(Scientific Datum)

Concentration of Atmospheric Pollen in Cartagena (Spain) from March 1993 to March 1994

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The pollen concentration in the atmosphere of Cartagena was studied using a volumetric capture device (Hirst sampler) from March 1993 to March 1994. The spring／summer period has the highest pollen concentration and the most pollen diversity.

Key words: Aerobiology, Aeropalynology, Pollen calender, Pollen dispersion, Biotic particulate matter.

Cartagena is a Mediterranean city with an important seaport situated in the Southwest of Europe, latitude 37° 37′ 08″ N, longitude 0° 59′ 11″ W, belonging to the Region of Murcia (Spain). We have been characterizing the atmospheric aerosol of Cartagena from 1986[1]. Our aerobiological study has been started on 1991, using the method developed by Suáez-Cervera & Seoane-Camba[2]. A Hirst sampler device came into operation on March 18, 1993, the eleventh week of the year. To show the pollen results of a whole year, we have included the first ten weeks pollinic counting, from 1994.

Materials and Methods

A Campionatore volumetric pollen and particles sampler (Hirst sampler device) model 2000 (Lanzoni, S.R.L.) was used for pollen capture. It is an exclusive programmed sampler for particles between 2 and 200 μm in diameter, fed with 220 V ± 10% and 50 Hz and a 30 W／h power output. The driving speed was 2 mm per hour, and the flow was adjusted at 10 l／min. A 345 mm Melinex tape (cod. 200.700) was set up around the sampler surface and impregnated with a silicon mixture, diluted in 300 ml of carbon tetrachloride and 200 ml acetone.

After the sampling, Melinex tape was cut into 48mm intervals and each piece was put on a 76×26 mm microscope slide and covered with glycerin-gelatin containing fuchsin as a staining agent. A microscope model Olympus BH-2 with D-Plan optics, and a 500× magnification was used for pollen counting (magnification of ocular lens 10×, and objective lens 50×). Four rows in each piece of Melinex tape

have been counted. The number of total pollen grains per cubic meter of air, was calculated taking into account the following equation:

$$Y = \frac{S_T}{S_L \cdot r \cdot v} \cdot x = \frac{672}{15.12 \cdot 4 \cdot 14.4} \cdot x = 0.77 \cdot x \qquad (1)$$

where:

Y grains/m³.

S_T Daily total impacted surface, mm².

S_L Measured surface for each raw, mm².

r Number of measured raws, non-dimensional.

v Total volume aspired in a day, m³/day.

x Number of pollen grains.

We have made use of the following keys for the identification: Lewis, W. H. et al. (1983)[3]; Valdés, M. J. et al. (1987)[4]; Faegri, K. et al. (1989)[5]; Suáez-Cervera, M. et al. (1990)[6]; Moore, P. D. et al. (1991)[7], and Reille M. (1992)[8].

Results

Forty five different pollinic taxa have been identified, in comparison with our reference pollen collection, which gathered more than 100 native plant pollen types. Table 1 shows the total pollen content gathered into families, as well as the average for each family represented in front of the total pollen content. Different identified pollinic types involve 35 families, being Urticaceae, Chenopodiaceae-Amaranthaceae, and Cupressaceae the most representative ones. They represent about 60% from the total pollinic airborne pollen picked up in our city. Oleaceae, *Quercus*, Pinaceae, Poaceae, *Plantago*, Asteraceae, *Platanus*, and *Zygophyllium* involve about 34% from the total pollen content. The other 25 different pollinic types mean 6% from the total pollen content. Fig.1 shows weekly average values for the most representative pollinic taxa through the period of analysis. We have used a logarithmic scale for pollen representation, and arranged the different concentrations into several ranks, measured in grains/m³. The scale has been included into the diagram.

