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Aerobiologia 11 (1995) 101–103

Aerobiologia
International Journal of Aerobiology

Airborne dispersal of *Cecropia peltata* L. (Moraceae) pollen, a Neotropical species, in the vicinity of Caracas, Venezuela

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Received 24 June 1994; accepted 11 August 1994

Abstract

In this paper, airborne dispersion of the pollen of *Cecropia peltata* L. (Moraceae) in a location close to the Equator is described. The Cecropias are fast-growing pioneer trees unique to the Neotropics, where they grow within a large altitude range, from Mexico to Brazil. *Cecropia* pollen was the most abundant grain throughout the year. The highest recovery occurred during April–May. As widely distributed members of the Moraceae family and because of their small pollen size, the Cecropias are prime suspects for being the source of inhalant allergens. The numbers of *Cecropia* airborne pollen grains that were recorded are well above those deemed necessary for human sensitization.

Keywords: *Cecropia*; Neotropical airborne pollen; Allergy; Venezuela

1. Introduction

The Cecropias are invasive pioneer trees unique to the Neotropical vegetation from Mexico to Brazil. *Cecropia peltata* grows within a 50- to 2700-m altitude range. It is a very common tree, is dominant in secondary forests where dense patches of the species are observed, and also in urban and rural landscapes (Velásquez, 1971). Pollen grains of *Cecropia peltata* L. (Moraceae) are the most abundantly recovered species in air samples from several locations north of the Equator (Venezuela and Colombia). Description of annual pollen grain concentrations, trends of dispersal and the diurnal rhythm of *Cecropia* are the subject of this paper. The data are derived from continuous volumetric air-sampling carried out during the past 6 years.

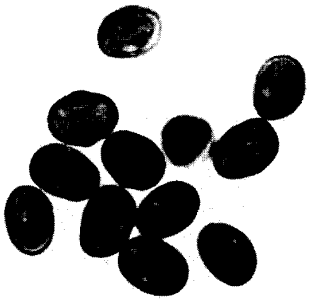

Fig. 1. *Cecropia* pollen. Magnification: ×400.

2. Materials and methods

The 7-day Burkard sampler (Burkard Manufacturing Co.) was used to monitor airborne pollen and spores in Caracas, Venezuela (1500 m altitude, 10° 30′ N latitude, 66° 70′ W longitude). The sampler was operated 10 m above ground level, on the open rooftop of a four-story

Table 1
Yearly pollen counts at Caracas

Year	Counts/m^3		*Cecropia*: % of total counts
	All pollen	*Cecropia*	
1992	12 080	3267	27.0
1991	9646	2223	23.0
1990	16 029	2912	18.2
1989	13 242	2629	19.9
1988	15 626	3188	20.4
1987	16 737	4847	29.0

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SSDI 0393-5965(95)00119-C

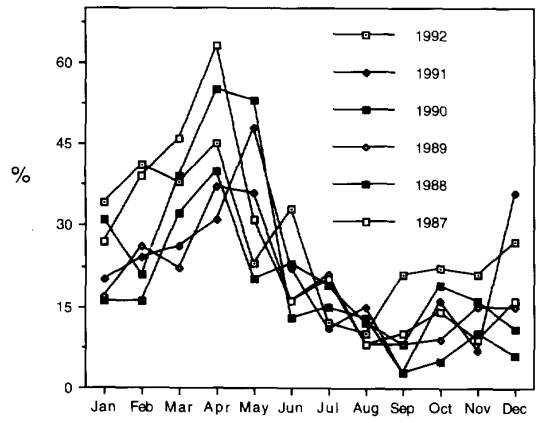

Fig. 2. Percentage contribution of *Cecropia* to monthly counts in Caracas.

