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Study of Antagonism between Test Fungal Organisms Isolated as Aero-mycoflora from Kalyan P.G. College, Bhilai Nagar, Durg (Chhattisgarh State)

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Abstract

Screening for the search of aero-mycoflora, procured from different vertical strata revealed that the air get contaminated with nearly 16 different categories of molds. Out of 16, 06 namely *Aspergillus niger*, *Curvularia lunata*, *Pestalotia machrotricha*, *Chaetomium globossum*, *Bipolaris sorokinianum* and *Alternaria alternata* were taken as test fungal organisms for the study of antagonism. Dual culturing experiments showed that the *Chaetomium globossum* hindered effectively the growth of all the test fungi and *Pestalotia machrotricha* was found to synergistic against *Curvularia lunata* and *Bipolaris sorokinianum*, while *Chaetomium globossum*, and *Aspergillus niger* effectively suppressed the growth of *Pestalotia machrotricha*. Among all the test fungal species, *Bipolaris sorokinianum* was found weaker in competition, where as *Chaetomium globossum* the most stronger and dominating followed by *Pestalotia machrotricha* and *Curvularia lunata*.

Key-Words: Fungal interaction, Aero-Mycoflora and Antagonism

Introduction

The atmospheric air of a particular area represents a colorful array of mycoflora comprising heterogenous population of both pathogenic and non-pathogenic fungal species.The aero-mycoflora is subjected not only to the influence of the area, but also to its own factors. An important aspect is the production of self-inhibitory products as well as self-stimulatory products by the fungal organisms present on the particular area or atmosphere. Antagonism is the decrease in inoculum or the disease producing activity of a pathogen accomplished through one or more organisms. It is important to note that all physiochemical parameters interact with each other (Lilly and Barnett, 1953), in which there is a possibility of interaction between several species of molds present at the same time on the same area or atmosphere. Depending on the situation there may be mutualism or antagonism between the fungi (Moreau and Moreau, 1956). There may be simple competition for available substrate by one of the antagonists or the transformation of the substrate by one of the fungi leading to unfavourable medium for other species of fungi. Thus inter-fungal interaction studies pave towards biological control of fungi by less harmful ones. Thus the present investigation aims to evaluate antagonism between fungal organisms on different area / strata of Kalyan P. G. College, Bhilai Nagar, Durg (C. G.).

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Material and Methods

Antagonisms between the test fungal organisms were measured in term of "Zone inoculation method". Uniformly cut discs of the pure culture of test fungal organisms were placed in pairs, in different combinations on agar plates, at a distance of 02 centimeters apart from each other.

All the paired culture plates were incubated for 07 days along with pure culture plates (control) at 28±01°C. Mycelial growth was recorded in term of area of the colonies.

Results and Discussion

Aspergillus niger, *Curvularia lunata*, *Pestalotia machrotricha*, *Chaetomium globossum*, *Bipolaris sorokinianum* and *Alternaria alternata* were treated as test organisms for further studies. The results were as follows.

Curvularia lunata Vs. Other: - The combination of *Curvularia lunata* with *Bipolaris sorokinianum*, *Aspergillus niger*, *Pestalotia machrotricha*, *Chaetomium globossum* and *Alternaria alternata* colony growth diameters were 03-04 cm, & 01-02 cm, 02-03 cm & 03-04 cm, 01-02 cm & 03-04 cm, 01-02 cm & 03-04 cm and 02-03 cm & 01-02 cm respectively (**Combination No. 1-5**).

Bipolaris sorokinianum Vs. Others: - The combination of *Bipolaris sorokinianum* with *Curvularia lunata* shows colony growth diameter of 03-04 cm & 01-02 cm. *Bipolaris sorokinianum* with combination of

Aspergillus niger, Pestalotia machrotricha, Chaetomium globossum and *Alternaria alternata* colony growth diameters were 01-02 cm & 02-03 cm, .01-01 cm & 02-03 cm, 01-02 cm & 03-04 cm and 01-02 cm & 02-03 cm respectively (**Combination No.-1 & 6-9**).

