MANAGEMENT STRATEGIES OF *PHYTOPHTHORA CAPSICI*

A.S. Csinos, Lara Lee Hickman, and Unesssee Hargett
Department of Plant Pathology
University of Georgia
P.O. Box 748
Tifton, Ga. 31793

Introduction

Phytophthora capsici is a soil borne disease that causes serious losses to cucurbits, peppers, and tomatoes in Georgia. This organism has three phases of the disease that may cause damage to crops. The root rot phase kills individual plants by attacking the root system. A crown rot phase, which attacks the above ground portion of the plant and a third phase a fruit rot. This trial evaluated several new fungicides alone and in combination both in plasticulture and bare ground.

Methods and Materials

Two trials using drip application under plasticulture and a single trial on bare ground was established in the *P. capsici* nursery at the Black Shank Farm, Tifton, Ga. on 15 August. Yellow squash cultivar 'Prelude II' was transplanted on 15 August. The individual tests were a randomized complete block design with four replications,. The drip tape was Aquatraxx™ with a 12-inch emitter spacing, and a flow rate of .45 gal/min with a 12-PSI regulator. Individual applications were made on a seven-day schedule with an injection period of two hours. The applications for the bare ground trial were made every seven days with a CO_2 powered sprayer. Each plot was inoculated the day after transplanting on 16 August, by placing 1/8 teaspoon of *P. capsici* infested beet seed (approximately 15-20 seed) in three locations in each plot just below the soil surface. Plots in all three tests were irrigated with additional overhead water twice a day starting on 14 September and ending on 03 October.

Results and Conclusions

The month of September 2005 was one of the driest and hottest on record. These conditions are not good for disease development, and thus an irrigation regime was initiated at the last few weeks of the test to simulate wet conditions typically associated with *P. capsici* epidemics.

None of the treatments in the Drip 1 test were significantly different from the non-treated control in the total yield, or marketable yield. However, total number of fruit was increased, and disease index and percent diseased plants decreased for Prophyt at 8 pt/A applied six times. In Drip 2 test, only Ridomil Gold plus mandipropamid had total yield higher than the non-treated control. Although no other treatments showed significant differences from the non treated control, several treatments tended to have reduced disease and increased yields. In the Foliar applied study only Reason plus Previcur Flex

had significantly higher total yield and marketable yield, than the non-treated control. However several treatments, Reason plus Previcur Flex, Ridomil Gold plus mandipropamid, Prophyt plus Bravo, Valent plus Previcur Flex, and Captan plus TM-473 reduced the disease index over the non-treated control. These tests would suggest that with some products, application methods might influence efficacy of the fungicide.

2005 Drip Application of Candidate fungicides for Management of *P. capsici* (Drip Test 1)

		Marketable		Cull		Total Yeild		Disease	
Treatment[1]	Vigor[2]	Number[3]	Yield[4] (in lbs.)	Number[5]	Yield[6] (in lbs.)	Total Number[7]	Total Yield[8] (in lbs.)	Index[9]	Percent[10]
1	7.0 a	20.8 a	9.5 a	1.8 c	1.5 ab	22.5 b	11.0 a	24.8 a	85.0 a
2	5.3 a	21.8 a	8.3 a	4.3 bc	0.4 b	26.0 ab	8.7 a	21.8 ab	85.2 a
3	5.3 a	19.0 a	7.6 a	4.6 bc	2.1 ab	23.6 ab	9.7 a	21.7 ab	73.3 ab
4	6.3 a	19.5 a	8.6 a	5.8 abc	2.0 ab	25.3 ab	10.6 a	23.3 ab	80.0 ab
5	6.6 a	19.8 a	8.2 a	9.3 ab	4.4 a	29.0 ab	12.6 a	16.7 ab	75.0 ab
6	6.6 a	19.8 a	8.7 a	2.5 bc	1.2 ab	22.3 b	9.9 a	21.5 ab	80.0 ab
7	5.5 a	23.8 a	9.8 a	11.8 a	3.5 ab	35.5 a	13.2 a	11.7 b	48.3 b

[1] Data are means of five replications. Means in the same column followed by the same letter are not different (P=0.05) according to Duncan's multiple range test. No letters indicate non-significant difference.

[2] Vigor was done on a scale of 1-10 with 10= live and healthy plants and 1 = dead plants and an average was taken of vigor for 30 August and 12 September.

[3] The fruit collected from each individual plot that was considered to be marketable and showed no symptoms of disease was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[4] The fruit was collected separately by each plot and the fruit considered marketable and non-diseased was weighed (in lbs.) on 15 September, 20 September, 27 September, and 04 October.

[5] The fruit collected from each individual plot that was considered diseased and non-marketable was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[6] The fruit was collected separately by plot and the fruit diseased and non-marketable was weighed (in lbs.) on 15 September, 20 September, 27 September, and 04 Oct.

[7] Equals total number of fruits harvested both marketable and culls

[8] Equals total yield (in lbs.) of fruits harvested both marketable and culls.

[9] Disease index was calculated by averaging the percent disease at each of the seven stand counts, summing the averages, and dividing the number by seven.

[10] Percent Disease was calculated by dividing the total dead plants by the initial stand count and multiplying by 100.

