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Study of Aeromycoflora in Indore environment of College Building

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Abstract

Airborne micro fungal propgules are found in large numbers in indoor and outdoor environments and are widely distributed in nature. Some of them have the potentiality to cause allergies, spoilage of foods and many other adverse health effects. Present investigation focuses on aeromycobial survey of government college building of Sakti, distt. Janjgir Champa (C.G.). It is a study carried out between July 2015 and December 2015. Environmental factors play an important role in the distribution of the fungal spores. Fungi are diverse groups of organisms and have been found in large amount in the environment. Air almost always contains spores, but the number and type of spores depend on the time of the day, weather, season and geographical location. Aeromycoflora simply refers to the airborne fungal contributors of the environment. A large number of airborne mycofungal propaguls are found in indoor environment which are generally widely distributed in nature. The aim of this study is to determine the aeromicoflora, their identification, concentration and diversity in indoor environment to understand the cumulative aeromycoflora composition in the college environment. During the present investigation period of growth in population of fungal spores is observed. In the specified period of the six months growth of *Aspergillus niger, Rhizopus, Cladosporium Fusarium* and *Oxysporum* was observed in high percentage in indoor environment.

Airborne micro fungal propgules are found in large numbers in indoor and outdoor environment 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[1,3,14]. The effect of threshing operation of the fungal spores of farm air was studied with the culture plate method[17]. The concentration of air borne micro-organisms is correlated with the presence of dust and human activities. In addition, the concentration of fungal spores in the air is linked to geographical regions,

seasonal variation and atmospheric conditions[8].

Fungi are eukaryotic, filamentous and mostly spore-bearing organisms, which exist as saprophytes or as parasites of animals and plants. Fungal spores are ubiquitous. The airborne spores of these fungi are generally considered to be important cause of both allergic rhinitis and allergic asthma. The present paper deals with the aerobiological survey of Govt. K.K.B. College Sakti with environment factors.

Govt. College Sakti is situated District Janjgir- Champa (C.G.). Fungal flora of the air was determined from different parts of the indoor environment of college campus every month during investigation period July to December 2015.

Survey of Aeromycoflora :

For study of aeromycoflora, petriplate exposure method was used for the isolation of fungal species using PDA (Potato Dextrose Agar) media every month. Five petri plates were exposed for 5 to 10 minutes in indoor environment. The exposed petriplates were brought to laboratory and incubated at 28+1uc for 6 to 7 days[16]. At the end of incubation period the fungal colonies were counted, isolated and identified with the help of literature[2,11,15] and finally identified by the authentic authority, National center of fungal taxonomy, Delhi.

The Ecological Study :

For the ecological study, at the end of incubation period percentage frequency and percentage contribution of fungal flora were calculated by the following standard formula[12,15]

$$\text{Percentage frequency} = \frac{\text{Number of observations in which a species appeared}}{\text{Total number of observations}} \times 100$$

$$\text{Percentage contribution} = \frac{\text{Total no. of colonies of a species in all observations}}{\text{Total number of colonies of all the species}} \times 100$$

Thirty seven fungal floras were isolated from sampling site (Table-1). During investigation period 1374 fungal colonies belonging to 37 fungal species of 18 genera which falls in four groups Zygomycroftina, Ascomycotina, Anamorphic fungi and Mycelia sterilia were identified. Anamorphic fungi were the most dominating group during the study period as 30 fungal species out of 37 belonged to this group only.

In the present study percentage frequency and percentage contribution of aeromycoflora are found to be affected by the change of weather. It was also observed that highest percentage frequency of the aeromycoflora was shown by *Rhizopus nigricans, R. stolnifer, Acremonium kilience, Alternaria alternata, A. citri, A. tenuissima, Aspergillus flavus, A. fumigatus,* A. luchensis, A. nidulans, *A. niger, A. oryzae, Botryodiplodis theobromse, Cladosporium cladosporioides, C. herbarum, C. oxysporium, C. lunata, Fusarium chlamydosporum, Torula caligans, Mycelia*

Table-1. Fungal distribution of indoor aeromycoflora at Govt. K. K. B. College Sakti, July to December 2015

S.N.	Name of Fungal Species	July	Aug	Sep	Oct	Nov	Dec	Grand Total
A	**Zygomycotina**							
1	*Rhizopus nigricans*	5	4	1	2	1	3	16
2	*Rhizopus stolinifer*	3	4	2	2	1	6	18
3	*Rhizopus oryzae*	2	2	5	1	2	-	12
4	*Mucor varians*	-	3	1	2	-	2	8
5	*Mucor racemosum*	7	-	-	2	4	1	14
B	**Ascomycotina**							
6	*Chaetomium globosum*	-	2	5	-	1	5	13
7	*Myrothecium roridum*	2	4	-	-	1	2	9
C	**Anamorphic fungi**							
8	*Acremonium kilience*	2	1	2	3	3	4	15
9	*A. strictum*	12	-	1	5	3	6	27
10	*Alternaria altenata*	16	21	4	13	8	23	85
11	*A. citri*	4	3	3	5	7	3	25
12	*A. tenuissima*	5	3	2	2	3	6	21
13	*Aspergillus flavus*	17	11	9	4	12	22	75
14	*A. fumigatus*	6	17	21	12	6	39	101
15	*A. luchensis*	23	13	5	8	9	20	78
16	*A. nidulans*	18	8	12	7	2	4	51
17	*A. niger*	15	3	21	9	33	41	122
18	*A. oryzae*	11	9	4	16	25	16	81
19	*Botryodiplodis theobromae*	1	3	1	2	2	2	11
20	*Chaetomella raphigera*	-	3	3	-	1	2	9
21	*Cladosporium cladosporioides*	13	7	11	6	21	33	91
22	*C. herbarum*	29	7	9	11	8	4	68
23	*C. oxysporium*	32	11	8	24	21	16	112
24	*Curvularia clavata*	1	8	2	-	2	9	22

