

Short communication

A one-year aeropalynological study at Ankara, Turkey

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Abstract

Atmospheric pollen was collected with a Burkard spore trap in Ankara, Turkey from January 1993 to January 1994. The sum of the annual totals of the daily concentration of pollen, belonging to 44 taxa, was 57,735. A relatively high pollen concentration was recorded in June which could be caused by higher wind speed and lower rainfall. Pinaceae, Cupressaceae/Taxaceae, Gramineae, *Platanus*, *Populus*, Moraceae, Chenopodiaceae/Amaranthaceae, *Acer*, *Quercus*, *Betula*, *Salix*, *Rumex* and *Plantago* are found to be the dominant pollen types in the atmosphere in Ankara.

1. Introduction

Weather conditions probably have an important influence on the numbers of pollen grains in the atmosphere. Airborne pollen in the Ankara atmosphere from 1990–1993, their percentages, concentrations and pollen season periods in relation to some climatic factors were examined by İnçeoğlu et al. (1994). The first aim of this study is to present the results of the airborne pollen concentration in the atmosphere of Ankara during another one-year period (1993–1994), in order to compare them with the previous three-year pollen calendar and to correlate these with some meteorological parameters. Secondly, our analysis shows that pollen concentrations in the Ankara area change from year to year. Therefore, this study is of importance in the preparation of a 10-year pollen calendar for the Ankara atmosphere.

2. Materials and methods

The Burkard seven-day recording volumetric trap was placed on the roof of the Department of Geology, University of Ankara, at a height of 15 meters above the ground. The air was sucked at a flow rate of 10 litres per minute, and pollen grains impacted onto tapes

which were coated with a thin film of vaseline-paraffin wax in toluen. The tape was then mounted in glycerin jelly (Hirst, 1953). Twelve transverse traverses were counted on each slide, at a magnification of $\times 400$. Counts were made at two hour intervals and total daily counts were converted to no of pollen grains per cubic meter of air (Ogden et al., 1974). Meteorological data were obtained from the Meteorological station in Ankara.

3. Results and discussion

During the observation period (1993–1994), 44 taxa were identified in the Ankara atmosphere (Table 1). As in the previous three years of survey from 1990 to 1993, tree pollen predominantly contributed to the total pollen sum with a percentage of 76%, followed by grasses 14% and herbs 10%.

The seasonal variation in tree, herb and grass pollen during the one year period is presented in Figure 1. Quantities of pollen from trees were higher than those from herbs and grasses, forming five peaks. The first peak occurred in weeks 12–15 (March–April), caused mainly by pollen from Cupressaceae/Taxaceae (8621), *Populus* (2871), *Acer* (1408), *Salix* (420),

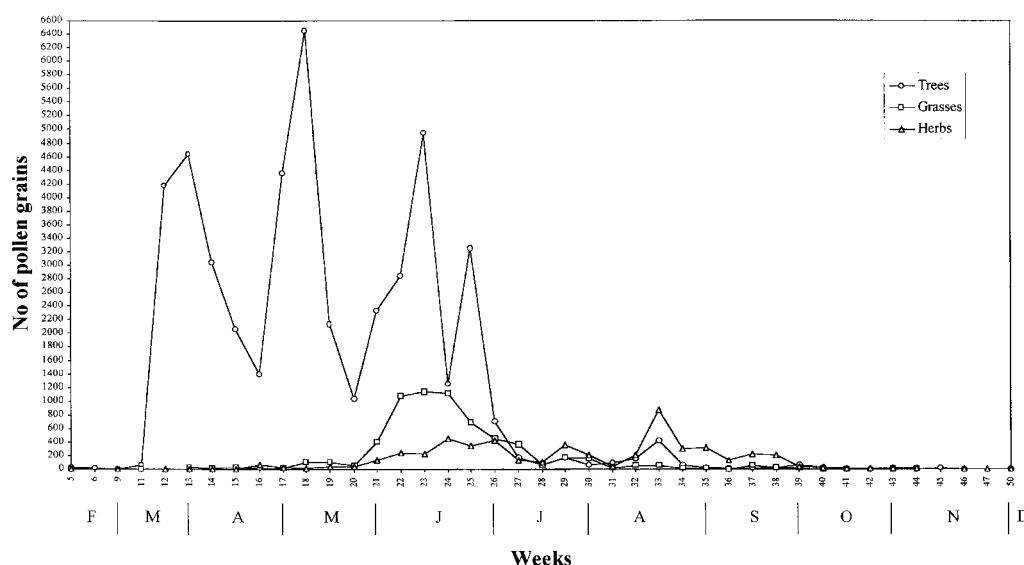


Figure 1. Total weekly variation in atmospheric pollen from 1993–1994.

