



International Ragweed Society

# Catalonia (NE Spain): a new step of ragweeds (*Ambrosia* sp.) in the biological invasion of Europe?

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**UAB**

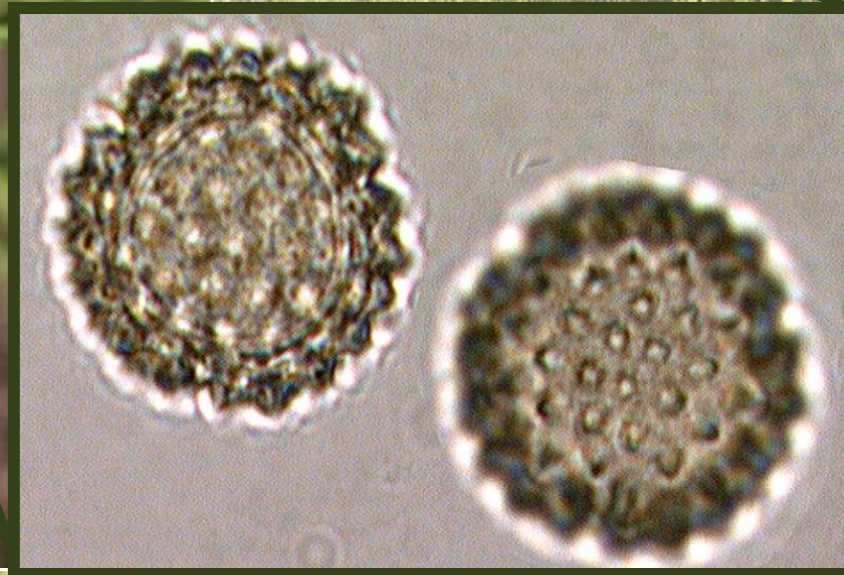
Universitat Autònoma de Barcelona





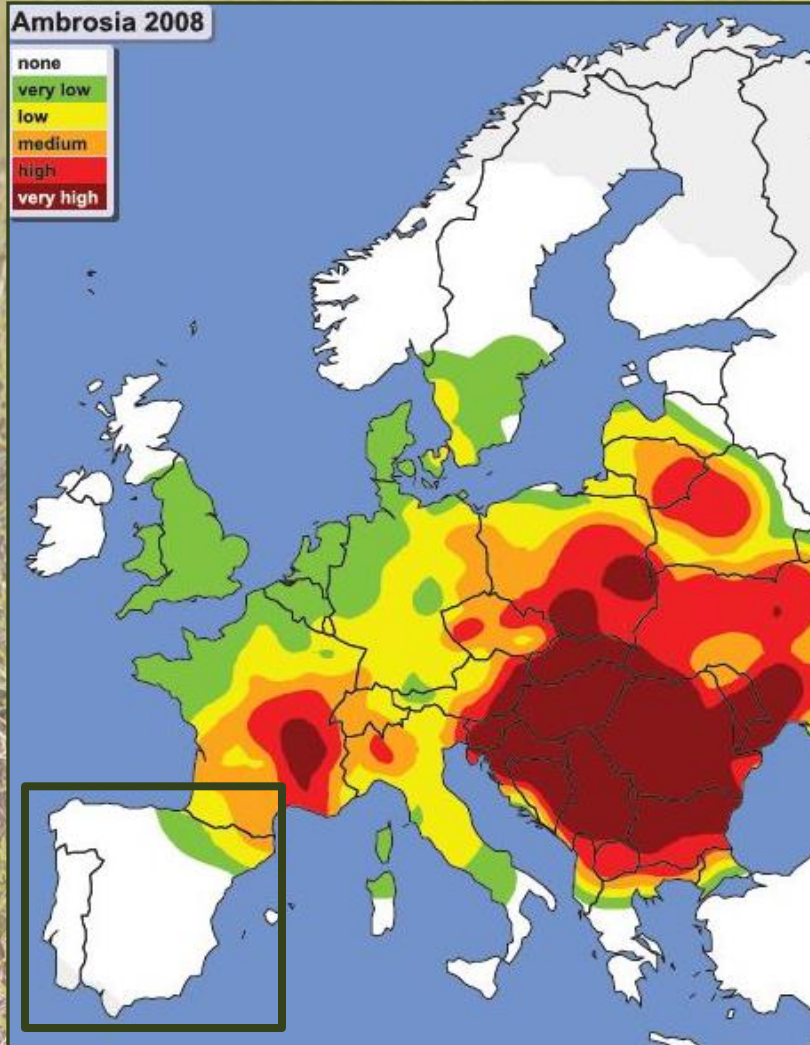
***Ambrosia* sp. [Family: Asteraceae]**

Genus of plants largely studied in aerobiology because of its highly allergenic pollen





# Situation in Europe



# Situation in Spain

Lack of *Ambrosia* pollen data for most part of Spain



Source: Euroallergen Pollen Network





HOWEVER,

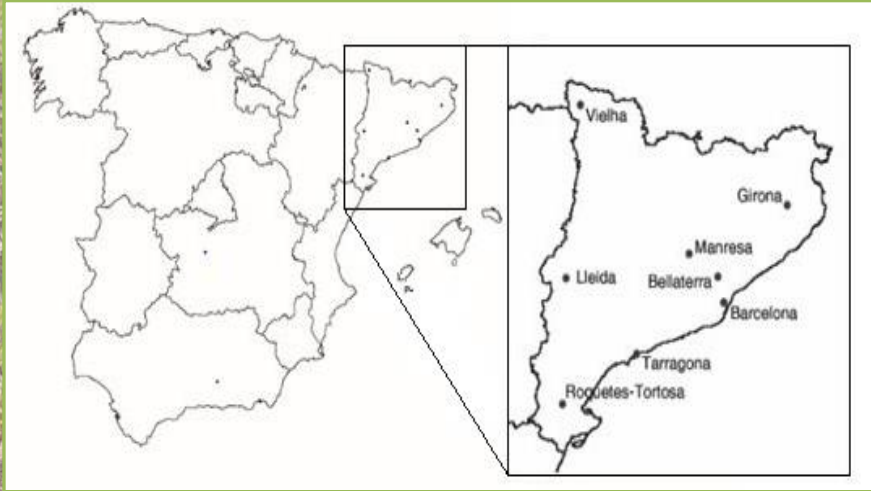



Certain signs of the beginning of an expansion of the genus over the territory

At an aerobiological level: episodes of long-range transport of pollen [Belmonte *et al.*, 2000]



First project for the study of ragweed in Spain, launched by the Aerobiological Network of Catalonia



 Belmonte, J., Vendrell, M., Roure, J.M., Vidal, J., Botey, J. & Cadahía, A. (2000) Levels of *Ambrosia* pollen in the atmospheric spectra of Catalan aerobiological stations, *Aerobiologia*, 16, 93 – 99.



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graph TD; A["Ambrosia sp. in Catalonia"] --> B[ANALYZE]; B --> C["Biogeographic expansion"]; B --> D["Aerobiological expansion"]; C --> E[DETERMINE]; D --> E; E --> F["1. The naturalisation stage of the genus in Catalonia"]; E --> G["2. Its implications for public health, regarding its allergenicity"];
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**Ambrosia sp. in Catalonia**

