

## EFFICACY OF BIO-AGENTS AND ORGANIC AMENDMENTS AGAINST *SCLEROTIUM ROLFSII* CAUSING COLLAR ROT OF CHICKPEA

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**Abstract:** Chickpea is cultivated throughout the Chhattisgarh state and mostly grown in kanhar soil in Chhattisgarh plains. However, chickpea productivity is low due to susceptibility of the crop to different biotic and abiotic stresses. The collar rot disease of chickpea caused by *Sclerotium rolfsii*, which is soil borne and fast spreading fungus, causes considerable damage to the plant stand. The collar rots of chickpea caused by *S. rolfsii*, can cause considerable loss to plant stand when soil moisture is high and temperature is warm (nearly 30°C) at sowing time. Drying of plants with foliage turned slightly yellow before death, scattered throughout the field is an indication of collar rot infection. The study of bio-agent and organic amendment application revealed that all the treatments significantly increased seed germination and reduced collar rot incidence. Seed treatment with bio-agent *Trichoderma* and Neem cake application in soil was found to be the most effective recording maximum seed germination and minimum mortality followed by *Trichoderma* with Mustard cake and *Trichoderma* with Karanj cake combination under natural condition.

**Keywords:** Collar rot of chickpea, *Sclerotium rolfsii*, *Trichoderma* spp, Bio-agents

### INTRODUCTION

Chickpea is an important pulse crop grown all over the world; it occupies the premier position in terms of area as well as production. In India, chickpea is grown over 6.93 m ha with the production of 5.60 m tones. Chickpea contributes about 37 per cent of the total pulse production in the country. Chhattisgarh contributes a 0.26 m tone that is about 4.43 per cent of total chickpea production of India (Anonymous, 2008). *Sclerotium rolfsii* causing collar rot is an important soil borne and fast spreading fungal pathogen causes considerable damage to economically important crops like (chickpea, soybean, groundnut, beans, clover, peas and lentil). Under field conditions, the *S. rolfsii* has been reported to cause 30 to 60 per cent reduction in yield of chickpea (Prasad, 2005). The collar rots of chickpea caused by *S. rolfsii*, can cause considerable loss to plant stand when soil moisture is high and temperature is warm (nearly 30°C) at sowing time. Drying of plants with foliage turned slightly yellow before death, scattered throughout the field is an indication of collar rot infection. The disease generally appear within two weeks of sowing and the younger plants collapse but older ones turn yellow and may dry without collapsing. The younger plants exhibit clear rotting at the collar region. The rotten portion is often covered with white mycelial strands of *S. rolfsii*. Looking towards the above facts an attempt was made to study the Efficacy of bio-agents and organic amendments against *Sclerotium rolfsii*.

### MATERIAL AND MATHOD

#### Seed treatment

Seed treatment was done with *Trichoderma* @ 4 gm/kg seeds in T1. In treatment T2, T3 and T4 neem cake, mustard cake and karanj cake respectively was mixed in the soil and seeds were not treated with *Trichoderma*. Treatment T5, T6 and T7 received seed treatment with *Trichoderma* and soil treatment with neem cake, mustard cake and karanj cake respectively, was done. No seed treatment and soil treatment served as control.

#### Seedling inoculation

In seedling stage, test fungus was inoculated at the collar region of plants in two lines of each plot and then irrigated lightly by hand shower and mortality were recorded 15 days after inoculation.

#### Experimental details

Season	:	Rabi – 2007
Situation	:	Upland and Kanhar (Vertisol)
Design	:	Randomized Block Design (RBD)
Replications	:	Three
Treatments	:	Eight
Variety	:	JG-315
Plot size	:	2 x 3 m <sup>2</sup>
Seed rate	:	80 kg/ha
Date of sowing	:	7 November, 2007

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**Details of Treatments**

S. N.	Treatment	Notation
1	<i>Trichoderma</i> spp	T1
2	Neem cake	T2
3	Mustard cake	T3
4	Karanj cake	T4
5	<i>Trichoderma</i> spp + Neem cake	T5
6	<i>Trichoderma</i> spp + Mustard cake	T6
7	<i>Trichoderma</i> spp + Karanj cake	T7
8	Control	T8

**Observation recorded**

1. Total plant population per plot
2. Mortality were recorded after 15, 30, and 45 days of sowing.
3. Yield of plots.

**RESULT AND DISCUSSION****Efficacy of bio-agent with organic amendments against plant mortality caused by *S. rolfisii* (under natural condition)**

Results (Table1) revealed that all the organic amendment significantly increased seed germination and reduced collar rot incidence over untreated control. However, among all treatments, seed treatment of bio-agent *Trichoderma* with Neem cake soil application was found to be the most effective recording maximum seed germination (93.05%) and minimum total mortality (8.32%) followed by *Trichoderma* with mustard cake (85.03 & 9.55%) and *Trichoderma* with karanj cake (80.86 & 11.41%).

