RESEARCH ARTICLE

PLANT GROWTH PROMOTING ACTIVITIES OF INDIGENOUS STRAINS OF *TRICHODERMA VIRIDE* AND *TRICHODERMA HARZIANUM* USED AS SEED TREATMENT IN GROUNDNUT

Shweta Mishra*[1], Arwind Kurre[2] and R.K.S. Tiwari[3]

[1,2]*Departmant of Plant Pathology, IGKV Raipur*
[3]*Dean BTC CARS, Bilaspur*

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Abstract: Experiment was conducted *in vivo* to study the plant growth promoting activities of strains of *Trichoderma harzianum* and *Trichoderma viride* used as seed treatment@ 10 g /kg seed in groundnut. Various observations of growth parameters and yield components i.e. plant height (cm), no. of branches, no. of pods / plant, unfilled pods/ plant, filled pods/plant and pod yield/ plant (g) were recorded maximum in *Trichoderma strains* T2 respectively, followed by T3, T4 and minimum unfilled pod was recorded in strain T4(18) superior over control.

Keywords: Groundnut, *Trichoderma harzianum*, *Trichoderma viride* growth parameters, Yield components, Seed

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a major legume and an important oil seed crop in India, covering nearly half of the area under oilseeds. It is grown in over 100 countries with a total estimated area of 21.8 million ha and with production of 28.5 million tons. In India, it is grown over an area of 4 lakh ha, with an annual production of 5.5 million tons and productivity of 1007 kg ha in the year 2009-10 (Economic Survey, 2010-11). Several factors are responsible for low productivity among which diseases like leaf spot, collar rot, stem rot, bud necrosis, etc., are very important. Stem rot, collar rot and afla root are the major soil borne diseases of groundnut causing extensive damage to the crop. *S. rolfsii* attacks the crop at all the stages causing seed rot, seedling blight, stem rot and pod rot, the most common being stem rot (Deepthi and Eswara reddy, 2013). On the contrary, both *A. niger* and *A. flavus* primarily attack the seedling stage causing collar rot and aflaroot. Out of the only economical management measure recommended for these diseases is to treat seed with fungicides, but it can not protect the crop for longer period (T.benitez ,2004). The chemical method developed control too has its own limitations such as high capital investment, non remunerative, poor availability, selectivity, temporary effect, efficacy affected by physio chemicals and biological factors, development of pest resistance, pollution of food and feeds, health hazards, environmental pollution, etc. Considering these limitations, biological control is an important approach in this direction. (N.B. bagwan, 2011). Reduction of amount of inoculum or disease producing activity of a pathogen accomplished by through one or more organisms other than man" (Cook and Baker, 1983).

MATERIALS AND METHODS

Experiment was conducted under direct sown conditions taking groundnut cultivar J-11 in upland field having clay loam soil. The land was well prepared by ploughing two three times. Isolaton of Biological control agents from soil by serial dilution method: Different strains of Trichoderma were isolated from rhizosphere soil of healthy groundnut plants by serial dilution technique on Trichoderma specific medium (Elad, 1980).. Talc powder based formulations of different strains of *Trichoderma* spp. were developed and used as seed treatment. Seeds of chickpea were treated with Different strains of *Trichoderma* spp. @ 10 g /kg seed. Hexaconazole +Zineb was used @ 3 g kg/seed. Untreated control was kept for making comparison. Seeds @ 120 kg/ha were sown in each plot under randomized block design with three replications. Fertilizers i.e. NPK @ 20:60:0 / ha were applied as basal dose. Plant growth parameters i.e. plant height cm, number of branches /plant and yield parameters i.e. No. of pods / plant and pod yield / plant were recorded from each treatment.

Whenever required, the glasswares of Borosil make, plastic plates of Tarson make, blotter paper of standard grade and chemicals of standard grade (Merck, Qualigens, S.D. fine etc.) were used during the course of investigation. All the glasswares, polythene bags, ethyl alcohol, formalin, chemicals and other materials were procured from the Thakur Chhedilal Barrister College of Agriculture and Research Station, Bilaspur (C.G.).

The following equipments or materials used in present investigation were-

1. Autoclave for media sterilization
2. BOD incubator for incubation
3. Binocular research microscope
4. Compound microscope
5. Hot air oven for glassware sterilization

*Corresponding Author

6. Forceps, needles, blades, inoculation needle, cork borer, petri dishes
7. Growth chamber
8. Laminar air flow for isolation and purification

Efficacy of talc based formulations of *Trichoderma* strains as seed treatment for plant growth promoting activities in groundnut

Treatment details

Seed treatment with *Trichoderma* strains @ 10 g /kg seed

Seed treatment with Hexaconazole + Zineb @ 3 g /kg seed.

