

APPLE (*Malus domestica* 'Fulford Gala')
 Fire blight; *Erwinia amylovora*
 Apple scab; *Venturia inaequalis*

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Test of coppers and biopesticides for the control of fire blight and apple scab on Gala apple, 2016.

Sixteen treatments were compared for blossom blight (fire blight) and apple scab control and fruit finish effects. The test was established on 15-yr-old 'Fulford Gala' trees in four randomized blocks using single-tree replications. Our goal was to select treatment days according to the protocol with an inoculation day to be the day before a relatively warm day (>60° F), which would be as favorable for natural infection as possible. Treatments were applied dilute to run-off with a high pressure motorized sprayer at 250 psi on the mornings of: 14 Apr (Pk, Pink/early bloom, no inoculation); 18 Apr (B1, bloom, 1st inoculation), 21 Apr (B2, full bloom, 2nd inoculation); 27 Apr (B3, late bloom, no inoculation); 19 May (PF, Petal fall-1st cover, no inoculation). Two selected branches per tree, each with about 25 blossom clusters, were inoculated by spraying to wet with a bacterial suspension containing 1X10⁶ *Erwinia amylovora* cells/ml in the evenings of 18 Apr and 21 Apr. Infection data were based on counts of number of blossom clusters present on the inoculated branch at the time of the first inoculation. A cluster was rated as infected if it had at least one blossom with any fire blight symptoms on 4 May. Cover spray fungicide (Captan 80WDG 3.75 lb/A) was applied to the entire test block (including "no treatment") with an airblast sprayer 10 Jun, 23 Jun, 7 Jul, 20 Jul, and 2 Aug. Conventional maintenance insecticides were applied with an airblast sprayer to the entire test block as needed. Scab infection and fruit finish were rated on 25-fruit harvest samples 31 Aug.

Inoculation resulted in strong fire blight test conditions. With considerable variation among replications, only treatment #12, four applications of NU-COP 30HB 4oz, significantly suppressed fire blight compared to non-treated trees (p=0.05). While many other treatments had fewer clusters infected than non-treated trees, they were not significantly different. The first scab infection period occurred during the treatment series 22-23 Apr, and 13 scab infection periods occurred in 15 days, 28 Apr to 12 May, resulting in heavy scab pressure while the fire blight treatment series was in progress. Covering the entire block, including "no treatment" trees with Captan, allowed opportunity for demonstrating scab control particularly among the fire blight treatments involving NU-COP. However, treatment #11 (NU-COP 30HB 4 oz), which did not include the 19 May petal fall-first cover application, had a greater incidence of apple scab on fruit. Cueva + Double Nickel (#5) also significantly reduced fruit scab incidence and lesions per fruit, but less so than the NU-COP treatments. Although the NU-COP treatments reduced the amount of scab, they increased the amount of russet. NU-COP 50DF 4 oz treatments #9 and #10 were more prone to fruit russet and opalescence than NU-COP 30HB (#7, 8 and 12).

Treatment and amount/100 gal	Bloom. app. # ^x					Fire blight		Apple scab infection		Fruit finish ratings (0-5) ^y	
	Pk	1	2	3	PF	% clusters infected	% control	% fruit lesions	/fruit	russet	opalescence
0 No treatment	--	--	--	--	--	43.1 bc ^z	--	89 ef	6.7 d	1.4 a	1.3 a-d
1 FireWall 17 8 oz	--	X	X	X	X	36.3 bc	16	74 de	4.5 c	1.3 a	1.2 a-c
2 CX-10250 40% 4.5 oz	X	X	X	X	X	29.3 ab	32	80 d-f	4.0 bc	1.5 a	1.2 ab
3 Double Nickel LC 8 fl oz	X	--	X	--	X	33.1 a-c	23	82 d-f	4.0 bc	1.5 a	1.3 a-d
FireWall 17 8 oz	--	X	--	X	--						
4 Cueva 10% Fl 1 pt	--	X	X	X	X	41.4 bc	4	75 de	3.7 bc	1.8 a	1.3 a-d
5 Cueva 1 pt + Double Nickel LC 8 fl oz	--	X	X	X	X	37.5 bc	13	68 d	2.6 b	1.4 a	1.1 a
6 Actigard 50WG 0.5 oz	--	X	X	X	X	29.8 a-c	31	90 ef	4.6 c	1.4 a	1.4 a-d
7 NU-COP 30HB 3 oz	X	X	X	X	X	38.5 bc	11	24 bc	0.8 a	2.8 b	2.0 ef
8 NU-COP 30HB 3 oz + Double Nickel 8 fl oz	X	X	X	X	X	30.0 ab	30	17 ab	0.3 a	2.8 b	1.8 de
9 NU-COP 50DF 4 oz	X	X	X	X	X	36.8 bc	15	7 a	0.1 a	3.6 c	2.4 f
10 NU-COP 50DF 4 oz	--	X	X	X	X	51.5 c	-19	14 ab	0.2 a	3.4 c	2.0 ef
11 NU-COP 50DF 4 oz	--	X	X	X	--	33.1 a-c	23	36 c	0.8 a	2.9 b	1.7 c-e
12 NU-COP 30HB 4 oz	--	X	X	X	X	15.4 a	64	10 a	0.2 a	2.5 b	1.7 b-e
13 FireWall 17 8 oz + Regulaid 1 pt	--	X	--	X	--	29.2 ab	32	92 f	4.8 c	1.4 a	1.1 a
Serenade Optimum 26.2WP 5 oz	--	--	X	--	X						
14 FireWall 17 8 oz + Regulaid 1 pt	--	X	X	--	X	35.2 bc	18	87 ef	5.0 cd	1.7 a	1.6 a-e
Serenade Optimum 26.2WP 5 oz	--	--	--	X	--						
15 FireWall 17 8 oz + Regulaid 1 pt	--	X	--	X	--	35.3 bc	18	87 ef	4.8 c	1.6 a	1.2 ab
16 FireWall 17 8 oz + Regulaid 1 pt	--	X	X	--	X	25.5 ab	41	88 ef	3.6 bc	1.4 a	1.2 a-c

^z Mean separation by Waller-Duncan K-ratio t-test (p=0.05). Dilute rates based on 400 gal/A.

^y Fruit finish rated on a scale of 0-5 (0=perfect finish; 5=severe russet or opalescence).

^x Applications: 14 Apr (Pk, Pink/early bloom, no inoculation); 18 Apr (B1, bloom, first inoculation), 21 Apr (B2, full bloom, second inoculation); 27 Apr (late bloom, no inoculation); 19 May (PF-1C, follow-up, no inoculation).