



Incidence of Pollen Grains at an Urban Site at Gwalior (M.P.)

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ABSTRACT : The Paper presents the data on aeropalynological survey conducted during September 2006 to August 2007 by using Burkard Portable Spore Trap Sampler at some urban sites at Gwalior (M.P.). A total of 21 pollen types were observed mainly belong to Poaceae, Amaranth-Chenopodiaceae, Simaroubaceae and Euphorbiaceae. Maximum pollen concentration was observed in the month of March ($1290/m^3$) followed by April ($1010/m^3$) and minimum in July ($170/m^3$). *Ailanthus excelsa* pollens were found in maximum number ($1700/m^3$) during the year with the maximum counts in April ($800/m^3$). Poaceae pollens were also high concentration ($750/m^3$) followed by *Delonix regia* ($360/m^3$) and least number were represented by species of *Dalbergia*, *Moringa*, and members of family Mimosaceae. The total pollens as well as individual pollen types displayed distinct seasonal periodicity in their incidence.

Key words : Aeropalynology, seasonal incidence, urban site Gwalior.

INTRODUCTION

Air is one of the basic needs required for the sustenance of life on the earth. The air is becoming polluted day by day due to various human activities such as mode of transportation, industries, biotic exploitation and rapid growth of civilization in urban areas. This implies the importance of fresh air, which apart from containing beneficial and other gases is fast becoming a repository of microorganisms as also of many toxic gases and other organic and inorganic substances. These are also responsible for atmospheric pollution which is harmful to plants, animals and mankind. This has accentuated the necessity to analyze the atmosphere on a chemical, physical and biological basis.

Aeropalynological studies have gained unique importance, as such information is an important pre-requisite to both physicians in selecting the diagnostic allergens and the patient in planning avoidance strategies. Plants produce huge amount of pollen grains. As shown by Durham (1946) the pollen grains carry allergenic and enzymic protein in the exine or intine for purpose of their own recognition, reaction and germination.

Gwalior is a historical, cultural and industrial city, where a large number of gardens exist at and around. Wild and cultivated plant species also occur in good number. A record on pollen calendar indicates the presence of a large number of pollen types in the air of city. Some clinical investigations have also indicated the prevalence of allergic disorders among the inhabitants.

MATERIAL AND METHODS

Burkard Portable Spore Trap Sampler was used for trapping the pollen grains from the air at outdoor site (Old High-court area). The sampling was done during September 2006 to August 2007 at weekly intervals. However the data have been presented in the results in compiled form i.e. monthwise. For catching pollen standard micro slides

(75 mm × 25 mm) of 0.8 mm thickness smeared with glycerine jelly were also exposed at selected site.

The standard zone of the slide was mounted by glycerine jelly and covered with a rectangular coverslip (22 mm × 50 mm). Slides were then examined for identification of airborne pollen types. Identification was done with the help of reference slides and standard manuals for pollen identification by Erdtman, G. (1952).

RESULTS AND DISCUSSION

A total of 21 pollen types were observed from September 2006 to August 2007 from the Old High-court. The pollen types mainly belonged to members of family Poaceae, Amaranth-chenopodiaceae, Simaroubaceae and Euphorbiaceae (Table : 1 and Fig. 1). Maximum pollen concentration was observed in the month of March ($1290/m^3$) followed by April ($1010/m^3$) and minimum in July ($170/m^3$) followed by December ($210/m^3$) and June ($220/m^3$). *Ailanthus* pollen type occurred in maximum number ($1700/m^3$) during the year with the maximum count in April ($800/m^3$). Poaceae pollens were also in high concentration ($750/m^3$) followed by *Delonix regia* ($360/m^3$) and least number was represented by *Dalbergia* sp., *Moringa oleifera* and members of family Mimosaceae ($40/m^3$).

