Fungicide Trials for Phytophthora Blight of Tropical Pumpkin

Researchers:
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Dates of Experiment:
July to September 2005

Introduction

Tropical pumpkin (*Cucurbita moschata* Duchesne) is an important food crop in Latin America. It is very susceptible to the pathogen *Phytophthora capsici*, which, under appropriate conditions, can cause devastating losses to the crop. This study evaluated the ability of several experimental and standard fungicides to control this pathogen in this crop.

Figure 1: Tropical pumpkin (*Cucurbita moschata*)

Description of Experiment:

A field at the University of Florida – IFAS Plant Science Research and Education Unit in Citra, Florida that consisted of Kendrick loamy sand was planted with tropical pumpkin (a.k.a. "calabaza" cultivar "La Estrella") seed on July 14, 2005. Seeds were planted 3 feet apart in 3 foot-wide raised beds that were on 6 foot centers. The beds had been fumigated earlier with methyl bromide and chloropicrin and then covered with 1.25 mil reflective plastic mulch. Plants were irrigated and fertilized through drip irrigation. Seven different fungicide programs were tested (see table 1). Fungicide treatments were applied eight times during the season at 7 to 14 day intervals, starting at planting time and ending on October 6, 2005. However, depending on the program of applications, not all plots were treated each time (see table 1 and 2). The initial fungicide application for each program was made by soil drench, other applications by foliar spray. The first three sprays in each program were applied with a CO_2 backpack sprayer at 30 lb/in^2 (psi) in 50 gpa water, through a single 8008 TeeJet® flat fan tip. Subsequent spray applications were

applied at 30 psi using two 8004 TeeJet® flat fan tips on a 30 in. boom. Each fungicide treatment program and a non-treated control were replicated three times, using six-plant plots arranged in a randomized complete block design. Inoculum sources for the experiment were provided by planting two tropical pumpkin plants that were infected with *Phytophthora capsici* on the ends of each plot. (These plants were inoculated on August 17 by applying 10 ml of a suspension of $3.3x10^5$ zoospores/ml of the fungus to the base of each plant.) Following the application of the fungicides, plants were inspected for symptoms of phytotoxicity (necrosis, plant distortion, etc.). Plants were monitored for Phytophthora blight incidence on August 25, September 1, 5, 11, and 16, and October 6. Ratings for percent blight incidence at the end of the experiment included all dead and dying plants. Rainfall for July and September was below normal, while rainfall during August was above normal. Plants were harvested on September 28. Data were analyzed using Fisher's Protected LSD ($P<0.05$), following transformation of percentage data. In figures 1 through 4 below, the means within columns followed by the same letters are not significantly different at $P<0.05$ by Fisher's Protected LSD. Arc sine square root transformation was performed on the means prior to data analysis. However, non-transformed data is presented in the figures.

Figure 2: Field planted with tropical pumpkin.

Figure 3: Tropical pumpkin plants infected with *Phytophthora capsici.*

Results:

No symptoms of fungicide-induced phytotoxicity were detected at any time during the experiment. Due to the unusually dry weather in July and September, Phytophthora blight developed slowly. It reached 100% in non-treated controls by the end of the experiment though. All programs except for #4 reduced Phytophthora blight incidence (figure 4). All programs except for #4 and #8 reduced the area under the disease incidence progress curve (figure 5). Although most programs increased the weight of marketable fruit (figure 6) and decreased fruit rot incidence (figure 7), significant differences among the fungicide treatments and non-treated control were not observed with these parameters. Data for marketable fruit weight was based on one harvest of six plants per plot.