**ANALYZE**

**Biogeographic expansion**

**Aerobiological expansion**

**DETERMINE**

**1. The naturalisation stage of the genus in Catalonia**

**2. Its implications for public health, regarding its allergenicity**



## BIOGEOGRAPHICAL DATA

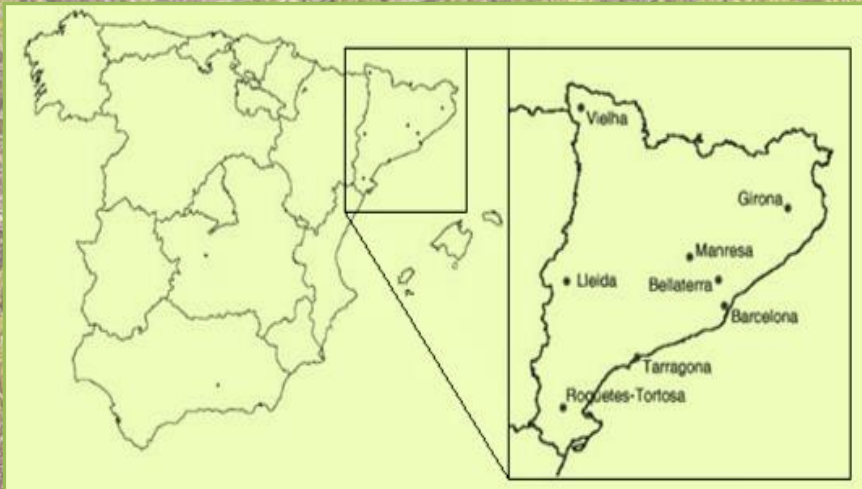
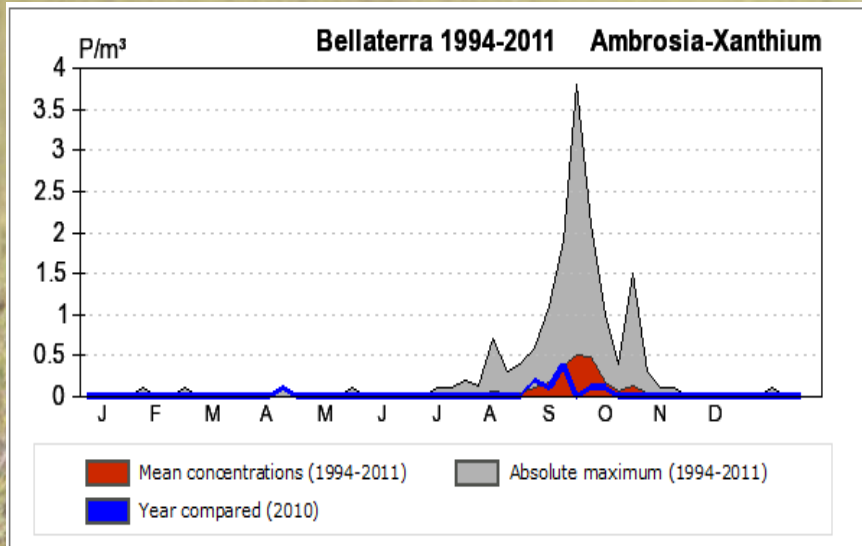
Bibliographical research for the whole of Spain [biodiversity databases, records of the National Botanic Conservatories, scientific publications]

Monitorisation of 7 populations of *Ambrosia coronopifolia* over the territory for the period 2010 – 2011



- Cartography of ragweeds in Catalonia and Spain
- Follow-up of the spreading rates





## Mean daily concentrations of *Ambrosia* pollen type

**Aerobiological Network of Catalonia  
(XAC, Xarxa Aerobiològica de Catalunya)**  
[<http://lap.uab.cat/aerobiologia>]

**8 sampling stations**

**Period under study: 1994 – 2010**

**Hirst traps [Hirst, 1952]**

**Pollen counts were performed following the norms of the Red Española de Aerobiología, REA [Galán *et al.*, 2007]**



Galán, C., Cariñanos, P., Alcázar, P. & Domínguez, E. (2007) *Manual de Calidad y Gestión de la Red Española de Aerobiología*, Servicio de Publicaciones de la Universidad de Córdoba, Córdoba, Espagne



Hirst, J.M. (1952) An automatic volumetric spore-trap, *Annals of Applied Biology*, 39, 257 – 265





### AEROBIOLOGICAL DATA

#### Study of air mass trajectories

Meteorological synoptic maps [UK MetOffice]

HYSPLIT-4 [Draxler & Rolph, 2003]

Isentropic 120-h back-trajectories at different heights

#### Source-receptor model

Based on the Seibert method [Seibert *et al.*, 1994]

Two daily backward trajectories (at 00 and 12 UTC)

Period from 1997 to 2009 (25 June to 10 October)



