VERTICAL VARIATION OF AEROSPORA CONCENTRATION AT LUCKNOW

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Abstract

Experiments were conducted at Birbal Sahni Institute of Palaeobotany during the year 1971-1972 on vertical variation of biopollutant concentrations in the air of Lucknow by exposing slides on the ground (20 cm) and terrace level (9 m).

The differences have been observed in qualitative and quantitative abundance of pollen grains and fungal spores, the time of their first appearance, monthly maxima and period of their settlement at two dissimilar heights.

Introduction

The vertical mixing of aerospora in turbulent meteorological conditions stimulates the dispersion of pollen grains and spores at longer distances. The knowledge of vertical profile of these bioparticles provides better information of distributional pattern of airspora to plant pathologists and allergists.

Gregory and Hirst (1957) and Raynor *et al.* (1973) have studied the vertical aeropora concentration of a few taxa in lower atmosphere. However, no such statistical evaluation of total pollen and spores has been done in India. Generally, the information obtained at one particular height has been used in reference for a larger surrounding area ignoring spore/pollen concentrations at different levels. Here, the attempt has been made to find out the degree to which the information obtained at two dissimilar heights could be valid for a particular place regarding the qualitatative and quantitative abundance of pollen and spores, their time of first appearance, daily and monthly maxima, suspension and settlement.

After the pioneer work of Lakhanpal and Nair (1958) on atmospheric pollen grains of Lucknow the similar kind of study had been extended for a period of three years (March, 1969—February, 1972) with the additional information of aeromycology and correlation of biopollutant concentration with meteorological conditions prevailing at that time (Khandelwal, 1986).

Material and Method

The standard microslide smeared with safranin stained glycerine jelly was placed in an apparatus which has been classified in the group under 'Impaction using wind movement by vertical and inclined microscope slide' (Gregory, 1961). The slide was exposed for 24 hours at two different heights (20 cm and 9 m) above the ground level for a period of one year (March, 1971 to February, 1972) in the premises of Birbal Sahni Institute of Palaeobotany, Lucknow.

Results

From the annual distribution of pollen grains it has been possible to distinguish the following three periods in relation to the seasons as reported earlier (Vishnu-Mittre & Khandelwal, 1973).

Spring and Early Summer Season (February to May); Late Summer and Rainy Season (June to September); Late Rainy and Winter Season (October to January)

(a) *Daily census of atmospheric pollen grains on the terrace*—The total pollen count for the year (March 1971 to February 1972) was 19521 represented by 47 taxa (Table 1).

Table 1—Annual pollen counts obtained from different heights

Pollen grains	On Terrace	On Ground
1. *Holoptelea integrifolia*	7746(39.7%)	5802(31.3%)
2. Poaceae (Gramineae)	2962(15.1%)	4164(22.5%)
3. Cheno-amaranth type	2138(10.9%)	1545(8.3%)
4. *Xanthium strumarium*	1108(5.6%)	937(5.0%)
5. *Ailanthus excelsa*	745(3.8%)	1360(7.36%)
6. *Azadirachta indica*	654(3.3%)	329(1.7%)
7. *Casuarina equisetifolia*	649(3.3%)	330(1.8%)
8. *Ricinus communis*	617(3.1%)	913(4.9%)
9. *Cyperaceae*	353(1.8%)	133(0.7%)
10. *Eucalyptus citridora*	326(1.6%)	615(3.3%)
11. *Syzygium cumini*	259(1.3%)	329(1.7%)
12. *Putranjiva roxburghii*	197(1.0%)	115(0.6%)
13. *Emblica officinalis*	173(0.88%)	76(0.41%)
14. *Pinus roxburghii*	166(0.84%)	57(0.31%)
15. Brassicaceae	142(0.72%)	266(1.4%)
16. *Polyalthia longifolia*	124(0.63)%	78(0.72%)
17. *Morus alba*	117(0.59%)	190(0.1%)
18. *Dodonaea viscosa*	97(0.49%)	256(1.3%)
19. *Coriandrum sativum*	86(0.44%)	14(0.07%)
20. *Tribulus terrestris*	72(0.36%)	—
21. *Alnus*	68(0.34%)	77(0.42%)
22. *Cycas circinalis*	130(0.6%)	79(0.4%)
23. Asteraceae (Compositae)	45(0.22%)	79(0.43%)
24. *Aegle marmelos*	44(0.22%)	40(0.22%)
25. *Heliotropium*	43(0.21%)	23(0.13%)
26. *Melia azedarch*	41(0.21%)	32(0.17%)
27. *Cannabis sativa*	38(0.19%)	81(0.44%)

Table 1—(*Contd.*)

