



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 381-384
Received: 05-05-2019
Accepted: 10-06-2019

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Antagonistic activity of *Trichoderma viride* and *Trichoderma harzianum* isolated from Bilaspur and Sarguja division against *Rhizoctonia solani* and *Sclerotium rolfsii*

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Abstract

In the present investigation the antagonistic activity of *Trichoderma* strains has been tested *in vitro* against *Rhizoctonia solani* and *Sclerotium rolfsii*. Ten strains of *Trichoderma* were isolated from different location and geographical area of Bilaspur and Sarguja division, nine isolates were *Trichoderma harzianum* and one *Trichoderma viride*. Dual culture technique was followed and radial mycelial growth was recorded. Maximum radial growth of *Trichoderma* (mm) was in strain T28, T5, T6, T7 against *Sclerotium rolfsii* and strain T3, T4, T5, T6, T7, T28 were effective against *Rhizoctonia solani*.

Keywords: Antagonistic, *Rhizoctonia solani*, *Sclerotium rolfsii*, *Trichoderma harzianum*, *Trichoderma viride*

Introduction

In the recent years, the environmental contamination caused by excessive use of chemical pesticides increased the interest in integrated pest management, where chemical pesticides are substituted by biopesticides to control plant pests and plant diseases (HayyanIsmaeil Al-Taweil *et al.*, 2009) [1]. *Trichoderma* spp. are among the most promising biocontrol agents (Elad *et al.*, 1984; Lui and Baker, 1980) [9, 15]. *Trichoderma* spp. has provided one of the first economical antagonistic control method against soil borne pathogen like *Fusarium*, *Sclerotium*, *Rhizoctonia*, *Phytophthora* and *Pythium* etc. (Backman and Kabana, 1975) [3]. *Trichoderma* is one of the common fungal biocontrol agents being used worldwide for suitable management of various foliar- and soil-borne plant pathogens like *Ceratobasidium*, *Fusarium*, *Rhizoctonia*, *Macrophomina*, *Sclerotium*, *Pythium* and *Phytophthora* spp. (Domingues *et al.*, 2000; Anand and Reddy, 2009) [8, 2].

Materials and Methods

1. Isolation of pathogens

Isolate of *Rhizoctonia solani* used in the present study was collected from severely diseased rice plants infected with sheath blight from rice production fields of T.C.B. College of Agriculture and Research Station (IGKV), Bilaspur, Chhattisgarh, India. Whereas, *Sclerotium rolfsii* was isolated from chickpea crop infected with collar rot diseases from chickpea fields of T.C.B. College of Agriculture and Research Station (IGKV), Bilaspur, Chhattisgarh, India. The segments were separately dried in between sheets of sterile filter paper and plated (3 segments per plate) on fresh sterilized selective media i.e. potato dextrose agar (PDA), rice polished agar and potato sucrose agar (Dhingra & Sinclair, 1985) [7] impregnated with streptomycin (100 ppm), and incubated at 26±1 °C. Pure culture was obtained by sub-culturing three times and maintained on culture slants in the refrigerator until required.

2. Dual Culture Interaction

In vitro, the antagonistic activity of different strains of *Trichoderma viride* against *Rhizoctonia solani*, *Sclerotium rolfsii* and was studied by dual culture technique (Raju *et al.*, 2000, Kcuk and Kivane, 2003) [19, 11]. A mycelial disc (7 mm diameter), obtained from the peripheral region of 7 days old cultures test pathogens i.e. *Rhizoctonia solani*, *Sclerotium rolfsii* and antagonistic fungi i.e. *T. Viride*, *T. harzianum* were placed simultaneously on the periphery, about 1 cm from the edges of the Petridishes (9 cm diameter) at opposite sides. The radial mycelial growth (mm) of *Trichoderma* strains was recorded.

