



# Influence of atmospheric pollutants on pollen concentrations of *Chenopodia-Amaranthaceae*, *Fraxinus* and *Myrtaceae*

Air plays an important role in the health of the population (World Health Organization, 2021). Airborne bioaerosols such as pollen grains cause pulmonary and cardiovascular diseases in allergic citizens, around 30% of the world's population (Brunekreef et al., 2000). Among the most allergenic pollen grains are those of the families of Poaceae, Oleaceae, Urticaceae, Compositae, and *Chenopodia-Amaranthaceae*. The allergenicity of these pollen types can be increased due to atmospheric pollution (Cuinica et al., 2015).

On the other hand, atmospheric compounds such as carbon dioxide can increase pollen production (Zhang et al., 2013), and pollutants as ozone, sulfur dioxide, carbon monoxide, nitrogen oxides, and particulate matter, as well as meteorological variables show effects on pollen concentrations, highlighting the importance of environmental conditions on pollen levels (Cariñanos et al., 2021). The aim of our study is to analyze the influence of O<sub>3</sub>, NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, PM<sub>1</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> on the concentrations of *Fraxinus*, *Chenopodia-Amaranthaceae* and *Myrtaceae* pollen types in the city of Badajoz (SW, Spain).

The concentrations of atmospheric pollutants were obtained from the studied city air quality monitoring unit from 2010 to 2019. The concentrations of the pollen types under study were determined using a volumetric sampler with the Hirst methodology. The relationship between atmospheric pollutants and pollen concentrations was studied through Spearman correlations, testing for a significance level of 95 and 99% with the R studio software.

The obtained correlations for the different pollen types vary depending on the pollutant. Ozone showed the highest correlation, being positive for *Chenopodia-Amaranthaceae* (0.42) and *Myrtaceae* (0.37) and negative for *Fraxinus* (-0.36). The positive and negative values obtained are in line with the literature (Oduber et al., 2019; Rahman et al., 2019). Nitrogen oxides had statistically significant negative correlations with *Chenopodia-Amaranthaceae* (-0.26 NO, -0.07 NO<sub>2</sub> and -0.12 NO<sub>x</sub>) and with *Myrtaceae* (-0.20 NO, -0.10 NO<sub>2</sub> and -0.13 NO<sub>x</sub>) positive correlations for the pollen type *Fraxinus* (0.24 NO, 0.19 NO<sub>2</sub> and 0.23 NO<sub>x</sub>), the latter being similar to a previous study (Puc, 2012). Particulate matter levels had statistically significant positive correlations for *Chenopodia-Amaranthaceae* and negative correlations for *Fraxinus* as well as the values published in the previous studies (Oduber et al., 2019; Puc, 2012; Rahman et al., 2019). Carbon monoxide levels had statistically significant positive values for *Chenopodia-Amaranthaceae*, similar to studies cited above. The results showed different influences of pollutants on pollen grain concentrations. In general, pollutants have a similar correlation on

*Chenopodia-Amaranthaceae* and *Myrtaceae* pollen types but the opposite correlation on *Fraxinus* pollen types.

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### Keywords

Pollen, Pollutants and Correlation

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