

**EFFECT OF SELECTED FUNGICIDES ON  
COTTON SEEDLING DISEASE IN ALABAMA**  
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**Abstract**

Two cotton seedling disease fungicide tests were conducted at three locations on the Auburn University Tennessee Valley Substation, Wiregrass Substation and the Prattville Experiment Field in 1999. Treatments of test 1 consisted of in-furrow applications of Terraclor Super X 18.8 applied at 7.0 and 5.5 lb/A, Terraclor Super X + WGB 49 applied at 7.4 and 5.5 lb/A, Ridomil Gold PC 11G applied at 7.0 lb/A, Rovral applied at 5.0 oz/A and an untreated control. Treatments of test 2 consisted of in-furrow applications of Quadris applied at 8.35 and 5.5 fl oz/A, Terraclor applied at 7.4 fl oz/1000 ft row, Ridomil and Terraclor applied at 0.75 and 7.4 fl oz/ 1000 respectively, seed treatment applications of Protégé + Allegiance (40ppm) + Ascend applied at 0.75 fl oz/cwt, Protégé + Allegiance (40ppm) + Quadris 0.75 fl oz/cwt and an untreated control. The plots were inoculated with millet seed infested with *Rhizoctonia solani* and *Pythium* spp. At 21 and 35 days after planting significant increases in stand were observed between all fungicide treatments and the untreated control in both tests. Plant stand at 35 days after planting ranged from 2.19 to 0.43 plants per foot of row from the Terraclor Super X + WGB 49 at 7.4 lb/s and the untreated control respectively in test 1. In test 2 plant stand at 35 days after planting ranged from 1.88 to 0.46 plant per foot of row from Quadris at 8.35 fl oz/A and the untreated control respectively. Seed cotton yields in test 1 were significantly increased over the untreated control by all fungicide treatments except Terraclor Super X + WGB49 at the low rate. In test 2, seed cotton yields were also significantly increased by all fungicide treatments over the untreated control. The average fungicide cost was \$16.70 per acre. The average net value increase in cotton yield over the control at \$0.60 lb was \$69.70 with an average return to the producer of \$ 52.97.

**Introduction**

Seedling disease of cotton is a major problem across the cotton belt. Seedborne and soilborne organisms, acting singly or in combination produce the seedling disease complex of cotton. The seedling disease complex is composed of several fungi which cause serious problems wherever cotton is grown. Losses attributed to seedling disease, across the cotton belt usually average at approximately 4.0% . The soil

borne pathogens most commonly involved in the seedling disease complex in Alabama include *Pythium* spp., *Fusarium* spp., and *Rhizoctonia solani*. These soil fungi may produce symptoms alone or in combination. Plant-pathogenic nematodes are often associated with these fungi, and in combination can produce disease more severe than the fungi alone. The seedling disease syndrome includes the pregermination decay of the seed, preemergence damping off, postemergence damping off and seedling root rot. The effects of seedling root rot are often subtle and lead to long-lasting weakness of the plant and thereby reduce yields. Most of the pathogens involved in the seedlings disease complex are ubiquitous fungi that are associated with many other hosts as well as with cotton. The fungi that cause these diseases are carried in the soil and can attack either seed or seedling. The organisms that cause seedling disease are found in all cotton producing areas of the United States, but populations and virulence differ from area to area thus demonstrating the necessity of testing the various recommended control practices across a wide geographic area.

The objective of our research was to examine the influence of experimental and currently recommended in-furrow applied fungicides for control of the seedling disease complex of cotton and subsequent effects on the growth and development of the cotton plant and yield responses.

**Materials and Methods**

Two cotton seedling disease fungicide tests were conducted at three locations, the Tennessee Valley Substation located in north Alabama, the Wiregrass Substation located in south Alabama and the Prattville Experiment Field in central Alabama.. Treatments of test 1 consisted of in-furrow applications of Terraclor Super X 18.8 applied at 7.0 and 5.5 lb/A, Terraclor Super X + WGB 49 applied at 7.4 and 5.5 lb/A, Ridomil Gold PC 11G applied at 7.0 lb/A, Rovral applied at 5.0 oz/A and an untreated control. Treatments of test 2 consisted of in-furrow applications of Quadris applied at 8.35 and 5.5 fl oz/A, Terraclor applied at 7.4 fl oz/1000 ft row, Ridomil and Terraclor applied at 0.75 and 7.4 fl oz/ 1000 respectively, seed treatment applications of Protégé + Allegiance (40ppm) + Ascend applied at 0.75 fl oz/cwt, Protégé + Allegiance (40ppm) + Quadris 0.75 fl oz/cwt and an untreated control. Treatments of each test were arranged in a randomized complete block design with four or five replications. Plots were planted between April 20 and May 3, 1999. Plots were rated at 21 and 35 days after planting to determine the percent seedling loss, stand uniformity and plant vigor. Cotton seedlings were collected and aseptically plated on Potato Dextrose Agar (PDA) to isolate and identify the specific fungi present. The number of open and closed bolls were determined three weeks before harvest to determine fungicide effects on in plant maturity. All plots

were harvested using one row cotton pickers to determine the effects of the treatments on cotton yields.

