

TOMATO: *Lycopersicon esculentum* Miller

EVALUATION OF BIOPESTICIDES AND COPPER-BASED BACTERICIDES FOR BACTERIAL SPOT CONTROL, FALL 2009

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Xanthomonas axonopodis pv. *vesicatoria*

On 4 Sep 2009, plots were established at the University of Florida's Gulf Coast Research and Education Center in Balm, FL to assess the effect of several copper-based fungicides on the severity of bacterial spot on tomato. Raised beds, 300 ft in length, were prepared on 5 ft center-to-center spacing, covered with black virtually impermeable mulch and irrigated with a drip system. Plots consisted of 3 adjacent 21 ft bed sections transplanted with the TYLC resistant cultivar SecuriTY28 at 18" spacing along beds skipping a 6 ft section between plots as a buffer. Treatments were applied on 11 Sep, 21 Sep, 28 Sep, 5 Oct, 12 Oct, 26 Oct, 2 Nov, 9 Nov, 16 Nov, and 23 Nov with a tractor sprayer calibrated to deliver 60 to 120 gal/A at 200 psi. A water-treated control was included to measure disease pressure (water was applied to keep the amount of spore dispersal by sprayer activity uniform across all plots). Treatments were arranged in a randomized complete block design with each treatment repeated 4 times. Alternating applications of Revus Top (5.5 floz/A) and Quadris F (5 floz/A) were made to minimize the impact of fungal foliar diseases, like early blight and target spot throughout the season. The outer beds of each plot were inoculated 18 Sep with a suspension (10^6 cfu/ml) of *Xanthomonas perforans* using a backpack sprayer. Plots were monitored, and rated on 22 Oct, 5 Nov, and 18 Nov using the Horsfall-Barratt scale to assess the percentage of canopy affected by bacterial spot. Marketable yield was assessed from two separate harvests of the center 10 plants in each plot. Only large and extra large fruit were harvested on 23 Nov followed by a complete harvest of all fruit on 30 Nov.

Overall, weather conditions were quite favorable for disease development with heavy rains and high humidity in September (4.84 inches of rain) that helped to quickly establish bacterial spot in the trial. October was unusually hot and dry which slowed disease progress. However, by the end of October the higher humidity levels and heavy morning dews returned, punctuated by several rain events in November (1.82 inches of rain), resulted in high disease pressure. No statistical differences among treatments were observed for any measurable disease or yield parameters.

Table 1. Effect of biopesticides and copper-based bactericides on the mean severity of bacterial spot on tomato during fall 2009 field trial at GCREC, Wimauma, FL.

TRT	Treatment, rate/acre ^x	Disease Severity ^y				Diseased Fruit ^z		% Diseased Fruit (of total weight)	
		22 Oct	5 Nov	18 Nov	AUDPC	No. fruit	Weight (lbs)		
1	GWN 4610, 0.3 g/L; Penncozeb 75DF, 2 lb	39.0	63.4	74.4	1887	3	1.5	0.013	
2	GWN 4610, 1.5 g/L; Penncozeb 75DF, 2 lb	50.0	74.4	83.9	2371	3	1.7	0.015	
3	GWN 4620, 6 ml/L; Penncozeb 75DF, 2 lb	57.1	83.8	83.8	2700	9	4.6	0.040	
4	GWN9833, 6 ml/L; Penncozeb 75DF, 2 lb	57.1	75.5	80.3	2642	6	3.2	0.030	
5	GWN 9855, 3.5 ml/L; Penncozeb 75DF, 2 lb	52.4	82.6	82.6	2516	8	4.1	0.032	
6	Requiem 25EC, 2 Qt; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	61.0	79.1	79.1	2811	7	3.4	0.028	
7	Nu-film-P, 6 floz; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	39.0	65.8	67.3	1903	10	5.0	0.038	
8	Requiem 25EC, 2 Qt; Nu-film-P, 6 floz; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	56.3	76.8	72.0	2619	5	2.9	0.027	
9	Requiem 25EC, 2 Qt; Nu-film-P, 6 floz	59.5	88.6	79.1	2822	9	5.7	0.052	
10	QRD 452, 1 Qt	72.0	86.3	83.9	3268	6	3.0	0.031	
11	QRD 452, 2 Qt	50.0	67.3	86.3	2321	10	5.2	0.047	
12	QRD 452, 1 Qt; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	54.8	65.8	79.1	2486	4	2.3	0.021	
13	QRD 452, 1 Qt; Serenade Max, 1 lb	50.0	69.6	76.8	2337	12	6.1	0.059	
14	Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	57.1	81.5	74.4	2684	8	3.6	0.031	
15	Water-treated control	65.8	92.1	83.9	3078	9	4.3	0.038	
		<i>P</i> > <i>F</i>	0.7419	0.1095	0.6389	0.6103	0.3318	0.4165	0.3217

^x Treatments (TRT) were applied on 11 Sep, 21 Sep, 28 Sep, 5 Oct, 12 Oct, 26 Oct, 2 Nov, 9 Nov, 16 Nov, and 23 Nov with a tractor sprayer calibrated to deliver 60 to 120 gal/A at 200 psi. A water-treated control was included to measure disease pressure (water was applied to keep the amount of spore dispersal by sprayer activity uniform across all plots). Listed treatment rates are on a per acre basis unless noted otherwise. Seedlings were transplanted 4 Sep.

