

# Controlling RHIZOCTONIA COTTON

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Best treatments for control of Rhizoctonia pre- and post-emergence damping-off of cotton seedlings were: (1) Terra-Coat L-21 (PCNB-Terrazole) seed treatment plus PCNB-Terrazole in-furrow granular; and (2) Demosan seed treatment. Demosan seed treatment plus Demosan in furrow granular was no better than Demosan seed treatment alone. Terra-Coat L-21 seed treatment plus PCNB-Terrazole in-furrow granular gave excellent control in one trial without the basic mercury treatment.

Intermediate in effectiveness were: (1) Vitavax seed treatment; (2) Terra-Coat L-21 seed treatment; and (3) PCNB in-furrow granular. However, Vitavax seed treatment was one of the best materials tested in two trials at the UC Meloland Field Station in Imperial Valley. Bay 78175 in-furrow spray effectively controlled Rhizoctonia damping-off in the only trial where it was applied.

PREVIOUS STUDIES have shown that damping-off of cotton seedlings (caused by the fungus, *Rhizoctonia solani* Kuehn) is the most serious seedling disease in the interior valleys of southern California. Studies reported here were initiated in the spring of 1968 to test some of the newer fungicides as seed treatments, in-furrow sprays, or granular treatments—or combinations of both methods for control of the Rhizoctonia fungus.

## Artificial infection

Natural field infection by Rhizoctonia proved to be very erratic in early experiments at Riverside. The 1968 trials involved artificial inoculation of the covering soil at planting time with the Rhizoctonia fungus. Rhizoctonia used in the tests was isolated from a naturally infected damped-off cotton seedling which had developed in an experiment station field at U.C., Riverside. This fungus was placed on water-soaked oat seed which

had been sterilized by steaming in 2-quart, wide-mouth glass jars. The jars' metal screw-type lids were fitted with two cotton-plugged 1-cm gas exchange openings. When the fungus had developed throughout the oats in the jars (after growing at 75° F), the medium was removed, air-dried, ground and passed through a 2-mm mesh screen in a Wiley mill. It was stored in polyethylene sacks at approximately 42° F until needed.

## Riverside, spring 1968

Treatments consisted of no seed treatment, Ceresan L 2 oz, Vitavax 75W 8 oz, Terra-Coat L-21 12 oz, Demosan 65W 10 oz, Demosan 65W 10 oz plus Demosan 5% granular—1 lb active per acre, and Terra-Coat L-21 12 oz plus PCNB-Terrazole 10%—2.5% granular 10 lb per acre. All seed treatments were applied to 100 lbs of acid delinted Delta Pine variety cottonseed.

All treatments received an artificial inoculation by metering inoculum through a Noble granular applicator into the planting furrow as the soil covered the seed. This placed the seed and the inoculum in close proximity—resulting in uniform Rhizoctonia infection of the cotton seedlings, and permitting an accurate assessment of the fungicides.

The plot was planted May 31 and counts were made of healthy appearing plants in 100 ft of row on June 18, 25, and July 5. Since results were similar for all dates, only the data from the July 5 count are presented:

Treatment	Healthy plants per 100 ft
No treatment	25 a*
Ceresan L 2 oz	93 a
Ceresan L 2 oz plus	
Vitavax 75W 8 oz	313 b
Terra-Coat L-21 12 oz	354 bc
Demosan 65W 10 oz	389 cd
Demosan 65W 10 oz	
+ Demosan granular 1 lb actual	390 cd
Terra-Coat L-21 12 oz	
+ PCNB-Terrazole granular	
1 lb actual	447 d

\* Significant 1% level.

Terra-Coat seed treatment plus PCNB-Terrazole in-furrow granular; Demosan seed treatment alone; and Demosan seed treatment plus Demosan in-furrow granular were the outstanding treatments in this test.