Total number of treatments: 12
Replications: 03
Design: RBD

Plot size: 2 mts x 0.60 mt Fertilizer: N 20 P60 K 0/ha

Dates of sowing – 9/12/2016

Observations to be recorded

Growth parameters: Plant height cm
Number of branches

Yield parameters: No. of pods / plant
Pod yield / plant

Treatment details

S.No.	Treatments
1	*Trichoderma harzianum* (T 1)
2	*Trichoderma harzianum* (T 2)
3	*Trichoderma harzianum* (T 3)
4	*Trichoderma harzianum* (T 4)
5	*Trichoderma harzianum* (T 5)
6	*Trichoderma harzianum* (T 6)
7	*Trichoderma harzianum* (T 7)
8	*Trichoderma harzianum* (T 8)
9	*Trichoderma viride* (T 18)
10	*Trichoderma harzianum* (T 28)
11	Hexaconazole + Zineb (Fungicide)
12	Control

RESULTS AND DISCUSSION

Experiment was conducted *in vivo* to study the plant growth promoting activities of strains of *Trichoderma harzianum* and *Trichoderma viride* used as seed treatment@ 10 g /kg seed in groundnut. Various observations of growth parameters and yield components were recorded Data from Table indicate that *Trichoderma* strain number T2 (34cm), T4 (32.8 cm) and T3 (32 cm) were significantly at par among themselves and more effective in increasing plant height over *Trichoderma harzianum* strain number T1 (31.2 cm), T5 (31 cm), *Trichoderma viride* strain number T18 (30.6 cm) and *Trichoderma harzianum* strain number T8 (30.4 cm) which are statistically at par among themselves .Whereas, *Trichoderma harzianum* strain number T 3 (5.6cm), T5 (5.6cm), T8 (5.6cm), T1 and T2 were significantly more effective in increasing number of branches/ plant over other strains and control. Numbers of pods / plant were significantly higher in treated plots over control (8.4) with maximum number of pods from T18 (10.8), T2 (9.6), T1 (9.6) and T3 (9.0). However, numbers of pods / plant recorded from T4 (6.4) were significantly less over other strains and at par with control (8.4). Similarly, unfilled pods/plant were also less in T4 (1.4) and at par with T5 (3.0),T6 (3.2) and T7 (2.1). Whereas significantly higher number of unfilled pods were recorded from control (5.8). All strains were found significantly effective in increasing filled pods/ plant over control (2.6). However, significantly higher number of filled pods were recorded from *Trichoderma viride* T18 (6.6), T7 (6.4) and T2 (6.2) over other strains. Pod yield (g) / plant recorded from plots treated with different isolates shows significantly higher pod yield (g) from *Trichoderma harzianum* strain number T2 (12.6 g), T1 (12.4 g), T3 (12 g), *Trichoderma viride* T18 (11.8 g), T6 (10.8 gm), T4 (10.8 gm) and T28 (10.6 gm) over control (6.6gm). Similarly, in pot culture assay soil treatment with *T.harzianum*, *T. viride* was found to enhance the root/shoot length. Increased growth by Trichoderma sp. was also induced by a diffusible growth-regulating factor (Windham *et al*., 1986).Similar findings reported by Saralamma and Reddy (2003) confirms above findings regarding plant growth promoting activities of different *Trichoderma* strains isolated from different locations.

Table 1. Plant growth promoting activity of indigenous strains of *Trichoderma harzianum* / *Trichoderma viride* as seed treatment in groundnut.

Strains	**Designation**	**Plant height (cm)**	**No. of branches**	**No. of pods / plant**	**Unfilled pods/ plant**	**Filled pods/ Plant**	**Pod yield/ plant (g)**
Trichoderma harzianum	T 1	31.2	4.8	9.6	4.6	5.0	12.4
Trichoderma harzianum	T 2	34.0	4.8	9.6	3.4	6.2	12.6
Trichoderma harzianum	T 3	32.0	5.6	9.0	3.4	5.6	12.0
Trichoderma harzianum	T 4	32.8	4.6	6.4	1.8	5.2	10.8
Trichoderma harzianum	T 5	31.0	5.6	8.6	3.0	5.6	9.4
Trichoderma harzianum	T 6	29.0	3.8	9.0	3.2	5.8	10.8
Trichoderma harzianum	T 7	27.4	4.0	8.6	2.1	6.4	12.4
Trichoderma harzianum	T 8	30.4	5.6	8.8	4.8	4.0	10.4
Trichoderma viride	T 18	30.6	5.4	10.8	4.2	6.6	11.8
Trichoderma harzianum	T 28	28.4	4.2	10.0	4.2	5.8	10.6
Control		24.6	3.8	8.4	5.8	2.6	6.6
S E m (±)		0.70	0.28	0.95	0.48	0.25	0.65
CD 5%		2.08	0.83	2.79	1.42	0.74	1.91

