

Aeromycological Investigation of Indoor Environment of College Laboratories

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Abstract-

Laboratories are major working areas of science colleges. They are being sterilized for better, contamination free environment time to time. Still these areas get contaminated due to airborne microorganisms. The major contaminants of the laboratory are aeromycoflora. Thus, the present investigation explores the aeromycoflora of indoor environment of Shri R.L.T. College of Science, Akola (MS). The study was undertaken at the beginning of monsoon i.e. from June to August. For this, 5 petri-dishes with Potato Dextrose Agar (PDA) media were kept open in each laboratory for 1 hour. After incubation period fungi were isolated and identified. Total 22 species belonging to 16 genera were isolated. Most dominant class was Ascomycotes, while Zygomycotes, Oomycetes and Deuteromycetes were quite less in number. Most dominant genera were *Aspergillus*, *Rhizopus* and *Penicillium*.

Key words- Aeromycoflora, Indoor Environment, laboratories, fungi.

Introduction-

College is the place where students not only explore the knowledge of world but also, learn how to live in society. They study various theoretical as well as practical courses. But, the actual knowledge they get by practical experiments. These experiments are performed in laboratories. The laboratories are the rooms which are equipped with different instruments and used for various scientific experiments, testing and teaching. These laboratories are provided with sophisticated environment. But, still these laboratories get contaminated due to airborne microorganisms. The major contaminants of laboratories are aeromycoflora. Fungal spores constitute a significant fraction of bioaerosol and they are often much more numerous than other airborne bioparticulate matters. Airborne microfungal propagules are found in large numbers in indoor and outdoor environments and are widely distributed in nature in general. Some of them have the potentiality to cause allergies, spoilage of foods and many other adverse health effects, namely, bronchial asthma, allergic rhinitis and atopic dermatitis (Burge and Rogers, 2000; Terui et al., 2000; Akiyama, 2001). Since diverse fungal species constitute the major components of airborne flora are the major cause of respiratory ailment of humans, causing allergies, asthma and plant diseases and as well as important agents of degradation of cellulosic and non-cellulosic material in indoor closed environment, thus there is a great need for understanding, aerobiological studies from indoor environment of different laboratories where number of students work.

So, present investigation was undertaken in Botany, Chemistry, Microbiology and Zoology department laboratories of Shri R. L. T. College of Science, Akola. Akola city is the district headquarter situated in the middle east of Maharashtra state. The average rainfall in this district is 750 mm to 1000 mm. and the average temperature is 30⁰ C. In Akola city, Shri R. L. T. College of Science is one of the reputed science college, where thousands of students studies every year. So, the present investigation undertaken to understand relationship of aeromycoflora and health related issue.

Material and Methods-

The aeromycoflora of four laboratories was isolated by Culture Plate Exposure method (Lanjewar and Sharma, 2014). For this, petri dishes containing potato dextrose agar (PDA) were exposed for 10 min. in Botany, Chemistry, Microbiology and Zoology laboratory during three monsoon months i.e. from June to August in different corners of the laboratories. The exposed petri dishes were incubated at 27⁰C for 3-5 days. The appeared colonies on agar plates were recorded and species were identified by microscopic and morphological characters using compound microscope.

Result and Discussion-

The present investigation was undertaken in four laboratories namely, Botany, Chemistry, Microbiology and Zoology laboratories of Shri R. L. T. College of Science, Akola. This investigation shows that, use of Culture Plate Expose method is one of the good method to isolate aeromycoflora. During this investigation, total 1269 fungal colonies were reported. From these colonies total 22 species belonging to 16 genera were identified (Table-1).

The most dominant division was Deuteromycota with 12 genera followed by Ascomycota with 6 genera. Zygomycota and Oomycota had least number of genera i.e. 2 and 1 genera respectively. One unidentified sterile hyphae also reported. No genera of Basidiomycota was reported from any plate (Graph -1).

Aspergillus, *Alternaria*, *Mucor* and *Rhizopus* were most dominant genera reported with highest number of colonies in all the laboratories. Total 4 species of *Aspergillus* and 2 species of *Alternaria* and *Fusarium* each were reported with highest number of colonies. These genera were also reported dominantly in indoor aerosol in previous studies (Chakraverty and Sinha, 1985; Santra and Chanda, 1989).