^y Trial was inoculated 5 Oct and 13 Oct with a 10⁶ cfu/ml suspension of *Xanthomonas perforans*. Bacterial spot severity was assessed as the percentage canopy showing symptoms. The Horsfall-Barratt scale was used for all ratings, but values were converted to mid-percentages prior to statistical analyses.

^z Culled diseased fruit with symptoms typical of bacterial spot were not included in marketable yields.

Table 2. Effect of biopesticides and copper-based bactericides on the mean marketable tomato yields during fall 2009 field trial at GCREC, Wimauma, FL.

	Treatment, rate/A ^y	Marketable weight (lbs/trt) ^z					Culls	% Culled (of total weight)	% Marketable (of total weight)
		Total	Small	Medium	Large	X-Large			
1	GWN 4610, 0.3 g/L; Penncozeb 75DF, 2 lb	118.4	8.2	14.7	18.7	56.3	19.1	16.4%	82.3%
2	GWN 4610, 1.5 g/L; Penncozeb 75DF, 2 lb	115.9	6.1	11.5	16.3	58.0	22.3	19.6%	78.9%
3	GWN 4620, 6 ml/L; Penncozeb 75DF, 2 lb	116.8	9.0	13.9	17.6	49.7	22.1	19.4%	76.6%
4	GWN9833, 6 ml/L; Penncozeb 75DF, 2 lb	112.6	5.8	11.3	17.9	49.5	25.0	22.8%	74.3%
5	GWN 9855, 3.5 ml/L; Penncozeb 75DF, 2 lb	125.5	7.5	12.8	15.3	59.7	26.0	20.8%	76.1%
6	Requiem 25EC, 2 Qt; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	120.2	9.3	15.7	19.8	53.3	18.7	15.4%	81.8%
7	Nu-film-P, 6 floz; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	129.1	5.8	13.6	19.5	55.7	29.6	23.1%	73.1%
8	Requiem 25EC, 2 Qt; Nu-film-P, 6 floz; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	110.2	8.8	15.2	17.8	43.1	22.3	20.5%	76.8%
9	Requiem 25EC, 2 Qt; Nu-film-P, 6 floz	105.4	5.8	10.5	14.7	44.5	24.2	24.3%	70.5%
10	QRD 452, 1 Qt	107.7	9.2	15.8	17.8	37.9	23.9	22.6%	74.3%
11	QRD 452, 2 Qt	116.9	5.9	15.3	17.9	45.8	26.8	22.9%	72.4%
12	QRD 452, 1 Qt; Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	109.0	4.1	11.4	16.5	49.2	25.5	24.3%	73.6%
13	QRD 452, 1 Qt; Serenade Max, 1 lb	103.8	5.2	10.4	17.9	40.2	23.9	22.9%	71.2%
14	Cuprofix 40D, 3 lb; Penncozeb 75DF, 2 lb	110.0	4.5	8.6	18.1	44.1	31.0	27.5%	69.4%
15	Water-treated control	109.7	6.8	11.3	16.9	44.7	25.7	23.6%	72.6%
	<i>P</i> > <i>F</i>	0.2778	0.6379	0.9012	0.9962	0.4403	0.4015	0.5644	0.4517

^y Treatments (TRT) were applied on 11 Sep, 21 Sep, 28 Sep, 5 Oct, 12 Oct, 26 Oct, 2 Nov, 9 Nov, 16 Nov, and 23 Nov with a tractor sprayer calibrated to deliver 60 to 120 gal/A at 200 psi. A water-treated control was included to measure disease pressure (water was applied to keep the amount of spore dispersal by sprayer activity uniform across all plots). Listed treatment rates are on a per acre basis unless noted otherwise. Seedlings were transplanted 4 Sep. Plots were harvested on 23 Nov and 30 Nov.

^z Culled represents the % of total fruit weight discarded due to physical defects, while Marketable represents the % of total fruit weight free of physical defects and disease; acceptable for retail [% Marketable = ((Culled + Diseased) / Total)*100].