Program	Treatment and Rate/Acre
1	Omega 500 F 1.5 pt (A) Omega 500 F 1.0 pt (B) Ranman 400 SC 2.75 fl oz + Kocide 2000 DF 2 lb (CDEF)
2	Ridomil Gold 47.6 EC 1.0 pt (A) Tanos 50 DF 10 oz + Manex 37 F 1.6 qt (BDFH) Forum 4.16 SC 6.2 oz + Kocide 2000 DF 2 lb (CEGI)
3	AgriFos 400 L 2 qt (A) AgriFos 400 L 2 qt + Bravo Ultrex 82.5 WDG (BCDEFGHI)
4	Ridomil Gold 47.6 EC 1 pt (A) Ridomil Gold Copper 65 WP 2.5 lb (BDFH) Forum 4.16 SC 6.2 oz (CEGI)
5	Ridomil Gold 47.6 EC 1 pt (A) Ridomil Gold Copper 65 WP 2.5 lb (BDFH) V-10161 4 F 2.81 oz + Previcur Flex 6 F 1.2 pt (CEGI)
6	Prophyt 4 L 4 pt (A) Prophyt 4 L 5 pt + Bravo Ultrex 82.5 WDG 2 lb (BCDEFGHI)
7	Ridomil Gold 47.6 EC 1 pt (A) Ridomil Gold Copper 65 WP 2.5 lb (BDFH) Reason 500 SC 5.5 oz + Previcur Flex 6 F 1.2 pt (CEGI)

Table 1: Programs of fungicide treatments used in the experiment

Letter	Date	Letter	Date
A	July 14	F	August 25
B	July 28	G	September 1
C	August 4	H	September 22
D	August 11	I	October 6
E	August 18		

Table 2: Treatment times for the programs

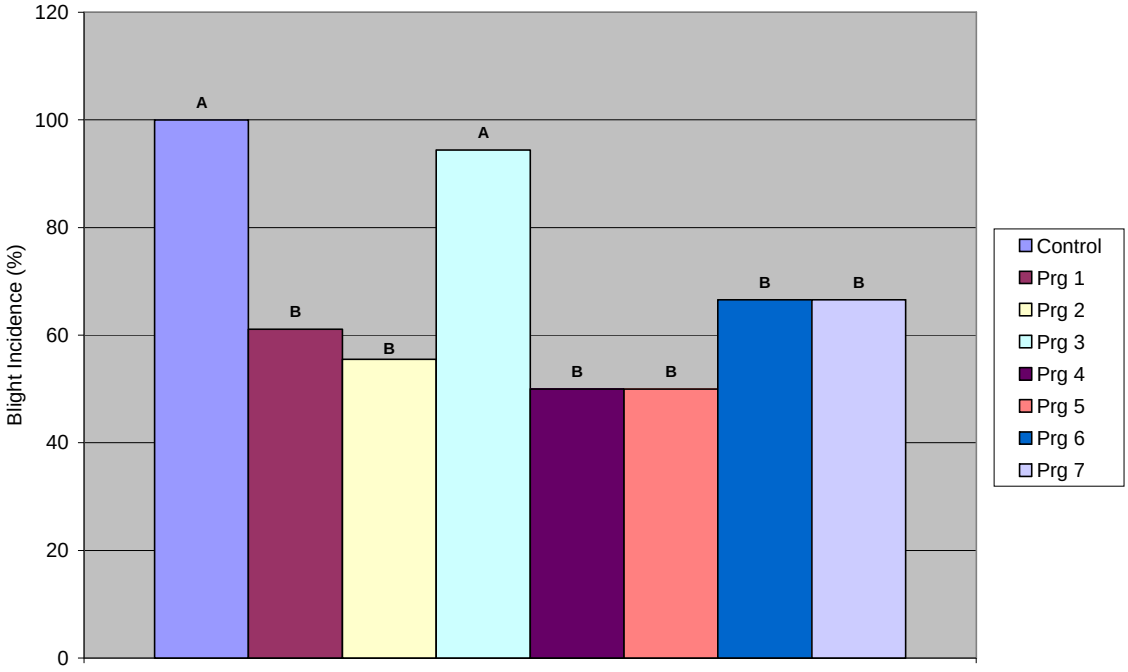

Figure 4: Impact of fungicides on Phytophthora blight incidence on tropical pumpkin.

