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

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Evaluation of fungicides for control of eastern filbert blight, 2002 - 2003.

Healthy two-year-old 'Ennis' hazelnut trees were planted on 14 Jan 02 at the North Willamette Research and Extension Center, Aurora, OR. Limbs with EFB cankers were cut from a heavily diseased 'Ennis' orchard near Keiser, OR on 19 and 30 Nov 02. A total of 420 cankered limbs were placed on top of chicken wire supported by a 6 wire horizontal trellis above test trees on 28 Feb 02. Treatments were arranged in a randomized complete block design. Each treatment consisted of 6 single tree replicates. Fungicide suspensions were applied on two sides of the tree to runoff with a backpack sprayer equipped with a hand wand. Approximately 0.7 gal of a spray suspension was used per 6 trees. Fungicide treatments were applied on 26 Mar 02 (bud break), 12 Apr 02, 25 Apr 02, and 8 May 02. Roundup at 3 gal/100 gal water was used between trees to control weeds on 29 Apr 02 and 8 Aug 02. Trees were fertilized with a 16-16-16 at a rate of 2 lb/6 trees on 9 Apr 02. Trees were also painted with at 50% solution of white latex paint on 5 Jun 02 on the southwest side of the trunk to prevent summer sunburn. Supplemental irrigation was provided as needed during the 2002 and 2003 growing seasons. The number of EFB cankers and total length of all cankers/tree was determined on 16 July 03.

An identical set of trees was also established in the same area and were maintained in the same way, however, different fungicide treatments were applied to these trees. Only 3 applications of fungicides were made to this set during the 2002 spring season. Fungicide treatments were applied on 26 Mar 02 (bud break), 12 Apr 02, and 25 Apr 02.

A PVC trough spore trap was placed in the site on 28 Feb 02. The spore trap consisted of a 2.3 meter long 1/2 inch PVC pipe split in half lengthwise, supported by 2 metal posts, and angled at 20 degrees to drain into a covered 16 liter collection bucket. Each bucket contained 200 ml of 50% copper sulfate v/v as a spore preservative and germination inhibitor. Rainwater from the traps was collected on 26 Mar 02, 12 and 25 Apr 02, 8 and 22 May 02 by swirling the contents and pouring into a volumetric cylinder to measure the total volume of rainwater collected. Approximately 500 ml of the rainwater was collected for laboratory analysis and the copper sulfate solution was replenished after each collection. The rainwater was filtered first through a 20 um sieve then through a cellulose nitrate filter with 0.8 um pore size. This filter paper was placed on a microscope slide, stained with 0.05% (v/v) trypan blue in lactoglycerine. The number of ascospores on filters was then determined using a light microscope at 400X and used to calculate the number of ascospores collected per M^2 of trap surface. Rainfall during the spore trapping periods were as follows: 6.59 in from 28 Feb 02 to 26 Mar 02, 0.66 in from 26 Mar 02 to 12 Apr 02, 1.49 in from 12 Apr 02 to 25 Apr 02, 0.37 in from 25 Apr 02 to 8 May 02 and 0.59 in from 8 May 02 to 22 May 02.

Spore counts were lower than the previous year, especially during late April and into May (Fig 1). Rainfall was also below normal during the spring of 2002. Trees treated with Quintec, Messenger or JMS Stylet Oil alone had just as many cankers as trees nontreated with fungicides (Table 1). All other treatments resulted in significantly fewer cankers per tree. All trees treated with any DMI (Orbit, Indar, Procure or Elite) or storbilurin fungicide (Flint or Pristine) had levels of EFB that were not significantly different from trees treated with Bravo. Trees treated with Captan also had levels of EFB that were not significantly different from trees treated with Bravo. The number of cankers on trees treated with any rate or formulation of Procure were not significantly different from one another. The addition of JMS stylet oil did not improve the efficacy of Elite. All fungicide treatments applied only three times resulted in significantly fewer EFB cankers than on nontreated trees (Table 2). Trees treated 3 times with Orbit alone, a tank mix of Elite plus Flint (middle rate) or Flint alternated with Procure did not develop any EFB cankers. All other fungicide treatments, however, resulted in a similar number of cankers except on trees treated with Bravo then the high rate of Abound.

