

# Allergenic pollen calendar, prevalence of pollen allergy symptomatology and pollen sensitization in Alentejo Region (South Portugal) are changing: trends

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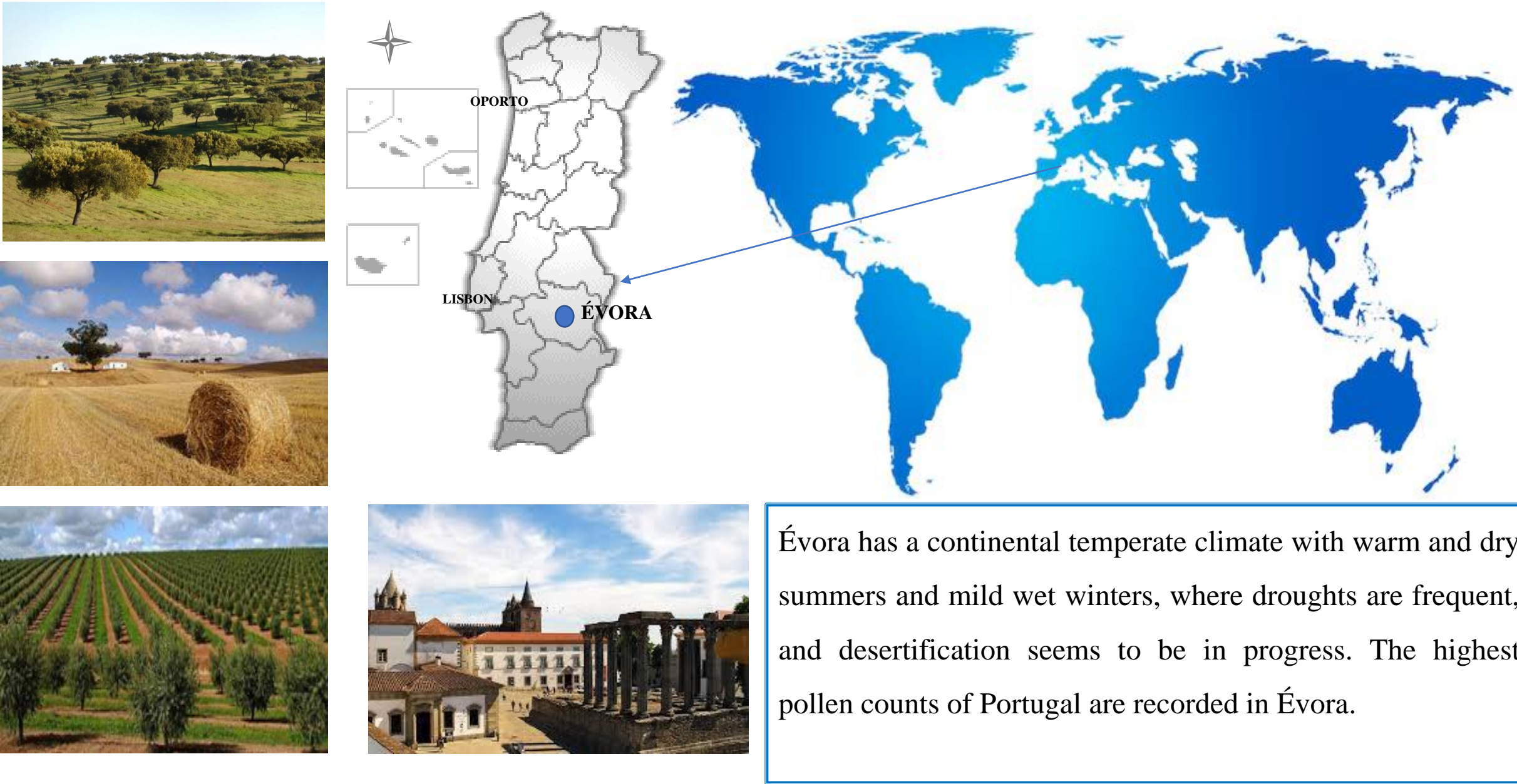
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## INTRODUCTION

Pollen is one of the main sources of aeroallergens. Allergic rhinitis (AR), rhinoconjunctivitis (RC) and asthma (AA) are the main respiratory allergic diseases associated with aeroallergens exposure which prevalence tend to increase. Such chronic diseases and symptomatology have a significant negative impact on patient’s life quality with consequent economic impact, high health care system costs and loss of productivity due to the interference with the performance at work or at school. Usually it is frequent to associate seasonal symptoms to pollen sensitization, but for polysensitized patients, symptoms may persist several months or indefinite periods throughout the year.

