ENY-857

UF UNIVERSITY of FLORIDA
IFAS Extension

Spotted Wing Drosophila New in Florida Berry Culture[1]

James F. Price and Curtis A. Nagle[2]

A new pest has arrived in Hillsborough County that could affect production of strawberry, blueberry, raspberry and other thin-skinned fruit. In August, 2009, the spotted wing drosophila (*Drosophila suzukii* (Matsumura), Diptera:Drosophilidae) was discovered in the northeast corner of the county, after having been known about 1 year in California and for less time in Washington.

This fly, originating in the Orient, resembles the common *Drosophila* spp. flies that accumulate on over-ripe bananas, flats of strawberries left without refrigeration, old fallen citrus, and other fruit beginning to spoil. In fact, both are small, have prominent red eyes and, indeed, are closely related. Wing tips of spotted wing drosophila males contain a dark spot that is lacking in our common drosophilids (Figure 1).

Female spotted wing drosophila possess serrations on their egg laying organ that can cut soft surfaces of sound fruit to lay eggs inside. Common drosophilid flies are without that modified ovipositor. Spotted wing drosophila eggs that hatch inside fruit become white maggots that can soften and ruin fruit in the field or can accompany harvested fruit undiscovered until the fruit are in consumers' hands.

Figure 1. Male spotted wing drosophila. Credits: G. Arakelian, Los Angeles County Agricultural Commissioner/Weights & Measures Department

There presently are no restrictions to be placed on fruit from infested farms.

1. This document is ENY-857 (IN839), one of a series of the Department of Entomology and Nematology, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Date first published: October 2009. Please visit the EDIS Website at **http://edis.ifas.ufl.edu**.

2. James F. Price, associate professor, and Curtis A. Nagle, biological scientist, Gulf Coast Research and Education Center, Department of Entomology and Nematology, Cooperative Extension Service, IFAS, University of Florida, Gainesville.

This group of small flies often is called the pomace, vinegar, or fruit flies, but "fruit flies" in this case is confusing since that common name applies to larger flies, the Tephritidae, often problematic and reported in the news media. Tephritids include banded winged flies such as Mediterranean fruit fly, Caribbean fruit fly, Oriental fruit fly, Mexican fruit fly, and others. Drosophilid flies are not closely related to tephritid flies and management of the two groups can be vastly different. For instance, rare outbreaks of Mediterranean fruit flies in Florida are managed in part with mass releases of sterilized male Mediterranean fruit flies. This technique has not been developed for drosophilids and is impractical to consider in most cases.

The spotted wing drosophila are expected to survive in Florida's climate and, given the swift colonization of California, strawberry growers should be prepared to encounter this fly in winter 2010 and beyond. The degree of interference to production is clearly unknown. However, management plans are surfacing. Below are tactics that can be applied as conditions warrant. Presently, there are no action thresholds established or even farm-level scouting protocols established. Presence of spotted wing drosophila on a farm could be ascertained by sweep-netting and observing *Drosophila* spp. attracted to strategically placed bait containers of rotting fruit or of bait prepared from aged bananas mixed with yeast activated by warm water.

Management practices immediately available in Florida for spotted wing drosophila are those used to manage our common drosophilids. Additional techniques of adapting tephritid fruit fly baits with toxicants are being considered and developed for strawberries, but some problems exist in transferring the procedure to the spotted wing drosophila/strawberry system.

The most important progress in managing the new pest will be achieved by implementing cultural practices that deny spotted wing drosophila their breeding sites and kill immature spotted wing drosophila inside infested fruit. This can be accomplished in a strawberry field by removing marketable berries quickly, before they are infested, and removing and properly disposing unmarketable fruit and the immature insects they may harbor.

Practices of strawberry fruit disposal should advance beyond the common routine of dropping unsalable fruit into the row middle. Any fruit not to be sold should be collected and buried or collected, covered, and sent to municipal disposal sites.

Additionally, applications of appropriate insecticides should be made as spotted wing drosophila appear. Insecticides presently approved for *Drosophila* spp. fly control include malathion, diazinon, and pyrethrum based products (Table 1) targeted to adults. There are no insecticides available for egg or maggot control inside fruit. It is unknown how long residues of malathion or diazinon could be effective to kill spotted wing drosophila flies, but the active period of pyrethrum is very short. Consequently, recurring applications at close intervals may be required under heavy pressure, for populations of mixed life stages, or when flies move from outside sources into fruiting fields. When these conditions are absent, applications could be held to one lifecycle or longer, probably 10 days to 2 weeks or longer during much of Florida's fruit production period.