## Fall trial, 1968

Several new materials were added for this trial, including Benlate 50W 0.5 and 1 lb in-furrow spray; Bay 78175 40W at 0.5 and 1.5 lb active per acre in-furrow spray; and Daconil 2787 10%-Terrazole 2.5% granular 1 lb active per acre. Materials previously tested and included in the trial were Vitavax 75W 8 oz, Demosan 65W 8oz, and Terra-Coat L-21 12 oz as seed treatments, and Terra-Coat L-21 12 oz seed treatment plus PCNB-Terrazole granular 1 lb active per acre. All of the Delta Pine 16 acid-delinted cotton seed used in this experiment had a basic treatment of Panogen 2 oz per 100 lbs. The plot was planted October 3 and all of the treatments received artificial inoculation. Counts made of healthy appearing plants November 18 were:

Treatment	Healthy plants per 100 ft row
Panogen 15 2 oz	88 a*
Panogen 15 2 oz plus	
Benlate 50W 0.5 lb in-furrow spray	101 a
Benlate 50W 1 lb in-furrow spray	102 a
Daconil 2787 10%-Terrazole 2.5% granular/1 lb active per acre	140 a
Terra-Coat L-21 12 oz seed treatment	203 b
Vitavax 75W 8 oz seed treatment	217 b
Bay 78175 40W 0.5 lb	
in-furrow spray active per acre	261 bc
Demosan 65W 8 oz seed treatment	262 bc
Bay 78175 40W 1.5 lb	
in-furrow spray active per acre	284 c
Terra-Coat L-21 12 oz seed treatment plus PCNB-Terrazole granular 1 lb active per acre	322 c

\* Significant at 1% level.

Bay 78175 at either 0.5 or 1.5 lb, or Demosan seed treatment, or Terra-Coat seed treatment plus PCNB-Terrazole granular were significantly better than all other materials tested for the control of Rhizoctonia seedling disease of cotton. But there were no significant differences

# SEEDLING DISEASE OF in Southern California

between Demosan, Vitavax, or Terra-Coat seed treatments or Bay 78175 as an in-furrow spray. Benlate in-furrow spray at either rate, and Daconil 2787-Terrazole granular were not significantly better than Panogen seed treatment alone.

## Imperial valley, Meloland, 1968

A cotton plot in the inland cotton growing areas of southern California was selected and inoculated with *Rhizoctonia* for comparison with the Riverside station trials. Delta Pine 16 acid-delinted cotton seed was the variety used for the seed treatments. All the following rates are per 100 lbs of cotton seed or per acre for the granular treatments: Ceresan L 2 oz; Vitavax 75W 8 oz; Terra-Coat L-21 12 oz; Demosan 65W 10 oz; Demosan 65W 10 oz plus Demosan 5% granular 1 lb active per acre; and Terra-Coat L-21 12 oz plus PCNB-Terrazole 10%-2.5% granular 1 lb active per acre. The plot was planted at the University of California Meloland field station April 17, 1968. *Rhizoctonia* inoculum was metered through a Noble granular applicator and applied in the planting furrow as the soil covered the seed. Counts were made of healthy appearing plants May 9 and May 23 in 50 ft or row but since counts were essentially the same on both dates, only the May 23 data are presented.

Treatment	Healthy plants per 50 ft row
No treatment	54 a*
Ceresan L 2 oz	78 a
Ceresan L 2 oz plus	
Terra-Coat L-21 12 oz	114 b
Vitavax 75W 8 oz	117 bc
Terra-Coat L-21 12 oz + PCNB-Terrazole granular—1 lb act.	123 bc
Demosan 65W 10 oz + Demosan granular 1 lb act.	137 bc
Demosan 65W 10 cz	146 c

\* Significant at 1% level.

Demosan seed treatment alone was equal to the Demosan seed treatment plus the Demosan in-furrow granular application. Terra-Coat seed treatment plus PCNB-Terrazole in-furrow granular treatment and Vitavax seed treatment

were as effective as the Demosan treatments.

The effectiveness of the fungicides was tested in the fields of three different growers in the Imperial Valley in the spring of 1968. Delta Pine 16 acid-delinted cotton seed had previously been treated with Ceresan L 2 oz per 100 lbs of seed. The seed was divided into four equal lots of 80 lbs each. One lot was left with just the Ceresan L treatment and each of the other three lots was given an "overcoat" treatment of either Demosan 65W 10 oz; or Vitavax 75W 8 oz; or Terra-Coat L-21 12 oz per 100 lbs of seed. The fungicides were mixed in 960 cc of water and transferred to a pressurized sprayer. The seed was placed in a cement mixer and the fungicidal mixture was sprayed over the top of the cotton seed as the mixer turned. This treatment was applied March 4.