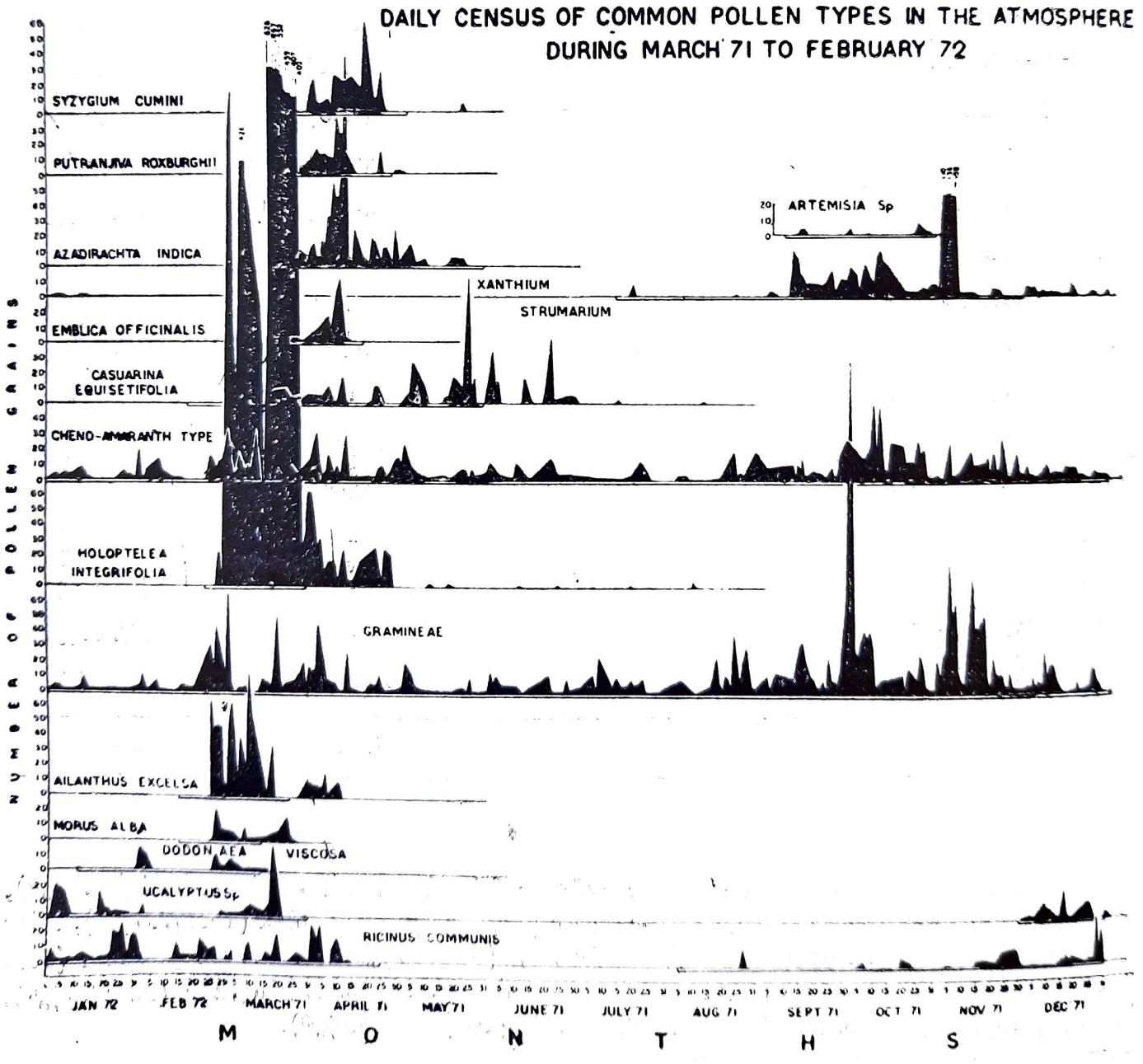
Pollen grains	On Terrace	On Ground
28. *Prosopis juliflora*	37(0.18%)	14(0.07%)
29. *Artemisia vulgaris*	33(0.16%)	117(0.63%)
30. *Grevillea robusta*	32(0.16%)	17(0.09%)
31. *Argemone mexicana*	30(0.15%)	23(0.12%)
32. *Cedrela toona*	22(0.11%)	—
33. *Jasminum*	19(0.09%)	23(0.12%)
34. *Terminalia arjuna*	16(0.08%)	41(0.22%)
35. *Acacia arabica*	14(0.07%)	17(0.09%)
36. Malvaceae	13(0.06%)	47(0.23%)
37. *Justicia*	13(0.06%)	49(0.21%)
38. *Salmalia malabarica*	13(0.06%)	39(0.21%)
39. *Pithecolobium dulce*	12(0.06%)	24(0.13%)
40. *Bauhinia*	10(0.05%)	—
41. *Anagallis arvensis*	9(0.04%)	9(0.049)%
42. *Ephedra*	6(0.03%)	5(0.027%)
43. *Santalum album*	5(0.02%)	—
44. *Typha*	4(0.02%)	—
45. Fabaceae (Leguminosae)	3(0.01%)	—
46. Urticaceae	3(0.01.%)	3(0.015%)
47. *Tamarindus indica*	1(0.005%)	—
48. *Anethum graveolens*	—	25(0.14%)
49. *Chrozophora rottleri*	—	1(0.005%)
50. *Galphimia gracilis*	—	5(0.027%)
Unidentified	86(0.43%)	114(0.63%)
Total	19521	18493

The highest incidence of pollen grains was observed in the month of March (9363/47.9%*), followed by April (2586/13.2%*), November (1701/8.7%*), October (1533/7.8%*), May (696/3.5%*), December (659/3.3%*) February (650/3.3%) and then September (613/3.10%*) Comparatively less number of pollen grains were recorded in June (526/2.6%*), July (433/2.2%*), January (433/2.2%*) and August (328/1.06%*).

