

PEPPER (*Capsicum annuum* 'Aristotle')  
Bacterial spot; *Xanthomonas euvesicatoria*  
Phytophthora root rot; *Phytophthora capsici*

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#### **Comparison of plant defense activators and bactericides for controlling bacterial spot on bell peppers, spring 2012.**

On 19 Mar 2012, plots were established at the University of Florida's Gulf Coast Research and Education Center in Balm, FL to assess the effect of several plant defense activators and bactericides on the control of bacterial spot of pepper. 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. Pepper seedlings (cv. Aristotle) were transplanted at 18-in spacing along beds skipping a 4-ft alley between plots as a buffer. Treatments, including a water-treated and a non-treated control, were arranged in a completely randomized design with each treatment repeated four times. The treatments were applied on 19 Mar, 3 Apr, 10 Apr, 17 Apr, 23 Apr, 3 May, 11 May, and 22 May (corresponding with applications 1 to 8 below). Drench treatment rates were based on a 100 gal volume with 100 ml of solution applied to each seedling. Foliar treatments were applied with a CO<sub>2</sub> backpack sprayer calibrated to deliver 60 (apps. 1-3), and 90 gal/A (apps. 4-8) at 40 psi. Drip treatments were applied through a manifold by CO<sub>2</sub> at 12 psi through the drip tape in 2 L of water, and then followed by approximately 1.2 L of water at 10 psi to flush the tape (as predetermined by a dye test). Plots were inoculated on 4 Apr and again on 4 May with a suspension (10<sup>6</sup> cfu/ml) of races 4, 5, and 6 of *Xanthomonas euvesicatoria* using a backpack sprayer. Plots were monitored regularly for bacterial spot, and rated on 10 May, 24 May, and 31 May as disease developed. Additionally, the incidence of crown and root rot caused by *Phytophthora capsici* was recorded on 24 May and 31 May. Marketable yield was assessed from a single hand harvests on 17 May. Previcur Flex (1 pt/A) was drip-applied on 11 May and 18 May to try to minimize the impact of the crown and root rot on the trial. Unfortunately, the trial had to be prematurely terminated after 31 May due to the severity of crown and root rot symptoms throughout the trial. Noticeable phytotoxicity, in the form of stunting, was associated with drench applications of IST 200SL, and with Actigard.

