

## SEASONAL AIRBORNE POLLEN SCENARIO AT EXTRAMURAL SITE (KAMPOO) AT GWALIOR (M.P.)

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### ABSTRACT

Aeropalynological survey was conducted for two years, between September 2006 to August 2008 by using Burkard portable spore trap. A total of 35 pollen types were identified. The pollen grains belonged to 26 angiospermic families (24 Dicotyledons and 2 Monocotyledons). Dicotyledons taxa contributed maximum number of pollen grains as compared to monocotyledons. A comparative account of two years observation indicate that pollen of Poaceae ranked first followed by Asteraceae, Mimosaceae and *Cassia* type. Maximum pollens type were trapped during winter season followed by summer, autumn and rainy seasons.

*Key words* : Aeropalynology, seasonal periodicity, Gwalior

### Introduction

Occurrence of pollen grains, fungal spores and several other bio components in the atmosphere has a direct relationship with climatic factors and susceptible human beings. Continuous sampling of airborne particles during all weathers is necessary for combating various allergic ailments (Mandal, 2006, 2008). Regular sampling of airborne pollen at and around Gwalior was initiated by Jain and Datta (1992). The present investigation, a seasonal study was made on volumetric sampling.

Aerobiological survey made in different parts of India revealed that composition and concentration of air pollen flora changes according to climate, vegetational and geographical factors (Spikshma, 1995, Njokuocha, 2006, and Prabhudesai,

2009). Atmospheric temperature is probably the most important environment variable for pollen release (Singh, 1988, and Ahlawat, 2010). Various types of air biocomponents have been reported from Gwalior (Jain, 1981, 1999, Mishra, 1988 and Datta, 1993), Pune (Tripathi; 2009) and other places.

### Material and Methods

The present work was carried out at one extramural site (Kampoo) at Gwalior (M.P.) The observations were made from 1.9.2006 to 31.8.2008.

The “**Burkard portable spore trap**” sampler was used for trapping the pollen grains from the air. Sampling was made for two consecutive years at weekly intervals, sampling was done at human height for 10 minutes. Pollen identification

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was made with the help of reference slides and authentic literature. Beside this, Pollen atlases available on internet and published literature were also consulted, Erdtman, (1952), Walker, (1976). Reference slides were prepared by Acetolysis method (Erdtman, 1960).

The pollen count were expressed in number of pollen per cubic metre of air samples. The conversion factor of Burkard spore trap sampler is 10. For Burkard sampler the conversion formula is -

$$\frac{\text{Total number pollen in one exposure}}{\text{Total volume of air sampled}} \times 1000$$

$$\% \text{ Contribution} = \frac{\text{Total count of a pollen type over one month/one year/two years}}{\text{Total pollen count over one month/one year/two years}} \times 100$$

The sampling site is an extramural site and situated towards south-west direction of Gwalior city. This locality consists of small hills towards south and plains towards other directions. Surrounding hills consist of dry deciduous type of vegetation while the plains have crop fields, orchards and other areas with dense vegetation. Vehicular pollution can also be seen in this site due to private bus stand and passing of roads.

### Result

A Total of 35 pollen types were recorded during the study period. 21 pollen types were recorded during first year while 34 types during second year.

A comparative account of two years observations (Table-3) indicates that grass pollen exhibited maximum concentration (14.85%) followed by Asteraceae, Mimosaceae and *Cassia*

type. The concentration of Amaranth-chenopodiad, *Azadirachta indica*, *Lagerstroemia indica*, *Bauhinia sp.*, *Ailanthus excelsa*, *Morus alba* and *Polyalthia longifolia* contributed between 6-1% in decreasing order. These taxa were found during both years. *Casuarina equisetifolia*, *Clerodendron inermae* and *Zizyphus sp.* were also observed during both years (less than 1%).

Species of *Callistemon*, *Calotropis*, Convolvulaceae, *Croton*, *Dalbergia*, *Eucalyptus* and some other taxa contributed less than 1% and could be observed only during first year. Similarly species of *Brassica* and *Asparagus* were recorded during second year only.

Out of the total pollen types recorded from selected sites, 18 were found to be common.

