Exotic Fruit Flies in California

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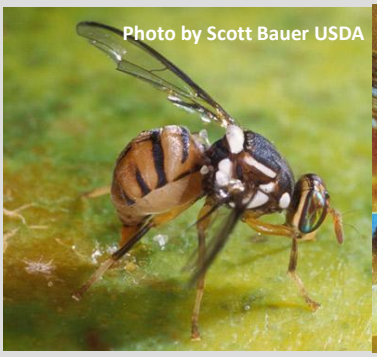
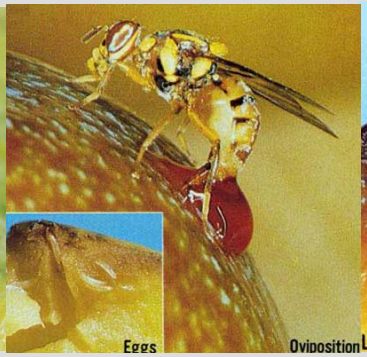
Exotic fruit flies **(Diptera: Tephritidae)** such as Mediterranean fruit fly **(*Ceratitis capitata*)** and oriental fruit fly (***Bactrocera dorsalis* group**) are among the most serious threats to California's $43 billion agricultural industry. These invasive pests are highly polyphagous, capable of breeding in a very wide variety of fruits and vegetables. Adult female flies pierce the skin of fruits and vegetables and lay eggs inside. The eggs hatch and develop into maggots, which feed on the pulp, rendering the produce unfit for consumption. Since fruit flies are internal feeders, they can be transported long distances by people carrying fruits and vegetables. The establishment of these pests would have significant repercussions including a significant increase in pesticide use and the loss of export markets.

To exclude exotic fruit flies and other pests from the United States, USDA, APHIS cooperates with **Customs and Border Protection** (CBP) officials to inspect incoming plant products, including illicit arrivals. The California Department of Food and Agriculture (CDFA) also inspects incoming vehicles for illicit fruits and vegetables at land border stations in California. Additionally, USDA, APHIS conducts surveillance of markets for illegal fruits and other plant products, and California County Agricultural Commissioners conduct inspections at high risk introduction facilities in their counties, such as package distribution centers (e.g., FedEx), nurseries, and markets.

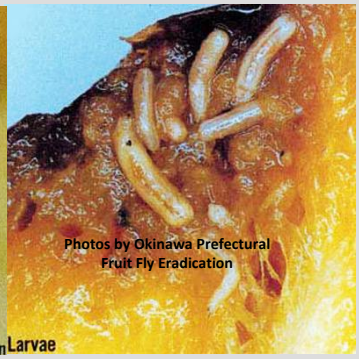
Nevertheless, the expanding volume of international commerce offers exotic fruit flies ample opportunities to make regular incursions into California. The vast majority of these incursions occur in urban areas of southern California and the San Francisco Bay area, where the major international ports of entry are located. In order to detect these incursions, the USDA, APHIS and CDFA Cooperative fruit fly **program** manages approximately 90,000 fruit fly traps throughout California. This detection trapping system has regularly shown itself to be sufficiently sensitive to detect populations while they are small enough to be eradicated using methods which are most effective against small, isolated populations. In addition, once an exotic fruit fly is captured in a trap, much denser arrays of traps are used to confirm that a population exists in the area and, if so, to determine its distribution and estimate its size. Following control activities, similarly dense arrays of traps are used to provide a high degree of assurance that a viable population no longer exists in the area.



Female ovipositing



Female ovipositing



Maggots feeding

The female oriental fruit fly is fertilized by the male, lays her eggs on the fruit, the eggs hatch into maggots that feed on the pulp and destroy the fruit.

