RESEARCH ARTICLE

Antagonistic activity on anthracnose a new disease causing by *Colletotrichum graminicola* of sugarcane phylloplane in Gondia district (M.S.) India

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ABSTRACT

Present study is carried on performance of different isolates against Colletotrichum graminicola causing anthracnose of sugarcane shows different result in antagonistic study. Antagonistic disease is controled by non-pathogenic fungi. Total 24 isolates are tested for antagonistic activity and positive result shows by 21 isolates pathogenic fungi. Antagonistic activity line is observed clear in position. Plus or square signaling is very good indication of result. The redial mycelia growth of the isolates (non-pathogenic fungi) on cultural petridisc found differed from each other.

Keywords: Sugarcane, Antagonistic, *Colletotrichum graminicola*, Phylloplane isolates, Anthracnose

INTRODUCTION

Sugarcane is most importance cash crop of Gondia district. This was traditional crop in very little area of Gondia for jagerry production. Now area is increasing regularly under sugarcane cultivation at commercial level for sugar production.

Anthracnose is very rare disease in Gondia district, but in all over world this is serious and wide spread disease. Number of other *Colletotrichum* specieses such as *C.gloeosporioides* (Verma, 1973), *C.acutatum* (Kaur and Singh, 1990) and *C.coccodes* (Oh *et al*,. 1988; Yu *et al*,. 1987) have been associated with the disease in different geographical areas. The use of fungi to control the disease will be helpfull for future practices. Antagonistic activity of these isolate with the *Collectotrichum graminicola* will be potent source of fungicides.

Present study was undertaken to evaluate antifungal activity or inhibition zone against anthracnose on sugarcane in Gondia district.

MATERIAL AND METHODS

Screening of phylloplane mycoflora on sugarcane for antagonistic study by both direct and indirect methods.

***Direct Method* :**

a) Field Observation: Survey has been carried out monthly to observe the disease and photographs were taken with the help of Nikon digital camera (6.0 megapixels). It gives direct images of object on screen.

b) Laboratory Observation: Infected leaves observed and collected in sterile sepretate polyethylene bags as per infected morphological appearance from different area randomly with on month interval. Laboratory section done by section cutting of infected yellow and green leaves. 1% aqueous solution of lactophenol cotton blue was used as stain and microscopic photographs also taken.

Indirect Method:

Infected lead cut into to 2 cm pieces and washed with tap water then transfer in 0.1% mercuric chloride ($HgCl_2$). Infected leaf pieces transferred into flask containing 100 ml sterile distilled water and washed serially for 5 – 6 times with changing sterile distilled water in aseptic condition these small leaf pieces about 2 cm long were transferred on sterile filter paper so as the blot dried for inoculation.

Culture of Fungi:

Washed and blot dried leaf pieces transferred on to surface of culture media (Zapak Agar Dex) in Petri dishes by spot inoculation method (Adams,1990) were incubated at room temperature 25± 2^0C for 9 days or till the antagonistic activity appear to get uniform result three replicate plates were prepared for each 24 sample.

Antagonistic Activities:

The antagonists are selected from phyllophane of sugarcane against *C.graminicola* causing anthracnose. The observation on redial mycelial growth of pathogenic fungi were recorded and all significant data differences of antagonistic activities were observed 3, 6, 9th day after incubation.

RESULTS AND DISCUSSION

Colletotrichum graminicola shows fast growth submerged in media. In result of antagonists showing different growth activity line in testing petridish, some fungi show super strong activation zone. The pure culture of *C.graminicola* grow regularly but testing pathogen cultural plate show variation in redial mycelial growth. When pathogenic and non-pathogenic fungi react with each other that time they change colour form activation line zone (square + signaling).