*Percentages are calculated in terms of total annual pollen catch.

**Percentages are calculated in terms of total monthly pollen catch.

Spring and early summer season (February-May)—This period was largely charged with the pollen grains of tree species in the atmosphere of Lucknow. The pollen of *Salmalia malabarica* appeared first on February 15 and continued up to March 15 exhibiting an uniform distribution. Both *Ailanthus excelsa* and *Morus alba* appeared first on February 27 with their peaks on March 1 and February 28 and continued upto July 7 and April 29 respectively (Text-fig. 1). The highest pollen catch in the month of March was of *Holoptelea integrifolia* of which pollen appeared on March 1 and continued upto August 26 with its peak on March 21 recording 667 pollen grains in a day. The next highest in March was of *Ailanthus excelsa* (563/6.0%**). The pollen grains of *Casuarina equisetifolia*, *Pithecolobium dulce*, *Emblica officinalis*, *Azadirachta indica* and *Putranjiva roxburghii* appeared first on March 15, 19, 27, 29 and 30 respectively with their peaks on May 26, April 4, 12, 14, and 11. These pollen grains were caught upto September 15, April 7, 14, May 11 and 4 respectively. The pollen of *Melia azedarch* was noticed in March (27/0.2%**) and



Text-figure 1

again in December (14/4.2%**). The pollen grains of *Argemone mexicana*, *Coriandrum sativum* and *Cannabis sativa* appeard first on March 1, 1 and 2 respectively and continued up to April 7, 12 and May 19 with their peaks on March 20, 25 and 27.

Pollen grains of *Syzygium cumini*, *Polyalthia longifolia*, *Cedrela toona* and *Grevillea robusta* were recorded first on April 1, 3, 10 and 12 respectively with their peaks on April 20, 24, 11 and 12. The pollen of *Tribulus terrestris* was noticed only on April 4 and 10. The pollen of *Anagallis arvensis* was observed first on May 15 and of *Aegle marmelos* on May 12 with their peaks on June 1.

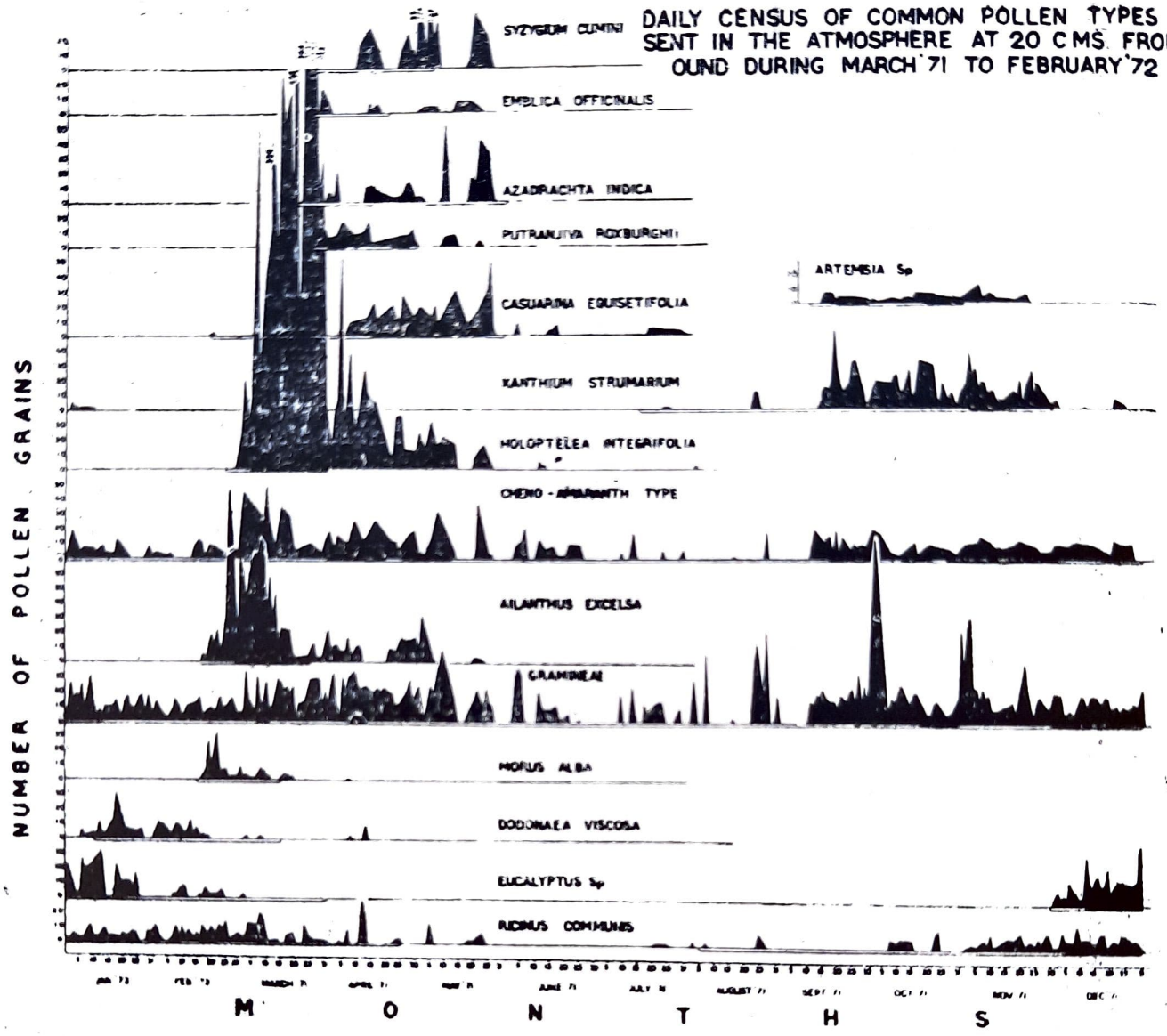
Late summer and rainy season (June-September)—The new elements encountered in the month of June included *Bauhinia* (10/1.9%**), *Acacia arabica* (3/0.5%**), *Typha* (2/0.3%**) and *Cycas circinalis* (33/6.2%**). The pollen of *Xanthium strumarium* appeared first on July 21 and attained the summit on November 5. The pollen catch in the month of July was constituted by pollen grains of *Casuarina equisetifolia* (166/38.4%**), *Holoptelea integrifolia* (6/1.3%**), *Pinus roxburghii* (5/1.1%**), *Azadirachta indica* (2/0.4%**), *Ailanthus excelsa* (1/0.9%**) of which flowering had been long over. Pollen of some of them continued to be caught up to August and September. The pollen grains of *Alnus* and *Artemisia vulgaris* were encountered on September 4 and 15 and their peaks on September 13 and October 25, respectively.