Aspergillus niger Vs. Other: - The combination of *Aspergillus niger* with *Curvularia lunata* shows colony growth diameter of 03-04 cm & 02-03 cm. *Aspergillus niger* with combination of *Bipolaris sorokinianum*, colony growth diameter of 02-03 cm. & 01-02 cm. *Aspergillus niger* with the combination of *Pestalotia machrotricha, Chaetomium globossum* and *Alternaria alternata* colony growth diameters were 02-03 cm & 01-02 cm, 01-02 cm & 03-04 cm and 02-03 cm & 01-02 cm respectively (**Combination No. 2, 6 & 10-12**).

Pestalotia machrotricha Vs. Others: - *Pestalotia machrotricha* with the combination of *Curvularia lunata, Bipolaris sorokinianum* and *Aspergillus niger*, colony growth diameters were 03-04 cm & 01-02 cm, 02-03 cm & .01-01 cm and 01-02 cm & 02-03 cm respectively. *Pestalotia machrotricha* with the combination of *Chaetomium globossum* and *Alternaria alternata* colony growth diameters were 01-02 cm & 03-04 cm and 02-03 cm & 01-02 cm respectively (**Combination No. - 3, 7, 10, 13 & 14**).

Chaetomium globosum Vs. Others: - *Chaetomium globosum* with the combination of *Curvularia lunata, Bipolaris sorokinianum, Aspergillus niger, Pestalotia machrotricha* and *Alternaria alternata* colony growth diameters was 03-04 cm & 01-02 cm in each combination (**Combination No. - 4, 8, 11, 13 & 15**).

Alternaria alternata Vs. Others: - *Alternaria alternata* with the combination of *Curvularia lunata, Bipolaris sorokinianum, Aspergillus niger, Pestalotia machrotricha* and *Chaetomium globossum* colony growth diameters were 01-02 cm & 02-03 cm, 02-03 cm & 01-02 cm, 01-02 cm & 02-03 cm, 01-02 cm & 02-03 cm and 1-2 cm & 3-4 cm respectively (**Combination No. - 5, 9, 12, 14 & 15**).

The results of present studies reveal that the *Chaetomium globossum* hindered effectively the growth of all the test fungi and *Pestalotia machrotricha* hindered effectively, the growth of *Curvularia lunata, Bipolaris sorokinianum* and *Alternaria alternata*. While *Curvularia lunata, Aspergillus niger* and *Alternaria alternata* suppressed effectively the growth of *Bipolaris sorokinianum.*

Thus amongst all the test fungal species, *Bipolaris sorokinianum* was found weaker in competition, where as *Chaetomium globossum* was found stronger, followed by followed by *Pestalotia machrotricha* and *Curvularia lunata.*

A number of myco-parasites (a fungus parasitic on another fungus) have been investigated as possible biocontrol agents; species of *Darluca, Tuberculina, Cladosporium* and *Verticillium* are common parasites of rust. All these hyperparasites exhibit little host specificity and occur over wide geographical area. Papavizas (1985) recorded *Trichoderma species* are potential biocontrol agents.

Chandra et al. (1988) have reviewed the control of foliar pathogens through resident antagonists. Rama Rao et al. (1989) have listed some examples of successful biological control of plant pathogen like *Sclerotium rolfsii, Rhizoctonia solani, Pythium aphanidermatum* and *Fusarium oxysporium* in field by *Trichoderma* species.

Chandel (1990) observed that the inhibition in spore germination and growth were directly proportional to the increase in filtrate concentration which perhaps, helped increase in the concentration of antifungal compound. *Trichoderma harzianum, T. longibrachiatum* and *Epicoccum nigrum* are seemed to be most effective and strong antagonist. All the three fungi were inhibiting the growth as well as spore germination of all the test fungi.

Bindu (1997) reported that the fungus, *Aspergillus flavus* isolated from groundnut and coriander hindered effectively the growth of *A. terreus* and *A. fumigatus* both, where as *A. terreus* was found to suppress the growth of A. *fumigatus*. Puri et al. (1994) studied antagonism of *Trichoderma* against fungal pathogen and found positive results.