## Objectives

- 1) to provide a regional pollen calendar;
- 2) to analyse the sensitization to pollen aeroallergens of the atopic patients living in the Alentejo Region and ;
- 3) to evaluate the trends.



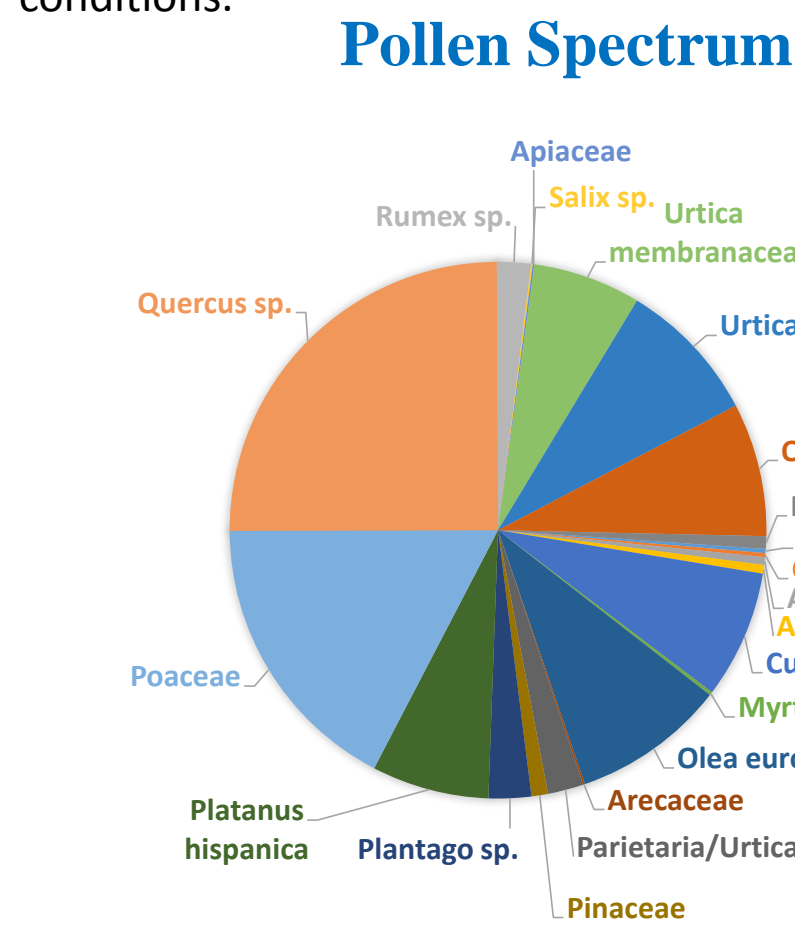
## MATERIAL AND METHODS:

Airborne pollen data from Évora monitoring station of the Portuguese Aerobiology Network – RPA (2001 to 2021), meteorological data of the Portuguese Institute of the Sea and Atmosphere, clinical data from children who attended the External Immunoallergy and Child Allergy Support Consultations (2015 to 2019) and from adult patients from External Consultation of Immunoallergy (2002 to 2007) at the Hospital do Espírito Santo of Évora were analysed. Patients were selected based on their clinical history and results from skin prick-tests (SPT). Patients with SPT positivity to pollens and with seasonal clinical symptoms were selected. The battery of the most representative inhalant pollen allergens from the geographic area was considered. Symptomatological surveys were completed by patients with pollinosis, and monthly and annual antihistaminic sales in Évora (2002 to 2007) were also used. Trends of pollen prevalence and sensitization were compared with results from previous studies. A pollen calendar of the Region was elaborated.