Late rainy and winter season (October-January)—In the month of October the pollen grains of *Xanthium strumarium* (240/16.0%**), *Artemisia vulgaris* (23/1.5%**), *Alnus* (6/1.0%**) and *Acacia arabica* (6/0.3%**) were found to continue from the previous months. In the month of January, the new elements were *Pinus roxburghii* and *Dodonaea viscosa* appearing on January 10 and 11 respectively although the flowering of the former was noticed in the month of March.

(b) *Daily census of pollen grains on the ground level*—The total pollen count for the year 1971-72 was 18,493 represented by 42 taxa (Table 1). Maximum pollen grains were caught in the month of March (6652/35.8%*) followed by April (2675/14.4*), and May (1586/8.5%*). Subsequently, the high numbers were recorded in February (1246/6.6%*), November (1239/6.6%*), December (1106/5.9%*), January (1066/5.2%*), October (970/5.2%*) and September (953/5.1%*). Comparatively less number of pollen grains were recorded in June (426/2.3%*), August (359/1.8%*) and July (215/1.1%*) perhaps due to heavy rains and violent winds during this part of the year.

Spring and early summer season (February-May)—During this period, the pollen grains of *Morus alba*, *Ailanthus excelsa* and *Holoptelea integrifolia* were recorded first on February 17, 17 and 29 with their peaks on February 22, 26 and 29 respectively (Text-fig. 2). The pollen grains of *Melia azedarch* and *Salmalia malabarica* were caught first on February 18 and 20 respectively. The other tree pollen of *Pinus roxburghii*, *Putranjiva roxburghii* (*Drypetis roxburghii*) and *Azadirachta indica* appeared first on March 14, 21 and 30 respectively, with their peaks on April 3, 4 & 2. No peaks were noticed in pollen grains of *Pithecolobium dulce* and *Emblica officinalis* which appeared first on April 18 and 25 respectively. The pollen grains of both *Cannabis sativa* and *Argemone mexicana* appeared first on March 4. The pollen grains of *Syzygium cumini*, *Cycas circinalis* and *Polyalthia longifolia* appeared first on April 11, 11, 14 respectively with their peaks on May 1, 25 and April 24. The pollen grains of *Grevillea robusta* and *Terminalia arjuna* were registered first on April 4 and 27 without any peak. A single pollen grain of *Chrozophor rottleri*, a new element was recorded on May 26.

Late summer and rainy season (June-September)—During this period the pollen of *Aegle marmelos* appeared first on June 4 and continued upto June 25 with its peak on June



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17. The pollen grains of *Acacia arabica* and *Xanthium strumarium* appeared first on July 9 and 23 respectively. Good amount of grass pollen was caught in the month of August (277/77.1%**) which gradually increases in next month (338/35.4%**).

Late rainy and winter season (October-January)—During this period the pollen grains of *Artemisia vulgaris* (38/4.09%**), *Alnus* (17/1.78%**), *Cycas circinalis* (11/1.15%**) and *Anagallis arvensis* (3/0.31%**) were recorded for the first time either in September or in October. The annual highest number of grass pollen was recorded in November (588/46.7%**) together with the pollen grains of *Alnus* (31/2.5%**), *Xanthium strumarium* (303/24.4%**) and *Ricinus communis* (105/8.47%**). The pollen of *Eucalyptus citriodora* appeared on December 1 with its peak on December 30 and continued upto March 3. The pollen grains of *Dodonaea viscosa* appeared first on January 6 with peak on January 18.

