Appendix A

Harmonia^{+PL} – procedure for negative impact risk assessment for invasive alien species and potentially invasive alien species in Poland

QUESTIONNAIRE

A0 | Context

Questions from this module identify the assessor and the biological, geographical & social context of the assessment.

a01. Name(s) of the assessor(s):

first name and family name

1. Julian Chmiel
2. Barbara Tokarska-Guzik
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acomm01. Comments:

	degree	affiliation	assessment date
(1)	dr hab.	Department of Plant Taxonomy, Faculty of Biology, Adam Mickiewicz University, Poznań, Poland	28-01-2018
(2)	prof. dr hab.	Faculty of Biology and Environmental Protection, University of Silesia in Katowice	01-02-2018
(3)	prof. dr hab.	Department of Botany and Nature Protection, Faculty of Biology and Biotechnology, University of Warmia and Mazury in Olsztyn	31-01-2018

a02. Name(s) of ***the species*** under assessment:

Polish name: –

Latin name: ***Baccharis halimifolia*** L.

English name: Tree groundsel

Współfinansowano w ramach projektu nr POIS.02.04.00-00-0100/16 pn. *Opracowanie zasad kontroli i zwalczania inwazyjnych gatunków obcych wraz z przeprowadzeniem pilotażowych działań i edukacją społeczną* ze środków Unii Europejskiej w ramach Programu Infrastruktura i Środowisko 2014-2020

acomm02. Comments:

The current and preferred name is given according to The Plant List (2013 – B). The more commonly used synonyms include: *Baccharis halimifolia* f. *subintegrifolia* Heering (1907), *Baccharis halimifolia* var. *angustior* DC. (1836) (EPPO 2013 – I, The Plant List 2013 – B) *Baccharis asteroides* Colla. In addition to the following English common names, the following are also used: Eastern baccharis, groundsel bush, salt march-elder, saltmyrtle, seepwillow, silverling, sea myrtle, manglier, saltbush, waterbrush (EPPO 2013 – I, Fried et al. 2016 – P). The Polish name was used by Stanisław Wodzicki at the beginning of the 19th century in the original notation: „komarnik wirginiyski" (Dolatowski 2013 – P). A synonym for the Polish name: bakcharis srebrzysty.

Polish name (synonym I) Komarnik wirginijski	Polish name (synonym II) Bakcharis srebrzysty
Latin name (synonym I) *Baccharis axillaris*	Latin name (synonym II) *Baccharis cuneifolia*
English name (synonym I) Groundsel baccharis	English name (synonym II) Consumption weed

a03. **Area** under assessment:

Poland

acomm03. Comments:

–

a04. **Status** of *the species* in Poland. *The species* is:

	native to Poland
	alien, absent from Poland
X	alien, present in Poland only in cultivation or captivity
	alien, present in Poland in the environment, not established
	alien, present in Poland in the environment, established

aconf01. Answer provided with a

low	medium	high
		X

level of confidence

acomm04. Comments:

In Poland, *Baccharis halimifolia* is known from a few places of cultivation in botanical gardens and arboreta. According to information by Stanisław Wodzicki from the beginning of the 19th century (compiled by Dolatowski 2013 – P), this species was kept in collections, in the so-called "temperate" or cold greenhouses in Puławy, in Krakow in 1808, in Krzemieniec in 1816 (current territory of Ukraine) and in Warszawa in 1824. At the present time, it has been confirmed in four botanical gardens with a number of several to a dozen or so individuals (in one of the gardens it is kept in pots/containers) (Botanical Gardens employees…2018 – N). The oldest specimens were introduced in 1999 in the Botanical Garden of the University of A. Mickiewicz in Poznań (curators: Karol Węglarski, Beata Grabowska). Spontaneous spread of the plants has been recorded only at the Botanical Garden of the University of Wroclaw, where newly occurring plants are removed. There are no signs of this species escaping beyond the botanical gardens and arboreta. There is also no information about its cultivation in private gardens, its use in park planting or along highways and expressways, or in plantings to strengthen the coastal zone in Poland. This last aspect is significant because from the mid-nineteenth century to the mid-twentieth century, in Western Europe, the species was recommended and used as an ornamental plant, to provide biological surrounding for roads, to strengthen dunes, stabilize the banks of canals and even as a medicinal plant supporting slimming (Ihobe 2013 – I).

