RESEARCH ARTICLE

ISOLATION AND IDENTIFICATION OF AEROMYCOFLORA FROM BHAVAN'S COLLEGE CAMPUS, ANDHERI

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ABSTRACT

Aeromycoflora are fungi from air with potential to cause diseases in plants, animals and human beings. In the present studies, air samples from Bhavan's College Campus, Andheri were analyzed and fungi were isolated and identified prevalent during monsoon. Fungi were isolated by plate exposure method and purified by serial dilution method. Fungi obtained were *Aspergillus niger, Aspergillus flavus, Aspergillus nidulans, Aspergillus fumigatus, Aspergillus ustus, Candida albicans, Epicoccum sp., Fusarium equisetii, Helminthosporium sp., Mucor mucedo, Rhizopus stolonifer* and *Penicillium notatum*. Most of the fungi obtained showed luxuriant growth probably due to high humidity and suitable temperature for their growth.

Keywords Aeromycoflora, Monsoon, Fungi.

INTRODUCTION

Bhavan's College, Andheri has a huge campus with a few educational institutes, a botanical garden, a lake and a large number of ornamental plants. More than 30% world population is known to suffer from allergic ailments such as bronchial asthma, allergic rhinitis and atopic dermatitis. Major causal agents are pollen grains, fungal spores, dust mites, plant fragrances and food. Clinically important fungal allergens are different species of *Aspergillus fumigatus, Aspergillus flavus, Aspergillus nidulans, Alternaria alternata, Cladosporium cladosporoides, Ganoderma leucidum, Mucor mucedo, Fusarium solani, Curvularia lunata, Neurospora sitophila, Scopulariopsis brancaulis*too. Air carries a large number of bioparticles (biopollutants) and chemicals which poses burden for asthma, bronchitis, etc.,of humans. The bioparticles include fungal spores etc. These are causative agents of respiratory disorders like asthma etc.

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Rapid industrialization and urbanization though has resulted in booming the economy of the country but it has also contributed significantly in enhancing problems of patients suffering from respiratory disorders as quality of the air is deteriorated due to addition of large number of pollutants in the air. Air is not the natural environment for their growth and multiplication of air mycoflora but it acts as a good medium for their dispersal from one place to another. Several factors like humidity, temperature, sunlight and suspension of organic and inorganic material affect the distribution of microbes in the air. In addition to this, many physical, chemical and biological factors bring about changes in composition of aeromycoflora of the area.

In the present work, aeromycoflora were studied in the laboratory of Department of Botany.

MATERIAL AND METHODS

For isolation of mycoflora from the air, sterile Petri plates containing 20 ml of Potato Dextrose Agar medium (200 gm potato, 20 gm dextrose, 20 gm agar agar and 1000 cc distilled water) were exposed to air at different locations of Laboratory of Botany

Department,Bhavan's College for 24 to 48 hours and incubated at 28° C temperature for four days. Results were recorded for cultural and morphological characters of fungi isolated (Table 1). Cultures were purified and preserved. Percent frequency in terms of CFUs(Colony Forming Units) was calculated (Table 2) by using following formula:

$$\% \text{ Frequency} = \frac{\text{No. of observation in which colony appeared}}{\text{Total No. of observations recorded}} \times 100$$

Percentage contribution for each organism was also calculated (Table 3) by using the formula:

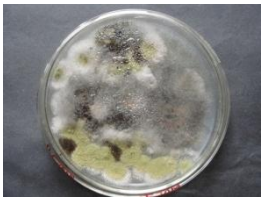
$$\% \text{ Contibution} = \frac{\text{Total no. of colony one species}}{\text{Total No. of colonies of all the species}} \times 100$$

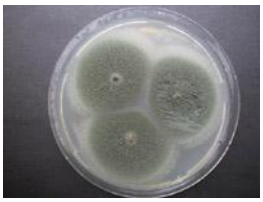
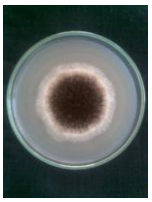
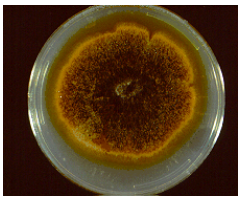
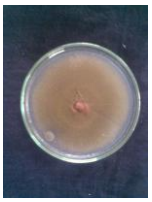
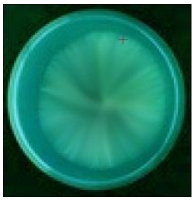
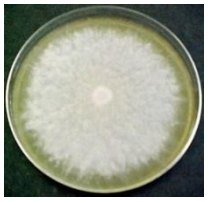
RESULT

