TOMATO (*Lycopersicon esculentum*)
Target spot; *Corynespora cassiicola*

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Evaluation of fungicides for the management of target spot of tomato, spring 2011.

On 7 Mar 2011, plots were established at the University of Florida's Gulf Coast Research and Education Center in Balm, FL to assess the effect of various copper and non-copper bactericides on the control of bacterial spot of tomato. Plots consisted of 25 ft-long bed sections within 300 ft-long, raised beds with 5 ft center-to-center bed spacing. Beds were covered with black virtually impermeable mulch and irrigated with a drip system. Tomato seedlings (cv SecuriTY 28) were transplanted at 18-in spacing along beds skipping a 4-ft alley between plots as a buffer. Foliar treatments including a water-treated control, were arranged in a completely randomized design with each treatment repeated six times. The treatments, with the exception of HeadsUp), were applied on 12 May, 20 May, and 27 May (corresponding with applications 1 to 3 below). HeadsUp was applied to transplants on 1 Mar. Foliar treatments were applied with a CO_2 back pack sprayer calibrated to deliver 120 gal/A at 40 psi. Plots were inoculated on 6 May with a suspension (10^5 condia/ml pooled from 10 field isolates) of *Corynespora cassiicola* using a backpack sprayer. Plots were monitored regularly and rated for target spot after disease reached appreciable levels on 24 May and for target spot and bacterial spot on 31 May. Marketable yield was assessed from a single hand harvest on 2 Jun. A preventative program that included Cuprofix 40D (2 lb) + Penncozeb 75DF (0.5 lb) alternated with Firewall (16 oz/100 gal) was established to minimize the impact of bacterial spot.

Weather at the beginning of the trial was cold, wet and unsettled with two rain events in late March bringing over 6 inches of rain to the site, accompanied by strong winds. The unsettled weather damaged plants, led to severe levels of bacterial spot, forcing a delay in the initiation of the trial to help manage the bacterial spot. The rest of the trial period from April through June was unusually hot and dry (< 2 inches of rainfall) that helped to reduce bacterial spot in conjunction with bactericide applications, but still resulted in poor fruit set and lower than average tomato yields. Inoculation of the trial with *C. cassiicola* was timed with a rain event on 6 May, followed by additional rain events on 14 & 15 May. While target spot severity increased rapidly, the increasing temperatures and relative humidity also accelerated bacterial spot severity leading to rapid defoliation and preventing further evaluations of target spot severity. Target spot severity initially ranged from 5.6% to 43.7% on 24 May, and increased to a range of 13.7% to 67.0% by 31 May. Based on area under disease progress curve (AUDPC) values, all treatments statistically reduced disease relative to the control with the exception of Actinovate (6 oz), Bravo WeatherStik (1 pt), HeadsUp (1 g/L), and NAI-5750 (1000 ppm). Effective treatments could be separated into two groups based on active ingredient, with the first group consisting of treatments with Actigard (0.5 oz/ 100 gal), Cabrio (8 oz), Endura (3.5 oz), LI-6355, Quadris (6 oz, or 6.2 fl oz (flowable)), and NAI-5750 (5000 ppm); and the second group consisting of treatments with BravoTop (1.5 & 2 pt), Quadris Top (8 fl oz), Luna Privelege (6.84 oz), Scala (7 fl oz), RevusTop (7 oz), Luna Tranquility (11.2 oz), Priaxor (4 & 6 fl oz), Fontelis (24 oz), and Inspire Super (20 fl oz). There was no significant effect of treatment on total or marketable yields. However, Scala (7 fl oz), Quadris Flowable (6.2 fl oz), and Priaxor (4 fl oz) statistically improved the yield of extra-large fruit (based on weight) over the control. Overall, results from this trial should be viewed with caution due to the impact of bacterial spot which was particularly high with severe defoliation in treatments that included an additional sticker-spreader treatment, such as Herbimax, Induce, or Kinetic.