Pollens of Poaceae were recorded regularly throughout the year with a maximum count in December and minimum in February. The other taxa namely *Azadirachta indica*, *Bauhinia* sp. *Cassia* sp. *Mangifera indica*, *Ricinus communis*, *Ailanthus excelsa* and *Malvaceous* types. Some of the pollen types exhibited their presence for a month only e.g. *Dalbergia* sp. and *Callistemon lanceolatus* in March; *Moringa oleifera* in November; *Myrtaceae*, *Psidium guajava* and *Putranjiva roxburghii* in February. The pollen types of *Asparagus racemosus*, *Zizyphus* for two months and *Euphorbia hirta*, and members of Malvaceae were recorded for three months only.

Table 1 : Incidence of Pollen types at site-A (Old High-Court) No/M3 (Burkard sampler) from September 2006 to August 2007.

S.No.	Pollen type	2006												2007												Total	
		Sept. 06	Oct.06	Nov. 06	Dec 06	Jan. 07	Feb. 07	Mar 07	Apr. 07	May 07	June 07	Jul. 07	Aug. 07	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
1.	<i>Ailanthus excelsa</i>	-	-	-	-	-	-	700	54.2	800	79.2	200	29.4	-	-	-	-	-	-	-	-	-	-	-	-	1700	32.62
2.	<i>Amaranth- chenopodiad</i>	40	14.8	-	-	-	-	30	2.3	-	-	80	11.7	40	18.1	40	23.5	-	-	-	-	-	-	-	-	230	4.41
3.	<i>Asparagus racemosus</i>	-	50	21.7	30	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	1.53
4.	<i>Asteraceae</i>	-	-	-	-	30	11.1	-	40	16.6	-	-	30	2.9	-	-	-	-	-	-	-	-	90	39.1	190	3.64	
5.	<i>Azadirachta indica</i>	40	14.8	-	-	-	-	80	6.2	40	3.9	40	5.8	-	-	-	-	-	-	-	-	-	-	-	-	200	3.83
6.	<i>Bauhinia sp.</i>	40	14.6	-	-	-	-	50	20.8	-	30	2.3	-	-	40	18	-	-	-	-	-	-	-	-	-	160	3.07
7.	<i>Callistemon lanceolatus</i>	-	-	-	-	-	-	50	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	6.95
8.	<i>Cassia sp.</i>	-	-	50	18.5	-	40	16.6	40	10.2	30	2.3	-	-	50	22.7	70	41.1	-	-	-	-	-	-	-	280	5.37
9.	<i>Dalbergia sp.</i>	-	-	-	-	-	-	40	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.76
10.	<i>Delonix regia</i>	-	-	-	-	-	-	80	6.2	-	-	280	41.1	-	-	-	-	-	-	-	-	-	-	-	-	360	6.90
11.	<i>Euphorbia hirta</i>	-	-	-	30	14.2	-	50	12.8	40	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120	2.30
12.	<i>Mahvaceae</i>	50	18.5	30	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	17.2	120	2.30	
13.	<i>Mangifera indica</i>	-	-	-	-	-	-	50	12.8	70	5.4	40	3.9	40	5.8	-	-	-	-	-	-	-	-	-	-	200	3.83
14.	<i>Mimosaceae</i>	-	-	40	14.8	-	-	40	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	1.53
15.	<i>Moringa oleifera</i>	-	-	40	14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.76
16.	<i>Myrtaceae</i>	-	-	-	-	-	-	40	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.76
17.	<i>Poaceae</i>	70	25.9	50	21.7	50	18.5	13061.9	60	25	30	7.6	50	3.8	70	6.9	40	5.8	60	27.2	60	35.2	80	34.5	750	14.39	
18.	<i>Psidium guajava</i>	-	-	-	-	-	-	40	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.76
19.	<i>Putranjiva roxburghii</i>	-	-	-	-	-	-	40	3.1	-	-	40	3.1	-	-	-	-	-	-	-	-	-	-	-	-	40	0.76
20.	<i>Ricinus communis</i>	-	-	-	-	-	30	12.5	50	12.8	40	3.1	30	2.9	-	-	-	-	-	-	-	-	-	-	-	150	2.87
21.	<i>Zyzyphus sp.</i>	-	50	21.7	-	-	-	30	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	1.53
Unidentified		30	11.1	50	23.8	20	8.3	20	5.1	10	0.7	-	-	-	30	13.6	-	-	20	8.6	-	-	20	8.6	260	4.99	
Grand Total		270	230	270	210	240	460	4.03	390	7.48	1290	1010	680	-	220	4.22	170	3.26	230	4.41	170	3.26	230	4.41	5210		
%		5.18	4.41	5.18	4.03	4.60	4.60	4.03	7.48	24.76	19.38	13.05	-	4.22	3.26	4.41	3.26	4.41	4.41	4.41	3.26	4.41	4.41	4.41	5210		

