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ORIGINAL ARTICLE **OPEN ACCESS**

Pollen Survey of Mahatma Jyotiba Phule Campus RTMNU Nagpur

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ABSTRACT
Airborne Pollen survey of Nagpur, was carried out for a two consecutive years i.e. Jan -2008-Dec-2009 at Mahatma Jyotiba Phule campus, RTM Nagpur University situated 5 km away from zero mile stone. Air-borne pollen were trapped using rotorod air sampler. Results delineate a rich cosmopolitan assemblage of pollen of local and distant origin, some of which bear allergic significance. Based on the data available a pollen calendar was constructed. The pollen calender indicated that there is no pollen free month which is ideal of the tropics. The atmosphere was dominated by the members of Poaceae (66.11%), Cyperaceae(49.71%), Achyranthes aspera (15.09%), Brassica campestris (12.51%), Lantana camera (10.52%), Xanthium strumarium (8.32%) and Alternathera sesilis (6.89%). It was evident that some pollen were dominant moderate & minimum percentage. The pollen data were also correlated with the meteorological parameters such as temperature, relative humidity and rainfall.
Keywords: Pollen, RTMNU

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INTRODUCTION

Atmospheric pollen forms a very significant part of the pollen survey. Providing us information of pollen periodicity and dispersion, some air borne pollen are proven causative agents for respiratory allergy and other respiratory disorders [1].

A review of literature reveals that systematic aeropalynological surveys to identity the local allergic pollen have been done in different parts of the world[2-5]. However in India, extensive work appears to have been concentrated only in a few limited geographical centres, vast areas and climatic zones yet remained unexplored. One such centre is Nagpur. Therefore a survey of relative abundance of atmospheric pollen in general , in Mahatma Jyotiba Phule campus RTMNU Nagpur, was carried out with a view to identify dominant and significant pollen of allergic importance.

MATERIALS AND METHODS

A daily survey of air-borne pollen was undertaken from January -2008 to December -2009 using a rotorod air sampler.

The present Rotord sampler was modified by [6] original [7] model. The devise relies upon the high efficiency with which small airborne particle is deposited on narrow brass rods.

After exposure the tape is removed, mounted beneath a cover glass with the help of glycerin Jelly for the microscopic examination. The pollen grains were identified on the basis of reference slides prepared out of local vegetation. The incidence of pollen was expressed as total number of each species & pollen/m^3 of the trapping surface of cellophane tape. A pollen calendar was prepared with a month interval of each species.

The meterological data such as temperature rainfall & relative humidity was collected from India meteorogical department Regional meterological centre, Airport, Nagpur.

Study Area :- Mahatma Jyotiba Phule Campus, Rashtrasant Tukdoji Maharaj University Nagpur. This area is well connected to the roads with beautifully grown avenue trees. NH6 is connected to the area . This area is mostly covered by Herb, Shrubs & trees and Aeropalynoflora was selected as Study area is 5 km away from Zero mile stone.

RESULTS AND DISCUSSION

Total of 33375/M^3 were recorded and classified into 27 types of which 16 belongs to Herbs, 3 Shrubs and 7 trees. (Table 1-2) These pollen types belong to 18 Entomophilous, 5 Anemophilous and 3 Amphilous mode of pollination. In two years study 2 monocotyledonous and 24 Dicotyledonous pollen grain were recorded.

In three years study of air around pune by [8] pollen of 20 monocotyledonous and 21 dicotyledonous plants were recorded, [9] while surveying aerial pollen flora at Bareilly and at other places in Gangetic

region found that pollen of Cyperaceae, Poaceae among monocotyledonaus and *Azadirachta, cannabis, Chenopodium, Morus* and *Ricinus* among dicotyledonous, were dominant in the air.