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Results and Discussion

Radial mycelial growth (mm) of *Trichoderma* was recorded maximum on 6th day was in *Trichoderma* T28 (68.33), T6 (65.00), T5 (64.17) T7(61.17) on 7th T6(65.00), T5 (64.16), T28 (68.66) and on 10th day radial mycelial growth (mm) was maximum in strain T5(68.67), T6 (66.00), T7 (66.00), T28 (68.83) Bandyopodhyay *et al.* (2003) [4] reported that *Trichoderma* strains inhibited the growth of *Rhizoctonia solani* by 73.3%, *Sclerotium* spp by 66.6% and *R. bataticola* by 51.1%. *T. viride* was an important antagonist inhibiting the growth of *S. rolfisii* was reported by several workers (Kolte and Raut. 2007 [12]; Khosla.

Against *Rhizoctonia solani* radial mycelial growth (mm) of *Trichoderma* was maximum was observed on 5th days T8 (67.50), T28 (63.33), T1 (58.), T3 (61.66.), T7 (65.), T6

(64.33,) on 6th day maximum radial mycelial growth (mm) recorded in T3 (77.50), T5 (75.83), T6 (75), T8 (73.33), T4 (73.40), T28 (64.16) after 7 days maximum radial mycelial growth (mm) was recorded in strain T3 (78.33), T5 (77.83), T6 (75.50), T8 (75), T4 (75), T28 (70) followed by T1 (68.33), T2 (70). Pal and kaushik (2012) [18] reported that the antagonistic activity of *Trichoderma viride* been tested against *Rhizoctonia solani*. *Trichoderma viride* was isolated from *Rhynchostylis retusa* and *Rhizoctonia solani* from *Aerides multifloral* an orchid. Dual culture method was followed and result revealed that *Trichoderma viride* inhibited the mycelial growth of *Rhizoctonia solani* by 79.08%. Antagonistic activity of *Trichoderma viride* against *Rhizoctonia solani* revealed the inhibition of growth of *R. solani* which was 79.08% as calculated by Fokkema formula.

Table 1: Antagonistic activity of *Trichoderma* strains against *Sclerotium rolfisii* in dual culture technique.

<i>Trichoderma</i> strains	Designation	Mycelial growth (mm) after incubation hrs /days					
		144 hrs/ 6 days		168 hrs/7 days		240 hrs/10 days	
		<i>S. rolfisii</i>	Tricho	<i>S. rolfisii</i>	Tricho	<i>S. rolfisii</i>	Tricho
<i>Trichoderma harzianum</i>	T1	80.00	19.17	77.50	19.16	78.67	22.83
<i>Trichoderma harzianum</i>	T2	74.50	35.00	71.66	35.00	74.17	46.33
<i>Trichoderma harzianum</i>	T3	78.33	40.83	73.33	40.83	75.33	28.33
<i>Trichoderma harzianum</i>	T4	65.83	61.17	63.16	61.16	66.17	65.17
<i>Trichoderma harzianum</i>	T5	54.33	64.17	52.50	64.16	56.67	68.67
<i>Trichoderma harzianum</i>	T6	50.17	65.00	48.00	65.00	56.50	66.00
<i>Trichoderma harzianum</i>	T7	54.67	61.17	52.00	61.16	54.83	66.00
<i>Trichoderma harzianum</i>	T8	61.67	58.17	59.00	58.16	62.67	61.50
<i>Trichoderma viride</i>	T18	72.50	45.83	62.50	45.83	67.17	41.57
<i>Trichoderma harzianum</i>	T28	67.50	68.33	67.50	68.66	64.00	68.83