Oriental fruit fly

Western Plant Diagnostic Network News

WPDN
Western Plant Diagnostic Network

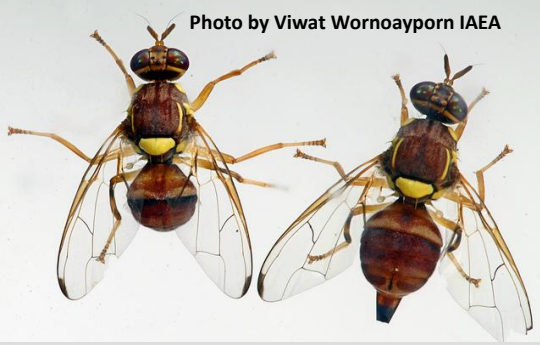
As of September 18, a total of 80 oriental fruit flies have been trapped this year in California. All of these have been found in the urban areas of southern California and the San Francisco Bay area. Two areas have been quarantined following the confirmation of breeding populations of flies. These areas include parts of the cities of Anaheim (Orange County), Cerritos, and Artesia (Los Angeles County). A total of 43 adult oriental fruit flies were trapped in Anaheim. Here the flies were focused around a secluded residential property that maintained a fruit orchard. During the first visit to that property, inspectors hand-collected an additional 50 adult oriental fruit flies. In addition, nine larvae were found in peaches at a neighboring property. Only one fly has been trapped since August 23. The second area quarantined for oriental fruit fly is in the cities of Cerritos and Artesia. In this area a total of 19 flies were trapped between July 9 and August 14. The other 18 oriental fruit flies were trapped in the Orange County cities of Santa Ana, Fullerton, Seal Beach, and Garden Grove, the Los Angeles County cities of Los Angeles, Glendale, Placentia, and Long Beach, the San Diego County city of San Diego, the Alameda County city of Pleasanton, and the Santa Clara County cities of Cupertino and San Jose. Four species of exotic fruit fly have been detected in California in 2013. These include three species of the genus *Bactrocera*, which are native to Asia. These are oriental fruit fly, peach fruit fly (***Bactrocera zonata***), and guava fruit fly (***Bactrocera correcta***). The fourth species is Caribbean fruit fly (***Anastrepha suspensa***), which is native to the Caribbean.

A total of 13 peach fruit flies have been trapped this year. These include 3 flies trapped in the cities of Chino and Chino Hills (San Bernardino County), 6 flies in the cities of Fairfield and Suisun City (Solano County), and 4 flies in the Alameda County cities of Fremont, Union City, and San Lorenzo.

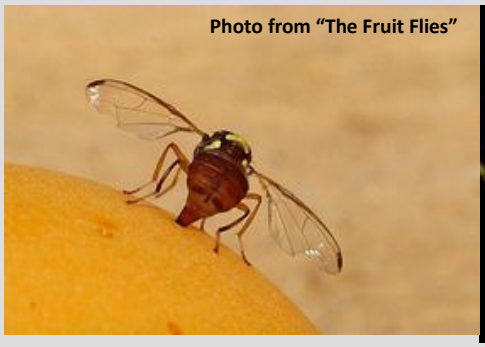
A total of 6 guava fruit flies have been trapped this year. These include 5 flies trapped in the Santa Clara County cities of Cupertino and San Jose and 1 fly trapped in Garden Grove (Orange County).

The single Caribbean fruit fly was trapped in Los Angeles in the vicinity of Los Angeles International Airport (LAX).

High-density delimitation trapping will continue around each of these fly detections well into 2014, to allow for three life-cycles of the flies to pass based upon degree day models. Once three life-cycles have passed without any fly finds, the density of traps will be returned to detection levels.



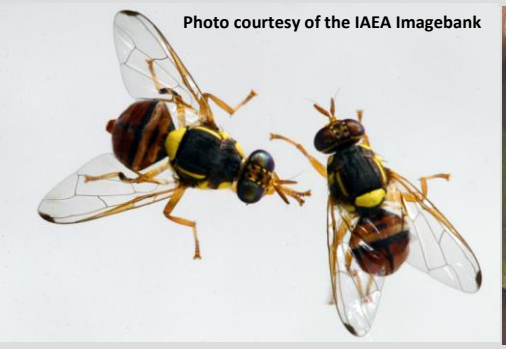
Male (l) and female (r) peach fruit flies