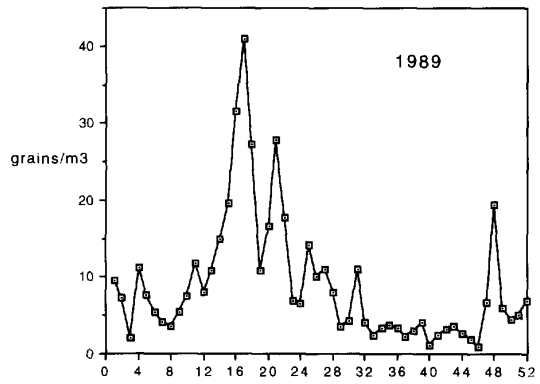

Fig. 4. Weekly average of *Cecropia* at Caracas.

building. The 24-h strips were mounted in Gelvatol, stained with Calberla's solution (Biopol Laboratory Inc.) and read at a magnification of ×400. Pollen counts/m^3 were derived from readings of a 455-μm longitudinal band or of 12 455-μm transverse bands on the entire slide.

3. Results

3.1. Pollen description and sources

As illustrated in Fig. 1, *Cecropia* pollen grains are prolate, 9 × 11 μm, 2-porate. *Cecropia peltata* L. (Moraceae) is the predominant species in the sampling area. It is a fast-growing pioneer tree typical of disturbed patches in urban and rural areas.

Voucher specimens and pollen reference slides of *C. peltata* L. have been filed in the collection of the Laboratory.

3.2. Pollen counts

Yearly counts of *Cecropia* pollen from six consecutive years (1987–1992) are shown in Table 1 and compared to the total pollen counts. Approximately 20% of the total airborne pollen were *Cecropia*. This percentage makes it the most abundant grain, well above that of any other grain in the local pollen spectrum.

When examined monthly, the percentage contributions of *Cecropia* to the total pollen counts were observed to reach up to 30–60%. This occurred from April to May when the recovery of *Cecropia* is at its highest (Fig. 2).

3.3. Pattern of pollen grain dispersal

Pollen grains of *Cecropia* were recovered year-round from air samples. The monthly recovery was highest around April, either as a single peak during that month, or as a March–May plateau. The exception was 1987 when a large early March peak occurred (Fig. 3).

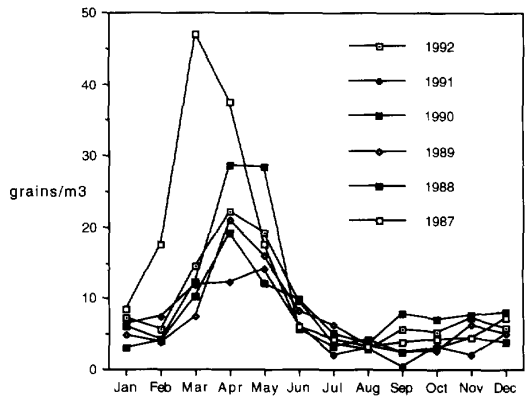

Fig. 3. Monthly average of *Cecropia* at Caracas.

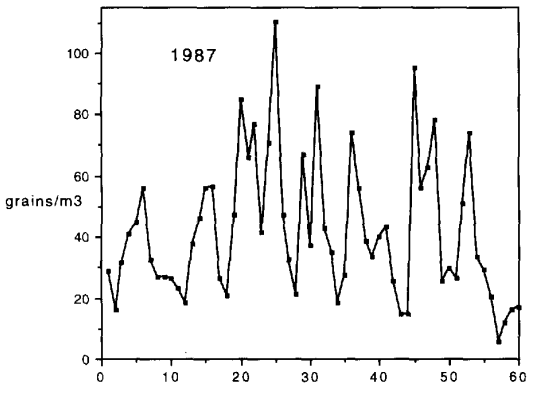

Fig. 5. Daily *Cecropia* counts during March–April.

