



ORIGINAL ARTICLE

Intramural Aerobiological Studies of Library

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ABSTRACT

Knowledge of airborne pollen and fungal spores is useful as a preliminary approach to solve respiratory allergy problems, therefore the qualitative and quantitative aspects of the aerospora was studied in Library of P.G.T.D. Botany, RTM Nagpur University, Nagpur during the period January 2008 – December 2009 using Rotorod air sampler. The study revealed 11 types of pollen grains and 21 types of fungal genera along with other types. *Aspergillus* sp. (16.08%) was found to be predominant in the library atmosphere. This was followed by *Cladosporium* sp. (14.24%) and *Penicillium* (10.07%). Among the identified pollen grains *Cyperaceae* (8.87%) were found to be predominant followed by *Achyranthus aspera* (2.45%) and *Brassica campestris* (2.45%). The results were correlated with meteorological data.

Key words: air-spore/intramural/pollen/spores

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INTRODUCTION

The allergenicity of airborne pollen grains, fungal spores and knowledge of their significance in the management of nasal and nasobronchial allergy, has been convincingly demonstrated earlier (1). The magnitude and quality of pollen and fungal spores in the atmosphere varied from season to season and year to year and also from region to region depending on local flora, (2). Topography of landscape and human interference with urbanization, man spends most of his time at indoors either at office or house, hence he is more exposed to indoor aeroallergens besides outdoors (3). With this particular aim, the present investigation has been undertaken to study the indoor airspora of P.G.T.D. Botany, RTM Nagpur University Library.

MATERIAL AND METHOD

Sampling Site :- The present study was carried out for the period of two years from January 2008 to December 2009 in Nagpur city. Nagpur is situated in the Central Part of India in Maharashtra State and it is located between 21° 45' N to 20° 30' N and 78° 15' E to 79° 45' E which essentially indicates that Nagpur is located in the Deccan Plateau.

Sampling Method: - Spore Sampling was done by Rotorod Sampler.

Analysis of Data: - Slides were observed under the microscope and aerospora types were identified with the help of standard literature and reference slides up to genus level. Meteorological data like temperature, humidity & rainfall was recorded during study period (fig-1-5)

RESULT AND DISCUSSION

The atmosphere contains the mixture of bioparticles such as fungal spores, pollen grains, detached part of plants and animals, The data about the incidence, percentage contribution of spores/pollen and other types was studied (Tabl 1). Of the total 32 types recorded during the present survey, 21 belonged to fungal spores, 11 to pollen grains and 7 to other types.

Pollen grains: - Altogether 11 pollen types were recorded, of which 1 belonged to tree & 10 to herbs. *Cyperaceae* pollen were found to be the most dominant during both the years i.e. 2008 (4.97%) and 2009 (3.90%), other dominant pollen types were *Brassica campestris* (2008 – 1.17%, 2009 – 0.89%), *Achyranthus aspera* (2008 – 1.30% and 2009 – 1.15%).

Pollen grains showed two peak periods, first major peak in September and a minor peak in March.

Fungal Spores: - From the total 21 fungal spores recorded, 1 belonged to Zygomycotina, 4 to Ascomycotina, 3 to Basidiomycotina and 13 to Deuteromycotina.

Among the Fungal spores, *Aspergillus* ranked highest during both the years i.e. 2008 (7.98%) and 2009 (3.90%) followed by *Cladosporium* (2008 – 7.29% and 2009 – 6.95%) and *Alternaria* 2008 – (5.54% and 2009-4.53%)

Species of *Aspergillus*, *Penicillium* and *Cladosporium* are found to be the most common in the indoor air of library. Predominance of these fungi in the indoor air of library were also reported from other parts of India –Nagpur (4), Vishakhapatnam (5), Gulbarga (6) and Jalgaon (7).

Other Types :- The other types included algal filaments, hyphal fragments, insect parts, tracheideal elements and plant trichomes. The remaining two types included unidentified spores and pollen grains respectively (8).

Most of the spores showed their preponderance during June to August and September to November. Spore load in the air was significantly low during March to May (Table 1). The peak concentration observed during September to November was probably due to 'wet spora' Higher concentration of spore, in winter was due to large number of sporophytic forms.

It has been found that environmental factors like rainfall, relative humidity, temperature have a direct or indirect influence on the spores in the air.