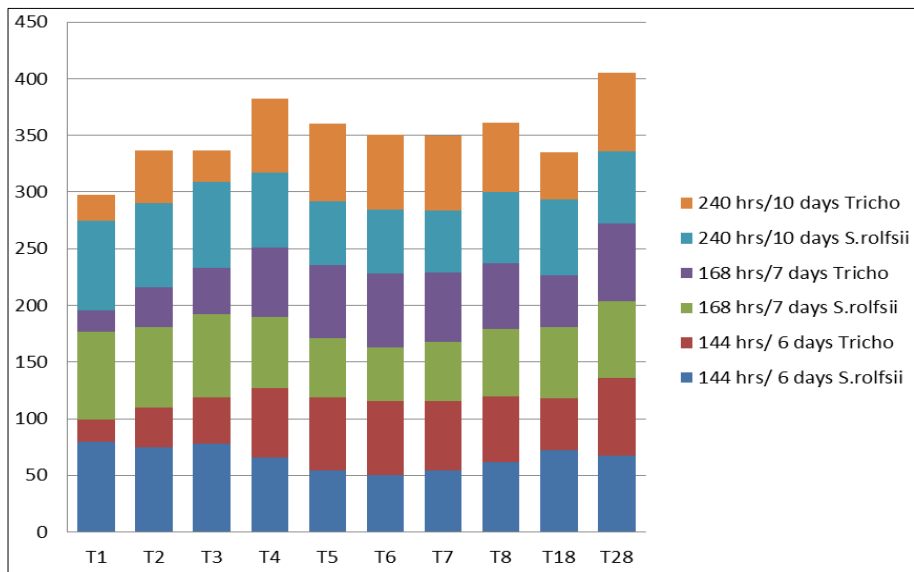


Fig 1: Antagonistic activity of *Trichoderma* strains against *Sclerotium rolfisii* in dual culture technique.





Plate 1: Antagonistic activity of *Trichoderma* strains against *Sclerotium rolfsii* in dual culture technique

Table 2: Antagonistic activity of *Trichoderma* strains against *Rhizoctonia solani* in dual culture technique.

<i>Trichoderma</i> strains	Designation	Mycelial growth (mm) after incubation hrs /days					
		120 hrs/ 5 days		144 hrs/6days		168 hrs/7 days	
		<i>R. solani</i>	Tricho	<i>R. solani</i>	Tricho	<i>R. solani</i>	Tricho
<i>Trichoderma harzianum</i>	T1	57.66	58.00	50.66	68.33	50.83	68.33
<i>Trichoderma harzianum</i>	T2	59.66	57.33	37.50	68.33	37.33	70.00
<i>Trichoderma harzianum</i>	T3	60.66	61.66	36.66	77.50	40.00	78.33
<i>Trichoderma harzianum</i>	T4	57.83	59.00	35.00	73.40	35.00	75.00
<i>Trichoderma harzianum</i>	T5	63.33	59.33	42.33	75.83	44.33	77.83
<i>Trichoderma harzianum</i>	T6	63.33	64.33	47.50	75.00	45.33	75.50
<i>Trichoderma harzianum</i>	T7	60.00	65.00	44.00	71.33	44.66	74.33
<i>Trichoderma harzianum</i>	T8	39.00	67.50	28.66	73.33	28.66	75.00
<i>Trichoderma viride</i>	T18	69.00	43.66	67.50	49.16	66.83	49.00
<i>Trichoderma harzianum</i>	T28	42.66	63.33	33.00	64.16	33.33	70.00