Graph 1- Showing Division wise Number of Fungal Genera

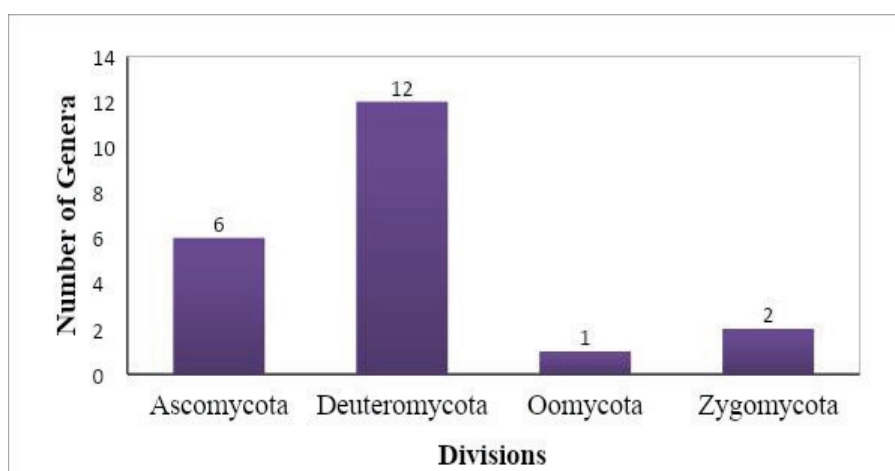


Table 1- Reported Fungal Species

Sr. No.	Division	Fungal Species	Botany Lab.	Chemistry Lab.	Zoology Lab.	Microbiology Lab.
1.	Ascomycota	<i>Aspergillus flavus</i>	✓	✓	✓	
2.		<i>Aspergillus fumigatus</i>	✓	✓	✓	
3.		<i>Aspergillus niger</i>	✓	✓	✓	✓
4.		<i>Aspergillus sulphureus</i>	✓	✓	✓	
5.		<i>Chaetomium glabosum</i>	✓		✓	
6.		<i>Penicillium oxalicum</i>	✓	✓	✓	
7.	Deuteromycota	<i>Alternaria alternata</i>	✓	✓	✓	✓
8.		<i>Alternaria solani</i>	✓	✓		✓
9.		<i>Botryodiplodia sp</i>		✓	✓	
10.		<i>Cladosporium cladosporoides</i>		✓		✓
11.		<i>Curvularia lunata</i>	✓		✓	
12.		<i>Curvularia tetramera</i>	✓		✓	✓
13.		<i>Fusarium moniliformae</i>	✓			✓
14.		<i>Fusarium oxysporum</i>	✓	✓	✓	
15.		<i>Helminthosporium tetramera</i>	✓	✓	✓	
16.		<i>Nigrospora sp.</i>	✓			✓
17.		<i>Pyricularia sp.</i>	✓		✓	
18.	<i>Trichothecium roseum</i>		✓	✓	✓	
19.	Oomycota	<i>Phytophthora infestans</i>		✓		✓
20.	Zygomycota	<i>Mucor pusillus</i>	✓	✓	✓	✓
21.		<i>Rhizopus stolonifer</i>	✓	✓	✓	✓
22.		Unknown 1		✓	✓	

Optimum temperature and about 60% humidity requires for germination and growth of fungal spores. As the college campus is at surrounded by good vegetation, these fungal spores gets suitable environment to grow and propagate. People constantly being exposed to these spores of which a good number are known for their hypersensitive reactions leading to respiratory problems like bronchial responsiveness (asthma), hypersensitivity pneumonitis, allergic alveolitis such as bronchopulmonary aspergillosis, bronchoalveolar lavage or transbronchial lung problem (John, 1985; Bennett, 1995; Sugar, 1995).

Conclusion-

Health of students and staffs is of great concern. As it is well known that some fungi are allergic and responsible for causing various diseases, it is necessary to maintain cleanliness in laboratories. Certain corrective measures, strict maintenance or precautions which can reduce their frequency of occurrence include installation of exhaust fan to remove spores from the indoor environment before they get a chance to settle; air filtration; good ventilation; use of vacuum cleaner to remove dust; air conditioning machines and more frequent cleaning and preventive processes.

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