In addition to being grown, the species is found in the wild in Western Europe. It has been recorded so far in Belgium, France, Spain, the Netherlands, Italy and the British Isles (Caño et al. 2013 – P, EPPO 2014 – B). The secondary range outside Europe includes Asia – the

	eastern coast of the Black Sea in Georgia; Oceania – Australia and New Zealand (where it has the status of being locally established). *Baccharis halimifolia* originates from North America and its natural range includes Canada, Mexico, USA; it also occurs in the Caribbean - the Bahamas and Cuba (EPPO 2014 – B and literature cited therein). The northern range limit reaches Canada. It is considered to be a very rare Atlantic species there, associated with the coast; it is present in the area of the Tusket River estuary (EPPO 2014 – B, Fried et al. 2016 – P).

a05. The impact of *the species* on major domains. *The species* may have an impact on:

X	the environmental domain
X	the cultivated plants domain
	the domesticated animals domain
X	the human domain
X	the other domains

acomm05.	Comments: *Baccharis halimifolia* tree groundsel is assessed as a species with a significant negative impact on the natural environment (EPPO 2014 – B). Within the limits of its secondary range, especially in Western Europe, the species has negative effect on the physiognomy and structure of native plant communities; it exerts a lot of competitive pressure on other plant species, resulting in even the displacement of native plant species (Campos et al. 2004, Herrera and Campos 2010, Caño et al. 2014 – P). By evoking changes in the structure of plant communities, it also adversely affects the feeding, resting and nesting conditions of some bird species (Arizaga et al. 2013 – P). The effect of tree groundsel on plant cultivation is minimal/little and is manifested in the occupation of areas used as pastures, the transfer of crop pests and in its toxic properties. Allergic reactions caused by the species have been found in humans (Valle Álvarez et al. 1999, Herrera and Campos 2010, Ihobe 2011 – P). Waterlogged, subhalophylic thickets with the participation of the species promote the massive reproduction of mosquitoes, which negatively affects the comfort of human life (Bouterin and Canonge 1999 in Müller 2004 – P). The species, by having the ability to render wet pastures and arable land temporarily unavailable for use, hinders grazing use or re-acquisition of land for agricultural use (Ihobe 2011 – P). Growth at high density may contribute to changes in the hydrological system, especially in the coastal river-mouth sections of rivers (Brunel et al. 2010, Ihobe 2011 – P). The shrub contains flammable resins and therefore poses a fire hazard (Müller 2004 – P). Because it often colonizes salty mud and wastelands around the salt production plants, there are incidents of salt being contaminated with its seeds (David 1999 – P). Populations of the species are difficult to control and the costs of treatments are high (EPPO 2014 – B, Fried et al. 2016 – P).

A1 | Introduction

Questions from this module assess the risk for *the species* to overcome geographical barriers and – if applicable – subsequent barriers of captivity or cultivation. This leads to *introduction*, defined as the entry of *the organism* to within the limits of *the area* and subsequently into the wild.

a06. The probability for ***the species*** to expand into Poland's natural environments, **as a result of self-propelled expansion** after its earlier introduction outside of the Polish territory is:

X	low
	medium
	high

aconf02.	Answer provided with a	low	medium **X**	high	level of confidence

acomm06. Comments:

In Poland, *Baccharis halimifolia* does not occur in a wild state. It is an established species in Spain, France and Belgium. The level of invasiveness is particularly high in coastal regions (Brittany, the Basque Country). In addition, it has been recorded spontaneously in semi-natural and natural ecosystems, on the French part of the Mediterranean coast and on the northern shores of the Tyrrhenian and Adriatic Sea in Northern Italy. There are also reports of the scarce presence of *Baccharis halimifolia* on the northern shore of the English Channel in southern England (Caño i in. 2012 – P), on the western coast of Scotland (NBN Atlas 2017 – B) and in Georgia (Abkhazia) near the Black Sea (Kikodze et al. 2010 – P). Closest to the territory of Poland, the species was observed on Goeree-Overflakkee Island in 2003 (R. van der Meijden 2005 – P) on the North Sea (southern Netherlands). The site visited almost 10 years later by Johan van Valkenburg gave a negative result. Van Valkenburg (2013 – P) was surprised by the negative result of the observation, given the large diaspore production, their anemochoric dispersion (by wind) and the fact that there is a large population of *Baccharis halimifolia* at a distance of several kilometres on the Belgian coast. In Poland, the species has not yet managed to escape from cultivation. Perhaps only individuals of a single sex occur in these rare cases of cultivation. However, there is no relevant information in this regard.

