



**European and Mediterranean Plant Protection Organization**  
**Organisation Européenne et Méditerranéenne pour la Protection des Plantes**

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**Report of a Pest Risk Analysis for *Baccharis halimifolia***

This summary presents the main features of a pest risk analysis which has been conducted on *Baccharis halimifolia*, according to EPPO Decision-support scheme for quarantine pests (EPPO Standard PM 5/3(5)). The full PRA record is also available (EPPO (2013) Pest risk analysis for *Baccharis halimifolia*. EPPO, Paris. Available at [http://www.eppo.int/QUARANTINE/Pest\\_Risk\\_Analysis/PRA\\_intro.htm](http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm)).

**Pest:** *Baccharis halimifolia* L.

**PRA area:** EPPO region

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The PRA has been reviewed by the following core members: Ms Le Fay-Souloy, Plant Health Laboratory Angers, France; Mr Montecchio, Università di Padova, Italy; Mr Sundheim, Norwegian Institute for Agricultural and Environment Research, Plant Health and Protection Division; Mr Uludag, Igdır University, Turkey; Ms Ustun, Plant Protection Research Station, Turkey; as well as by Ms Suffert, EPPO Secretariat.

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**STAGE 1: INITIATION**

**Reason for doing PRA:** *Baccharis halimifolia* causes major environmental damage in France, Italy and Spain, while its distribution in the EPPO region is still restricted to Belgium, France, Spain and the UK. This species has been identified as an invasive alien plant which represents a priority for Pest Risk Analysis according to the EPPO Prioritization process for invasive alien plants (EPPO, 2012a).

**Taxonomic position of pest:** Reign: Plantae; Family: Asteraceae; Genus: *Baccharis*; Species: *Baccharis halimifolia* L.  
Nomenclatural synonym: *Baccharis cuneifolia* Moench [1794, Meth.: 574] [nom. illeg.]

## STAGE 2: PEST RISK ASSESSMENT

### PROBABILITY OF INTRODUCTION

#### Entry

##### Geographical distribution:

(see PRA record for references and for distribution details in EPPO countries)

##### Native distribution:

**North America:** Canada (Nova Scotia), Mexico (Mexico, Nuevo Leon, San Luis Potosi, Tamaulipas, Veracruz; Flora of North America Website), the USA (Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Virginia, West Virginia).

**Caribbean:** Bahamas, Cuba.

*Note:* In Canada, *B. halimifolia* reaches its northern limit range and it is considered as an extremely rare Atlantic coastal plain species, occurring only in Tusket River estuary and its vicinity.

##### Exotic distribution:

**Oceania:** Australia (Queensland, New South-Wales), New-Zealand (South Island).

**Asia:** Georgia (in Abkhasia, on the eastern coast of the Black Sea).

**EPPO Region:** Belgium, France, Italy, Spain, and the UK.

*Note:* the species had been recorded in the Netherlands but is not known to be present anymore in this country. The plant is also recorded as planted in the Ataturk arboretum in Istanbul, but has so far not been recorded in the wild.

##### Major habitats:

(see PRA record for references)

*B. halimifolia* can be found in several coastal habitats including salt marshes, coastal swamps, coastal forests, tidal rivers, sandy places (Weber, 2003). It can also colonize disturbed habitats even in places far from the coast.

##### Which pathway(s) is the pest likely to be introduced on:

##### Pathway: intentional import as an ornamental and amenity plant

'Ornamental' and 'amenity' are defined according to Lambdon *et al.* (2008):

- Ornamental species are cultivated on a small scale (especially in private gardens).
- Amenity species are cultivated on a large to moderate scale in public places for landscaping purposes (e.g., for soil stabilization or aesthetic enhancement).

Trade for ornamental purposes can occur both via the internet and by direct retail at nurseries. The plant is widely available in garden centres and nurseries in Europe, in France, Germany, the United Kingdom and Italy. The species is still sold in EPPO countries, and is already established in Belgium, France, Italy, Spain and the United Kingdom.

For amenity purposes, municipalities may produce the plants. Figures of production for such purposes are not available, but volumes are considered to be higher than for ornamental use.

