The Bioscan 7(4): 701-703, 2012
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.in

ANTAGONISM OF SOME WELL-KNOWN BIOAGENTS AGAINST *CURVULARIA ERAGROSTIDIS* (HENN.) J.A.MEY. - AN INCITANT OF SPIDER LILLY LEAF TIP BLIGHT

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KEY WORDS
Biological control
Curvularia eragrostidis
Antagonist

Received on :
05.07.2012

Accepted on :
22.10.2012

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ABSTRACT
Investigation on leaf tip blight (*Curvularia eragrostidis* (Henn.) J. A. Mey. of spider lilly (*Hymenocallis littoralis* L.*)* under south Gujarat conditions was carried out 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 eight known bioagents were evaluated by dual culture, pathogen at periphery and pathogen at the centre technique to monitor antagonistic effect. The results revealed that out of all the eight bioagents used, three bioagents *viz., T. viride* (73.39 %, 69.80%, and 70.73% maximum growth inhibition in dual culture, pathogen at periphery and pathogen at the centre methods respectively), *T. longibrachyatum* (71.76%, 64.57% and 69.93% maximum growth inhibition in dual culture, pathogen at periphery and pathogen at the centre methods respectively) and *T. harzianum* (67.75%, 63.55% and 67.49% maximum growth inhibition in dual culture, pathogen at periphery and pathogen at the centre methods respectively) showed strong antagonistic effect to inhibit the mycelia growth of the pathogen significantly.

INTRODUCTION

Spider lilly (*Hymenocallis littoralis* L. syn. *H. adnata* L.) a bulbous ornamental plant belonging to family Amaryledaceae is one of the popularly grown and economically important flowering crop in Southern Gujarat, India. Production of spider lilly is worth rupees 7.50 crores per annum in Surat (Gujarat) region (Anon**,** 2007**).** Farmers grow spider lilly for its fetches remunerative price, pleasant fragrance and have attractive white flowers. Due to importance and easy culturable practices in this high rainfall area, the crop is gaining popularity among the growers (Bhatt, 2007). Survey conducted for disease of spider lilly during the kharif season of 2008 in 20 farmers' field near 'Itarva' village of Navsari district in South Gujarat region. The crop was found to be severely affected by the leaf tip blight disease resulting in huge losses to the farmers year after year. The chief symptom of disease involved small straw yellow colored leaf spot which were later coalesced to form necrotic blight, with dark yellow halo interfacing diseased and healthy leaf area and all the foliage of the plants displayed severe necrotic blightening (Dasgupta *et al*., 2005). Considering the seriousness of the problem, the present investigation was carried out. 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 a day, the commercial formulation of some of the biocontrol agents has already become available in the market. In the present study, attempts have been made to identify antagonistic bioagents against *Curvularia eragrostidis in vitro* condition.

MATERIALS AND METHODS

Eight known antagonists viz., *Trichoderma viride* Pers Ex. Grey. (TV), *T. longibrachyatum* Rifai. (TL), *Aspergillus niger* Link. (AN), *Bacillus subtilis* Ell. (BS) *T. harzianum* Rifai. (TH), *Gliocladium virens* Miller. (GV), *Chaetomium globosum* Kunze. (CG) and *Pseudomonas fluorescens* Migula. (PF) were tested *in vitro* against *C. eragrostidis*.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 (Dennis and Webster, 1971), culture discs of test or-

ganisms and the pathogen were placed opposite to each other at 4cm apart in the Petri plate containing 20mL PDA aseptically and real antagonistic properties of the test bioagents were exhibited. In Pathogen at the periphery technique (Asalmol and Awasthi, 1990), the culture disc of the pathogen placed aseptically 4cm away radially at four corners keeping one disc of test organism at centre in the plate containing 20mL 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 4cm away from the pathogen at the periphery in the Petri plate containing 20mL 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 by using formula as suggested by Vincent (1927) given as below:

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

Where,
PGI = Per cent growth inhibition; DC = Average diameter of mycelial colony of control set (mm); DT = Average diameter of mycelial colony of treated set (mm)

RESULTS

All the antagonists under test were significantly superior over control in all the techniques against *C. eragrostidis* however in Dual culture technique, Out of eight antagonists tested, *T. viride* (73.39%) and *T. longibrachyatum* (71.76%) showed maximum growth inhibition of the pathogen and appeared to be the most superior over all the antagonists tested. Next best in order of merit was *T. harzianum* (67.75%) followed by *G. virens* (63.71%), *B. subtillis* (62.08%), *A. niger* (60.49%) and rest of the antagonists showed comparatively least growth inhibition (Table 1). In Pathogen at the periphery techniques, *T. viride* gave maximum growth inhibition (69.80%) and appeared to be the most superior antagonists against *Curvularia eragrostidis* over all the antagonists tested. Next best in order of merit was *T. longibrachyatum* (64.57%) which was statistically at par with *T. harzianum* (63.55%) and which in turn was at par with *G. virens* (62.50%) followed by *B. subtillis* (55.00%) and *A. niger* (52.92 %), both at par while rest of the antagonists showed comparatively least growth inhibition (Table 2). In Pathogen at the center technique, maximum inhibition was found in *T. viride* (70.73%). Which was statistically at par with *T. longibrachyatum* (69.93%) and also with *T. harzianum* (67.49%), followed by *B. subtillis* (64.22%) at par with *G. virens* (62.61%) followed by *A.niger* (59.34%). The rest of the antagonists showed comparatively least growth inhibition (Table 3).