**Efficacy of bioagent with organic amendments against plant mortality caused by *S. rolfisii* (under inoculated condition)**

After completion of all observations two lines of each treatment were artificially inoculated by test fungus *Sclerotium rolfisii* in all three replications. The results (Table 2) revealed that among all treatments, seed treatment of bio-agent *Trichoderma* and soil application with Neem cake found to be most

effective with maximum germination (96.29%) and least total mortality (18.51%), followed by *Trichoderma* and Mustard cake (92.59%) and mortality per cent (25.92) and *Trichoderma* with Karanj cake (92.59%) and mortality per cent (25.92). These treatments were statistically at par with other for germination and total mortality. Upmanyu *et al.* (2002) reported that soil amendment with cotton, mustard and neem cakes were effective in reducing pre and post emergence incidence of root rot of frenchbean under glasshouse and field condition. Prasad *et al.* (1999) reported that isolates of *Trichoderma* and *Gliocladium* sp. inhibited mycelial growth (54.9 to 61.4%) and suppressed the sclerotial production (31.8 to 97.8%) of *S. rolfisii*, the causal organism of root and collar rot of sunflower *in-vitro*. Bhoraniya *et al.* (2003) found that castor oil cakes reduced the stem rot disease (caused by *Sclerotium rolfisii*) incidence of chilli by 78.57 per cent, while sesame oil cake against foot rot of brinjal (Siddique *et al.*, 2002). Similarly, neem cake against wilt of bell pepper (Chowdary *et al.* 2000) and mustard cake against wilt of potato (Baker and Khan, 1981) were superior in controlling the disease caused by *S. rolfisii* in pot culture.

**Table 1.** Effect of bio-agent with organic amendments, on plant mortality under natural conditions

S. No.	Treatment	Germination* (%)	Mortality*(%)			Total mortality (%)
			15 DAS	30 DAS	45 DAS	
1	<i>Trichoderma</i> sp.	72.99 (58.66)**	2.46	5.55	6.01	14.02 (2.24)***
2	Neem cake	66.82 (54.87)	2.77	5.55	5.40	13.72 (2.23)
3	Mustard cake	66.97 (55.18)	3.24	5.86	6.17	15.27 (2.35)
4	Karanj cake	61.88	3.39	5.40	5.40	14.19

		(51.91)				(2.27)
5	<i>T. sp</i> with neem cake	93.05 (74.82)	1.54	3.24	3.54	8.32 (1.79)
6	<i>T. sp</i> with mustard cake	85.03 (67.80)	2.00	3.54	4.01	9.55 (1.90)
7	<i>T. sp</i> with karanj cake	80.86 (64.30)	1.85	5.09	4.47	11.41 (2.04)
8	Control	57.40 (49.47)	4.62	9.41	9.25	23.28 (2.84)
	SEm $\pm$	0.40	3.05	2.74	3.32	0.05
	CD (p=0.05)	1.22	8.45	7.61	9.20	0.17

\*=Average of three replications

DAS= Days after sowing

\*\*=Data in parenthesis show Arc sine transformation

\*\*\*=Sq. root transformation value in parenthesis

**Table 2.** Effect of bio-agent with organic amendments on collar rot under artificially inoculated conditions

S. No.	Treatments	Germination* (%)	Mortality*		Total mortality (%)
			L1	L2	
1	<i>Trichoderma sp.</i>	85.18 (68.67)**	14.81	14.81	29.62 (3.91)***
2	Neem cake	85.18 (67.44)	18.51	22.22	40.74 (4.56)
3	Mustard cake	81.48 (63.72)	25.92	29.62	55.54 (5.31)
4	Karanj cake	74.07 (59.40)	22.22	29.62	51.86 (5.12)
5	<i>T. sp</i> with neem cake	96.29 (77.30)	7.40	11.11	18.51 (3.10)
6	<i>T. sp</i> with mustard cake	92.59 (74.51)	14.81	11.11	25.92 (3.66)
7	<i>T. sp</i> with karanj cake	92.59 (74.51)	11.11	14.81	25.92 (3.66)
8	Control	48.15 (43.91)	33.33	37.03	70.37 (5.97)
	SEm $\pm$	2.34	0.20	0.60	0.19
	CD (p=0.05)	7.12	0.56	1.67	0.65

\*= Average of three replications

\*\*=Data in parenthesis show Arc sine transformation

\*\*\*=Sq. root transformation value in parenthesis

L1= Line no. 1

L2= Line no. 2

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