loads being rejected at the processor due to worms and mold underlined that SWD had found its mark in cherries in NY. Tons of tart cherries were dumped on the ground. The situation in tart cherry and blueberry necessitated developing resources for how to treat dumped and fallen fruit on the ground to minimize infestation of susceptible fruit awaiting ripening and harvest.

Expected and Observed Impact/Outcome:

For growers to protect susceptible fruit crops from SWD, in the absence of new knowledge and tools, they must treat repeatedly with insecticides throughout the harvest period resulting in significant economic costs from chemicals and fuel. When insecticides fail or are not used, SWD destroys the crop, growers cease harvesting and lose considerable revenue. The main outcome will be to address this by supplying accurate, targeted and timely information about the presence of SWD in New York.

We have preliminary data suggesting growers can hold off spraying crops until SWD is found in traps in a regional location (i.e. County). We implemented rapid-delivery of statewide SWD monitoring information for Extension and grower audiences. The positive impacts of deploying a SWD trap network are that fewer insecticide applications would be used by growers, crops would be better protected from SWD, and crop losses would be minimized.

Evaluation Approaches/Methods and Results:

We have done preliminary analysis of SWD trap catch results across the network and compared these to crop damage assessments. There were cases of trap catch coinciding with fruit infestation, trap catch occurring ahead of fruit infestation, and trap catch occurring after fruit infestation. The most useful results for spray decisions appear to be from traps that are situated as close as possible to the at-risk field, and the spatial relationships of field location associated with trap site density in a county or region are being examined more closely by researchers with whom we are sharing our data, in order to better deploy an effective network. For instance, if there is only one raspberry grower in a county or region, it will be best for that farm to monitor traps, pay close attention to reports of trap catch from the surrounding region and potentially base spray decisions on crop maturity, regardless of trap catch reports.

The value of the trap network reports is greatest for the earlier ripening berry crops, such as early-season blueberry varieties and summer raspberry. In these instances, trap catch reports serve to underline the need for protecting crops with insecticide programs. For early season crops, the trap network can provide an effective protecting crops with insecticide programs. For

early season crops, the trap network can provide an effective early warning, and this was the case in 2017. For late maturing crops, such as fall raspberry and blackberry and late-season blueberry, typically SWD has already built up sizable populations and the crop is likely already at risk of infestation. Late maturing berries are best monitored via fruit sampling using salt flotation to detect larvae in fruit.

The project group met via email before the trapping season in 2017. Thirteen cooperators agreed to collaborate on the project, monitoring 98 traps at 32 sites in 21 counties. Information was provided to cooperators on the type of trap to be used, how to report trap data to the mapping system, Eastern Spotted Wing Drosophila Volunteer Monitoring Network (SWD*VMN), www.eddmaps.org/swd/, and how to report trap data for inclusion in the SWD blog. Traps and lures were purchased and provided to all cooperators.

In 2017, many County-based extension educators were hesitant to collaborate because of how time-consuming it is to identify SWD in the traps among other Drosophilids caught. Therefore, some of these educators chose to either not participate or to service traps and send the filters containing the trapped insects to Carroll's lab for identification.

The NYS IPM Invasive Species and Exotic Pests fact sheet, Spotted Wing Drosophila, was revised in 2017, as was the brochure on SWD. The Quick Guides to Insecticides for SWD in berries and in tree fruit and grapes were updated before the season began to provide guidance to growers. A table of insecticides for treating cull fruit and fruit dropped to the ground was developed in 2017 in light of the significant damage to tart cherry and blueberry caused by SWD in NY.

The Spotted Wing Drosophila blog, http://blogs.cornell.edu/swd1/, tracks subscriber numbers. Subscribers to the SWD blog rose 43% from 2014 (159 subscribers) to 2015 (228 subscribers) and an additional 20 people subscribed in 2016 and 5 in 2017. Grower workshops on SWD given in 2015 in which the SWD blog was featured resulted in significant increases in blog subscribers. The 254 subscribers are mostly berry growers and we are directly reaching a majority of NY berry growers with the SWD blogs that provide information on the monitoring network findings. The SWD blog provides the opportunity to inform berry growers about other topics related to SWD, such as management, new research, workshops and webinars.

First trap catch occurred for all but one site over a five-week-long period, from June 8 to July 11, with the last site reporting first catch four weeks later. SWD was caught earlier this year than in prior years, and the warm, cloudy, rainy and humid weather across New York State benefited SWD population growth resulting in significantly more SWD damage to crops. This year, for the first time in NY, tart cherries were significantly infested and loads of fruit were rejected by processors and dumped on the ground.

SWD doesn't show up around the same time each year in a particular location, although Suffolk County Long Island is often among the earlier sites to catch SWD in traps. The long length of time over which first trap catch occurs across NY (62 days in 2017, 66 days in 2016, 56 days in 2015, 56 days in 2014, 76 days in 2013) provides evidence that SWD arrival across NY is asynchronous. For this reason, in addition to trap catch reports, growers must consider crop maturity and crop susceptibility to infestation when formulating management decisions.