Draxler, R.R., & Rolph, G.D. (2003) HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY website. NOAA Air Resources Laboratory, Silver Spring



Seibert, P., Kromp-Kolb, H., *et al.* (1994) *Trajectory analysis of aerosol measurements at high alpine sites*, in *Transport and transformation of pollutants in the troposphere*, Academic, La Haye, Pays-Bas



Aerobiologia

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ORIGINAL PAPER

## ***Ambrosia* L. in Catalonia (NE Spain): expansion and aerobiology of a new bioinvader**

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Mirna López-Pacheco

2012



*Aerobiologia* 16: 93–99, 2000.

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2000

### **Levels of *Ambrosia* pollen in the atmospheric spectra of Catalan aerobiological stations**

Jordina Belmonte<sup>1,4\*</sup>, Mercè Vendrell<sup>1,4</sup>, Joan M. Roure<sup>1,4</sup>, Josep Vidal<sup>2</sup>, Jaume Botey<sup>3,4</sup> & Àlvar Cadahía<sup>3,4</sup>

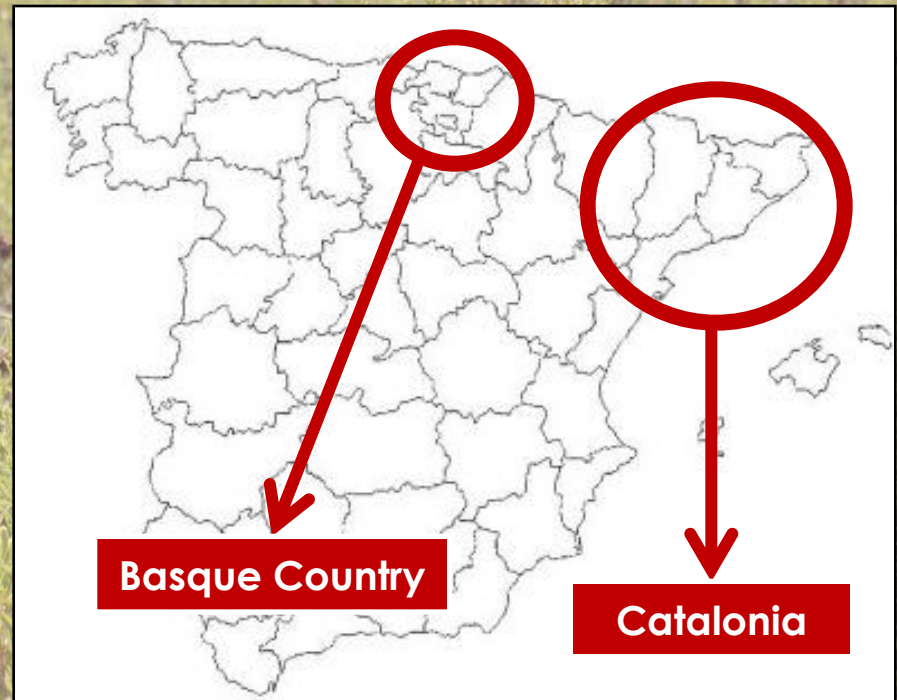
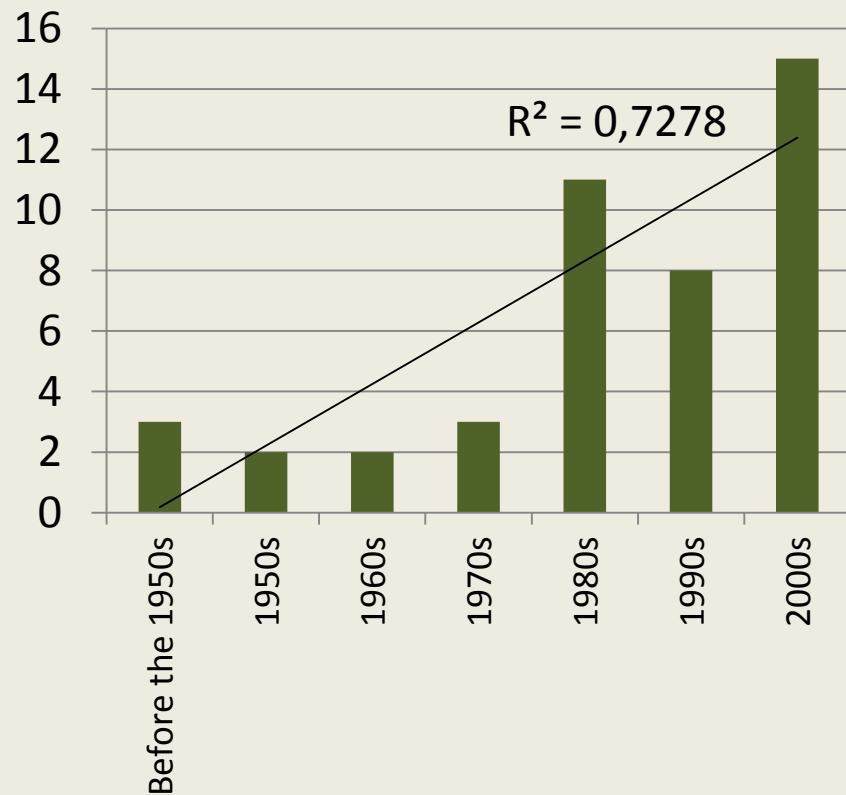
<sup>1</sup>Unitat de Botànica, Facultat de Ciències, Universitat Autònoma de Barcelona, Spain; <sup>2</sup>Departament d'Astronomia i Meteorologia, Universitat de Barcelona, Spain; <sup>3</sup>Unitat Docent d'Allergologia, Hospital Vall d'Hebron, Barcelona, Spain <sup>4</sup>Xarxa Aerobiològica de Catalunya (XAC).

