

REPORT – DECEMBER 2013

**IMPROVED MONITORING, BASIC BIOLOGY, AND CONTROL OF SPOTTED WING
DROSOPHILA IN SOUTHERN BRAMBLE CULTURE**

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The exotic invasive spotted-wing *Drosophila*, *Drosophila suzukii* is currently a major US fruit pest and is now distributed nationwide. Early economic losses to this small fly ranged between 20% and 100% with a total loss in annual revenue of \$500 million, and yield losses continue to mount. Objectives of our research focused on 1) monitoring, 2) basic biology, 3) biological control and 4) chemical control of the SWD fly.

1) Monitoring: We initiated a study to detect adult SWD early using patentable traps that were developed in our lab in collaboration with Scentry Biologicals, Inc. (Billings, Montana). Our cooperative research with USDA-ARS researchers in Wapato WA (Don Cha, Peter Landolt) has helped to develop a lure with four compounds that are highly attractive to SWD, particularly female flies, the sex responsible for egg laying and yield loss. This research is still ongoing, but next season we will test these traps with the new lures. Prototype traps have been constructed with a light source and will soon be produced by Scentry on a larger scale for field-testing in 2014.

2) Basic Biology: Our success in rearing adult flies has revealed female flies oviposit mainly during the day and adults are long-lived and may live as long as 30 days. Intact fruits are preferred by females as egg-laying sites, the berry's skin serves as a firm substrate and as a critical cue for oviposition. Rotting bramble fruit or damaged fruit that are fermenting were shown to attract adult SWD, but not to induce egg laying. In fact, adult SWD cannot feed on fermented caneberries, and if they do, they quickly die within 24 h of exposure; not so for native *Drosophila* which, can feed and reproduce on fermenting substrates. These studies are ongoing. With the colonies established with NABG funding, we were able to establish a cooperative project with Dr. Shahid Karim (University of Southern Mississippi) to identify the microbiota associated with SWD digestion by using rRNA genetic sequencing. Preliminary data identified endosymbiotic bacteria that may be crucial to SWD digestion and chemical (ethanol) detoxification. Our hope is to interfere with the synthesis of proteins produced by these microbes in order to reduce the survival and reproductive fitness of adult SWD flies.

3) Biological Control: We have identified *Leptopilina boulandi* as a parasitoid wasp associated with SWD in blackberry fields in southern Mississippi. Next year we hope to collect enough adult wasps and raise them on native *Drosophila*, to get an ample supply for exposing them to SWD larvae.

At right: Female *L. boulandi*, a well-known parasitoid of *Drosophila* species discovered on southern brambles in Mississippi and associated with SWD.

4) Chemical Control: We have currently developed the bioassays in cooperation with MSU (Eugene Blythe) and the USDA-ARS NPURU (David Wedge) to test essential oils from the United States and China as deterrents and contact insecticides against adult SWD.





Bench-top bioassays to test contact biopesticides against confined adult SWD