

# Damping-off in cotton controlled with combination seed treatment fungicides

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**D**amping-off of cotton seedlings in southern California is caused by two fungi, *Rhizoctonia solani* and *Pythium* spp. Seed rot and seedling decline are particularly severe during cool, wet weather and when soil temperatures are below 60° F. Several new fungicides were tested against common, standard, commercial fungicides.

## 1975 trials

In the first trial, fungicides were applied as a spray to acid-delinted Delta Pine 61 variety cotton seeds, as they rotated in a small cement mixer. Three hundred cotton seeds were planted per plot in the field on April 16, and each plot was replicated five times. Two new systemic fungicides from Ciba Geigy (38140 and 29212) were tried alone and in combination with PCNB. Number of healthy appearing plants (counted on May 19) was: CG 38140 50W 2.4 ounces + PCNB 24 percent 12 ounces, 154; CG 29212 + PCNB 24 percent 12 ounces, 149; CG 38140 50W 2.4 ounces, 100; CG 29212 50W 2.4 ounces, 98; and the control or no treatment, 33. The combination treatments were significantly better than the Ciba-Geigy materials used alone. All fungicide treatments were significantly better than no treatment.

The second trial compared several combination treatments. Three hundred cotton seeds of acid-delinted Acala SJ-2 were planted per plot on May 16 and procedure was the same as the previous trial. Results are shown in table 1.

Terra-Coat L-21 24 ounces gave significantly more healthy plants than Terra-Coat L-21 12 ounces. All fungicide treatments were significantly better than no treatment.

**TABLE 1. Comparison of Treatments of Acid-delinted Acala SJ-2 Cotton Seed, Spring Trial, 1975**

Fungicide*	Rate oz/100 lb seed	No. healthy plants June 11
Terra-Coat L-21	24	145 a
Dexon 70W + Demosan 65W	3 6	145 a
Terra-Coat L-21	12	107 b
Vitavax 75W Kathon 84%	8 4	100 b
No treatment	—	17 c

\*Significant at the 1% level. Treatments with same letter are not significantly different.

## 1976 trials

Three hundred acid-delinted Delta Pine 61 treated cotton seeds were planted per plot on April 30 and each plot was replicated five times. Procedures were the same as in the previous trial and number of healthy plants were counted on May 27. Results are shown in table 2.

Ciba Geigy 38140 + PCNB and Terra-Coat L-21 12 ounces were significantly better than any of the other treatments. Terra-Coat L-21 24 ounces and Ciba Geigy 38140 alone provided intermediate control.

A second 1976 trial compared Ciba Geigy 48988 50W 1 or 2 ounces + PCNB 24 percent 12 ounces; Dexon 70W 3 ounces + Demosan 65W 10 ounces; and no treatment. Three hundred treated cotton seeds were planted on May 18 and each treatment was replicated five times. Number of healthy plants (counted on June 11) was: Ciba Geigy 48988 2 or 1 ounces + PCNB, 205 and 203 respectively; Dexon + Demosan, 197; and no treatment, 16. All treatments were significantly better than no treatment.

All treatments significantly increased the number of plants emerging, but Ciba Geigy 48988 provided the least disease on the roots.

**TABLE 2. Comparison of Treatments of Acid-delinted Delta Pine 61 Cotton Seed, Spring Trial, 1976**

Treatment*	Rate oz/100 lb seed	No. healthy plants May 27
Ciba Geigy 38140 + PCNB (1:4)	9	221 a
Terra-Coat L-21 Ciba Geigy 38140 50W	12 2	198 a 137 b
Terra-Coat L-21 No treatment	24 —	131 b 63 c

\*Significant at the 1% level. Treatments with same letter are not significantly different.

## 1977 trials

In greenhouse trials, *Pythium* inoculum was prepared by growing the fungus on potato dextrose broth agar and vermiculite. After the fungus had grown through the mixture, the inoculum was taken to the greenhouse and mixed with UC soil at a ratio of 1:9. Sixteen cotton seeds were planted per replicate in four 2¼ inch peat pots and replicated four times. Two weeks later, the number of emerged plants was counted. Roots were washed and the root system rated for disease. Average of two experiments is shown in table 3.

All treatments significantly increased the number of plants emerging, but Ciba Geigy 48988 provided the least disease on the roots.

In field trials, acid-delinted Delta Pine 61 cotton seeds were treated as in previous trials, and 300 seeds per replicate were planted on April 19. The plot was preirrigated before planting and replicated five times. Healthy appearing plants were counted on June 3. Results are shown in table 4.

