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Allergenic pollen and pollinosis in Madrid. A study of 45 years

Presentación premiada en el apartado de aerobiología

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BACKGROUND

A 45-year pollen count was carried out in the atmosphere of Madrid, Spain, to determine the presence of airborne pollen, temperature influence, and the prevalence of sensitization to pollens among patients with pollinosis in Madrid.

METHODS

Pollen counts were done with a Burkard spore trap (Burkard Manufacturing, Rickmansworth, Herst., U.K.) from 1979 to 2023. Additionally, the results were compared with the results of the Alex Allergy Explorer (Macro Array Diagnostics GmbH, Austria) in 1,584 patients with pollinosis born and residing in Madrid and studied consecutively during 2022-23. Temperatures were recorded daily from Barajas-Madrid Station of the National Meteorological Agency.

RESULTS

The most predominant pollens from November to April was tree pollens (Cupressaceae, Alnus, Fraxinus, Ulmus, Populus, Platanus, and Morus), although these were also abundant in May and June (Quercus, Olea, and Pinus). The grass pollination peaked in May-June. Among allergenicly significant weeds, the most notable was Plantago spp. (3%), in contrast, Rumex spp. (1.3%), Urticaceae (1.2%), Amaranthaceae (0.9%), Artemisia spp. (0.2%) had very low concentrations. Fig. 1

Start (first day of 3 consecutive days > 10 grains/m³)
 An early start of the season was observed for:

- Cupressaceae -31 days
- Platanus -6 days
- Quercus -13 days
- Poaceae -4 days
- Olea -7 days

End (last day of 3 consecutive days > 10 grains/m³)
 An early season end was observed for:

- Cupressaceae -18 días
- Platanus -2 días
- Quercus -6 días
- Poaceae -7 días
- Olea -8 días