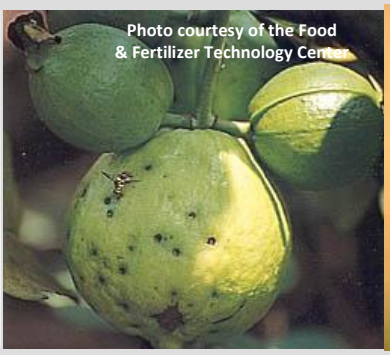
Female ovipositing on fruit

Maggots feeding on peach

Peach Fruit Fly



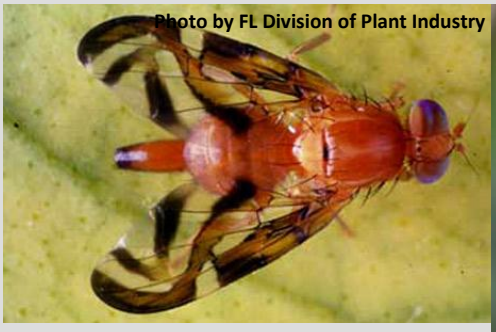
Female (l) & male (r) guava fruit fly



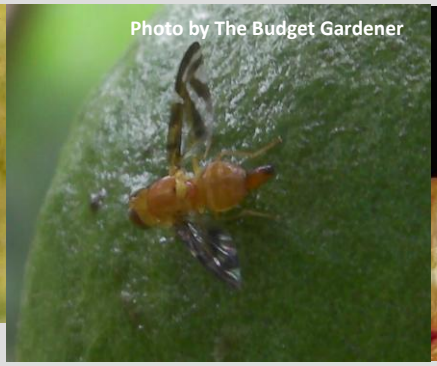
Female ovipositing on guava

Maggots feeding on guava

Guava Fruit Fly



Adult female Caribbean fruit fly



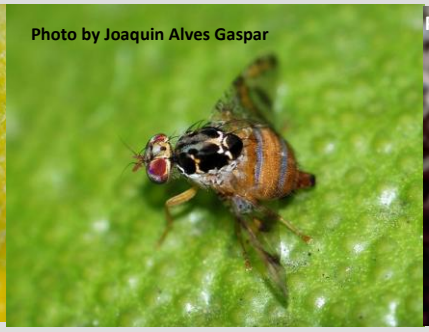
Female ovipositing on guava

Maggots feeding

Caribbean Fruit Fly

Other Problem Flies

Male Med fly

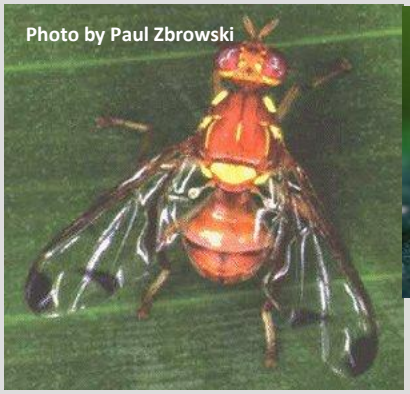


Female ovipositing on citrus

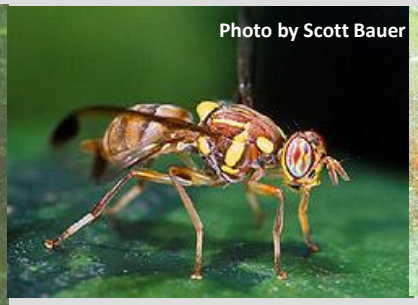
Maggots feeding on orange

Mediterranean fruit fly

Ceratitis capitata



Male melon fruit fly

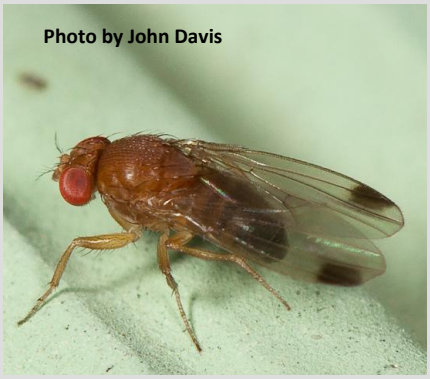


Female melon fruit fly

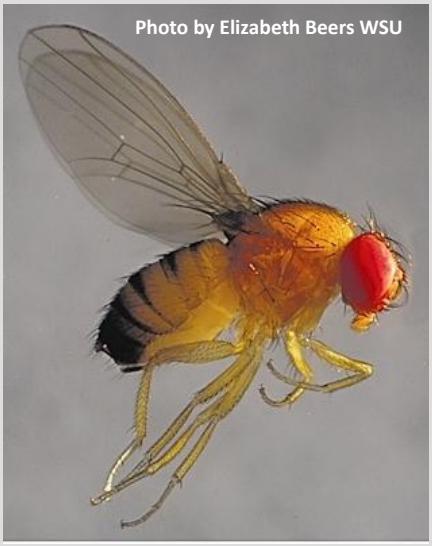
Maggots feeding on melon

Melon fruit fly

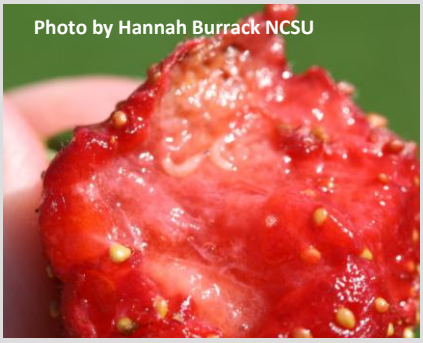
Bactrocera cucurbitae



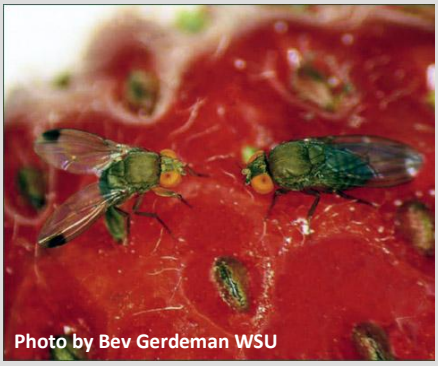
Only the male SWD has spotted wings



Female SWD (no spotted wings)



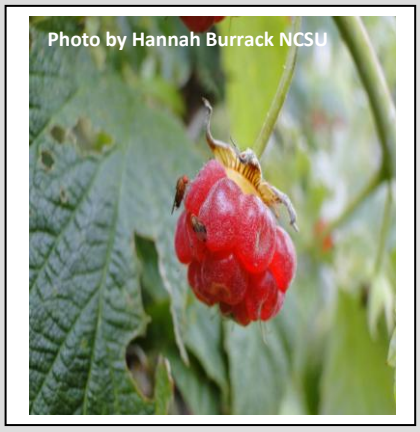
Maggots feeding on strawberry



Male (l) & female (r) on strawberry

Spotted Wing Drosophila

Drosophila suzukii



Female SWD ovipositing on raspberry

Unlike other **vinegar flies** that occur in the Western US, spotted wing drosophila attacks healthy ripening fruit as well as damaged or split fruit. The female will penetrate the skin of soft-skinned fruit with her large ovipositor and lay eggs just under the skin, creating a small puncture, or "sting," on the fruit surface. Each sting contains 1 to 3 eggs, and a female can oviposit on many fruit. Multiple larvae within a single fruit are quite possible, because many

females might visit the same fruit to oviposit. Once fruit integrity is compromised by SWD's activities, common vinegar flies also might oviposit in the damaged fruit.

Eggs hatch and maggots develop and feed inside the fruit, causing the flesh to turn brown and soft with sunken areas that can exude fluid on the surface of smooth-skinned fruit such as cherries and blueberries. Damage can provide an **entry site for infection** by secondary fungal and bacterial pathogens, but this is not always the case.

More about fruit flies