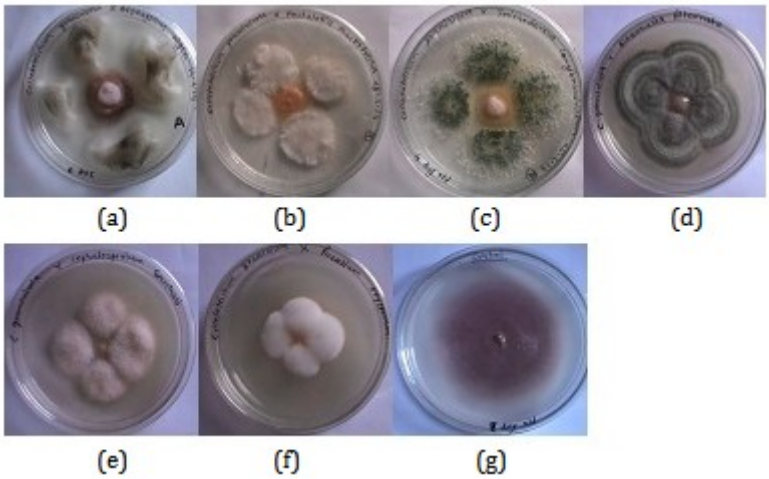

Figure 1: ***Pure culture (Colletotrichum graminicola)*** **(a)** *C. graminicola x Aspergillus niger.* **(b)**: *C.graminicola x Pestalotia macrotricha.* **(c)**: *C. graminicola x T. longibranchiatum* **(d):** *C. graminicola x alternaria alternate.* **(e):** *C. graminicola x cephalosporium sacchari.* **(f):** *C. graminicola x Fusarium oxysporum.* **(g):** *Pure culture (Colletotrichum graminicola)*

Table 1: Radial growth of Pathogen & Non Pathogen

S. No.	Radial Growth of Non-pathogen in cm.			Radial Growth of Pathogen (*C.graminicola*) in cm			Grade of Antagonistic Activity according morphological observation of tested Petridish	Radial Growth of Pure Culture (9 DAI)	Name of treated Fungi
	3 DAI	6 DAI	9 DAI	3 DAI	6 DAI	9 DAI			
1.	1.6 cm	2.5 cm	5 cm	1.4 cm	2.4 cm	2.4 cm	Positive	8 cm	*Aspergillus citri*
2.	2.5 cm	4 cm	5 cm	1.9 cm	3 cm	3 cm	Positive	7 cm	*Aspergillus niger*
3.	2.3 cm	3.5 cm	4.5 cm	2.8 cm	4 cm	5 cm	Negative	8 cm	*Aspergillus oryzae*
4.	1.1cm	1.7cm	1.9 cm	2.5 cm	4 cm	4.5 cm	Negative	7 cm	*Penicillum species*
5.	2.5 cm	4 cm	5 cm	1.5 cm	2.2 cm	2.2 cm	Positive	8 cm	*Monecillium indicum*
6.	3.00 cm	4.5 cm	4.5 cm	2.5 cm	2.6 cm	2.6 cm	Positive	7.5 cm	*T. longibranchiatum*
7.	3.00 cm	3.4 cm	3.5 cm	2.6 cm	2.6 cm	2.6 cm	Positive	7.5 cm	*Trichoderma virde*
8.	1.00 cm	0.5 cm	2.5 cm	2 cm	3.1 cm	3.2 cm	Positive	7.5 cm	*Aspergillus fumigatus*
9.	1.2 cm	1.8 cm	2 cm	1 cm	1.8 cm	1.8 cm	Positive	7.5 cm	*Alternaria palandui*
10.	1.00 cm	1.6 cm	2 cm	1.8 cm	2.5 cm	2.2 cm	Positive	7.5 cm	*Epicoccum nigrum*
11.	1.10 cm	1.3 cm	1.5 cm	3 cm	3 cm	3 cm	Positive	7.5 cm	*Aspergillus terrus*
12.	2.5 cm	3 cm	3.2 cm	2.5 cm	2 cm	2 cm	Positive	7 cm	*Pestalotia macrotricha*
13.	0.2 cm	1.5 cm	3.5 cm	0.5 cm	2 cm	2.5 cm	Positive	8 cm	*Nigrospora oryzae*
14.	1.2 cm	1.6 cm	2.8 cm	1.3 cm	1.3 cm	1.3 cm	Positive	8 cm	*Botrytis cinerae*
15.	1.3 cm	1.8 cm	2 cm	1.5 cm	1.5 cm	1.5 cm	Positive	8 cm	*Aspergillus flavus*
16.	1 cm	1.4 cm	2 cm	1.4 cm	2 cm	2 cm	Positive	8 cm	*Eurotium glomus*
17.	2 cm	2.5 cm	3 cm	1.2 cm	1.4 cm	1.4 cm	Positive	8 cm	*Mucor globus*
18.	0.6 cm	1.2 cm	2 cm	1.2 cm	2 cm	2 cm	Positive	8 cm	*Penicillum species*
19.	1.2 cm	1.8 cm	2.2 cm	1.2 cm	1.2 cm	1.2 cm	Positive	8 cm	*Penicillium rubrum*
20.	1.8 cm	2.2 cm	3.5 cm	0.6 cm	0.6 cm	0.6 cm	Positive	6 cm	*Cephalesporium sacchari*
21.	1.5 cm	2.6 cm	3.2 cm	1 cm	1.4 cm	1.4 cm	Positive	6 cm	*Alternaria alterneta*
22.	1 cm	1.5 cm	2.4 cm	1 cm	0.8 cm	0.5 cm	Positive	6.5 cm	*Fusarium oxysporum*
23.	0.3 cm	0.3 cm	0.3 cm	1.5 cm	2.5 cm	5.5 cm	Negative	7.5 cm	*C. cladosporioides*
24.	1 cm	1.5 cm	1.6 cm	1 cm	1.4 cm	1.4 cm	Positive	7.5 cm	*Curvularia lunata*