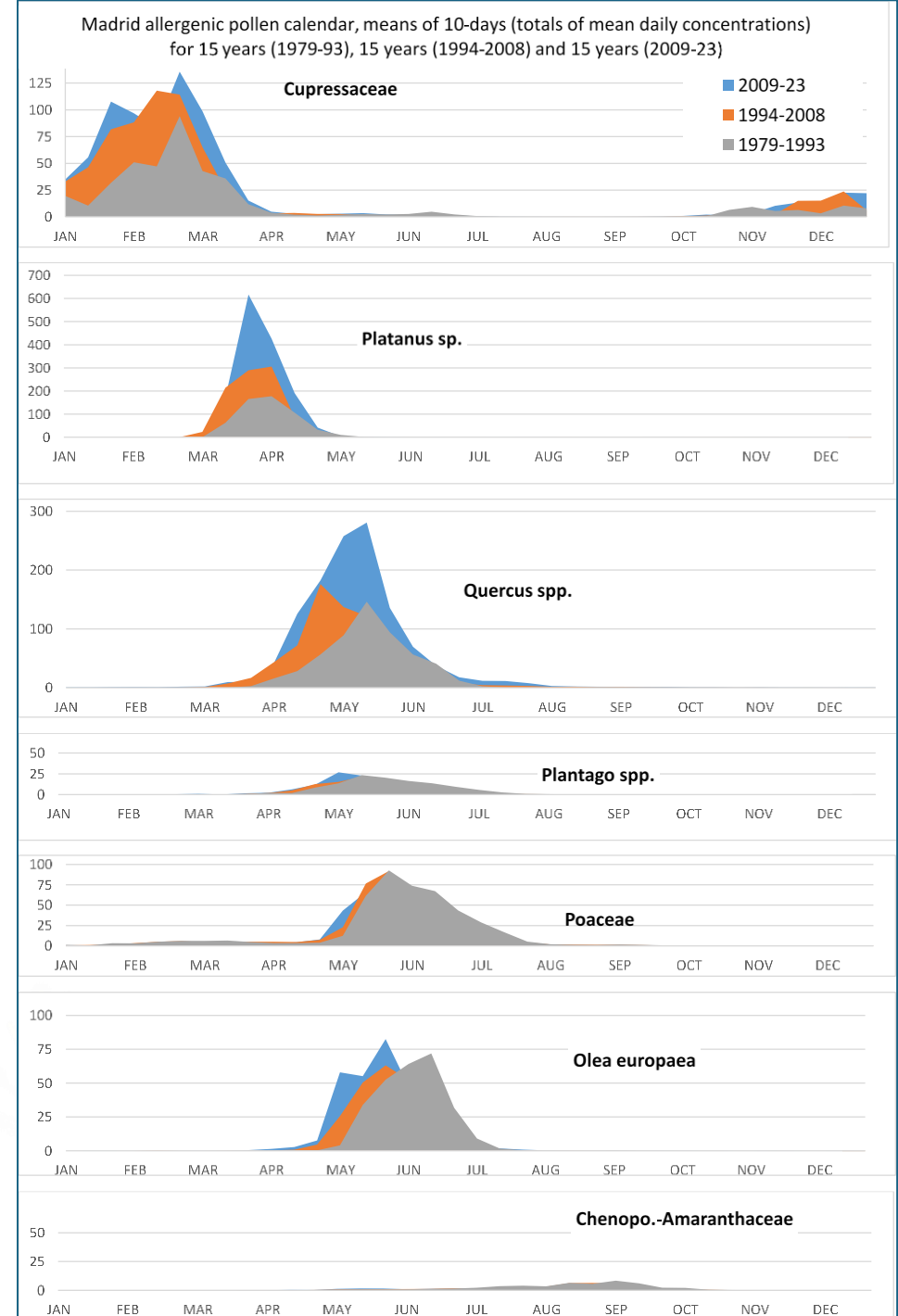


Fig. 1

We observed a 1.3°C increase in temperature in Madrid over 45 years.

This was associated with an important increase in *Cupressaceae*, *Platanus* and *Quercus* pollens. Fig 1

The highest airborne presence was for *Platanus* sp. (22%) followed by *Quercus* spp. (18%), *Cupressaceae* (13%), *Poaceae* (10%), *Olea* sp. (6%), *Pinus* spp. (5%), and *Populus* spp. (3%). Table I

- Temperature increase of 1.3 °
- Increase in pollens from trees, but not from grasses
- Oscillations of both variables
- Very significant correlation of temperature with *Platanus*
- Also with *Cupressaceae* and *Quercus*
- No correlation with grasses or *Olea*

