

# Spotted Wing Drosophila in California Cherries

## *Understanding the Issue & Options for Management*

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**S**potted wing drosophila (SWD), *Drosophila suzukii*, is an invasive pest with broad host range including crops, non-crop and ornamental plants. Native to Japan, this fly was first introduced in California in 2008 and has become a major threat for several soft thin-skinned berries and some stone fruits including cherry. Adult flies look similar to other flies belonging to the genus *Drosophila*, including the common vinegar fly. SWD adults (size: ~ 3 mm; Fig. 1) have red eyes, pale brown thorax and abdomen with black bands on abdomen. Male fly has two distinguishing characteristics: 1) black spot on the tip of each wing, and 2) dark band encircling the forelegs. Female flies have a heavily serrated ovipositor (Fig. 2). Tiny white larvae (3.5-4 mm) feed inside the fruit and pupate. Most of the pupae remain inside the fruit with their respiratory tubes extending out until emerged as adults.

### **Why is SWD a big deal?**

Out of ~1500 *Drosophila* species worldwide, SWD is one of the two species capable of depositing eggs on healthy and ripening fruits because female SWD is equipped with a serrated (i.e., saw-like) ovipositor (i.e., egg laying apparatus) for depositing eggs inside fruits. One female is capable of laying more than 300 eggs during her lifetime and, in most instances, one fruit is infested with multiple larvae. The ovipositor is capable of incising the intact fruit skin rendering the cherry fruit with typical oviposition scars (Fig 3). Direct damage on fruits by internal-feeding larvae of SWD leads to fruit tissue damage and ultimately the fruit collapse. Fruits injured by oviposition and feeding become an easy target for several other pests such as vinegar flies and other secondary infections (Fig. 4),



**Fig. 1. Spotted wing drosophila adults.** Photo by M. Hauser

which are otherwise not a threat to intact fruits. In addition to indirect damage associated with secondary pest and disease incidence, there is a high risk of fruit lots being rejected during the processing and/or exporting of fruits if SWD infestation is found on fruits, thus the economic threshold for this pest in cherry is 'zero' in practical terms.

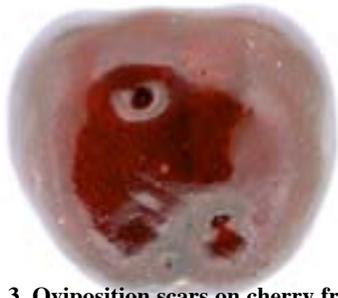
### **Why, how, and when to monitor SWD?**

Because of wide host range, unique egg laying behavior, high fecundity, and large number of generations per season, damage by SWD in soft and susceptible fruits such as cherry becomes severe very quickly. Therefore, it is very important to pay attention on SWD adult activities as well as any other signs of fruit damage in cherry orchard on a regular basis. There are traps that capture SWD but the relationships of trap captures to population or crop damage have not been worked out. Monitoring adult fly activities using traps beginning just before fruit ripening (i.e. changing fruit color from green to red), and continue through the harvest is key for SWD management. Traps can be constructed locally. Some local trap designs are described here ([http://](http://www.fruit.cornell.edu/spottedwing/pdfs/SWDTraps_CornellFruit.pdf)



**Fig. 2. Detail view of SWD ovipositor.** Photo by M. Hauser

[www.fruit.cornell.edu/spottedwing/pdfs/SWDTraps\\_CornellFruit.pdf](http://www.fruit.cornell.edu/spottedwing/pdfs/SWDTraps_CornellFruit.pdf)). Traps designed using plastic cups with screened holes on sides and 'apple cider vinegar' as attractant are effective in catching high number of SWD adults. SWD lures/traps are also available commercially. Currently, there are many studies going on across the United States focusing on improving effectiveness and specificity of several attractants to SWD, and we are hopeful that even more effective traps will be available in the near future. Traps developed so far for this pest catch both male and female SWD flies along with other *Drosophila* species. Although some traps are more specific than others in



**Fig. 3. Oviposition scars on cherry fruit caused by SWD. Photo by M. Hauser**



**Fig. 4. Secondary infection by mold on cherry fruit. Photo by M. Hauser**

catching SWD, none of the traps to date has shown complete specificity to SWD. In this context, identification of SWD from other flies (mostly vinegar flies)

is very important. Here is an excellent id-kit for SWD (<http://www.ipm.msu.edu/uploads/files/MSU-SWD-ID.pdf>). Cherry growers are recommended to hang traps on shady sides of the tree since SWD prefers relatively shady areas of the trees/orchards. The height of traps should be within easy reach or at eye-level. In addition to placing traps, it is highly advisable to be vigilant about any signs of SWD damage on the fruits still in trees as well as those dropped into the orchard floor. Here is the excellent information related to recognizing fruit damage caused by SWD (<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/19525/em9021.pdf>).

### ***What are options for SWD management?***

Current management practices for SWD in California cherry production mostly rely on a limited number of insecticides, particularly of pyrethroid and spinosyn products. Although frequent use of these insecticides may lead to pest resistance, adverse effect on natural enemies, secondary



**Fig. 5. Larva of spotted wing drosophila. Photo by Larry L. Strand/UCIPM Program**

pest outbreaks, and more importantly unacceptable level of residues in fruits, growers do not have many options available at this time. In this context, exploring new pest management options is needed. Recently, United States Dept. of Agriculture (USDA) has granted \$6.7 million research funding to University and USDA scientists across the nation for conducting applied research and extension activities that is intended to explore ways to manage SWD in sustainable ways under several cropping systems.



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