The probability of spontaneous expansion of *Baccharis halimifolia* to Poland from abroad in the upcoming years is low. The species demonstrates a high potential for spreading (anemochory, dispersion within a 100 m radius of the fruiting plant) (Charpentier et al. 2006 – P) and one cannot exclude more distant transport. However, the species requires high temperature (15-20°C) and much light during germination (Westman et al. 1975 – P).

a07. The probability for *the species* to be introduced into Poland's natural environments by **unintentional human actions** is:

X	low
	medium
	high

aconf03. Answer provided with a

low	medium	high
	X	

level of confidence

acomm07. Comments:

Tree groundsel reproduces sexually, producing huge amounts of fruits (achenes) with a flight apparatus. So far there have been no documented pathways that would allow the species to enter the natural environment of Poland due to unintentional human activities. In Western Europe, *Baccharis halimifolia* has been used for roadside planting in the past (EPPO 2013 – I, EPPO 2014 – B). In view of the intensive road transport of goods, there is a possibility that the species diaspores will enter Western Poland by this route. However, a deficit of precipitation, suboptimal thermal conditions and intensifying effects of the continental climate may be factors stopping further expansion in an eastern direction. Resistance of the plant to temperature falls only down to -15°C (Huxley 1992 – P, in: Müller 2004 – P) would allow the shrub to freeze regularly in Polish winter conditions. In the climate conditions in Poland, there may also be a problem with seed germination. This requires a temperature of 15-20°C (Westman et al. 1975 – P, however, cf. the comment in question a08). For the effective production of seeds, *B. halimifolia* requires a long, warm summer and an annual rainfall of over 900 mm (Westman et al. 1975 – P). For these reasons, CLIMEX climate simulations according to Sims-Chilton et al. (2010 – P) indicate that the coasts of the western part of the Baltic Sea, including the coastal area of Poland, demonstrate relatively low susceptibility to invasions by *Baccharis halimifolia* (20-40% at most). According to this source, apart from the Atlantic part of Europe, there is a potentially large threat of *Baccharis halimifolia* invasion in the European Mediterranean zone.

a08. The probability for *the species* to be introduced into Poland's natural environments by **intentional human actions** is:

X	low
	medium
	high

aconf04.	Answer provided with a	low	medium **X**	high	level of confidence

acomm08. Comments:

On the Atlantic coasts of the European part of its secondary range, tree groundsel is planted in home gardens, hedges and on roundabouts – it escapes from these places ("becomes wild") and first colonizes anthropogenic habitats: roadsides, canal banks, agricultural wastelands, including wastelands near old salt production plants (Le Moigne and Magnanon 2009 – P). The species has been cultivated in botanical gardens and arboreta in Poland since the beginning of the 19th century (Dolatowski 2013 – P), currently quite rarely (Botanical Gardens employees...2018 – N; cf. question a04). In one (the Botanical Garden of the University of Wroclaw) of the four gardens in which cultivation was confirmed – it spreads spontaneously but seedlings are systematically removed. The species appears in the horticultural lists (including on the Internet), but it is often marked in sale lists as unavailable (Tokarska-Guzik 2017 – A). One might also hope that the appearance of "black lists" of invasive species (2011, 2016, 2017) will be an effective tool against the conscious introduction of the species onto the Polish market. The cultivation of *Baccharis halimifolia* in botanical gardens and arboreta is a separate issue. Given the dioeciousness of the species – only a collection composed of either female or male individuals should be maintained in a given botanical garden or arboretum. Based on the information gathered, the probability of introducing the species to the natural environment of Poland due to intentional human activities should be assessed as low, with an average degree of certainty related to the lack of sufficient data on the cultivation of the species throughout the country.