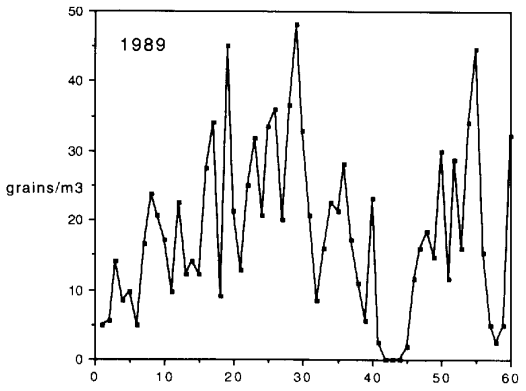

Fig. 6. Daily *Cecropia* counts during April–May.

An examination of the weekly average counts showed that the recovery of *Cecropia* pollen fluctuated widely, both during the high deposition season around the 20th week, and during the low deposition season at the end of the year. Fig. 4 is representative of this pattern.

Daily counts of *Cecropia* pollen also varied widely. This is shown for the months of highest recovery in 1987 and 1989 (Figs. 5,6). The fluctuation pattern for these 2 years is similar, although the amount of pollen recovered in 1987 almost duplicated that of 1989 (Table 1). The highest daily counts were 111 grains/m^3 on 25 March (Fig. 5); and 48 grains/m^3 on 30 April (Fig. 6).

The diurnal rhythm of *Cecropia* pollen grain abundance during peak months is shown in Fig. 7 for 1989. In April, which was the month with the highest counts (Fig. 3) the diurnal deposition had two peaks, one at noon of almost 30 grains/m^3, the other at 18:00 h of over 35 grains/m^3. During May the rhythm was similar, although peaks were less defined and the counts lower.

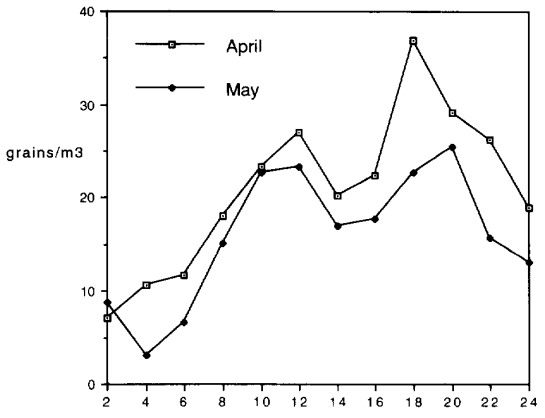

Fig. 7. Average diurnal rhythm of *Cecropia* in 1989.

4. Discussion

The Cecropias have attracted the attention of ecologists as fast-growing pioneer neotropical trees (Fleming and Willians, 1990). Their association with Azteca ants has been cited as a most conspicuous example of ant-plant mutualism in the Neotropics (Longino, 1989). Pollen grains of *Cecropia* are commonly found in honey from various localities (Kerkvliet and Beerlink, 1991; Ramalho et al., 1991). In spite of the research focused on these trees and their pollen grains, little data are available on the anemophily of *Cecropia* (Lewis, 1986).

We reported the recovery of *Cecropia* from air samples from our Caracas location almost a decade ago (Hurtado and Riegler-Goihman, 1984). During the past several years, we also recovered *Cecropia* pollen grains from other cities in Venezuela (Barquisimeto, Valencia, Litoral) and Colombia (Bogotá, Quibdó) (Hurtado et al., 1989; Hurtado, unpublished data).

The *Cecropia* pollen is most efficiently trapped by volumetric samplers, the Burkard trap being superior to the Rotorod sampler (Hurtado, unpublished data).

The small size of *Cecropia* pollen grains, the ample distribution of the tree and the fact that it belongs to the allergenic Moraceae family, make this species a prime suspect for causing pollinosis in the Neotropics. The data we have gathered on airborne pollen grain dispersal lend further support to this thesis.

Acknowledgements

The authors thank Henry Ramos for valuable help with the microscopic work of particle identification and counting; and Lorena Cariani for her assistance in processing the data.

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