Given its tolerance to salt spray, *B. halimifolia* is deliberately planted in coastal regions in gardens, but also on roundabouts or along roads, along pathways close to shorelines, in places situated nearby the habitats at risk (coastal wetlands of the backshore). From these plantations, the species may spread to semi-natural and natural habitats (i.e. unintended habitats), first along roadsides or disturbed grasslands, then into coastal wetlands (Le Moigne & Magnanon, 2009). The numerous seeds produced, as many as 10 000 to 1 500 000 per plant (Westman *et al.*, 1975; Panetta, 1979a, b,

c) are easily dispersed by wind (achenes with pappus) up to hundreds of metres, which facilitates the establishment in unintended habitats (e.g. coastal saltmarshes, cliffs, wetlands, wet grasslands).

In the EPPO region, the probability that *B. halimifolia* would transfer from the pathway to a suitable habitat is variable depending on the proximity of suitable habitats to areas where *B. halimifolia* is planted, but is considered to be high overall, with a low level of uncertainty.

#### **Other pathways identified but not studied further:**

Natural spread through seeds being wind dispersed is a possible pathway, and is expected to have occurred between France and Spain. Though, this pathway is considered to be minor in comparison with intentional import of the plant as an ornamental and amenity plant and is therefore not considered further in this analysis.

Unintentional entry of the plant through contaminated vehicles or contaminated soil movements are also relevant pathways. Though, these pathways are also considered to be minor in comparison with intentional import of the plant as an ornamental and amenity plant.

#### **Establishment**

##### **Habitats at risk in the PRA area:**

The following list summarizes the main habitats in which *B. halimifolia* is known to occur in the EPPO region according to the EUNIS habitat classification (see EEA Website):

- A2.5: Coastal saltmarshes and saline reedbeds
- B1.43: Mediterraneo-Atlantic fixed grey dunes
- B1.8: Moist and wet dune slacks
- B3.3: Rock cliffs, ledges and shores, with angiosperms
- C3.2: Water-fringing reedbeds and tall helophytes other than canes
- D5.2: Beds of large sedges normally without free-standing water
- E3.1: Mediterranean tall humid grassland
- E3.4: Moist or wet eutrophic and mesotrophic grassland
- F4.234: Northern [*Erica vagans*] heaths
- F9.3: Southern riparian galleries and thickets
- G1.13: Southern [*Alnus*] and [*Betula*] galleries
- J4.2: Road networks
- J4.3: Rail networks
- J4.5: Hard-surfaced areas of ports
- J4.6: Pavements and recreation areas
- J5: Highly artificial man-made waters and associated structures
- X03: Brackish coastal lagoons.

##### **Climatic similarity of present distribution with PRA area (or parts thereof):**

Moderately similar

Level of uncertainty: high

*B. halimifolia* has already established in several EPPO countries (in France and in Spain, but also in Belgium, in the United Kingdom and in Italy) and it is particularly widespread on the Atlantic coast from Northern Spain to South Brittany in France.

The potential distribution of *B. halimifolia* was projected with the software CLIMEX using the parameters of a previous study undertaken by Sims-Chilton *et al.* (2010). A Maxent and a GBIF Niche Model projection have also been undertaken. The Maxent projection identifies a very limited endangered area which may be an underestimate. The CLIMEX and GBIF Niche Model projection maps are concordant, although the EWG considered that the CLIMEX projection maps provided by Sims-Chilton *et al.* (2010) may overestimate the potential range of the species in the EPPO region, particularly in northern countries.

Uncertainties remain on the cold and drought resistance of the species (see Appendix 2 of the Pest Risk Analysis record for more details).

The countries considered most at risk by *B. halimifolia* are the following: Algeria, Austria, Belgium, Bosnia & Herzegovina, Croatia, Cyprus, the Czech Republic, Denmark, Former Yugoslav Republic of Macedonia, France, Georgia, Germany, Greece, Ireland, Italy, Montenegro, Morocco, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey, the United Kingdom.

Other countries considered to be exposed to a lower risk by *B. halimifolia* are: Azerbaijan, Israel, Jordan, Lithuania, Moldova and Ukraine.

