

## Effect of *Trichoderma* sp. on Germination and Mortality in Chickpea

B. P. TRIPATHI, D. K. SHRIVASTAVA, P. K. MISHRA<sup>1</sup> AND N. KHARE<sup>2</sup>

Government E.R.R. Postgraduate Science College, Bilaspur, (CG), India

<sup>2</sup> JNKVV, KVK, Sagar, MP, India

<sup>3</sup>Department of Plant Pathology, Indira Gandhi Agricultural University, Raipur, India

### Abstract

All the seven *Trichoderma* spp. including local isolates (*Trichoderma harzianum* (K) ; *Trichoderma viride* (K) ; *Trichoderma harzianum* (P) ; *Trichoderma Viride* (P) ; *Trichoderma* spp. (rpr) ; *Trichoderma* spp. (drg) and *Trichoderma* Spp. (nrp) were found to be effective against *Fusarium oxysporum* f sp. *ciceri*, *Rhizoctonia solani* and *Sclerotium rolfsii* increasing germination per cent and decreasing the mortality to seedlings over control.

**Key words :** Chickpea, Germination, Mortality, *Trichoderma* spp.

Chickpea is the most important pulse accounting for more than 70% of the global production in India. Chickpea is the cheapest source of protein and is the inseparable part of the daily diets of every Indian. In spite of being the largest producer, India has to import chickpea up to 1.5 Million tons every year to meet its domestic requirements. The major constraints that limit the realization of potential yield of chickpea are well known. This includes biotic and abiotic stresses prevalent in the chickpea growing areas besides socio-economic factors. *Fusarium* wilt coupled with root rot complex are the most widespread disease, considerably damaging the crops and thus affecting productivity. Mukhopadhyay et al. (1) also obtained excellent control of wilt and root rot diseases of chickpea caused by *Fusarium oxysporum* f. sp. *ciceri* under glass house and field conditions with *Trichoderma harzianum*.

### Methods

All *in vitro* studies on *Fusarium oxysporum*, *Sclerotium rolfsii* and *Rhizoctonia solani* were conducted in the Department of Botany, Government E.R.R. Postgraduate Science College, Bilaspur (Chhattisgarh) during 2006-07. The experiment was conducted to find out an effective antagonist enhancing germination and minimizing mortality of seedlings. For this, plastic pots of 10 cm diameter were filled with infested soil. The soil was infested with pathogens grown on soil maize medium. Seeds of suscep-

tible cultivar *Annegeri* were treated with different species and isolates of *Trichoderma* spp. six seeds were sown in each pot. Untreated seeds sown in the infested soil served as check. Three replications were maintained.

### Results and Discussion

#### *Effect on Germination and Mortality Caused by Fusarium oxysporum*

Table 1 reveals that there was significant difference in germination of the seeds treated with different isolates and strains of *Trichoderma*. Maximum germination (77.77%) of chickpea was observed when the chickpea seeds were treated with *Trichoderma* spp. (nrp), which was statistically significant over other strains of *Trichoderma*. However, the germination was least (61.60%) when the seeds were treated with *Trichoderma* spp. (nrp), compared to 50% seed germination in control. The germination of seeds treated with *Trichoderma harzianum* (P) (72.22%), *Trichoderma viride* (P) (72.22%) and *Trichoderma* spp. (drg) (72.22%) was similar and not at par with that of maximum germination. The pre-emergence mortality in chickpea also differed significantly. It was significantly less (33.33%) in seeds treated with *Trichoderma viride* (K). But the pre-emergence mortality was significantly higher (38.90%) when the seeds were treated with *Trichoderma* spp. (rpr) compared to 50% mortality in control. Similarly, the post-emer-

**Table 1.** Effect of seed treatment by different antagonists on germination and mortality (pre and post-emergence) of chickpea caused by *Fusarium oxysporum* f. sp. *ciceri*. K—Kanpur isolate ; P—Parbhani isolate ; rpr—Raipur isolate ; drg\_Durg isolate ; nrp—Narayanpur isolate Average of three replications. Data in parentheses show arcsine transformation.

	Antagonists isolate	Germination (%)	Mortality (%)		Average mortality
			Pre-emergence	Post-emergence	
1	<i>Trichoderma harzianum</i> (K)	66.66 (54.73)	34.34 (35.87)	44.44 (41.80)	39.39
2	<i>Trichoderma viride</i> (K)	66.66 (54.73)	33.33 (35.87)	38.33 (38.25)	35.83
3	<i>Trichoderma harzianum</i> (P)	72.22 (58.19)	27.77 (31.79)	45.00 (42.13)	36.39
4	<i>Trichoderma harzianum</i> (P)	72.22 (58.19)	27.76 (31.79)	26.11 (30.72)	26.94
5	<i>Trichoderma</i> spp. (rpr)	61.60 (51.70)	38.90 (38.58)	38.33 (38.25)	38.62
6	<i>Trichoderma</i> spp. (drg)	72.22 (58.69)	27.77 (31.79)	47.22 (43.40)	37.50
7	<i>Trichoderma</i> spp. (nrp)	77.77 (61.87)	22.22 (28.12)	30.00 (33.20)	26.11
	Control	50.00 (45.00)	50.00 (45.00)	100.00 (85.11)	75.00
	SE ±	0.31	0.34	0.38	
	CD (%)	0.95	1.02	1.14	

gence mortality was significantly less (26.11%) in seeds treated with *Trichoderma viride* (P). However, the post emergence mortality was higher (47.22%)

when the seeds were treated with *Trichoderma* spp. (drg) compared to that of 100% mortality in control. The mean mortality was highest (39.39%) in seeds

**Table 2.** Effect of seed treatment by different antagonists on germination and mortality (pre and post-emergence) of chickpea caused by *Sclerotium rolfsii*. K—Kanpur isolate ; P—Parbhani isolate ; rpr—Raipur isolate ; drg—Durg isolate ; nrp—Narayanpur isolate Average of three replications. Data in parentheses show areaine transformation.