A component of tephritid management often includes large droplet applications of protein-based bait such as Nu-Lure mixed with an insecticide or GF-120 bait manufactured with spinosad insecticide. It is uncertain if such tools can be effective for spotted wing dosophila under any circumstances. However, problems maintaining adequate moisture will exist in the bait residues used in Florida's spotted wing drosophila/strawberry system. And it may be problematic to deliver sufficient quantities of effective bait and toxicant mixture in an environment of heavy feeding pressure by common drosophilid flies.

Production by vigilant and responsive strawberry growers in Florida probably will not be reduced by this new pest, so long as the present management tools remain effective and available and growers cooperate to manage spotted wing drosophila throughout the area. New management measures must be developed, though, to assure long-term control and to reduce the impacts that presently available insecticides can bring to bear on *Orius* spp., *Phytoseiulus persimilis*, and other naturally occurring

Table 1. Insecticides available in Florida for management of *Drosophila* spp. flies on strawberries.

Active Ingredient	Trade Name	REI[1]	PHI[2]	Mode of Action Code[3]
Diazinon	Diazinon	24 hours	5 days	1B
Malathion	Malathion	12 hours	3 days	1B
Pyrethrins	Pyganic	12 hours	0 days	3A
Pyrethrins / Piperonyl butoxide	Pyrenone	12 hours	0 days	3A / no code

[1]Re-entry interval that must elapse between application of the indicated insecticide and entry of any persons into the treated area.
[2]Pre-harvest interval that must elapse between the application of indicated insecticide and harvest of the crop.
[3]For management of spotted wing drosophila (SWD) resistance to insecticides, growers should use products from one mode of action group during the period of one SWD lifecycle then rotate to another mode of action for a similar period.

or applied beneficials useful in Florida strawberry pest management.

Sources and Additional Information

Bolda, M. 2008. New fruit fly pest in strawberries and caneberries. University of California, Agriculture and Natural Resources Blogs, Strawberries and Caneberries, 21 November 2008 http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=821, viewed 1 Sep 2009.

Bolda, M. 2009. Update on the cherry vinegar fly, *Drosophila suzukii*, now known as the spotted wing Drosophila. University of California, Agriculture and Natural Resources Blogs, Strawberries and Caneberries, July 9, 2009, http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=1483 , viewed 1 Sep 2009.

Bolda, M. 2009. *Drosophila suzukii* update. University of California, Agriculture and Natural Resources Blogs, Strawberries and Caneberries, June 3, 2009. http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=1351 , viewed 1 Sep 2009.

Cline, H. 2009. CVF causing widespread damage. Western Farm Press, 6 July 2009, http://westernfarmpress.com/citrus/cherry-fruit-fly-0706/, viewed 24 July 2009

Delfinado, M. D. & D. E. Hardy. 1977. A catalog of the Diptera of the oriental region. Vol III Suborder Cyclorrhapha. The University Press of Hawaii, Honolulu. x + 854 pp

Kaneshiro, K. Y. 1983. *Drosophila (Sophophora) suzukii* (Matsumura). Proceedings Hawaiian Entomological Society 24: 179.

Kanzawa, T.1936. Studies on *Drosophila suzukii* Mats. Journal of Plant Protection (Tokyo) 23: 66-70. 127-132, 183-191. Abstract in Review of Applied Entomology 24: 315.

Kanzawa, T.1939. Studies on *Drosophila suzukii* Mats. Kofu, Yamanashi Agric. Exp. Sta. 49 pp. Abstract in Review of Applied Entomology 29: 622.

Steck, G.J., W. Dixon, & D. Dean. 2009. Spotted wing drosophila, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae), a fruit pest new to North America. Pest Alert. Florida Dept. Agric. and Consumer Services, Div. of Plant Industry. http://www.fl-dpi.com/enpp/ento/drosophila_suzukii.html#pagecontent , viewed 1 Sep 2009.

Uchino, K. 2005. Distribution and seasonal occurrence of cherry Drosophila, *Drosophila suzukii* (Diptera: Drosophilidae), injurious to blueberry in Chiba Prefecture. Annual report of the Kanto Tosan Plant Protection Society 52: 95-97.

University of California Cooperative Extension, Mariposa County. Be on the look out for spotted wing

Drosophila. http://cemariposa.ucdavis.edu/files/67726.pdf , viewed 1 Sep 2009.

van der Linde, Kim. 2009. *Zaprionus indianus* distribution in the United States. http://www.kimvdlinde.com/professional/Zaprionus distribution US.html , viewed on 1 Sep 2009.