



Seasonal Prevalence of Air-Borne Pollen and Spores in Kuala Lumpur, Malaysia.

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Air-borne pollen and mold spores are major sources of inhalant allergens.^{1,2} The spatial and seasonal distribution of these aeroallergens vary between different localities in the same country. Information on the seasonal distribution of local aeroallergens are important tools to aid allergists in making accurate diagnosis. Little is known about the seasonal distribution of such atmospheric pollen and mold spores in Peninsular Malaysia. Preliminary investigations have indicated that allergy to grass pollen and mold spores are present in the country (Ho TM, personal communication). To further clarify the role of these materials in the ecology of allergies, a multicenter study was undertaken to examine the seasonal abundance of atmospheric pollen and mold spores in the country. The correlation of the seasonal abundance with various meteorological factors was studied. The findings of a 2-year survey in one of the centers which is located in Kuala Lumpur, are herewith reported.

MATERIALS AND METHODS

The study was conducted for 2 years from December 1991 to November 1993. The study site was in the compound of the Institute for Medical Research,

SUMMARY Aerosampling using Rotorod samplers was conducted in the Institute for Medical Research, Kuala Lumpur, Malaysia, from December 1991 to November 1993. Samples were collected twice a week between 10.00 hours to 12.00 hours. Rods were stained and examined microscopically. A total of 8 and 20 types of pollens and mold spores were collected, respectively. More mold spores were collected than pollens. Grass pollen constituted more than 40 percent of total pollen counts. Gramineae pollen counts peaked in March and September. The most abundant mold spore was *Cladosporium* followed by *Rust*, *Nigrospora*, *Curvularia* and *Smut*. *Cladosporium* counts peaked in February and August. *Rust* counts peaked in June and December whereas counts for *Nigrospora* peaked in February and October. Highest counts of *Smut* were recorded in March and October. *Curvularia* counts peaked in January, June and September.

search, Kuala Lumpur, on a rectangular piece of open land measuring 30.5 m by 47.0 m.

Rotorod samplers were used for the collection of pollen and mold spores. These samplers were made by Mahidol University, Bangkok, Thailand. Each sampler is equipped with 2 arms. The arms which are in line with each other, start horizontally from the motor assembly for 4 cm and then bend vertical upwards for another 6 cm. A plastic collecting rod measuring 2 x 2 x 65 cm. is attached to each of the vertical section of the side arms. The large surface of the rod facing the direction of rotation is lightly smeared with silicon grease. For each collection, the samplers were

operated at a rotating speed of 2,300 rpm for 1 hr. Approximately 4,400 liters of air were sampled each time. The samplers were mounted on an aluminium ladder and raised approximately 229 cm above ground level. Sampling was conducted twice a week for 1 hour be-

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tween 10.00 hours to 12.00 hours. After collection, the rods were stained in Caberla's solution and examined microscopically. The number and types of pollen and mold spores were recorded and expressed as number per square centimeter.

RESULTS

A total of 8 and 20 types of pollen and mold spores respectively were identified

in the collection. The monthly average counts of those pollen and spores were determined. (Tables 1 and 2). The relative frequencies of the pollen and mold spores are shown in Figs. 1 and 2. The monthly distribution of pollen of Gramineae and Palmae, are shown in Fig. 3. Monthly distribution of the 5 most abundant mold spores are shown in Fig. 4. The mean annual meteorological data are shown in Fig. 5a & b.

DISCUSSION

Atmospheric pollen and mold spores were present throughout the year. The majority of the types of pollen and mold spores could be collected every month.

The quantity of mold spores collected was consistently more than pollen. Grass pollen which constituted more than 40 percent of the total pollen count was the most abundant pollen collected.

Table 1. Mean monthly pollen counts (years 1991 - 1993).

	Number per square cm												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Amaranthaceae	0	0	0	0	0	0	0	1	0	0	0	0	1
Cyperaceae	1	2	2	3	1	1	1	2	1	1	1	1	12
Leguminosae	1	1	0	7	1	0	0	1	0	0	1	0	12
Palmae	1	6	16	15	3	14	17	17	18	9	1	1	118
Pinus	1	0	0	1	1	5	6	2	0	2	0	0	18
Gramineae	11	12	29	25	13	15	15	17	17	15	11	16	196
Mimaceae	0	0	0	0	0	0	0	0	0	0	1	0	1
Unidentified pollen	11	11	13	3	12	11	3	13	5	6	14	12	114
Total	26	32	60	54	31	46	42	53	41	33	27	30	475

Table 2. Mean monthly mould spore counts (years 1991 - 1993).

