

Evaluation of fungicides for control of powdery mildew (*Leveillula taurica*) on tomato, 2013

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This study was conducted in a commercial fresh market tomato field (cv. Valleycat) located SE of Stockton, CA. Closest intersection was Jack Tone and Wildwood Roads, GPS coordinates were 37° 50' 55.5" N 121° 07' 41" W. Closest CIMIS weather station was #70 Manteca, located just over 5 miles away.

The field was transplanted on June 25th and furrow-irrigated. Each plot consisted of a single row on 60-in centered beds and plots measured 30 feet long. The experimental design was a randomized complete block design with four replications. The trial area was managed by the grower similarly to the rest of the field except that no sulfur or mildew fungicides were applied to the test area. Experimental fungicide applications were initiated prior to disease appearance; the first application was on August 28th, the second following 14 to 15 days later on September 11th and 12th. All fungicides were applied in the equivalent of 50 gallons of water per acre with a CO₂ backpack sprayer (operating at 34 psi at the boom) and a handheld boom with four hollow cone nozzles (TXVS-18), two of which were on drops. A surfactant was added to all treatments (see footnote to Table 1 for specifics). No phytotoxicity symptoms were observed on foliage, but damage was noted on some fruit at harvest. Plots were rated for the percentage of the foliage that was symptomatic (yellow spotting, sporulation, or necrotic). Powdery mildew pressure was low until the very end of the trial when it began to increase fairly rapidly. Foliar necrosis did vary between treatments, although many treatments had very similar levels. The registered products Quadris Top and Priaxor did well, as did the experimental products Quintec, Rhyme and Mettle. Rates effects were not observed, with the exception of the white spotting of the fruit with the 3x rate of Quintec. On September 26th and 27th, a 6-ft section of each plot was hand-harvested and sorted for defects (sunburn, white spotting, fruit rot and other culls). The primary cause of fruit culling was buckeye rot caused by *Phytophthora capsici*. Fruit yield and cull rates were similar between treatments. Many thanks to Triple E Produce, Rob Norman and PCA Bill Vignolo for their cooperation on this trial.

Table 1. Fungicide programs evaluated for tomato powdery mildew: disease severity, fruit yield and cull rate.

#	Products and rates*	Ist application	2nd application	DISEASE SEVERITY			YIELD AND FRUIT QUALITY Sept 26 & 27					
		(28-Aug)	(11-Sep)**	(% leaf area affected)		Fruit biomass	Marketable yield	Sunburn	Culls***	White spotting		
	active ingredient applied per acre			19-Sep	27-Sep	(tons/acre)			(% fruit by weight)			
16	Quintec 6 oz	1.5 oz quinoxyfen		3.1	i	2.5	e	33.1	23.8	12.9	11.4	0.0
15	Quintec 4 oz	1 oz quinoxyfen		6.3	fgh	2.5	e	41.3	23.1	30.0	3.2	0.0
14	Rhyme 7 oz	1.82 oz flutriafol		4.2	hi	4.4	de	39.9	29.2	15.2	7.6	0.0
4	Mettle 8 oz	1 oz tetraconazole		5.8	ghi	4.4	de	37.3	25.3	19.4	7.4	0.0
17	Quintec 12 oz	3 oz quinoxyfen		6.7	efgh	4.4	de	43.8	23.4	30.4	13.4	5.5
12	Rhyme 3.5 oz	0.91 oz flutriafol		7.4	defgh	4.4	de	43.6	31.8	15.4	5.2	0.0
20	Quadris Top 8 oz	1.67 oz azoxystrobin + 1.05 oz difenoconazole		7.7	defgh	4.4	de	44.0	29.5	16.3	10.5	0.0
18	Priaxor 8 oz	1.4 oz fluxapyroxad + 2.8 oz pyraclostrobin		8.1	defg	4.4	de	34.4	20.7	25.3	4.7	0.0
13	Rhyme 5 oz	1.3 oz flutriafol		8.6	defg	4.4	de	41.3	28.1	22.5	2.5	0.0
3	Mettle 6 oz	0.75 oz tetraconazole		5.3	ghi	6.3	cde	37.9	25.2	21.4	5.5	0.0
19	Priaxor 8 oz fb. Vivando 15 oz	1.4 oz fluxapyroxad + 2.8 oz pyraclostrobin	4.7 oz metrafenone	8.1	defg	6.3	cde	38.8	22.4	24.6	10.6	0.0
	Fontelis 1.5 pt fb. Quadris Top	1.67 oz azoxystrobin + 1.05 oz difenoconazole										
11	8 oz	5 oz penthiopyrad		9.8	bcdef	6.3	cde	39.4	25.2	16.3	10.4	0.0
2	Mettle 4 oz	0.5 oz tetraconazole		4.5	hi	6.9	bcde	41.4	28.5	16.7	7.2	0.0
10	Fontelis 1.5 pt	5 oz penthiopyrad		8.6	cdefg	8.1	bcd	38.3	24.4	22.4	4.2	0.0
5	Taegro 5.2 oz	0.7 oz <i>Bacillus subtilis</i> var. <i>amyloliquefaciens</i> Strain FZB24		9.6	cdefg	9.4	bcd	37.4	21.8	23.8	3.3	0.0
		1.05 oz fluopyram + 1.05 oz trifloxystrobin + 0.9 oz										
	Sonata 3 qt fb. Luna Sensation	1.3 oz <i>Bacillus subtilis</i> strain QST 2808	<i>Bacillus subtilis</i> strain QST 2808	14.8	ab	10.0	bc	36.5	22.6	22.6	11.5	0.0
8	4 oz + Sonata 2 qt											
		1 oz trifloxystrobin + 0.9 oz										
	Sonata 3 qt fb. Gem 2 oz +	1.3 oz <i>Bacillus subtilis</i> strain QST 2808	<i>Bacillus subtilis</i> strain QST 2808	11.1	bcd	12.8	ab	35.6	23.6	19.9	8.4	0.0
9	Sonata 2 qt											
		1.3 oz fluopyram + 1.3 oz trifloxystrobin										
7	5 oz			13.4	abc	12.8	ab	40.9	26.7	21.3	5.5	0.0
		1.7 oz <i>Bacillus subtilis</i> strain QST 2808		16.9	a	12.8	ab	36.4	23.5	19.1	6.5	0.0
6	Sonata 4 qt											
1	Non-treated control	---	---	10.9	bcde	18.3	a	46.3	33.5	14.9	11.7	0.0

P value < 0.0001 < 0.0001 not significant not significant not significant not significant not analyzed

Values represent the means of four observations; means in the same column followed by the same letter are not statistically different, according to Fisher's protected least significant difference test. Data were subjected to arcsin square root transformation prior to analysis.

*Most treatments included 0.25% NIS Latron B-1956 (v/v). However NIS rate for Quintec and Quadris Top was 0.125%, and Vivando application included 0.25% Dyne-Amic.

**Treatments 1 to 10 applied Sep 11, while 11 to 20 were applied Sep 12.

*** The vast majority of culled fruit were due to buckeye rot caused by *Phytophthora capsici*