25	*C. lunata*	1	7	5	7	5	1	26
26	*Drechslera hawaiensis*	3	1	8	-	-	1	13
27	*D. specifer*	2	4	3	4	2	1	16
28	*Fusarium chlamydosporum*	7	8	3	7	2	1	28
29	*F. moniliformae*	-	3	1	-	1	3	08
30	*Gilmaniella humicola*	3	1	-	-	1	1	06
31	*Monilla sps.*	6	5	2	-	1	5	19
32	*Penicillium chrysogenum*	8	14	2	-	3	5	32
33	*P.citrinum*	2	-	-	1	-	-	03
34	*P.expansum*	1	2	-	3	-	1	07
35	*P. italicum*	3	1	-	2	-	2	08
D	**Mycelia sterilia**							
36	*Torula caligans*	12	9	13	7	3	7	51
37	*Mycelia sterile white*	16	8	13	10	15	11	73
	Grand total	288	210	182	177	209	308	1374

sterilia white (100%) and the lowest frequency was shown by *Penicillium citrinum* (33.33%) (Table-2). These results are in agreement with Lall[10], Singh[13], Kunjam[9], Sharma *et. al.*[12]. It has also been reported that *Aspergillus* species was the most frequent fungi.

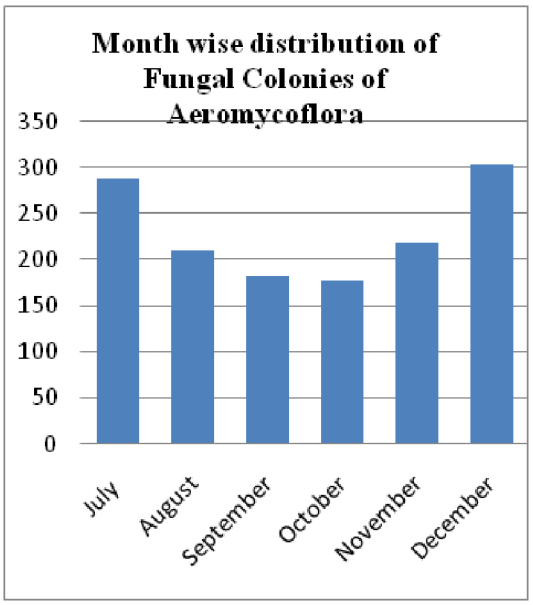
It was observed that the highest percentage contribution during the study period was shown by *Aspergillus niger* (8.87), *Cladosporium oxysporium* (8.15) and the lowest percentage contribution was shown by *Penicillium citrinum* (0.21), *Gilmaniella humicola* (0.43) Table-2 similar results were also recorded by Chakraborty S. *et.al.*[4], Katarzyana Zielinska *et.al.*[7],Ghose *et. al.*[5].

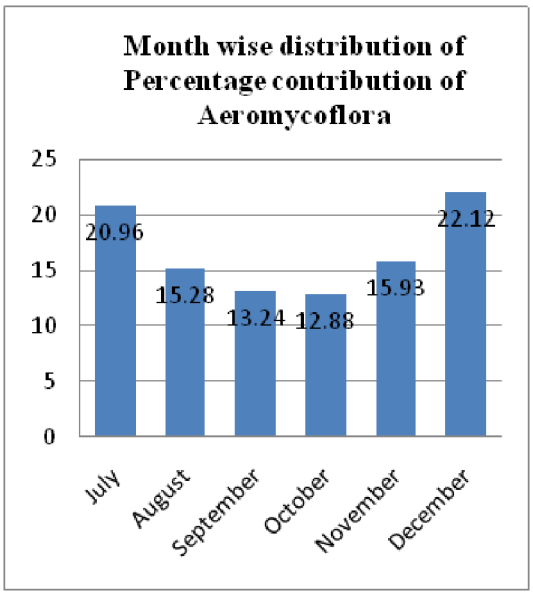
Fungal spores are not equally distributed in the environment. Their distribution varies according to geographical location and meterological conditions. The number of total fungal species increased form July to December both qualitative and quantitative. But overall count of the fungal spores exhibited seasonal fluctuation. It was higher in between July, and December. Higher numbers of fungi were isolated in the month of July, October and December. Verma and Chile[18] also reported greater variety and large number of aeromycoflora during May to October. This is generally attributed to favourable conditions for growth during periods. Singh and Siddiqui[13] have done in similar work in polluted and non polluted air zone and reported that the survival of air borne spores would depend on several factors like wind velocity, distance form sources, time in air, relative humidity, gaseous composition of atmosphere, sunshine and