## RESULTS

### Aerobiological analysis

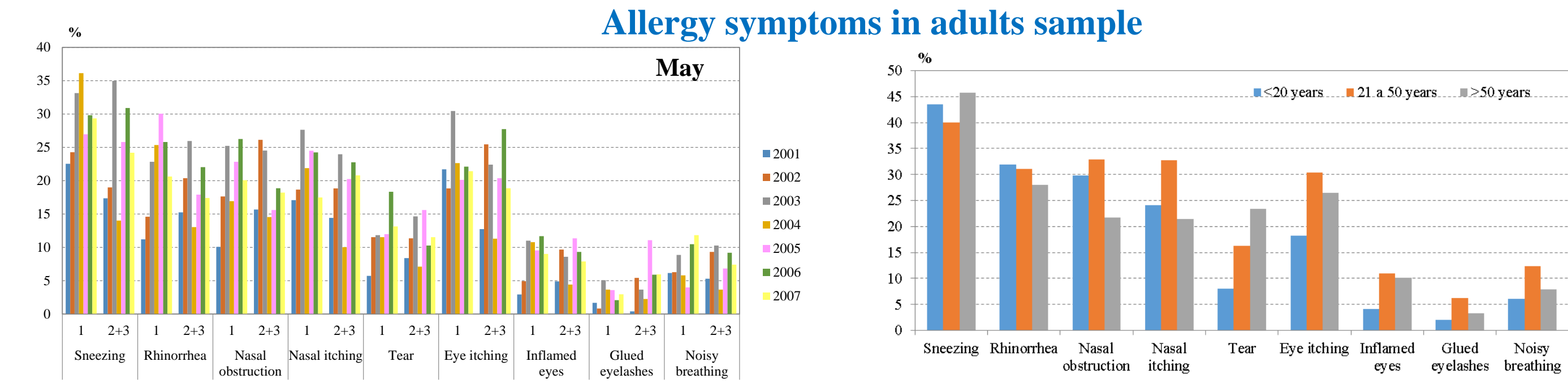
- The average annual pollen index was 86,410 ± 26,492 pollen grains.
- The most predominant airborne pollen types were: 27% Quercus sp, 20% Poaceae, 10% Olea europaea, 9% Cupressaceae and Urticaceae (with Urtica membranacea type representing 7%), 8% Platanus hispanica, 3% Plantago, 2% Rumex, 1% Pinaceae, Amaranthaceae and Asteraceae, typical vegetation with production of allergenic pollens characteristic of Mediterranean continental climatic conditions.



### Clinical analysis

- The clinical analysis of the sample from the pediatric allergology clinic showed:
- 27% of the children were pollen-sensitized, (previously 10,3%). with an average age of 9±4 years old.
  - The majority of the masculine sex (62%), lived in urban areas (59%) and had a family history of allergic diseases (73%).
  - 72% presented AR, 38% Conjunctivitis, 34% AA, 25% AR and AA.
  - 90% children were sensitized to grasses and 77% to Olea. Children monosensitized to Olea pollen were detected for the first time and an increase of Olea sensitization when it was compared with previous study occurred (previously Olea 36%).

- In the adult allergology clinic data analysis showed:
- 24% of patients were sensitized to pollens.
  - an average age of 32 +/- 13 years, 61% were female, 2/3 lived in an urban environment,
  - 51% had AR, 42% AR and AA and 7% AA.
  - 99% were sensitized to grasses, 56% to *Chenopodium*, 47% to *Olea*. No patients monosensitized to *Olea* pollen or other pollen type were found, besides grasses.
  - The highest frequency of pollinosis symptoms was recorded in May.
  - A significant positive correlation between antihistaminic sales and the pollen counts ( $p < 0.05$ ) was observed.



## Conclusion:

The pollen count showed a significant increase in the annual pollen integral, due to changes on the land use and/or to the influence of climate change. Grass pollen is the most important cause of pollinosis in this region, followed by *Olea* and Amaranthaceae pollens. They are also responsible for interannual variations in the antihistaminic sales during the spring. Over these two decades, changes in sensitization patterns of patients occurred, with a dramatic increase in Olea sensitization, particularly in children including monossensitization. Moreover, there are rising trends for increasing prevalence of more aggressive symptoms. The evolution in the data pollen, prevalence of pollinosis and symptoms must be monitored over time in order to detected changes in sensitization patterns and disease severity.

