



Walnut Husk Fly

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS039E

Introduction

This fact sheet is intended to help small-scale commercial growers and plant-care service providers recognize the walnut husk fly (*Rhagoletis completa* Cresson) and the damage its larvae can cause in commercial walnut orchards (Figure 1). This fact sheet also discusses the non-chemical and chemical management strategies available to control this pest.

While California is the leading producer of Persian or English walnuts (*Juglans regia*) in the United States, significant commercial walnut acreage can be found in Oregon (Olsen 2006) and Washington State (McMullen 2007). The walnut husk fly originated east of the Rocky Mountains and was first reported in California in 1926 (Riedl 1993). By the 1950s, it had spread to the Pacific Northwest, where it has become a serious mid- to late-season pest of walnuts. While the larvae of this fly feed directly on husks, their feeding may damage both the quality of the shell and the flavor of the walnut kernel. The larvae are also occasional pests of late-harvested peaches and nectarines, particularly when these fruits are grown in close proximity to neglected and infested walnut trees.



Figure 1. A commercial walnut orchard in May. (Photo by Jeff Olsen, OSU Extension.)

Crop Damage

Female walnut husk flies lay their eggs just beneath a husk's surface. Upon hatching, the larvae feed inside walnut husks, but do not penetrate the shell. The walnut, in response to larval feeding, releases a dark liquid that stains the walnut shell and may discolor the kernels. The larvae may also injure the conductive tissues of the nut, which leads to shriveling of the kernel. Heavily infested husks show blackened areas on the outer surface (Figure 2). These areas are soft to the touch due to larval feeding beneath the surface (Figure 3). This damage makes it difficult to remove the husk from the nut after harvest.

Most English walnuts, including the Franquette and Mayette varieties and the seedlings of Manregion and Carpathian walnuts, are highly susceptible to husk fly damage. Walnut husk fly larvae may also infest and destroy late-harvested peaches by feeding internally on the flesh just beneath the fruit skin.

Walnut blight can be mistaken for husk fly damage since husks affected by blight develop similarly roughened, sunken, and cracked surfaces. However, the blighted areas on a walnut are usually hard and dry, while areas that have been damaged by husk fly larvae are soft and spongy.

Description and Life History

Husk flies overwinter as pupae in the soil under the host tree, frequently a walnut tree. Adult flies typically emerge from the soil in July and August, but may continue to emerge as late as October.

Flies are about ¼-inch long (6 mm), and are brown with a yellow semicircular tip on their thorax or back (Figure 4). Their wings are distinctly marked with brownish bands, and their eyes are blue-green.

Mating and egg-laying begin 1 to 2 weeks after the adult flies emerge and continues into autumn. Females lay several elongated, pearl-colored eggs approximately 1/25-inch long (1 mm) in walnut husks or nearly mature peaches. Eggs hatch in approximately 5 to 7 days. The tiny white maggots (refer back to Figure 3) feed inside the walnut husk (or in the peach flesh just below the surface)



Figure 2. Walnut husk fly damage to walnut husks. The tissue directly under the darkened areas on the husk will be soft and spongy. (Photos by Mike Bush, WSU Extension.)



Figure 3. Walnut husk fly larvae found beneath the husk's surface. (Photos by Mike Bush, WSU Extension.)



Figure 4. Dorsal views of the adult walnut husk fly. Note the distinct pattern on the wings and the brown coloration of the thorax and abdomen. (Photos by Elizabeth Beers, WSU and Mike Bush, WSU Extension)

for 3 to 5 weeks until they reach maturity. Mature larvae are approximately 1/2-inch long (13 mm) when they exit the host and drop to the ground to pupate in the soil. The pupae remain in the ground through the winter and spring before emerging as adult flies in July or August of the next season.

Monitoring Walnut Husk Flies

Walnut husk fly activity can be monitored with a variety of different traps. Commercial growers should monitor fly activity to determine the best time to apply pesticide sprays that target adult flies before they begin laying eggs.