Characteristics (other than climatic) of the PRA area that would favour establishment:

*B. halimifolia* has already developed dense populations in the EPPO region, e.g. in France (Muller, 2004; Fried, 2012) and Spain on the Atlantic coast (Campos *et al.*, 2004; Campos & Herrera, 2009), despite competition with native plants and predation by natural enemies. It can also be found on a wide range of soil types. For example, in Australia, it is recorded from dry infertile forest soils to rich volcanic loams and low-lying clay soils with high moisture content (Winders 1937, cited in Sims-Chilton & Panetta, 2011).

In addition, *B. halimifolia* has the ability to invade habitats where native vegetation is periodically disturbed by fire, flooding or animal activity (Panetta, 1977). Several current management actions are therefore assumed to favour the establishment of *B. halimifolia*:

- by developing irrigation channels and canals, which are favourable habitats for *B. halimifolia* (Westman *et al.*, 1975), human infrastructure can enhance the spread of *B. halimifolia*.
- water management with the introduction of fresh water as in Camargue (and probably in other coastal areas) influences soil water balance in such a way that it favours establishment due to less brackish water;
- artificial fire regimes (sometimes used to control *B. halimifolia*) have a positive influence on the germination success of this species (Panetta, 1977);
- construction activities and management along roadsides have a positive influence on *B. halimifolia* establishment (see Ervin, 2009);
- in conditions of disturbed soils, the plant was highly invasive in Australia (Ensbey, 2009);
- in pastures under conditions of over- or under-grazing, in recently cleared areas and forestry plantations, or in fertilized areas, the species was particularly invasive in Australia (Ensbey, 2009);
- disturbances may also favour the invasion of *B. halimifolia* over native species. According to Connor & Wilson (1968) quoted by Westman *et al.* (1975), the relative dominance of *B. halimifolia* in swamp vegetation increased following fertilizer application.

Which part of the PRA area is the area of potential establishment:

According to both climatic requirements and habitat preferences, the following coastal areas would be most at risk from the plant:

- the **Atlantic coast**, from north of Morocco to Scotland (including France, Ireland, Portugal, Spain, the United Kingdom);
- the **Mediterranean Basin**: Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Former Yugoslav Republic of Macedonia, France (Mediterranean part), Greece, Italy, Montenegro, Romania, Serbia, Slovenia, Slovakia, Spain (Mediterranean part), Turkey (Mediterranean part). The Southern Mediterranean coast may be too dry for the species to thrive, but may still be at risk: Algeria, Israel, Jordan, Morocco, Tunisia.
- the eastern part of the **Black Sea**: Georgia, Turkey, Russia.

Uncertainty remains on the ability of the species to thrive under colder and arid climates, and the following areas are considered to be less suitable but

may still be at risk:

- the **North Sea coast** (including Belgium, the Netherlands, Germany) ;
- from Denmark to Poland, and in the south of Sweden on the **Baltic sea coast**.
- **temperate areas**: Austria, Azerbaijan, the Czech Republic, Denmark, Germany, Hungary, Lithuania, Moldova, the Netherlands, Poland, Serbia, Slovakia, Switzerland, Ukraine as well the Scandinavian and Baltic coasts of Finland, Norway and Sweden.
- **arid areas**: Azerbaijan, Israel, Jordan.

## POTENTIAL ECONOMIC CONSEQUENCES

**How much economic impact** Environmental impacts

**does the pest have in its present** *B. halimifolia* has major environmental impacts.

**distribution:**

Major

Medium uncertainty

*B. halimifolia* forms dense monospecific stands that are persistent: each shrub can live up to 25 years. Therefore, the species can have detrimental impacts on native populations and communities. As an example, in France, Muller (2004) reports that *B. halimifolia* can outcompete other plants. Once established, the shrub blocks the light to other species, modifying micro-climatic conditions, leading to a regression of herbaceous species (see Pierre, 2012; Fried *et al.*, 2013 for France; see Caño *et al.*, 2012 for Spain)

*B. halimifolia* invasions cause a marked change in the structure and physiognomy of the invaded community (Campos *et al.*, 2004). The stands of *B. halimifolia* stabilize the soils and transform the substrate by producing humus that changes the composition of soils. This effect limits the development of species related to marshes, the colonized area remaining suitable for halophyte species (Lozano Valencia & Alagón Cardoso, 1995).

