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Efficacy of different seed dressing agents in the control of damping off disease of chilli caused by *Pythium aphanidermatum*

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Damping off of chilli caused by *Pythium aphanidermatum* is one of the major problems leading to severe pre- and post- emergence losses. Seed treatment with different chemical and bio-fungicides is effective in reducing the disease infection. In the present endeavour, out of the different seed treatment agents, Thiram, Captan, *Pseudomonas fluorsecens and Trichoderma viride* gave good control against the disease.

Key words : *Pythium* sp., damping off, Thiram, *Pseudomonas fluorescens*

INTRODUCTION

Chilli (*Capsicum frutescens* L.) is one of the important crops grown for the value of its fruits in making spice and condiment. *Pythium aphanidermatum* (Edson) Fitz. causes damping off disease in chilli and various methods, both chemical and biological have been reported to control the disease (Tripathi and Grover, 1977; Lifshitz *et al.,* 1986; Ghosh, 2002). In the present endeavour a reconnaissance trial was set up in pots with different seed treating agents like fungicides, bio-antagonists and bio-fertilizers to evaluate their efficacy in controlling the pre-emergence and post-emergence 'damping off' disease of chilli.

MATERIALS AND METHODS

Isolation of *P. aphanidermatum* was done by using pointed gourd fruit as a bait (Saha *et al.*,2000). Mass inoculum of the fungus was prepared on sand-maize meal (20:1 w/w) medium (Muthuswamy, 1972) and used for soil inoculation in pots. It was mixed at the rate of 1 part to 20 parts of the soil used.

Three chemical fungicides, namely Carboxin 37.5 DS in combination with Thiram 37.5 DS, Thiram 75 WS and Captan 50WP were used at the rate of 2.5 g/kg of seed, while three bio-antagonists like *Aspergillus niger, Trichoderma viride* and *Pseudomonas fluorescens* were applied at the rate of 8 g, 4 g and 5 g container medium per kg of seed respectively. Two formulations of bio-fertilizers, namely *Rhizobium* sp. and *Azotobacter* sp. which gave appreciable result earlier (Gupta *et al.,* 1995) were also used, each at the rate of 2 g container medium per kg of seed.

Each seed dressing agent was made into a slurry and 300 seeds were treated in it. Treated seeds were sown in pathogen pre-inoculated soil at the rate of 100 seeds per pot. Each treatment was replicated thrice and pots were uniformly watered regularly. Pre-emergence damping off was recorded. Post-emergence damping off was also noted after 10, 15 and 20 days after sowing.

RESULTS AND DISCUSSION

The analysis of pooled data (Table 1) indicated that Thiram gave the best control of the disease resulting pre-emergence loss to 6.71 % and post emergence loss to 13.7 % only. Initially (10 DAS) post emergence control of disease with the application of Captan was better than Thiram the loss recorded being 10.6% and 11.3% respectively but later (20 DAS) Thiram proved superior than Captan and the loss recorded was 13.7 % and 18.35 % respectively. Carboxin-Thiram combination could control the disease minimizing pre-emergence loss to 14.98 % but not the post-emergence one (30.33 %).

Table 1 : Effect of different seed dressing agents on damping off disease of chilli

Treatments	Dose /kg of Seed	Pre-emergence loss (%) #	Post-emergence loss (%) Days after sowing		
			10	15	20
T_1 : Carboxin 37.5% DS+ Thiram 37.5% DS	2.5	*14.98 (22.77)	18.34 (25.33)	24.7 (29.79)	30.33 (33.39)
T_2 : Thiram 75 WS	2.5	6.71 (14.99)	11.33 (19.65)	11.8 (20.08)	13.7 (21.72)
T_3 : Captan 50 WP	2.5	9.34 (17.72)	10.6 (18.9)	15.81 (22.93)	18.35 (25.36)
T_4 : *Aspergillus-niger*	8	19.22 (25.96)	28.74 (32.42)	29.2 (32.71)	37.8 (37.94)
T_5 : *Trichoderma viride*	4	18.31 (25.96)	24.6 (29.72)	25.29 (30.18)	31.88 (34.37)
T_6 : *Pseudomonas Fluorescens*	5	10.49 (18.86)	17.2 (24.44)	19.4 (26.1)	23.84 (29.21)
T_7 : *Rhizobium sp.*	2	23.45 (28.93)	30.78 (33.69)	47.21 (43.4)	53.4 (46.95)
T_8 : *Azotobacter sp.*	2	14.92 (22.67)	17.8 (24.95)	19.32 (26.03)	26.1 (30.65)
T_9 : Control	-	32.5 (34.75)	40.3 (39.4)	44.8 (42.01)	63.7 (52.96)
CD		3.39	1.72	1.79	2.15
SE(d)		1.6	0.81	0.85	1.016

After 96 hr. of sowing * Mean of 3 replications
N.B. The figures in parenthesis denote angular transformed value.

Among the bio-control agents *P. fluorescens* proved to be the most efficient mycoparasitic agent, both in the perspective of pre-and-post emergence damping off. Seed treated with this antagonistic bacteria reduced the pre-emergence loss to 10.49% and post-emergence loss to 23.84 % at 20 DAS. It is noteworthy that the result manifested by *P. fluorescens* was significantly better than Carboxin-Thiram combination. The mycoparasitic potentiality could be attributed to the production of a variety of secondary metabolites by fluorescent *Pseudomonas* (Mathre *et al.*,1999) or it is known to induce systemic resistance by synthesizing chitinases and β-1, 3 glucanases (M'Piga *et al.*, 1997). Seed dressing with *T. viride* also gave appreciable results lying next to *P. fluorescens*, having a pre-and-post-emergence loss of 18.31 % and 31.88 % respectively. Seed dressing with *T. viride, T. harzianum* and *T.hamatum* in managing damping off caused by *Pythium* spp. in various crops had been previously reported (Sivan *et al.*, 1984; Ghosh 2002). The mycoparasitic ability of *Trichoderma viride* might be attributed to its ability to colonize rapidly the seed coat of chilli and thereby disallowing the pathogen to grow in the same niche. The enzyme cellulase secreted by the antagonist was capable of degrading the cell wall of *Pythium* sp. (Dennis and Webster, 1971) and this mechanism might also be operative in controlling the pathogen. Out of the two bio-fertilizers used, *Azotobacter* sp. gave a better post-emergence control than *Rhizobium* - perhaps the reason being that in case of *Azotobactor* sp. treated seeds, the plant vigour and health were better than those treated by *Rhizobium* sp. This was evident from the seedlings phenotypic expression of height, foliage development and colour of foliage. A similar finding was reported by Gupta *et al.*, (1995) where the emergence of tomato seedlings was increased and the infection of the pathogen was reduced by using *Azotobacter* sp.

The promising results of these seed-dressing agents especially bio-antagonist have hinted towards an on-farm trial and further to get an unequivocal conclusion is a mandate.

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