Treatment	Disease Severity (%): 24-May		31-May		AUDPC		Bacterial Spot (%)		Diseased Fruit (lbs)	% Market. (by weight)
Actigard, 0.5 oz/100 gal (1-3)	16.1	c	37.5	cde	1021	c	90.8	e	0.9	98.3
Actinovate, 6 oz (1-3)	43.7	a	67.0	a	2520	a	97.0	ab	1.7	96.9
Bravo WeatherStik, 1 pt (1,3)	32.7	b	56.2	ab	1924	b	95.5	a-d	1.9	96.4
BravoTop, 1.5 pt (1,3)	9.0	d	27.9	efg	627	de	92.1	de	0.8	98.4
BravoTop, 1.5 pt (1,3); Kinetic, 0.125 % v/v (1,3)	9.0	d	33.8	def	670	d	95.1	a-d	1.8	96.6
BravoTop, 2 pt (1,3); Kinetic, 0.125 % v/v (1,3)	6.7	d	20.6	gh	465	fg	97.0	ab	1.8	96.7
Cabrio, 8 oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	37.5	cde	1144	c	97.0	ab	1.7	96.0
Cabrio, 8 oz (1,3); LI-6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	37.5	cde	1144	c	92.3	de	1.7	96.8
Endura, 3.5 oz (1,3); Bravo WeatherStik, 1 pt (2)	16.1	c	32.7	def	985	c	95.1	a-d	2.3	96.5
HeadsUp, 1 g/L (Prior to transplant,1,3)	37.8	ab	45.4	a-d	2107	ab	93.9	b-e	1.3	96.5
Inspire Super, 20 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	5.6	d	13.7	h	360	h	94.4	b-e	1.6	96.5
Fontelis, 24 oz (1,3); Bravo WeatherStik, 1 pt (2)	5.6	d	33.0	def	507	efg	94.0	b-e	1.7	97.3
LI-6355, 2 fl oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	16.1	c	37.5	cde	1021	c	98.5	a	0.8	98.3
LI-6355, 2 fl oz (1,3); LI-6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	43.5	bcd	1188	c	97.7	ab	1.9	95.9
Luna Privilege (drip), 6.84 oz (1,3); Bravo WeatherStik, 1 pt (2)	9.0	d	32.7	def	666	d	92.8	cde	3.1	93.9
Luna Privilege (foliar), 6.84 oz (1,3); Bravo WeatherStik, 1 pt (2)	5.6	d	33.0	def	507	efg	95.1	a-d	1.7	97.1
Luna Tranquility, 11.2 oz (1,3); Bravo WeatherStik, 1 pt (2)	6.7	d	32.6	def	561	def	94.0	b-e	2.8	95.4
Priaxor, 4fl oz (1,3); Induce, 0.25 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	5.6	d	23.3	fg	435	gh	98.5	a	0.7	98.6
Priaxor, 6 fl oz (1,3); Induce, 0.25 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	7.9	d	23.3	fg	535	d-g	97.7	ab	0.9	98.1
Quadris Flowable, 6.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	37.5	cde	1144	c	95.5	a-d	1.4	97.7
Quadris, 6oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	37.5	cde	1144	c	97.0	ab	1.0	97.9
Quadris, 6 oz (1,3); LI 6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	18.5	c	43.5	bcd	1188	c	97.0	ab	1.0	98.3
QuadrisTop (8fl oz)	9.0	d	33.0	def	669	d	96.3	abc	1.2	97.4
Revus Top, 7 oz (1,3); Bravo WeatherStik, 1 pt (2)	9.0	d	27.9	efg	627	de	96.3	abc	1.0	98.3
Scala, 7 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	9.0	d	32.6	def	662	d	96.3	abc	1.3	97.7
NAI-5750, 1000 ppm (1-3)	32.7	b	49.9	abc	1879	b	96.2	abc	2.3	95.8
NAI-5750, 5000 ppm(1-3)	18.5	c	37.5	cde	1144	c	91.0	e	2.1	96.1
Control	32.7	b	56.2	ab	1953	b	94.4	b-e	0.5	98.9
	P < 0.0001		P < 0.0001		P < 0.0001		P = 0.0030		P = 0.8205	P = 0.8993

Target spot and bacterial spot severity was assessed as the percentage of total leaf area affected by disease using the Horsfall-Barratt scale; values were converted to mid-percentages and fit to a lognormal distribution for final statistical analysis. Area under the disease progress curves (AUDPC) was calculated using the formula: $\Sigma([(x_i+x_{i-1})/2](t_i-t_{i-1}))$ where x_i is the rating at each evaluation time and (t_i-t_{i-1}) is the time between evaluations. Means followed by the same letter are not significantly different at $\alpha=0.05$.