Fields No. 1 and No. 2 were planted March 18 and No. 3 was planted on April 4. Stand counts of healthy-appearing plants were made April 11 on 100 ft of row per replication in fields No. 1 and 2 while counts of field No. 3 were made April 22 and consisted of 50 ft of row per replication. Results are as follows:

Treatment	Number of Healthy Plants		
	50 ft of row		
	Field 1	Field 2	Field 3
Ceresan 2 oz only	708 a*	486 c	134 e
Ceresan plus Terra-Coat L-21 12 oz	733 a	734 d	211 f
Ceresan plus Vitavax 75W 8 oz	886 b	717 d	223 f
Ceresan plus Demosan 65W 10 oz	882 b	753 d	232 f

\* Significant at 1% level.

Ceresan seed treatment plus an overcoat seed treatment of either Vitavax or Demosan was significantly better than Ceresan alone in all three fields. Ceresan seed treatment plus Terra-Coat was significantly better than Ceresan alone in two out of the three fields.

A second stand count was made in all three fields ten days after the first count.

Treatments were ranked the same as on the first count.

## Riverside trials, 1969

In all previous trials a basic seed treatment of either Ceresan L or Panogen 15 was used to control *Pythium* seed rot. In this experiment only one seed coating was used per treatment except for a combination seed treatment of Ceresan L plus Demosan or PCNB seed treatment plus PCNB-Terrazole in-furrow granular. Single seed treatments consisted of Hoechst 2989 3 oz, PCNB LST 12 oz, Panogen 15 2 oz, Demosan 65W 10 oz, Terra-Coat L-21 12 oz and Vitavax 75W 8 oz. All seed treatment rates are per one hundred pounds of acid-delinted Delta Pine 16 cotton seed. *Rhizoctonia* inoculum was applied in-furrow at planting time as in previous experiments. The plot was planted March 31 and the number of healthy-appearing plants in 100 ft of row was counted May 6. The results are:

Treatment	Healthy plants per 100 ft row
Hoechst 2989 3 oz	28 a*
Check or No Treatment	31 a
PCNB LST 12 oz	72 ab
PCNB 10% granular 1 lb active per acre	87 bc
Panogen 15 2 cz	95 bc
Demosan 65W 10 cz	106 bc
Terra-Coat L-21 12 oz	107 bc
Vitavax 75W 8 oz	140 c
Ceresan L 2 oz plus Demosan 10 oz	233 cd
PCNB LST plus PCNB-Terrazole granular 1 lb active per acre	271 d

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

Ceresan plus Demosan seed treatment, or PCNB seed treatment, plus PCNB-Terrazole granular was significantly better than any other materials tested. Next in effectiveness were Vitavax, Terra-Coat L-21, Demosan, and Panogen seed treatment and PCNB in-furrow granular treatment. Hoechst 2989 treatment did not control *Rhizoctonia* and the stand count was not significantly higher than that from the plots not receiving any fungicide.

## Summer trial, UCR

Isobac 20, a product of Nationwide Chemical Corporation, was reported to give good control of damping-off as an in-furrow spray, or as a pre-emergence spray at ground cracking or during the post-emergence period. The active ingredient of Isobac 20 is monosodium salt of 2,2 methylenebis (3,4,6-trichlorophenol). Isobac was compared with Panogen 15 2 oz, Panogen plus Vitavax 75W 8 oz, Ceresan L 2 oz plus Demosan 65W 10 oz, Terra-Coat L-21 12 oz plus PCNB-Terrazole granular 1 lb active per acre, and PCNB-Terrazole granular 1 lb active per acre. Isobac 20 was applied as an in-furrow spray at planting at the rate of 6 oz per acre, as a spray over the cottonseed bed at ground cracking, and as a topical spray after emergence of the cotton seedlings. Delta Pine 16 acid-delinted cottonseed was planted June 25, 1969. *Rhizoctonia* inoculum was added in-furrow at planting time. Stand counts were taken of healthy appearing plants in 50 ft of row July 15. The results are as follows:

Treatment	Plants per 50 ft row
Panogen 15 2 cz	129 a*
Isobac 20 in-furrow spray at planting 6 oz	179 a
Isobac 20 6 oz at ground cracking	192 ab
Isobac 20 6 cz post emergence	246 b
Panogen plus Vitavax 75W 8 oz	376 c
PCNB-Terrazole granular 1 lb active per acre	412 cd
Ceresan L 2 oz plus Demosan 65W 10 oz	431 d
Terra-Coat L-21 12 cz, plus PCNB-Terrazole granular 1 lb active per acre	476 d

\* Significant at 1% level.

