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**RESEARCH ARTICLE**

# STUDY OF FUNGAL SPORES IN LIBRARY ENVIRONMENT

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## ABSTRACT

A Survey for air borne fungal spores in indoor and outdoor environment of Library building of K.T.H.M. College, Nashik, was carried out by using Perkin's Rotorod Air Sampler from November2008 to April 2009.The sampler was operated twice a week in the stack room, student library and reading hall. During the investigation, total 31 air borne components were trapped, out of which 26 were fungal spores' types and 5 other types. The most dominant fungal spore types were *Aspergillus* 8.21 % followed by*Cladosporium* 7.04 %,*Nigrospora*7.0*%, Alternaria* 5.57 %,*Biospora*4.49*%,Helminthosporium*3.81 *%.*Besidesfungal spores hyphal fragments,pollen grains,insect scales, plant parts and unidentified spores were also recorded. Most of the fungal spores are well known for bio-degradation of paper and are potential agents of allergic respiratory disorders, skin irritation etc. among the students and employees of the library.

**Keywords** : Library, Allergy, Bio-degradation.

## INTRODUCTION

Aeromycology is the study of airborne fungal flora. Fungi grow on organic material like fruits, vegetables, wood, clothes, leather, paper etc. So, it is an important indoor pollutant. It deteriorates books, archives and paintings on papers, etc. Cellulosic material acts as a suitable substrate for the growth of various fungi (Singh et-al,1990).

It is also well known fact that people spend most of their time indoors. Fungi acts as a pathogen causing Respiratory tract infections like rhinitis, sinusitis, bronchitis; skin infections, ear infections (otomycosis) and eye infections (oculomycosis). Airborne fungi are a potential source of allergic disorders (Agashe S.N. &Anand P.1982). Fungi and pollen grains trigger allergic reactions causing bronchialasthma, eczema, itching and watering of eyes etc.

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Books in the libraries provide a very good substrate for fungi since binding glue, cloth covering and paper supports its growth. Inhalation of fungal spores dispersed from mouldy books during handling is a common practice in library. The occurrences of allergic disorders among library workers are well documented. Vaidya K.K. and Murdhankar S.M. in 1990 performed their experiments in ambient air inside central library in thesis and binding section at university of Poona. Tilak recorded fungi on papers and books belonging to species *Alternaria, Fusarium, Caldosporium, Chaetomium* and *Nigrospora*etc.

So, we carried out a survey of airborne fungal spores inside K.T.H.M. College library with "Rotorod Air Sampler."

## MATERIAL AND METHODS

Air sampling was carried out by usingRotorodAir Sampler of Parkins (1957 ) modified by Harrington (1959). This is very suitable for short period sampling up to 2 hrs. and its efficiency is largelyindependent of wind speed. The Sampler was operated inside the K.T.H.M.CollegeNashik, twice in a week for half an hour.

Simultaneously Petri-plates containing potato-dextrose-agar medium and streptopenicillin were also exposed in the Library for twenty minutes. The Sampling was carried outfor a period of 6 months (From November 2008 to April 2009). The method of sampling, slide preparation and the scanning was done as method described earlier (Tilak and Srinivasulu). The different spore types were identified by comparison with the fungal collection from affected books, comparison with standard slides and photographs, characteristics and by visual identification.

## RESULT

During the period of present investigation air monitoring was carried out inthe indoor air of library. Total 31 air borne components were identified up to generic level and classified under their respective groups.Out of 31 components 26 are fungal spores and 5 other types. Out of 26fungal spores 5 spores belong to Phycomycotina, 7 belong to Ascomycotina, 2 to Basidiomycotina, 12 to Deuteromycotina and 5 to other types which include hyphal fragment, insect scale, pollen grain, plant part and unidentified spores. In order of dominance Deuteromycotina stood first with highest concentration (49.57%) to the total aerospora followed by other types (21.11%), Ascomycotina (12.27%), Phycomycotina (10.85%) and Basidiomycotina (6.16%).

## DISCUSSION:

A total of 31 types of isolates 8 types were having paper deteriorating activity. These are *Caldosporium*(7.04%), *Penicillium*(4.16%), *Aspergillus (8.21%), Curvularia (2.05%), Alternaria (5.57%), Rhizopus (2.58%),Chaetomium (1.40%) Insects and scales (5.57%).*

**Table 1:** Total Concentration and Percentage contribution of Each Airborne Component Inside The Library

| Sr. No. | Spore Type | Total No Of Spores / m3 of air | Percentage contribution to air - spore |
|---|---|---|---|
| **[A]** | **PHYCOMYCOTINA.** | | |
| 1. | *Albugo* | 34 | 2.05 |
| 2. | *Circinella* | 26 | 1.49 |
| 3. | *Cunninghamella* | 55 | 3.23 |
| 4. | *Mucor* | 28 | 1.62 |
| 5. | *Rhizopus* | 42 | 2.58 |
| **[B]** | **ASCOMYCOTINA** | | |
| 6. | *Bitrimonospora* | 16 | 0.93 |
| 7. | *Chaetomium* | 24 | 1.40 |
| 8. | *Hysterium* | 40 | 2.35 |
| 9. | *Melanospora* | 23 | 1.34 |
| 10 | *Pleospora* | 37 | 2.17 |
| 11. | *Teichospora* | 45 | 2.64 |
| 12. | *Xyleria* | 25 | 1.47 |
| **[C]** | **BASIDIOMYCOTINA** | | |
| 13. | *Puccinia* | 30 | 1.76 |
| 14. | *Smuts* | 75 | 4.40 |
| | | | |
| | | | |