	Number per square cm												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Alternaria	4	5	4	4	2	3	1	2	3	1	4	3	36
Arthrospore	0	2	0	0	0	0	1	0	0	0	0	0	3
Black yeast	1	7	1	3	1	1	1	1	1	1	0	0	18
Chaetomium	1	1	0	0	0	0	0	0	0	0	0	5	7
Cladosporium	103	554	189	150	133	34	45	584	433	354	182	208	2,969
Curvularia	128	80	68	34	48	51	38	38	68	67	50	37	707
Fusarium	7	8	7	7	9	6	5	2	3	4	7	23	88
Helminthosporium	2	0	18	13	2	5	8	18	8	14	0	2	90
Nigrosporum	61	98	93	68	73	54	48	74	112	158	80	84	1,003
Papularia	0	1	20	10	2	1	1	2	2	1	0	2	42
Pestalotia	2	0	0	1	1	0	2	1	0	0	2	3	12
Pothomyces	2	4	1	2	1	2	2	1	2	2	1	1	21
Rust spore	172	178	184	111	139	176	95	62	109	186	181	252	1,845
Smut cell	7	4	20	12	6	14	10	15	22	45	9	4	169
Spegazzania	1	1	0	0	0	1	0	0	0	0	0	0	3
Tetraploa	3	2	1	0	3	3	2	32	1	1	1	1	50
Thielavia	2	3	1	3	1	2	1	0	0	5	14	2	34
One cell hyaline	6	13	4	6	7	5	1	4	5	5	7	12	75
Unclassified one cell spore	221	243	161	146	153	176	123	111	149	237	323	270	2313
Unclassified two cell spore	59	61	65	74	60	87	63	47	59	110	92	123	900
Total	782	1,265	837	644	641	621	447	994	977	1,192	953	1,032	10,385

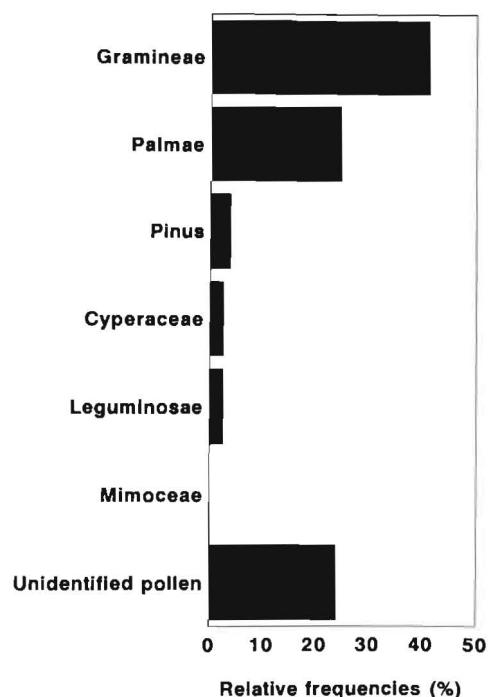


Fig. 1 Relative abundance of pollen types collected in Kuala Lumpur (years 1991 - 1993).

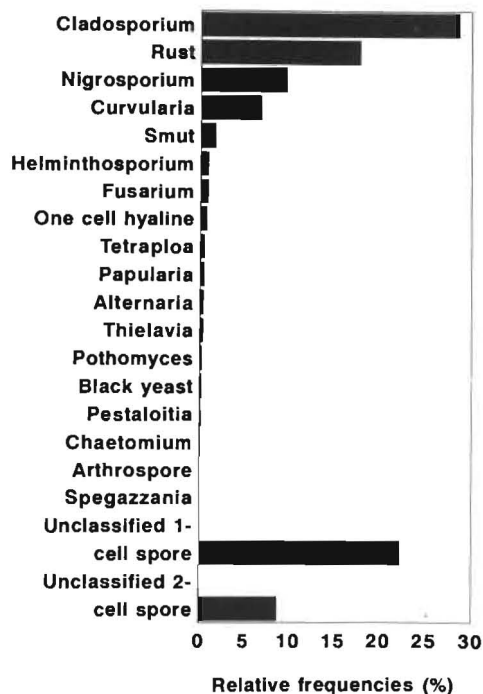


Fig. 2 Relative abundance of mold spores collected in Kuala Lumpur (years 1991 - 1993).

Similar observations have been reported in other parts of this region.³⁻⁶ In many parts of neighbouring Thailand, grass pollen is one of the five most common airborne pollens found.⁷ It was difficult to differentiate the various species of Gramineae based on morphology alone. Grass pollen are important allergens.^{8,9} Although there is cross reactivity of the various grass pollen allergens, they may not be of equal importance. The allergenicity associated with each grass species need to be examined further in detail by testing of their extracts on atopic individuals.

