Pollen calendar of Malaga (Southern Spain), 1991–1995

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Abstract

A pollen calendar has been constructed for Malaga (Southern Spain) based on the data obtained during 5 years (1991–95) using a Burkard spore trap set up approximately 1 km west of the city. The calendar only reflects taxa which showed a 10-day mean pollen concentration equal to or greater than 1 grain of pollen/m³ of air. Twenty nine taxa are included, of which the three commonest (Olea europaea, Cupressaceae and Quercus) represent approximately 54% of the total annual count and the following four (Chenopodiaceae-Amaranthaceae, Gramineae, Urticaceae and Plantago) represent 21.3%. The greatest diversity of pollen types occurs during Spring and the highest concentrations from February to June, when approximately 85% of the total annual pollen is registered. Several peaks occur during the year principally due to Cupressaceae in February, Quercus in April, Olea europaea in May and Casuarina in October, although substantial quantities of Urticaceae, Chenopodiaceae-Amaranthaceae, Plantago and Gramineae are also detected in April and May. The pollination of important allergy-producing taxa such as olive and grass takes place earlier in Malaga than in cities more inland, so that the data presented here may be useful in predicting the beginning of the pollination season of these localities. © 1998 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

To obtain information on the air pollen content in Malaga, a very popular tourist resort, the Plant Biology Department of Malaga University in collaboration with the Spanish Aerobiological Network (REA) set up a Burkard spore trap in the University Campus in May 1991, since then continuous readings have been made. As regards pollen diversity, its quantity and seasonal distribution, several papers have been published (Cabezudo et al., 1994; Recio et al., 1995) although we decided to take samples over a longer period (at least 5 years) before constructing a pollen calendar for Malaga.

Due to the close relation between pollen quantity and quality of a given area and the climate, we first describe the geographical situation and general climatic characteristics of Malaga. For a greater understanding of the results obtained we study the climate’s behaviour during the sampling period.

1.1. Geographical situation and predominant vegetation

The city of Malaga lies in the south of the Iberian Peninsula on the shores of the Mediterranean Sea (36° 47' N, 4° 19' W). It sits on the alluvial plains of the rivers Guadalhorce and Guadalmedina, extending eastwards along a narrow coastal strip which is hemmed in by mountains very close to the sea.

As in any urban area, the most significant aspects of the flora are the deterioration of the natural vegetation, an important component of ornamental plants and an increase of weeds. The city is close to plantations of olives, citrus, almond, vine, sugar cane, and typical ‘huertas’ or small-holdings, growing a variety of products. The natural vegetation has been relegated to small stands of cork-oak, holm-oak and kermes-oak and, in...
its more degraded stage, to silicicolous scrub and thyme thickets. In many places the natural vegetation has been replaced by repopulations of pine, which favour pasture land.

1.2. Climatology

Malaga has a Coastal Mediterranean climate with dry Summers and mild Winters. The mean annual temperature is 18°C, January being the coldest month and August the hottest. The annual average rainfall is 575 mm, the rain falling principally in Autumn (October–December) and Winter (January–March). The rain is frequently torrential, so that in a matter of hours quantities of water similar to the monthly average can fall.

There are very few cloudy days (average 57.9 p.a.), its 3000 h of sunshine making it one of the sunniest places in the Iberian Peninsula. This fact, together with the aforementioned temperature regime, influences the local flora and brings forward the flowering season compared with that of other inland sites.

The city is almost completely surrounded by mountains, which cause a special wind regime. As in other coastal localities nearby with a similar setting, the predominant winds are easterly and westerly (Fig. 1). Northerly winds take on a NW direction, coming through the Guadalhorce 'gap' and constituting the locally denominated 'terral' winds. The wind direction plays an important role in the airborne pollen content since south-easterly winds blowing off the sea partially clean the atmosphere, sweeping the pollen towards the interior. Those from the north-west, on the other hand, are capable of bringing with them large quantities of pollen from distant inland sites.

Relative humidity in Malaga is always high although it varies with the temperature, rainfall (presence or absence) and wind direction. This parameter is, as is to be expected, closely related to rainfall and indirectly with temperature. The fact that humidity remains high throughout the year is due to the nearby presence of the sea. However, it falls when there are strong NW winds which bring dry air from the interior, as occurs mainly in Spring and Summer when the temperatures are high. When winds blow from the SE (off the sea), relative humidity increases.

2. Materials and methods

Sampling was carried out by means of Hirst's volumetric method (Hirst, 1952) using a 7-day recording Burkard® spore trap on the top of the Medicine Faculty of University of Malaga, approximately 15 m above ground level. The faculty is situated 1 km west of the city in an open area with no nearby buildings to interfere with air circulation. The trap works continuously and aspirates a constant air flow of 10 l per min.

To count the different pollen types, four longitudinal scans per slide were made using a lens × 40 (0.45 mm microscopic field) according to the method proposed by Domínguez et al. (1991). The pollen concentrations are expressed as number of pollen grains/m³ of air, the mean daily values being used for the tables and graphs.