| Sr. No. | Spore Type | Total No Of Spores / m3 of air | Percentage contribution to air - spore |
|---|---|---|---|
| **[D]** | **DEUTEROMYCOTINA** | | |
| 15. | *Alternaria* | 95 | 5.57 |
| 16. | *Aspergillus* | 140 | 8.21 |
| 17. | *Bispora* | 75 | 4.49 |
| 18. | *Caldosporium* | 120 | 7.04 |
| 19. | *Curvularia* | 35 | 2.05 |
| 20. | *Epicoccum* | 30 | 1.76 |
| 21. | *Exosporium* | 18 | 0.58 |
| 22. | *Heiminthosporium* | 65 | 3.81 |
| 23. | *Nigrospora* | 98 | 5.74 |
| 24. | *Penicillium* | 71 | 4.16 |
| 25. | *Pithomyces* | 48 | 2.81 |
| 26. | *Torula* | 50 | 2.94 |
| **[E]** | **OTHER TYPE** | | |
| 27. | Hyphal Fragment | 65 | 3.81 |
| 28. | Insect scale. | 95 | 5.57 |
| 29. | Pollen grain. | 90 | 5.27 |
| 30. | Plant part. | 60 | 3.51 |
| 31. | Unidentified spore. | 50 | 2.94 |

The spores of *Aspergillus* are in highest concentration (140/m3). They occurred regularly throughout the period of investigation. It is reported that *Aspergillus*is allergic, biodeteriorating and also responsible for Aspergillosis from both outdoor and indoor environment (Shivpuri and Agarwal, 1969). *Alternaria*, *Aspergillus, Bispora, Caldosporium Helminthosporium, Nigrospora*, *Penicillium*, Insects scales ,Hyphal Fragments, Pollen grains occurred in the air throughout the period of investigation.

The result of exposed petriplates also showed same spore types *Caldosporium*, *Penicillium*, *Aspergillus, Alternaria*were found associated with the deteriorated book samples during cultural studies.

The occurrence of hyphal fragments (3.81%) in the air of library is suggestive of deteriorated material of books inside the library.The insect scales, whole insects and insect parts shows major contribution (5.57%) to total airspora of library. These may be coming from affected books may probably be helpful in colonization of fungi.

At the same time fungal spores like *Aspergillus, Caldosporium*, *Penicillium, Nigrospora* are potential agents of allergic respiratory disorders and skin diseases. So to minimize the harmful effects of fungal spores for the of library staff, students, readers and precious collection of books and literature certain corrective measures (Bank 1974) can be definitely reduce frequency of their occurrence like, installation of exhaust fans, use of vacuum cleaner to remove dust, disinfection of shelves with fungicides, discarding damaged books and start planning for regular cleaning and preventive process.

## REFERENCES:


Mukherji BB (1973) Preservation of library material archieves& Document's The world press, Pvt. Ltd. Calcutta.

Ainworth GC, Sparrow Treatise, Sussman AS (1973) The fungi an advanced, academic press New York & London.

Tilak ST, and Pillai G (1988) Fungi in library: An aerobiological survey. *Ind. J. Aerobiol.* 1: 92 – 94.

Tilak ST (1982) Aerobiology.

Singh AB, Chattergy M, Singh BP and Gangal SV (1990). Airborne viable fungi in library: before and after agitation of books. *Ind.J.Aerobiol.*, 3: 32 – 38.

Agarwal MK and Shivpuri DN (1974) Fungal spores – their role in respiratory allergy. Advances in pollen spore research,1: 78-128

Adhikari A, Sen MM Gupta-Bhattacharyya S and Chanda S (2000) Incidence of` allergenically significant fungal aerosol in a bakery of West Bengal, India. *Mycopathologia*, 149:35-45.

Tilak ST (1989) Air borne pollen & fungal spores. VaijayntiPrakashan Aurangabad.

Singh RS (1991) Principle of plant Pathology 3rd Edition Oxford & IBH.

Gallo F (1993) Aerobiological research and problems in libraries. Aerobiologia 9: 117-130.

S.T.Tilak (1998) Aerobiology,SatyajeetPrakashan, Pune.

Vittal B.P.R. (2004) Indian contribution to Aerobiology of fungal plant Pathogen.

U.G. Basarkar and A.A.Saoji (2010) Allergenicity of *Partheniumhysterphorus*L.pollen:A Preliminary study:Indian Journal of Aerobiology vol.23 pp 93-96.

ManasRanjanMajumdar and SubendhuHazara(2005) vol.18 Assessment of Fungal Contaminants in the Libraries of Presidency College, Kolkata. Vol.18 Indian Journalof Aerobiology pp 1-5.

Saoji A.A. (2006) *Aspergillus* a review article in advancing Frontiers Ecological research in India Edited by A.K.Kandya,Asha Gupta 537-544.


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