Comparison of pollen calendars for the period of March 1971—February 1972 on terrace and ground

During the course of investigation a relative assessment of the pollen catches at terrace and ground level revealed that the number of pollen grains caught on the terrace

was higher than the ground level both qualitatively and quantitatively. The total number of pollen grains caught on the terrace was 19521 belonging to 47 taxa and 18493 on the ground level belonging to 42 taxa. The pollen grains of *Tamarindus indica, Tribulus terrestris, Santalum album, Typha* and *Bauhinia* were recorded only on the terrace while, the pollen grains of *Chrozophora rottleri* and *Anethum graveolens* were encountered only on the ground. Higher concentration of pollen grains of *Holoptelea integrifolia Azadirachta indica, Casuarina equisetifolia, Emblica officinalis, Xanthium strumarium, Putranjiva roxburghii, Argemone mexicana*, etc. were recorded on the terrace than on the ground level. Whereas pollen grains of *Syzygium cumini, Ailanthus excelsa, Ricinus communis, Artemisia vulgaris, Morus alba*, Poaceae, etc. were observed more on the ground than on the terrace. The decline in Poaceae pollen with the increase in height was also noticed in Bhopal (Tripathi & Oommachan, 1981). It has been found that airspora near the ground is greatly affected by the fluctuations in immediate local sources. In the airspora of the terrace, however, the effect of local sources are smoothed out and attention can be focussed on the organisms being incorporated by the means of long distance transport.

The difference in first appearance of pollen on the terrace or ground level was found varying from a day's time to about one and half month's time. The first appearance of pollen on the terrace than on the ground was recorded in *Acacia arabica, Aegle marmelos, Syzygium cumini, Melia azedarch*, etc. showing significant differences of 9, 22, 30 and 45 days respectively. Similarily, *Morus alba* and *Casuarina equisetifolia* showed the difference of 10 and 22 days and were reported earlier on the ground than on the terrace (Khandelwal, 1974). Besides the difference in first appearance of pollen, the pollen peaks of a few taxa were found different on ground and on the terrace. This period of gap varied from a day to about two months (Tables 2, 3).

Table 2—Pollen peaks earlier on the terrace than on the ground

Taxa	At Terrace	At Ground level
Holoptelea integrifolia	March, 21	March, 23
Aegle marmelos	June, 1	June, 17
Syzygium cumini	April, 20	May, 1
Cannabis sativa	March, 26	April, 11
Cycas circinalis	April, 13	May, 25

(a) *Daily census of fungal spores on the terrace*—In the annual spore catch for the year 1971-72 twenty one types of fungal spores were identified among the total spore catch of 22704 (Table 4). Unlike pollen grains, it was not possible to define three seasons in relation to annual distribution of fungal spores in the atmosphere of Lucknow. However, it was only during two periods in a year, viz., February to June and July to December when the fungal spores in atmosphere were predominently present.

*Percentages are calculated in terms of total annual spore catch.
**Percentages are calculated in terms of total monthly spore catch

Table 3—Pollen peaks earlier on the ground than on the terrace

Taxa	At Ground level	At Terrace
Azadirachta indica	April, 2	April, 14
Casuarina equisetifolia	May, 25	May, 26
Xonthium strumarium	November, 2	November, 5
Putranjiva roxburghii	March, 4	April, 11
Pinus roxburghii	April, 13	April, 26
Ailanthus excelsa	February, 26	March, 1
Morus alba	February, 22	February, 28
Eucalyptus citriodora	December, 30	March, 19
Dodonaea viscosa	January, 18	February, 1

The highest incidence of fungal spores was encountered in the month of March (5180/22.7%*) followed by October (3459/15.2%*), April (3417/15.0%*) and May (2212/9.7%*). Subsequently, high number of fungal spores were recorded in February (1551/6.8%*), November (1546/6.3%*) July (1212/5.3%*) December (1200/5.2%*) and September (1186/5.2%*). Comparatively, less number of fungal spores were encountered in June (827/2.1%*) January (545/1.9%*) and August (369/1.6%*).

The spores of *Alternaria*, *Helminthosporium*, uredospores of *Puccinia*, *Aspergillus Type*, *Chaetomium* and smut were found distributed all the year round. The spores of *Alternaria* and uredospores of *Puccinia* were encountered maximum in the month of March (2709/52.1%** and 974/18.8%**) with the peaks on April 24 and March 26 respectively (Text Fig. 3). The highest number of spores of *Helminthosporium* (933/26.9%**), *Cercospora* (584/16.8%**) and Smut (84/2.4%**) were encountered in the month of October with their peaks on October 7, 7 and 21 respectively. A good number of *Aspergillus* type spores were recorded throughout the year. The following fungal spores were recorded throughout the year except for the months noted against them: *Cladosporium* (September); *Curvularia* (April); 2-4 celled coloured spores (January); *Nigrospora* (June, September); *Fusarium* (May, November) and *Tetraploa* (March, December). A good number of spores of *Nigrospora* (247/7.1%**) occurred in the month of October with its peak on March 26 and of *Fusarium* on October 7. The maximum spores of *Tetraploa* occurred in September (125/10.5%**) with its peak on September 17. The highest number of teleutospores of *Puccinia* were recorded in the month of May (7/0.3%**) The spores of *Diplodia*, *Tilletia* and *Torula* were found intermittently and irregularly distributed in the atmosphere. However, their maximum numbers and the dates of their peaks were as follows: *Diplodia* (21/1.3%**, November 25); *Tilletia* (8/0.2%** October, without peak; *Torula* 4/0.2%** February, without peak). There were a few spores of *Botryodiplodia* in the months of May and July and *Spegazzinia* in May only.