A2 | Establishment

Questions from this module assess the likelihood for *the species* to overcome survival and reproduction barriers. This leads to *establishment*, defined as the growth of a population to sufficient levels such that natural extinction within *the area* becomes highly unlikely.

a09. Poland provides **climate** that is:

	non-optimal
X	sub-optimal
	optimal for establishment of *the species*

aconf05.	Answer provided with a	low	medium **X**	high	level of confidence

acomm09. Comments:

The homeland of the species includes the Atlantic coast of Canada (Nova Scotia), the United States (Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia) (Anonymous 2006 – I), Mexico (Nuevo Leon, San Luis Potosi, Tamaulipas, Veracruz) and the Caribbean (the Bahamas and Cuba) (Correl and Correl 1982, Ihobe 2014 – P). Within its natural range, tree groundsel is found in areas characterized by humid subtropical to tropical climates (Florida), to areas with snow fall in winter (Massachusetts) (USDA-ARS Website – I). The range includes four plant zones, with an annual minimum temperature of 17.8°C/23.3°C. Because of the proximity of the Atlantic Ocean, the climate is much more humid and the thermal amplitudes are lower than in Poland. *Baccharis halimifolia* is an evergreen shrub, yet in cooler regions of its native range is sheds

leaves for winter (Sims-Chilton and Panetta 2011 – P). Due to its late flowering period, *B. halimifolia* requires a long and warm autumn (average temperature in October 10-20°C) (USDA-ARS Website – I). Plants tolerate frost and withstand temperatures down to – 15°C (CABI 2018 – B). Westman et al. (1975 – P) indicate that temperatures of 15-20°C are optimal for germination of seeds; the seeds also require a cold period at 5°C. These parameters indicate the climatic preferences of the species – from temperate to subtropical (CABI 2018 – B).

The map of Poland's climate similarity with regard to the entire world, developed using the Mahalanobis distance modelling method, places the values of climatic similarity in the range of 0-45%, which should be interpreted as unfavourable conditions for the establishment of the species. This interpretation should be treated with caution, due to numerous reports on the displacement of the climate niche of invasive species in their secondary range and the fact that the plants spread spontaneously even in Poland – data from the Botanical Garden of the University of Wroclaw (Botanical Gardens employees…2018 – N; cf. question a08). The model of the potential distribution of *Baccharis halimifolia* for Europe developed using the CLIMEX software indicates the countries of the Mediterranean area and the Atlantic part of Western Europe as the areas most suitable for this species; they also characterise Germany, Denmark and the Netherlands as having a lower likelihood. The areas most likely to allow establishment of the species in Poland on the basis of this model include the seashore of the Baltic Sea and, to a lesser extent, the regions of south-western Poland (Fried et al. 2016 – P). Theoretically, the biggest chance of *B. halimifolia* introduction into the natural environment of Poland is in the coastal part of the West Pomeranian Voivodeship, which is included in climatic region 7B (with an average minimal temperature between -12.2 and -15 °C). Hence the assessment indicates moderately favourable conditions with an average degree of certainty.

a10. Poland provides **habitat** that is

	non-optimal
X	sub-optimal
	optimal for establishment of *the species*

aconf06.	Answer provided with a	low	medium **X**	high	level of confidence

acomm10. Comments:

Tree groundsel in its native range grows in various types of coastal habitats, including salty, irregularly flooded marshes, dunes and in the open forests. It also colonizes habitats created by man: wastelands, roadsides and former fields located at altitudes from 0 to 100 m above sea level (Sundberg and Bogler 2006 – P). In countries where it is found naturally, it is considered to be a common species of coastal salt marshes and the gray dune habitat (Cronquist 1980 – P). The species also colonizes disturbed habitats, such as fallows and hedgerows, as well as inland salt marshes (Krischik and Denno 1990 – P).

In its secondary range, similarly to in its natural range, tree groundsel primarily colonizes coastal habitats with an average level of salinity, above the tidal level, but it also enters inland anthropogenic habitats (Caño et al. 2013 – P). In the secondary range as a whole, it is found in a range of different types of habitats: in Australia, the tree groundsel grows in dry eucalyptus forests, but also in marshy forests created by the *Melaleuca quinquenervia* paper bark tea tree; it prefers saline mud and wetlands. As in the natural range, it colonizes disturbed habitats: various types of wastelands, slopes, pastures, banks of irrigation canals, pine plantations (Westman et al. 1975, Panetta 1979a and b – P).

