



RAGWEED: THE STORY OF A POLLUTANT

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Ambrosia artemisiifolia belongs to the Asteraceae family. It is an annual plant, whose maintenance in each environment is related to its reproductive success. It is an invasive exotic species, native to North America, capable of growing in our latitudes (45°N) and able to produce a large quantity of pollen and mature seeds.



The World Health Organization (WHO) classifies allergic diseases as the fourth largest health problem in the world and considers them to be "a major public health problem in terms of quality of life, loss of working and teaching days, drug costs and even mortality". In France, especially in the Rhône-Alpes region, 13 to 21% of the exposed population is allergic to ragweed (Rhône-Alpes ORS study).



RAGWEED: THE STORY OF A POLLUTANT

Annual number of publications on ragweed referenced in Google Scholar[®] from 1962 to 2021



years



Ragweed History

Ambrosia artemisiifolia in Europe

• 1860-1870 – first introductions into Europe from North America:



• Very close dates: a same vector in the different countries?

Chauvel B. and Martinez Q. IRC 2012

Map from Jacobs after Fremin, 1860

How to identify the first introduction vector(s)?



Source of references:

 * XIXth- and early XXth-century literature
 * Data on herbarium



• **Red clover** is for sure the first vector of common ragweed introduction in Germany (Ascherson, 1874), in Great Britain (Hon, 1871), in the Netherlands (Anonymous, 1902) and in France (Olivier, 1876).

• Introduction to different points in each country with the same vector during many years.

Chauvel B. and Martinez Q. IRC 2012



Trifolium pratense Sturm, 1796

History of its introduction in Europe



A gradual introduction, later in Central/Eastern Europe than in Western Europe

B.Chauvel

Spread across French *communes*



Chauvel & Cadet, 2011



https://gd.eppo.int/taxon/AMBEL/distribution

Some publications (1)

- Blamoutier P.1955: first communication about ragweed allergy in France. International Archives of Allergy and Applied Immunology, vol. 6, 1955, n° 3, pp. 189-189.
- Ambrosia artemisiifolia L. (common ragweed) was accidentally introduced into France in the 1860s. Its single vector of introduction in Europe was red clover seeds (*Trifolium pratense* L.), probably coming from Pennsylvania, United States at the time. *A. artemisiifolia* was later introduced into France in many places and at different times. Chauvel B et al: *Acta Botanica Gallica*, vol. 158, 2011, n° 3, pp. 309-327.
- Ambrosia arrived in Hungary from northern Mediterranean in the 1920s, and by the end of the 20th century it has become widely distributed. In Southern Hungary (northern part of Serbia-Montenegro included), Ambrosia pollen concentrations during the peak season are about one order of magnitude higher than the counts in the rest of Europe. Makra L et al:Grana 44: 57–64, 2005

Some publications (2)

- The most important habitat areas of ragweed and the highest pollen concentrations occur, in decreasing order of the pollen levels (1) in the southwestern part of the European Russia, (2) in the southern and eastern parts of Ukraine, (3) in the Pannonian Plain in Central Europe, (4) in the Rhône-Alpes region in France, furthermore (5) in the Po River valley in Italy. Besides Europe, ragweed occurs in China, India, Japan and in other Asian countries, furthermore in Australia and the Unites States of America. Makra L et al: *Applied Ecology and Environmental Research*, vol. 13, 2015, n° 2, pp. 489-512
- The Ambrosia species represent one of the most problematic groups of invasive weeds around the world. The ease with which they are introduced and spread in new countries, their generalist ecological requirements, and functional traits facilitate their invasion and subsequent naturalization in new areas. All of these aspects contribute to increasing their global social and economic impact, which is mostly related to pollen allergy. Montagnani C et al.: *Critical Reviews in Plant Sciences*, vol. 36, 2017, n° 3, pp. 139-178.
- Etc.



