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Book Bank Deterioration in Libraries: Aerobiological Approach

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Abstract: Intramural studies were carried out at Shivaji Mahavidyalaya Renapur Library in two seasons i.e. October 2023 to December 2023 and October 2024 to December 2024, to find out some allergic fungi which are harmful for books and also Library staff. In the Library, fungi, a specific class of microorganisms, are hazardous agents that not only cause paper degradation and book aging but also have a serious negative impact on staff health. During the examination, the prominent fungal spores like *Cladosporium, Alternaria, Aspergili, Curvularia, Nigrospora, Torula, Helminthosporium, Epicoccum*, and *Chaetomium* were encountered.

Keywords: Intramural, Library, Tilak Air Sampler, allergic fungi

I. INTRODUCTION

Today, poor indoor air quality has become a serious health issue, because there are more chances for fungal spores to serve in a tight environment, and therefore more chances for allergy or respiratory disorders to flourish. Aerobiology is the study of organic particles such as bacteria, fungal spores, and pollens that are passively transported by air. The intramural study of mycoflora is critical due to its relevance in human allergies and plant illnesses. According to epidemiological studies, asthma affects 5-30% of children and 2-30% of adults. Clinicians and the general public have become more aware over the past decade that mold sensitivity is a substantial contributor to allergy disorders. Allergic asthma, allergic rhinitis, allergic fungal sinusitis, bronchio pulmonary mycoses, eczema (atopic dermatitis), and hypersensitivity pneumonitis are examples of these disorders. *Penicillium,Cladosporium, Aspergillus*, and *Alternaria* are linked to asthma flare-ups. Hypersensitivity pneumonitis is linked to *Aspergillus* and *Cladosporium*. We and others have shown that exposure to a variety of indoor fungal spore taxa, both short- and long-term, is connected with asthma symptoms. The microorganisms occurs everywhere on the planet and more so in the tropics where humidity and temperature are better suited for them to grow and multiply. The ongoing study of intramural aerobiology is carried out at the Shivaji Mahavidyalaya in the Renapur Tehsil of the Latur district in the Marathwada region of Maharashtra. The samples were collected at college library, to identify some allergenic fungi that can grow in indoor environments.

II. MATERIALS AND METHODS

The current study used a volumetric Tilak air sampler, which is an electric instrument with dimensions of 10.4" x 8 in a cubical-shaped box. This device runs on AC (230 V) electricity. One circular revolving drum is fixed within the sampler, with cellophane tape stuck to the drum. The sampler continuously suckers in outside air. As a result, all probable aerospora sticks were wrapped with cellophane tape. One full revolution of the drum captures one week of qualitative and quantitative data. Cellophane is divided into 14 equal portions for permanent slide preparation; each length of tape on the slide is 4.3 cm long. Shows a catch of length and a sampling time of 12 hours. For the preparation of permanent slides, glycerin jelly is necessary. It is composed of 120 ml of glycerin, 0.5 g of phenol, 40 g of gelatin, and and140 ml of distilled water.

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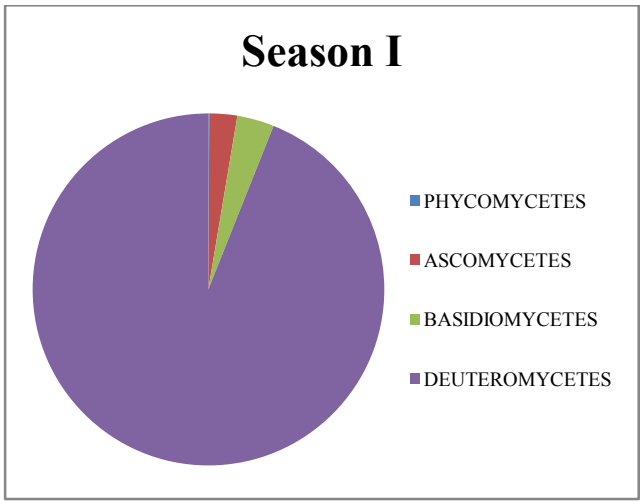
III. RESULTS AND DISCUSSION

Table-1: Percentage contribution of fungal groups during I season (1/10/2023 to 31/12/2023) and II season (from 01/10/2024 to 31/12/2024) in college library.