As Dr. Leathers writes above: "Since fruit flies are internal feeders, they can be transported long distances by people carrying fruits and vegetables. The establishment of these pests would have significant repercussions including a significant increase in pesticide use and the loss of export markets." As First Detectors, it is important to know and observe quarantines for fresh fruit. Do not send or receive fresh fruit from quarantine areas or across state (and in some cases even county) lines. A good example is fruit exported from Hawaii. Hawaii is infested with the melon fly (1895), the Mediterranean fly (1907), Oriental fly (1944) and the Malaysian fly (1983). Fruit exported to the mainland must be treated to ensure none of these flies infest other areas. Irradiation, vapor heat, and hot water treatments are among the methods used. These methods kill any fly larva within the fruits. See **Why We Treat Fruit For Export** and **Heated Air Blasts Papaya Pests** . **Customs and Border Patrol guidelines** explain the philosophy and biology behind the regulations. "**PLEASE – DO YOUR PART TO HELP PROTECT AMERICAN AGRICULTURE!**
When planning your trip, keep in mind that regulations change frequently around the world, depending on outbreaks of plant and animal diseases. So, whether or not the item in question seems to be one that is permitted, travelers are still responsible for declaring those items and presenting them for inspection upon returning to the United States. **DECLARE** all agriculture-related products when entering the United States."

Repeat Offenders

In conversations with the USDA and various state departments of agriculture, invasive fruit flies turn up over and over again in the same locations. Oftentimes friends and families may ship fruit into the US from abroad, or people visiting abroad may bring produce and/or animal products and/or live plants and propagules with them. All of these can harbor fruit flies and other diseases and this is why it is almost always in the same locations. UC Davis has recently published a study: **Medfly and other fruit flies entrenched in California, study concludes**. The CA **Eradication trapping program** describes the methods of fruit fly detection and trapping. **Fruit fly quarantine areas in CA** is found on the CDFA web site. For your state, go to the **Pest Tracker** site, select **States, and then** select your state to find your state agriculture contact info and the status of plant diseases, insect pests, invasive weeds, etc.