

Identification of Invasive and Reemerging Pests on Hazelnuts

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Hazelnuts are produced in many countries, including the United States. Hazelnuts are grown on approximately 30,000 acres in the Willamette Valley, accounting for about 99 percent of U.S. production and 5 percent of world production. Turkey produces more than 70 percent of total world hazelnut production.

Hazelnut species that occur naturally in the Willamette Valley include the wild native hazelnut, which is found in uncultivated woodland areas as well as in some parks. Wild and cultivated hazelnuts are attacked by similar pests.

This publication is intended to increase producer awareness of important pests that occur in hazelnut orchards in the Pacific Northwest.

The biggest threat to hazelnut production since the 1970s has been Eastern filbert blight. This disease is found in two-thirds of the Willamette Valley and, if not controlled, can kill mature trees.

The key insect pests currently associated with hazelnuts include filbertworm, *Cydia latiferreana* (Figures 1 and 3); filbert weevil, *Curculio occidentalis* (Figure 3); filbert aphid, *Myzocallis coryli* (Figure 4); hazelnut aphid, *Corylobium avellanae* (Figures 4 and 5); filbert leafroller, *Archips rosanus*; and obliquebanded leafroller (OBLR, *Choristoneura rosaceana*). Of these, filbertworm and filbert aphid are perceived to be the most important.



Figure 1. Adult filbertworm (photo courtesy of USDA Forest Service).

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Filbertworm and filbert weevil

Filbertworm and filbert weevil larvae feed on nut kernels and can cause between 20 and 50 percent damage if untreated. Both species cause similar damage (Figure 2). Infested nuts have holes in the shell, and the kernels are damaged by feeding and contaminated with feces.

Filbertworm and filbert weevil populations also infest several oak species and wild hazelnut stands. These populations can migrate to nearby hazelnut orchards and cause crop loss.

Identification

Filbertworm larvae are creamy to pink and approximately $\frac{1}{2}$ inch long (Figure 3). They have three pairs of true legs and additional pairs of prolegs toward the posterior portion of the body. After emerging from nuts, larvae defend themselves by regurgitating a red excretion and moving relatively fast.

Filbert weevil larvae are similar in length, but are grublike and creamy colored (Figure 3). Larvae are rather inactive when touched and curl in a c-shape. They have only three pairs of true legs.

Life cycle

The majority of adult **filbertworm** moths (Figure 1) emerge from late June to early October. They lay eggs near nut clusters and on leaves close to developing husks. After hatching, the minute larvae search for a nut and feed on the part of the husk that adheres to the nut until they locate a soft spot through which they can enter the nut. They may feed in the nut for several months before reaching maturity.

The mature larvae exit the nut by chewing through the side of the shell or enlarging the entrance hole. They drop to the soil beneath the tree and overwinter in organic material and soil to a depth of 2 inches.

Damage may occur as early as late May, when nut development begins. Damaged nuts often drop early.



Figure 2. Hazelnuts with clearly visible emergence holes made by filbertworm or filbert weevil.

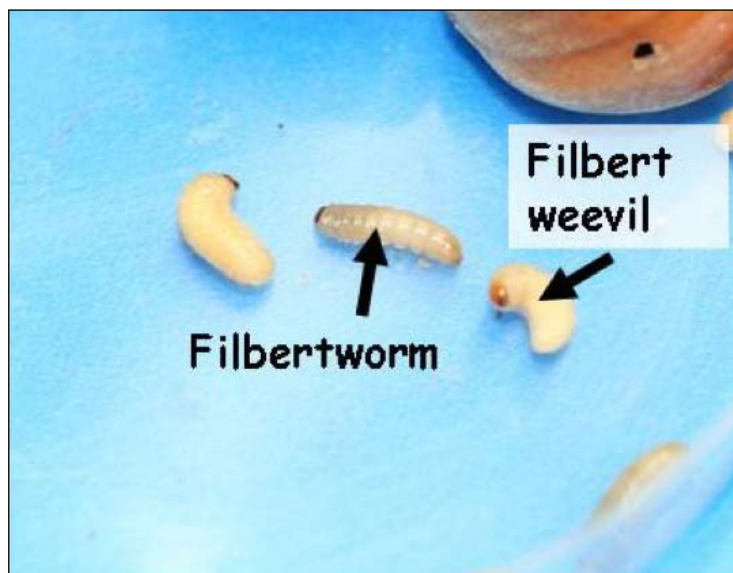


Figure 3. Filbert weevil larvae (left and right) are more grub-shaped and creamy colored than filbertworm (center), which has three pairs of true legs, prolegs, and a darker body color.

Little has been learned about the biology of the **filbert weevil** since initial work was done by Dohanian in 1944. Adult weevils cut small holes in the nut shell and lay eggs in the nut during the early part of the season (May to June). Larvae hatch and feed on the kernel until they reach maturity in August. Damage is not observed until the end of the growing season.

After nuts drop, larvae exit and burrow into the soil to a depth of 3 to 6 inches. Adults emerge in the spring after hibernating as larvae in the soil for up to 3 years.

Pest status

Studies by Dohanian indicated that roughly 50 percent of infested nuts are damaged by filbert weevil and 50 percent by filbertworm. Infested hazelnuts collected in cultivated and abandoned orchards in 2006, however, showed 91 percent filbertworm and 9 percent filbert weevil. Collections of nuts in several orchards during 2007 did not reveal filbert weevil infestations.