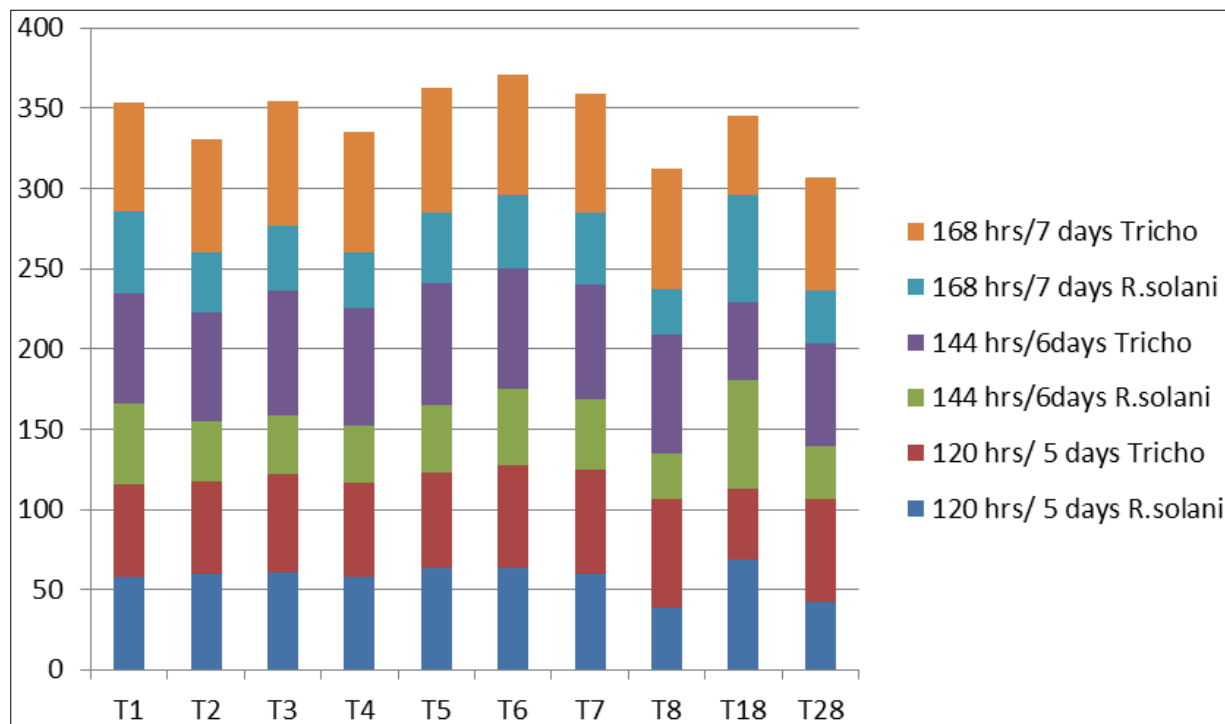


Fig 2: Antagonistic activity of *Trichoderma* strains against *Rhizoctonia solani* in dual culture technique.

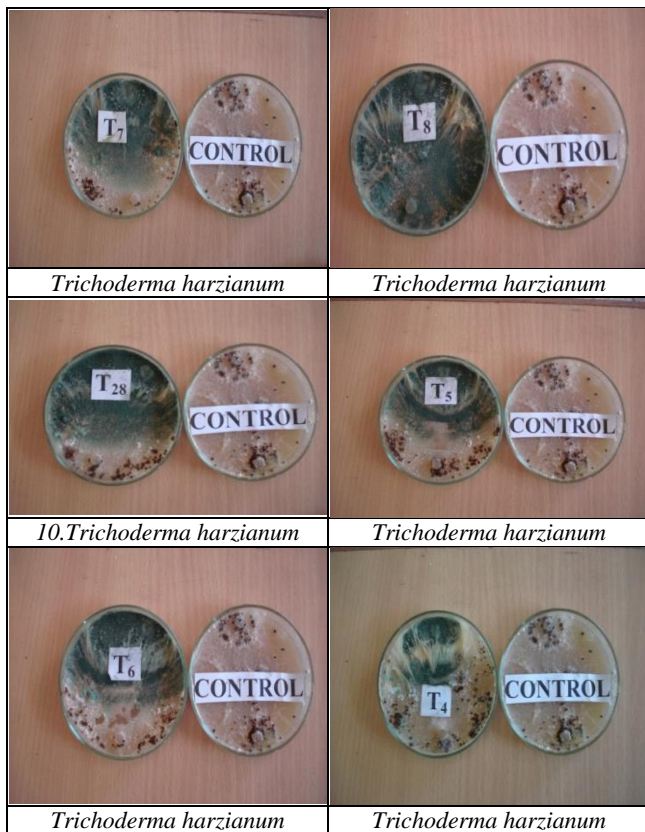


Plate 2: Antagonistic activity of *Trichoderma* strains against *Rhizoctonia solani* in dual culture technique.

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