Antagonistic activity of microorganisms has been studied since long and reviewed by various authors (Baker, 1987; Mukhopadhyay, 1987; Chet, 1987; Schippers et al., 1987; Weller, 1988; Dube and Podilc, 1988; Dayal, 1989; Natarajan and Govindasamy, 1990; Chandrol, 2000; Asan, 2004; Aydogdu and Asan, 2008; Hindumathi and Reddy, 2011; Rosaria Nicoletti and Mario De Stefeno, 2012).

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Table 1: Antagonism between test Fungal Organisms

Combination No.	Test organisms	Colony growth (Diameter)	
		Test organism - 1	Test organism - 2
1.	*Curvularia lunata* (Boedijin.) *Vs* *Bipolaris sorokinianum* (Schoemaker)	*Curvularia lunata* (Boedijin.) ++++	*Bipolaris sorokinianum* (Schoemaker) ++
2.	*Curvularia lunata* (Boedijin.) *Vs* *Aspergillus niger* (Tieghem.)	*Curvularia lunata* (Boedijin.) +++	*Aspergillus niger* (Tieghem.) ++++
3.	*Curvularia lunata* (Boedijin.) *Vs* *Pestalotia machrotricha*	*Curvularia lunata* (Boedijin.) ++	*Pestalotia machrotricha* (De Not.) ++++
4.	*Curvularia lunata* (Boedijin.) *Vs* *Chaetomium globossum* (Kunze.)	*Curvularia lunata* (Boedijin.) ++	*Chaetomium globossum* (Kunze.) ++++
5.	*Curvularia lunata* (Boedijin.) *Vs* *Alternaria alternata* (Keissler.)	*Curvularia lunata* (Boedijin.) +++	*Alternaria alternata* (Keissler.) ++
6.	*Bipolaris sorokinianum* (Schoemaker) *Vs* *Aspergillus niger* (Tieghem.)	*Bipolaris sorokinianum* (Schoemaker) ++	*Aspergillus niger* (Tieghem.) +++
7.	*Bipolaris sorokinianum* (Schoemaker) *Vs* *Pestalotia machrotricha*	*Bipolaris sorokinianum* (Schoemaker) +	*Pestalotia machrotricha* (De Not.) +++
8.	*Bipolaris sorokinianum* (Schoemaker) *Vs* *Chaetomium globossum* (Kunze.)	*Bipolaris sorokinianum* (Schoemaker) ++	*Chaetomium globossum* (Kunze.) ++++
9.	*Bipolaris sorokinianum* (Schoemaker) *Vs* *Alternaria alternata* (Keissler.)	*Bipolaris sorokinianum* (Schoemaker) ++	*Alternaria alternata* (Keissler.) +++
10.	*Aspergillus niger* (Tieghem.) *Vs* *Pestalotia machrotricha* (De Not.)	*Aspergillus niger* (Tieghem.) +++	*Pestalotia machrotricha* (De Not.) ++
11.	*Aspergillus niger* (Tieghem.) *Vs* *Chaetomium globossum* (Kunze.)	*Aspergillus niger* (Tieghem.) ++	*Chaetomium globossum* (Kunze.) ++++
12.	*Aspergillus niger* (Tieghem.) *Vs* *Alternaria alternata* (Keissler.)	*Aspergillus niger* (Tieghem.) +++	*Alternaria alternata* (Keissler.) ++
13.	*Pestalotia machrotricha* (De Not.) *Vs* *Chaetomium globossum* (Kunze.)	*Pestalotia machrotricha* (De Not.) ++	*Chaetomium globossum* (Kunze.) ++++
14.	*Pestalotia machrotricha* (De Not.) *Vs* *Alternaria alternata* (Keissler.)	*Pestalotia machrotricha* (De Not.) +++	*Alternaria alternata* (Keissler.) ++
15.	*Chaetomium globossum* (Kunze.) *Vs* *Alternaria alternata* (Keissler.)	*Chaetomium globossum* (Kunze.) ++++	*Alternaria alternata* (Keissler.) ++

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