

## A SURVEY OF AERO-ALLERGENIC POLLEN AND SPORES IN THE RURAL ATMOSPHERE OF MEERUT

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Aerobiological studies have been proved significant because of the hazards of the atmospheric biopollutants, responsible for various human allergic disorders such as bronchial asthma, allergic rhinitis, nasobronchial allergy, contact dermatitis *etc.* Several air borne pollen grains and fungal spores are known to cause allergies in human beings. The present paper is an attempt to deal with pollen grains and fungal spores found to occur in a rural atmosphere of village. Teharki in Tehsil Sardhana of District Meerut (U.P.). This village lies at a distance of about 22 Km. west to the Meerut City.

In India Cunningham (1873) observed for the first time microbiological materials in the air at Calcutta. After several decades of findings made by him, Mehta (1933) recorded fungal spores from the air on adhesive coated cellophane slips attached to kites at Agra. Later a medical scientist group, Kalra and Wanchoo (1958), Kasliwal *et al.* (1959) made aerobiological investigations with particular references to allergy from Pune and Jaipur respectively. Gaur (1978, 1980) carried out aerobiological investigation of the Meerut region. Gaur and Kasana (1984) conducted aerobiological investigations of Modinagar. They observed that the aerospora of Modinagar industrial site was comparatively low in quality and quantity than earlier studies from the rural areas and adjacent Meerut.

The latter part of the present century has witnessed significant advances made in aerobiological studies both in relation to human allergy and plant pathogenicity (Nair 1986, Shivpuri 1982, Singh 1983, Tilak 1987-88, 1990-91, Sathes *et al.*, 1993).

### MATERIALS AND METHODS

The microslides coated with stained adhesive glycerine jelly were exposed daily in an aeroscope at a height of approximately 6 metres above the ground level. The aeroscope fabricated by Lakhanpal and Nair

(1958) has been used. When installed the open end of aeroscope faces the wind currents and thereby enables the direct impact of microslides leading to efficient catch. By means of smoke test, it has been established at Raipur Centre (Nair 1986) that the slanting position of slide is superior to horizontal or vertical in efficiency. The slides were changed after every 24 hours. The 10 cm<sup>2</sup> area of the slide covered by a cover glass of 25 x 50 mm was studied and total annual count was made.

For supplementing the data on aero-mycological survey petriplates were exposed at different hours for 4-5 minutes containing potato dextrose agar medium. The spore type have been identified with the help of reference slides and available literature (Barnett and Hunter 1972).

### RESULTS AND DISCUSSION

In total 21 pollen and 12 fungal aero-allergenic taxa have been observed. The total annual count and percentage occurrence of various aero-allergenic pollen and fungal taxa is as follows :

*Pollen Types* : Figure 1 shows monthly occurrence and percentage occurrence of pollen grains. Amongst the pollen types the family Poaceae contributed the maximum number of pollen grains 34.53% and was present round the year with its peak in the month of October (216) while the least number was recorded in the month of December (48).

*Euphorbia* contributed least number of pollen grains (0.19%), showing its peak in the month of April. Mainly two pollen seasons can be outlined, one from February to May and second from September to November. The first season contributed higher number of pollen grains than the second one. Other taxa which contributed good number of pollen grains in the atmosphere were *Amaranthus* (9.33%), *Azadirachta* (5.83%),