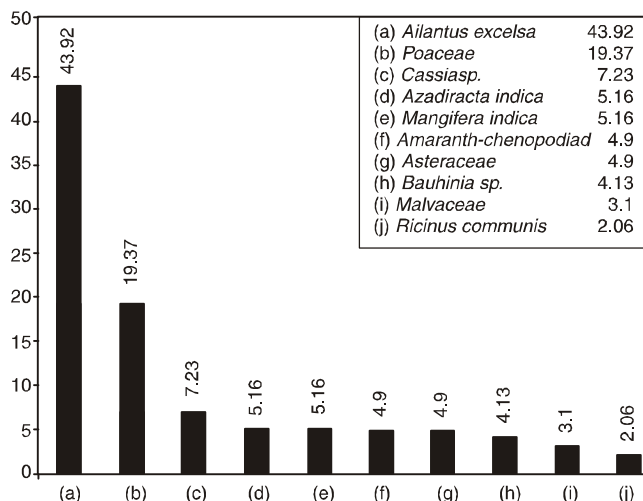


Fig. 1. Ten dominant pollen taxa at site-A (Old High Court) during study period.

Different types of bioparticles present in the air mainly happen to be directly concerned with the occurrence of flora and fauna of the particular locality. It is an established fact that the difference in the composition of the local vegetation and ecological conditions made variation in the composition of trapped pollen by Avasthi and Agashe; (1997), Mishra; et.al. (2002) and Pandey; *et al.*, (2006)

Aerobiological studies at Gwalior have shown presence of different types of biocomponents in the atmosphere. Various types of biocomponents have been reported from Gwalior by Datta (1993) Jain; *et al.*, (1981, 1992, 1999), Jain and Mishra (1988).

A perusal of the Table-1 indicates that during the study period a total of 5210 pollen were observed with a maximum concentration in the month of March followed by April and May.

This could be synchronized with the flowering periods of respective species. The pollens of *Ailanthus excelsa* were found in maximum number because these plants are growing abundantly in and around Gwalior. As most of the species of *Poaceae* predominantly bloom just after rainy season and before winter season this taxa provided maximum pollens during this period.

Observations from other places [Prabhudesai and Bhat; (2009) and Nilakshree and Sharma; (2007)] also indicated the prevalence of such pollen types in the air. It seems that smooth exine and light weight of *poaceae* pollen help them in spreading even from far off places. The other dominant pollen types observed during this year belonged to species of *Delonix*, *Cassia*, *Amaranth-Chenopodiad*, *Mangifera* and *Azadiracta*. All these plants are abundantly growing in the vicinity. A good number of *Asteraceae* pollens were also observed at this site because their plants have encroached almost all corners of the city. From various other places also its pollen have been recorded from the air (Seetharamaiah *et al.*, (1981), Gupta *et al.*, (1986), Ahlawat *et al.* (2010) and Oommachan, *et al.* (1996).

Maximum pollen numbers were recorded in the month of March and April because most of the trees and shrubs have maximum flowering during these months. Similarly minimum pollen load was recorded in June and July. Although most of the herbs, shrubs and other weeds bear flowers during this season but due to the rains most of the pollen get washed off from their sources and the chances of pollen dispersal in air get reduced.

It can be concluded that the local vegetation has direct impact on concentration and composition of atmospheric pollen flora. It is therefore essential, that aerobiological survey of an area is conducted continuously over the years. Pollen calendars are compiled and updated at regular intervals. The present study provides current status of air borne pollen flora at Gwalior city.

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