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

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

Genus of plants largely studied in **aerobiology** because of its highly allergenic pollen.
Situation in Europe

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

Situation in Spain

Source: Euroallergen Pollen Network
INTRODUCTION

AIMS

METHODS

RESULTS

DISCUSSION

FUTURE PROPOSALS

**INTRODUCTION**

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**FUTURE PROPOSALS**

**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**

**Ambrosia** sp. in Catalonia

**AIMS**

**INTRODUCTION**

**METHODS**

**RESULTS**

**DISCUSSION**

**FUTURE PROPOSALS**

- **ANALYZE**
  - Biogeographic expansion
  - Aerobiological expansion

- **DETERMINATE**
  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]


Hirst traps [Hirst, 1952]
AEROCOLOGICAL 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)

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

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

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

![Graph showing the evolution of the number of bibliographic references on *Ambrosia* plants presence in Spain from the 1950s to the 2000s. The graph includes data from Basque Country and Catalonia.](image)

R² = 0.7278
RESULTS

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%
RESULTS

New Terminal of the Barcelona Airport (T1)

646%
Following the Besòs riverflow (outskirts of Barcelona)

230%
Following the path of the railway train (Mollet)
Along the sandy dunes of the beaches of Barcelona
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 (*Charandrins 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/m³** (Thibaudon, 2002)-, over 8 stations for the period 1994-2010.

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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