Table 1: Month wise Contribution of Pollen grain/M^3 during January 2008 to December 2009 from Indoor (Mahatama Jyotiba Phule Campus RTM Nagpur University)

	Spore type	year	January	February	March	April	May	June	July	August	September	October	November	December	Total	Total no. of spore/M3	Percentage
		2008	9	2	3	1		1			10	1	2	14	43	215	5.90
1	*Achyaranthes aspera*	2009	10				2		1		11	2	1	12	39	195	6.02
		2008			6	4			1	2					21	105	2.88
2	*Azadirachta indica*	2009	2	1	5	3	8		4			3			27	135	4.17
		2008	8	1	7		9			9	1	10	1		39	195	5.35
3	*Brassica campestris*	2009	5	2	4		1	1		6		8	2		30	150	4.63
		2008	3	5	3	8	2		20	31	30	31	10		165	825	22.66
4	Cyperaceae	2009	4	7	6	10	7	9	15	17	22	20	9		132	660	20.40
		2008	2	1			7	11					2	1	5	25	0.68
5	*Evolvulus alsinoid*	2009	1	2									3	8	8	40	1.23
		2008	2		3	1					1	2	2	4	12	60	1.64
6	Labiatae	2009	1		2	1					3	1	1		12	60	1.85
		2008	1	1								2	3	2	7	35	0.96
7	*Leucas aspera*	2009	2									1	3	1	6	30	0.92
		2008			*2*	*10*							*2*	*3*	*31*	*155*	*4.25*
8	*Mimosa pudica*	2009				15							1		36	180	5.56
		2008	10	15	20	21	8	10	16	13	16	20	15		177	885	24.31
9	Poaccae	2009	15	12	23	28	15	12	14	14	18	22	14		205	1025	31.68
		2008	2	3								2	1		8	40	1.09
10	*Sonchus*	2009	1	2	8							3	2	17	8	40	1.23
	Xanthium	2008			10		11		1	3	3			20	26	130	3.57
11	*strumarium*	2009	10				14				2			13	26	130	4.01
	Bougainvila	2008												18	10	50	1.37
12	*spectabilis*	2009					8								8	40	1.23
		2008											10		10	50	1.37
13	*Tridax procumbens*	2009												8	8	40	1.23
		2008			10	5	7								22	110	3.02
14	*Polyalthia longifolia*	2009			4	3									7	35	1.08
	Alternanthera	2008	10			8						3	6	10	37	185	5.08
15	*sessilis*	2009	3			1						2	4		10	50	1.54
		2008	1	1	3	5				2	1	1			14	70	1.92
16	*Argemone mexicana*	2009				2	1	3			1				7	35	1.08
		2008								2	2				4	20	0.54
17	*Cassia tora*	2009									1				1	5	0.15
		2008		1	1										2	10	0.27
18	*Butea monosperma*	2009			1										1	5	0.15
		2008		2	2	1				3	4	5	1		18	90	2.47
19	*Lantena camera*	2009	5	4	10					6	7	5	4	6	47	235	7.26

	Spore type	year	January	February	March	April	May	June	July	August	September	October	November	December	Total	Total no. of spore/M3	Percentage
20	*z*	2008						1	1						2	10	0.27
		2009							1						1	5	0.15
21	*Zizyphus Jujuba*	2008							8	11					19	95	2.60
		2009							5	3					8	40	1.23
22	*Acacia nilotica*	2008		2	1	6									9	45	1.23
		2009															
23	*Hibiscus – rosa- sinesis*	2008				1	2		3						6	30	0.82
		2009			2										2	10	0.30
24	*Tephrosia purpurea*	2008									10	15			25	125	3.43
		2009									4				4	20	0.61
25	*Tectona grandis*	2008									20				20	100	2.74
		2009															
26	*Sida cordifolia*	2008									1	2	1		4	20	0.54
		2009								1		1			2	10	0.30
27	Unidentified pollen grains	2008	1	2	1					1		1	2		9	45	1.23
		2009	2	1	3		1		1			2	2	1	14	70	2.16
	Total	2008	59	35	70	70	44	22	50	77	99	80	58	2	728	3240	
		2009	51	31	70	63	59	26	40	47	69	70	46	64	647	3235	
	Percentage	2008	8.10	4.80	70	9.61	6.04	3.02	6.86	10.57	13.59	10.98	7.96	75	99.83		
		2009	7.88	4.79	9.61	1081	9.11	4.01	6.18	7.26	10.66	10.81	7.10	8.79	99.93		

Table 2 : Month wise Contribution of Pollen grain/M³ Recorded during January 2008 to December 2009 from outdoor environment of Mahatma Jyotiba Phule Campus RTM Nagpur University.