Ragweed distribution/dissemination

Its current distribution

Source : Observatoire des ambroisies

No data



No introduction reported – Plant absent Few introductions – Very low reproductive success – Plant absent or very rare

Few introductions – Low reproductive success – Very rare or rare plant

Repeated introductions – proven reproductive success – limited expansion. Rare plant, only naturalized in part of the territory

Repeated introductions – Demonstrated reproductive success – Expanding. Rare or uncommon plant – Naturalized in part of the territory with high density areas

Repeated introductions – Proven reproductive success – Common plant – Naturalized throughout the territory with more or less dense areas



Fields



Fumanal et al., 2007

Process of remote sensing ragweed risk maps



Ragweed risk map

Ragweed in Europe



Around the 45th parallel



AEROBIOLOGY

Aerobiology: a multidisciplinary approach





Pollens stations in Europe



Ragweed pollen during 30 years (1992-2021)



Bi-hourly data

• Ragweed pollinates in the morning, between 4 and 10 am.



 On the stations which are located not so far of the infested areas, ragweed pollens are present between 1 and 6 pm



Seasonal Ambrosia pollen counts

- Interpolation of pollen data from 296 pollen monitoring stations
- Interpolation of data points
- Threshold above which humans express symptoms: 6-10 pollen grains per m³ and day





(Schaffner et al., Nature Comm 2020)

Ambrosia sensitisation rates

European pollen monitoring program:
 296 stations

Before 2013:

- 13.4 million persons suffering from ragweed allergies
- Costs of approx. € 7.4 billion annually





Ambrosia sensitisation rate (%)

(Schaffner et al., Nature Comm 2020)

Pollen allergy





Ragweed: a pollutant?

Ragweed: a pollutant?

The most commonly used definition of pollutant is: a biological, physical or chemical component, which beyond a certain threshold, and sometimes under certain conditions, develops negative impacts on all or part of an ecosystem or environment in general.

Within the framework of the European commission, a substance is considered as a pollutant if it is of anthropogenic origin, if it has a health impact, and if only the man can help to its elimination.

The question is, whether ragweed pollen can be considered as a pollutant? A lot of work, article, research projects, etc. are published about ragweed and ragweed pollen. Since more that 50 years, ragweed became more and more important.

INTERNATIONAL RAGWEED SOCIETY



International Ragweed Society



INTERNATIONAL RAGWEED SOCIETY

The creation of the International Ragweed Society by our colleague Professor Tamás KOMÍVES in Budapest 14 years ago, is an example of the necessity and the wish of number of research teams to work on this topic.

The creation of the International Ragweed Day (IRD) at the beginning of the summer, each year is an important event to sensitize the population, the territorial authorities, the health authorities and the medical profession on the importance of recognizing the plant and knowing the means of eviction. But still a lot of work remains to be done!

INTERNATIONAL RAGWEED DAY

Numbers of French events for International ragweed day



INTERNATIONAL RAGWEED DAY

Dissemination of information:

- since 2002 actions against Ambrosia
- since 2004 legal commitment to erradicate Ambrosia





IRS PHOTOS

Buenos Aires 2010









Has the allergy to pollen favoured the invasion of common ragweed?

Bruno Chauvel, Marilou Mottet & Rebecca Bilon



Lyon 2016





Vianden 2016

Study of the prevalence of allergy to ragweed in Rhône-Alpes **Report from December 2014**

The study was a telephone survey based on a questionnaire, conducted in mid September 2014 by IPSOS on a sample of 7024 people

Since 2004, the rate of households with at least one case of allergy has increased significantly. Similarly, the individual prevalence of allergy to ragweed was 13% in 2014 (against 9.2% in 2004) and reached 21% in the strongly exposed area.

In total, 284 604 Rhônalpins are potentially affected by the allergy to ragweed. 161 697 people are in highly exposed area, 88 436 habitants in moderately exposed area, and 34 613 habitants in the unexposed area.



Programme of the Bavarian State Ministry for Public Health and Care Services (since 2007):

- > information (internet, flyer, television, press...)
- installation of registration office for ragweed announcements, registration of big (≥ 100 plants) ragweed stands

52

- denotation of a person in charge in each rural district
- research programmes and monitoring/scientific companionship

Aim: eradication of ragweed in Bavaria







With 4 differents ways to reports and inform :





An integrated tool to fight againt ragweed











INTERNATIONAL RAGWEED SOCIETY



Thank you for your attention



www.pollens.fr
http://internationalragweedsociety.org/