Discussion

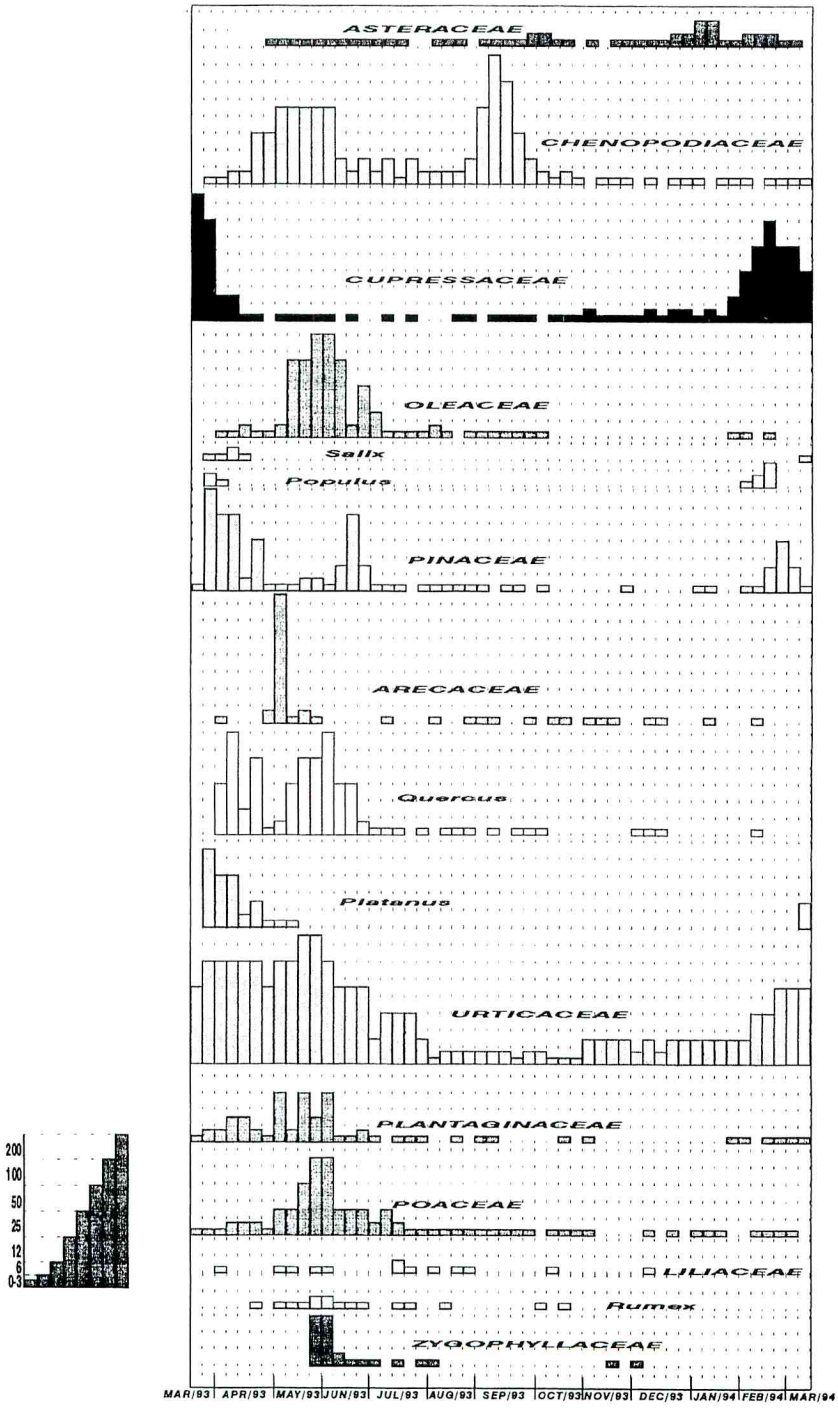
The climate of this area is defined as arid Mediterranean subtropical. Due to its location at the south Mediterranean side of Europe, this area has all the thermic and dynamic characteristics of the continental and maritime tropical wind flows, as well as Mediterranean and, exceptionally, Continental and Arctic Polar winds. The main rainfall characteristics in the area of Cartagena are its annual variability, with a small annual average, being less than 300 mm[9].