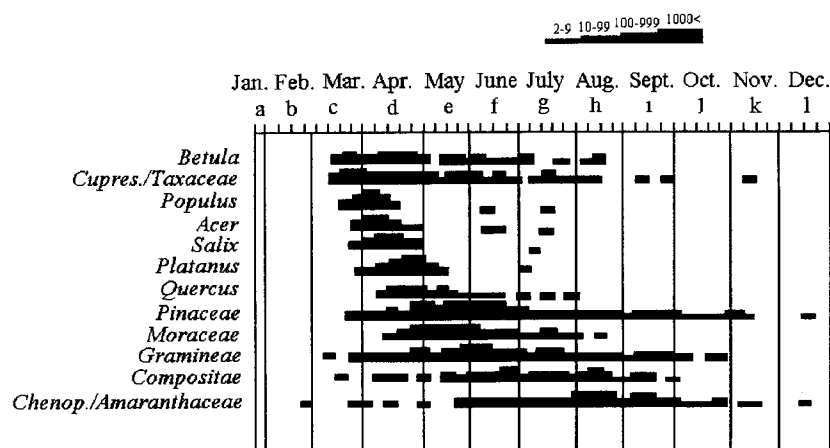


Figure 2. One year (1993–1994) pollen calendar in Ankara, Turkey.

Betula (352) and *Ulmus* (160). In weeks 16–19 (April–May) a second peak was observed caused by airborne pollen from Pinaceae (5180), *Platanus* (5029), *Quercus* (1176), *Morus* (869) and Rosaceae (77). The third peak occurred in weeks 22–23 (June) with an increase in the numbers of pollen from Pinaceae and Rosaceae and a decrease in that of *Platanus* and *Quercus*. *Ailanthus* pollen also contributed to the third peak. The continued pollination of *Ailanthus* (90), Pinaceae (2947) and Cupressaceae/Taxaceae (148) formed the fourth peak in the 25th week (end of June). The fifth peak in the 33rd (August) week was caused by an increase in the pollen of *Robinia* and *Maclura*. Grass pollen was recorded from the end of March

to the end of October with a maximum value in June (Figure 1), as in the previous three years of observation.

Seasonal totals of daily concentrations for grass pollen were higher in 1993 than 1992 (2070) and 1990 (5298). This was probably caused by the higher wind speeds in June 1993 (2.2 m/sec) than in June 1992 (1.6 m/sec) and June 1990 (1.8 m/sec). McDonalds (1980) shows that wind velocity has the greatest influence on the numbers of grass pollen in atmosphere.

Herb pollen was observed from the first week of March to December. In weeks 24–26 (June) there was an increase in the pollen from *Rumex*, Compositae, *Plantago* and Leguminosae. In the 33rd

Table 1. Annual totals of daily pollen counts. Ankara 1993–94

<i>Acer</i>	1477	<i>Artemisia</i>	157
<i>Aesculus</i>	65	Boraginaceae	15
<i>Alnus</i>	4	<i>Campanula</i>	2
<i>Ailanthus</i>	329	Caryophyllaceae	13
<i>Betula</i>	959	<i>Carex</i>	79
<i>Carpinus</i>	7	Compositae	716
Cupress/Taxaceae	11013	Cheno/Amaranthaceae	2212
Ericaceae	4	Cistaceae	41
<i>Fraxinus</i>	20	Cruciferae	128
<i>Juglans</i>	37	<i>Euphorbia</i>	27
<i>Maclura</i>	141	Gramineae	6282
<i>Morus</i>	2154	Labiatae	56
Oleaceae	94	Leguminosae	250
Pinaceae	18721	Liliaceae	45
<i>Platanus</i>	5047	Malvaceae	2
<i>Populus</i>	2894	Papaveraceae	12
<i>Quercus</i>	1400	<i>Plantago</i>	448
<i>Robinia</i>	471	Rubiaceae	53
Rosaceae	374	<i>Rumex</i>	510
<i>Salix</i>	789	Scrophulariaceae	25
<i>Tilia</i>	9	Umbelliferae	326
<i>Ulmus</i>	166	<i>Urtica</i>	161
TOTAL (AP)	46175	TOTAL (NAP)	11560
TOTAL (AP+NAP)			57735