Electronic address: <http://cc.uab.es/palinologia/aerobio.htm>

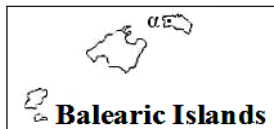
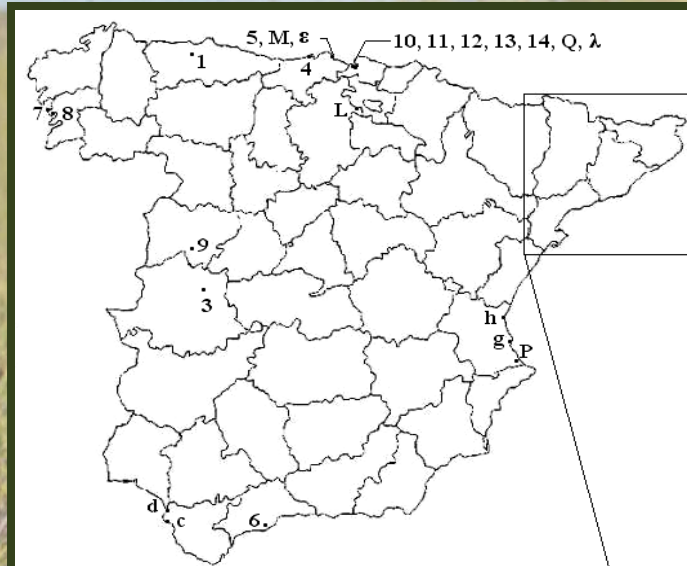
(\*author for correspondence, fax: +34 93 5811321)



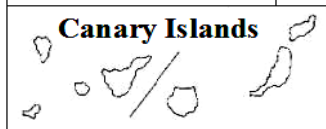
## Evolution of the number of bibliographic references on *Ambrosia* plants presence in Spain