Filbert aphid and hazelnut aphid

Filbert aphid and hazelnut aphid feed on husks and leaves. Aphid feeding drains nutrients from leaves and may reduce photosynthesis due to the growth of black sooty mold on the aphid's honeydew excretions. It is believed that reduced photosynthesis may result in substantial crop losses in the long term. It is unknown whether large populations of aphids feeding on husks can cause premature nut drop and lower nut quality.

Identification

Often both species are found on a leaf, which makes it easier to distinguish them (Figure 4).

Filbert aphid has smaller cornicles, which often are not visible to the naked eye. Cornicles look like tail pipes and are used to excrete honeydew. The antennae and legs are the same color as the body.

The **hazelnut aphid**, on the other hand, is often difficult to see, as it is greenish and blends in with plant tissue. The cornicles of this species are longer and more visible. The antennae and legs are darker than the body.

Pest status

Before the mid-1980s, the **filbert aphid** was considered the only important aphid pest of hazelnuts in Oregon. Aphids were controlled with several sprays of organophosphates each season.

The management of filbert aphid changed after the introduction of a cool-climate French strain of the braconid parasitoid *Trioxys pallidus* between 1984 and 1986. This parasitoid wasp spread rapidly and became established as a consistent control agent.

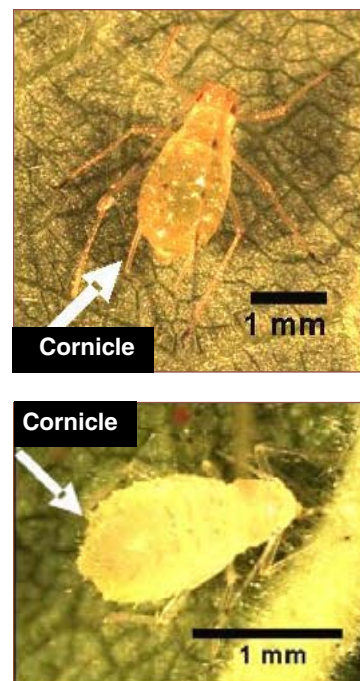


Figure 4. Hazelnut aphid (top) and filbert aphid (bottom).

The **hazelnut aphid**, a newly invasive species, was first reported by the Oregon Invasive Species Council in October 2003 on hazelnut trees in the northern Willamette Valley. Recent collections of this aphid from various orchards and wild habitats show that this pest has spread rapidly into many hazelnut production areas. However, little is known about the status of this aphid in hazelnut orchards.

Several management changes have taken place since the initial release of *T. pallidus*. Large aphid populations on husks have been reported recently, leading to increased chemical control efforts by growers. Little is known about the underlying reasons for increased aphid activity in hazelnut orchards in the Pacific Northwest. Sampling was conducted in several orchards in the Willamette Valley during 2007, and large populations of both species of aphids were found on leaves. Husks were primarily populated by hazelnut aphid (Figure 5).

In addition, there have been several reports of poor biological control. Our data suggest that hazelnut aphid populations on husks showed low parasitism rates. Collections of mixed aphid species from different field sites during 2007 indicate parasitism of 15 percent ($n=15,819$) on leaves and 2.84 percent ($n=3404$) on husks. Other research has found parasitism rates between 11 and 28 percent, resulting in aphid population reductions of 26 to 48 percent.

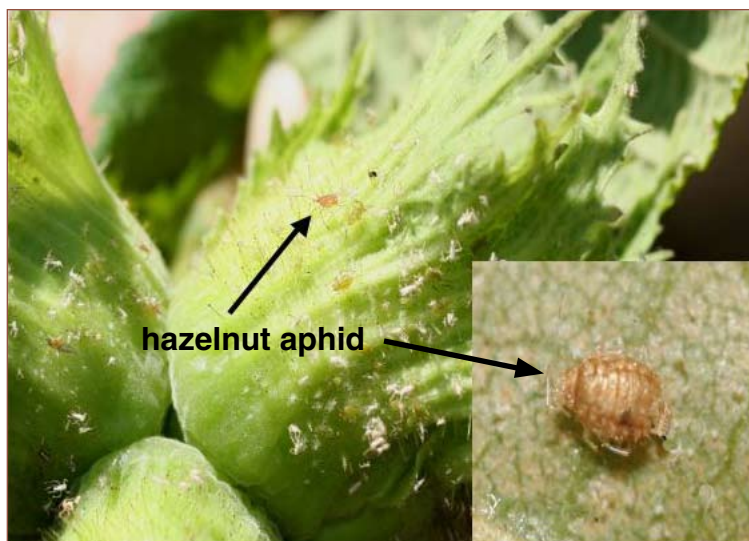


Figure 5. Hazelnut aphid feeding on husks and parasitized aphid mummy (bottom right).

Conclusions

Hazelnut producers are continuously confronted with changes in the insect pest and disease complex. In order to continue the production of superior quality hazelnuts and remain profitable, producers need to be aware of the specific pest complex in their production units.

Initial survey work in hazelnut orchards indicates that the focus should be on monitoring and on alternative and integrated pest control. “Forgotten pests” such as filbert weevil and hazelnut aphid may be important. Producers need to be aware of these pests and be willing to use newly available, environmentally safe control methods. Examples of such options include entomopathogenic nematodes (nematodes that prey on insects), mating disruption, and organic compounds. Further work needs to be done on the biology and ecology of filbert weevil and hazelnut aphid.

The newly invasive hazelnut aphid may change the current aphid management protocol in hazelnut orchards. Future work on aphids may include the preservation of natural enemies of filbert aphid and the importation of new natural enemies for hazelnut aphid.

For more information

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