



Original Research Article

Role of Aeromycoflora in Book Deterioration in the College Library at Patan (M.S)

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ABSTRACT

Keywords

Air monitoring, Library, Intramural environment, Rotorod sampler, Aerobio components

Air monitoring over library for intramural aerobiological investigations have been carried out from June 11 to September 11. Rotorod air sampler was used to carry out the study of aeromycoflora. Rotorod air sampler operated every morning from 8 a.m. to 9.00 a.m. During study period totally 90 aerobio components have been recorded. 81 spore types belonging to Myxomycotina, Phycomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina have been recorded. Rainy season finding (June- September 2011) revealed *Aspergillus* (20.36%) followed by *Penicillium* (18.38%), *Cladosporium* (9.53%), *Nigrospora* (2.28%), *Curvularia* (2.14%). 25 types of ascospores have been reported in the months of June to September 2011 due to high rainfall, high relative humidity, average temperature. Ascospore acts as bioindicators for the rainfall. Class wise percentage contribution of the library aerospora revealed that Deuteromycotina as a dominant group (66.55%), followed by Basidiomycotina (7.40%) followed by Ascomycotina (7.17%), Phycomycotina (1.33%) and in least percentage Myxomycotina (0.51%), other types also showed a significant dominance with (17.01%).

Introduction

College students and staff spend most of the day time in the indoor environment .i.e. college library. Due to high humidity, Patan area reveals a greater quantity of aerospora. Aeromycology of intramural environment has a greater significance in this region as area enjoys relatively high rain fall and humidity. Fungal spore types show variations with the time of the day, weather, and seasons. Usually highest no of airborne spores occurs in temperate and tropical regions or deserts (Lacy, 1981).

As biodeterioration occurs in all types of stored products, library material mainly constitutes cellulose. Along with glue, gum in bounded books Sometimes leather as a binding material. All these substrates provides a congenial atmosphere for the growth and sporulation of Fungi and handling of moldy books and papers causes inhalation of spores which may creates respiratory and cardiac problems with allergic reactions in library workers and visitors in the library. Sometimes other

problems like dermatitis may occur in the library visitors; therefore this study on airborne fungi has been conducted in the library of B.D.C. Patan. Library is rich with over 50000 books, periodicals and daily newspapers .the library is visited regularly by approximately by 500 students and teaching staff visit library daily. Patan is situated 30km distance from Karad and 70 Km from Satara. Patan is located in the vicinity of Koyana Dam and is earthquake prone area situated at 17⁰22' North latitude and 73⁰54' East Longitude , and Above 2200-feet from main sea level having heavy rainfall was 2000 mm during 2011.The concentration of fungal spores is determined by time, day, and weather parameters and seasons.

Materials and Methods

Present study was undertaken in B.D.C. library. Library material provided this source for aerobiological study. The stalks of books, racks, tables, periodicals and the intramural aeromicrobiota grown over them was studied by air sampling method using Rotorod sampler of Perkins (1957) and modified by Harrington (1959). The device relies upon high efficiency with which small airborne particles are deposited on narrow cylinders. Sampler consists of a small constant speed battery operated motor. The motor operating with 6 to 9 volts battery and gives a rotation speed of sampling rods approximately 2600 rpm. On the two vertical bars of the rods the cello tape is applied and cut to their size, the tape is then coated with petroleum jelly. After exposure the tape is cut into 2 parts each 1.5 cm length. These parts are carefully mounted in glycerine jelly for microscopic examination. Samples were collected from June to September 2011. Total no of spores/m³ of air at that particular site Sampling was done at a particular height of 2.5 to 3 feet from

ground level by multiplying with conversion factor 5. The spore number was monitored.