Treatment	Fruit weight (lbs) by market type: Small	Medium	Large	X. Large		Fruit weight (lbs): Marketable	Total
Actigard, 0.5 oz/100 gal (1-3)	0.8	4.3	10.0	38.6	a-d	53.7	54.6
Actinovate, 6 oz (1-3)	2.5	4.0	8.1	38.9	a-d	53.5	55.2
Bravo WeatherStik, 1 pt (1,3)	0.9	3.5	8.2	38.2	a-d	50.8	52.6
BravoTop, 1.5 pt (1,3)	1.2	4.9	6.3	37.1	a-d	49.4	50.3
BravoTop, 1.5 pt (1,3); Kinetic, 0.125 % v/v (1,3)	2.5	4.3	8.8	41.5	a-d	57.1	58.9
BravoTop, 2 pt (1,3); Kinetic, 0.125 % v/v (1,3)	3.0	4.2	5.7	36.0	bcd	48.9	50.7
Cabrio, 8 oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	1.5	4.3	7.3	39.6	a-d	52.7	54.4
Cabrio, 8 oz (1,3); LI-6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	1.4	5.0	8.7	35.7	bcd	50.7	52.3
Endura, 3.5 oz (1,3); Bravo WeatherStik, 1 pt (2)	1.6	4.7	11.1	41.4	a-d	58.9	61.1
HeadsUp, 1 g/L (Prior to transplant,1,3)	3.2	5.5	9.4	24.4	e	42.6	43.9
Inspire Super, 20 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	1.9	4.9	10.4	33.0	cde	50.2	51.8
Fontelis, 24 oz (1,3); Bravo WeatherStik, 1 pt (2)	1.3	4.0	9.2	43.3	abc	57.8	59.5
LI-6355, 2 fl oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	2.2	4.5	7.6	30.4	de	44.6	45.4
LI-6355, 2 fl oz (1,3); LI-6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	0.9	3.4	8.5	34.2	cde	47.1	49.0
Luna Privilege (drip), 6.84 oz (1,3); Bravo WeatherStik, 1 pt (2)	2.3	4.6	10.5	32.1	cde	49.5	52.6
Luna Privilege (foliar), 6.84 oz (1,3); Bravo WeatherStik, 1 pt (2)	2.6	6.1	10.0	40.6	a-d	59.3	61.0
Luna Tranquility, 11.2 oz (1,3); Bravo WeatherStik, 1 pt (2)	2.2	4.0	8.1	39.2	a-d	53.5	56.3
Priaxor, 4fl oz (1,3); Induce, 0.25 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	2.2	3.9	7.9	46.0	ab	59.9	60.6
Priaxor, 6 fl oz (1,3); Induce, 0.25 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	2.1	5.2	6.8	32.0	cde	46.0	46.9
Quadris Flowable, 6.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	1.8	4.7	7.5	46.0	ab	59.9	61.3
Quadris, 6oz (1,3); Herbimax, 0.5 % v/v (1,3); Bravo WeatherStik, 1 pt (2)	2.5	3.8	7.6	31.6	de	45.4	46.4
Quadris, 6 oz (1,3); LI 6262, 3.2 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	2.0	3.3	7.7	41.5	a-d	54.4	55.4
QuadrisTop (8fl oz)	2.0	4.5	11.4	33.1	cde	51.0	52.2
Revus Top, 7 oz (1,3); Bravo WeatherStik, 1 pt (2)	2.5	5.6	7.8	38.6	a-d	54.4	55.4
Scala, 7 fl oz (1,3); Bravo WeatherStik, 1 pt (2)	1.6	3.3	6.2	47.3	a	58.3	59.6
NAI-5750, 1000 ppm (1-3)	3.3	4.7	9.8	36.0	bcd	53.8	56.2
NAI-5750, 5000 ppm(1-3)	1.9	3.6	8.1	41.1	a-d	54.7	56.8
Control	1.6	3.2	8.3	33.3	cde	46.4	46.8
	P = 0.1781	P = 0.7099	P = 0.4740	P = 0.0286		P = 0.5119	P = 0.3555

Yields are based on a single harvest. Means followed by the same letter are not significantly different at α=0.05.