As for temperature, we can distinguish two categories: the Coastal climate with mild temperature, and the Continental climate, with sharp thermometric contrast. The annual mean temperature in this area is about 17.5 ℃. Wind is one of the most important climatic factors in this region. It normally flows from the first to the third quadrant all year long. All these bioclimatical conditions cause extended bloomings thorough out the year. Therefore, Chenopodiaceae-Amarantaceae, Urticaceae, Plantaginaceae, Poaceae, and Cupressaceae types have a broad blooming season. The highest pollen concentrations are found in May and June. The minor pollen concentrations are found in January, July, August, November, and December.

Table 1. Total pollinic concentration. This table shows the average values for thirty five main pollinic types identified in the atmosphere of Cartagena for the considered period. Results are expressed in grains／㎥.

FAMILY	Total	%
Urticaceae	9643	33.51
Chenopodiaceae-Amaranthaceae	4111	14.28
Cupressaceae	3410	11.85
Oleaceae	2237	7.77
Fagaceae *Quercus*	1826	6.35
Pinaceae	1701	5.91
Poaceae	1359	4.72
Plantaginaceae *Plantago*	830	2.88
Asteraceae	623	2.16
Platanaceae *Platanus*	589	2.05
Zygophyllaceae *Zygophyllium*	406	1.41
Salicaceae	216	0.75
Arecaceae	184	0.64
Poligonaceae *Rumex*	119	0.41
Rhamnaceae *Rhamnus*	79	0.28
Fabaceae	75	0.26
Liliaceae	50	0.17
Myrtaceae *Eucalyptus*	48	0.17
Brassicaceae *Brassica*	39	0.14
Apiaceae *Foeniculum*	31	0.11
Ericaceae	27	0.09
Euphorbiaceae *Mercurialis*	24	0.08
Casuarinaceae *Casuarina*	22	0.08
Anacardiaceae *Schinus*	16	0.06
Thymelaceae	15	0.05
Betulaceae *Alnus*	12	0.04
Tamaricaceae *Tamarix*	11	0.04
Cyperaceae *Carex*	11	0.04
Cannabaceae	9	0.03
Hipocastanaceae *Aesculus*	4	0.01
Lauraceae	3	0.01
Rosaceae *Rubus*	3	0.01
Labiatae	2	0.01
Typhaceae	2	0.01
Cucurbitaceae	1	<0.01
TOTAL	28778	

Fig. 1 Pollen calendar from Cartagena. A logarithmic scale is shown at the left of the figure, expressed in grains/m³.



According to the Allergological Spanish Society, 22% of the Spanish population suffers from some kind of allergenic disease. Among these affections, pollinosis represents a large number, and has increased rapidly over the last years. Pollen and spores present in the atmosphere may be native or foreign in origin. Therefore, for the development and understanding of a pollen calendar, climatological, ecological, and botanical information must be collected. The monitoring of airborne pollen constitutes a powerful tool for prevention and taking hygienic steps for symptomatic patients. On the other hand, the combination between climatological and botanical information and their mathematical formulations allows the development of forecasting dispersion models, which must be verificated and calibrated according to experimental data provided after long periods of time.

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カルタヘナ（スペイン）における 1993 年 3 月から 1994 年 3 月の空中花粉濃度

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スペインの地中海沿岸都市カルタヘナにおける空中花粉調査結果を紹介する．調査は容量法の花粉測定装置であるハースト・サンプラーを用いて 1993 年 3 月から 1994 年 3 月までの 1 年間行った．空中花粉は春から夏にかけて最も多く，種類においても最も多かった．代表的な花粉はイラクサ科，アカザ科・ヒユ科とヒノキ科に属し，調査期間中の花粉飛散総数の約 60% を占めた．残る約 34% をオリーブ科，コナラ，マツ科，イネ科，オオバコ，キク科，スズカケノキと *Zygophyllium* が占め，他の 25 の花粉種が 6 % ほどみられた．