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A PRELIMINARY SURVEY OF POLLENS IN THE ATMOSPHERE OF KHAPARKHEDA DIST. NAGPUR (M.S.) INDIA

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ABSTRACT

Atmosphere is composed of both biotic and abiotic components. Among biotic components pollen and fungal spores contribute major amount of aerospora. Release of such components in the environment is depends upon seasonal variation. Present study deals with the study of concentration of pollens present in the atmosphere. Pollen represent the smallest reproductive structure produce in the anthers and at maturity transferred to female part by wind, water, insect, birds etc. The pollen samples were collected from two different sampling location sites (New Bhanegao and Chicholi) Khaparkheda, Nagpur district, Nagpur during January2013 to December 2013. A total of 10313 pollens were trapped during the collection of samples. Total 29 pollen types were identified. The major contributor to the pollen was Poaceae (23.59 %), Amaranthaceae (15.55 %), Parthenium hysterophorus (13.29 %), Carica papaya (8.03 %), Butea monosperma (6.39 %) and Boerhaavia diffusa (5.50 %). Two major pollen seasons were recognized, i.e., January to April and August to October, although pollen was recorded in varying concentrations all over the year. Variations were observed, with higher pollen count at the site having dense vegetation. This study gives the general idea of pollen morphology and range of various plant species found in both the sapling sites of Khaparkheda. It will be helpful for palynologist and local allergologists for effective diagnosis and treatment of allergic patients.

INTRODUCTION

Erdtman (1952) coined the term" Aeropalynology" to cover the study of airborne pollen, its variation with seasons, time and place both at or near ground level and in air, associated with plant material. Pollen grains found in the air of a geographical area were widely known to be cause of various allergic complaints like hay-fever, asthma and urticaria (Mandal and Chanda 1979). The research has shown that most hayfever is caused by wind-transported pollen, although not all such plants cause hay fever (Boral, 2004; Bricchi, 1992; Faegri and vander, 1996). Cultivated plants with showy flowers are entomophilous and do not cause pollen allergies (Marquez *et al.,* 2002). Efforts to maintain a stable and tolerable climate has made it essential to find climatically sensitive easily monitored biological indicators that respond to climate change (Adekanmbi and Ogundipe, 2010). Flower blooming and pollination are linked to temperature and wind (Gioulekas *et al.,* 2004; Erkara, 2008). Airborne pollen grains monitoring has become an essential field for the medical community (Levetin *et al.,* 2000; Weryszko-Chmielewska *et al.,* 2001) as pollen calendars are proved to be serve as a supportive tool to take such steps which would help in prevention of allergies (Green *et al.,* 2002). The airborne pollen grains data are also useful by numerous botanists, ecologist and taxonomist for other purposes. The concentration of airborne pollen grains varies not only from place to place, but also within the same area due to both environmental and anthropogenic reasons (Roopashree *et al.,* 2014**)**. In order to identify the dominant pollens, an aeropalynological survey has been conducted in the khapakheda area which would probably the first attempt in this area.

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MATERIAL AND METHODS

Study area: Khaparkheda is a medium size village located in Kamptee of Nagpur district, Maharashtra. Near to the village thermal power station is present it is one of the coal base power plant due to which pollution is at peak every time.

Sampling site: Aeropalynological survey was carried out at Khaparkhea, Dist. Nagpur, for a period of one year from January 2013 to December 2013.

Table 1. Pollens identified from atmosphere of Khapakheda

Sr. No.	Species	Family	Flowering Season
1.	*Acacia nilotica* L.	Fabaceae	Aug – Oct
2.	Amaranthaceae	Amaranthaceae	Throughout the year
3.	*Argemone mexicana* L.	Papaveraceae	Throughout the year
4.	*Azadirachta indica* A. Juss	Meliaceae	March-May
5.	*Boerhavia diffusa* L.	Nyctaginaceae	Throughout the year
6.	*Butea monosperma* Lamk.	Fabaceae	March-Jun
7.	*Canna indica L.*	Cannaceae	Throughout the year
8.	*Carica papaya* L.	Caricaceae	Throughout the year
9.	*Cassia fistula* L.	Caesalpiniaceae	July-Oct
10.	*Cassia tora* L.	Caesalpiniaceae	Aug-Oct
11.	*Casuarina equisetifolia* L.	Casuarinaceae	Jan-May
12.	*Cyperus* sp.	Cyperaceae	Throughout the year
13.	*Dalbergia sissoo* Roxb.	Fabaceae	Feb-May
14.	*Delonix regia (Hook.)* Raf.	Fabaceae	March-July
15.	*Emblica officinalis* Gaertn.	Euphorbiaceae	March–April
16.	*Eucalyptus Sp.*	Myrtaceae	Oct-Jan
17.	*Lagerstroemia indica* L.	Lythraceace	May-Aug
18.	*Lantana camara* L.	Verbenaceae	Throughout the year
19.	*Mangifera indica* L.	Anacardiaceae	February-April
20.	*Mimosa pudica* L.	Fabaceae	Throughout the year
21.	*Morus alba* L.	Moraceae	Jan-March
22.	*Parthenium hysterophorus* L.	Compositae	Throughout the year
23.	*Peltophorum pterocarpum* (DC.) Baker ex Heyne	Fabaceae	Jun-oct
24.	*Poaceae*	Poaceae	Throughout the year
25.	*Ricinus communis* L.	Euphorbiaceae	Nov- Apr
26.	*Tamarandus indica* L.	Fabaceae	July-Sept
27.	*Tridax procumbens* L.	Asteraceae	Throughout the year
28.	*Vitex negundo* L.	Verbenaceae	July-Oct
29.	*Ziziphus mauritiana* Lamk.	Rhamnaceae	Oct-Jan