Combination seed treatments were significantly better than all other treatments. BASF 389 was significantly better than no treatment, but did not give

**TABLE 3. Comparison of Treatments for the Control of *Pythium* Seed Decay and Damping-off of Cotton Seedlings, Greenhouse Trial, 1977**

Treatment*	No. plants emerged	Disease rating of root systems†
Ciba Geigy 48988 50W 1 oz	13.7 a	0.2
Dexon 70W 3 oz + Demosan 65W 10 oz	13.4 a	2.2
Terra-Coat L-21 12 oz	13.2 a	2.9
Thiram 40W 4.5 oz + Demosan 65W 10 oz	11.6 a	3.0
No treatment	3.0 b	3.9

\*Significant at the 5% level. Treatments with same letter are not significantly different.  
 † Scale of 0 to 4. 4 = severely diseased, reddish-brown roots.

**TABLE 4. Comparison of Treatments of Acid-delinted Delta Pine 61 Cotton Seed, Spring Trial, 1977**

Fungicide*	Rate oz/100 lb seed	No. healthy plants June 3
Terra-Coat L-21	12	189 a
Ciba Geigy 48988 50W + PCNB 75W	1	190 a
Difolatan 4F, + Demosan 65W	3 fl 10	186 a
Ciba Geigy 48988 50W + Demosan 65W	1 10	179 a
BASF 389F	8	60 b
No treatment	—	38 c
Boots 7503 25W	4	24 c
Boots 7503 25W	16	20 c

\*Significant at the 5% level.

adequate commercial control of damping-off.

In a second trial, we compared BASF 389 alone; in combination with Ciba Geigy 48988; and against a standard commercial treatment of Dexon plus Demosan. Treatments were applied as in previous trials and 300 acid-delinted Delta Pine 61 cotton seeds were planted per replicate on May 19. Plots were replicated five times.

Number of healthy appearing plants on June 20 per replicate was: Ciba Geigy 48988 50W 1 ounce + BASF 389 8 ounces, 218; Dexon 70W 3 ounces + Demosan 65W 10 ounces, 202; BASF 389 8 ounces, 160; and no treatment, 138. Results show combination seed treatments were significantly better (5% level) than single seed treatments.

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# Barley, wheat, and triticale responses to planting date and seeding rate

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**Y**ield potential of a crop is dependent upon genetic and environmental factors. The environmental factors can be manipulated to exploit the maximum yield potential of a variety. As new varieties are developed or introduced into an area, new and efficient cultural practices must be developed. This study at Tulalake was conducted under irrigation to determine the effects of planting dates and seeding rates on the yield and other agronomic characteristics of wheat, barley and triticale.

## Experimental design

Experiments were established on an organic clay loam soil (12 percent organic matter) in 1972, 1973, and 1974 at the Tulalake Field Station. In a split-plot design, four planting dates (April 16, 23, and 30 and May 7) were main plots. One variety each of barley, wheat, and triticale was chosen to represent these crops for the Tulalake region. Previous experiments had shown that they were generally adapted to Tulalake conditions. The varieties included Wocus 71 barley, D6301 wheat, and 6TA-204 triticale. The triticale was kindly provided by B.C. Jenkins and the wheat variety is a short-statured selection from the International Maize and Wheat Improvement Center in Mexico.

Four seeding rates were used for each variety and planting date. The rates were 100, 200, 300, and 400 seeds per 10-foot row. These correspond approximately to the following rates in pounds per acre: 50, 95, 145, and 190 for Wocus 71; 40, 70, 105, and 145 for D6301; and 45, 90, 130, and 180 for 6TA-204. Plot size was four 10-foot rows, with rows 1 foot apart;

data were collected from the central 8 feet of the two center rows. The varieties and seeding rate treatments were randomized as subplots within each planting date main plot.

## Effect of planting date

Planting date significantly influenced grain yields for all three crops (fig. 1). Based on the 3-year mean performance, April 30 planting was most satisfactory for Wocus 71 barley, whereas early planting gave the highest yields for D6301 wheat and 6TA-204 triticale. The optimum planting date for wheat and triticale may be even earlier than April 16, but unfavorable weather conditions often prevent an earlier planting time at Tulalake.

The decline in yield for wheat and triticale was about 70 pounds of grain for each day that planting was delayed after April 16. Decreased yields with later planting dates were consistent in all 3 years for wheat and triticale, but the barley variety showed increased yield with delayed planting in 2 of the 3 years (fig. 1).

Kernel weight (fig. 2) was reduced with later planting in 2 of 3 years for all crops. Other effects of late planting included reduced plant height, number of days to heading, and lodging.

## Effect of seeding rate

Variation in seeding rate had less pronounced effect on grain yields than did variation in planting time (fig. 3). The responses to seeding rate were different in each year for the three crops. The highest yields for Wocus 71 were attained with 145 pounds per acre, but