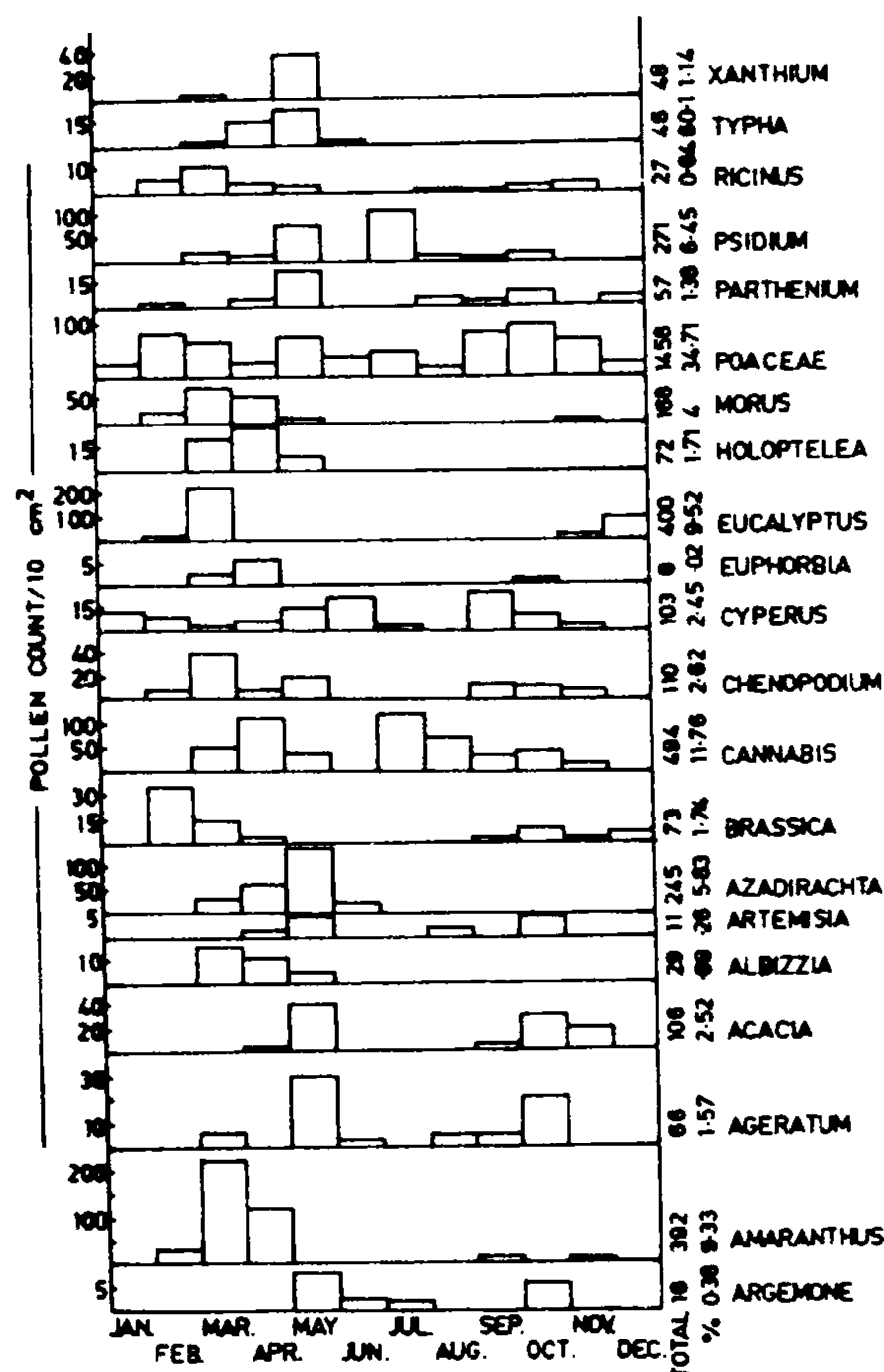


Figure 1. Monthly occurrence of Pollen [1990]

*Cannabis* (11.76%), *Eucalyptus* (9.52%), *Morus* (4.0%), *Psidium* (6.45%) and others which showed low frequency were *Argemone* (0.38%), *Albizzia* (0.69%), *Artemisia* (0.26%), *Ricinus* (0.64%) and *Typha* (1.09%).

**Fungal Taxa :** An aerobiological survey carried out for the year 1990 in the rural atmosphere of district Meerut has shown that pollen grains and fungal spores including algal filaments form the major part of the aerial biomass.

Figure 2 shows the monthly occurrence and percentage of fungal spores in the atmosphere. *Cladosporium* is most dominant air-borne allergenic fungal spore and occurs round the year. *Aspergillus* though contributed good number of spores (25.24%) but occurred mainly in the rainy season and the number of spores were maximum in the month of July (2604). *Cladosporium* contributed 37.79% with it's peak in February and minimum in July, while *Alternaria* showed