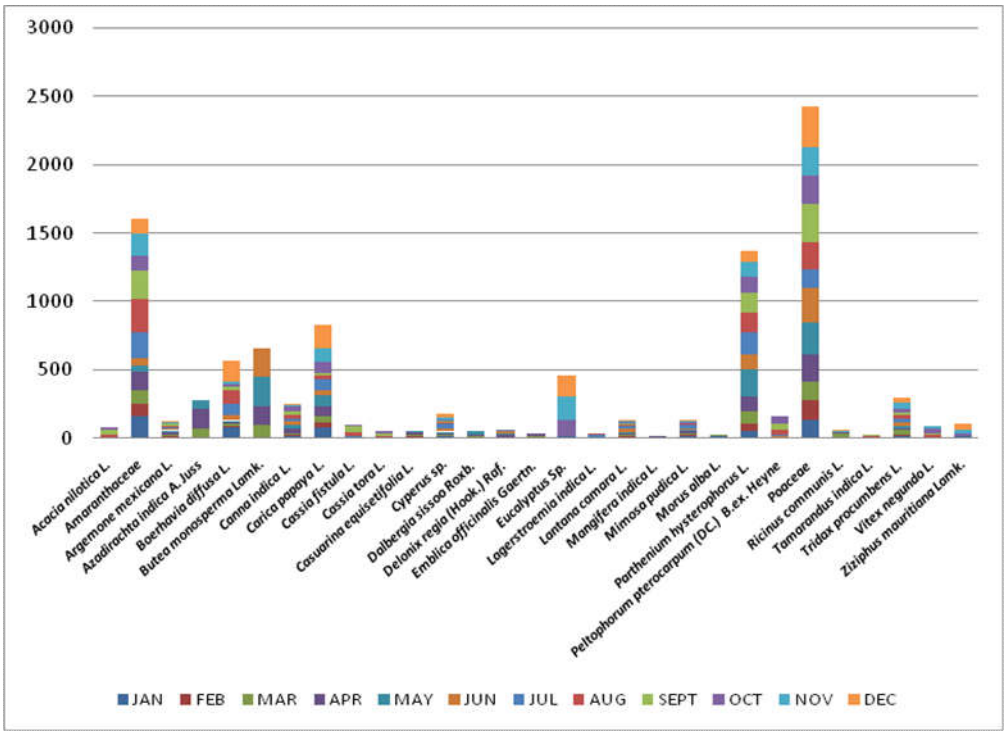

Fig. 1. Pollen calender of khaparkheda, Nagpur 2013

Samples were collected daily from two different sites of Khaparkheda viz, New Bhanegao and Chicholi.

Sampling method: A standard 75 x 25mm slide was smeared with glycerine jelly leaving only 7mm x 22mm for labelling. Slide was exposed at each site and was removed after 24 hours and a new slide was placed. After exposing the coated slide for 24 hours the tape was carefully removed and placed on the glass slides and mounted in glycerin jelly for microscopic observations. Identification of pollens was done with the help of standard literature and reference slides.

Observations

A total of 29 pollen types were trapped during one year of investigation. Depending on their morphological features they were identified up to family, genus or species level (Table 1). Some pollen of families like Amaranthaceae and Poaceae could not be identified up to generic level. A total of 10313 pollens were trapped during the collection of samples. Total 30 pollen types were identified. The major contributor to the pollen was Poaceae (23.59 %), Amaranthaceae (15.55 %), Parthenium hysterophorus (13.29 %), Carica papaya

(8.03 %), *Butea monosperma* (6.39 %) and Boerhaavia diffusa (5.50 %). Oomachand et al.,(1996) identified 44 pollen types with maximum concentrationwas of Asteraceae and minimum of Liliaceae, Solanaceae and Papavaracae. During present investigation two major pollen seasons were recognized, *i.e.,* January to April and August to October, although pollen was recorded in varying concentrations all over the year. Variations were observed, with higher pollen count at the site having dense vegetation. During the aeropalynological study, out of 29 pollen types identified 10 were herb pollen, 5 shrub pollen and 15 were tree pollen which belonged to Anemophilous, Entomophilous or Amphiphiolous plants. The tree pollen contributed in highest percentage (51.72%) followed by herb pollen (34.48%) and shrub pollen (13.79%). During the study, pre-monsoon recorded highest pollen catch, followed by monsoon and post-monsoon. The present data reveal that the pollen grains present in air correlate with the flowering period of the local flora. The pollen grains of weeds and grasses were consistently found throughout the year (fig 1). Pollen calendars have great significance in pollen allergy as they serve as important guidelines to allergy practitioners with respect to the onset of allergenically significant pollen season, their peak and decline in the atmosphere. In this context a pollen calendar serves as a bridge between aerobiologists and allergists, as both are dependent on each other and get equally benefited (Roopashree *et al.,* 2014). In khaparkheda Poaceae, Asteraceae, Amaranthaceae, Lecithidaceae, and Fabaceae are important families from which dominant pollen are contributing to the pollen concentration in the atmosphere. The present data revealed that the occurrence of pollens in the environment is depends upon the flowering period of the particular area. The present study is the first attempt in this area. The present data which will definitely provides useful information of the offending pollen which subsequently helps the clinician to treat the allergic patient in more systematic manner. Such studies are necessary from time to time for getting information about the pollen allergens present in particular locality.

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