

Airborne pollen concentrations in Sierra de las Nieves National Park (southern Spain) and its allergenic potential

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Sierra de las Nieves (southern Spain) was declared National Park in 2021. Around 100 000 people visit the park every year and a high percentage of them may suffer allergy symptoms due to the presence of some pollen types in the atmosphere. Therefore, it is of great interest to determine the seasonality and intensity of the airborne pollen concentrations in there, as well as their allergenic potential.

Despite the atmospheric pollen content has been monitored since 2018 in the park, the allergenic potential of the pollen levels detected has never been studied. The aim of this study was to determine the allergenic potential of the concentrations registered in the atmosphere of Sierra de las Nieves National Park as well as the seasonality of different pollen types.

Airborne pollen was sampled by means of a Hirst-type volumetric pollen trap installed in “Las Conejeras” recreational area, within the domains of the National Park. In this study, data from the year 2022 were considered. Pollen samples were mounted and counted following the methodology proposed by the Spanish Aerobiology Network (REA) (Galán et al. 2007). Daily pollen concentrations were expressed as pollen grains/m³ air, and the allergy risk was established according to the thresholds established by the REA (Galán et al. 2007). Data were managed by means of the AeRobiology package, implemented in R software.

Spearman correlations test between daily pollen concentrations and the main meteorological parameters were performed (i.e., wind patterns, wind speed, relative humidity, precipitation, and maximum, mean and minimum temperatures), in order to determine the environmental conditions that favour pollen release and dispersion.

Airborne pollen was detected during almost the whole year, with the highest concentrations being reached during the period April-June (89.19% of the total annual pollen integral) (Figure 1). The most abundant pollen types were *Quercus*, *Olea*, *Castanea*, Poaceae, Cupressaceae, *Pinus*, *Plantago*, Urticaceae, Apiaceae and Amaranthaceae, in order of abundance.

The pollen type with the highest number of days with concentrations of high allergenic potential was *Quercus* (25 days), followed by *Castanea* and Poaceae (8 days), the period with the highest risk for allergy sufferers being April-July.

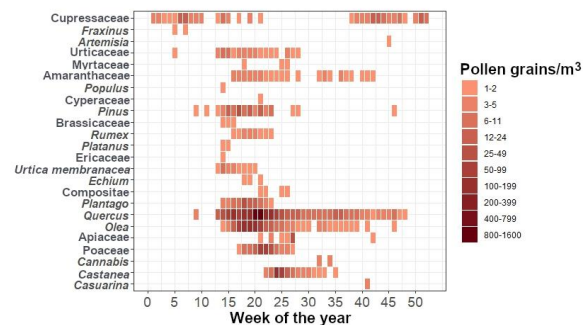


Figure 1. Seasonality and intensity of the airborne pollen concentrations detected in the atmosphere of Sierra de las Nieves National Park during 2022

In general, high temperatures favour pollen release, increasing airborne pollen concentrations. On the contrary, precipitation and high relative humidity favour pollen precipitation, reducing airborne pollen concentrations. Wind dynamics play different roles depending on the pollen type considered, due to the heterogeneous distribution of the pollen emission sources.

According to these results, allergy sufferers should consider the pollination period of the pollen types which they are allergic to, when planning their visits to the National Park, especially in days with high temperatures and low relative humidity, meteorological conditions that tend to increase pollen concentrations.

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