In the European part of the secondary range, first of all it colonizes anthropogenic habitats in areas of cultivation: roadsides, post-agricultural wastelands, post-industrials wastelands (including saline sites). It also enters into semi-natural and natural habitats from halophilous marshes (communities with the participation of *Sarcocornia fruticosa*, *Juncus maritimus*, *Phragmites australis*, *Elytrigia elongata* subsp. *scirpea*, *Althaea officinalis*, *Sonchus maritimus* subsp. *maritimus* and *Juncus acutus*) to coastal cliffs (the *Crithmo-Armerion* community and *Dactylido-Ulicion*) and heathlands and coastal dunes (Campos et al. 2004, Muller 2004 – P). Tree groundsel grows on a variety of soil types, typically on moist

and fertile soils, however – for example as in Spain – it can occur on coarse sands (Sims-Chilton and Panetta 2011 – P). The plant is listed from soils with a wide pH range of 3.6 to 9; it endures high water levels and salinity of up to 3.6% (Westman et al. 1975 – P). Due to the habitat preferences, the possibility of *Baccharis halimifolia* spread in Poland should be assessed as limited only to the coastal zone and to habitats such as cliffs, seaside salt pans, Baltic dune pine woods or natural inland salt pans, and locally anthropogenic habitats (saline roadsides, post-industrial salt fields, etc.). The described habitat preferences allow the recognition that habitat conditions are moderately favourable in Poland.

A3 | Spread

Questions from this module assess the risk of *the species* to overcoming dispersal barriers and (new) environmental barriers within Poland. This would lead to spread, in which vacant patches of suitable habitat become increasingly occupied from (an) already-established population(s) within Poland.

Note that spread is considered to be different from range expansions that stem from new introductions (covered by the Introduction module).

a11. The capacity of *the species* to disperse within Poland by natural means, **with no human assistance**, is:

	very low
	low
	medium
X	high
	very high

aconf07.	Answer provided with a	low	medium **X**	high	level of confidence

acomm11. Comments:

Tree groundsel is a dioecious shrub or small tree growing up to a height of 4 m with wind-pollinated flowers. It grows quickly and reaches maturity after two years only. It reproduces mainly via seeds, but it can also regenerate to form roots from the root collar (Westman et al. 1975, Panetta 1979a and b, Herrera and Campos 2010 – P).

Dispersion from a single source (type A data). Tree groundsel flowers in late summer and its small flowers collected into numerous inflorescences are wind-pollinated. It is one of the most fertile plants – one adult shrub produces from 10,000 to 1,500,000 seeds per year (Auld 1970, Westman et al. 1975 – P). The achenes are very small, their weight is about 0.11 mg (Panetta 1977 – P). The achenes with an attached flight apparatus, under conditions of a wind speed of 17 km/h, are transported to a distance of approx. 140 m from a 2-metre tall shrub (Diatloff 1964 – P). Most seeds fall within a few metres from the mother shrub. Ascending air currents can carry seeds over several kilometres (5-6 km) (Anonymous 2007 – P). Seeds can also be spread by water ((Panetta 1977 – P, CABI 2018 – B).

Estimation (type C data). Numerous seeds germinate quickly under favourable humidity conditions, and they retain their germination capacity for 2 years (Westman et al. 1975, Panetta 1979a – P, EPPO 2014 – B). In the area of the Bay of Biscay, tree groundsel has colonized almost all the estuaries, forming numerous populations in many places on the coast; data from northern Spain confirm the spread of tree groundsel shrubs over 90 years into all the estuaries of the 300 km coastal segment (Caño et al. 2013 – P).

It has also been found that due to the seeds being very small, the seedlings grow very slowly, which makes *B. halimifolia* in this development phase not very competitive with other plants and this effect is increased by drought. At this stage of development, the plant is sensitive to shading (Panetta 1977 – P). Sunlight is also an important factor in flowering (Panetta 1979a – P).