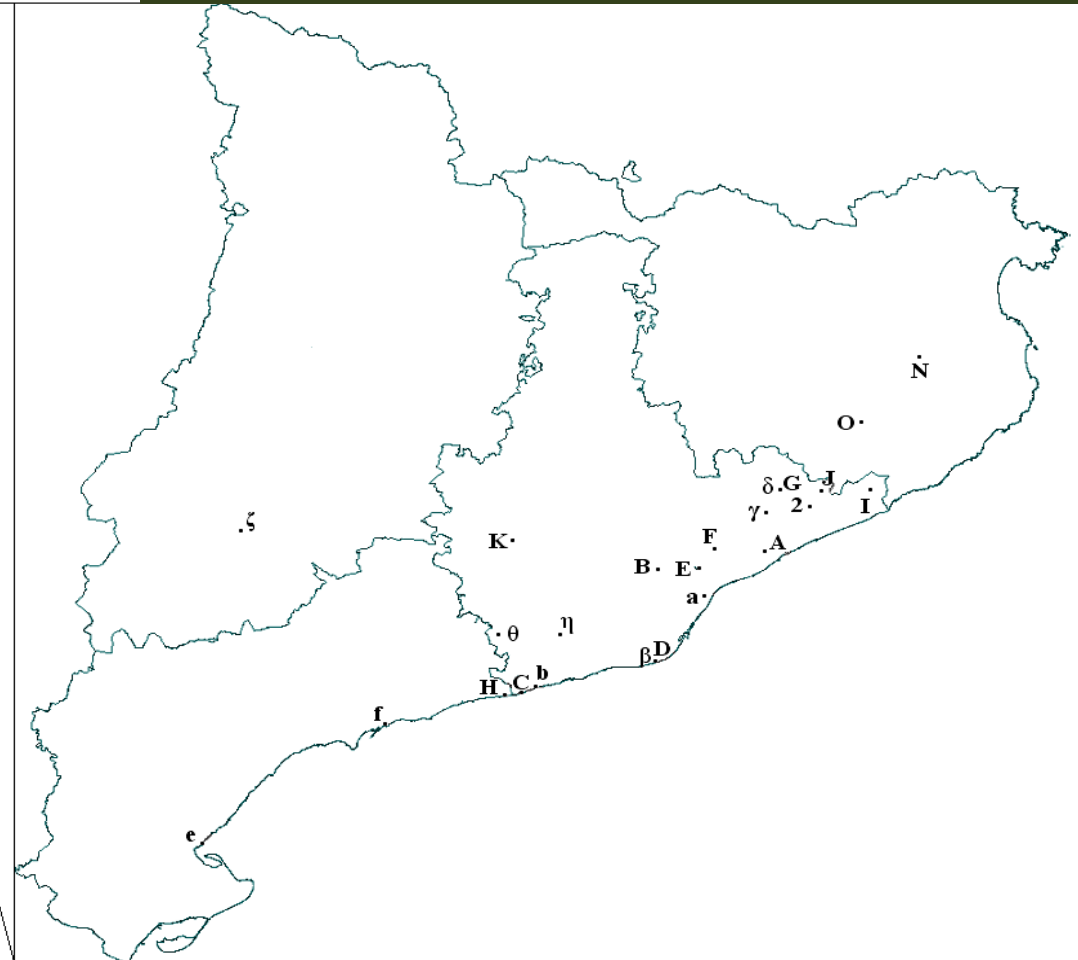


Balearic Islands



Canary Islands

## Ragweed cartography in Spain and Catalonia



48 references for the whole of Spain,  
50% of which are in Catalonia

Numbers correspond to *A. artemisiifolia*, capital letters correspond to *A. coronopifolia*, lower-case letters correspond to *A. maritima* and Greek letters correspond to *A. tenuifolia*.