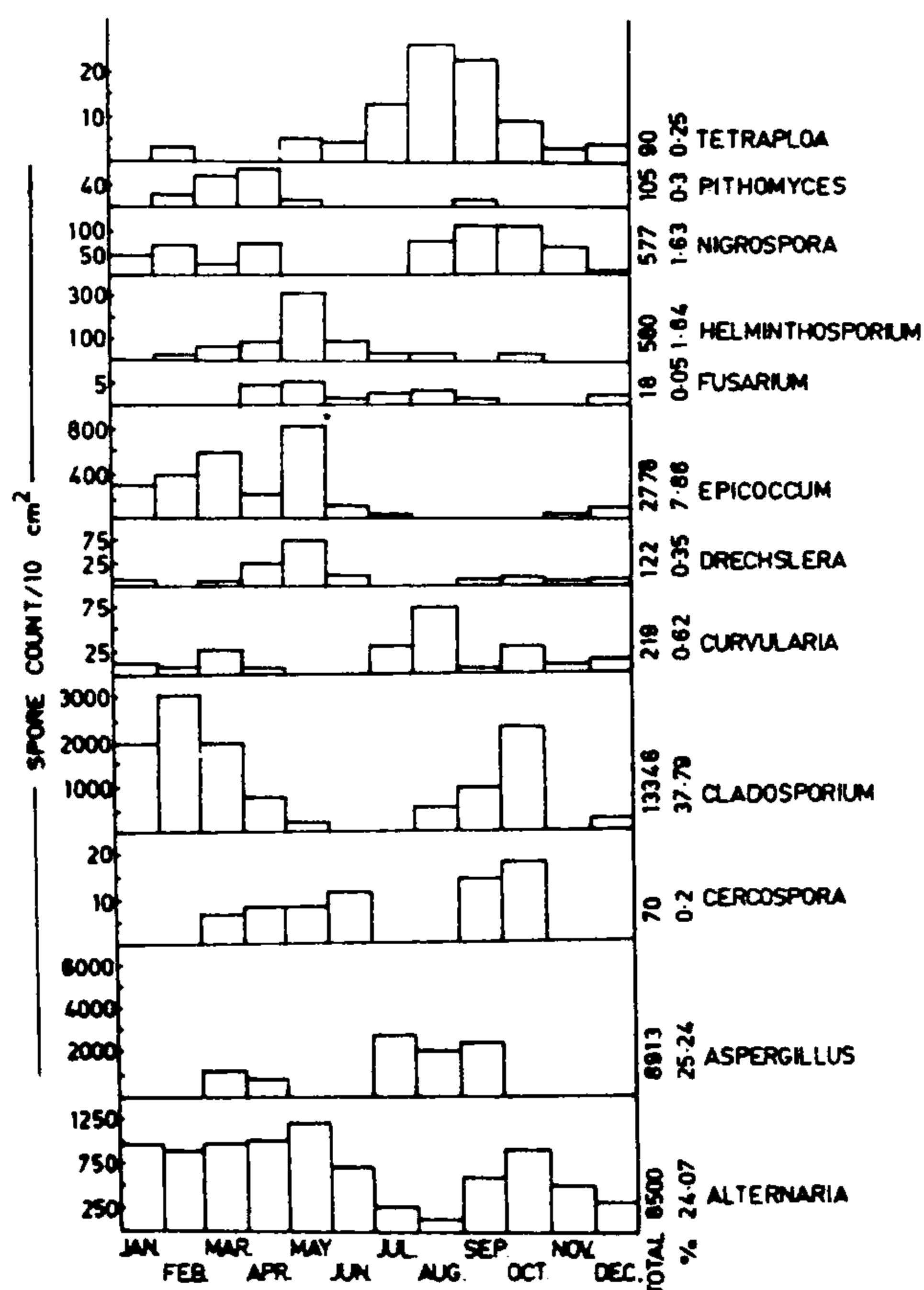


Figure 2. Monthly occurrence of Fungal spores [1990]

24.07%, with it's peak in May and minimum in the month of August. Other fungal taxon which occurred round year is *Epicoccum* (7.86%). The least number of spores were contributed by *Fusarium* (0.05%) with it's peak in the month of October. Others which contributed low number are *Tetraploa* (0.25%), *Pithomyces* (0.3%), *Cercospora* (0.2%) and *Drechslera* (0.35%).

On the basis of monthly occurrence of allergenic pollen grains and fungal spores it is observed that there are 3 major seasons namely the spring (February-April), the summer-rainy (May-August) and autumn-winter (October-January). For pollen, occurrence of these summer rainy months (May-August) are lean period and so also are November-January. It may be mentioned that all aero-allergenic taxa have been found to occur in air during spring season (February to April) which closely coincides with the flowering period of these taxa on the ground. The taxa *Azadirachta*, *Eucalyptus* are entomophilous but their higher fre-

quency and lower duration may be attributed to the fact that these are avenue trees and found growing on road sides, gardens etc. There fore, during their flowering time pollen dropping occurs in the atmosphere due to strong air currents. On the basis of monthly frequency of fungal spores also, it is observed that there are 3 major seasons namely spring-summer (March-June), rainy (July-October) and winter (November-February). During September-October comparatively higher frequency of spores have been recorded followed by February-May. The lowest number of spore counts have been recorded during November-January. The total aero-allergenic fungal spores show higher incidence during rainy and summer seasons while minimum in winter season which may be attributed perhaps to the fact that moderately high temperature coupled with increasing wind velocity favours the presence of air borne inoculum.

The studies of the rural area showed that the aerospora was richer as compared to the city. It is evidenced by, the earlier studies made by Gaur (1972) who reported 26 types of fungal spores, and 35 pollen types belonging to 29 families in the atmosphere of Meerut and Gaur and Kasana (1984) who reported 30 types of fungal spores and 23 pollen types in the industrial atmosphere of Modinagar adjacent to Meerut City.

The aero-allergenic spore types namely *Alternaria*, *Cladosporium* and *Epicoccum* occur throughout the year and are therefore of significance from the allergenic view point. Apart from climatic factors occurrence of these spore types throughout the year may be due to their ability to grow and sporulate on a wide variety of substrates and host plants.

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