Winter season (Tables-1 and 2) was predominated by Asteraceae (4.76%) and poaceae (4.49%) followed by Mimosacene, *Ailanthus excelsa*, and *Cassia sp.*

During summer season the pollen of *Azadirachta indica* alone contributed (4.59%). Other pollen contributors belonged to Poaceae, Asteraceae, *Cassia sp.* and Amaranth - Chenopodiad. Rainy season was represented by pollen of Poaceae (3.63%) which was the highest recorded followed by Asteraceae and Malvaceae. In the autumn season the pollen of Mimosaceae (6.34%) exhibited maximum occurrence followed by Asteraceae, *Cassia sp.*, Poaceae, Malvaceae, *Bauhinia* and others.

### Discussion

Observations indicate that the air of Gwalior comprises a good amount of pollen types representing various taxa. Poaceae,

TABLE — 1 INCIDENCE OF POLLEN TYPES AT THE SITE NO/M<sup>3</sup> (01.09.2006 TO 3.08.2007)

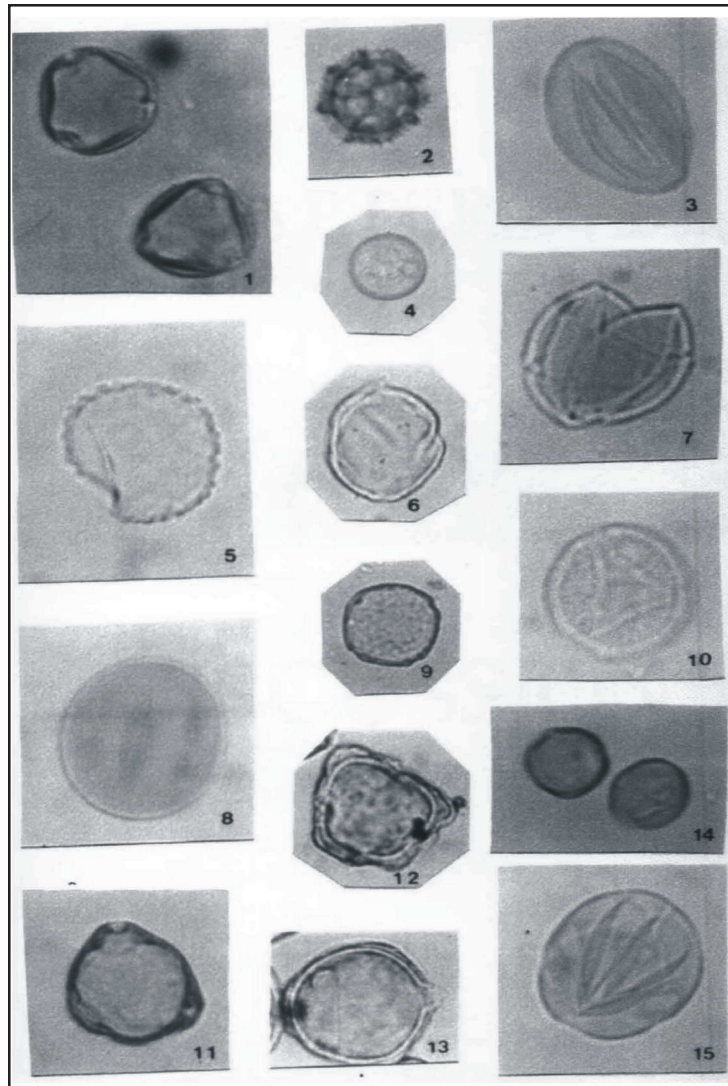
S. No.	Pollen type	2006								2007								Total									
		Sept.06		Oct.06		Nov.06		Dec.06		Jan.07		Feb.07		Mar.07		Apr.07		May.07		Jun.07		Jul.07		Aug.07		No.	%
1	<i>Ailanthus excelsa</i>	-	-	-	-	-	-	-	-	-	40	5.7	80	19	-	-	-	-	-	-	-	-	-	-	-	120	1.97
2	<i>Amaranth -chenopodiad</i>	50	15.1	40	10	40	6.4	-	-	-	-	-	90	21.4	50	13.5	-	-	30	18.7	30	14.2	-	-	-	330	5.42
3	<i>Asparagus racemosus</i>	80	24.2	-	-	-	-	30	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	1.8
4	<i>Asteraceae</i>	-	-	200	50	170	27.4	50	5.2	270	20.3	40	5.7	-	-	-	-	-	-	-	40	19	30	18.7	800	13.15	
5	<i>Azadirachta indica</i>	-	-	-	-	-	-	-	-	-	-	-	-	90	24.3	340	80.9	-	-	-	-	-	-	-	-	430	7.07
6	<i>Bauhinia sp.</i>	-	-	-	-	170	27.4	80	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250	4.11
7	<i>Brassica compestris</i>	-	-	-	-	-	-	-	-	-	40	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.65