Furthermore, invasive populations occur in protected areas as in the Parc Naturel Regional de Camargue (Southern France). *B. halimifolia* also causes a decrease in the cover of *Erica vagans* heath, which is a habitat listed as a priority in the Directive 92/43/EEC (Estela Beteta, Gobierno Vasco, pers. comm., 2012), and within the Natura 2000 European networks. *B. halimifolia* has also been reported to have reduced the populations of rare or threatened species, such as *Matricaria maritima* (Campos *et al.*, 2004), which is included within the category 'danger of extinction' in the 'Basque Catalogue of Threatened Species of the Wild and Marine Fauna and Flora', however no measurements of such decline are available. *B. halimifolia* is also considered to reduce the attractiveness and use of the habitats for nesting, roosting and feeding of birds.

### Control costs

*B. halimifolia* has moderate economic impacts through control costs. As an indication, in the Basque Country a Life+ project has been implemented to suppress *B. halimifolia* from three estuaries (Urdaibai, Txingudi and Lea). In 2011, 298 ha were treated, with a total cost of 630 000 € (LIFE project Website).

### Social impacts

*B. halimifolia* has moderate social impacts.

Establishment of *B. halimifolia* occurs in areas favorable to mosquitoes. Dense thickets of *B. halimifolia* protect mosquito larvae from insecticide treatments and impede access for mosquito control (Bouterin & Canonge, 1999 in Muller, 2004).

*B. halimifolia* is also reported to cause hay fever-type allergies (Moss, 1967, cited in Panetta, 1979b; De Loach *et al.*, 1986) caused by airborne

pollen and seed ‘fluff’ (Anonymous, 2007a). *B. halimifolia* pollen is reported to be severely allergenic (Pollen library Website, <http://www.pollenlibrary.com/>) and to cause symptoms in *Ambrosia artemisiifolia*-sensitive persons (The Asthma and Allergy Foundation of America Website, <http://www.aafa.org/>).

**Describe damage to potential habitats in PRA area:**

*B. halimifolia* already has major impacts in the EPPO region (France and Spain). In the Mediterranean area up to the north of France, impacts will probably be similar.

		
<p><i>B. halimifolia</i> fruiting along a river course in the Domaine de la Palissade in Camargue (FR). © Sarah Brunel, EPPO</p>	<p>Seeds of <i>B. halimifolia</i>. © Guillaume Fried, Anses, FR.</p>	<p>Invasion in the saltmarshes of the Domaine de la Palissade, Camargue (FR) © Guillaume Fried, Anses, FR.</p>

**How much economic impact would the pest have in the PRA area:**

Major  
Medium uncertainty  
Some uncertainties remain about *B. halimifolia*'s behaviour in Northern Europe.

**CONCLUSIONS OF PEST RISK ASSESSMENT**

**Summarize the major factors that influence the acceptability of the risk from this pest:**

*B. halimifolia* can be found in several coastal habitats, of which some are protected. The species is already established in the EPPO region and has major environmental impacts, and it could spread and establish in further countries.  
High seed production, effective dispersal by wind and the promotion of germination upon exposure to light make the management of *B. halimifolia* and containment difficult (Westman *et al.*, 1975). Eradication would only be a possibility for isolated and small infestations where sustained resourcing could be anticipated.

**Estimate the probability of entry:**

The probability of entry through intentional import as an ornamental and amenity plant is very likely, as the species already entered the EPPO region, and continues to enter, with a low level of uncertainty.

Very high probability of entry  
Low level of uncertainty

**Estimate the probability of establishment:**

*B. halimifolia* has already established in five countries in the EPPO region (Belgium, France, Italy, Spain, and the United Kingdom); the probability of establishment in the EPPO region is therefore considered as very high, with a low level of uncertainty.

