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Evaluate *in vitro* different bio agents for growth of *Rhizoctonia bataticola*

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Abstract
Chickpea (*Cicer arietinum* L) is an important pulse crop of India popularly known as 'Gram'. In India, it is cultivated on nearly about 10.22 million ha. area with an annual production of 09.88 metric tonnes and productivity of 967 kg/ha. The Marathwada region contributes the 6.58 lakh ha. area with production of 06.64 lakh tonnes and productivity of 918 kg/ha., during *Rabi.* (Anonymous, 2014). Of the major fungal diseases infecting chickpea, dry root rot incited by *Rhizoctonia bataticola (taub)* Butl. is one of the most destructive and wide spread disease which cause average yield losses of 05-50% (Anonymous, 2012). Keeping in view, economic importance of chickpea and losses incurred by dry root rot disease, present investigations on the aspects *viz*., survey against *R. bataticola* were undertaken during *Rabi*, 2014-15 at the Department of Plant Pathology, College of Agriculture, Badnapur.
The suppression of growth of pathogen was maximum with *Trichoderma viride* (86.62 per cent) followed by *Trichoderma harzianum*(66.33 per cent) and the least effective bioagents was *Aspergilus niger* (55.13 per cent). *Trichoderma viride* showed best performance against the pathogen.

Keywords: Chickpea, Dry root rot, Bioagents

Introduction
The cultivated chickpea (*Cicer arietinum* L.) was one of the first grain legume to be domesticated in the old world. Chickpea is most probably originated in area of present day south eastern Turkey and adjoin Syeria,
The genus Cicer belongs to fay Leguminoceae and sub family Papilionoidae. Chickpea has been well recognized as a valuable source of protein particularly in the developing countries , where majority of the populations depends on the low priced food for meeting it's dietary requirements nutritionally , chickpea is low in sodium, contains (21.1%), fats (4.5%), no cholesterol and overall an excellent source of both soluble and insoluble fiber , complex carbohydrates(61.5%), vitamins (especially B vitamins) and minerals (especially potassium , phosphorous, calcium, magnesium, copper , iron and zinc). Therefore, chickpea is an excellent heart healthy food that may be beneficial to the prevention of coronary and cardiovascular diseases and by reducing blood lipids also help some serious complications of diabetes.
Chickpea is grown in many tropical, sub-tropical and temperate regions of the world. Chickpea is mainly used for human consumption as well as animal feed. It is consumed as whole seed, dal, fried, boiled, salted or more generally cooked fresh green leaves generally used as vegetable. The grains also used as vegetable chole,Gram flour is mixed with wheat flour to improve the protein content of wheat flour and it is used for making missi roti, The flour of dehusked gram is called basen which widely used in making pakodas, kadi, and several snack foods.
In India chickpea is primarily grown as *Rabi* (post rainy) season crop on residual soil moisture It ensures nutritional security besides being a rich source of protein and is also important in substantial agriculture as it improves physical, chemical and biological properties of soil by mixing atmospheric nitrogen symbiotically. Deep roots of pulse crop also open up the soil by increasing soil aeration and fit well in various cropping ecosystem and hence have got unique position in rainfed agriculture.
Chickpea is grown throughout the world. In India on large scale in Punjab, Harayana, Uttar Pradesh, Madhya Pradesh, Rajasthan, Andhra Pradesh, Karnataka, and Maharashtra it is mostly cultivated under rained condition in a variety of soil, varying in a residual moisture. In India area under chickpea was 10.22 M/ha with production 9.88 MT and productivity 967 kg/ha during 2014. In Maharashtra chick pea is grown under *rabi* season and it occupies area of 18.19 lakh ha with production 16.22 lakh ton and productivity 891 kg /ha during 2014. In marathwada region, total area under chickpea during 2014 was 6.58 lakh ha with production 6.64 lakh ton and productivity 918 kg/ha. (Anon 2014)

suceptibility of the crop to different biotic and abiotic stress. Abiotic stress is basically due to insufficient moisture. regarding biotic stresses , diseases , insect pest , nematodes and parasitic weeds account major losses for example , extend of yield loss due to wilt and root rot disease is far more in the event of drought high temperature in the country. The chick pea crop is attacked by 172 pathogen *viz* as 67 fungi, 22 viruses, 3 bacteria, 80 nematodes and mycoplasma from all over the world (Nene *et al*.996).

Being soil borne in a nature it is very difficult to control this pathogen,Use of resistant cultivar is more effective strategy for sustainable chickpea cultivation. Despite of several resistant varieties are available, yield losses due to root rot are more, and Ahmed and Mohammed (1986) reported losses due to dry root rot in gram to extend of 70.8% at full podding and 48.9% at pre-harvest stage. It indicates that use of resistant varieties is not soul control measure against dry root rot of chick pea, therefore, two or more control must be tried in combination with resistant variety from sustainable production.