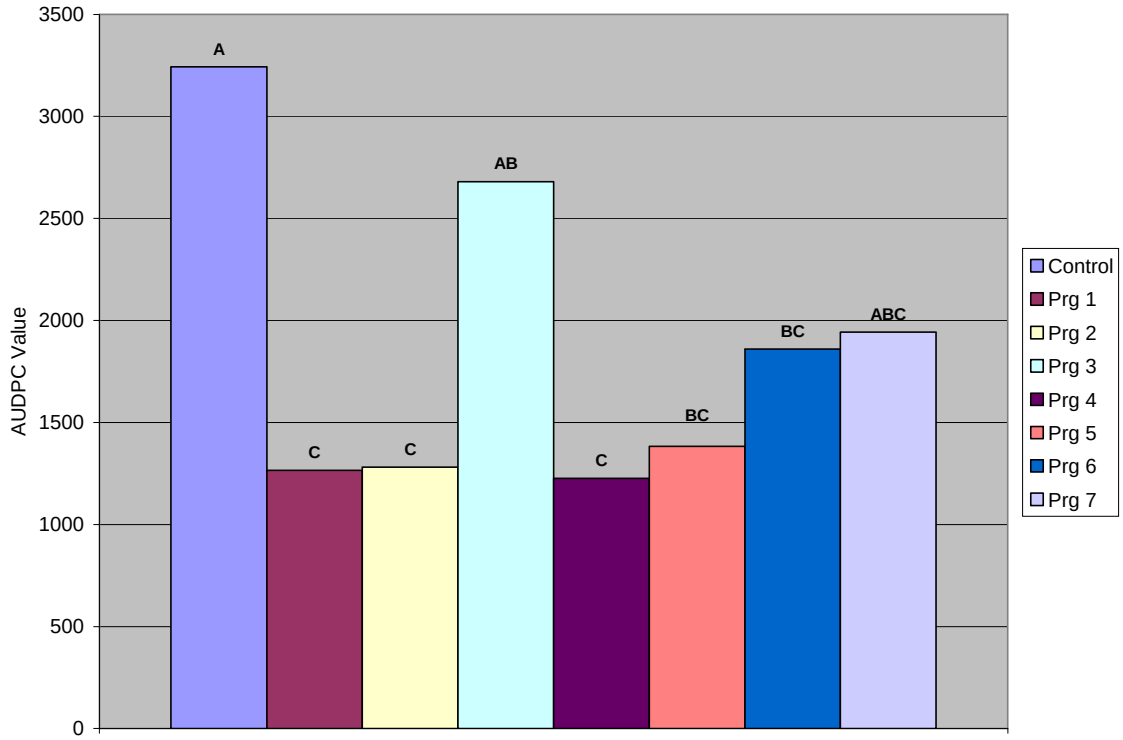

Figure 5: Impact of fungicides on the Area Under the Disease Incidence Progress Curve (AUDPC) for Phytophthora blight in tropical pumpkin.

