

CUCUMBER (*Cucumis sativus*)
Phytophthora Blight and Fruit Rot;
Phytophthora capsici

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Evaluation of fungicides to control Phytophthora blight and fruit rot of cucumber, 2004.

A field trial was established on a commercial farm near Bancroft, in central WI to evaluate efficacy of selected fungicides to control Phytophthora blight and fruit rot. The trial was placed in a field with a history of severe loss due to this disease. Seeds of cultivar Viaspik were planted 22 Jul by the grower, at approximately eight seeds per ft, using standard planting equipment. Areas in the field were staked in August to establish plots arranged in a randomized complete block design with four replications. Each plot consisted of three 6-ft-wide beds with three 20-ft-long rows planted in each bed. Soil was sandy loam with pH 6.5. Plots were fertilized with liquid formulation 9-6-6-1S (26 gal/A) at planting, 34-0-0 (66 lb/A) + Cal Sul (33 lb/A), on 5 Aug and an application of 28% UAN through the irrigation (35 lb N/A), on 24 Aug. Weeds were controlled with application of Curbit EC (2.75 pt/A), pre-emergence, on 23 Jul. Fungicide (Champ Flowable, 1 pt/A + Ultra Flourish, 6 fl oz/A) was applied by the grower 9 Sep to the commercial field surrounding the trial, and plants from the this area were evaluated at harvest to provide a grower standard for comparison with the experimental treatments in the trial. Experimental foliar fungicide treatments were applied 10 and 17 Sep, at 19 psi with a tractor-mounted boom sprayer with a roller pump, equipped with XR11004 extended range flat fan nozzles (13 nozzles, spaced 20-in. apart) delivering 33.6 gal/A. Plots were not inoculated, relying on natural infestation of *Phytophthora capsici*. The area chosen for the trial was a low, poorly drained area with a history of severe disease and fruit rot. All plants from a 5-ft-long section of the center row of each of the three beds in each plot were harvested 24 Sep and evaluated for yield and disease symptoms. Each vine was categorized as healthy or showing symptoms of Phytophthora blight, and all fruit > 1.5-in.-long were picked and separated into healthy fruit and those with symptoms of Phytophthora rot. The number and weight of healthy and diseased fruit were recorded. Up to 50 healthy-appearing fruit were selected at random from the yield from each plot and stored at approximately 60° F and > 90% relative humidity. The stored fruit were rated for incidence of symptoms of Phytophthora rot on 28 Sep, 6 Oct and 13 Oct (diseased fruit were discarded on each rating date and only those with no symptoms were returned to storage for later rating). Rainfall plus irrigation (in.) measured for the field was Jul – 4.5, Aug – 1.75, Sep (up to commercial harvest) – 1.25. Commercial harvest in the field took place a week before disease evaluation was done in the experimental plots. An additional 2.25 in. of water was applied as irrigation during this week to enhance disease development in the plots.

Weather conditions during August and September were favorable for disease development. When commercial harvest was done, a buffer area around the trial was not harvested and samples were taken from this area as a grower standard for comparison with experimental treatments. At the time of evaluation of the trial, there was standing water in much of this commercial area which had not been harvested, and little standing water in the experimental trial area. Severity of Phytophthora fruit rot symptoms reflected this, with a much higher number of diseased fruit found in the commercial areas than in our untreated control. In fruit stored after harvest, the highest incidence of fruit decay symptoms was also observed in the commercial samples. No diseased vines were observed in any of the plots. A few diseased fruit were observed in all treatments within the experimental trial area. There were no significant differences in level of disease between experimental treatments in the trial but all treatments, including the untreated control in the trial area, had significantly less disease than the grower standard samples from the commercial area of the field.

Table 1. Summary of treatments applied.

#	Treatment, rate/A formulated product and application schedule
1	Untreated control
2	Tanos 8 oz + Kocide 2000 1.5 lb + Manex 4F 1.6 qt, Appl 1 Acrobat 50 WP 6.4 oz + Kocide 2000 1.5 lb, Appl 2
3	Tanos (KP481) 10 oz + Kocide 2000 1.5 lb + Manex 4F 1.6 qt, Appl 1 Acrobat 50 WP 6.4 oz + Kocide 2000 1.5 lb Appl 2
4	Acrobat 50 WP 6.4 oz + Kocide 2000 1.5 lb, Appl 1 2
	Grower standard: Champ 1 pt/A + Ultra Flourish, 6 fl oz/A, 9 Sep

Table 2. Effect of fungicide treatment on disease development on vines and fruit, and yield of cucumbers.

Treatment no.	Vines/15 feet of row			Fruit harvested/15 feet of row						Yield of healthy fruit (ton/A, hand harvest)	Relative yield (as % of grower standard) ¹	Adjusted yield, relative to commercial harvest (ton/A) ²	Relative gross value of yield (\$/A) ³	% Diseased fruit			Total % of stored fruit with symptoms of disease
	Number		Incidence of diseased vines (%)	Number		Incidence of diseased fruit (%)	Weight (lb)		Diseased fruit (% by weight)					28 Sep	6 Oct	13 Oct	
	Healthy	Diseased		Healthy	Diseased		Healthy	Diseased									
1	45.0	0	0	55.5	0.5	0.8	21.3	0.1	0.3	15.5	228	11.4	1505	0.0	6.0	3.0	9.0
2	42.3	0	0	56.3	0.3	0.4	20.3	0.1	0.6	14.7	216	10.8	1426	0.6	4.9	2.0	7.5
3	40.3	0	0	50.5	0.0	0.0	20.5	0.0	0.0	14.9	219	11.0	1452	0.0	2.5	4.1	6.7
4	43.3	0	0	61.8	3.0	4.0	22.0	0.9	3.6	16.0	235	11.8	1558	0.5	2.5	2.0	5.0
Grower standard ¹	44.5	0	0	31.8	28.3	48.5	9.3	5.3	41.8	6.8	100	5.0	660	28.6	55.4	4.5	88.6
<i>P</i> > <i>F</i> ⁴	---	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	---	0.08	<0.01	0.67	<0.01
LSD ⁴	---	---	---	12.8	5.9	12.0	4.8	1.3	14.8	3.5	---	---	---	NS	18.1	NS	14.9

1. Samples were taken from adjacent areas of the commercial field which were not commercially harvested. Commercial harvest was done a week prior to our evaluation so fruit had grown past commercial size and total weight of yield was much higher for our trial than at the time of commercial harvest. Setting the yield for samples from the commercial field as 100%, relative yield of the other treatments is expressed as a percentage of this.
2. Actual commercial harvest was 5.0 ton/A with a value of \$132/ton. Figures in this column are the result of multiplying this value for commercial harvest by the % relative yield (the column to the left).
3. Adjusted yield x value of \$132/ton.
4. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS = not significant at *P* = 0.05.