

Ornamental trees and their relationships with pollen concentrations in three cities in the SW of Iberian Peninsula

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Introduction: Ornamental urban trees provide a high number of benefits; nevertheless, some damage or negative factors may be included, as being responsible for pollen allergies. To assess properly airborne pollen influence on inhabitants it is necessary to take into account pollen sources distribution. The aim of this work was to analyze the importance of ornamental trees distribution and try to relate it with airborne pollen records using volumetric pollen traps.

Material and Methods: Three localities in the SW of Iberian Peninsula were studied, Plasencia, Don Benito and Zafra, belonging to the Extremadura region (Spain). Volumetric Hirst pollen traps recorded pollen continuously for three years (from March 2011 to March 2014). Ornamental trees in streets, squares and parks were identified, counted and mapped, as well as those trees that appeared 100 m around the urban perimeter with allergenic significance, such as *Cupressus* sp. and *Olea europaea*, and due to its proximity and its influence in the pollen content inside the urban area. We studied the relationship between the airborne pollen records and the number of trees, closeness to traps, pollination system and wind direction.

Results: A total of 17635 trees belonging to 67 species were counted. Density of trees per 1000 inhabitant ranged 130-270. About 80% of ornamental tree species showed total or partial entomophilous pollination system. Five species represent more than 50% of total ornamental trees: *Platanus hispanica*, *Olea europaea*, *Ulmus minor*, *Acer negundo* and *Melia azedarach*. More than 4/5 of airborne pollen comes from trees. Average total pollen concentration ranged 93-102 in g m^{-3} . A close relationship between the abundance of ornamental trees, its distribution within the city and wind direction with airborne pollen concentrations were appreciated; in Don Benito for *Platanus* (15 g m^{-3}), *Cupressaceae* (5 g m^{-3}) and *Arecaceae* (0.5 g m^{-3}), in Plasencia for *Pinaceae* (2.4 g m^{-3}), *Fraxinus-Phillyrea* (1.6 g m^{-3}) and *Alnus* (0.6 g m^{-3}), and in Zafra for *Olea europaea* (24 g m^{-3}) and *Ulmus* (0.5 g m^{-3}).

Conclusions: The mapping of ornamental trees within urban areas is useful information for detecting possible local patterns of abundance in the concentrations of some pollen types. Therefore, *Alnus glutinosa*, *Fraxinus* sp. in Plasencia, *Arecaceae* sp. and *Platanus hispanica* in Don Benito or *Ulmus minor* in Zafra were planted as ornamental trees with a high frequency, and this fact seems to be related with their pollen concentrations.

Keywords: ornamental trees, urban green infrastructure, airborne pollen.