Table 1. EFB cankers on trees treated with 4 applications of fungicides.

Treatment and Rate/100 gal water	Ave Number of Cankers/Tree*		Total Canker Length/Tree* (cm)	
Nontreated ……...……...…	2.3	a	34.2	a
Bravo Weather Stik at 32 fl oz……	0.3	bc	2.3	d
Captan 50 WP at 4 lb……	0.2	c	0.8	d
Orbit at 2.5 fl oz ……..	0.3	bc	6.1	cd
Indar at 1 oz plus Latron B-1956 at 8 fl oz……	0.7	bc	11.7	bcd
Procure 50 WS at 4 oz……	0.7	bc	5.5	cd
Procure 50 WS at 6 oz……	0.5	bc	4.7	cd
Procure 50 WS at 8 oz……	0.2	c	2.3	d
Procure 4 SC at 4 fl oz……..……	0.5	bc	8.0	bcd
Elite 45 DF at 2 oz…….……	0.7	bc	13.1	bcd
Elite 45 DF at 2 oz plus JMS Stylet Oil at 1 gal ……..…	0.3	bc	5.5	cd
JMS Stylet Oil at 1 gal…….	2.2	ab	32.6	abc
Flint 50 WG at 1 oz ……..	0.2	c	3.2	cd
Pristine (BAS 516) 0.15 lb A……..	0.3	bc	6.4	cd
Messenger at 9 oz ……	1.2	ab	22.0	ab
Quintec at 6 fl oz……	2.8	a	41.3	a

* Analysis of variance is based on log10 (x+1) transformation. Values presented are detransformed means. Means followed by the same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

Table 2. EFB cankers on trees treated with 3 applications of fungicides.

Treatment and Rate/100 gal water	Application Timing**	Ave Number of Cankers/Tree*		Total Canker Length/Tree* (cm)	
Nontreated ……...……...…	None	2.1	a	32.0	a
Bravo Weather Stik at 32 fl oz……	All	0.1	bc	0.7	c
Abound 2.08 F at 3 fl oz……..……	All	0.1	bc	1.8	bc
Orbit 2.5 fl oz ……..	All	0.0	c	0.0	c
Elite 45 DF at 2 oz…….……	All	0.1	bc	2.9	bc
Flint 50 WG at 1 oz ……..	All	0.1	bc	1.6	bc
Elite 45 DF at 0.77 oz plus Flint 50 WG at 0.67 oz ……..…	All	0.4	bc	6.7	bc
Elite 45 DF at 0.97 oz plus Flint 50 WG at 0.87 oz ……..…	All	0.0	c	0.0	c
Elite 45 DF at 1.17 oz plus Flint 50 WG at 1.03 oz ……..…	All	0.1	bc	1.1	bc
Flint 50 WG at 1 oz then	A				
Procure 50 WS at 4 oz then	B				
Flint 50 WG at 1 oz …….…….	C	0.0	c	0.0	c
Bravo Weather Stik at 32 fl oz then	A				
Procure 50 WS at 4 oz ……..…	B and C	0.1	bc	2.5	bc
Bravo Weather Stik at 32 fl oz then	A				
Elite 45 DF at 2 oz …….……..	B and C	0.4	bc	8.3	bc
Bravo Weather Stik at 32 fl oz then	A				
Abound 2.08 F at 12.3 fl oz ……	B and C	0.6	b	8.7	b
Bravo Weather Stik at 32 fl oz then	A				
Abound 2.08 F at 9.2 fl oz ……	B and C	0.0	c	0.0	c

* Analysis of variance is based on log10 (x+1) transformation. Values presented are detransformed means. Means followed by the same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

** Fungicide treatments were applied on A = 26 Mar 02 (bud break), B = 12 Apr 02, and C = 25 Apr 02.