Assuming that the species becomes present in Poland, on the basis of the quoted data, it should be assumed that the ability of the species to spread without human involvement would be large, but that its spread may be limited by local micro-habitat conditions.

a12. The frequency of the dispersal of *the species* within Poland by **human actions** is:

	low
	medium
X	high

aconf08.	Answer provided with a	low	medium **X**	high	level of confidence

acomm12. Comments:

In western Europe, the species is used on a limited scale as a decorative plant in home gardens, but much more often in landscape architecture, in order to stabilize soils and for aesthetic value. According to the data included in the EPPO report (2014 – B), the shrub is still available commercially, both in garden centres and through on-line sales. Currently, the species does not occur in Poland in the natural environment, and very rarely in cultivation. Assuming that there are or will be places from which there will be potential spread within the territory of the country (the condition is the coexistence of shrubs with female and male flowers), further spread of the species with human participation is likely to occur due to the movement of seeds. They can stick to clothes, shoes, car tyres, agricultural and forestry machinery and other equipment; they can be transferred with soil containing seeds. Due to the characteristics of fruits (small and light) it can be estimated that there are will be more than 10 cases per decade.

A4a | Impact on the environmental domain

Questions from this module qualify the consequences of *the species* on wild animals and plants, habitats and ecosystems.

Impacts are linked to the conservation concern of targets. Native species that are of conservation concern refer to keystone species, protected and/or threatened species. See, for example, Red Lists, protected species lists, or Annex II of the 92/43/EWG Directive. Ecosystems that are of conservation concern refer to natural systems that are the habitat of many threatened species. These include natural forests, dry grasslands, natural rock outcrops, sand dunes, heathlands, peat bogs, marshes, rivers & ponds that have natural banks, and estuaries (Annex I of the 92/43/EWG Directive).

Native species population declines are considered at a local scale: limited decline is considered as a (mere) drop in numbers; severe decline is considered as (near) extinction. Similarly, limited ecosystem change is considered as transient and easily reversible; severe change is considered as persistent and hardly reversible.

a13. The effect of *the species* on native species, through **predation, parasitism or herbivory is**:

X	inapplicable
	low
	medium
	high

aconf09.	Answer provided with a	low	medium	high	level of confidence

acomm13. Comments:

The species is a non-parasitic plant.

a14. The effect of *the species* on native species, through **competition** is:

	low
X	medium
	high

aconf10.	Answer provided with a	low	medium **X**	high	level of confidence

acomm14. Comments:

Baccharis halimifolia can successfully compete with other plant species. It forms compact, single species thickets that limit the access of light and modify local micro-habitat conditions, leading to the elimination of native herbaceous species (Müller 2004 – P). The results of studies confirm the reduction effect of tree groundsel on species richness (Pierre 2012, Fried et al. 2016 – P). It has also been confirmed that the tree groundsel may threaten rare plant species. For example, it is assumed that in the Spanish part of the Bay of Biscay the species contributed to a reduction in the population size of *Matricaria maritima* (Campos et al. 2004 – P), which has an "endangered with extinction" species category, the shrub also threatens other species of plants associated with coastal swamps (including *Cochlearia aestuaria*, *Frankenia laevis*, *Limonium humile*, *Salicornia* spp. or *Sarcocornia perennis*) (Uribe-Echebarría i Campos 2006 – P). Other studies indicate the negative effect of dense populations of tree groundsel on populations of birds naturally associated with the habitat colonized by the species, which do not find favourable places for nesting, resting and feeding in the changed conditions (EPPO 2014 – B). If the species were to spread in Poland, at least in the coastal zone, one can assume that its influence would be medium or even large. Competition, as in the current part of the Western European secondary range, would mainly concern light and food resources. In particular, weakly competitive and extremely heliophytic halophytes from the communities of salt meadows and sub-humoral rush would be at risk. However, this effect will be weakened due to prevailing climatic conditions: excessively low temperatures in the winter and too short a vegetation season.

a15. The effect of *the species* on native species, through **interbreeding** is:

X	no / very low
	low
	medium
	high
	very high

aconf11.	Answer provided with a	low	medium	high **X**	level of confidence

acomm15. Comments:

