



## **Airborne pollen in urban parks in Thessaloniki, Greece: pollen taxa and concentrations and associated allergy risks**

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**Background** - Pollen in the air reflects vegetation on the ground and, therefore, pollen monitoring provides valuable information on vegetation dynamics. Concurrently, it is an essential tool for assessing the air quality with respect to allergenic particles of biological origin. Urban parks provide a series of ecosystem services, but they can also act as sources of allergenic particles, thus impacting negatively human health. We studied airborne pollen in Thessaloniki, at breast height, in urban parks of the city that differ in a number of features, and also at rooftop level, at the aerobiological station of the city. We aimed at (i) identifying the plant taxa that considerably contribute pollen to the air of the parks, (ii) estimating pollen concentrations in each park and how they vary with time, and (iii) evaluating parks after the concentrations of the most abundant and allergenic pollen taxa.

**Methods** - Six urban parks (sampling stations) were selected in the city of Thessaloniki. Sampling was conducted in 2021, with the use of portable volumetric samplers. Once per week, 20-min air samples were collected from all stations. Pollen grains in each sample were counted and identified under an optical microscope at x400 magnification and were expressed as pollen grains m<sup>-3</sup> per unit of time. Only taxa contributing with more than 1% of the total yearly sum, as recorded at the aerobiological station of the city, were taken into consideration. We calculated their main pollen seasons per station using the percentage method. Then, we explored their concentration and pollen season patterns in order to identify the main pollen sources across Thessaloniki as well as the parks of the city that are associated with higher allergenic risk.

**Results** - A total of 44 pollen taxa were detected in the air near the ground, ranging between 33 and 37 in each station. Cupressaceae, Quercus, Urticaceae, Platanus, Pinaceae, and Poaceae were the most abundant taxa; they are also among the most allergenic. These six taxa accounted for 84% to 93% of the total airborne pollen in the urban parks studied. Their main pollen season (MPS) started in all stations, in late January to February, with Cupressaceae pollen appearing first and Quercus pollen last (April), but durations differed. For all pollen taxa, the peak was observed from late February (Cupressaceae) to early July (Poaceae). The seafront park had the lowest concentration of airborne pollen for four of the most abundant taxa (Cupressaceae, Quercus, Pinaceae and Poaceae). Therefore, it can be considered as of the lowest allergenic risk. Nevertheless, this does not hold true for Urticaceae pollen, the concentration of which was the highest there.

**Conclusion** - Airborne pollen is not homogeneously distributed in the city. Pollen abundance of the different taxa is site specific, depending on the local vegetation, hence, the associated allergy risk is not the same everywhere. The seafront area of the city is characterized by the lowest amounts of allergenic pollen from woody taxa, except for Platanus, but it has high concentrations of Urticaceae pollen.

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**Co-authors:** TSIGGANI-PAPANIKOLAOU, Olga (Aristotle University of Thessaloniki); Dr LAZARINA, Maria (Aristotle University of Thessaloniki); Dr LEONTIDOU, Cleopatra (Technische Universität Kaiserslautern); Prof. CHANLIDOU, Effie (Aristotle University of Thessaloniki); Prof. VOKOU, Despoina (Aristotle University of Thessaloniki)

**Presenter:** CHARALAMPOPOULOS, Athanasios (Aristotle University of Thessaloniki)