

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

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Need for surfactants with fungicides for control of eastern filbert blight, 2009 - 2010.

Healthy appearing two-year-old 'Ennis' hazelnut trees were planted on 23 Jan 09 at the North Willamette Research and Extension Center, Aurora, OR. The planting was surrounded on all sides with trees or branches with symptoms of EFB but no cankers were placed above trees. Treatments were arranged in a randomized complete block design along with a nontreated set of trees. Each treatment consisted of 8 single tree replicates. Fungicides with and without surfactants were applied to trees from two directions until runoff using a Solo-Pump-Style backpack sprayer. Approximately 0.25 gal of a spray suspension was used per 8 trees. Fungicide treatments were applied on 26 Mar 09 (bud break), 7 and 21 Apr 09 and 5 May 09 for a total of 4 applications. Fungicides included Cabrio, Gem, Orbit, Procure and Quash. The traditional, nonionic surfactant Regulaid was used with Orbit, Procure and Quash. The organosilicone surfactant Silwett was used with Cabrio and Gem. A nontreated treatment was included for a complete block design. Sucker shoots were killed on trees using Rely (60 oz/A) on 18 May 09. Honcho (2 qt/100 gal) plus Goal Tender (3 oz/100 gal) was applied to control weeds between trees on 15 Apr 09 and 30 Apr 09. Honcho (2 qt/100 gal) alone was used on 18 May 09, 18 Jun 09 and 24 Aug 09 for weed control. Preen (6 lb/1,000 sq ft, with fertilizer 9-17-9) was used on 13 May 09 and 18 Jun 09. Trees were fertilized with 16-16-16 at a rate of 1 lb/8 trees on 28 May 09, 23 Jun 09 and 16 Apr 10. Supplemental irrigation was provided as needed during the 2009 growing season. Plant growth regulation effects on shoots and phytotoxicity were evaluated on 13 May 09 and 27 May 09 where 0 = no effect, 1 = slight effect that is not obvious, 2 = obvious darker green leaves and shortened internodes, 3 = Deep green leaves and shortened shoots but no necrosis, 4 = intense symptoms with marginal burning, leaf necrosis and/or possible dead shoots. The number of EFB cankers on the main tree trunk and total length of these cankers/tree was determined on 15 Jul 10. Data were analyzed both as a randomized complete block design and as a factorial trial with 2 factors (fungicide vs. fungicide plus surfactant).

There was a significant ANOVA (which included all treatments) indicating the number of cankers on nontreated trees (11.4 cankers) was significantly higher than the number found on fungicide treated trees (Table 1). Factorial analysis found no significant interaction between factors and that the addition of a surfactant significantly reduced the number of cankers that developed on trees (Table 2). Trees treated with Orbit alone or Orbit with Regulaid did not develop cankers. Factorial analysis without data from Orbit treated trees resulted in the same conclusion. Plant growth regulation (PGR) effects were obvious on Orbit treated trees as expected. Although the addition of surfactants slightly increased the PRG effect on Quash treated trees, in general, addition of a surfactant did not increase any phytotoxicity associated with these fungicides (Table 1).

Table 1. Cankers and growth regulation effects for nontreated and individual fungicide treatments.

Treatment and Rate/100 gal water	Ave Number of Cankers/Tree*		Total Canker Length/Tree* (cm)		Growth Regulation Effect and/or phytotoxicity**		
					13 May	27 May	
Nontreated	11.4	a	166.9	a	0.0	c	0.0
Cabrio 20 EG at 4.75 oz	0.6	bc	9.4	bcd	0.3	c	0.0
Cabrio 20 EG at 4.75 oz plus Silwet L-77 at 6.4 fl oz.....	0.3	bcd	2.3	cde	0.1	c	0.0
Gem 500 at 1.5 fl oz.....	0.4	bcd	4.5	cde	0.3	c	0.0
Gem 500 at 1.5 fl oz plus Silwet L-77 at 6.4 fl oz	0.0	d	0.0	e	0.0	c	0.0
Orbit 3.6 EC at 4 fl oz	0.0	d	0.0	e	2.5	a	0.0
Orbit 3.6 EC at 4 fl oz plus Regulaid at 1 pt	0.0	d	0.0	e	2.5	a	0.0
Procure 480 SC at 6 fl oz	0.9	b	15.0	b	0.0	c	0.0
Procure 480 SC at 6 fl oz plus Regulaid at 1 pt	0.8	bc	11.8	bcd	0.1	c	0.0
Quash 50 WDG at 4 oz	1.0	b	10.5	bc	0.0	c	0.0
Quash 50 WDG at 4 oz plus Regulaid at 1 pt	0.1	cd	3.0	de	0.6	b	0.0

* Analysis of variance is based on log₁₀ (x+1) transformation. Means followed by the same letter do not differ significantly based on Fisher's protected LSD (P=0.05). Means without letters did not differ significantly.

** Plant growth regulation effects of shoots where 0 = no effect, 1 = slight effect that is not obvious, 2 = obvious darker green leaves and shortened internodes, 3 = Deep green leaves and shortened shoots but no necrosis, 4 = intense symptoms with marginal burning, leaf necrosis and/or possible dead shoots.

Table 2. Cankers for pooled fungicide treatment data with or without surfactant (excluding nontreated trees).

Treatment	Ave Number of Cankers/Tree	Total Canker Length/Tree (cm)
Fungicide Alone	0.6	7.9
Fungicide plus Surfactant	0.2 *	3.4 *
Fungicide Alone**	0.7	9.8
Fungicide plus Surfactant**	0.3 *	4.3 *

* Means are significantly different based on Analysis of Variance (P=0.05).

** Orbit data removed as no cankers developed on these trees.