

**EVALUATION OF BACTERICIDE PROGRAMS INITIATED AFTER DISEASE DETECTION FOR MANAGING BACTERIAL LEAF SPOT OF PEPPER, 1997:** The objectives of this study were to determine if bacterial leaf spot (BS) of pepper can be managed effectively with a copper fungicide/bactericide (1) when applications were initiated after disease detection and (2) when the spray interval was lengthened under unfavorable disease conditions (night temperature <60 F). A field experiment was conducted at the Long Island Horticultural Research Laboratory on Riverhead sandy loam soil. Fertilizer (1000 lb/A of 10-10-10) was broadcast and incorporated on 15 May. Seven-wk-old seedlings were transplanted on 5-6 Jun into raised beds with black plastic mulch and drip irrigation. Weeds were controlled by applying Devrinol 50DF (2 lb/treated A) between rows, mechanically cultivating with a rototiller and hand-weeding. Insects were controlled by applying Ambush 25W (12.8 oz/A) once, Orthene 75S (1.3 lb/A) six times, Sevin 80S (1.5 lb/A) once; and Provado 1.6F (3.75 oz/A) twice. Plots consisted of 24 plants in two staggered rows with plants spaced 15 in. apart within and between rows. There was a single guard row on each side of the treatment rows and a double spreader row next to one guard row. The spreader row was inoculated on 7 and 11 Jul by using a pressurized garden sprayer to mist a suspension of races 1, 2, and 3 of *X. c. pv. vesicatoria* (from S. A. Miller, Ohio). Leaves were moistened by running overhead irrigation for 1 hr before and after inoculation. Plants were watered as needed based on irrometer readings using drip irrigation. For most treatments, Kocide 2000 was tank mixed with Maneb 75DF and agitated for 90 min which reportedly increases the amount of copper in solution. To assess the benefit of mixing Kocide with Maneb, Kocide was applied alone without extra agitation for one treatment. Treatments were applied with a tractor-mounted boom sprayer equipped with D3-45 hollow cone nozzles spaced 11 in. apart that delivered 100 gpa at 250 psi. A randomized complete block design with four replications was used. BS severity was recorded weekly from 8 Aug to 15 Oct as percent green leaf tissue with symptoms. Leaf death due to BS (% defoliation) was also recorded. Fruit were harvested, counted, and weighed every 6-8 days over a 65-day period (4 Aug-8 Oct). Fruit with sunscald, blossom-end rot, insect damage, or BS symptoms were considered unmarketable. Yield data were summed over three harvest periods: early (4-19 Aug), middle (8 Aug-9 Sep), late (16 Sep-8 Oct).

Symptoms of BS were first observed in the spreader row on 21 Jul and at a low level in some plots on 23 Jul. Symptoms were observed at a low level in all plots on 28 Jul, which was one wk before fruit were ready to harvest. IPM scheduled sprays were started on 29 Jul. BS severity differed significantly among treatments on 22 and 28 Aug and for AUDPC; but not on 8 Aug or 5 Sep-15 Oct. However, there was significantly less defoliation in treated than in control plots. There were no significant differences among treatments in number or weight of fruit until the harvest period of 16 Sep-8 Oct. Fruit with BS symptoms were observed during the last three harvests. More fruit with BS occurred on nontreated plants (0.4/plant) than on plants sprayed with Kocide + Maneb starting after disease detection (0.2/plant); however, differences among treatments were not significant (p=0.076). BS did not have a substantial impact on yield because BS did not become sufficiently severe and/or because Kocide was not sufficiently effective. Weather was generally dry and not favorable for BS (only 11 days with >0.1 in. from 22 Jul to 28 Sep, total rainfall of 6.7 in.). Chemical control may have been compromised because applications made on 14 and 30 Aug were 2 to 3 days late because of rain or equipment failure (however, temperature was <60F for at least 4 hrs on 2 and 4 nights during these delays). In addition, yield was much lower during Sep and Oct, when disease would be expected to have a greater impact, than during Aug. Harvested fruit/plant increased from 1 on 4 Aug to 2 on 19 Aug, then declined to 0.2 on 2 Sep. This decline was partially due to insufficient fertilizer as the number rose to 1 fruit/plant on 24 Sep after applying 200 lb/A potassium nitrate through the drip on 12 Sep. Many fruit were unmarketable because of insect damage, however, there were no significant differences among treatments. In conclusion, under conditions of this experiment BS was managed with an IPM program (fungicide/bactericide applications started after disease detection and delayed when <60 F at night) as effectively as with a preventive spray program. Plants receiving these treatments produced a similar number of fruit during the late harvest period which was significantly more than nontreated plants and plants not sprayed during Sep. There were five fewer sprays with the IPM program. Combining Maneb with Kocide 2000 did not improve efficacy. This is an important finding because harvesting is restricted by a 7-day pre-harvest interval when Maneb is used, consequently the spray interval must be more than 7 days during harvest.

Treatment	Schedule (application time <sup>3</sup> )	Bacterial spot severity (%) <sup>1</sup>				Defolia- tion (%)	Yield (fruit/plant)				
		28 Aug	15 Sep	AUDPC	15 Sep		4 Aug - 9 Sep <sup>2</sup>			16 Sep - 8 Oct	
							#	lb	Total #	#	lb
Nontreated Control	.....	6.5 a <sup>4</sup>	29	780 a	30 a <sup>4</sup>	4.3	2.2	5.3	.58 b	.18 c	
Kocide + Maneb <sup>5</sup> Preventive	(1-10,12,13) ....	0.4 c	12	301 b	13 b	4.8	2.3	5.5	1.36 a	.51 ab	
Kocide + Maneb	Start at detection (4-10,12,13) ....	2.0 b	16	424 b	12 b	4.6	2.3	5.5	1.10 a	.38 ab	
Kocide	Start at detection (4-10,12,13) ....	1.4 bc	10	292 b	9 b	4.6	2.3	5.5	1.43 a	.52 a	
Kocide + Maneb	Start at detection (4-9,11) Delay when <60F at night .....	1.9 b	13	364 b	9 b	4.1	2.1	5.4	1.43 a	.50 ab	
Kocide + Maneb	Start at detection (4-8) End treatment in Sep .....	2.0 b	14	424 b	13 b	4.5	2.2	5.4	.96 b	.32 bc	
P-value		0.0001	0.17	0.027	0.0124	0.70	0.86	0.997	0.014	0.011	

<sup>1</sup> Percent of leaf tissue in a plot with symptoms.  
<sup>2</sup> Number and weight of marketable fruit and total number of fruit (including unmarketable fruit) harvested from 4 Aug to 9 Sep.  
<sup>3</sup> Application times were: 1=8 Jul, 2=14 Jul, 3=21 Jul, 4=29 Jul, 5=5 Aug, 6=14 Aug, 7=20 Aug, 8=30 Aug, 9=5 Sep, 10=13 Sep, 11=17 Sep, 12=19 Sep, and 13=26 Sep.  
<sup>4</sup> Numbers in a column with a letter in common are not significantly different according to Fisher's Protected LSD (P=0.05).  
<sup>5</sup> Kocide 2000 at 2 lb/A + Maneb 75DF at 1.5 lb/A.  
 Vegetables