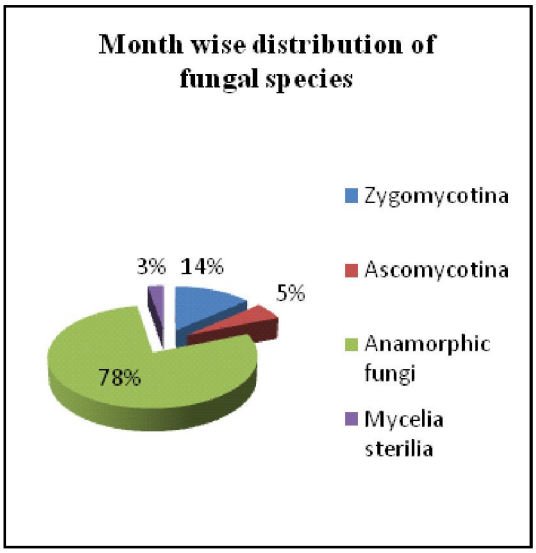
Table-2. Ecological variation of Aeromycoflora

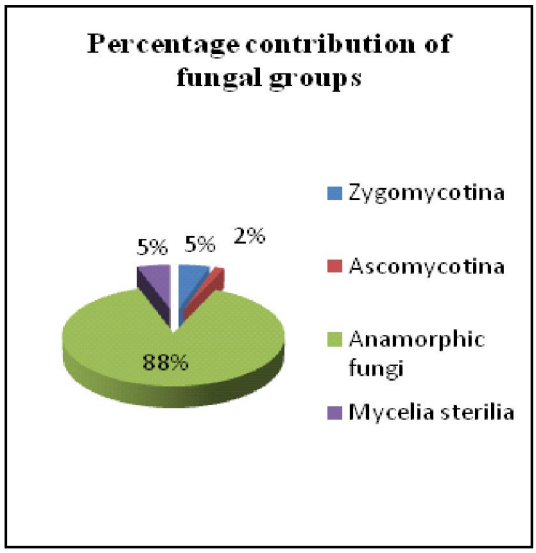
S. N.	Name of fungal species	Grand total	Percentage Frequency	Percentage contribution
A	**Zygomycotina**			
1	*Rhizopus nigricans*	16	100	1.16
2	*Rhizopus stolinifer*	18	100	1.31
3	*Rhizopus oryzae*	12	83.33	0.87
4	*Mucor varians*	8	66.66	0.58
5	*Mucor racemosum*	14	66.66	1.01
B	**Ascomycotina**			
6	*Chaetomium globosum*	13	66.66	0.94
7	*Myrothecium roridum*	9	66.66	0.65
C	**Anamorphic fungi**			
8	*Acremonium kilience*	15	100	1.09
9	*A. strictum*	27	83.33	1.96
10	*Alternaria altenata*	85	100	6.18
11	*A. citri*	25	100	1.81
12	*A. tenuissima*	21	100	1.52
13	*Aspergillus flavus*	75	100	5.45
14	*A. fumigatus*	101	100	7.35
15	*A. luchensis*	78	100	5.67
16	*A. nidulans*	51	100	3.71
17	*A. niger*	122	100	8.87
18	*A. oryzae*	81	100	5.89
19	*Botryodiplodis theobromae*	11	100	0.80
20	*Chaetomella raphigera*	9	66.66	0.65
21	*Cladosporium cladosporioides*	91	100	6.62
22	*C. herbarum*	68	100	4.94
23	*C. oxysporium*	112	100	8.15

24	*Curvularia clavata*	22	83.33	1.60
25	*C. lunata*	26	100	1.89
26	*Drechslera hawaiensis*	13	66.66	0.94
27	*D. specifer*	16	100	1.16
28	*Fusarium chlamydosporum*	28	100	2.03
29	*F. moniliformae*	08	66.66	0.58
30	*Gilmaniella humicola*	06	66.66	0.43
31	*Monilla* sp.	19	83.33	1.38
32	*Penicillium chrysogenum*	32	83.33	2.32
33	*P.citrinum*	03	33.33	0.21
34	*P.expansum*	07	66.66	0.50
35	*P. italicum*	08	66.66	0.58
D	*Mycelia sterilia*			
36	*Torula caligans*	51	100	3.71
37	*Mycelia sterilia* white	73	100	5.31
	Total	1374		









species itself.

The present investigation was aimed to observe the fungal flora, their concentration, diversity and identification in the indoor environment of college building. At the end of the research work, it was proven that a good number of fungal spores were found, that, is, the indoor air of the college building had been never free from fungal spores. Different types of fungal spores found in the indoor environment. The percentage of some airborne fungal viability is in higher concentration.

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