

HAZELNUT (*Corylus avellana* ‘Ennis’ and ‘Butler’)
Eastern Filbert Blight; *Anisogramma anomala*

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Whole orchard evaluation of pruning strategies for management of eastern filbert blight, 2018-19.

The goal of this trial is to evaluate pruning strategies for management of EFB on heavily infected, mature, commercial sized hazelnut trees. This is a redesign of a 12-year randomized complete block fungicide trial within a 1-acre orchard of Ennis hazelnuts with Butler pollenizers (every 3rd tree in every 3rd row) planted on a final 20 x 20 foot spacing in 1986 at the Botany and Plant Pathology Field Laboratory, Corvallis, OR. Growers wanted to know if cutting heavily infected trees to the ground and re-growing from sucker shoots would be an effective management strategy. There were also questions about the value of pruning heavily diseased trees. We hypothesize that the detailed pruned blocks will continue to decline in yield while non-pruned blocks could have a slight increase in yield for a period before declining rapidly. We also predict that severely cut and regenerated trees will take several years to bring back into production.

Treatments were arranged in a randomized complete block design. Each treatment consisted of 4 blocks (replicates) containing a group of 9 trees, (8 Ennis and 1 Butler). Each set of 9 trees was composed of 3 consecutive trees in a row and in 3 consecutive rows. The former non-treated trees were cut one foot above the ground on 15 Feb 2016. The former Bravo (chlorothalonil) only blocks were left non-pruned to let the disease take its natural course. The former Best Management Program (BMP) blocks were detailed pruned from 7 to 11 Jan cutting most EFB cankers 1 to 3 feet below symptomatic tissue. The number and length of cankers removed was not determined. The entire 1 acre block of trees was treated with an application of Echo 90 DF (3.25 lb/A) on 26 Mar (bud break), then Tilt EC (8 fl oz/A) plus Equus DF (1.8 lb/A) on 18 Apr, then Cabrio EG (5 oz/A) plus Equus DF (1.8 lb/A) on 2 May. A 4th application was not needed due to dry weather. Fungicides were applied using a Rear’s air blast sprayer at a rate of 100 gal water/A. Suckers were sprayed with Makaze (32 fl oz/A) plus Rely 280 (1.8 fl oz/A) on 3 July and followed up with mechanical removal on 20 Aug. Weeds were sprayed with Makaze (32 fl oz/A) on 18 Mar, then Rely 280 (52 fl oz/A) on 1 May then Makaze (32 fl oz/A) plus Rely 280 (52 fl oz/A) on 9 Aug. Asana XL (16 fl oz/A) was applied on 3 Jul for filbert worm management. There was no supplemental irrigation applied this year. The orchard was fertilized with 46-0-0 at 30 lb/A on 14 May. The orchard floor was “floated” on 27 Aug and 16 Sep to remove dead weeds, blanks and twigs. Plots were harvested on 1 to 2 Oct by raking nuts into windrows, then placed in wooden tote boxes using a Flory Hazelnut Harvester. The harvester was designed to allow soil and dirt to fall between conveyor belt chains and to blow or suck away leaves, husks and some blank nuts. Nuts were then conveyed into large wooden bins and weighed using a Vishay Celtron model Digital Summit 3000 scale.

Rainfall for the growing season (Oct 2018 to Sep 2019) was approximately 5 inches below the 115 yr average but temperatures were at the average of 59.2°F. March precipitation was 3 in below normal while April was 3 in above normal which led to localized flooding from April 9 to 16 through the middle of the orchard. Trees appeared water stressed with rolled leaves through most of the summer.

The severely cut trees produced many sucker shoots in 2016 where 4 to 6 were selected during the 2016-2017 dormant season for continued growth. Although a handful of nuts were produced in 2017 on these shoots they were not harvested. Catkins were observed to form on shoot re-growth in the fall of 2017. EFB cankers were observed in these blocks in 2018 and removed. Two of the severely pruned blocks did not have EFB cankers while the other two blocks had 4 and 7 one year old cankers, respectively.

Field run nut weight was 11.1, 40.7 and 37.0 lb/tree for the severely pruned, detailed pruned and non-pruned treatments, respectively. Yield data, however, were normalized for moisture content to make year to year comparisons. Average dry weight yield per tree increased for severely pruned trees but decreased and was not significantly different between the non-pruned and detailed pruned treatments (Table 1 and Figure 1). The change in yield from 2018 to 2019 was also not significantly different between the non-pruned and

detailed pruned treatments. Although there was no significant difference in yield the non-pruned trees were showing a lot more twig and branch dieback. Twigs and small branches were a minor but noticeable problem during harvest of the non-pruned plots.

Table 1. Pruning treatments and clean dry weight yield for 2018 and 2019.

Treatment	Ave Yield/Tree 2018* (lbs)	Ave Yield/Tree 2019* (lbs)	Ave. change from 18 to 19* (%)
Severely pruned.....	2.3 b	6.8 b	227 a
Detailed pruned.....	32.1 a	25.0 a	-27 b
Non-pruned.....	29.8 a	22.8 a	-30 b

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$).

Figure 1. Clean and dry weight yield per tree from 2012 to 2019. All trees were treated with the same fungicide program in 2016, 2017, 2018 and 2019. The former non-treated trees (square symbols) were severely cut one foot above the ground in Feb 2016. The former Bravo only blocks (diamond symbols before 2016, circle symbols after) were left non-pruned to let the disease take its natural course. The former Best Management Program blocks (diamond symbols before and after 2016) were detailedly pruned Feb 2016, Jan 2017, Jan 2018 and Jan 2019 cutting most EFB cankers 1 to 3 feet below symptomatic tissue.