Baccharis is a genus of about 400 species. It was found that within its natural range *Baccharis halimifolia* interbreeds with *B. neglecta* and *B. angustifolia* (Arkansas, Louisiana and eastern Texas). There are known cases of *B. halimifolia* hybridizing with *B. angustifolia* in Florida (EPPO 2013 – I). Other species of the *Baccharis* genus are not present in Europe, including Poland. Thus, it is impossible to form hybrids here.

a16. The effect of *the species* on native species by **hosting pathogens or parasites** that are harmful to them is:

X	very low
	low
	medium
	high
	very high

aconf12.	Answer provided with a	low	medium **X**	high	level of confidence

acomm16. Comments:

133 species of insects have been identified from the natural range, which have been collected from plants of tree groundsel, 11 of which are considered to be specific to the *Baccharis* genus (Palmer 1987 – P). The fungus pathogen – *Puccinia evadens* coyote brush rust causes defoliation of the bush, infecting leaves and shoots (CABI 2018 – B). In the

southern part of North America, the *Belonolaimus longicaudatus* nematode feeds on the *B. halimifolia* roots. It also causes significant damage to grass crops and populations of some wild species (Crow 2015 – I). Taxa which would be related to the grass species found in Poland are not mentioned among them, however.

So far, two species of aphids have been identified in France (Hemiptera: *Aphidiae*) – *Aphis fabae* and *Aphis spiraecola* – feeding on *B. halimifolia* (Dauphin and Matile-Ferrero 2003, Fried et al. 2013 – P). *Aphis fabae* aphids are a species widely distributed in temperate regions of North America, Europe and Asia feeding on 200 species (Plantwise Knowledge Bank – I). In Poland it feeds on many native species: *Euonymus, Viburnum, Arctium, Cirsium, Chenopodium, Rumex* genus, and those commonly grown (cf. question a23). The second species of aphids feeding on *B. halimifolia*, i.e. *Aphis spiraecola*, is of lesser significance from the perspective of potential hosts among native species throughout the country. In future, its hosts may potentially include *Crataegus* hawthorn, *Malus sylvestris* wild apple tree, and wild species of the *Prunus* genus (Anonymous 2014a – I). The aforementioned two species of aphids feeding on *B. halimifolia* are a natural component of Polish entomofauna and the presence of *B. halimifolia* should not result in increasing populations of these insects.

a17. The effect of *the species* on ecosystem integrity, by **affecting its abiotic properties** is:

X	low
	medium
	high

aconf13.	Answer provided with a	low	medium **X**	high	level of confidence

acomm17. Comments:

Tree groundsel may cause physical modification of habitat conditions. Because the leaves and stems of the plants contain flammable resins, the dense thickets formed by the tree groundsel increase the frequency of fires in occupied habitats (Müller 2004 – P). It is assumed that dense populations of the species may have a negative effect on ecosystem productivity, nitrogen and carbon circulation processes and the decomposition of organic matter, which may be of great importance in river-mouth zones; however, there is still no direct evidence to support this effect (Caño et al. 2013 – P). However, there are also no data to assess the extent and intensity of the type of disturbance, which the species could possibly cause in ecosystems occurring in Poland. Assuming hypothetically that the species could establish in natural ecosystems in Poland (on coastal halophilic meadows), its negative effect might be related primarily to the shading of the habitat of photophilic salt pan plants.

a18. The effect of *the species* on ecosystem integrity, by **affecting its biotic properties** is:

	low
	medium
X	high

aconf14.	Answer provided with a	low	medium **X**	high	level of confidence

acomm18. Comments:

Mass colonization by tree groundsel in the secondary range of semi-natural and natural habitats leads to changes in their structure and physiognomy (Campos et al. 2004 – P). In the patches of communities dominated by this species, there is a decline in the diversity of representatives of the native flora. The communities formed by *Juncus maritimus* and *Elytrigia atherica*, considered as part of the protected natural habitats of the "Atlantic salt meadows" (code 1330) are the most exposed to the invasion of *B. halimifolia* (Caño et al. 2013 – P). In northern Spain, subhalophilous vegetation communities have been completely replaced by single-species populations of tree groundsel (Campos 2010 – P). Presumably,

	these changes reduce the diversity and density of arthropods, and this reduces the number of birds that feed on arthropods (cf. also question a14). It can be assumed that the presence of the species in Poland, at least in the Baltic seashore zone, could lead to similar consequences in coastal communities of halophilic meadows, vegetation of cliffs and Baltic dune pine woods, including changes in the species composition of phytocoenoses (mainly communities of the *Glauco-Puccinellietalia* order). This shrub, characterized by intensive annual growth, could crowd native species out, limiting floral diversity.