	Spore type	year	January	February	March	April	May	June	July	August	September	October	November	December	Total	Total no. of spore/M3	percentage
		2008	15	2	1	3	1	4		2	18	2	3	20	71	355	2.59
1	*Achyaranthes aspera*	2009	10	1	4	1	5	1		4	17	1	5	13	62	310	2.34
		2008			12	3	11	5		1	4				36	180	1.31
2	*Azadirachta indica*	2009	1	3	13	4	20	17				2			60	300	2.26
		2008	15		12			1		15		14			57	285	2.08
3	*Brassica campestris*	2009	8		11		2			11		16			48	240	1.81
		2008	2	7	4	8	15	7	13	21	26	12	4	3	122	610	4.46
4	Cyperaceae	2009	7	10	6	11	10	17	32	35	52	36	9	7	232	1160	8.76
		2008		1									1		2	10	0.07
5	*Evolvulus alsinoid*	2009	1	2									3	2	8	40	0.36
		2008	1		1	2					1	2			7	35	0.25
6	Labiatae	2009	3		1	2					2	6	4	6	24	120	0.90
7	*Leucas aspera*	2008	1									1	1		3	15	0.10

		2009		2								2	1		5	25	0.188
		2008			4	8							3	15	30	150	1.09
8	*Mimosa Pudica*	2009		1		9							4	20	34	170	1.28
		2008	20	25	18	23	27	10	18	15	11	17	15	24	213	1065	7.79
9	Poaccae	2009	18	23	21	24	25	25	22	16	20	16	14	23	247	1235	9.33
		2008	1	3								3	4		11	55	0.40
10	*Sonchus*	2009	2	2								1	2		7	35	0.26
	Xanthium	2008			4		6		2	3	4				19	95	0.69
11	*strumarium*	2009			3		2				1				6	30	0.22
	Bougainvila	2008						20							20	100	0.73
12	*spectabilis*	2009					8								8	40	0.30
		2008											20	10	30	150	1.09
13	*Tridax procumbens*	2009											5	15	20	100	0.75
		2008			8	7	3								18	90	0.65
14	*Polyalthia longifolia*	2009			4	5	2								11	55	
15	*Alternanthera*	2008	5			3						2	5	4	19	95	0.69
	sessilis	2009	1										1	2	4	20	0.16
		2008	2	1	2	3				1	1	2			12	60	0.43
16	*Argemone mexicana*	2009				1	2	1			2				6	30	0.22
		2008								3	1				4	20	0.14
17	*Cassia tora*	2009								2	1				3	15	0.11
		2008		2	3										5	25	0.18
18	*Butea monosperma*	2009			3										3	15	0.11
		2008		1	3	1				2	2	3	1		13	65	0.47
19	*Lantena camera*	2009	6	4	5					4	5	4	2	4	34	170	1.28

	Spore type	year	January	February	March	April	May	June	July	August	September	October	November	December	Total	Total no. of spore/M3	Percentage
20	*Annona*	2008													1	5	0.03
	squamosa	2009							10						1	5	0.03
21	*Zizyphus*	2008							10	15					25	125	0.91
	Jujuba	2009							1	4					5	25	0.18
22	*Acacia*	2008			2	1	4								7	35	0.25
	nilotica	2009		1	1	3									5	25	0.18
23	*Hibiscus -*	2008				2	1			4					7	35	0.25
	rosa -sinesis	2009			3										3	15	0.10
24	*Tectona*	2008									8				8	40	0.29
	grandis	2009									10				10	50	0.36
25	Sida	2008									1	2	1		4	20	0.14
	Cordifolia	2009										1		1	2	10	0.07
26	Unidentified pollen grains	2008	2	3	4	5	7			1	3	2	4	3	34	170	1.24
		2009	1	2	2	1	4	2		3	1	1	2	1	20	100	0.75
	Total	2008	170	188	218	227	193	190	190	281	403	357	172	145	2734	13670	
		2009	148	191	224	171	160	199	189	284	406	322	146	206	2646	13230	
	Percentage	2008	621	687	797	830	7.05	6.94	6.94	10.27	14.74	13.06	6.29	5.30	99.93		
		2009	5.59	7.21	8.46	6.46	6.04	7.52	7.14	10.73	15.34	12.16	5.51	7.78	99.94		