AP: Arboreal pollen

NAP: Nonarboreal pollen

week (August) Chenopodiaceae/Amaranthaceae pollen became abundant. The pollination period of herbs in 1993–1994 was longer than in 1990–1993. In addition, there were higher quantities of pollen from Compositae, *Rumex*, Leguminosae and *Carex* pollen concentrations in Summer during 1993–1994.

A reason for the greater amount of herb pollen in 1993 is higher rainfall during May (88.1 mm). Rainfall during spring, caused herbs growth and increased flowering intensity in the summer.

For the twelve taxa with annual totals which are more than 10% of the sum of annual total the weekly variations are shown in Figure 2.

The correlation between the monthly airborne pollen concentration and the monthly meteorological factors over the period January 1993–January 1994 is shown in Figure 3. In 1993 the pollen season began in February, while it began a month later, in March, in the previous year (1992). This may be attributed to the fact that the mean February temperature (-0.7°C) in 1993 was higher than that in 1992, being the latter -3.8°C . In 1993 there was no significant change in pollen concentration during April and May. Steady

pollen counts in May may be attributed to high rainfall during this month. The heavy rain in May may have delayed the stamens to open, and may have depressed pollen dispersal (McDonalds, 1980) showed that high and continuous rainfall depressed pollen dispersal. In June the increase in the total pollen concentration was caused by the beginning of the pollination of herbs and dispersal of pollen of taxa such as Pinaceae, which might have delayed the opening of their stamens because of the rainfall in May. Boydak (1995) found that *Pinus silvestris* L. pollen dispersal reaches higher levels after short rainfall periods. This can also be correlated with the greater wind speed and lower rainfall during June. The lower pollen concentration in July is attributed to the decline in pollen production by the trees at the end of the flowering season rather than weather conditions. The higher rainfall during August lowered the pollen concentration further. Very low values of airborne pollen were recorded from September to December 1993. Another reason for the greater amount of pollen in 1993 than 1990 and 1992 are higher precipitation during December 1992 (47 mm) and January 1993 (28.8 mm). Storage

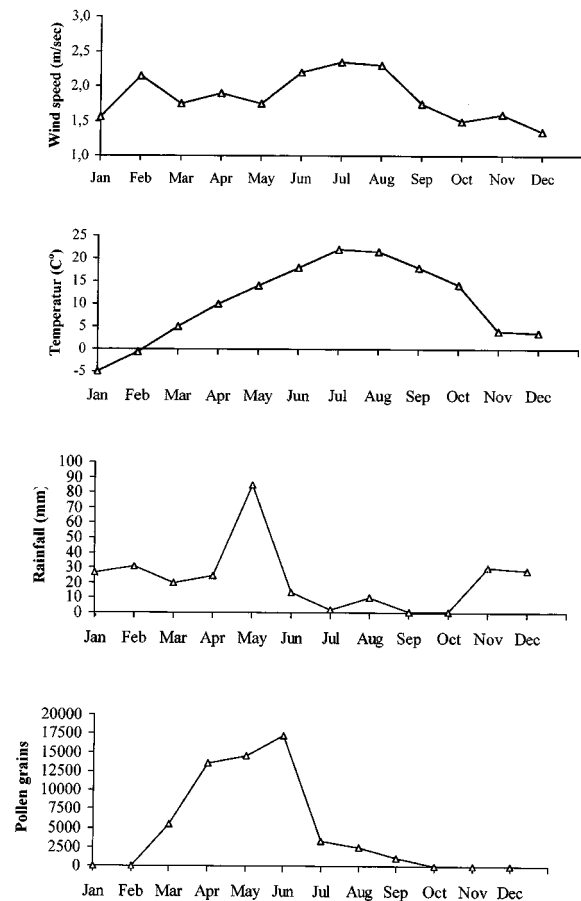


Figure 3. Monthly variation in atmospheric pollen and weather conditions over the period Jan. 1993–Jan. 1994.

of water in the soil during winter, might cause plant growth and increased flowering intensity in spring.

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