Treatment, Rate/A (application) <sup>w</sup>	Bacterial Spot Severity (%): <sup>x</sup>			AUDPC <sup>y</sup>	Root Rot Incidence (%)		Marketable
	10-May	24-May	31-May		24-May	31-May	Yield (lbs)
IST 200SL, 13.7 oz (Drench 1)	1.5 c <sup>z</sup>	1.5 e	2.1 ef	73 gh	4.4	5.2	1.5 g
IST 200SL, 27.4 oz (Drench 1)	1.5 c	1.6 e	2.4 def	77 fgh	2.3	13.2	0.9 g
IST 200SL, 3.436 oz (1-8)	1.5 c	2.8 cde	5.5 bc	101 d-h	4.7	34.7	15.2 ab
IST 200SL, 6.85 oz (1-8)	2.1 bc	2.8 cde	5.5 bc	125 c-h	3.1	7.7	13.6 ab
IST 200SL, 13.7 oz (1-8)	2.8 abc	3.6 bcd	4.5 cd	154 c-e	5.4	18.7	12.7 abc
AdmirePro, 7 floz (1)	2.1 bc	3.6 bcd	3.6 cde	127 c-h	5.2	16.6	13.0 abc
Actigard, 1 oz (Drench 1), 0.5 oz (2), 0.25 oz (4,6); Kocide 3000, 1 lb (3-8); Penncozeb, 2 lb (3-8)	1.5 c	2.8 cde	2.8 def	92 e-h	1.8	2.7	8.7 cde
Actigard, 1 oz (Drench 1), 0.5 oz (2), 0.5 oz (4,6); Kocide 3000, 1 lb (3-8); Penncozeb, 2 lb (3-8)	2.8 abc	2.8 cde	3.6 cde	144 b-f	10.0	31.0	4.8 efg
Actigard, 1 oz (Drench 1), 0.5 oz (2), 0.75 oz (4,6); Kocide 3000, 1 lb (3-8); Penncozeb, 2 lb (3-8)	1.5 c	1.5 e	1.5 f	71 h	0.9	22.3	4.7 efg
Actigard, 1 oz (Drench 1), 0.5 oz (Drip 2), 0.25 oz (Drip 4,6); Kocide 3000, 1 lb (3-8); Penncozeb, 2 lb (3-8)	1.5 c	2.1 de	2.8 def	84 fgh	0.9	4.4	6.5 def
Actigard, 1 oz (Drench 1), 0.5 oz (2), 0.25 oz (4,6)	1.5 c	2.1 de	2.8 def	84 fgh	13.3	25.0	5.3 efg
Actigard, 1 oz (Drench 1), 50 uM (2-8)	1.5 c	1.5 e	2.1 ef	73 gh	1.8	10.6	4.1 fg
Actigard, 1 oz (Drench 1), 50 uM (3,5,7)	1.5 c	2.1 de	1.5 f	78 fgh	0.4	18.7	3.3 fg
Kocide 3000, 1 lb (1-8); Penncozeb, 2 lb (1-8)	2.8 abc	3.6 bcd	4.5 cd	154 abc	8.0	32.7	12.3 abc
Kocide 3000, 1 lb (1-8); Penncozeb, 2 lb (1-8); Synbiont, 24 floz (1-4), 52 floz (5-8)	2.1 bc	4.5 abc	5.5 bc	141 b-g	16.4	48.9	10.6 bcd
Kocide 3000, 1 lb (1-8); Penncozeb, 2 lb (1-8); Synbiont, 24 floz (2x/wk 1-4), 52 floz (2x/wk 5-8)	3.6 ab	5.5 ab	5.5 bc	202 ab	2.6	7.1	14.5 ab
Procidic, 25 floz/100 gal (1-8)	2.8 abc	2.8 cde	3.6 cde	144 b-f	3.6	19.5	15.5 a
Procidic, 25 floz/100 gal (2x/wk 1-8)	3.6 ab	4.5 abc	5.5 bc	191 abc	1.3	6.2	13.6 ab
42pHiCuMaxx, 3 qt (1-8)	2.8 abc	4.5 abc	5.5 bc	166 a-d	2.6	20.8	13.4 ab
42pHiCuMaxx, 3 qt (2x/wk 1-8)	2.8 abc	3.6 bcd	3.6 cde	152 b-f	4.7	24.9	11.6 abc
Water-treated Control	3.6 ab	6.6 a	11.1 a	234 a	0.4	6.5	14.9 ab
Non-treated Control	4.5 a	5.5 ab	7.7 ab	235 a	12.4	38.7	13.7 ab
<b>P =</b>	<b>0.002</b>	<b>&lt; 0.0001</b>	<b>&lt; 0.0001</b>	<b>&lt; 0.0001</b>	<b>0.7627</b>	<b>0.112</b>	<b>&lt; 0.0001</b>

<sup>w</sup> Listed treatment rates are on a per acre basis unless noted otherwise. Treatments were applied 19 Mar, 3 Apr, 10 Apr, 17 Apr, 23 Apr, 3 May, 11 May, and 22 May (corresponding with applications 1 to 8 above).

<sup>x</sup> The severity of bacterial spot was assessed as the percentage of canopy affected. The Horsfall-Barratt scale was used for all ratings, but values were converted to mid-percentages prior to statistical analyses.

<sup>y</sup> Area under the disease progress curve (AUDPC) values were calculated using the formula:  $\sum[(x_i + x_{i-1})/2](t_i - t_{i-1})$  where  $x_i$  is the rating at each evaluation time and  $(t_i - t_{i-1})$  is the time between evaluations.

<sup>z</sup> Means followed by the same letter are not significantly different according to Fisher's LSD test ( $\alpha=0.05$ ).