Detecting and Controlling Eastern Filbert Blight

Jay W. Pscheidt

CONTENTS

Figure 1. The stroma forms in July and August.

Credit: © Oregon State University

Introduction

Eastern filbert blight is a fungal disease that has infected many hazelnut orchards in Oregon and Washington. Historically, the pathogen had been restricted to the Great Lakes and Appalachian regions of North America. But in 1970, EFB was found in a hazelnut orchard near Vancouver, Washington, and since then it has spread into all production areas of Oregon and Washington. All hazelnut trees, including commercial orchards, backyard trees and escaped seedlings, are at risk of contracting this disease. This includes resistant trees with the Gasaway R-gene.

Oregon State University

EC 1499 | Published May 1999, Reviewed 2023

View online: https://extension.oregonstate.edu/catalog/pub/ec1499

Symptoms and signs

Eastern filbert blight is difficult to find by casual inspection. Usually, the fungus has been in an orchard for four to five years before it's first detected. Symptoms can occur on any portion of the tree, from the top of the canopy to the main scaffold limbs. However, the first cankers usually are located on small branches near the top of the canopy.

Elongated, raised bumps begin to form on infected twigs and branches during June. When the bark is removed, the cambium below these bumps is chocolate brown.

These bumps continue to expand until the fungus breaks through the outer bark in July and August (Figure 1). A white oval- to football-shaped fungal structure called a stroma then can be seen. As the stroma continues to mature from August to October, it turns black and is raised about one-eighth inch above the branch (Figure 2). Stromata occur in relatively straight rows lengthwise along the branch. Cankers can occur on branches of any size and on trunks.

Infected branches may appear to die suddenly during July to September. Dead leaves may remain attached to the branch (Figure 3).

Eastern filbert blight may be confused with Eutypella cerviculata, which produces smaller, black, fruiting bodies on dead branches. This fungus produces diagnostic black rings under the bark, which can be detected using a pocket knife. Cicada egglaying scars also can look somewhat like EFB, but they are not black and they look stitched.

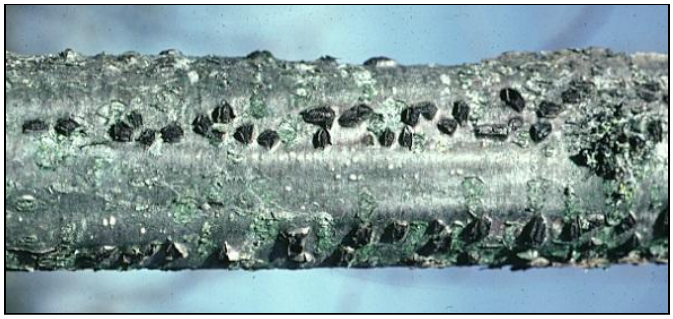

Figure 2. As the stromata mature, they turn black and is raised about one-eighth inch above the branch.

Credit: © Oregon State University

Figure 3. Once girdled, it's easy to see dead leaves on infected branches.

Credit: © Oregon State University

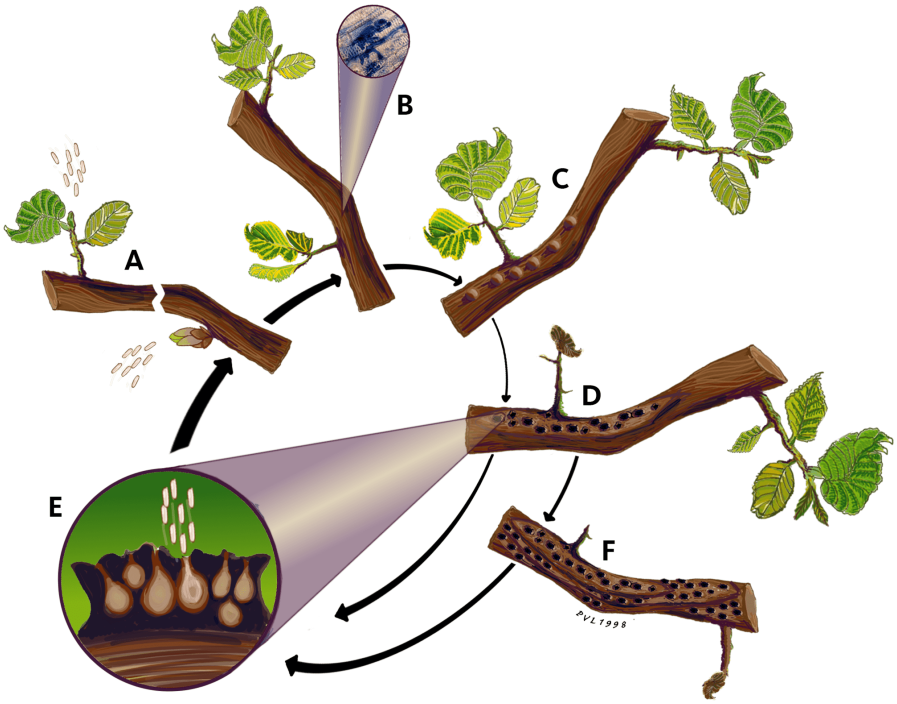

Figure 4. Life cycle of eastern filbert blight.

