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Antagonestic Activities of *Aspergillus umbrosus* for Biological Control

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Abstract

The antagonistic activities of *Aspergillus umbrosus* against some phytopathogenic & storage fungi was experimented by co-plating, spore suspension, over-lay & food poison techniques. Results with test organisms indicate an inhibition zone of different size, achieved some success to the objective that *A. umbrosus* can be used as an agent for biological control.

Key Words: *Aspergillus umbrosus*, Antagonestic activities, Phytopathogenic & Storage Fungi, Biological control

Introduction

A. umbrosus (Bainier & Sartery) as reported by Kulshreshta & Ali (1986) was found to a strong biological antagoinst and possesses inhibitory factors active against a number of phytopathogenic and storage fungi, therefore it can be exploited as a sorce material for antifungal antibiotic. They also observed that the fungus was a difficult organism for exploitation because of very slow rate of growth and scanty to minimal sporulation, due to degeneration polymorphism of the candial heads. Cultural physiology as related with growth & sporulation of this fungus was also experimented (Sood, 1990). The work presented in this paper emphasized on the antagonistic activities of *A. umbrosus* against some plant pathogenic and storage fungi and bacteria manipulating *A. umbrosus* as an agent which can be exploited for biological control.

Materials and Methods

The antibiosis of *A. umbrosus* has been evaluated by antagonistic in co-culture by employing various methods. The test organisms against which the antibiotic activity of *A. umbrosus* was determined were:-

Fungi:- Aspergillus niger, A. flavus, A. fumigates, Fusarium solani, Penicillum chrysogenum, P. nigricans, Alternaria alternate and Colletotrechum spp.

Bacteria:- Escherichia coli (gram -ve), Streptomyces coelicolor (gram +ve).

The methods used for the antagonism of *A. umbrosus* against the test organisms were:-

1. Co-plating method:- The method used in this method was potato-dextose agar at pH 4.5. both the *A. umbrosus* and test organisms were inoculated in the in the same plate at a little distance from each other and incubated at 30±1°C. The size of the zone of inhabitation (mm) was recorded after sufficient growth (10 days).

*2. Spore Suspention method:-*The method used for fungi was potato-dextose –agar and nutrient agar for bacteria. In this method spare suspention of test organism was prepared in sterilized distilled water. This spore suspention of the test organism was added to the molten sterilized medium and plated. After solidification of the medium, mycelia discs of *A. umbrosus* were also plated in each of the seeded plates and incubated. Data of growth inhibition if any in respect of the test organism was recorded after 10 days of incubation at 30±1°C.

3. Over-Lay method:- Here the medium inxulated with the spore suspention of the test organism was pored over a well growth culture of *A. umbrosus* and both were simuntaniously incubated for 10-12 days. Formation of clear zone over the *A. umbrosus* colony in the seeded layer was observed and recorded as measure of activity. In yet another way the A. umbrosus was overlayed on the seeded plate of the test organism and incubated. Date was similarly taken.

4. Food poison technique:- This method described by Nene and Thapliyal (1965) was followed here. The crude culture filtrate its ethyl acetate fraction of *A. umbrosus* taken and added to the culture medium after autoclaving. The test organisms were then inoculated in the plates containing the culture filtrate or it's fraction and incubated. Record of growth was taken as measure of activity.

Results

The organism has been intensively tested against a variety of fungi and a few bacteria including an actinomycete. The results obtained by following the over-lay, co-plating, spore suspension inoculation and food poison technique have been

presented. It was found that the fungi *A. umbrosus* was antagonistic towards the test fungi belonging to the *genera Penicillium, Aspergillus, Fusarium, Colletotrichum and Alternaria alternata*. It was active against the gram +ve bacteria including *S. coelicolor* and had no effect upon the gram negative *E. coli.* All the test organisms that were inhibited were failed to grow in the region of the dark brown zone of the exudates sexreted by *A. umbrosus*, thereby confirming its antagonistic activity [Table].

Table:- The antibiosis of *Aspergillus umbrosus* against the test organism in solid cultures

S.No.	Test organism	Nature	Antibiosis	Zone of inhibition (mm)
1.	*Penicillium nigricans*	storage decomposer	+	35
2.	*P. chrysogenum*	storage decomposer	+	30 – 35
3.	*Aspergillus fumigates*	storage decomposer	+	40
4.	*A. niger*	storage decomposer	+	26
5.	*Fusarium solani*	plant pathogen	+	14 – 18
6.	*Colletorichum capsici*	plant pathogen	+	12 – 16
7.	*Streptomyces coelicolor*	gram positive	+	6 – 12
8.	*Escherichia coli*	gram negative	-	-

Discusion and Conclusions

The fungus *A. umbrosus* has antagonistic activity against a number of fungi (Kulshrestha and Ali,1986). This has been further ascertained towards a few test fungi and bacteria. The positive antifungal and antibacterial activity occurs in the growth medium of the fungus has suggested for the occurrence of an active principle in it. Some useful antibiotics as *Aspergillus* sp. are Flavipucine and isoflavipucine form *A. flavus* (Findley et al,1977), echinocandins from A. nidulans (Steinmann et al., 2010) gliotoxin from *Aspergillus* sp. (Russel et al.,2005) and asperlicin from *A. alliaceous* (Monaghan et al.,1989) funcin, some other antibiotics of *Aspergillus* sp. are funcin, versilin, mycoversilin, mulundocandin, nominine etc. Production of dark brown exudates in the medium was found associated with the antagonistic activity of *A. umbrosus*. This study has achieved some success towards that objective that *A. umbrosus* and its metabolites can be used against some plant pathogenic and storage fungi as an agent for biological control.

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