Explanation: *Positive= strong morphological activation zone between pathogen and non pathogen.*
Negative= poor morphological activation zone between pathogen and non pathogen

Cladosperium cladosporioides, Aspergillus oryzae, penicillium sp express negetive antagonistic activity according there poor activation zone.

Radial mycelial growth of non-pathogenic fungi as well as pathogenic fungi with 3, 6, 9th day after inoculation and growth of pure culture compared with tested petridish, given in Table 1. Antagonistic activity study and observation of few plates given in plate fig. 1 (a) to (f).

Observation of antagonistic activity are recorded from the time of formation of inhibition zone or after contact between pathogen and the antangonist, as the case may be and the ratings are given. These findings are correlated with (Pan and Jash, 2010) who reported the different isolates of *Trichoderma spp*. Shows mycoparistic activities against *Macrophomina phasdina*.

Certain antagonistic fungi that were isolated in the previous study from the rhizosphere and rhizoplane of perennial grasses in India, for their antagonism in vitro to *C.graminicola* root coloniation .He tested 138 isolates from which 89 were antagonistic (Madhugir, 2014) several biocontrol agents have been used by earlier workers for managing the bacterial with pathogen *R.Solanacearum* in different crops(Vanitha *et al*., 2009). 21 antagonist tested on fusarium blight of rice out of which seven isolates shows 100% growth inhibition after 7 days of inoculation (Rane *et al*., 2009).

Above table shows variability in redial mycelia growth of pathogen and non pathogen as well as growth of pure culture. All tested isolates somewhat different with each other; therefore fluctuation occurs in pathogenic and non pathogenic isolates.

CONCLUSION

Present antagonistic activity study showing different mark of inhibition zone. Fungal inhibition zone or activity line are categarised into two grade. 21 antagonists shows positive activity. 3 antagonists shows negative activity against *C. graminicola*. Hence this study suggested that these antagonists one capable to control anthracnose disease, which is introduce in this area on sugarcane.

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