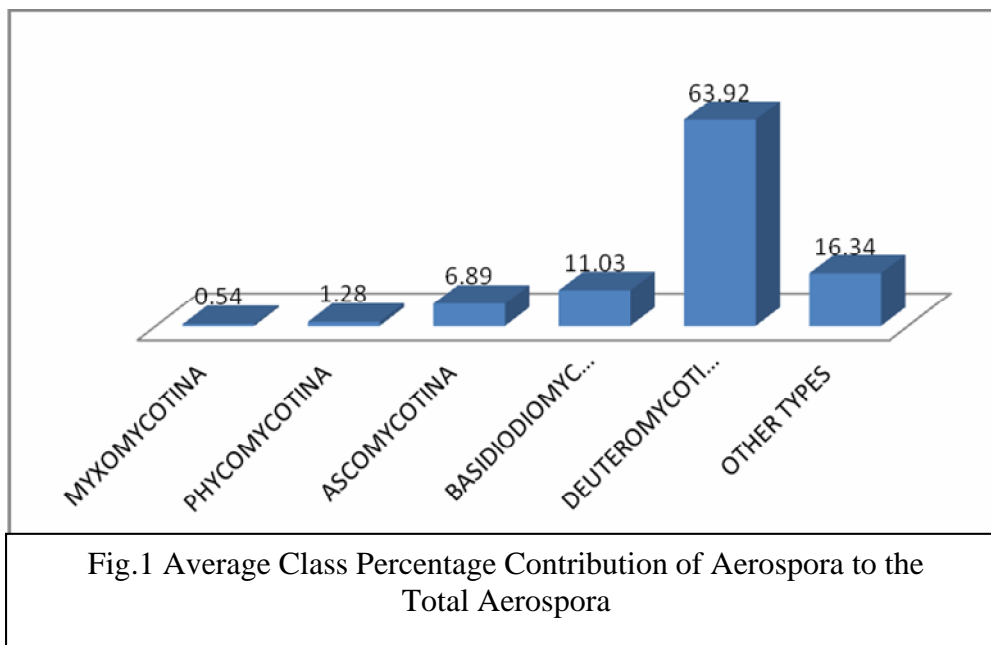
Results and Discussion

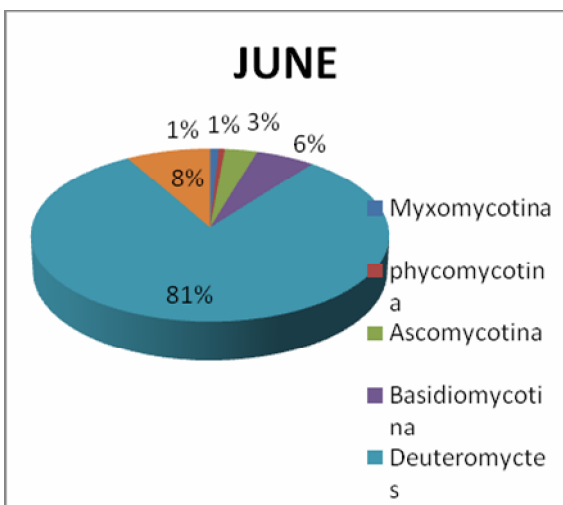
In the present study the intramural aeromicrobiota was analyzed both qualitative and quantitative basis. This study revealed 90 types of airborne bio components totaling about 36155/m³.totally 81 fungal spore type have been reported 30245 spores/m³ and 9 other types 5910/m³. Out of 81 fungal spore types the most dominant group was Deuteromycotina with 47 spore type (percentage contribution is 63.91% 23110 spores/m³) followed in sequence by Basidiomycotina 4 spore types (11.06%,4000/m³), Ascomycotina 25 Spore types (6.88% ,2490/m³), Phycomycotina 4 types (1.28%,465/m³),1 type belong to Myxomycotina (0.49%,180/m³) and 9 other biocomponents (16.34%,5910/m³) have been reported.

The percentage contribution of different spore types have been recorded for three months period and in the order of dominance percentage of each spore type enumerated as follows *Aspergillus* (19.55%), *Penicillium* (17.66%), *Cladosporium* (9.15%), *Basidiospores* (6.50%), *Nigrospora* (2.19%), *Periconia* (1.63%), and *Curvularia* (2.06%). Present aerobiological investigation was carried out in BDC library at Patan. The library location is ideal for study of intramural environment as library is situated at the basement of college building with open ventilator windows situated at the top without glass and almost exposed with grill and library is surrounded by college garden on both sides. This is an ideal situation for the fungal diversity.

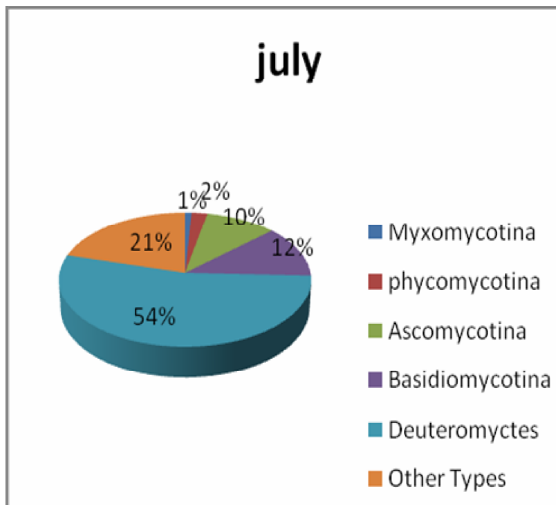
Table No. 1 Percentage contribution of dominant spores to the total aerospora during rainy season (June –September 2011).