Group	Total concentration of spores/m^3 of air		Percentage contribution to the total aerospora		Mean % contribution
	Season I	Season II	Season I	Season II	
PHYCOMYCETES	211	113	0.052	0.033	0.043
ASCOMYCETES	9007	16474	2.22	4.807	3.514
BASIDIOMYCETES	12044	6112	2.971	1.783	2.377
DEUTEROMYCETES	330717	273135	81.558	79.716	80.638



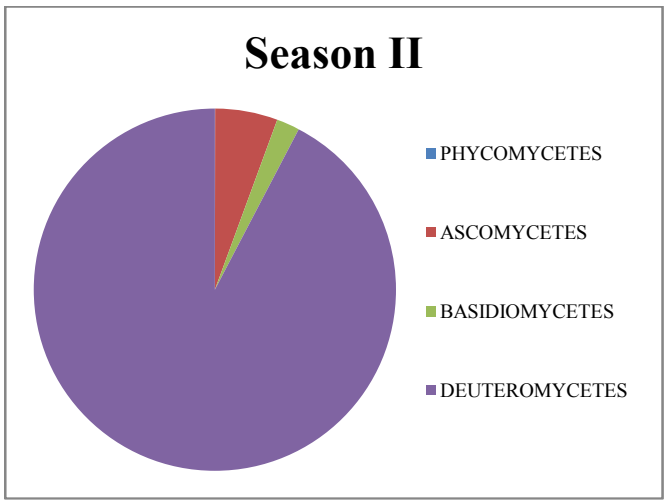


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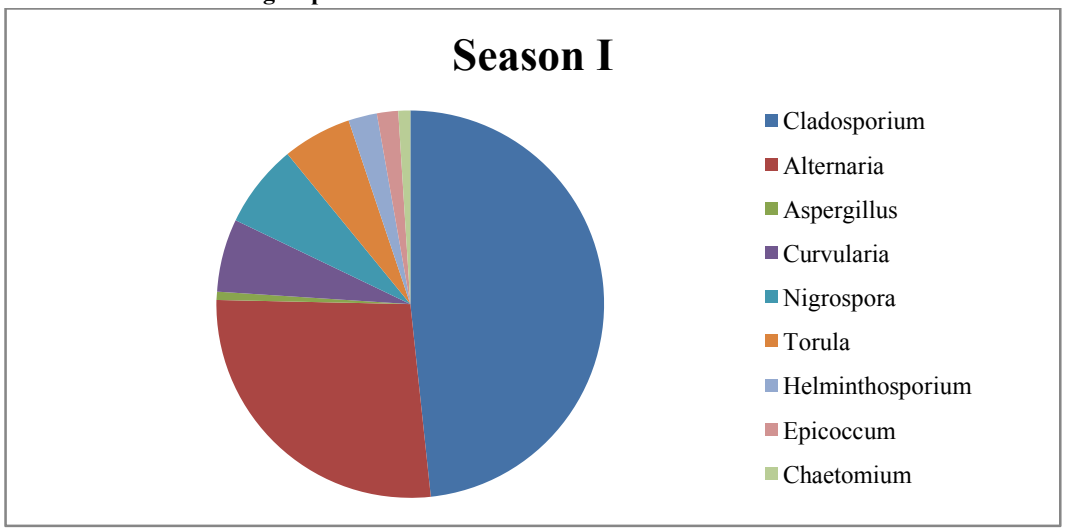
Table-II: Percentage contribution of dominant fungi from library during I season (1/10/2023 to 31/12/2023) and II season (from 01/10/2024 to 31/12/2024) in college library.