8	<i>Cassia sp.</i>	-	-	-	-	40	6.4	280	29.1	160	12	-	-	-	-	40	9.5	50	31.2	30	14.2	-	-	-	600	9.86	
9	<i>Casuarina equisetifolia</i>	-	-	-	-	-	-	-	-	-	40	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.65
10	<i>Clerodendron inermae</i>	-	-	-	-	-	-	-	-	-	40	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.65
11	<i>Delonix regia</i>	-	-	-	-	-	-	-	-	-	50	7.1	-	-	40	10.8	-	-	-	-	-	-	-	-	-	90	1.48
12	<i>Holoptelia sp.</i>	-	-	-	-	-	-	-	-	-	20	2.8	90	21.4	50	13.5	-	-	-	-	-	-	-	-	-	160	2.63
13	<i>Lagerstroemia indica</i>	-	-	-	-	-	-	-	-	90	6.71	180	25.7	-	-	-	-	-	-	-	-	-	-	-	-	270	2.44
14	<i>Malvaceae</i>	40	12.1	-	-	80	12.8	160	16.6	170	12.7	-	-	-	-	-	-	-	-	-	20	9.5	30	18.7	500	8.22	
15	<i>Mimosaceae</i>	-	-	80	20	80	12.8	280	29.1	360	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	13.15
16	<i>Morus alba</i>	-	-	-	-	-	-	-	-	40	3	50	7.1	30	7.1	-	-	-	-	-	-	-	-	-	-	120	1.97
17	<i>Poaceae</i>	120	36.3	40	10	40	0.4	40	4.1	80	6	90	12.8	80	19	140	37.8	40	9.5	80	50	8	38	80	50	910	14.96
18	<i>Polyalthia longefolia</i>	-	-	-	-	-	-	20	2	70	5.2	50	7.1	10	2.3	-	-	-	-	-	-	-	-	-	-	150	2.46
19	<i>Tamarindus indica</i>	-	-	-	-	-	-	-	-	20	1.5	20	2.8	40	9.5	-	-	-	-	-	-	-	-	-	-	80	1.31
20	<i>Zizyphus sp.</i>	-	-	-	-	-	-	20	2	30	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	0.82
	Unidentified	40	12.1	40	10	-	-	-	-	40	3	40	5.7	-	-	-	-	-	-	-	10	4.7	20	12.5	190	3.12	
	<b>Grand Total</b>	<b>330</b>	<b>5.42</b>	<b>400</b>	<b>6.57</b>	<b>620</b>	<b>10.19</b>	<b>960</b>	<b>15.78</b>	<b>1330</b>	<b>21.87</b>	<b>700</b>	<b>11.51</b>	<b>420</b>	<b>6.9</b>	<b>370</b>	<b>6.08</b>	<b>420</b>	<b>6.9</b>	<b>160</b>	<b>2.63</b>	<b>210</b>	<b>3.45</b>	<b>160</b>	<b>2.63</b>	<b>6080</b>	

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TABLE — 3 COMPARATIVE ACCOUNT OF POLLEN TYPES IN THE AIR DURING THE STUDY PERIOD