Diverse Audiences Reached:

We indirectly served the interests of diverse audiences. The use of webpages to deliver SWD information and education is non-discriminatory and therefore may reach audience members of under-represented groups. A majority of berry farms in NY are operated by small

farms or hobby farms, many of which may be operated by diverse audiences. “Cornell University is an equal opportunity, affirmative action educator and employer.” is posted on the Cornell Fruit Resources webpages where the SWD resources are published.

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Project Conclusion:

SWD can destroy unprotected, susceptible fruit crops. Growers cannot harvest or sell infested fruit and therefore lose considerable revenue. We addressed the threat of SWD by supplying targeted and timely information about the presence of SWD in New York, and supported those findings with accurate integrated pest management (IPM) information for protecting crops against SWD.

The SWD monitoring network provided early warning of SWD in 27, 26 and 21 counties in NY during the 2015, 2016, and 2017 growing seasons, respectively. We distributed SWD trap catch data via the SWD blog, posting, on average, 43 blogs per year and reaching upwards of 250 growers, educators and researchers who subscribed to the blog. The blog and the monitoring network distribution map, which cooperators contributed their data to, provided an excellent way for growers to learn when SWD was found in their area. In turn, extension educators distributed the monitoring network data in their local and regional channels. For growers to protect susceptible fruit crops from SWD they must know when to treat their ripening crops with insecticides and the SWD blog, distribution map, and Cornell Fruit Resources SWD webpages helped deliver this essential information.

Research data suggest that growers can hold off spraying crops until SWD are found in traps in a regional location (i.e. County). The extension scientists monitoring SWD serviced 120, 121, and 98 SWD traps in 2015, 2016, and 2017, respectively, in their regions. To support the monitoring data, we created quick guides to labeled insecticides and how-to guides for trapping SWD and checking fruit for infestation. We implemented rapid, web-based delivery of statewide SWD monitoring information, SWD guidelines, and research updates for Extension and grower audiences. Extension educators in two CCE Regional Programs, Lake Ontario Fruit and Eastern NY Commercial Horticulture, and nine County Associations, Erie, Genesee, Herkimer, Livingston, Steuben, Suffolk, Tioga, Ulster and Wyoming, collaborated with Carroll throughout the project. The SWD monitoring network personnel were kept up-to-date with research findings. In turn, our SWD monitoring network data was shared with researchers across the U.S. who work on SWD.

The most vulnerable crop to SWD is red raspberry, especially fall raspberry, but also summer raspberry. During the three years of the study, we monitoring for SWD in 55 raspberry plantings, 47 blueberry plantings, seven blackberry plantings, five vineyards, and three strawberry fields. Our monitoring methods changed as research on SWD traps and lures advanced. In 2015, we used a fermenting wheat dough lure with apple cider vinegar – an easy to make and relatively effective trapping system. In 2016 and 2017, we used commercially available Scentry traps and lures, which were equally effective at trapping SWD, but were easier to service and more selective for Drosophilids making it easier to find SWD among the trapped

insects. During the project, several farmers started monitoring SWD on their own, as well as learned how to check fruit for infestation using salt flotation.

Although monitoring may prove useful, there is evidence, from preliminary work done in 2015 by project collaborators and ongoing research on SWD, that fruit infestation can occur before SWD is caught in traps in the same field. This is particularly true for raspberries. This may relate to the effectiveness of the lures used, the degree of susceptibility of the crop, or highly favorable environmental conditions for SWD development. Both 2015 and 2017 were favorable years for SWD development, while the heat and drought of 2016 was unfavorable. Although SWD was caught early in 2016, sustained catch in subsequent weeks was spotty with many sites reporting one to six weeks before a subsequent trap catch and this was reflected in reports from the field on fruit infestation with farms successfully harvesting berries through the end of their harvest season. In stark contrast, SWD arrived early in 2017 and sustained catch occurred the subsequent week, weather was warm, rainy and humid, favoring SWD and contributing to significant crop losses in raspberry, blueberry, tart cherry and other fruit crops.

The positive impacts of deploying the SWD trap network are that fewer insecticide applications are used by growers, crops are better protected from SWD, and crop losses are minimized. Growers must know when to treat their ripening crops with insecticides – and the SWD blog, distribution map, and Cornell Fruit Resources SWD webpages helped deliver this essential information. To support the monitoring data, we created quick guides to labeled insecticides and how-to guides for trapping SWD and checking fruit for infestation. These project deliverables supported better IPM for SWD with resulting reductions in crop losses. Our SWD monitoring network data was shared with researchers across the U.S. who work on SWD. We continue to learn more about this invasive insect as it adapts to our agroecosystems and we implemented rapid, web-based delivery of statewide SWD monitoring information, SWD guidelines, and research updates for Extension and grower audiences.