

Pla a 1 in the bioaerosol of Valladolid (Spain) and its implications on public health

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Introduction

Platanus acerifolia (Aiton) Willd. is an abundant ornamental plant in the world. In the city of Valladolid (Spain) the different methods of pruning affect the flowering of plane tree.

Primary biogenic particles emitted by vegetation form part of bioaerosols, and also including among others, pollen grains and small fragments of plants (Després *et al.*, 2007).

Pla a 1, the major allergen of *Platanus* pollen, is a 18 kDa protein nonglycosylated associated with invertase inhibitors (Arilla *et al.*, 2005).

This study aims to investigate the relationship between the atmospheric concentration of Pla a 1 aeroallergen, the *Platanus* pollen and the different air pollutants.

Material and Methods

The period of this study includes the *Platanus* main pollen season, from March to June in the years 2009, 2010 and 2011.

The pollen sampling was carried out using a Hirst-type volumetric trap (Lanzoni©) for pollen grains and a Burkard Cyclone sampler (Burkard©) for Pla a 1 allergen. Allergens were quantified by modified ELISA.

Air pollutant (PM-10, PM-2.5, NO and NO₂, carbon monoxide, sulfur dioxide, ozone and benzene) levels have been provided by the Valladolid Air Pollution Control Network.

We have used Spearman's test through the SPSS 14.0 statistical package in order to establish potential correlations between daily pollen and Pla a 1 concentrations and different air pollutants.

Results

During the *Platanus* pollination period, the aerobiological dynamics of *Platanus* pollen grains, Pla a 1, particulate matter and nitrogen oxides are quite alike for 2009, 2010 and 2011.

We got, with a level of significance of 0.01, positive correlations between concentration of *Platanus* pollen and levels of aeroallergens.

Positive correlations are found between Pla a 1 and particulate matter and between Pla a 1 and nitrogen oxides NO and NO₂. Also, negative correlations are found between the aeroallergen and ozone.

The higher concentrations of Pla a 1 are recorded with decreases in ozone levels, due to lower oxidative action of this, which has been shown in studies in vitro (Ribeiro *et al.*, 2013).

Conclusions

Platanus pollen is the most abundant pollen in the atmosphere of the city of Valladolid.

The higher levels of Pla a 1 are produced with a high concentration of *Platanus* pollen. The first 20 days of April may be considered periods of risk to human health.

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