Fig. 1 : Monthly variation of dominant pollen grains from Indoor during January 2008 – December 2008

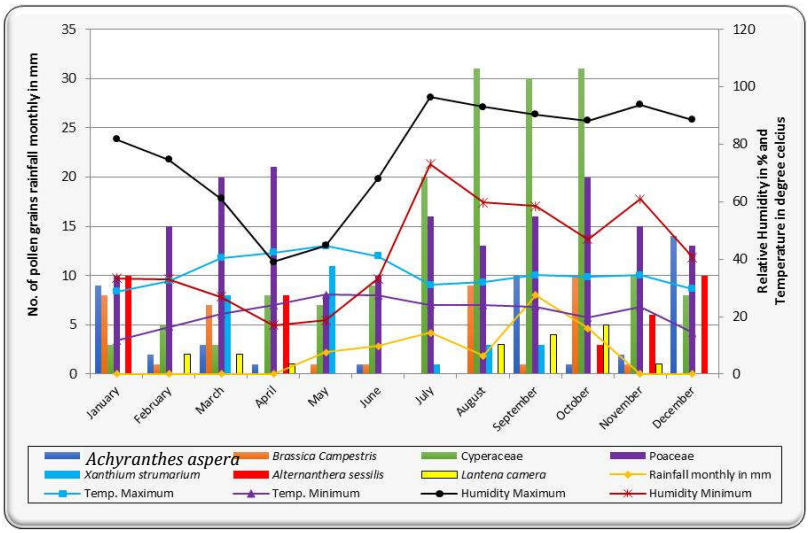


Fig. 2 : Monthly variation of dominant pollen grains from Indoor during January 2009 - December 2009

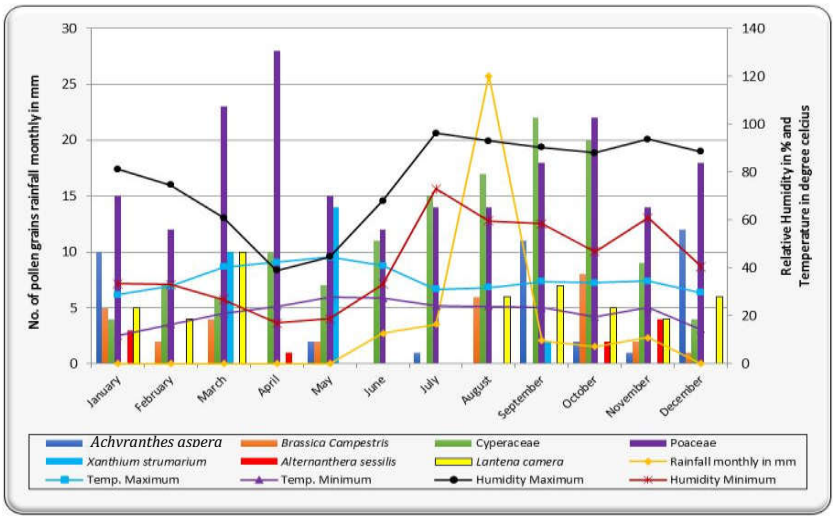


Fig. 3: Monthly variation of dominant pollen grains from Site – A* Outdoor during January 2008 - December 2008

