



ANTAGONISTIC EVALUATION OF DIFFERENT BIO-CONTROL AGENTS AGAINST *FUSARIUM UDUM*, CAUSING WILT OF ARHAR (*Cajanus cajan* L.)

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ABSTRACT

Experiments were conducted for study the antagonistic activity of six bio-control agents like *Trichoderma viride*, *T. hamatum*, *T. harzianum*, *Gliocladium virens*, *Pseudomona fluorescens* and *Bacillus subtilis* against *Fusarium udum* was determined by dual culture technique. Seven days old culture of these bio-agents was used to find out their antagonistic activity against *Fusarium udum*. Disc (5 mm) of different bio-agents were placed in a sterilized petri plate which was previously poured with PDA at three different points leaving 0.5 cm distance from the periphery, separately. Antagonistic activity of the bio-agents against wilt incidence has found that all the bio-agents are able to reduce wilt incidence. The minimum wilt incidence was recorded by *T. harzianum* showing 8 per cent wilt incidence against 29 per cent in case of control. The rest of the treatments were also showing superior over control. From the table it is also cleared that among two bacterial bio-agents *Pseudomona fluorescens* performed better over to *Bacillus subtilis* but inferior over *T. harzianum*.

Keywords: Arhar, Bio-control agents, Evaluation, Wilt

Pigeon pea (*Cajanus cajan* L.) is an important pulse crop in India as well as in the world. The fungal, bacterial, viral and nematodes diseases leading to cause serve yield loss in India. Among the diseases, wilt caused by *Fusarium udum* is the most important one. The pathogen is soil borne in nature and remains to be challenging task in term of management. Several management practices have been adopted to minimize the diseases, but there is no doubt that chemical is the best method for management of the disease. Considering adverse effect of chemical on human health and environment, it should not be adopted continuously for this purpose. Hence, there is need to search for an alternative method for management of disease. In this content, bio-logical control has been taken a promising place for management of plant diseases (Upadhyay and Rai, 1981), Haider *et al.*, 1978. Hence, a study was initiated to find out the efficacy of fungal and bacterial bio-control agents against *Fusarium udum* under laboratory and glass house condition.

MATERIALS AND METHODS

Antagonistic activity of six bio-control agents like *Trichoderma viride*, *T. hamatum*, *T. harzianum*, *Gliocladium virens*, *Pseudomona fluorescens* and *Bacillus subtilis* against *Fusarium udum* was determined by dual culture technique (Finey, 1971). Seven days old culture of these bio-agents was used to find out their antagonistic activity against *Fusarium udum*. Disc (5 mm) of different bio-agents were placed

in a sterilized petri plate which was previously poured with PDA at three different points leaving 0.5 cm distance from the periphery, separately. At the centre of Petri plate, a disc of *Fusarium udum* of 5 mm diameter was placed in each treatment. One plate was kept without antagonistic to serve as control. The Petri plates were incubated at 25±1°C for seven days. Three replications were kept for each treatment. Observations on growth of both antagonistic, pathogen and zone of inhibition as recorded after 7 days of incubation.

Effect of seed treatment with bio-agents on wilt incidence of Arhar in glass house condition

An experiment was conducted at glass house condition, Department of Plant Pathology C.S. Azad University of Agriculture & Technology, Kanpur. The seed of Arhar, variety Bahar, was treated with spore suspension of all these bio-agents @ 10⁴ conidia/ml separately. The treated seeds were sown in earthen pots which were previously filled by soil containing *F. udum*. An untreated control was also maintained with four replications. Observation on wilt incidence was recorded at the age of 4 weeks of seedlings.

RESULTS AND DISCUSSION

The result presented in the table showed that all the six bio-agents inhibited the growth of *Fusarium udum* (Table-1). Among six bio-agents was exhibited by *T. harzianum* representing maximum antagonistic activity inhibition zone of 15 mm followed by *G. virens*, *T. viride* and *T. hamatum*, causing 12, 10 and 7

mm inhibition zone indicating the inhibitory effect of these bio-agents against *F. oxysporum* f.sp. *udum* was due to antibiosis. The antagonistic activity of *T. harzianum* has also been observed against several workers (Haidar *et al.*, 1979, Biswas *et al.*, 2003 Girdhari *et al.*, 2008). Rajik *et al.* (2012) also observed the biochemical basis of defense response in plant against Fusarium wilt through bio-agents as inducers.

Antagonistic activity of the bio-agents against wilt incidence has found that all the bio-agents are able to reduce wilt incidence (Table-2). The minimum wilt incidence was recorded by *T. harzianum* showing 8 per cent wilt incidence against 29 per cent in case of control. The rest of the treatments were also showing superior over control. From the table it is also cleared that among two bacterial bio-agents *Pseudomona fluorescens* performed better over to *Bacillus subtilis* but interior over *T. harzianum*. Several workers have also been reported that application of bioagents reduces disease incidence in Fusarium wilt (Arzoo *et al.*, 2012; Vasudeva, and Roy, 1950; He *et al.*, 2002).

Table-1: Evaluation of antagonists against *Fusarium oxysporum* f. spp. *udum* in vitro

S. No.	Antagonists	Growth (mm)		Inhibition zone
		Antagonists	Pathogen	
1	<i>Trichoderma viride</i>	63	17	10
2	<i>T. harzianum</i>	60	15	15
3	<i>T. hamatum</i>	65	18	7
4	<i>Gliocladium virens</i>	68	10	12
5	<i>Pseudomona fluorescen</i>	12	65	13
6	<i>Bacillus subtilis</i>	30	48	12
7	Pathogen alone	-	90	-
	C.D.@0.05	-	-	2.6

Table-2: Field evaluation of antagonists against *Fusarium oxysporum* f. spp. *udum*

S. No.	Antagonists	% Wilt Incidence
1	<i>Trichoderma viride</i>	11
2	<i>T. harzianum</i>	8
3	<i>T. hamatum</i>	16
4	<i>Gliocladium virens</i>	10
5	<i>Pseudomona fluorescen</i>	9
6	<i>Bacillus subtilis</i>	19
7	Pathogen alone	29
	C.D.@0.05	4

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