

Pest Alert

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Florida Department of Agriculture and Consumer Services, Division of Plant Industry
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Spotted Wing Drosophila, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae), a fruit pest new to North America

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INTRODUCTION: The first Florida detections of this fly were made on 4 August 2009 in rural Hillsborough Co. where a single male fly was captured in each of two separate multi-lure traps located about 3 miles apart (E2009-5702 and E2009-5703, collected by K. A. Miller, USDA). Delimiting trapping is underway to better understand the fly's distribution and population levels.

In the fall of 2008, the first reports emerged of an unfamiliar fruit pest in the Watsonville area of central coastal California (Santa Cruz Co.). "Vinegar fly" (Drosophilidae) larvae were found in maturing fruits of raspberries and strawberries (<http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=821>), apparently as primary pests. This was quite out of the ordinary, as vinegar flies (including the well-known and ubiquitous *Drosophila melanogaster*) typically lay eggs on damaged and decaying fruit. This pest, new to North America, was determined to be *Drosophila suzukii*. The problem in California has since escalated. Fly populations are now widespread in central California (<http://cemariposa.ucdavis.edu/files/67726.pdf>), and detections have been made over the entire length of the state from San Diego Co. in the south to Siskiyou Co. in the north.

Flies have been found infesting fresh cherries (CDFA Detection Advisory, PD21-09, 2 June 2009), with severe production losses in some areas (<http://westernfarmpress.com/citrus/cherry-fruit-fly-0706/>). High fly counts have been reported again in raspberry fields this summer in areas where it was first detected in 2008 (<http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=1351>).

Florida growers and agricultural service agencies should be alert to the appearance of this pest in their areas. Crops potentially at risk in Florida include thin-skinned fruits such as strawberries, blackberries and blueberries.

DESCRIPTION: This fly is of typical size and appearance for drosophilids with an adult body length of approximately 2-3 mm, red eyes, yellowish-brown body color and dark bands on the abdomen. The males are relatively distinctive, as they have a small dark spot on the leading edge of the wing near the tip, hence the "spotted wing" sobriquet (Fig. 1). Females lack the wing spot (Fig. 2). The female's unusual serrated ovipositor apparently enables it to penetrate thin-skinned fruits to deposit its eggs. See <http://cemariposa.ucdavis.edu/files/67726.pdf> for details of identifying characteristics for adults and photos of immature stages. Florida is home to at least 60 members of the family Drosophilidae, including 27 or more species of *Drosophila*, and some have spotted wings. Without careful examination, some of these native species could easily be mistaken for *D. suzukii*.



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BIOLOGY: In Japan, fly populations complete about 13 generations per year, and a single life cycle can be as short as 8-9 days. Flies are active from April to November. In mid-season, adult life span is typically 3-9 weeks. However, flies emerging late in the season overwinter and may live many months until the following summer. Adult activity is highest at about 68° F and declines above 86° F. Females may lay 7-16 eggs per day, and they have an average lifetime fecundity of 384 eggs. Females laid an average of 2.7 eggs per cherry, and up to 65 adults have emerged from a single cherry fruit (Kanzawa 1936, 1939). Pupation has been reported to take place both inside and outside of fruit. Biological information has been further summarized by investigators in California; see <http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=1483>. Of particular concern is the high reproductive potential of the fly. Local populations can go through multiple generations and build to very large population sizes even in a single cropping cycle. As the fly is reported to thrive at cool temperatures and poorly at temperatures above 86° F, Florida's winter and spring berry crops probably are at highest risk. However, the discovery of this fly in the height of Florida's summer heat casts some doubt on the assessment of the earlier biological observations on heat tolerance.

DAMAGE: Infestation in cherry initially is manifested by scars in the fruit surface left by "stinging" (ovipositing) females. As egg hatch time is very short (about 1 day), larvae soon begin feeding inside the fruit. Within as little as 2 days, the fruit begins to collapse around the feeding site. Thereafter, mold and infestation by secondary pests may contribute to further damage. Additional images of damage to cherry fruit can be viewed at <http://cemariposa.ucdavis.edu/files/67726.pdf>.

HOSTS & ECONOMIC IMPORTANCE: In California, this pest has been recorded in cherries, raspberries, blackberries, blueberries and strawberries. In Japan, the fly has been reported to cause severe damage to cherries and grapes, and it also infests fruit of apple, peach, plum, persimmon and *Rubus* (Kanzawa 1936, 1939). Presently, it is also a pest in blueberry in Japan as indicated in a recent study (Uchino 2005). Control recommendations to best suppress fly populations are still under development by University of California scientists.

DISTRIBUTION: The fly was first observed in Mainland (Honshu) Japan in 1916 (Kanzawa 1936). It also occurs in parts of China, India, Thailand and Korea (Delfinado and Hardy 1977); and has been established in Hawaii since at least 1980 (Kaneshiro 1983). Its presence has been confirmed in Oregon, and it is likely present in other western states with commercial cherry production, such as Washington. Its brief history in California demonstrates that it can spread quickly. Whether its spread is entirely natural or human-assisted is unknown. For comparison, one can consider the case of another recent drosophilid immigrant to North America, *Zaprionus indianus* (another of the rare drosophilid primary fruit pests; in this case, figs). It was first noted in Florida in 2005 and within 2 years it had been recorded across nearly the entire range of southern United States and extending to California (<http://www.kimvdlinde.com/professional/Zaprionus%20distribution%20US.html>).

TAXONOMY: There has been some confusion over the identity of the pest fly in California. Initially, it was thought to be another spotted-wing species, *Drosophila biarmipes*, a native of India. Further investigation revealed it to be *D. suzukii*, and DNA sequence data are now available to aid in identification. Both are members of a taxonomic group of genus *Drosophila* called the *suzukii* subgroup. An early moniker was "cherry vinegar fly", but "spotted wing *Drosophila*" is the common name currently in use in California.

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Figure 1. *Drosophila suzukii* male
Photo credit: G. Arakelian, Los Angeles County Agricultural Commissioner/Weights & Measures Department

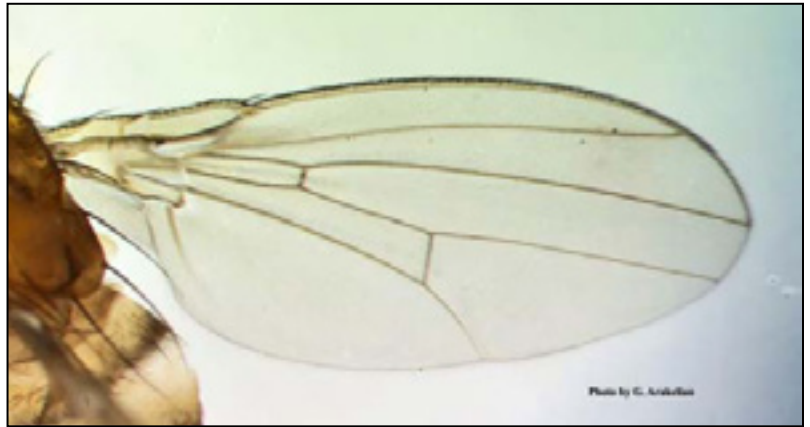


Figure 2. *Drosophila suzukii* female.
Photo credit: G. Arakelian, Los Angeles County Agricultural Commissioner/Weights & Measures Department



Figure 3. Cherries damaged by *Drosophila suzukii*.
Photo credit: University of California Cooperative Extension, Mariposa County