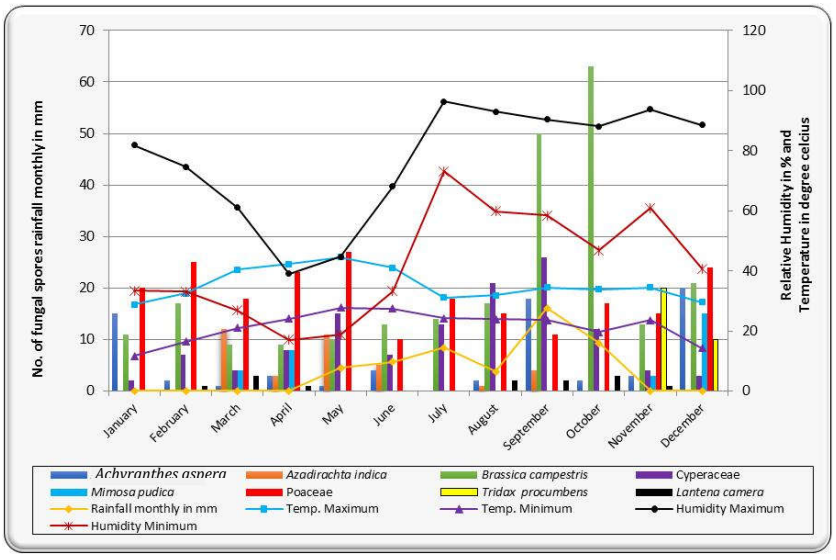
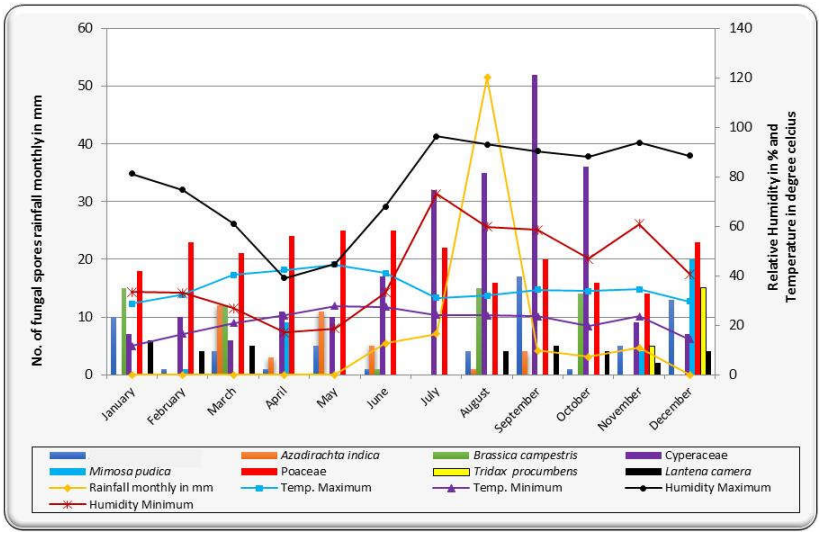
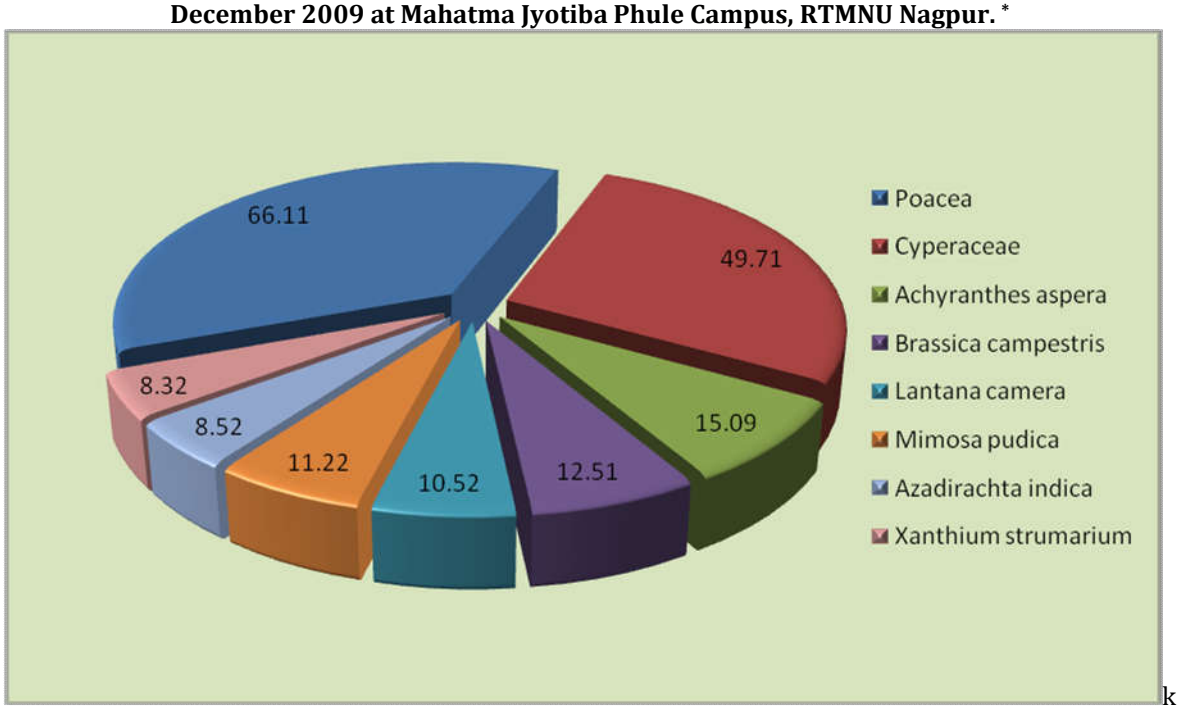