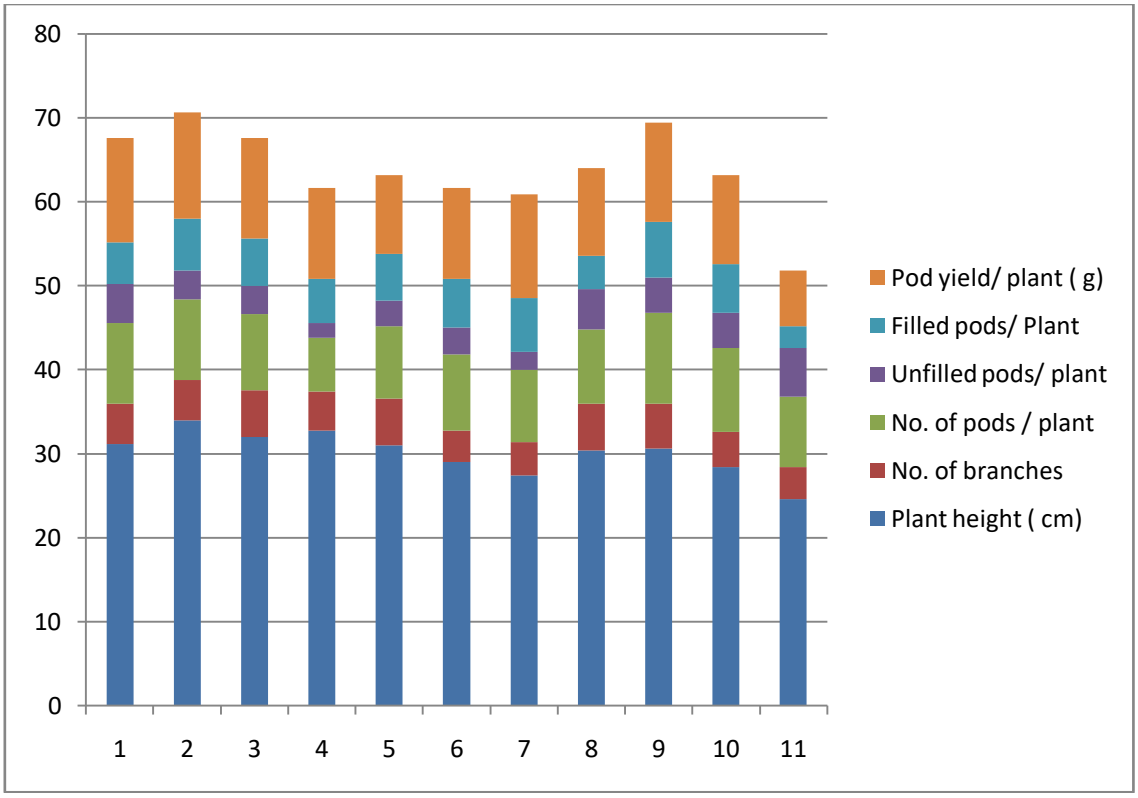
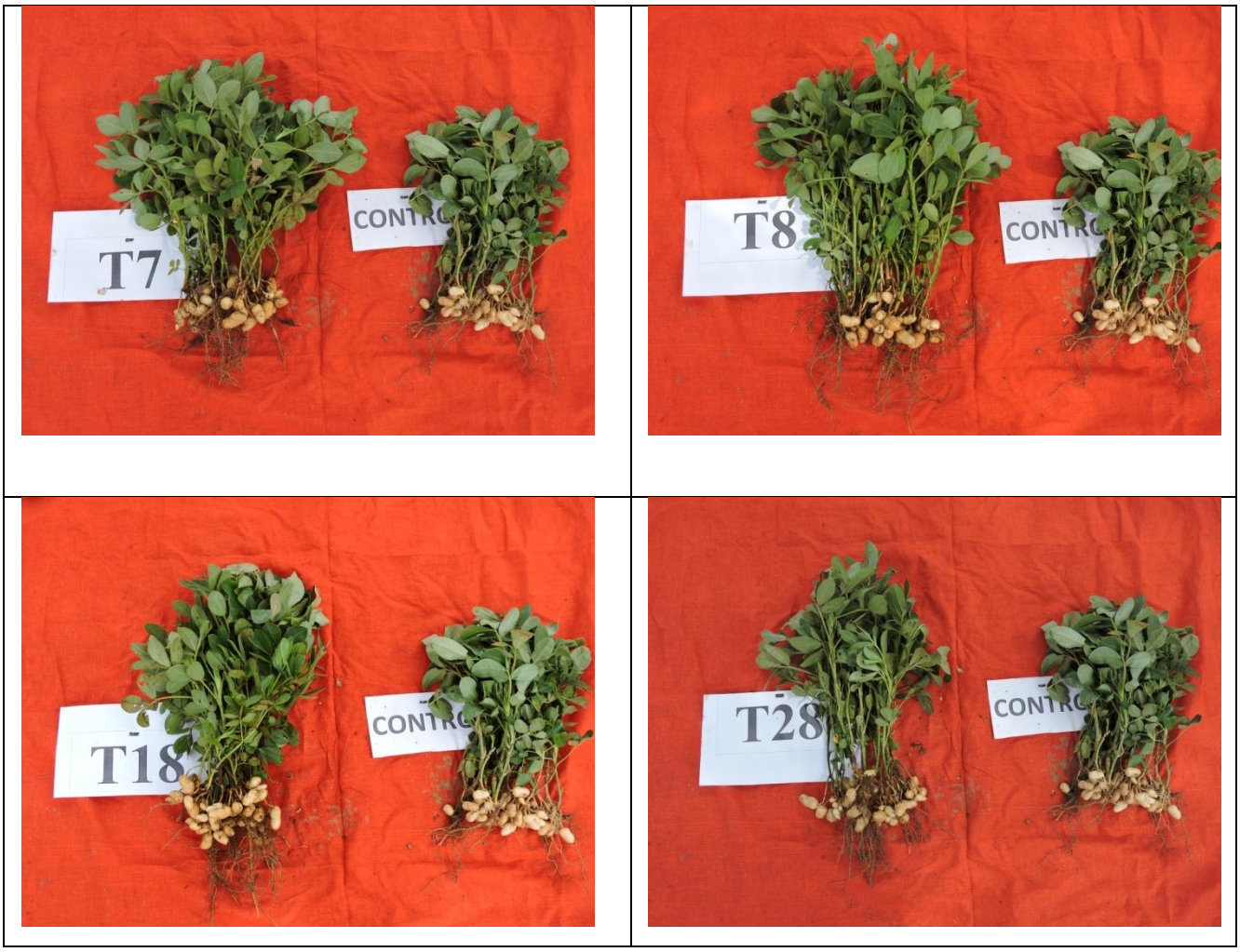


