

# Eastern Filbert Blight of Hazelnut

March 2021

Eastern filbert blight (EFB) on hazelnut is caused by the fungus *Anisogramma anomala*. Vigour and productivity decline significantly when trees are infected with this fungus, resulting in an economically unproductive orchard. EFB has become a common and serious disease in hazelnut orchards throughout the Pacific North-western United States and southern parts of British Columbia.

## Spread

In spring, spores are released from mature cankers of infected hazelnut trees. Spores are spread by rain and splashing water droplets driven by wind. Young and developing shoots, during bud-break to shoot elongation, are highly susceptible to new infection. Newly infected trees do not show any symptoms for 12-15 months (latent period). The second summer following infection, the fungus begins to produce dark-brown to black spore-producing structures called “stroma” within cankers on infected stems (an important diagnostic feature in field and laboratory). The mature stroma begin releasing spores the following spring. The fungus continues to produce new stroma and releases spores as the canker expands each year.

## Symptoms

Infected trees may show sudden dieback of twigs and branches in summer months. When closely observed, elongated, sunken cankers, expanding lengthwise on branches can be seen. Cankers are infected areas of sunken, dying tissues formed along a branch. Stroma are produced within cankers in relatively straight rows lengthwise along the branch (Figure. 1). Cankers expand from year to year and girdle the branch, resulting in branch dieback. The disease also resembles another fungal disease caused by *Eutypella cerviculata*. *Eutypella* produces similar spore producing structures; however, they are smaller in size and produced on dead wood.



Figure 1. Dark brown to black stroma, bearing spores, are produced on infected branches in a uniform manner by the fungus *Anisogramma anomala*.

## Disease Control

**Monitoring:** As EFB continues to spread within and around commercial orchards, all orchards must be scouted intensively. Control of EFB will be much more effective if the disease is detected early. Scouting should be done twice a year. In late summer, look for dying branches (dieback). In the dormant season (late fall and winter), look for the cankers and stroma; mostly found near the top of the canopy. Suspicious samples should be submitted to the [Ministry of Agriculture Plant Health Laboratory](#) for disease confirmation.

**Prevention:** Prune out any diseased branches with cankers about 2-3 feet below the site of infection and burn diseased wood. Alternatively, infected wood can be chipped, covered with plastic film and allowed to compost. This must be done before bud-break in spring. Because initial infection is often found in the top of trees, it is best to use a “cherry picker” to gain better viewing during scouting for disease and access for pruning out infections.

**Chemical control:** If EFB has been detected in your orchard or in the vicinity, fungicides are essential to help prevent new infections and slow down the progress of the disease. Since new growth in spring and early summer is highly susceptible to infection, spraying must begin soon after bud-break. In Oregon, 4 applications at 10-14 day intervals, from bud-break to new shoot growth, are considered necessary to provide adequate protection. In coastal B.C., the spray period will generally be from late March to early May. The fungicides registered for EFB (Table 1) can only protect young shoots from initial infection, i.e. they need to be applied before the fungal spores land on vulnerable young tissues so that germinating spores can be killed before they germinate and infect plant tissues. It is essential to set up the sprayer to obtain a good coverage of all new growth. Given the density and height of the orchards, this can be challenging even with the best air-blast sprayers. Because of EFB’s latent period, the effect of fungicides on disease control will only be evident several years after application.

**Table 1.** A summary of registered fungicides and label information. Please refer to Health Canada’s [Pest Management Regulatory Agency](#) website for fungicide label information.

Product	Active ingredient	Chemical or Biological group	Mode of action	PEI <sup>1</sup>	PHI <sup>2</sup> days	Application guidelines
Bravo	chlorothalonil	M	protectant (non-systemic)	3 days for orchard activities; 20 days for scouting; 11 days for transplanting	120	Apply preventatively from bud-break to shoot elongation at 20 days intervals. Do not exceed 3 applications per season.
Cueva	copper octanoate	M	protectant & curative (non-systemic)	12 hr	1	Apply preventatively at 5 to 10 days intervals. Do not exceed 3 applications per crop cycle.
Guardsman or Copper Spray	copper oxychloride	M	protectant & curative (non-systemic)	48 hr	2	Apply preventatively at 10 to 14 days intervals. Do not exceed 3 applications per crop cycle.

Quash	metconazole	3	protectant & curative (locally systemic)	12 hr	25	Apply preventatively from bud-break, at 14 days intervals. Do not exceed 4 applications per crop cycle.
Cevya	mefentrifluconazole	3	protectant & curative (locally systemic)	12 hr	14	Apply preventatively before onset of disease. Do not exceed 1.125 L/ha per year.
Ridomil	metalaxyl	4	protectant & curative (systemic)		30	Apply preventatively in the spring or at first sign of symptoms. For new plantings, apply after 2 weeks of planting or in the spring at bud-break to green-growth or in the fall soon after harvest. Do not exceed 3 applications
Fontelis	penthiopyrad	7	protectant & curative (locally systemic)	12 hr		Apply preventatively prior to disease development and continue a 7 to 14 days intervals.
Flint	trifloxystrobin	11	protectant & curative (locally systemic)	12 hr	60	Apply preventatively from bud-break, at 14 days intervals. Do not exceed 4 applications per crop cycle.
Quadris	azoxystrobin	11	protectant & curative (locally systemic)	12 hr	45	Apply preventatively from bud- break, at 7 to 10 days intervals. Do not exceed 4 applications per crop cycle.
MustGrow	Mustard ( <i>Brassica juncea</i> ) seed meal	Bio	suppressive	24 hr		Apply 11.2-22.4 kg / 100 m <sup>2</sup> , 10 to 14 days prior to seeding or transplanting. Do not apply when soil temperature is below 10°C.

<sup>1</sup>REI - re-entry interval

<sup>2</sup>PHI - pre-harvest interval

**Notes:**

Use Bravo and Cueva or Guardsman preventatively in young and established orchards that have not been exposed to or detected with EFB (low risk orchards).

Use Bravo and Cueva or Guardsman in rotation with Flint or Quadris, Quash or Cevya, and Fontelis for orchards infected with EFB.

Flint and Quadris, considered high risk, are in the same fungicide group (strobilurin), and Quash or Cevya, considered medium risk, are in the same fungicide group (conazoles) for resistance development by the pathogen if used repeatedly. Therefore, these two groups of fungicides should be used in rotation with Group M fungicides to prevent resistance development and prolong their longevity.

Quadris can cause damage to many varieties of apple. Do not allow drift onto nearby apple plantings.

### **For further information**

[Canadian Food Inspection Agency \(CFIA\) Phytosanitary Requirements](#)

[Disease cycle and symptoms can be seen on the Oregon Eastern Filbert Blight Help Page](#)

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