Fig. 4 : Monthly variation of dominant pollen grains from Site – A* Outdoor during January 2009 - December 2009



* - Mahatma Jyotiba Phule Campus, RTM Nagpur University

Fig. 5: Percent occurrence of dominant pollen grains from Nagpur during January 2008 to December 2009 at Mahatma Jyotiba Phule Campus, RTMNU Nagpur. *



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Habit wise Analysis of pollen contribution showed maximum percentage of herb followed by trees and shrubs . A small fraction airborne pollen flora remained unidentified. The percentage contributions are related to the pollen contribution made by the constituent species of each plant group, Herbaceous plant species belonged mainly to Amaranthaceae, Cruciferae, Cyperaceae, Labiatae, Mimosaceae, Poaceae and Asteraceae. These Families contributed the highest pollen concentration. The lower pollen contribution by tree might be due to the low frequency of occurrence and short flowering period by the plants belonging to these groups . These results are similar to those reportd by previous workers [10, 11]. The classification of pollen grains followed by maximum, moderate & minimum on the basis of percentage [12].

At this site the dominant pollen was found to be of Poaceae (66.11%) Cyperaceae (22.66%) *Lantana camera* (10.52%), *Mimosa pudica* (11.22%), *Brassica campestris* (12.51%), *Achyranthus aspera* (15.09%), *Xanthium strumarium* (8.32%) and *Azadirachta indica* (8.92%) during the years 2008-2009 by sampler method, (Fig.05). The moderate percentage at this site was found to be of *Alternanathera sessilis* (6.89%), *Zyzyphus jujube* (4.78%), *Annona squamosa* (4.17%), , *Polyalthia longifolia* (3.80%), *Tephrosia*

purpurea (3.73%), labiatae (3.56%), *Argemone Mexicana* (3.48%) and *Tectona grandis* (3.15%). The minimum percentage was found in *Sonchus* (2.78%) followed by *Evolvulus alsinoid* (2.07%), *Lucas aspera* (2.02%), *Bougainvila spectabilis* (1.91%), *Acacia nilotica* (1.54%), *Hibicus-rosa-sinersis* (1.39%), *Sida cordifolia* (0.99%), *Cassia tora* (0.85%), *Butea monosperma* (0.62%) , *Tridax procumbens* (0.43%) and unidentified pollen grains (4.81%) during the small period, (Table 1- 2) .

The significant effect of meteorological factors on pollen counts is well documented in the literature [13, 14]. In the present study, considering whole years data, no significant correlation between daily pollen counts and meteological factors were shown however, analysing daily pollen and meterogical data for each month separately indicated significant correlations.

The warm, dry season stimulates flowering in some tree taxa [15] and aids in dehiscence [16, 17] Accordingly a high total count was observed from April to July when there was an increase in temperature and decrease in relative humidity.

Many authors have concluded that the relationship between rainfall and pollen concentration is negative i.e. it washes all the Pollen from the atmosphere and simultaneously also preventing the pollen release from the plants (18). However this study have shown rainfall had very little significant correlation.

CONCLUSION

Monitoring of the pollen in the atmosphere thus provides a guide to the clinician in the diagnosis and treatment of respiratory allergy caused by pollen.

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