Spore type	Concentration of dominant fungal spores/m^3 of air		Percentage contribution to the dominant fungal spores		Mean % contribution
	Season I	Season II	Season I	Season II	
Cladosporium	142530	110964	35.153	32.385	33.769
Alternaria	79856	27541	19.695	6.287	12.991
Aspergillus	2017	72658	0.497	21.205	10.851
Curvularia	17964	12673	4.431	3.688	4.059
Nigrospora	20541	13964	5.066	4.075	4.571
Torula	16984	14329	4.189	4.182	4.185
Helminthosporium	7028	4263	1.733	1.244	1.489
Epicoccum	5241	2863	1.293	0.836	1.064
Chaetomium	2947	1748	0.727	0.510	0.618

Concentration of dominant fungal spores/m^3 of air Season I



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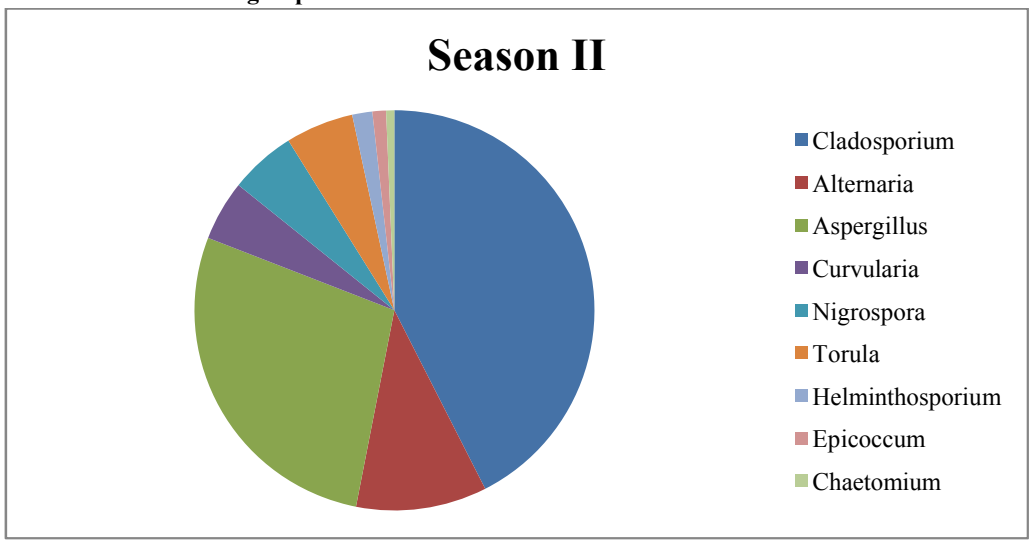
Concentration of dominant fungal spores/m^3 of air Season II



The current intramural examination of aerospore in Shivaji Mahavidyalaya Renapur detected by 57 species of spores, with the leading spores being *Cladosporium,Alternaria, Aspergili, Curvularia, Nigrospora, Torula, Helminthosporium, Epicoccum,* and *Chaetomium.* Libraries are one such indoor location where working employees, university community, students, and members of the general public spend time consulting books, reference books, news papers etc. Due to biodeterioration of stacked books, news papers, journals, magazines, paper products, and wooden book racks, students, teachers, and book handlers have health issues. In indoor environment fungal spores like *Alternaria, Cladosporium, Aspergillus* are more common allergenic fungi, it is associated with asthma, and the fungal sensitivity of *Aspergillus* and *Cladosporium* species are reported .Currently *Alternaria* (12.99%) , *Cladosporium* (33.76%) and *Aspergilous* (10.85%) gives the predominance of spores, it indicates that the indoor environment of the library has a high risk of allergic respiratory diseases like asthma. Also a global issue, bio deterioration of library materials is very destructive, especially to rare manuscripts and volumes kept in libraries. *Curvularia, Aspergillus, Alternaria, Nigrospora, Periconia, Helminthosporium, Bispora, Fusarium, Torula, Cladosporium,* and *Pithomyces* were prevalent fungal forms detected in the air of the library as well as correlated with deteriorating samples of books .It is serious issue in library of bio deterioration was found during investigation. In order to minimize harm and preserve library collections, environmental factors should be changed so that fungal development becomes less prominent. The ideal temperature is between 18 and 22°C, with humidity set to less than 55%.We may use an air purifier in the library to solve this problem, and regular day to day cleaning is also crucial.

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