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Cupressaceae Pollen in the City of Évora, South of Portugal: Disruption of the Pollen during Air Transport Facilitates Allergen Exposure

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Abstract

Research Highlights: Daily airborne Cupressaceae pollen disruption ranged from 20 to 90%; relative humidity (RH), rainfall and atmospheric pressure (AtP) were the major meteorological determinants of this phenomenon. *Background and Objectives:* Cupressaceae family includes several species that are widely used as ornamental plants pollinating in late winter-early spring and might be responsible for allergic outbreaks. Cupressaceae pollen disruption may favour allergen dissemination, potentiating its allergenicity. The aim of this work was to characterize the Cupressaceae pollen aerobiology in Évora, South of Portugal, in 2017 and 2018, particularly the pollen disruption, and to identify the meteorological parameters contributing to this phenomenon. *Materials and Methods:* Pollen was collected using a Hirst type 7-day pollen trap and was identified following the standard methodology. Temperature, RH, rainfall, global solar radiation (Global Srad), AtP, wind speed and direction were obtained from a weather station installed side-by-side to the Hirst platform. Back trajectories (12-h) of air masses arriving at Évora were calculated using the HYSPLIT model. *Results:*Cupressaceae pollen index was higher in 2017 compared to 2018 (>5994 and 3175 pollen/m^3, respectively) and 36 ± 19% (2017) and 64 ± 17% (2018) of the pollen was disrupted. Higher levels of disrupted pollen coincided with RH > 60% and rainfall. Temperature, Global Srad and AtP correlated negatively with pollen disruption. Wind speed and wind direction did not significantly correlate with pollen disruption. Intra-diurnal pollen pattern peaked between 9:00 am–2:00 pm, suggesting local origin, confirmed by the back trajectory analysis. Intra-diurnal pollen disruption profile followed hourly pollen pattern and it negatively correlated with AtP, temperature and Global Srad but was uncorrelated with RH. *Conclusions:* The results suggest that RH, rainfall and AtP are the main factors affecting airborne Cupressaceae pollen integrity and in conjunction with daily pollen concentration may be used to predict the risk of allergy outbreaks to this pollen type. View Full-Text

Keywords: Cupressaceae pollen; pollen disruption; meteorological parameters; back trajectories

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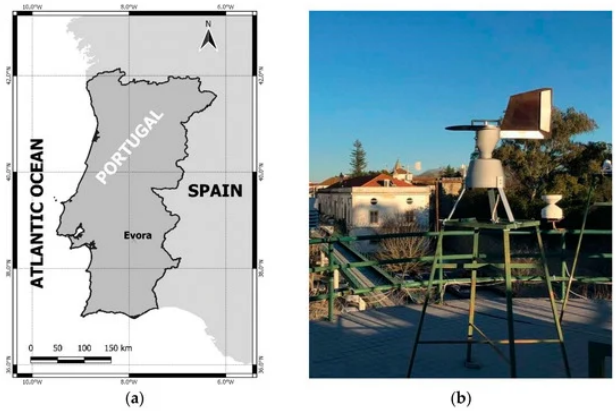

Figure 1

Supplementary Material

Supplementary File 1:
PDF-Document (PDF, 13967 KiB)