2005 Drip Application of Candidate fungicides for Management of *P. capsici* (Drip Test 2)

		Marketable		Cull		Total Yield		Disease	
Treatment[1]	Vigor[2]	Number[3]	Yield[4] (in lbs.)	Number[5]	Yield[6] (in lbs.)	Total Number[7]	Total Yield[8] (in lbs.)	Index[9]	Percent[10]
1	6.1 a	27.0 ab	10.3 abc	1.3 c	0.7 b	28.3 ab	11.0 b	26.5 ab	83.4 ab
2	6.5 a	31.5 ab	13.6 ab	0.0 c	0.0 b	31.5 ab	13.6 ab	26.5 ab	86.7 ab
3	7.4 a	35.5 a	16.0 a	7.0 a	2.7 a	42.5 a	18.7 a	16.3 b	58.3 b
4	6.8 a	21.8 b	10.3 abc	0.8 c	0.2 b	22.5 b	10.5 b	25.7 ab	86.7 ab
5	6.5 a	27.8 ab	9.8 bc	2.3 bc	0.4 b	30.0 ab	10.2 b	25.7 ab	86.7 ab
6	5.8 a	22.0 ab	7.3 c	3.3 bc	0.7 b	25.3 b	8.0 b	29.0 a	90.0 a
7	6.4 a	24.5 ab	11.6 abc	4.8 ab	1.9 ab	29.3 ab	13.4 ab	29.0 a	85.0 ab

[1] Data are means of five replications. Means in the same column followed by the same letter are not different (P=0.05) according to Duncan's multiple range test. No letters indicate non-significant difference.

[2] Vigor was done on a scale of 1-10 with 10= live and healthy plants and 1 = dead plants and an average was taken of vigor for 30 August and 12 September.

[3] The fruit collected from each individual plot that was considered to be marketable and showed no symptoms of disease was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[4] The fruit was collected separately by each plot and the fruit considered marketable and non-diseased was weighed (in lbs.) on 15 September, 20 September, 27 September, and 04 October.

[5] The fruit collected from each individual plot that was considered diseased and non-marketable was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[6] The fruit was collected separately by plot and the fruit diseased and non-marketable was weighed (in lbs.) on 15 September, 20 September, 27 September and 04 Oct.

[7] Equals total number of fruits harvested both marketable and culls

[8] Equals total yield (in lbs.) of fruits harvested both marketable and culls.

[9] Disease index was calculated by averaging the percent disease at each of the seven stand counts, summing the averages, and dividing the number by seven.

[10] Percent Disease was calculated by dividing the total dead plants by the initial stand count and multiplying by 100.

2005 Foliar Application of Candidate fungicides for Management of *P. capsici*

		Marketable		Cull		Total Yield		Disease	
Treatment[1]	Vigor[2]	Number[3]	Yield[4] (in lbs.)	Number [5]	Yield[6] (in lbs.)	Total Number[7]	Total Yield[8] (in lbs.)	Index[9]	Percent[10]
1	6.4 bc	16 bcd	9.2 bc	6.4 ab	3.0 ab	22.4 bc	12.2 bc	32.7 a	87.8 ab
2	8.1 ab	17.6 bcd	10.1 b	4.4 b	2.9 ab	22 bc	13 ab	27.9 ab	88.0 a
3	8.6 a	26.4 a	14.7 a	5.8 ab	2.5 ab	32.2 a	17.2 a	15.3 b	69.3 a-d
4	6.9 abc	22.6 ab	11.3 ab	6.8 ab	4.3 ab	29.4 ab	15.6 ab	15.1 b	46.7 ed
5[11]	3.9 d	12 d	5.1 c	7.8 ab	2.9 ab	19.8 c	8.1 c	15.0 b	53.4 cde
6	5.2 cd	16.2 bcd	9.1 bc	5.6 ab	3.7 ab	21.8 bc	12.8 abc	22.8 ab	80.4 ab
7	7.2 ab	21.2 abc	12.0 ab	7.8 ab	3.8 ab	29 ab	15.7 ab	17.5 b	63.6 b-e
8	6.5 bc	21 abc	11.9 ab	5.2 b	2.1 b	26.2 abc	14 ab	26.7 ab	71.8 abc
9	7.1 ab	16.6 bcd	8.9 bc	11.2 a	4.5 ab	27.8 abc	13.4 ab	15.1 b	42.4 e
10	6.6 bc	15.2 cd	9.5 b	9.8 ab	5.3 a	25 abc	14.8 ab	26.5 ab	74.7 abc

[1] Data are means of five replications. Means in the same column followed by the same letter are not different (P=0.05) according to Duncan's multiple range test. No letters indicate non-significant difference.

[2] Vigor was done on a scale of 1-10 with 10= live and healthy plants and 1 = dead plants and an average was taken of vigor for 30 August and 12 September.

[3] The fruit collected from each individual plot that was considered to be marketable and showed no symptoms of disease was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[4] The fruit was collected separately by each plot and the fruit considered marketable and non-diseased was weighed (in lbs.) on 15 Sept., 20 Sept., 27 Sept. and 04 Oct.

[5] The fruit collected from each individual plot that was considered diseased and non-marketable was separated and counted on 15 September, 20 September, 27 September, and 04 October.

[6] The fruit was collected separately by plot and the fruit diseased and non-marketable was weighed (in lbs.) on 15 September, 20 September, 27 September and 04 Oct.

[7] Equals total number of fruits harvested both marketable and culls

[8] Equals total yield (in lbs.) of fruits harvested both marketable and culls.

[9] Disease index was calculated by averaging the percent disease at each of the seven stand counts, summing the averages, and dividing the number by seven.

[10] Percent Disease was calculated by dividing the total dead plants by the initial stand count and multiplying by 100.

[11] Phytotoxicity was observed after the second spray and rate was reduced by fifty percent for the remaining four sprays.