



BUG BIZ

Pest Management and Insect Identification Series



Drosophila spp., Vinegar and Pomace Flies (Diptera: Drosophilidae)

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Description

Vinegar and pomace flies are small members of the order Diptera belonging to the genus *Drosophila*. Adults of most species of household vinegar flies are small, robust flies one-twenty-fifth of an inch to one-eighth of an inch (1 to 3 mm) in length, with short, rounded abdomens and clear wings. They vary in color from light reddish brown to almost black and are paler on the sides and underneath the abdomen. Adults of some species, such as the common *Drosophila repleta*, possess prominent black speckles on the upper surfaces. Adults of the other commonly encountered species, *Drosophila melanogaster*, are unspotted and paler reddish brown in color with dark bands across each abdominal segment and are darker toward the rear of the body. The eyes in live individuals are red, darker red in *D. repleta* and bright orange red in *D. melanogaster*. *Drosophila repleta* adults are larger in size than those of *D. melanogaster*. Eye color fades to brown after death. Additional species may be encountered in similar circumstances and require microscopic examination and often dissection to correctly identify to species. Larvae are small, up to one-sixth of an inch (4 mm) long, elongate maggots, best identified through association with adults or by rearing.

The two most frequently used common names, vinegar and pomace flies, refer to the flies' strong attraction to the products of fermentation and decomposition. *Drosophila melanogaster* also goes under the common name "fruit fly," but this is misleading because that common name is also applied to another entire family of flies, the Tephritidae.

Life Cycle

Adults are attracted to fermenting vegetable matter and organic biofilms created by bacterial aggregations, where they congregate and mate. They are strongly attracted to various volatile compounds produced from fermenting organic substrates. In nature these include tree wounds and sap flows, rotting mushrooms, tree



Drosophila melanogaster. André Karwath aka Aka. Licensed under CC BY-SA 2.5. <https://commons.wikimedia.org/w/index.php?curid=227170>.



Drosophila repleta female. Bbski. Licensed under CC BY-SA 3.0. <https://commons.wikimedia.org/w/index.php?curid=7818530>.

holes and other sources of moist, decomposing organic matter. The female attaches eggs to the substrate, and the maggots hatch within a day or two and burrow to feed for as little as a few days to a week or more, depending on temperature. They undergo three developmental growth stages (instars) before transforming into a pupa (the developmental stage between larva and adult) on or near the feeding substrate. After emerging from the pupae, adults require a few days for maturation and mating, and the cycle is repeated. Development is highly dependent on temperature. In Louisiana during summer, development may require as few as eight days from egg to adult, with many generations during warm weather in the southern U.S. Larval feeding substrates differ according to species, with *D. melanogaster* preferring fermenting fruits and vegetables and *D. repleta* preferring biofilms in areas where a mixture of organic matter and moisture persist. Other species have subtly different habitat preferences, but overall, life history details are similar.

Ecological Significance and Pest Status

These small flies are common as nuisance pests in households and businesses, and infestations can persist for long periods of time if the larval feeding substrate is not identified and eliminated. Under natural circumstances the rapid life cycles allow swift colonization of ephemeral food sources, producing large populations in a short period of time. These populations come and go accordingly to available resources. They play an important ecological role by converting fermenting and decomposing substrates to animal biomass and are in turn utilized as food by a wide variety of organisms. In residences and businesses, unidentified sources of fermentation can cause enormous populations to build up in a short period of time, often exploding onto the scene with onset of warm weather that promotes rapid generation times from small initial populations. Bars and restaurants are notorious for supporting large populations of these “barflies.” Ethanol is a powerful attractant, and spilled beer under floor coverings can form biofilms that are ideal to support the larvae. In residences, infestations can often be associated with compost containers and similar receptacles that are not cleaned thoroughly. Fermenting plant matter stuck in garbage disposals may also support infestations.

Drosophila melanogaster is particularly noteworthy in the history of biology. It is arguably the most thoroughly studied insect species. Generations of school students worldwide have been introduced to the study of genetics and evolutionary biology through simple experiments with this easily reared and massively researched insect. Although the details differ among species, the basic principles of developmental biology and animal genetics are based on this organism.

Control

Eliminating infestations of *D. melanogaster* is typically easier than it is for *D. repleta*. The source of the former species is easier to track down and may be as simple as finding a partially rotten apple or similar fruit in a container. Larval habitats of *D. repleta* can be more difficult to track down because they typically occur in biofilms that may persist around sinks, tubs, showers, kitchen cabinets, leaky faucets and drains as well as under loose floor mats, around damaged grout on tile floors and in similar places. Determining where adults are most numerous will often provide clues about larval infestations. Diligent and frequent sanitation of suspected problem areas will often solve persistent infestations. Area applications of insecticides are typically ineffective if the larval habitats are unknown. Sprays typically have limited residual efficacy, and populations are rapidly replaced as larvae mature and pupate. Commercial or homemade traps for adult flies usually do not address the cause of the problem by eliminating sources, but they can be effective in reducing numbers of residual adults after successfully dealing with sources. Qualified pest control operators are trained in tracking down likely sources of infestations and providing management options. Identification of the species involved in infestations can be critical in solving stubborn infestations to ensure that vinegar flies are the problem and not members of some other family of small flies (e.g., coffin flies, Phoridae). This may require submitting specimens to a professional entomological diagnostician. This can be done by contacting your local LSU AgCenter extension agent.

References

- B.A. Hottel, J. L. Spencer, and S.T. Ratcliffe 2015. Trapping *Drosophila repleta* (Diptera: Drosophilidae) using color and volatiles. *Florida Entomologist* 98: 272-275
- Keller, A. 2007 *Drosophila melanogaster's* history as a human commensal. *Current Biology* 17: 77-81.

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