Among the total number of fungi collected from airspora, *Aspergillus niger* was maximum in terms of CFUs (Colony Forming Units) and frequently isolated. There were five species of *Aspergillus* followed by *Rhizopus stolonifer, Candida albicans*, *Mucor mucedo,Epicoccum sp., Helminthosporium sp., Fusarium equisetii* and*Penicillium notatum.*

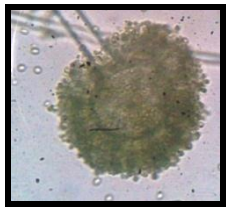
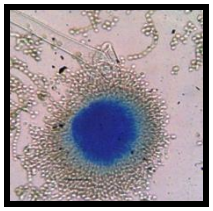
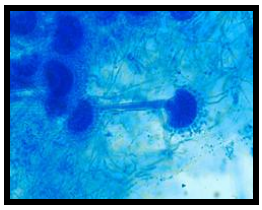
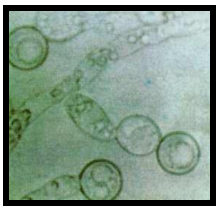
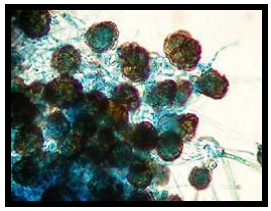
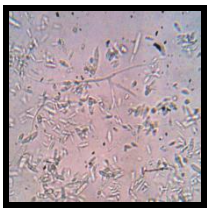
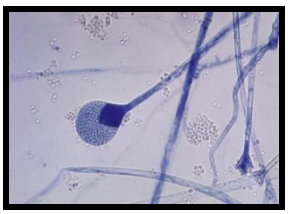
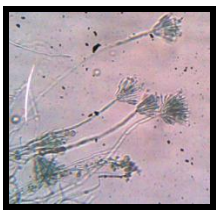
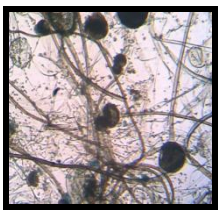
Table 1: Various species of fungi isolated from the indoor environment

Sr. No.	Class of Fungi	Name of the Fungi	Morphological Characters
1	Deuteromycetes	*Aspergillus niger*	Colonies spread rapidly, mycelium white to dark brown to black conidial heads, Conidiophores erect with a vesicle, sterigmata and chains of round conidia.
		Aspergillus flavus	Colonies yellow turning to yellow green. Having phialides borne directly on the vesicle, Conidia globose or subglobose.
		Aspergillus fumigatus	Smoky green colonies, velvety, Young heads bluish green, Conidiophores smooth, short, often greenish, , Vesicles flask shaped phialides borne directly on vesicles, closely packed, lower ones deflected upwards. Conidia small, globose, smooth.
		Aspergillus nidulans	Colonies light green smooth velvety. Conidial heads columnar short brown with distinct foot cell. Sterigmata biseriate conidia globose.
		Epicoccum sp.	Colonies yellowish brown. Sporodochia present, sporulation sparse. Blastoconidia formed singly or densely compacted slightly pigmented. Conidia globose to pyriform.
		Fusarium equisetii	Colony peach colored, conidiogenous cells hyaline, enteroblastic, mono or polyphialidic. Macroconodia abundant, typically falcate with foot cell, tapering at both the ends, 4 septate.
		Candida albicans	Colonies slimy yeast like, white to creamy. Budding cells present on pseudomycelium made up of pseudo septa resulting in budding cells which are ovoid.
		Helminthosporium sp.	Olive brown, proliferating cottony colony with beaded appearance, septate. 6 – Celled conidia, very tapering at the tip.
2	Ascomycetes	*Aspergillus ustus*	Colonies brownish yellow becoming purplish grey. Reverse yellow conidiophores short conidia globose.
		Penicillium notatum	Profusely branched, septate, hyaline, greenish yellow. Long with broom like branching, flask shaped sterigmata, globose conidia in chains.
3	Phycomycetes	*Mucor mucedo*	Colonies browning grey, sporangiophore long, terminating into a globose sporangium with round spores. Columella globose
		Rhizopus stolonifer	Colonies spread rapidly with white fluffy mycelium; rhizoids are dark brown, sporangiophore long, sporangia globose, shining white turning black at maturity.