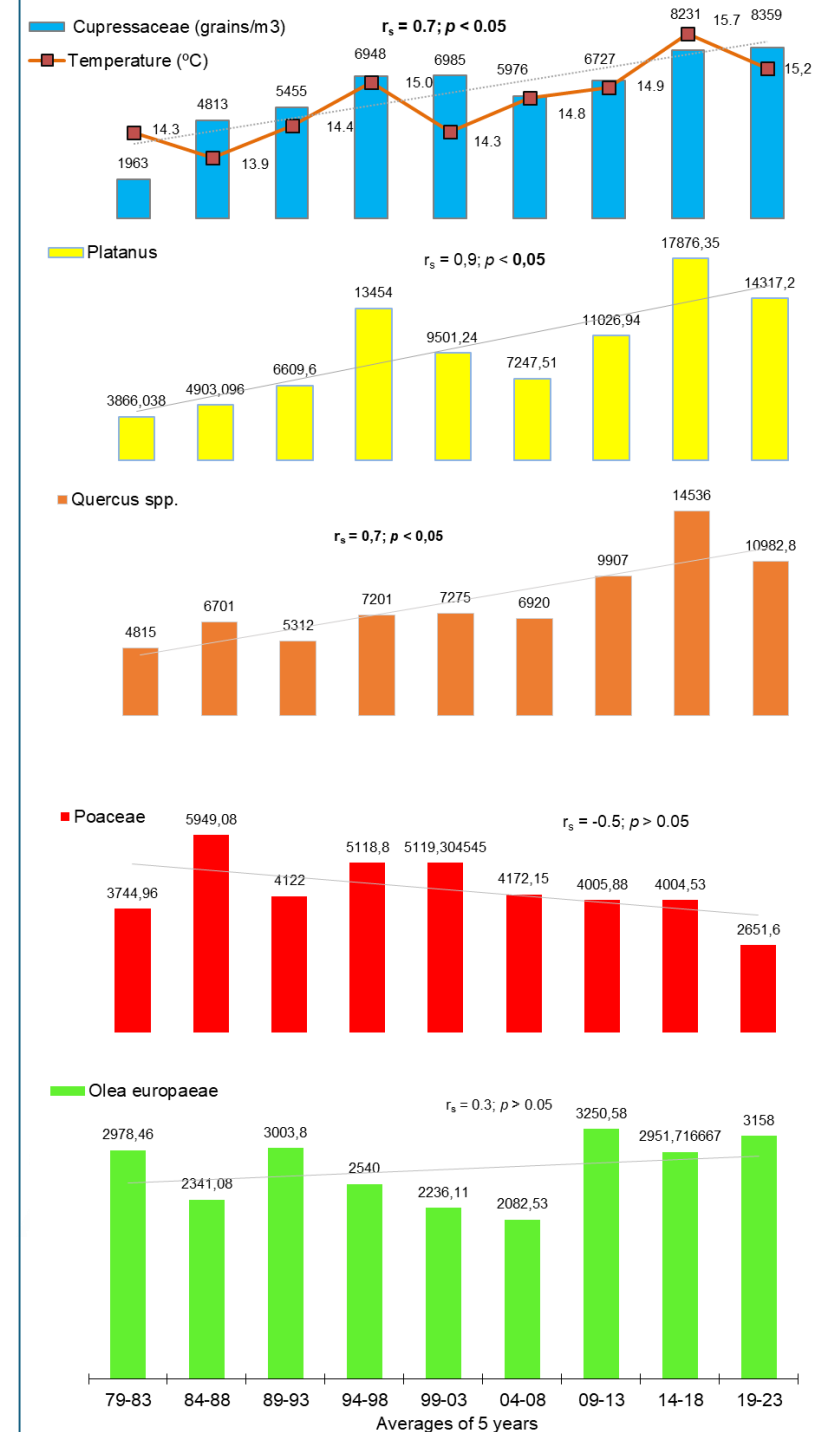


Fig. 2

The most significant allergenic pollen was for grasses, with a prevalence of positive (Phl p 1 and/or Phl p 5) of 68%, followed by *Cupressus arizonica* (Cup a 1) of 61%, *Olea europea* (Ole e 1) of 58%, *Platanus acerifolia* (Pla a 1 and/or Pla a 2) of 28% (Table I). Less prevalence was for *Plantago lanceolata* (Pla l 1) of 8% *Salsola kali* (Sal k 1) 10%, *Chenopodium album* (Chen a 1) 2 %, *Artemisia vulgaris* (Art v 1) of 4%, *Parietaria* (Par j 2) of 5%. Interestingly, Profilins was 42%, Polcalcines 16%, LTPS 18%, storage proteins 15%, PR-10 14% (Table I).

Quercus ilex subsp. Ballota is not present in ALEX, but a prevalence of prick test in patients with pollinosis in Madrid has recently been observed of 22% (Subiza J, doi: 10.1111/cea.14082.) and 60% (Pedrosa M, doi: 10.1111/cea.13679) (Table II).

Table I. Presence of airborne pollen and ALEX test positivity

Airborne presence		ALEX test positivity	
	%		%
<i>Platanus acerifolia</i>	22	Pla a 1 and/or Pla a 2	28
<i>Quercus</i> spp	18		
Cupressaceae	13	Cup a 1	61
Poaceae	10	Phl p 1 and/or Phl p 5	68
<i>Olea europaea</i>	6	Ole e 1	58
<i>Plantago</i> spp	3	Pla l 1	8
Chenopo-Amaranthaceae	0.9	Sal k 1	10
		Chen a 1	2
		Profilins	42
		Polcalcines	16
		LTPs	18
		Storage proteins	15
		PR-10	14

Airborne presence (percent of total yearly pollen count, mean of 1979-2023)

and ALEX test positivity (percent positive results in 1584 patients with polinosis studied consecutively during 2022-23)

Table II Prevalence of skin tests to aeroallergens, among Madrid patients with pollinosis, in previous studies

	1979	1994	2019
<i>Cupressus</i> spp γ/o <i>Juniperus oxicedrus</i>	0%	20%	59%
<i>Platanus hispánica</i>	2%	52%	56%
<i>Quercus ilex</i> subsp. <i>ballota</i>	0%	14%	22%
<i>Olea europaea</i>	50%	61%	71%
<i>Trisetum paniceum</i> γ/o <i>Dactylis glomerata</i>	90%	87%	88%

- **1979** (n = 100 patients) E. Subiza. Allergol et Immunopatol
- **1994** (n = 416 patients) J. Subiza et al. JACI
- **2019** (n = 100 patients) J. Subiza et al. Clin Exp Allergy

CONCLUSION

1. The population of Madrid is exposed to significant concentrations of allergenic pollen.
2. The most intense period, is from January to June.
3. Over the last 45 years, a significant increase in temperature and tree pollen has been observed.
4. Grass, Cupressaceae, Olea, Platanus and recently Quercus pollens, are the most important cause of pollinosis in this area

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