Table - 1 Month wise Contribution of Airspora (Spore/m³) Recorded during the period of Investigation i.e. Jan. 2008 to Dec. 2009
Place Site - A Indoor

Spore Type		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Total No. of spore/M ³	Percentage
<i>Cunninghamella</i>	2008	4	9	2	7	9	3	7	15	4	1	1	1	63	315	1.90
	2009	3		4	3		2	5	16	3	2	2	1	41	205	1.21
<i>Aspergillus</i>	2008		20	4	10	23	38	27	35	30	25	38	15	265	1325	7.98
	2009	10	25	11	30	26	40	30	18	19	28	20	17	274	1370	8.10
<i>Didymosphaeria</i>	2008	1		3	6	10	15	10	2	4	2	1	7	61	305	1.84
	2009	2	1	3	4	5	2		5	1	2	3	10	38	190	1.12
<i>Hypoxyton</i>	2008							3		1		2		6	30	0.18
	2009			1				4			1	3		9	45	0.27
<i>Penicillium</i>	2008	2	4	3	1	1	2	3	1	4	3	2		26	130	0.78
	2009	1	5	4	1		1	2		3	2	1		20	100	0.59
Basidiospore	2008	3		4		4		3			2		1	17	85	0.51
	2009			1		3		3						7	35	0.21
Smuts	2008										5			5	25	0.15
	2009	3	1		2				1		6	1		14	70	0.41
Teleutospore	2008	2	7	10	10	4	5			1	3	5	3	50	250	1.51
	2009		2	9	9	5	8			2	1	6	2	44	220	1.30
<i>Alternaria</i>	2008		11	18	50	40	30	18	10	4	2	1		184	920	5.54
	2009		10	15	45	30	25	15	9	3	1			153	765	4.53
<i>Bispora</i>	2008			2		1				1	3	1	2	10	50	0.30
	2009			1		1				2	1	2	7	14	70	0.41
<i>Cercospora</i>	2008	2	5	3	3		2	2	5	5	8	7	9	51	255	1.54
	2009	1	4	2	4	1	3	2	4	5	7	8	11	52	260	1.54
<i>Cladosporium</i>	2008	18	22	20	70	20	22	1	2	3	22	30	12	242	1210	7.29
	2009	25	70	18	58	16	3	2				28	15	235	1175	6.95
<i>Curvularia</i>	2008		2	2	3	1	4	2	6	10	15	10	3	58	290	1.75
	2009	1	1	1	4	3	3	3	5	12	13	7	2	55	275	1.63

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<i>Helminthosporium</i>	2008	5	3	6	8	1	2	4	3	20	23	5	2	82	410	2.47
	2009	4	5	9	2	3	5	2	5	18	19	6	2	80	400	2.37
<i>Hormiscium</i>	2008			1						1	1			3	15	0.09
	2009		1			1								2	10	0.06
<i>Memnoniella</i>	2008		1	2		2	1	4	2					12	60	0.36
	2009		3	1		2	3	5	2	1				17	85	0.50
<i>Monilia</i>	2008			2			1				2			5	25	0.15
	2009			1			1				1			3	15	0.09
<i>Nigrospora</i>	2008	3	1	2	4	3	1	1	5	8	11	16	4	59	295	1.78
	2009	3	3		3	4	5	2	2	10	15	8	5	60	300	1.77
<i>Pithomyces</i>	2008	8	11	6	13			12	11	30	35		2	128	640	3.86
	2009	9	10	2	7	2	3	13	8	20	17	15	1	107	535	3.16
<i>Torulla</i>	2008	3	2	16	12	4	6		1	3	6	3	4	60	300	1.81
	2009		5	9	11	3	1		2	2	5	2	1	41	205	1.21
<i>Rhizoctonea</i>	2008	1		4	4		3	2	2		1		1	18	90	0.54
	2009	1	1		2									4		0.12
<i>Achyranthus aspera</i>	2008	9	2	3	1		1			10	1	2	14	43	215	1.30
	2009	10				2		1		11	2	1	12	39	195	1.15