Very high probability of establishment  
Level of uncertainty: medium

**Estimate the probability of spread:**

*B. halimifolia* is known as one of the most prolific plants, with estimates of seed production ranging between 10 000 (Auld, 1970) to 1 500 000 (Westman *et al.*, 1975) seeds per plant per year. Seeds are very small, their

Very high rate of spread  
Level of uncertainty: medium

mass is approximately 0.11 mg (Panetta, 1977) and they are crowned by a pappus and are therefore readily dispersed by wind (Boldt, 1987) but also by water (Panetta, 1977).

In addition, *B. halimifolia* is often planted in coastal areas along roads or roundabouts, making it easier to reach unintended habitats such as coastal wetlands.

Considering the moderate natural spread capacity of *B. halimifolia* and the very high assisted dispersal by human activities, the overall probability of spread is very high, uncertainty is medium.

**Estimate the potential economic impact:**

Major  
Level of uncertainty: medium

*B. halimifolia* has major environmental impacts as it threatens native communities and protected habitats. The habitats in which *B. halimifolia* is found to occur (e.g. saltmarshes, cliffs, wetlands, wet grasslands, etc.) in climatically suitable areas, i.e. the Atlantic and Mediterranean areas are the most at risk.

It also has moderate social impacts through provoking pollen allergies and impeding the management of mosquitoes.

**Degree of uncertainty**

The following uncertainties are noted:

- the trade and use extent of the plant;
- the ability of the species to persist in cold and dry conditions;
- seed longevity ;
- the future rate of spread;
- the impacts at the species level (e.g. on birds);
- the degree of allergenicity of the species.

**OVERALL CONCLUSIONS**

*B. halimifolia* causes major environmental impacts in invaded native communities and protected habitats.

***B. halimifolia* qualifies as a quarantine pest.**

### STAGE 3: PEST RISK MANAGEMENT

#### IDENTIFICATION OF THE PATHWAYS

Pathways studied in the pest risk **Intentional import as an ornamental and amenity plant management**

#### IDENTIFICATION OF POSSIBLE MEASURES

Possible measures for pathways

- **Intentional import as an ornamental and amenity plant**

##### International measures

Prohibition of import and trade of *B. halimifolia* in the EPPO region and within the countries will effectively prevent further introductions into and within the EPPO region.

##### National measures

Prohibition of the import, selling, planting, holding, movement, and causing to grow in the wild, combined with eradication, containment and control of *B. halimifolia* may effectively prevent further establishment and spread within the EPPO region.

The presence of the plant in unintended habitats represents a particular form of holding that could be difficult to manage, i.e. where large infestations occur.

Sterile cultivars of the plant may be proposed in trade, but the effective sterility of such forms must be proven.

##### Integrated management plans

Integrated management plans are potentially highly effective if coupled with prohibition measures. Uncertainty concerns commitment to long-term implementation and coordination across different stakeholders and countries.

This would require:



- monitoring/surveillance in the countries where it is invasive or present (Belgium, France, Italy, Spain, the United Kingdom), and surveillance in the countries at risk where it is not reported;
- early warning consisting of exchanging information with other countries, and rapid response;
- control of existing populations;
- public awareness: producers and sellers shall be informed of the problem and work should be undertaken with them to explain the prohibition of the species, and inform consumers. Administrative bodies should also be warned that the plant should not be used as an ornamental or amenity species.

#### Monitoring and review

Performance of these measure(s) should be monitored in countries to ensure that the aim is being achieved. Monitoring of ongoing eradication campaigns and management activities should also be undertaken.

### **EVALUATION OF THE MEASURES IDENTIFIED IN RELATION TO THE RISKS PRESENTED BY THE PATHWAYS**

The estimated value of the species to the trade is low and interference of the prohibition of the species with trade is considered as low. Several nurseries and garden centers in France have voluntarily removed *B. halimifolia* from sale due to its known invasiveness. Considering the high costs to control the plant, compared to the benefit its trade generates, the prohibition of the import, selling, planting, movement, and causing to grow in the wild is very cost-effective.

**Degree of uncertainty**      No uncertainty.

### **IDENTIFICATION OF POSSIBLE MEASURES**

<b>Intentional import as an ornamental and amenity plant</b>	Prohibition
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