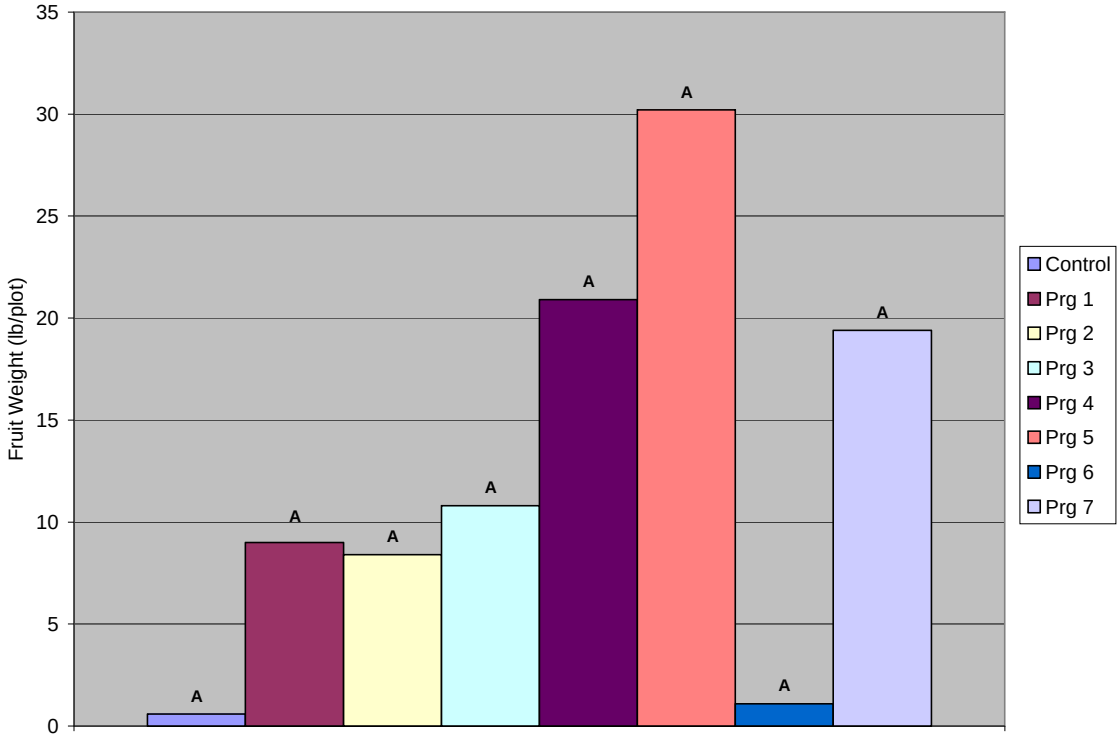

Figure 6: Impact of fungicides on marketable fruit weight of tropical pumpkin.

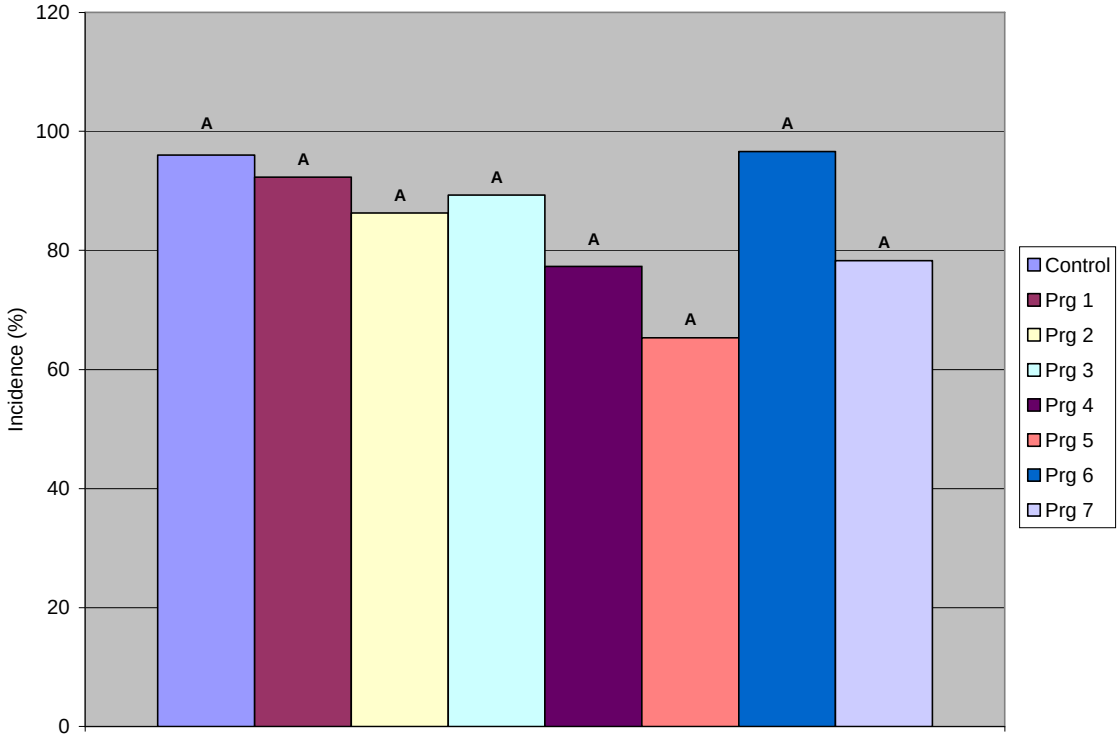

Figure 7: Impact of fungicides on fruit rot incidence in tropical pumpkin.