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## Studies on the Control of Seedling Disease of Cotton Caused by *Rhizoctonia bataticola* (Taub.) Butl.\*

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### ABSTRACT

Seed treatment with either Captan 0.4 per cent, Vitavax-thiram 0.4 per cent, Brassicol+Captan (4 + 2 g/kg) or Demosan 0.4 per cent was found effective to control pre-emergence-rot phase of the cotton seedling disease. Demosan 0.4 per cent, Bavistin 0.3 per cent. or Thiabendazole 0.3 per cent as one of the seed treatments was found to afford protection up to 10 days or more after germination. Drenching the soil with either Benlate 0.1 per cent, Bavistin 0.1 per cent or Thiabendazole 0.1 per cent was found effective against the pathogen.

### INTRODUCTION

Seedling disease of cotton caused by *Rhizoctonia* sp. was first reported by Shaw (1911). Subsequently Dastur (1931) reported that the disease in India was caused by *R. bataticola*. In recent years, in Tamil Nadu, with large scale cultivation of *barbadense* and hybrid varieties of cotton, the occurrence of seedling disease is noticed on a wide scale causing heavy mortality. Ramasami (1975) reported that 10 day old seedlings were highly susceptible to infection and a soil temperature of  $32 \pm 1^\circ\text{C}$  was found to be optimum for disease development. Though there are reports on the control of root rot phase of *R. bataticola* on cotton (Padwick, 1942; Vasudeva, 1943) reports on the control of seedling disease of cotton are few. The results of green house studies on the control

of the disease are presented in this paper.

### MATERIALS AND METHODS

Culture of *R. bataticola* was isolated from infected cotton plants (variety *Sujata*) and brought into pure culture by single hyphal tip method. The plants of the variety were raised in sterilised soil in 20 x 18 cm pots. Ten seeds were sown in each pot. Two pots comprised one replication and three replications were maintained. The inoculum consisted of 5 day-old cultures grown in sand - maize medium and the soil-hypocotyl inoculation method of Shanmugam (1971) was adopted in all the experiments using a soil inoculum ratio of 1:5.

Seed treatment experiments:  
The following fungicides were used:

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Agrosan GN, 0.3 per cent (Tolyl mercury acetate), Captan 0.4 per cent (N-trichloromethyl-thio-4-cyclohexane-1-2-dicarboximide), Captan 0.2 per cent + brassicol 0.4 per cent (pentachloro nitrobenzene), Bavistin 0.3 per cent (2-methoxy carbonyl) benzimidazole, Benlate 0.3 per cent (methyl 1-(butyl carbonyl) 2-benzimidazole carbomate, Demosan (chloroneb) 0.4 per cent (1,4-dichloro-2, 5 dimethoxy benzene), Demosan 0.4 per cent + Agrosan GN 0.2 per cent, Thiabendazole 0.3 per cent (2-4 (4-thioazolyl) benzimidazole, and Vitavax-Thiram 0.4 per cent (proprietary combination of 2,3 dihydro 5-carboxinilo-6-methyl-1, 4-oxathiin and tetra methyl diurum sulphide). Besides using proprietary products, mixtures of Captan + Brassicol and Demosan + Agrosan were made in the laboratory. The seeds were treated with the fungicides by thoroughly mixing and shaking in 500 ml conical flask for 5 minutes. In the first experiment the inoculum was added before sowing and the treated seeds were then sown. The seedlings including those killed after emergence were pulled out after ten days and assessed for disease intensity. In the second experiment the treated seeds were first sown and when the seedlings were 10 days old, they were inoculated and the disease intensity was recorded seven days after inoculation.

**Soil drench experiments:** The efficacy of the fungicides (0.1%) as soil drench treatment was assessed. Ten - day old *Sujata* cotton seedlings were inoculated using 500 ml of the

fungicides per pot. Three sets of experiments were conducted. In the first set drenching was done seven days before inoculation, in the second set, one day after inoculation and in the third two days after inoculation. The treatments were Brassicol, Captan, Ceresan wet (Methoxy ethyl mercury chloride), Bavistin, Benlate, Demosan, Kitazin (0, 0 disopropyl-5-benzyl thio-phosphate, thiobendazole) and Vitavax.

The infection index in different experiments was assessed 7 days after inoculation. The method described by Horsfall and Heuberger (1942) was followed for disease assessment. All the inoculated plants both surviving and killed were pulled out and the disease intensity in each plant was rated on a scale of reaction, 0,1,2,3,4 and 5 ranging from healthy (0) to death of seedlings (5). The infection index was calculated using the formula:

$$\frac{\text{Intensity in category values}}{\text{No. of plants rated} \times \text{max. category values}} \times 100$$

## RESULTS AND DISCUSSION

The data on infection in the seed treatment experiments are presented in Table I and II.

For controlling pre-emergence rot phase of the disease, under condition of presowing inoculation, captan was found to be significantly most effective followed by Vitavax - Thiram, Brassicol + Captan and Demosan which were on par. There are many reports about the efficacy of Captan in controlling diseases caused by *Rhizoctonia*

TABLE I. Effect of seed treatment on pre-emergence and post-emergence rot phases of the seedling disease  
(infection index as transformed values)

Treatment	Pre-emergence infection	Post-emergence infection
Agrosan GN 0.3 %	21.19	69.13
Captan 0.4 %	10.37	67.95
Captan 0.2 % +		
Brassicol 0.4 %	15.64	55.70
Bavistin 0.3 %	19.09	56.02
Benlate 0.3 %	20.00	61.94
Demosan 0.4%	15.89	17.46
Demosan 0.4 % +		
Agrosan GN 0.2 %	21.22	60.08
Thiabendazole 0.3%	16.84	56.60
Vitavax-Thiram 0.4%	13.20	63.29
Control	50.16	74.66
C.D. (P = 0.05)	6.84	14.16

TABLE II. Effect of fungicide drenching on seedling disease

Treatment (0.1%)	Infection index transformed values		
	7 days before inoculation	One day after inoculation	Two days after inoculation
Brassicol	57.49	57.49	66.44
Captan	72.93	54.99	72.00
Ceresan wet	73.76	37.22	69.27
Bavistin	28.77	40.41	64.69
Benlate	26.56	45.63	71.50
Demosan	47.07	39.87	68.15
Kitazin	54.78	43.07	63.96
Thiabendazole	32.51	41.07	64.50
Vitavax	78.17	57.00	60.33
Control	75.76	63.44	72.40
C.D. (P = 0.05)	4.76	10.81	Not significant

ssp. Grewal and Singh (1965) reported that cabbage damping off caused

by *R. solani* and *R. bataticola* was effectively controlled by seed treatment with captan. Paulos *et al.* (1973) reported the efficacy of captan PCNB seed treatment in controlling seedling disease of cotton. Seed treatment studies under conditions of post-emergence inoculation revealed that Demosan was significantly superior in recording minimum infection index than other fungicides. Demosan as seed treatment has been reported to afford protection to seedlings up to 10 days (David and Sinclair, 1968). Paulos (1970) reported that Demosan was effective in controlling seedling disease of cotton caused by *R. solani*.

Soil treatment one day and two days after inoculation has not resulted in appreciable reduction in infection (Table II). However, drenching with Benlate 0.1 per cent or Bavistin 0.1 per cent a week before inoculation has been found to record significantly low disease-index, indicating systemic action up to ten days. Ranney (1971) found benomyl to be highly effective against cotton seedling disease caused by *R. solani*.

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