Sr.no	Types of spores	June	July	Aug	Sept	Total	Average % contribution total aerospora
1	<i>Aspergillus</i>	1605	1185	1530	2750	7070	19.55
2	<i>Bispora</i>	25	175	30	125	350	0.96
3	<i>Basidiospores</i>	125	425	230	140	920	6.5
4	<i>Cladosporium</i>	245	1175	940	950	3310	9.15
5	<i>Curvularia</i>	60	130	290	265	745	2.06
6	<i>Didymosphaeria</i>	15	150	70	65	300	0.83
7	<i>Nigrospora</i>	135	130	110	420	795	2.19
8	<i>Penicillium</i>	2650	125	1450	2160	6385	17.66
9	Fungal hyphae	100	280	295	430	1105	3.05
10	cellulose fibers	95	595	445	635	1770	4.89

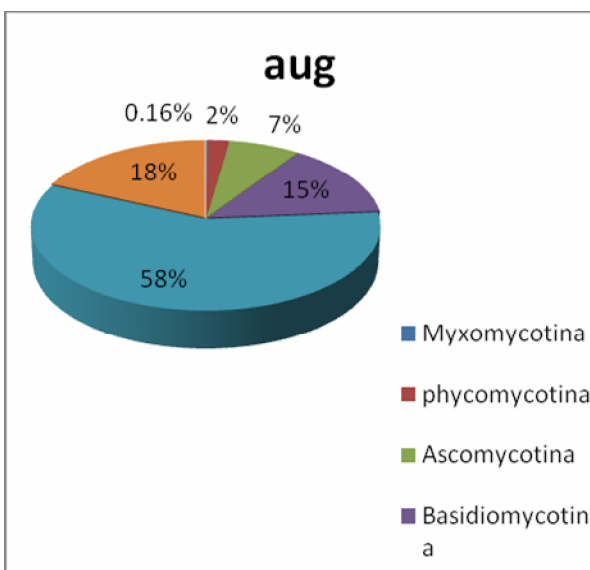




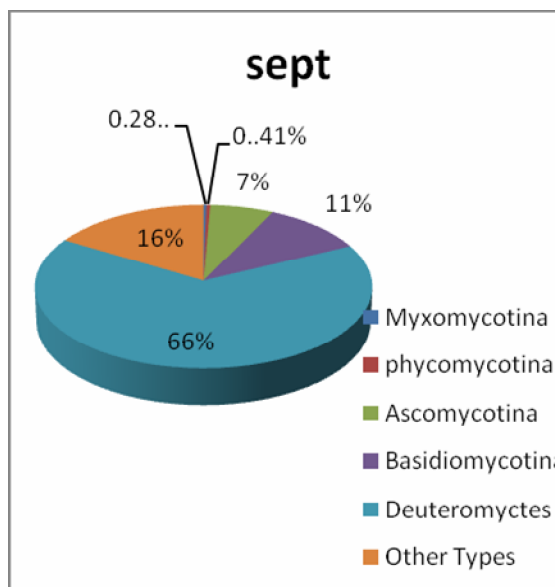
Percent contribution of aerospora in June, 2011



Percent contribution of aerospora in July, 2011



Percent contribution of aerospora in August, 2011



Percent contribution of aerospora in September, 2011

Location of Patan also promotes the aeromycoflora due to typical tropical climate and very high rainfall (around 2000mm) coupled with height of the place (2200 MSL). Extreme dampness and variation in day and night temperature promotes the aeromycoflora as humid conditions favors growth of fungi.

Biodeterioration of stacked books, news papers, journals, periodicals, paper materials and wooden book racks causes health problem among students, teaching staff and book handlers due to inhalation of airborne microbes. The dominance of *Aspergillus*, *Penicillium*, *Cladosporium*, *Curvularia* agree with findings of from

other libraries in the country. Allahabad, Sahney, and Purwar, (2001), Aurangabad, Tilak and Vishwe, (1975), Bangalore, Agashe, and Anuradha, (1988), Chennai, Vittal, and Glory, (1985), Delhi, (Singh et.al, (1990), Gorakhpur, Tripathi. (1987). Nagpur, Saoji and Giri, (1997), Vishakhapatnam, Alturi and Padmini, Pune (Jogdand, 2013), Mujumder Hazare (2005), Dalal and Bobal and Kalben (2011) showed same sequence pattern in the study at Wardha college, Library.

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