<i>Azadirachata indica</i>	2008			6	4	8		1	2					21	105	0.63
	2009	2	1	5	3	9		4			3			27	135	0.80
<i>Brassica Campestris</i>	2008	8	1	7		1	1		9	1	10	1		39	195	1.17
	2009	5	2	4		2			6		8	2	1	30	150	0.89
<i>Cyperaceae</i>	2008	3	5	3	8	7	9	20	31	30	31	10	8	165	825	4.97
	2009	4	7	6	10	7	11	15	17	22	20	9	4	132	660	3.90
<i>Evolvulus alsinoid</i>	2008	2	1									2		5	25	0.15
	2009	1	2									3	2	8	40	0.24
<i>Labiatae</i>	2008	2		3	1					1	2	2	1	12	60	0.36
	2009	1		2	1					3	1	1	3	12	60	0.35
<i>Leucas aspera</i>	2008	1	1								2	3		7	35	0.21
	2009	2									1	3		6	30	0.18
<i>Mimosa pudica</i>	2008			2	10							2	17	31	155	0.93
	2009				15							1	20	36	180	1.06
<i>Poaceae</i>	2008	1	2	3	5	7	4	6	2	1	8	4	3	46	230	1.39
	2009		1	1	2	5	3	4	1		6	2	1	26	130	0.77
<i>Sonchus</i>	2008	2	3								2	1		8	40	0.24
	2009	1	2								3	2		8	40	0.24
<i>Xanthium stromarium</i>	2008			8		11		1	3	3				26	130	0.78
	2009			10		14				2				26	130	0.77
III other types																
i) Algal filaments	2008	8	4	5	8	10	15	9	12	13	8	9	7	108	540	3.25
	2009	7	6	4	3	8	11	10		4	3	5	6	67	335	1.98

	2008	18	30	35	50	46	80	18	30	25	20	22	50	424	2120	12.77
Hyphal fragment	2009	30	25	28	47	30	60	15	23	10	15	9	35	327	1635	9.67
	2008	8	9	70	28	11	22	9	35	25	11	15	17	260	1300	7.83
Insect parts	2009	15	25	35	32	100	10	16	90	80	17	21	30	471	2355	13.93
	2008	18	21	15	15	50	28	32	17	9	8	11	21	245	1225	7.38
Tracheideal elements	2009	10	19	16	30	29	22	30	16	12	11	10	25	230	1150	6.80
	2008	13	28	9	18		20	18	25	31	20	28	33	243	1215	7.32
Trichomes	2009		21	10	45	90	80	30	20	35	18	22	30	401	2005	11.86
	2008	12	18	15	11	9	18	21	30	28	3	4	1	170	850	5.12
Unidentified fungal spores	2009	30	10	9	18	30	9	15	18	35	9	6	9	198	990	5.86
	2008	7	9	15					2		10	16	3	62	310	1.87
Unidentified pollen grains	2009	8	10	18		1		3			8	9	10	67	335	1.98
	2008	164	232	309	360	283	333	234	298	306	306	254	241	3320		
TOTAL	2009	189	278	240	391	432	311	231	268	315	246	218	262	3381		