			
			
Fungal colonies on exposed Petri plates			

			
Aspergillus flavus	*Aspergillus fumigatus*	*Aspergillus nidulans*	*Aspergillus niger*
			
Aspergillus ustus	*Candida albicans*	*Epicoccum sp.*	*Fusarium equisetii*
			
Helminthosporium sp.	*Mucor mucedo*	*Penicillium notatum*	*Rhizopus stolonifer*

Cultural characteristics of pure cultures of isolated fungi

			
Aspergillus flavus	*Aspergillus fumigatus*	*Aspergillus nidulans*	*Aspergillus niger*
			
Aspergillus ustus	*Candida albicans*	*Epicoccum sp.*	*Fusarium equisetii*
			
Helminthosporium sp.	*Mucor mucedo*	*Penicillium notatum*	*Rhizopus stolonifer*

Microscopic Characteristics of the isolated fungi

Table 2: Airborne CFUs recorded

Sr. No.	Organisms	% Frequency
1	*Aspergillus flavus*	75
2	*Aspergillus fumigatus*	12.5
3	*Aspergillus nidulans*	62.5
4	*Aspergillus niger*	100
5	*Aspergillus ustus*	50
6	*Candida albicans*	87.5
7	*Epicoccum sp.*	50
8	*Fusarium equisetii*	25
9	*Helminthosporium sp.*	37.5
10	*Mucor mucedo*	62.5
11	*Penicillium notatum*	25
12	*Rhizopus stolonifer*	87.5

Table 3: Percent contribution of airborne fungi

Sr. No.	Organisms	% Contribution
1	*Aspergillus flavus*	12.24
2	*Aspergillus fumigatus*	1.02
3	*Aspergillus nidulans*	8.16
4	*Aspergillus niger*	19.38
5	*Aspergillus ustus*	4.08
6	*Candida albicans*	18.36
7	*Epicoccum sp.*	4.08
8	*Fusarium equisetii*	2.04
9	*Helminthosporium sp.*	3.06
10	*Mucor mucedo*	7.14
11	*Penicillium notatum*	2.04
12	*Rhizopus stolonifer*	18.36

DISCUSSION:

Prevalence of fungi in monsoon can be attributed to high relative humidity and optimum temperature during rainy season but since the campus in Bhavan's College has a wide flora and associated with many microbes which can also prove to be antagonists against many fungi which are fatal to useful plants. *Rhizopus stolonifer* has been reported to cause respiratory allergy in some patient. Verma and Chile (1992) also reported greater variety of aeromycoflora during May to October. This is generally attributed to favorable conditions for growth during this period.

Singh and Siddiqui (2004) have done similar work in polluted and unpolluted air zones and reported that survival of air borne spores would depend on several factors like wind velocity, distances from source, time in air, relative humidity, gaseous composition of the air, sunshine and species itself. Although aeromycoflora was dominated by saprobes, the plant pathogenic and human allergic fungi were also encountered. The studies indicate that the incidence of air borne fungal spores of clinical significance show greater variation in response to the environmental conditions. *Aspergillus* species are the opportunist organisms and generally harmless in their normal environment but becomes pathogenic in compromised hosts having lower resistance. Several species of *Aspergillus* are known to cause Aspergillosis. *Penicillium, Cladosporium* and *Curvularia* are also considered as respiratory allergens and mycotoxin producing fungi. The prevalence of these fungi in study site explored potential risk of allergy among residing people. Sawane (2010) had done a survey of airborne *Penicillium* in different atmospheres of Nagpur and concluded its high percentage in the air as potential risk factor for allergic disorders to people residing nearby.

CONCLUSION:

Thus it is concluded from the present studies that the study of aeromycoflora with special reference to species of *Aspergillus* responsible for causing Aspergillosis as well as allergic disorders will definitely in preventing various diseases. Some fungi like *Fusarium* species can also be utilized as microbial weapons in the form of antagonists which will protect the flora of Bhavan's College campus against pathogenic fungi. Various fungi obtained will be preserved for academic curriculum of different classes so also in research. Microorganisms like fungi can also be used as markers or biological indicators to help in forecasting of weather conditions

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