- **A. Spores infect breaking buds and young shoot tips.**
- **B. 15-month latent period.**
- **C. Stromata first visible during the spring and early summer.**
- **D. Stromata with mature spores in early fall.**
- **E. Spores actively discharged during rainy periods.**
- **F. Expansion of perennial cankers.**

Credit: © Oregon State University

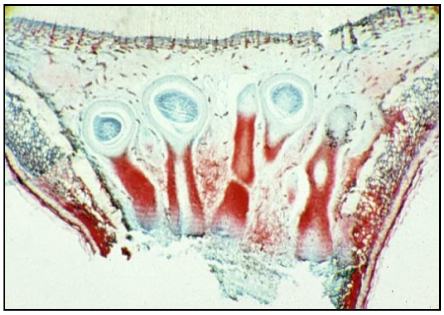

Figure 5. In this enlarged cross-section, you can see the flask-shaped spore-bearing perithecia.

Credit: © Oregon State University

Disease cycle

The disease cycle (see Figure 4) for eastern filbert blight requires two or more years, including a 12- to 15-month latent period when no visible symptoms can be detected (Figure 4B). In the spring, spores are ejected forcibly (squirted) into the wind and rain. These spores then spread to young, developing shoots. Infection occurs during wet weather from budbreak through shoot elongation (Figure 4A).

Spores penetrate immature epidermal cells just below the meristem where cell elongation occurs. Neither wounds nor natural openings on hazelnut trees have been shown to be sites of entry for this fungus. The fungus is not spread via the nuts.

The stromata begin to develop during the second summer after infection (Figure 4C). Embedded within the black stroma are 50 to 100 flask-shaped perithecia (Figure 5). About 5,000 sacs (asci), each with eight spores (ascospores), are produced within each perithecium.

The ascospores begin to mature in the fall as the rainy season begins in the Pacific Northwest (Figure 4D). Several hours of continuous rain are needed for release of ascospores (Figure 4E). Stromata continue to sporulate, even after

the diseased branch has been removed from the tree, until the canker has dried out completely.

Ascospores are ejected into the air all winter long but cannot infect hazelnuts until the spring.

New stromata develop each year as the canker continues to expand around and along the branch (Figure 4F). Cankers enlarge along the branch each year, anywhere from a few inches on small branches to 3 feet on larger branches of susceptible trees. Branch dieback occurs when expanding cankers girdle branches and limbs. Numerous new infections also occur each succeeding spring.

Vigor and health of an infected orchard decline slowly at first. Most of the canopy dies on susceptible trees within seven to 15 years after the first infection, though suckers may be produced for many years.

Tree productivity also declines slowly at first, but then declines sharply after three to 10 years, depending on the cultivar. The orchard becomes economically unproductive because the more susceptible pollinizers or main cultivars die out, resulting in poor nut set.

Cultivar susceptibility

The pollinizer ‘Daviana’ and the cultivar ‘Ennis’ are highly susceptible to this disease. Most wild seedlings also are susceptible, since they may have ‘Daviana’ as a parent. ‘Barcelona,’ ‘Butler,’ ‘Casina,’ and ‘Du Chilly’ are moderately susceptible. ‘Hall’s Giant,’ ‘Lewis,’ and ‘Willamette’ are more resistant than Barcelona, but can become infected through repeated exposure to EFB. Contorted ornamental hazelnuts and the Turkish hazel (*C. colurna*) can also be infected. The native wild hazel, *Corylus cornuta* var. *californica*, does not appear to be susceptible to this disease.

Resistant cultivars with the Gasaway R-gene have become susceptible to EFB. Symptoms are comparable to infections that are familiar from highly susceptible cultivars like 'Ennis'. These cultivars include 'Jefferson', 'Theta', 'Dorris', 'Yamhill', 'McDonald' and 'Wepster'.

Control methods

An integrated approach using several cultural and chemical techniques is needed to control this disease adequately. Scouting for cankers is very useful since early detection aids overall control efforts.

Cultural

1. Remove or destroy escaped seedlings and trees beyond the perimeter of your orchard.
2. Remove infected branches at least 1 to 3 feet below the cankered area and burn or chip them before bud break in the spring. Severely infected trees should be removed.
3. Start sucker control early in the season.
4. Growers should inspect orchards once in late summer and again in the dormant season.

Chemical

Four applications are needed to protect trees adequately. Make applications starting at budswell to budbreak, and continue at two-week intervals until early May. Thorough coverage of all branches is essential. Each row should be sprayed. Since EFB kills trees slowly, the yield benefits obtained from fungicidal protection are not realized for three to six years after application.

Products that contain Fungicide Resistance Action Committee (FRAC) codes 3, 11, M1, M3 and M5 alone or in combination have been shown to be effective against this disease. Check the PNW Plant Disease Management Handbook (https://extension.oregonstate.edu/catalog/pub/plant-2022-pnw-plant-disease-management-handbook) for current information on products registered for this disease.

Related publications

Eastern Filbert Blight

(https://extension.oregonstate.edu/video/eastern-filbert-blight)

A fungal canker disease of hazelnut that threatens production in Oregon but can be managed through pruning, fungicides and resistant cultivars.

Jay W. Pscheidt | Mar 2018 | VIDEO

About the author

Jay W. Pscheidt (https://bpp.oregonstate.edu/users/jay-pscheidt)

Professor and Statewide Extension Plant Pathology Specialist