Traps should be in place by the end of June, before the adult flies emerge from the soil. Set the traps high in the tree (at least 6 feet off the ground), preferably in the upper half of the canopy. Traps must be placed inside a shady area of the tree canopy to minimize sun exposure.

Sticky traps, one of the most common types of trap, are bright yellow, double-sided plastic or cardboard panels coated with an adhesive film that captures flies. These yellow sticky traps are commercially available through agricultural supply companies or manufacturers that specialize in pest monitoring. The trap's yellow coloration is effective in attracting a number of flying insects, including fruit flies, thrips, aphids, gnats, and other fly species. These traps come with twist-tie bands or wire for hanging the traps from tree limbs. Many companies also produce ammonium carbonate tubes or "superchargers" that release ammonium fumes, making these traps more attractive to the walnut husk fly (Figure 5).



Figure 5. A yellow, double-sided sticky card (9 × 5.5 in.) with ammonium carbonate fly lure. At least three walnut husk flies have been captured on this trap. (Photo by Henry Vander Houwen, Yakima County Horticultural Pest & Disease Board.)

Non-Chemical Control Strategies

Growers can greatly reduce the abundance of overwintering walnut husk flies by providing ground sanitation beneath the host tree. This process involves periodically raking and removing any dropped walnuts during July and August, as well as after nut harvest, to prevent mature maggots from exiting infested nuts and entering the soil to pupate.

The husk fly has few natural enemies, although predatory bugs, ants, and spiders reportedly do prey on mature larvae after they exit the husk, and on adult flies. However, these native predators do not effectively control the walnut husk fly.

Chemical Control Strategies

All insecticides registered for control of the walnut husk fly target the adult stage of the insect. Since a mature walnut tree can grow taller than 30 feet, the difficulty of getting good spray coverage to its upper canopy can make it difficult to achieve acceptable pest control.

Growers should apply the first insecticide treatment within 10 days after trap-catches show a sharp or steady increase over a 3-day period. This typically occurs in early to mid-August. Multiple applications may be necessary, depending on the number of days allowed between each application and the required days to wait to harvest (PHI) the walnuts after last product use.

For a listing of insecticide products effective against walnut husk fly, commercial applicators can consult the annually revised *Pacific Northwest Insect Management Handbook*, available online at <http://pnwhandbooks.org/insect/>.

Unique among pesticide products listed with the Materials Review Institute is a product called Surround WP Crop Protectant, which uses kaolin clay as its active ingredient. While kaolin clay is not a toxicant, this product has been found to be effective against the adult walnut husk fly when multiple applications and good spray coverage are achieved (Coats and Van Steenwyk 1992).

A recent strategy that is effective against the walnut husk fly uses an attract-and-kill product called GF-120 Naturalyte Fruit Fly Bait that combines a lure and a spinosyn toxin (Van Steenwyk et al. 2003). The lure is attractive to the adults of some tephritid flies, including the walnut husk fly, so the product is selective for a narrow range of target species. This product can be applied at a much lower rate per acre and can be applied using an ATV-mounted sprayer that shoots a stream of the bait-toxicant mixture into the canopy of the walnut tree. Spray coverage with this product is less critical because the flies will forage within the canopy to find and feed on the droplets of bait. Apply the initial treatment at first adult emergence or when monitoring traps capture the first flies of the season. Repeat applications every 7 to 10 days until harvest. This product has a short re-entry interval and can be used within 4 hours of anticipated harvest. There are also other commercial fruit fly baits

available that effectively manage walnut husk fly when mixed with insecticides labeled for use on walnuts (Coats and Van Steenwyk 2012).

Conclusion

The larvae of the walnut husk fly can become a significant pest in commercial walnut production. The best management program will depend on monitoring adult fly activity, recognizing the symptoms of larval damage, and using both chemical and non-chemical strategies to protect walnuts from the walnut husk fly.

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By **Michael Bush**, Ph.D., Extension Entomologist, Washington State University Extension; **Jeff Olsen**, Oregon State University; and **Arthur Antonelli**, Ph.D., Extension Entomologist, retired, WSU Puyallup REC.

Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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