### **Results and Discussion**

Cotton seedlings emerged within 7 to 10 days after planting. Significant differences in cotton stand were observed at 21 and 35 days after planting in both tests at all locations (Table 1 and 2). In test 1, at 21 days after planting, seedling stand ranged from 1.75 to 0.41 plants per foot of row in the Terraclor Super X + WGB 49 at 7.4 lb/A and the untreated control plots, respectively. In test 2, at 21 days after planting, seedling stand ranged from 0.91 to 0.28 plants per foot of row in the Quadris at 8.35 fl oz/A and the untreated control plots, respectively. *Rhizoctonia solani*, was isolated from the diseased cotton seedlings most frequently in all locations. Seedling stand and a skip index rated at 35 days after planting in test 1 and 2. In test 1, seedling stand ranged from 2.19 to 0.43 plants per foot of row from the Terraclor Super X + WGB 49 at 7.4 lb/s and the untreated control respectively. All fungicide treatments also had a lower skip index than the untreated control indicating these plots produced a more even stand. In test 2, plant stand at 35 days after planting ranged from 1.88 to 0.46 plant per foot of row from Quadris at 8.35 fl oz/A and the untreated control respectively. All fungicide treatments also had a lower skip index than the untreated control. Quadris at 5.56 fl oz/A produced the most uniform stand with a skip index of 2.5 compared to the control at 15.6. Cotton plant development was determined by the number of open bolls per plant at approximately 100 days after planting. No significant differences in the number of open bolls per plant were observed between treatments of test 1 or 2 (Table 3 and 4).

In test 1, seed cotton yield ranged from a high of 2506.2 to 2142.6 lb/A from the Ridomil Gold PC11G and the untreated control treatments respectively (Table 3 and 4). Seed cotton yields were significantly increased over the untreated control by all fungicide treatments except Terraclor Super X + WGB49 at the low rate. In test 2, seed cotton yields were also significantly increased by all fungicide treatments over the untreated control. Seed cotton yields ranged from a high of 2855.3 to 1449.7 lb/A from the Quadris at 5.56 fl oz/A and the untreated control respectively.

### **Economic Analysis**

An economic analysis indicates that all fungicide treatments had positive net returns above direct cost of the materials using the assumption of current input prices and the product price of \$0.60/lb of cotton .

Yield data in test 1 indicates an average lint yield across treatments of 962.6 pounds representing a 105.6 increase over the control. The value of this additional yield using a market price of \$0.60/lb is \$63.36/acre. Yield data in test 2

indicates an average lint yield across treatments of 1064 pounds representing a 126.6 increase over the control. The value of this additional yield using a market price of \$0.60/lb is \$75.98/acre.

Using the commercial materials (Terraclor Super X, Ridomil Gold, Rovral, and Quadris) the average cost per acre using rates in the experiment is \$16.70/acre. Comparing the additional cost to the additional revenue of \$52.97/acre return to fungicide use is realized. Therefore sufficient additional revenues are generated to cover all extra cost.

### **Disclaimer**

The interpretation of data presented may change with additional experimentation. Information is not to be construed either as a recommendation for use or as an endorsement of a specific product by Auburn University.

Table 1. Effects of Selected fungicides on Cotton Stand- Test 1, 1999.

Fungicide rate/acre	Stand 21DAP	Stand 35DAP	Skip Index	Plant Vigor
TSX G 7 lb	41	49	5.3	2.2
TSX G 5.5lb	20	29	9.1	1.8
TSXWGB 5.5lb	38	43	7.3	2.2
TSXWGB 7.4lb	44	55	5.0	2.1
TSX EC	43	49	4.5	2.2
Ridomil Gold PC	39	47	4.5	2.0
Rovral	40	41	8.4	2.3
Control	10	11	13.8	2.3
FLSD (0.05)	7.9	8.8	1.8	0.3

Table 2. Effect of Selected Fungicides on Cotton Yield - Test 1, 1999.

Fungicide rate/acre	Percent Open Bolls	Seed Cotton Yield lb/a
TSX G 7 lb	55.4	2434.6
TSX G 5.5lb	55.9	2399.4
TSXWGB 5.5lb	56.4	2282.9
TSXWGB 7.4lb	56.9	2411.5
TSX EC	57.7	2417.3
Ridomil Gold PC	56.5	2506.2
Rovral	56.3	2394.2
Control	54.2	2142.6
FLSD (0.05)	7.4	201.3

Table 3. Effects of Selected fungicides on Cotton Stand- Test 2, 1999.

Fungicide rate fl oz	Stand 21DAP	Stand 35DAP	Skip Index	Plant Vigor
Quadris 5.56/A	23	44	2.5	0.8
Quadris 8.35/A	23	47	5.2	0.9
Terraclor 7.4/ 1000 ft row	22	39	4.6	1.0
Ridomil +Terraclor 0.75 +7.4/1000 ft row	19	38	3.2	0.9
Protégé + Alligiance	10	19	9.2	1.2
Ascend 0.75 fl oz/cwt Protégé + Alligiance	21	41	3.3	0.9
Quadris 0.75 fl oz/cwt				
Control	7	12	15.6	1.4
FLSD (0.05)	12	12	5.9	0.8

Table 4. Effects of Selected fungicides on Cotton Yield- Test 2, 1999.

<b>Fungicide rate fl oz</b>	<b>Percent Open Bolls</b>	<b>Seed Cotton Yield lb/A</b>
Quadris 5.56/A	53.1	2855.3
Quadris 8.35/A	52.3	2518.8
Terraclor 7.4/ 1000 ft row	52.8	2635.1
Ridomil +Terraclor 0.75 +7.4/1000 ft row	53.5	2632.3
Protégé + Alligiance	58.3	2343.8
Ascend 0.75 fl oz/cwt		
Protégé + Alligiance	58.7	2660.4
Quadris 0.75 fl oz/cwt		
Control	53.1	1449.7
FLSD (0.05)	9.2	269.3