These results are similar to previous trials in that Terra-Coat seed treatment plus PCNB-Terrazole granular, PCNB-Terrazole granular alone, or Ceresan L plus Demosan combination seed treatment were significantly better than the other treatments. Plants from seeds treated with Panogen plus Vitavax were next in effectiveness. Isobac performed poorly in this test and in two out of three cases was not significantly better than the check or no treatment.

## Imperial Valley, 1969

Four growers trials were conducted during the spring of 1969 to compare single fungicide seed treatments. The seed treatments were as follows: Demosan 65W 10 oz, PCNB LST 12 oz, Panogen 15 2 oz, and no treatment. Rates of fungicides were per 100 lbs of untreated, acid-delinted Delta Pine 16 cottonseed. Disease incidence was low during these experiments and in only two trials were the responses significantly better than those from plots with no treatment. The

Brock trial was planted March 11 on a Holtville salty loam soil. The Borchard trial was planted March 27 on a Rositas very fine sandy loam soil. Plots were 200 ft long and replicated six times. The number of healthy plants per 100 ft of row was counted at the Brock ranch April 9 and the Borchard ranch April 22:

Treatment	Healthy plants per 100 ft row	
	Brock	Borchard
Panogen 15 2 cz	914 a*	604 a
PCNB LST 12 oz	795 a	554 a
Demosan 65W 10 oz	646 b	591 a
Check or no treatment	617 b	409 b

\* Significant at 1% level

Panogen and PCNB were significantly better than Demosan or the check treatment at the Brock ranch. Panogen, PCNB, or Demosan seed treatment were significantly better than the check or no treatment at the Borchard ranch trial.

## Meloland, 1969

Delta Pine 16 cotton seed was the variety used again in the spring trial at the Meloland Field Station. All fungicide rates are per 100 lbs of acid-delinted cotton seed or per-acre for the granular treatments. Treatments were as follows: No treatment, PCNB LST 12 oz, Terra-Coat L-21 12 oz, Vitavax 75W 8 oz, Ceresan L 2 oz plus Demosan 65W 10 oz, Demosan 65W 10 oz, and PCNB in-furrow granular 1 lb active. The plot was planted April 22 and treatments were 85 ft long and replicated six times. The number of healthy plants in 60 ft of row May 25:

Treatment	Healthy plants per 60 ft row
Check or no treatment	76 a*
PCNB LST 12 oz	186 b
PCNB in-furrow granular, 1 lb active	237 bc
Terra-Coat L-21 12 oz	248 bc
Vitavax 75W 8 oz	264 cd
Ceresan L 2 oz plus Demosan 65W 10 oz	275 cd
Demosan 65W 10 oz	328 d

\* Significant at 1% level.

Vitavax, Demosan or a combination seed treatment of Ceresan plus Demosan were significantly better than all other treatments. Terra-Coat or PCNB in-furrow granular was intermediate in the number of healthy plants.

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# Effects of SEMEN on of

No differences in fertility and hatchability of turkey eggs were observed when hens were inseminated with semen extended with three different diluents tested, as compared with undiluted semen.

**D**ILUTION OF TURKEY SEMEN has obvious economic advantages to the turkey breeder (as illustrated by the tom-hen ratio diagram). With a dilution program the semen from one male will inseminate three times the number of hens as in a program using undiluted semen. The more frequently the males are used within a week, the greater are the economic benefits from a dilution program with turkey breeder males.

Researchers in the Nebraska Experiment Station showed that turkey semen could be extended successfully in several experiments in 1954. Recently, Brown of the Ohio Experiment Station, and Lake of the Edinburgh Poultry Research Centre (using diluents widely different in composition), showed that dilution of turkey semen had no adverse effect upon fertility and hatchability of turkey eggs. At present, a diluent prepared by the Minnesota Turkey Grower's Association and sealed in 2-cc glass vials has been widely used in the field for the extension of turkey semen.

In this study, the objective was to determine whether these diluents (used at a ratio of one part semen to two parts diluent) would differ among themselves in terms of fertility and hatchability, after insemination into hens within one hour of collection and dilution. The formulae of the three diluents are shown in table 1.