	Antagonists isolate	Germination (%)	Mortality (%)		Average mortality
			Pre-emergence	Post-emergence	
1	<i>Trichoderma harzianum</i> (K)	50.00 (45.00)	50.00 (45.00)	44.44 (41.80)	47.22
2	<i>Trichoderma viride</i> (K)	38.88 (38.57)	61.10 (51.41)	44.44 (41.80)	52.77
3	<i>Trichoderma harzianum</i> (P)	50.00 (45.00)	50.00 (45.00)	44.44 (41.80)	47.22
4	<i>Trichoderma harzianum</i> (P)	66.66 (54.73)	33.33 (35.26)	22.22 (28.12)	27.77
5	<i>Trichoderma</i> spp. (rpr)	55.33 (48.05)	44.33 (41.74)	50.00 (45.00)	47.16
6	<i>Trichoderma</i> spp. (drg)	55.33 (48.06)	44.33 (41.74)	61.10 (51.41)	52.71
7	<i>Trichoderma</i> spp. (nrp)	44.44 (41.80)	55.33 (48.05)	44.44 (41.80)	49.88
	Control	33.33 (35.26)	66.66 (54.73)	100.00 (85.11)	83.33
	SE ±	0.29	0.32	0.38	
	CD (5%)	0.87	0.98	1.13	

**Table 3.** Effect of seed treatment by different antagonists on germination and mortality (pre and post- emergence) of chickpea caused by *Rhizoctonia solani*. K—Kanpur isolate ; P—Parbhani isolate ; rpr—Raipur isolate ; drg—Durg isolate ; nrp—Narayanpur isolate Average of three replications. Data in parentheses show Arcsine transformation.

	Antagonists isolate	Germination (%)	Mortality (%)		Average mortality
			Pre-emergence	Post-emergence	
1	<i>Trichoderma harzianum</i> (K)	77.77 (61.87)	22.22 (28.11)	28.33 (32.15)	25.28
2	<i>Trichoderma viride</i> (K)	55.55 (48.18)	44.44 (41.80)	41.66 (40.19)	43.05
3	<i>Trichoderma harzianum</i> (P)	72.21 (58.18)	27.27 (31.47)	38.33 (38.25)	32.80
4	<i>Trichoderma harzianum</i> (P)	83.33 (65.90)	16.67 (24.09)	30.00 (33.21)	23.34
5	<i>Trichoderma</i> spp. (rpr)	77.77 (61.87)	22.22 (28.12)	20.00 (26.56)	21.11
6	<i>Trichoderma</i> spp. (drg)	61.10 (51.41)	38.88 (38.57)	32.77 (34.92)	35.82
7	<i>Trichoderma</i> spp. (nrp)	77.77 (61.87)	22.22 (28.12)	43.33 (41.16)	32.77
	Control	50.00 (45.00)	50.00 (45.00)	100.00 (85.11)	75.00
	SE ±	0.32	0.35	0.29	
	CD (5%)	0.97	1.06	0.87	

treated with *Trichoderma harzianum* (K) while it was least (26.11%) in case of *Trichoderma* spp. (nrp) compared to 75% in control.

#### *Effect on Germination and Mortality Caused by Sclerotium rolfsii*

Maximum germination (66.66%) was found when seeds were treated with *Trichoderma viride* (P) and it was statistically significant over other isolates of *Trichoderma*. But minimum germination (38.88%) was recorded when the seeds were treated with *Trichoderma viride* (K) compared to 33.33% seed germination in control (Table 2). The pre emergence mortality was significantly higher (61.10%) when the seeds were treated with *Trichoderma viride* (K) compared to 66.66% mortality in control. But minimum pre-emergence mortality (33.33%) was noticed with *Trichoderma viride* (P). Similarly, post emergence mortality was significantly less (22.22%) in seeds treated with *Trichoderma viride* (P). However, the post emergence mortality was higher (61.10%) when the seeds were treated with *Trichoderma* spp. (drg) compared to that of 100% mortality in control. The average mortality was also found highest (52.72%) with *Trichoderma*

*viride* (K) and least (27.77%) was noticed with *Trichoderma viride* (P) compared to 83.33 in control.

#### *Effect on Germination and Mortality Caused by Rhizoctonia solani*

Table 3 reveals that seed treatment with *Trichoderma* spp. and isolates was found to significantly increase the germination of chickpea seeds compared to only 50.00% germination in control. Maximum germination (83.33%) found with *Trichoderma viride* (P), which was statistically significant over other isolates of *Trichoderma*. But minimum germination (55.55%) was noticed with *Trichoderma viride* (K). As regards to average mortality, maximum (43.05%) was recorded with *Trichoderma viride* (K) and minimum (21.11%) with *Trichoderma* spp. (rpr) compared to 75% in control. In case of pre emergence mortality, highest (44.44%) was found with the seeds treated with *Trichoderma viride* (K) but highest post-emergence mortality (43.33%) was found with *Trichoderma* spp. (nrp) compared to that of 100% mortality in control. Kaur and Mukhopadhyay (2) and Rajender et al. (3) found *Trichoderma harzianum* to be effective in reducing *Rhizoctonia solani*.

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