Fig. 1: Plant growth promoting activity of indigenous strains of *Trichoderma harzianum* / *Trichoderma viride* as seed treatment in groundnut.

Plate 1. Plant growth promoting activity of indigenous strains of *Trichoderma harzianum* / *Trichoderma viride* as seed treatment in groundnut.



REFERENCES

Benitez, T. (2004). Biocontrol mechanisms of *Trichoderma* strains. International microbiology. 7: 249-260.

Bagwan, N.B. (April, 2011). Evaluation of biocontrol potential of *Trichoderma species* against *Sclerotium rolfsii, Aspergillus niger and Aspergillus* flavus, International Journal of Plant Protection, Vol. 4 No. 1 :pp 107-111

Cook, R.T. and Baker, K.F. (1983). The nature and practices of biological control of plant pathogens. In: APS Books, St. Paul. Minn.539 pp

Deepthi, K.C. and Reddy Eswara, N.P. (2013). Stem rot of groundnut(*ARACHIS HYPOGAEA L.*) induced by *Sclerotium Rolfsii* and its management, International Journal of Life Science Biotechnology and Pharma Research ,Vol.2,No.3.

Elad, Y. Chet, I. and Katan, Y. (1980). *Trichoderma harzianum* a biocontrol agent effective against *Sclerotium rolfsii* and *Rhizoctonia solani*. Phyto path.70: 119-121.

Saralamrna, S. and Vithal Reddy, T. (2003). "Integrated Management of Sclerotial Root Rot in Groundnut", National Seminar on Stress Management in Oilseeds For Attaining Self Reliance in Vegetable Oil Indian Society of Oilseeds Research, Directorate of Oilseeds Research, Hyderabad January 28 - 30, pp. 20 - 21. 71.

Windham, M. T., Elad, Y. and Baker, R. (1986). A mechanism for increased plant growth induced by *Trichoderma spp*. Phytopathology 26: 518-521.