International Journal of Pharma and Bio Sciences V1(2)2010

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

A.J. DESHMUKH*[1], B.P. MEHTA[2] AND V.A.PATIL[3]

Department of Plant Pathology NMCA, NAU., Navsari, India.

Corresponding Author amol_deshmukhnau@yahoo.co.in

ABSTRACT

Investigation on anthracnose (*Colletotrichum gloeosporioides* Penz. and Sacc.) of Indian bean (*Lablab purpureus* L) under south Gujarat conditions was carried out in the Plant Pathology Lab., Deptt. of Plant Pathology, N. M. College of Agriculture, Navsari Agricultural University, Navsari during the year 2008-09 to find out suitable management strategies. Due to hazardous effect of chemical fungicides, search for safer alternative to control the pathogen is better choice. This led to trials on the use of bioagents to control the pathogen. The bioagents such as *Trichoderma viride,Trichoderma harzianum, Trichoderma longibrachyatum, Gliocladium virens, Chaetomium globosum, Pseudomonas fluorescens, Aspergillus niger,* and *Bacillus subtilis* were evaluated by dual culture, pathogen at periphery and pathogen at the centre technique respectively to monitor antagonistic effect. The results revealed that out of all the eight bioagents used, three bioagents in the three techniques respectively were able to inhibit the growth of the pathogen mycelia significantly, *T. viride* by (60.69, 58.57, 63.83), *T. harzianum* by (58.12, 52.27, 58.87) and *A. niger* by (55.56, 50.46, 57.44) per cent

KEY WORDS

Anthracnose, Bioagents, Indian bean, lnhibitory effect.

INTRODUCTION

Indian bean (*Lablab purpureus* L.) is an important pulse crops grown extensively in Gujarat. The anthracnose (*C. gloeosporioides*) was observed first time in serious proportion in *rabi* 2007 at Pulse Research Station, Navsari.The hazardous effects of chemicals used in plant disease management have diverted plant pathologists to find out the alternative techniques of plant disease control which may cause little or no adverse effect on environment. Notable success of disease management through the use of antagonistic bioagents in the laboratory, glass house and field has been achieved during past several years. On the basis of this information, there is possibility of development of biological control for plant diseases. Now days, the commercial formulation of some of the bio-control agents has already become available in the market. In the present study, attempts have been made to identify antagonistic bioagents against *C. gloeosporioides in vitro.*

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

MATERIAL AND METHODS

Eight known antagonists viz., *T. viride*, *T. harzianum*, *T. longibrachyatum*, *G. virens*, *C. globosum*, *P. fluorescens*, *A. niger*, and *B. subtilis* were tested in *in vitro* against *C. gloeosporioides*. The culture discs measuring 5 mm of test organism and pathogen were cut aseptically from the colony of pure culture grown on PDA medium and kept at different positions according to different techniques employed in the present investigation. In dual culture technique[1], culture discs of test organisms and the pathogen were placed opposite to each other at 4 cm apart in the Petri plate containing 20 ml PDA aseptically and real antagonistic properties of the test bioagents were exhibited .In Pathogen at the periphery technique[2], the culture disc of the pathogen placed aseptically 4 cm away radially at four corners keeping one disc of test organism at centre in the plate containing 20 ml PDA aseptically. In Pathogen at the centre the culture disc of the pathogen was placed in the center and four similar discs of the test organisms were placed 4 cm away from the pathogen at the periphery in the Petri plate containing 20 ml PDA aseptically. The culture discs of the pathogens were kept at respective places of pathogen in each technique without bioagent served as control. All the treatments were incubated at room temperature (27 ± 2oC) and after 6 days the radial growth of the test organism and pathogen was measured. CRD design with three repetitions of each treatment was employed in the present experiment. The per cent growth inhibition (PGI) was calculated as per[3].

$$PGI = \frac{100\ (DC-DT)}{DC}$$

Where,

PGI = Per cent growth inhibition

DC = Average diameter of mycelial colony from control set (mm)

DT = Average diameter of mycelial colony from treated set (mm)

RESULTS AND DISCUSSION

All the antagonists under test were significantly superior over control in all the techniques against *C. gloeosporioides* however in Dual culture technique, out of eight antagonists tested, *T. viride* inhibited significantly highest growth of the pathogen (15.33 mm) which was at par with *T. harzianum* (16.33 mm) .The next best in order of merit was *P. fluorescens* (17.33 mm) followed by *A. niger* (18.33 mm) and *B. subtilis* (18.33 mm) and rest of the antagonists inhibited comparatively least growth of the pathogen(Table-1).

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

Table 1.
Screening of known antagonists against *C. gloeosporioides in vitro* under dual culture technique.

Sr. No.	Test organism	Average growth diameter of pathogen(mm)	Per cent growth inhibition
1	*T. viride*	15.33	60.69
2	*T.harzianum*	16.33	58.12
3	*T.longibrachyatum*	26.33	32.48
4	*A. niger*	17.33	55.56
5	*G. virens*	33.00	15.38
6	*C. globosum*	29.66	23.94
7	*B. subtillis*	18.33	53.00
8	*P. fluorescens*	18.33	53.00
9	Control	39.00	-
	S.Em. ±	0.68	
	C.D at 5%	2.00	-
	C.V. %	4.9	

In Pathogen at the periphery technique, *T. viride* inhibited significantly the highest growth of the pathogen (15.33 mm) and appeared to be the most superior over all the antagonists tested. The next best in order of merit was *T. harzianum* (17.66 mm), *A. niger* (18.33 mm) followed by *B. subtilis* (20.00 mm). However rest of the antagonists inhibited comparatively least growth of the pathogen. (Table 2).