The second most common pollen collected in abundance was Palmae. As with Gramineae, the exact species was not identified. However, there were a number of Royal palm (*Roystonea regia*) trees surrounding the study site. It is highly possible that this species contributed a large proportion of the Palmae pollen collected. It is not known whether these pollens are allergenic.

The other pollen types constituted less than 10% of the total pollen counts. Twenty-four percent of the pollen samples were unidentified. This is indicative of the gaps in knowledge of identification of local pollen types. A comprehensive monograph for this purpose should be prepared.

The seasonal distribution pattern of pollen is an important aid for the effective management of pollen allergy. Use of suitable medications before an expected increase in atmospheric pollen counts will reduce the severity of allergic reaction.

The seasonal abundance of Gramineae pollen appeared to have a major peak in March and a minor peak around September. Pollen of Palmae had a similar distribution. These peaks corresponded to the peaks for monthly maximum temperature and temperature at 14.00 hours. Low counts of these pollen were recorded when the monthly rainfall and relative humidity were high. This association between pollen counts and rainfall as well as relative humidity has also been reported from Bangkok, Thailand.⁴ The effect of rain in general

is to wash out the pollen in the atmosphere. However it has also been reported that thunderstorms are known to be associated with epidemics of asthma induced by pollen allergy.¹⁰

Atmospheric mold spores were present throughout the year. The most abundant (28.59%) was *Cladosporium*. This allergenic mold has been reported to be most dominant in many parts of the world.¹¹⁻¹⁶ The other mold spores of Rust, *Nigrospora*, *Curvularia* and Smut are also similarly present in other parts of this region and are known to be allergenic as well. Rust and *Nigrospora* appeared in higher relative densities than in Thailand. That may be partly due to the different methods and duration of aero sampling.

Unidentified 1- and 2-cell mold spores were relatively abundant. These need to be further clarified as they may include molds of health importance.

The other types of mold spores made up less than 5% of the total number collected.

The monthly distribution of total mold spore count closely followed that of *Cladosporium*. Both had 2 peaks. The first peak was in February. The second peak for total mold spore counts was in October whereas it was in August for *Cladosporium*. Rust peaked in June and December. *Nigrospora* had a minor peak in February and major peak in October. *Curvularia* appeared to have 3 peaks; January, June and September. Smut had 2 peaks; one in March and other in October.

High counts of *Cladosporium* were recorded when rainfall and relative humidity were low and day temperatures were high. The same occurred for *Nigrospora* and Smut.

In conclusion, it is evident that important pollen and mold spores which are allergenic are found in the atmosphere in Kuala Lumpur. The more abundant pollen and mold spores should be included in any panel of allergens for diagnosis of inhalant allergies. Some of these particles show distinct monthly distribution patterns which can be used to forecast their

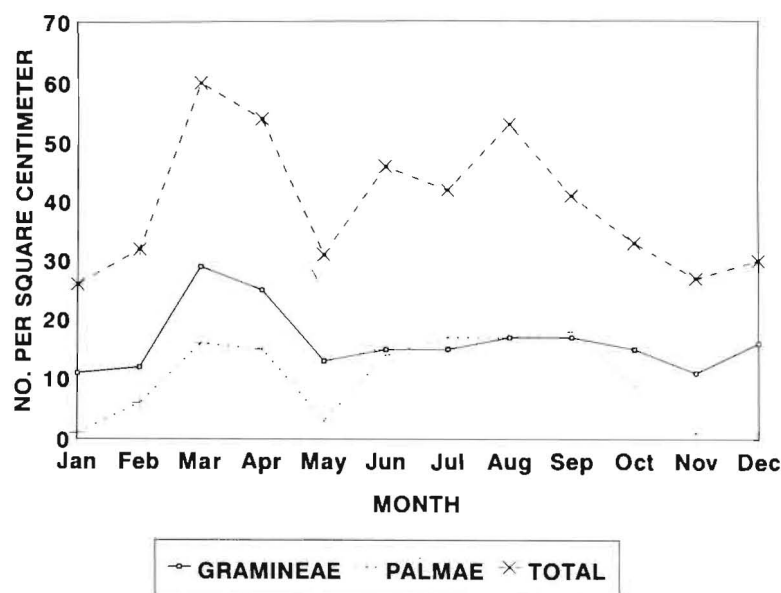


Fig. 3 Monthly distribution of Gramineae and Palmae pollen in Kuala Lumpur.