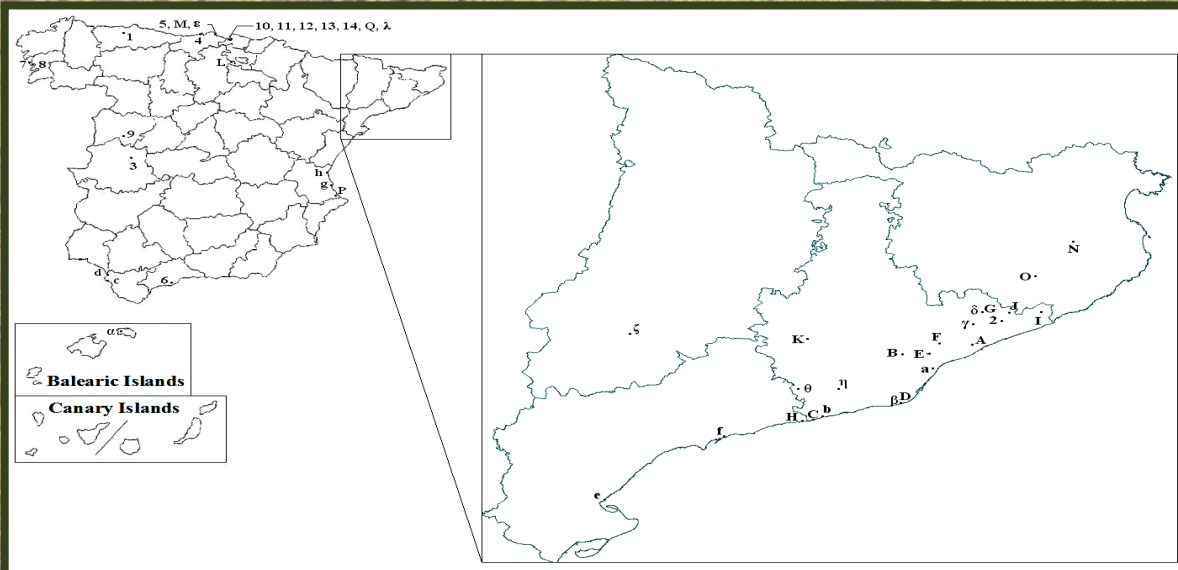
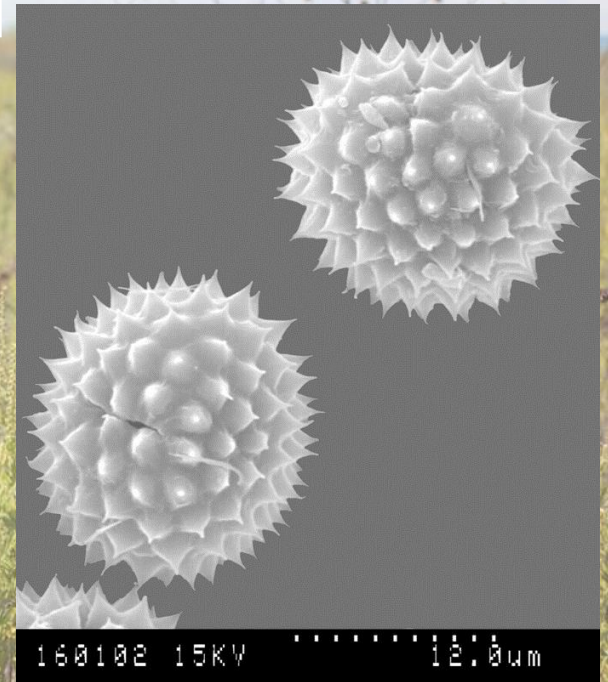


## Ragweed species in Spain

In Catalonia the most abundant one seems to be *Ambrosia coronopifolia*, although *A. artemisiifolia* is also present in the territory

*A. artemisiifolia* is mostly found in the Basque Country

The distribution of ragweeds in Spain might be explained taking into account the harbours as the main entry gates of seeds to the Peninsula





## Results of the ragweed biogeographical monitoring



GENERAL GROWING RATE:

324%





New Terminal of the Barcelona Airport (T1)



646%



Following the Besòs riverflow (outskirts of Barcelona)

230%





Following the path of the railway train (Mollet)