(b) *Daily census of fungal spores on the ground*—In the annual spore catch for the year 1971-72, twenty types of fungal spores were identified among the total spore catch of 21436 (Table 4). The spores of *Alternaria*, *Aspergillus* type, uredospores of *Puccinia*, *Helminthos-*

porium and *Cladosporium* were recorded all the year round with their maximum number in the month of March and peaks on February 19, March 11, 16, 23 and April 4 respectively (Text-fig. 4).

The spores of *Epicoccum*, *Curvularia*, and *Tetraploa* were observed all throughout the year except in June and July; September and December; March and September respectively. The high frequency of *Epicoccum* spores were found in the month of March (645/13.6%**) with its peak on March 11; those of *Curvularia* in October (49/3.3%**) with its peak on March 19 and of *Tetraploa* in April (43/1 2%**) without a prominent peak. The spores of *Cercospora* and *Fusarium* were found in all the months except in April to June and May to July respectively. A high frequency of spores of *Cercospora* was observed in October (294/19.8%**) with its peak on October 25 and that of *Fusarium* in the month of April (40/1.1%**) with its peak on April 16.

Table 4—Annual fungal spore counts obtained from different heights

	Fungal spores	On Terrace	On Ground
1.	*Alternaria*	9170(40.3%)	8859(14.3%)
2.	*Helminthosporium*	3332(14.6%)	1906(9.3%)
3.	Uredospores of *Puccinia*	2532(11.1%)	3753(17.5%)
4.	*Epicoccum*	1406(6.1%)	1708(7.9%)
5.	*Aspergillus*	1404(6.1%)	873(4.07%)
6.	*Cercospora*	904(3.9%)	845(3.9%)
7.	*Cladosporium*	701(3.08%)	786(3.6%)
8.	*Nigrospora*	651(2.8%)	679(3.1%)
9.	*Curvularia*	539(2.3%)	245(1.1%)
10.	2-4 celled brown coloured spores	460(2.02%)	455(2.1%)
11.	Smut	382(1.6%)	121(0.5%)
12.	*Chaetomium*	312(1.3%)	613(2.8%)
13.	*Tetraploa*	299(1.3%)	217(1.01%)
14.	*Fusarium*	253(1.1%)	95(0.06%)
15.	*Acrothecium*	104(0.4%)	70(0.3%)
16.	*Diplodia*	56(0.2%)	41(0.1%)
17.	*Tilletia*	20(0.08%)	9(0.04%)
18.	Teleutospores of *Puccinia*	15(0.06%)	59(0.2%)
19.	*Torula*	13(0.05%)	26(0.1%)
20.	*Botryodiplodia*	10(0.04%)	1(0.004%)
21.	*Spegazzinia*	2(0.008%)	—
	Unidentified spores	139(006%)	75(0.3%)
	Total	22704	21436

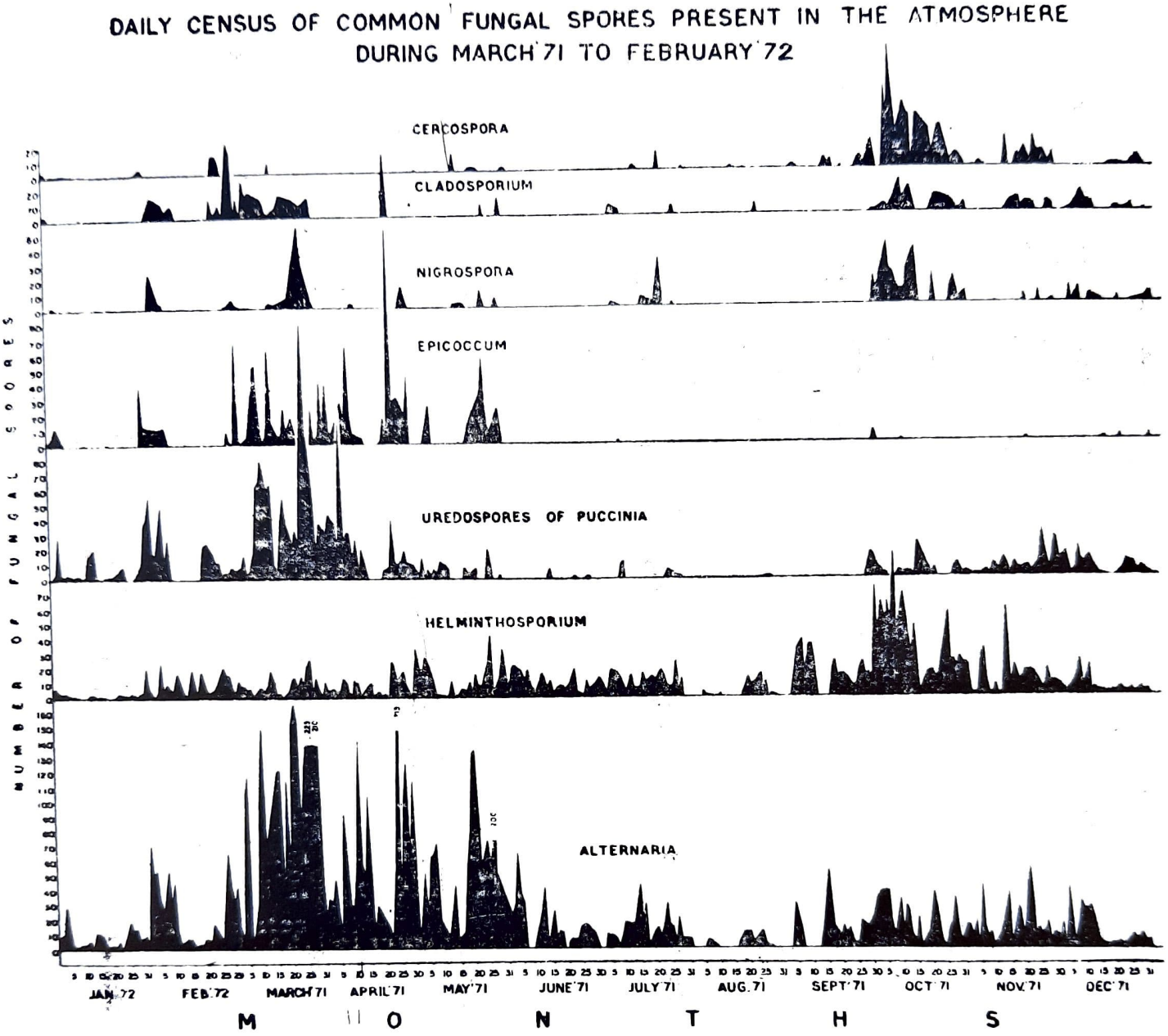
Table 5—Showing fungal taxa at two different heights regarding their monthly maxima and peaks