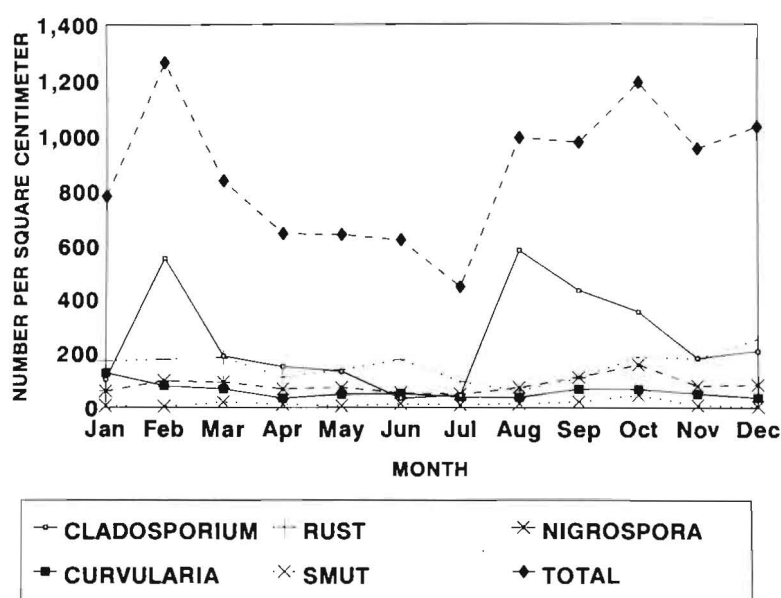


Fig. 4 Monthly distribution of mold spores in Kuala Lumpur.

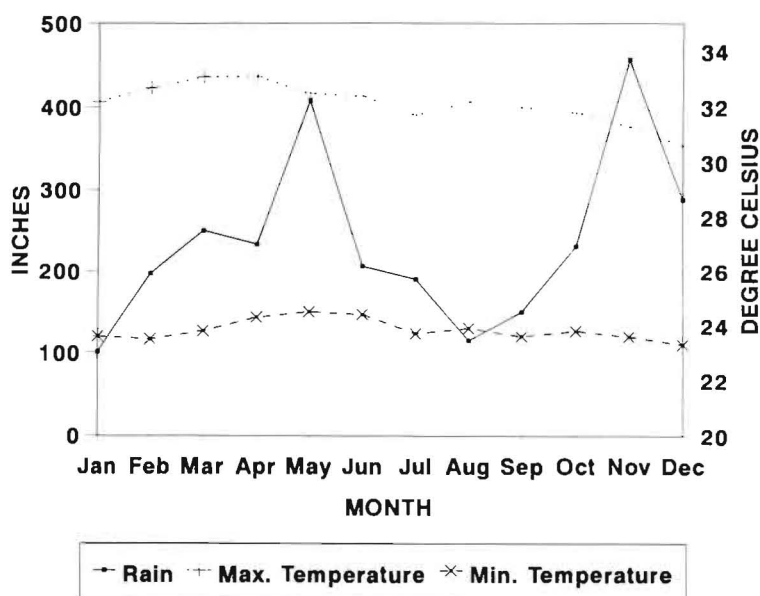


Fig. 5a Mean monthly rainfall, maximum and minimum temperatures in Kuala Lumpur (years 1991 - 1993).

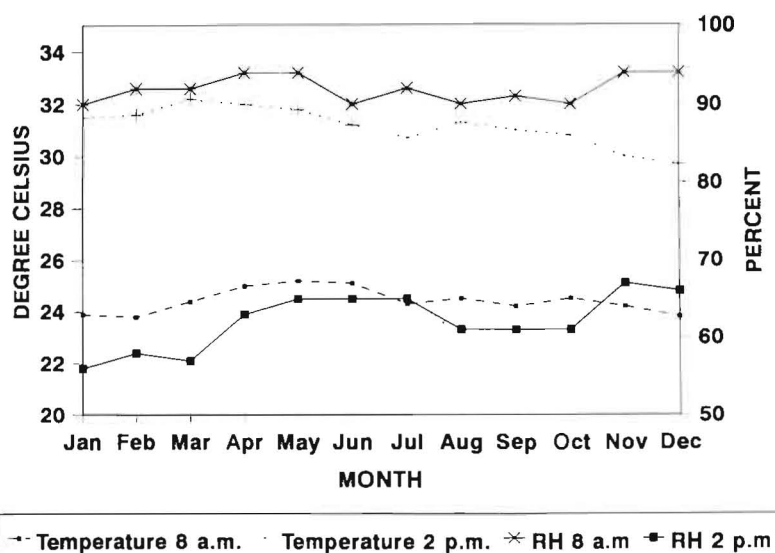


Fig. 5b Mean monthly temperatures and relative humidities (RH) in Kuala Lumpur (years 1991 - 1993).

peak abundance and in the process provide an early warning to allergic individuals.

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