Materials and Method

Seven bio control agents were assessed *in vitro* against *R. bataticola* by dual culture method. Mycelial disc of 5 mm diameter were cut from the margin of 7 days old culture of both test pathogen and placed opposite to each other on PDA in petriplate. The inoculums discs were placed 30 mm away from each other. The petriplate inoculated with disc of *Rhizoctonia bataticola* alone served as control. The inoculated plates were incubated at 27 $\pm 2^0$ C in BOD incubator for 7 days. The percent growth inhibition of inserting colonies was calculated as per formula given below.

Details of Experiment:

Design – CRD
Replication – Three
Treatment – Eight
T1 – *Trichoderma viride*
T2 – *Trichoderma harzianum*
T3 - *Trichoderma hamatum*
T4 - *Trichoderma Longibrachiatum*
T5 - *Trichoderma. Koningii*
T6 – *Trichoderma virens*
T7 – *Aspergilus Niger*
T8 - Control

$$\text{Per cent inhibition (I)} = \frac{A_1 - A_2}{A_1} \times 100$$

Where,

A_1 = Area covered by pathogen in control plate.
A_2 = Area covered by pathogen in dual culture plate

Results and Discussion

The results obtained on mycelial growth and inhibition of *R. bataticola with* eight antagonists are presented in Table and depicted in Fig. and PLATE. Results revealed that all the bioagents evaluated exhibited fungistatic / antifungal activity against. *R.bataticola* and significantly inhibited its growth over untreated control.

In vitro* efficacy of bioagents against mycelial growth and inhibition of *R. bataticola

Tr. No.	Treatments	Colony diameter* (mm)	% Inhibition
T_1	*Trichoderma viride*	10.24	88.62 (70.28)
T_2	*T. harzianum*	30.30	66.33 (54.52)
T_3	*T.hamatum*	34.51	61.65 (51.73)
T_4	*T. longibrachiatum*	38.02	57.75 (49.45)
T_5	*T. koningii*	39.12	56.53 (48.75)
T_6	*T. virens*	38.44	47.28 (43.44)
T_7	*Aspergillus niger*	40.38	55.13 (47.94)
T_8	Control	90.00	00.00 (00.00)
	S.E. ±	0.63	
	C.D.@ 1%	1.86	

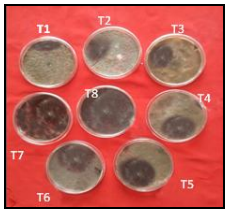
*-Mean of three replications, Figures in parenthesis are arc sine transformed values.

Among the bioagents/antagonists tested, *T. viride* was found most effective and recorded significantly least colony diameter (10.24mm) with highest per cent inhibition (88.62%) of the test pathogen. The second and third best antagonists found were *T. harzianum* and *T.hamatum* which recorded colony daimeter of 30.30 mm and 34.51 mm and per cent inhibition of 66.33 and 61.65 per cent, respectively. These were followed by *T.longibrachiatum* (38.02mm and 57.75%), *T.konnigi* (39.12mm and 56.53%) and *T. virens* (38.44mm and 47.28%) of colony daimeter and its per cent inhibition, respectively. *A. Niger* was found comparatively less effective with maximum colony daimeter (40.38mm) and minimum per cent mycelial inhibition (55.13%).

Results of the present study on antifungal activity of the *T. viride, T. harzianum,T. hamatum, T. longibrachiatum,T.virens, T. koningii* and *Aspergillus niger* against *R. bataticola* are in conformity with those reported earlier by several workers Malathi and Doraisamy (2003) and Joytsana *et al* (2008).

T. viride showed best performance against the pathogen followed by *T. harzanium, T.hamatum , T.longibrachiatum, A.niger, A.flavus, P. fleurescens* which also checked the fungus growth to some extent similar finding were also reported by Singh *et al*. (2006) reported that the *T. harzanium* was effective in inhibiting mycelial growth of *R. bataticola* the causal organism of chickpea dry root rot. Pan (2009) reported the antagonistic potential of *Trichoderma* isolates through production of volatile and nonvolatile substance against M. *phaseolina.* Chaudhary (2010) tested bioagents *viz*., T. *viride, T. harzanium, A.vesicolor* for the control of dry root rot in Mungbean. In dual culture, *T. viride, T. harzanium, A.vesicolor* were effective in inhibiting the growth of *M. phaseolina* to an extent of 61-65 per cent.

PLATE VIII



Effect of Bioagents on *R. bataticola*

T1= T. viride
T2=T. harzianum
T3=T.hamatum
T4=T.longibrachiatum
T5=T.konigii
T6=virens
T7=Aspergilus niger
T8=control

Conclusions

The suppression of growth of pathogen was maximum with *Trichoderma viride* (86.62 per cent) followed by *Trichoderma harzianum*(66.33 per cent), *T. hamatum* (61.65 per cent), *T.Longibachiatum* (57.75 per cent), *T. konigii* (56.53 per cent), T. virens (47.28 per cent)and the least effective bioagents was *Aspergilus niger* (55.13 per cent). *Trichoderma viride* showed best performance against the pathogen.

- Studies (*In vitro*) on efficacy of bioagents against *R.bataticola* proved that, among the bioagents *T. viride* is best to control dry root rot followed by *T. harzianum*could effectively and economically manage/control dry root rot of chickpea.

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