Taxa	At terrace		At ground level	
	Monthly maxima (No. of spores)	Peaks	Monthly maxima (No. of spores)	Peaks
Smut	October (84)	October, 2	February (52)	February, 19
Curvularia	October (192)	October, 6	October (49)	March, 11
Fusarium	October (162)	October, 7	April (40)	April, 16
Nigrospora	October (247)	March, 26	April (6)	No peak
Tilletia	October (8)	No peak	April (4)	No peak
2-4 celled brown coloured spores	March (167)	March, 5	April (156)	April, 16
Acrothecium	March (45)	March, 23	May (26)	May, 2
Uredospores of *Puccinia*	March (974)	March, 26	March (1314)	March, 16
Cladosporium	March (295)	April, 4	March (256)	No peak
Alternaria	March (2709)	April, 24	March (1981)	February, 19
Helminthosporium	October (933)	October, 7	March (298)	March, 23
Teraploa	September (125)	September, 17	April (298)	No peak
Diplodia	November (21)	November, 25	November (11)	No peak
Epicoccum	April (592)	April, 24	March (645)	March, 11
Chaetomium	December (57)	December, 10	December (19)	March, 10

The spores of smut, *Acrothecium* and telutospores of *Puccinia* were found largely in early summer and partly in winter season. The maximum number of smut spoers were recorded in February (52/2.4%**) and Teleutospores of *Puccinia* in the month of April (25/0.7**). The spores of *Diplodia*, *Torula*, *Tilletia* and *Botryodiplodia* were found intermittently and irregularly distributed in the atmosphere all throughout the year.

Comparison of fungal spores calendars for the period of March 1971—February 1972 on the terrace and ground

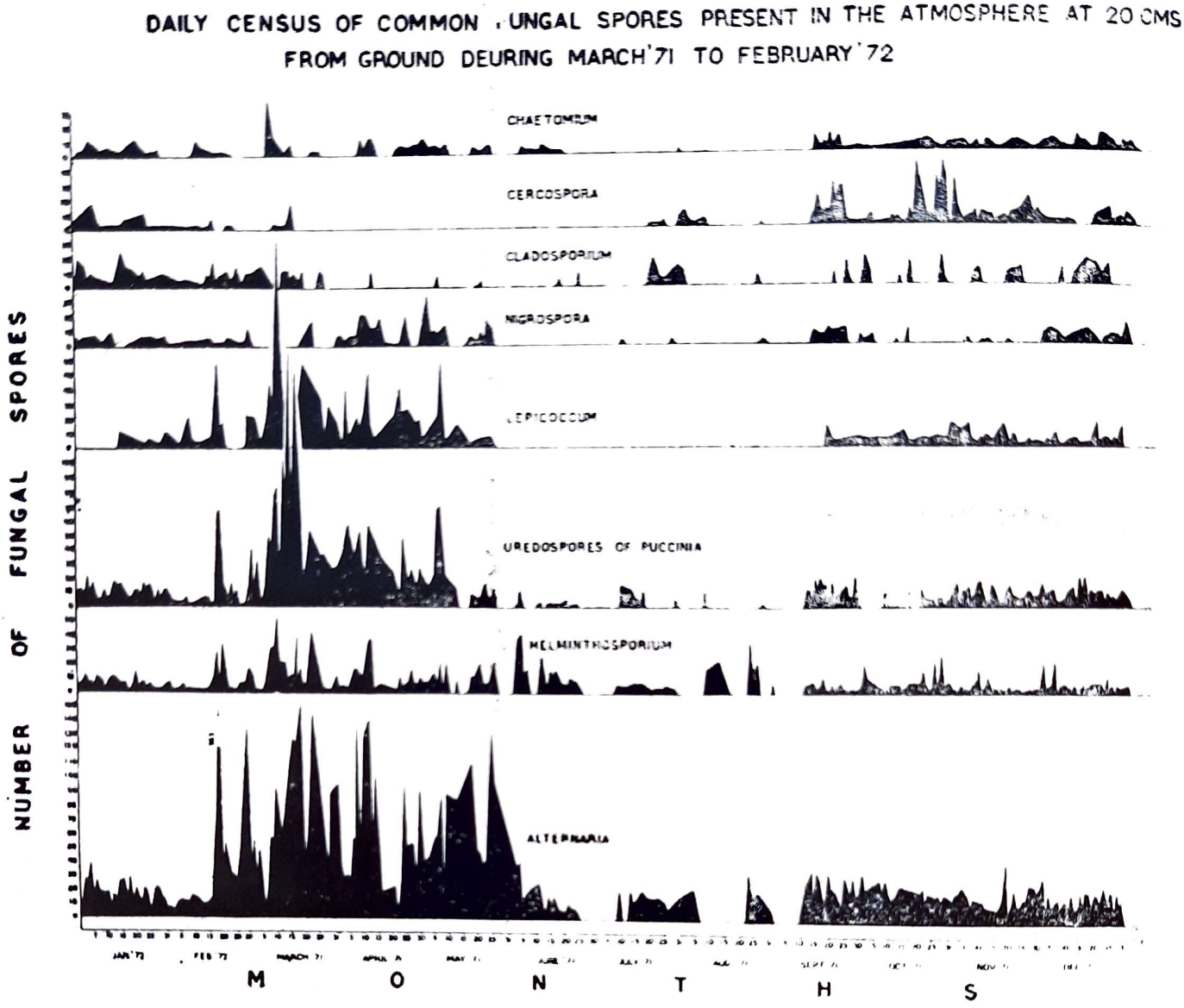
During the course of investigation relative assessment of annual fungal spore caught at two different heights has revealed the higher number of spores on the terrace (22704) than on the ground (21436). In general most of the fungal spores showed their numeri-