Fig. 4 Library aerospora Trapped During - 2008

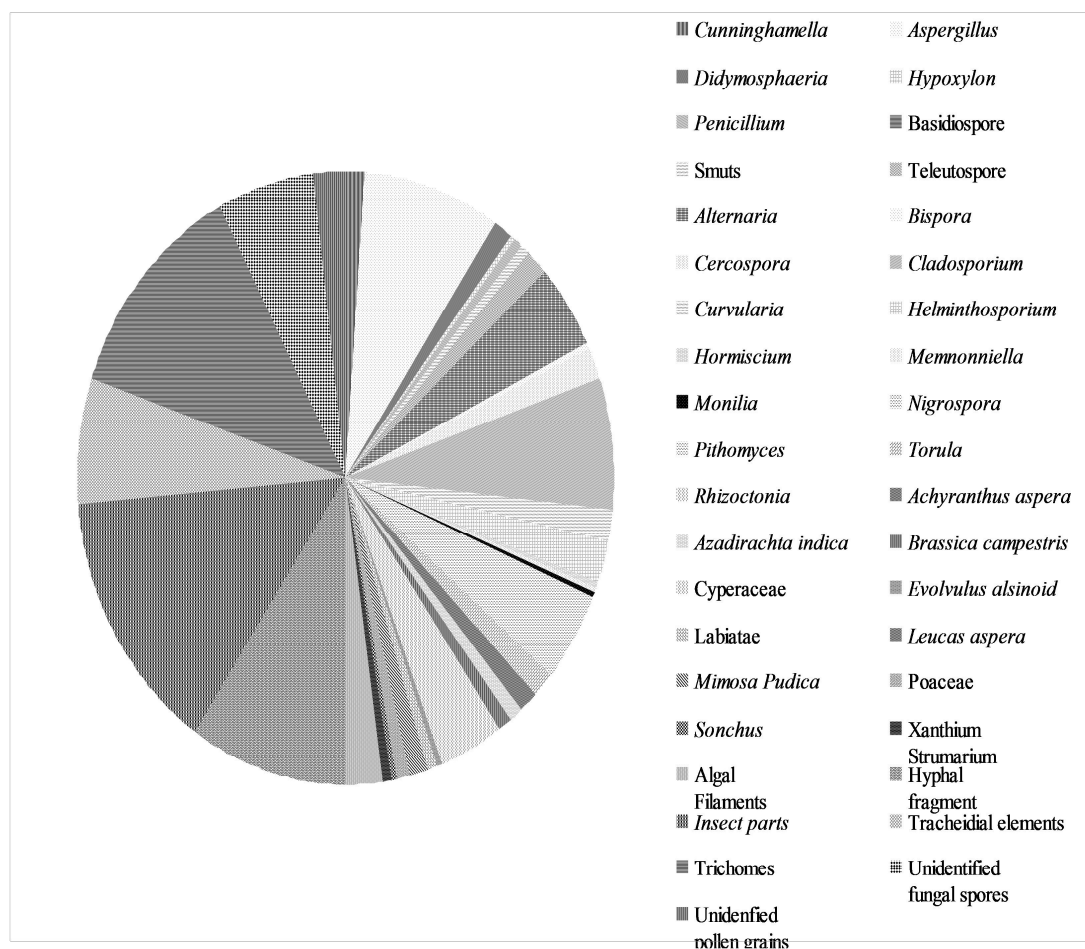


Fig. 5 Library aerospora Trapped During – 2009

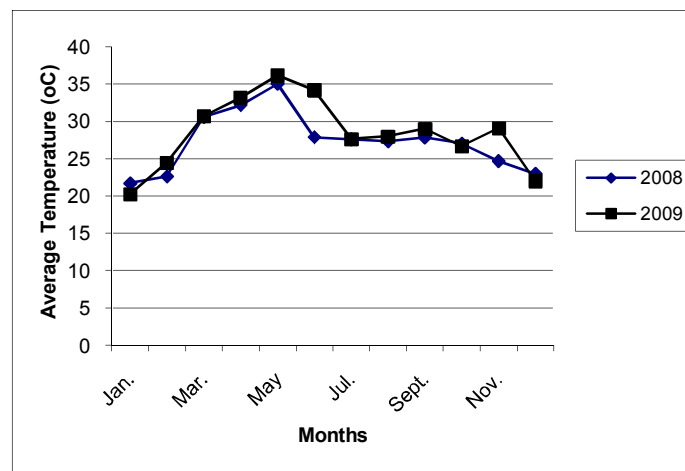
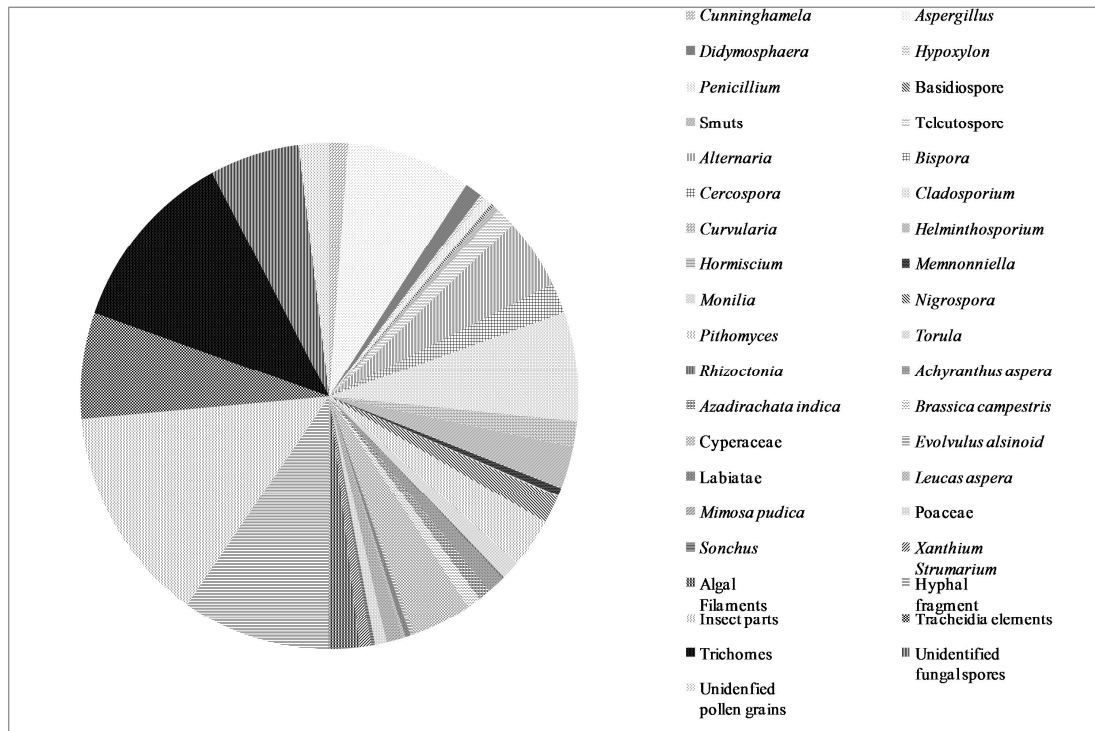