S.No.	Pollen types			Average % of both years
		I year %	II year %	
1	<i>Ailanthus excelsa</i>	2.03	4.13	3.08
2	<i>Amaranth-Chenopodiad</i>	5.06	6.2	5.9
3	<i>Argemne mexicana</i>	-	2.22	1.11
4	<i>Asparagus racemosus</i>	1.86	-	0.93
5	<i>Asteraceae</i>	13.58	15.42	14.5
6	<i>Azadirachta Indica</i>	7.3	3.49	8.59
7	<i>Bauhinia sp.</i>	4.24	3.17	3.7
8	<i>Brassica compestris</i>	0.67	-	0.33
9	<i>Callistemon lanceolatus</i>	-	1.9	0.95
10	<i>Calotropis sp.</i>	-	0.31	0.15
11	<i>Cassia sp.</i>	10.18	7.79	8.98
12	<i>Casuarina equisetifolia</i>	0.67	0.79	0.73
13	<i>Clerodendron inerme</i>	0.67	1.11	0.839
14	<i>Convolvulus sp.</i>	-	1.58	0.79
15	<i>Croton sp.</i>	-	0.47	0.23
16	<i>Dalbergia sp.</i>	-	0.79	0.39
17	<i>Delonix regia</i>	1.52	0.63	1.07
18	<i>Eucalyptus sp.</i>	-	1.27	0.63
19	<i>Holoptelea sp.</i>	2.71	0.95	1.83
20	<i>Lagerstroemia indica</i>	4.58	3.97	4.27
21	<i>Lantana camara</i>	-	0.47	0.23
22	<i>Lawsonia inermis</i>	-	1.43	0.71
23	<i>liliaceae</i>	-	0.79	0.39
24	<i>Malvaceae</i>	8.48	3.97	6.22
25	<i>Mangifera indica</i>	-	3.02	1.51
26	<i>Mimosaceae</i>	13.58	6.67	10.12
27	<i>Meringa oleifera</i>	-	1.9	0.95
28	<i>Morus alba</i>	2.03	3.49	2.76
29	<i>Peltophorum pterocarpum</i>	-	0.95	0.47
30	<i>Poaceae</i>	14.44	15.26	14.85
31	<i>Plyalthia longifolia</i>	2.54	1.27	1.9
32	<i>Qulsqualis indica</i>	-	0.67	0.33
33	<i>Ricinus communis</i>	-	2.54	1.27
34	<i>Tamarindus Indica</i>	1.35	0.79	1.07
35	<i>Zizyphus sp.</i>	0.84	0.47	0.65



1. *Ailanthus excelsa* 2. *Vernonia cineria* 3. *Cassia siamea* (equatorial view)  
 4. Poaceae pollen 5. *Dichrestachis cineria* 6. *Pongamia pinnata* 7. *Ricinus communis*  
 8. *Moringa oleifera* (equatorial view) 9. *Mangifera indica* 10. *Tamarindus indica*  
 11. *Casuarina equisetifolia* 12. *Lagerstroemia* sp. (Lythraceae)  
 13. *Lagerstroemia* sp. (Lythraceae) 14. *Dalbergia sissoo* 15. *Quisqualis indica*

**Plate -- Some identified airborne Pollen grains**

Asteraceae, Mimosaceae, *Cassia sp.*, Malvaceae and Amaranth - Chenopodiad were found to be dominant taxa because all these plants are abundantly growing at this site. Pollen of *Holoptelia*, *Lawsonia*, and *Tamarindus sp.* were recorded during II year only (Table-2). A large number of *Holoptelia* and *Tamarindus* trees are growing in the vicinity of hospital, college and school, situated at this site. Pollen types belonging to the Species of *Argemone*, *Callistemone*, *Calotropis*, *Croton*, *Dalbergia*, *Eucalyptus*, *Mangifera*, *Moringa*, *Quisqualis*, *Ricinus* and others were recorded during II year only and not during first year observation.

Pollen of *Croton*, *Convolvulus*, *Quisqualis*, *Zizyphus*, *Millingtonia* and *Parkinsonia sp.* were represented only for one to two months. The short duration of flowering and entomophilous mode of pollination of many such taxa could be the factors for this condition.

The contribution of Mimosaceae was maximum (Table - 1 and 2) during

Autumn season followed by winter. This is because many representatives of these taxa remain in flowering stage for a longer period.

During rainy season the occurrence of pollen was very low. The data indicates that maximum pollen types exhibited their presence during summer and winter seasons. These seasons exhibited maximum presence of tree and shrubs pollen. This is because of flowering of these taxa during summer season. During rainy season the pollen types mainly belong to herbaceous taxa with less presence in the air. Rain fall and high-humidity become the main obstacles in way of dispersal .

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