Table 1: Effect of antagonists against *C. eragrostidis* in the *in vitro* condition under dual culture method

Test organism	Average colony diameter of pathogen(mm)	Growth inhibition(%)
Trichoderma viride	11.00	73.39
Trichoderma harzianum	13.33	67.75
Trichoderma longibrachyatum	11.67	71.76
Gliocladium virens	15.00	63.71
Aspergillus niger	16.33	60.49
Bacillus subtilis	15.67	62.08
Pseudomonas fluorescens	32.33	21.77
Chaetomium globosum	31.67	23.37
Control	41.33	-
S.EM±	0.44	
C. D. at 5%	1.32	
C. V. %	3.68	

Table 2: Effect of antagonists against *C. eragrostidis* in the *in vitro* condition under pathogen at the periphery method

Test organism	Average colony diameter ofpathogen (mm)	Per cent growth inhibition
Trichoderma viride	12.08	69.80
Trichoderma harzianum	14.58	63.55
Trichoderma longibrachyatum	14.17	64.57
Gliocladium virens	15.00	62.50
Aspergillus niger	18.83	52.92
Bacillus subtilis	18.00	55.00
Pseudomonas fluorescens	31.83	20.42
Chaetomium globosum	31.17	22.07
Control	40.00	-
S.EM±	0.54	
C. D. at 5%	1.60	
C.V.%	4.29	

DISCUSSION

It is appeared from the results that all the antagonists tested by three different methods were effective against *C. eragrostidis* and useful as potential biological control agents. Among them, *T. viride*, *T. longibrachyatum* and *T. harzianum* proved to be effective antagonist against *C. eragrostidis*. This may be due to undeniably its mode of action like competition, antibiosis and mycoparasitim and it possess some important secondary metabolites and antibiotics like viridin, harzianiol and so many. The results of the present investigation are analogous to the previous findings published by several workers. Archana (2008) reported that maximum inhibition of mycelial growth of *Curvularia penniseti* was observed with *Trichoderma viride*

Table 3: Effect of antagonists against *C. eragrostidis* in the *in vitro* condition under pathogen at the centre method

Test organism	Average colony diameter of pathogen(mm)	Per cent growth inhibition
Trichoderma viride	12.00	70.73
Trichoderma harzianum	13.33	67.49
Trichoderma longibrachyatum	12.33	69.93
Gliocladium virens	15.33	62.61
Aspergillus niger	16.67	59.34
Bacillus subtilis	14.67	64.22
Pseudomonas fluorescens	31.33	23.58
Chaetomium globosum	33.33	18.71
Control	41.00	-
S.EM±	0.78	
C.D. at 5%	2.31	
C. V.%	6.38	

(53%) and was followed by *Trichoderma harzianum* (47%) in dual culture method. Michereff *et al*. (1994) reported that *Bacillus subtillis* inhibited conidial germination of *Curvularia eragrostidis* infecting yam leaf with average inhibition levels of 99.2% under laboratory condition. Michereff *et al*. (1995) reported that *Trichoderma* isolates under greenhouse condition inhibited (75%) the growth of *Curvularia eragrostidis* infecting yam leaves. It is now apparent that *T. viride, T. longibrachyatum* and *T. harzianum* as advanced inhibitor to affect the growth of *C. eragrostidis* as well as outstandingly a good model of biological control agent. Hence it can be recommended after rigorous testing in the pot and field condition against the pathogen for management of leaf tip blight of spider lilly.

REFERENCES

Anonymous 2007. A report from Directorate of Horticulture Mission, *Floriculture in Gujarat*. pp. 1-2.

Archana, S. 2008. Evaluation of Bioagents and Phytoextracts against *Curvularia penneseti* in Pearl mille. *Indian. J. Mycol and Pl. Pathol*. **38(2):** 396-397.

Asalmol, M. N., Sen, B. and Awasthi, J. 1990. Role of temperature and pH in antagonism of *Aspergillus niger* and *Trichoderma viride* against *Fusarium solani Proc. All India Phytopathol. Soc.,* (West Zone). M.P.A.U., Pune. pp. 11-13.

Bhatt, S. T. 2007. Effect of Wrapping material storage temperature and duration on post harvest life of spider lily (*Hymenocallis littoralis* L.) M.Sc. Thesis submitted to the Department of Floriculture, N.A.U., Navsari.

Dasgupta, S., Saga, D. and Saha, A. 2005. Levels of common antigens in determining pathogenicity of *Curvularia eragrostidis* in different Tea varieties. *Journal of Applied Microbiology*. **98:** 1084-1092.

Dennis, C. and Webster, J. 1971. Antagonistic properties of species groups of *Trichoderma* III hyphal interaction. *Trans. Br. Mycol. Soc.* **57:** 363-369.

Michereff, S. J., Norma, S. S., Silveira, D., Ailton, R. and Mariano, R. L. R. 1995. Green house screening of *Trichoderma* isolates for control of *Curvularia* leaf spot of Yam. *Mycopathologia*. **130:** 103-108.

Michereff, S. J., Silveira, N. S. S. and Mariano, R. L. R. 1994. Epiphytic bacterial antagonistic to *Curvularia* leaf spot of Yam. *Mycrobial Ecology*. **28(1):** 101-110.

Vincent, J. M. 1927. Distortion of fungal hyphae in presence of certain inhibitors. *Nature*. **159:** 850.