Text-figure 3

cal abundance on the terrace than on the ground, viz., *Alternaria*, *Helminthosporium*, *Aspergillus* type, *Cercospora*, *Curvularia*, smut, *Fusarium*, *Acrothecium Tetraploa*, *Diplodia*, *Tilletia* and *Botryodiplodia*. However, there are certain spores which were encountered more on the ground level, such as uredospores of *Puccinia*, *Epicoccum*, *Cladosporium*, *Chaetomium*, Teleutospores of *Puccinia*, *Torula* and *Nigrospora*. Sreeramulu (1958) observed that the mowing and tedding of grass cause immediate increase in frequency of grass pollen and spores of *Cladosporium* and *Epicoccum*. The spores of *Spegazzinia* were recorded only on the terrace. At Rothmsted, the heterogenity of spore concentration at 2 and 24 m in heights was observed in the case of *Cladosporium* by Gregory and Hirst (1957).

Generally, the coherence in monthly maxima of fungal spores with their peak days was encountered but there are certain taxa such as *Nigrospora*, *Alternaria*, *Curvularia* and *Chaetomium* listed in Table 5 showed different behaviour.



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Conclusion

The results of critical analysis of aerospora obtained at two different heights from Birbal Sahni Institute of Palaeobotany, Lucknow during March, 1971 to February, 1972 are as follows:—

1. Different composition of aerospora was recorded :
   On terrace : 19521 total annual pollen catch (47 types)
   : 22704 total annual fungal spore catch (21 types)
   On ground : 18493 total annual pollen catch (42 types)
   ; 21436 total annual fungal spore catch (20 types)

2. The pollen grains of *Tamarindus indica*, *Tribulus terrestris*, *Santalum album*, *Typha* and *Bauhinia* were recorded only on the terrace. Whereas, the pollen grains of *Chrozophora rottleri* and *Anethum graveolens* were recorded only on the ground. The types of fungal spores were similar on the ground and terrace except for the spores of *Spegazzinia* which were encountered only on the terrace.
3. The first appearance of pollen grains on the slides varied from a day to about one and half month. The pollen grains of *Acacia arabica*, *Aegle marmelos*, *Syzygium cumini* and *Melia azedarch* had taken 9, 22, 30 and 45 days respectively to settle on the ground. Similarly, the pollen peaks of a few taxa exhibited the period of gap varying from a day to about two months for example, *Cycas circinalis* showed the pollen peaks 43 days earlier on the terrace, while the pollen peak of *Eucalyptus citriodora* was noticed two months later on the terrace than on the ground. Generally the monthly maxima of most of the fungal spores coincided with their summit except for *Nigrospora*, *Alternaria*, *Curvularia* and *Chaetomium*.

Thus, the results of this study revealed the different composition of aerospora at two different heights; No specific reasons could be found for these differences. But, it may be assigned to changing meteorological factors associated with source and sampling site. These factors plus the diversity in size of pollen grains and fungal spores, timing, duration and magnitude of pollen/spore dispersal form such a complex set of possible variables that variation in concentration of airspora bound to occur. The result of vertical aerospora concentration of Lucknow corroborates with the conclusion made by Raynor *et al.* (1973) that the vertical mixing of airspora is often poor over short periods in the lower atmosphere resulting in day to day variability in the composition. But, when the taxa are averaged over the length of pollen season or longer periods these changes are not appreciable.

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