117%





Along the sandy dunes of the beaches of Barcelona

206%





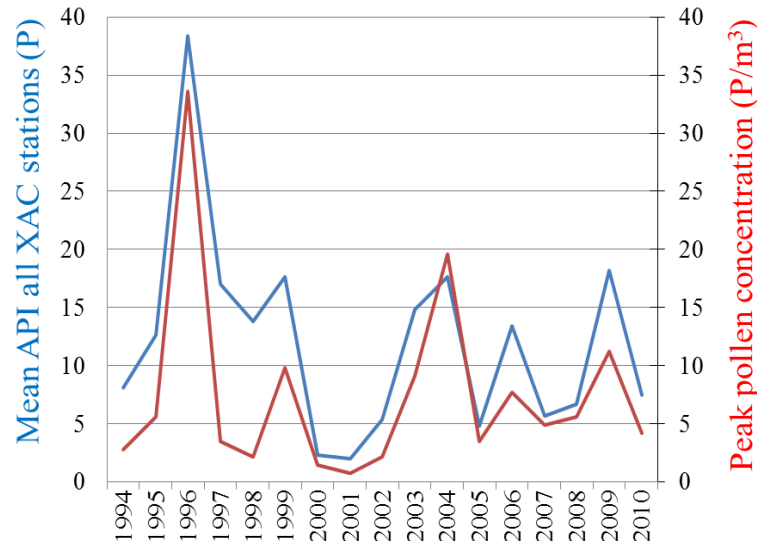
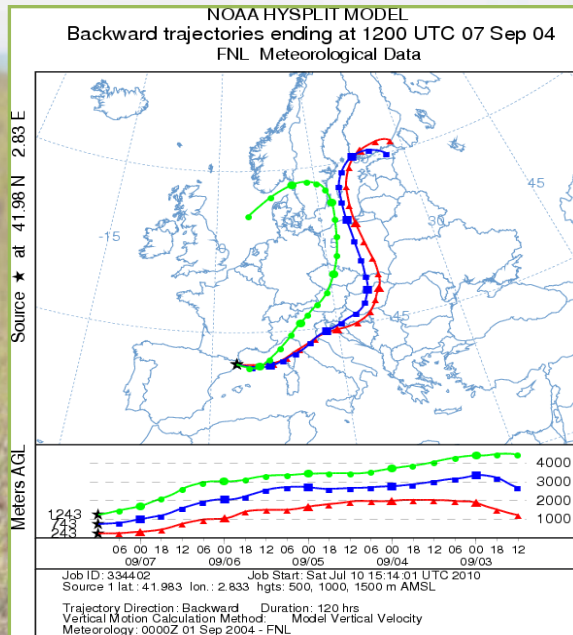
## Delta del Llobregat NATURAL PARK



## IMPACTS

1. Densely crowded beaches during the pollination season
2. Replace of the dune vegetation of the Mediterranean littoral (with endangered species such as *Stachys maritima*)
3. Negative impact on the nesting habitat of several birds such as the Kentish Plover (*Charadrins alexandrinus*)





The Annual Pollen Index (API) seems to be clearly influenced by the long-range transport episodes

There have been 64 pollen peaks, 77% of which came from the North/North-East of Europe (Lyon region, Hungary-Serbia...)

There have been 23 days under risk of allergy -more than 5 pollens/m<sup>3</sup> (Thibaudon, 2002)-, over 8 stations for the period 1994-2010.



Thibaudon, M. (2002) Threshold of allergenic risk for the pollinic information in France, *The 7<sup>th</sup> International Congress on Aerobiology*, Montebello, Canada ([www.isao.bo.cnr.it/aerobiol/ai](http://www.isao.bo.cnr.it/aerobiol/ai) 2002).





1. *Ambrosia* pollen type is present in the atmospheric spectrum of the Catalan aerobiological stations

2. The genus is expanding over the territory at particularly high spreading rates (>300%)

3. Even if the pollen levels are not generally high, the risk thresholds for public health are sometimes surpassed



*Ambrosia* sp. can become a serious menace for public health in Catalonia







1. Spain must participate in the European networks for the control of *Ambrosia* sp.

2. The Spanish Aerobiological Network (REA) should include *Ambrosia* within the pollens to analyze

3. The expansion of *Ambrosia* over the territory must be surveyed, particularly in Catalonia

4. The Government of Catalonia should face the eradication of *Ambrosia* before its biological invasion becomes too difficult to manage



# Thank you for your attention!



For further information: <http://lap.uab.cat/aerobiologia/en/>

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