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

Table 2.
Screening of known antagonists against *C. gloeosporioides in vitro* under pathogen at periphery technique.

Sr. No	Test organism	Average growth diameter of pathogen, mm.	Per cent growth inhibition.
1	*T. viride*	15.33	58.57
2	*T.harzianum*	17.66	52.27
3	*T.longibrachyatum*	25.66	30.65
4	*A. niger*	18.33	50.46
5	*G. virens*	32.33	12.62
6	*C. globosum*	33.66	9.03
7	*B. subtillis*	20.00	45.94
8	*P. fluorescens*	30.00	18.91
9	Control	37.00	-
	S.Em. ±	0.67	
	C.D at 5%	1.98	-
	C.V.%	4.5	

In Pathogen at the centre, *T. viride*, inhibited significantly highest growth of the pathogen (17.00 mm) which was followed by *T. harzianum* (19.33 mm) .The next best in order of merit was *A. niger* (20.00 mm) followed by *T. longibrachyatum* (26.66 mm) and rest of the antagonists showed comparatively least growth inhibition (Table- 3).

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

Table 3.
Screening of known antagonists against *C. gloeosporioides in vitro* under pathogen at the centre.

Sr. No.	Test organism	Average growth diameter of pathogen, mm.	Per cent growth inhibition.
1	*T. viride*	17.00	63.83
2	*T.harzianum*	19.33	58.87
3	*T.longibrachyatum*	26.66	43.28
4	*A. niger*	20.00	57.44
5	*G. virens*	42.33	9.93
6	*C. globosum*	37.66	19.87
7	*B. subtillis*	25.66	45.40
8	*P. fluorescens*	32.66	30.51
9	Control	47.00	-
	S.Em. ± C.D at 5% C.V.%	0.43 1.28 2.5	-

It is observed from the study that all the antagonists tested by three different techniques were effective against *C. gloeosporioides* and may be very useful as potential biocontrol agents. Among them, *T. viride* proved to be highly antagonistic followed by *T. harzianum* and A. niger. Antagonistic effect of *T. viride, T. harzianum* and *A. niger* against *C. gloeosporioides* was reported by[4]. [5]recorded that, *T. viride* inhibited the growth of *C. gloeosporioides* isolated from mango. Similarly, [6]reported that *T. viride*, isolated from cowpea phylloplane hyper parasitised the mycelium of *C. truncatum*. [7]found that *C. gloeosporioides* showed high degree of sensitivity to *T. harzianum, T. tolyposporium* and *T. pseudokoningii*. [8]reported that *A. niger, T. viride, T. harzianum, T. longibrachyatum, B. subtilis* and *P.fluorescens* were strong and potent antagonists against *C. gloeosporioides*. The results of the present investigation are analogous to the previous findings.

CONCLUSION

Thus out of three techniques, *T. viride* proved superior and inhibited the growth of *C.gloeosporioids* in vitro. Hence it can be recommended after rigorous testing in the field against the pathogen for management of anthracnose in Indian bean.

In vitro Evaluation of some known Bioagents to Control *Colletotrichum gloeosporioides* Penz. and Sacc., causing Anthracnose of Indian bean.

ACKNOWLEDGEMENT

The authors express their gratitude to Director of research, Dean P.G. Studies, Navsari Agric. University, Navsari-Gujarat for providing necessary facilities during the present investigations.

REFERENCES

1. Dennis, C. and Webster, J. (1971). Antagonistic properties of species groups of *Trichoderma* III hyphal interaction. *Trans. Brt. Mycol. Soc.*, **57**: 363-369.
2. Asalmol, M.N.; Sen, B. and Awasthi, J. (1990). Role of temperature and pH in antagonism of *Aspergillus niger* and *Trichoderma viride angaist Fusarium solani Proc. All India Phytopathol. Soc.*, (West Zone).M.P.A.U., Pune. pp. 11-13.
3. Vincent, J.M. (1927). Distortion of fungal hyphae in presence of certain inhibitors. *Nature*, **159**: 850.
4. Patel, R.V. (2000). Studies on leaf spot (*Colletotrichum gloeosporioides* Penz. and Sacc.) of turmeric (*Curcuma longa* L.) under South Gujarat conditions. M.Sc. (Agri.) Thesis. Gujarat Agricultural University, S.K. Nagar.
5. Bhuvneswari, V. and Rao, M.S. (2001). Evaluation of *Trichoderma viride* antagonism to post harvest pathogens on mango. *Indian Phytopath*., **54** (4): 493-494.
6. Bankole, S.A. and Adebanjo, A. (1996). Bio-control of brown blotch of cowpea caused by *Colletotrichum truncatum* with *Trichoderma viride. Crop protection*, **15** (7): 633-636.
7. Medeiros, S.A.F. and Menezes, M. (1994). Antagonistic potential of some fungi to *Colletotrichum gloeosporioides*, agent of cashew tree (*Anacardium accidentale*) anthracnose. *Fitopatologia Brasileria*, **19** (1): 84-91.
8. Patel, V.R. (2004). Investigation on dieback and fruit rot (*Colletotrichum gloeosporioides* Penz. and Sacc.) of chilli (*Capsicum annum* L.) under south Gujarat condition. M. Sc. (Agri.) Thesis. Navsari Agricultural University, Navsari.