HAZELNUT (*Corylus avellana* 'Ennis', 'Jefferson', 'McDonald')
Eastern Filbert Blight; *Anisogramma anomala*

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Response of resistant cultivars to various doses of *Anisogramma anomala*, 2019 - 2020.

Jefferson hazelnut trees planted next to orchards heavily infected with eastern filbert blight have developed cankers at low rates. The cultivars 'Ennis', 'Jefferson' and 'McDonald' were inoculated with various doses of *A. anomala* ascospores to see if high doses were more infective than lower doses. These cultivars were propagated by tie-off layering at the Botany and Plant Pathology Field Laboratory, Corvallis, OR. Rooted suckers were cut in Dec 2018 and healed into sawdust prior to potting. All trees were potted into 1 gal pots and all cultivars were placed in a warm (60 to 70° F) greenhouse (for 2 to 4 weeks) to force bud growth.

Inoculum was prepared from frozen cankers that were warmed under a stream of tap water, then stroma were excised, crushed and ascospore ooze was pipetted into a small watch glass. The concentration of ascospores was determined with a hemocytometer and adjusted accordingly through dilution with sterile distilled water. Doses at or above 10^7 ascospores per ml were extremely viscous.

Trees at bud break and/or early shoot growth were selected periodically from Mar to April 2019 for inoculation (Table 1). All cultivars were inoculated at concentrations of 0, 10^5, 10^6, and 10^7 ascospores per ml. Ennis was also inoculated at 10^4 ascospores per ml. A total of 10 trees were inoculated at each concentration on each of 6 inoculation dates for a total of 60 inoculated trees for each cultivar at each concentration. Ascospores were sprayed onto 4 to 5 open buds and/or shoots using a hand held pump-style sprayer. Inoculation at a dose of $\geq 10^7$ ascospores per ml was done with an eyedropper due to the viscous and granular nature of the preparation. Individual trees were then placed in a mist chamber with intermittent misting for 10 sec out of every 15 min during daylight hours for 72 hours then held in a greenhouse at 50°F for several weeks. Trees were then held in greenhouse facilities at outside ambient air temperatures for 1.5 years. Trees were watered and fertilized as needed during this time. The number of trees with EFB cankers on the main tree trunk and total length of these cankers/tree was determined 25 to 27 August 2020.

'Ennis' trees became infected when the concentration was at least 10^4 ascospores per ml and the percentage of trees infected increased as the concentration increased to 10^6 but declined at 10^7 ascospores per ml (Figure 1). 'Jefferson' trees became infected only when the concentration was at least 10^7 ascospores per ml. In contrast, 'McDonald' trees became infected when the concentration was at least 10^6 ascospores per ml. The highly susceptible 'Ennis' cultivar had more trees infected and longer cankers (Table 2) than either of the resistant cultivars. At similar doses the cultivar McDonald is slightly more susceptible to EFB than Jefferson. In general, the higher the dose of ascospores the more trees become infected. The highest dose may not have diluted an anti-germination factor, found in perithecia (Stone), enough to allow all spores to germinate. Any new orchards planted next to or downwind of a heavily diseased orchard should be protected with fungicide during bud break and early shoot growth.

Table 1. Date of cultivar inoculation in 2019.

Inoculation Replication	Ennis*	Jefferson**	McDonald
1	Mar 21	Mar 21	Apr 5
2	Mar 29	Mar 29	Apr 12
3	Apr 5	Apr 5	Apr 12
4	Apr 12	Apr 12	Apr 19
5	Apr 19	Apr 19	Apr 19
6	Apr 20	Apr 20	Apr 26

*10 trees were inoculated each date at each of 5 concentrations.
**10 trees were inoculated each date at each of 4 concentrations.

Figure 1. Dose response curve for 'Ennis', 'Jefferson' and 'McDonald' inoculated with various concentrations of *A. anomala* ascospores.

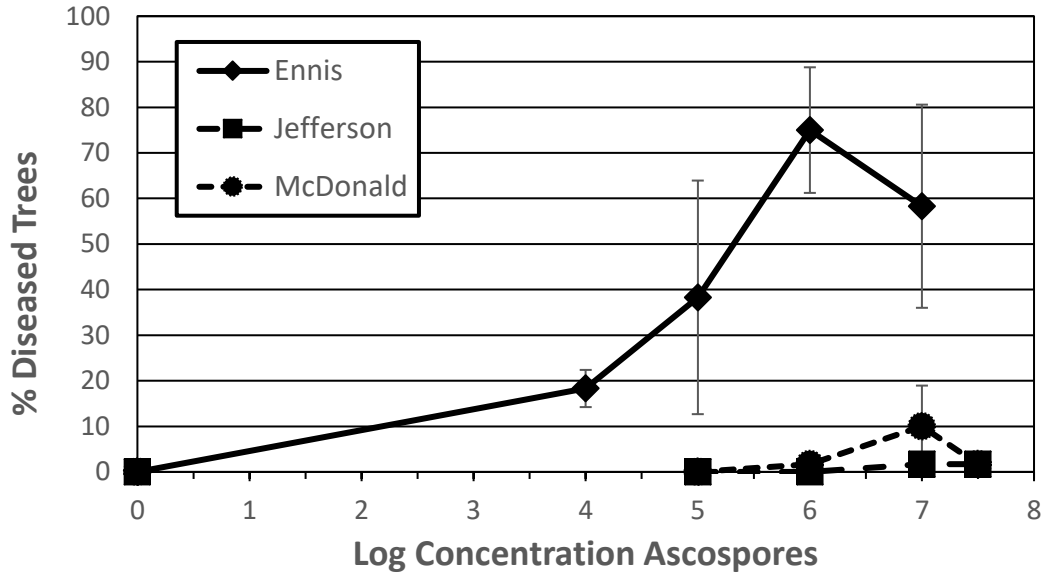

Table 2. Average canker length (cm) for trees with cankers*.

Cultivar	Concentration of Ascospores							Ave canker length (cm)
	10^0	10^2	10^4	10^5	10^6	10^7	$10^{7.5}$	
Ennis	0	---	23.2 n=11	19.5 n=23	16.6 n=45	14.0 n=35	---	18.3
Jefferson	0	---	---	0	0	7 n=1	5 n=1	6.0
McDonald	0	---	---	0	8 n=1	6.3 n=6	6 n=1	6.8

*Too few cankers developed for a statistical analysis of the data.