Fig.1 Monthly Temperature Variation in the Atmosphere of Nagpur (During Jan. 2008 to Dec. 2009)

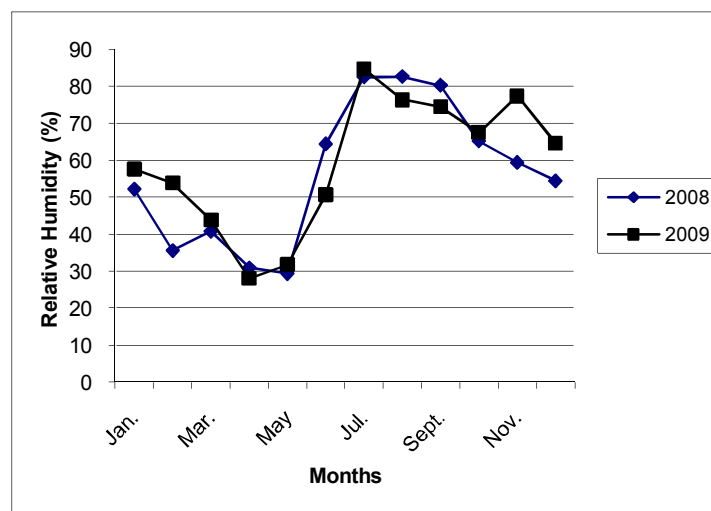


Fig. 2 Monthly Variation in Humidity in the Atmosphere of Nagpur (During Jan. 2008 to Dec. 2009)

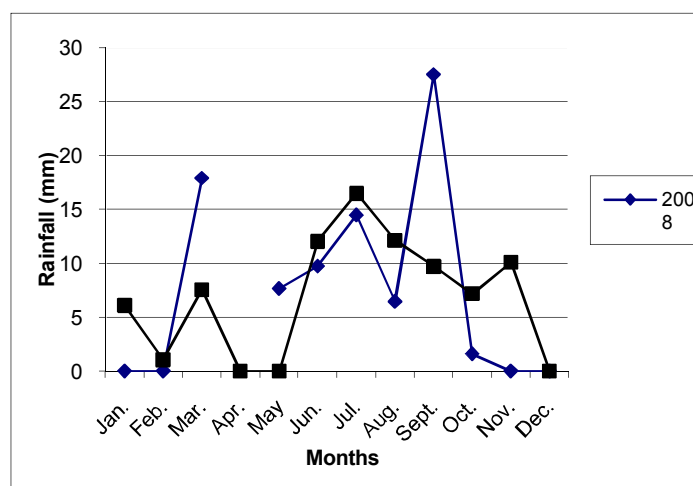


Fig. 3 Monthly Variation in Rainfall in the Atmosphere of Nagpur (During Jan. 2008 to Dec. 2009)

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