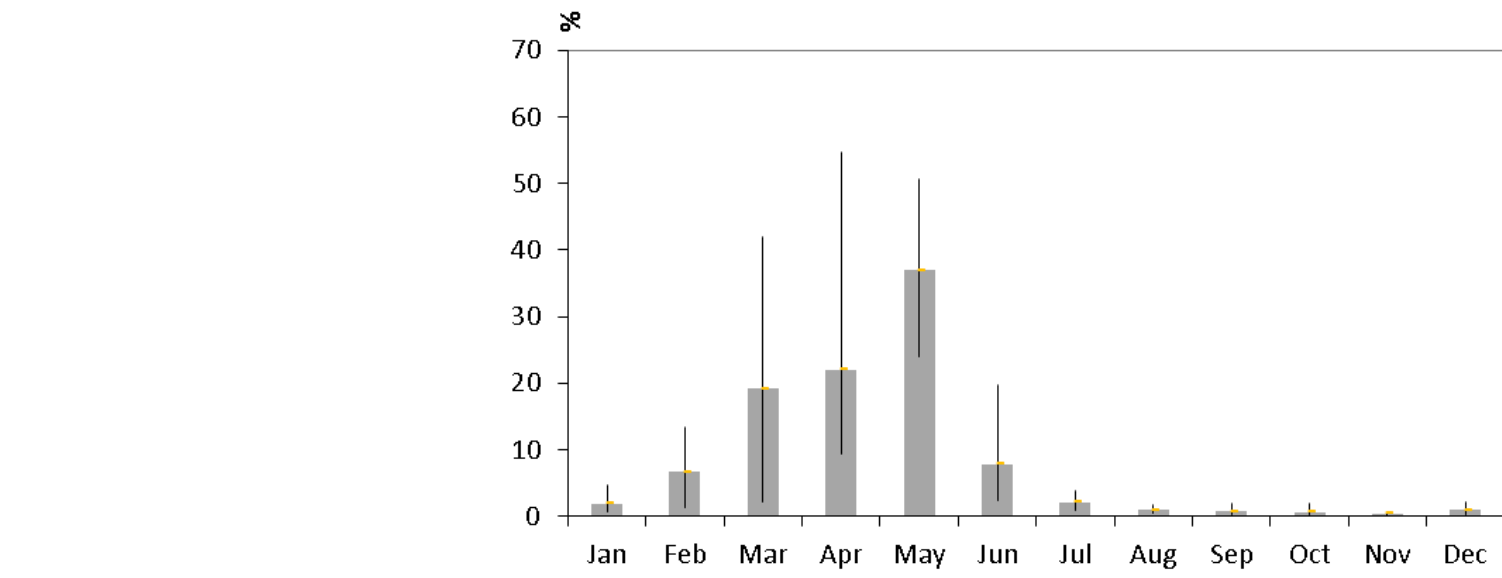
**Acknowledgment:** The authors are grateful to Dr. Fernando Almeida for having allowed to use the clinical data of children, to Dr. Luisa Lopes for having allowed to use the clinical data of adults, to Prof. Dr. José Costa Trindade for the review and analyse of the study and to the Portuguese Society of Allergy and Clinical Immunology - SPAIC for having allowed to present this aerobiological study of the RPA Network.

### Regional pollen calendar for Alentejo region (Southern of Portugal)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Alder												
Cypress tree												
Pine tree												
Plane tree												
Oak tree												
Birch tree												
Olive tree												
Eucalyptus tree												
Chestnut tree												
Dock												
Grasses												
Plantain												
Goosefoot												
Pellitory of the wall												
Mugwort												

- On average, 92% of the total pollen was collected between February and June, the lowest amounts of pollen in the air are recorded in the autumn.
- Over these two decades, an increase of the Annual Pollen Integral for the most pollen types was obtained, which was statistically significant trends for *Olea*, Urticaceae and Asteraceae pollen types, and a decreasing statistically significant trend for Betulaceae, Amaranthaceae, Cupressaceae and Arecaceae pollen types.

### Relative frequency of pollen recorded per month



### Sensitization by Skin tests (%)

Extract	Children		Adult
	study period 2002-2005*	study period 2015-2019	study period 2002-2007
Grasses	100	90	99
Olea europaea	34	77	47
Chenopodium	-	-	56
Platanus	-	29	38
Plantago	-	-	34
Parietaria	-	-	34
Ligustrum	-	-	32
Fraxinus	-	-	32
Alnus	-	-	29
Quercus suber	9	-	27
Quercus ilex	13	-	26
Robinia	-	-	23
Eucalyptus	-	-	21
Rumex	-	-	20
Urtica dioica	-	-	19
Cupressus	-	9	19
Pinus	-	-	6

\* published study  
Diamantino et al. Rev Port Imunoalergologia. 2006;14 (3): 245-49.

### Pollen vs antihistaminic sales