A4b | Impact on the cultivated plants domain

Questions from this module qualify the consequences of *the species* for cultivated plants (e.g. crops, pastures, horticultural stock).

For the questions from this module, consequence is considered 'low' when presence of *the species* in (or on) a population of target plants is sporadic and/or causes little damage. Harm is considered 'medium' when *the organism's* development causes local yield (or plant) losses below 20%, and 'high' when losses range >20%.

a19. The effect of *the species* on cultivated plant targets through **herbivory or parasitism** is:

	inapplicable
X	very low
	low
	medium
	high
	very high

aconf15.	Answer provided with a	low	medium	high **X**	level of confidence

acomm19.	Comments: This is not a species of parasitic plant.

a20. The effect of *the species* on cultivated plant targets through **competition** is:

	inapplicable
X	very low
	low
	medium
	high
	very high

aconf16.	Answer provided with a	low	medium	high **X**	level of confidence

acomm20.	Comments: In its natural range *Baccharis halimifolia* is considered a weed colonizing the areas used as pastures (Nesom 2006 – P). In its secondary range in Australia, it is similarly a weed in pastures which limits their productivity and animal movement (Ensbey 2001 – P). No effect on crop cultivation has been confirmed in the European part of the secondary range (EPPO 2014 – P).

a21. The effect of *the species* on cultivated plant targets through **interbreeding** with related species, including the plants themselves is:

	inapplicable
X	no / very low
	low
	medium
	high
	very high

aconf17.	Answer provided with a	low	medium	high **X**	level of confidence

acomm21. Comments:

Among the plants cultivated in Poland and in other European countries, there are no species which would be phylogenetically sufficiently close to *Baccharis halimifolia* to allow hybridization.

a22. The effect of *the species* on cultivated plant targets by **affecting the cultivation system's integrity** is:

X	very low
	low
	medium
	high
	very high

aconf18.	Answer provided with a	low	medium **X**	high	level of confidence

acomm22. Comments:

Within one area of secondary occurrence (Australia) the species as a weed can massively colonize land used as pasture. There is no detailed information (including from Europe), certifying its disruption of crop integrity elsewhere.

a23. The effect of *the species* on cultivated plant targets by hosting **pathogens or parasites** that are harmful to them is:

	very low
X	low
	medium
	high
	very high

aconf19.	Answer provided with a	low	medium **X**	high	level of confidence

acomm23. Comments:

In the native range of *B. halimifolia* 133 species of insects have been identified, collected from plants of tree groundsel, 11 of which are considered to be specific to the *Baccharis* genus (Palmer 1987 – P). The fungus pathogen – *Puccinia evadens* coyote brush rust – causes defoliation of the bush, infecting leaves and shoots (CABI 2018 – B; cf. question a16). Palmer and Bennett (1988 – P) also provide a list of more than 50 species of crop pests found on plants of tree groundsel in its natural range.

So far, in France, two species of *Coccidae* (Hemiptera: Coccidae): *Ceroplastes sinensis* and *Saissetia oleae* have been identified feeding on *B. halimifolia* and the aphids (Hemiptera: Aphidiae): *Aphis fabae* and *Aphis spiraecola* (Dauphin and Matile-Ferrero 2003, Fried et al. 2013 – P). *Ceroplastes sinensis* is also a pest of citrus species and vines and *Saissetia oleae* can also feed on olives, apricots and avocados (Byron, Gillett-Kaufman, Allan 2015 – I). *Aphis fabae* aphids are a species widely distributed in temperate regions of North America, Europe and Asia feeding on 200 species (Plantwise Knowledge Bank – I). In Poland, it feeds on many native species (cf. question a16) and can cause significant losses in the cultivation of sugar beet, spinach, beans, celery, potatoes, sunflower, carrots, artichokes, tobacco and tomatoes. The second species of aphid feeding on *B. halimifolia*, i.e. *Aphis spiraecola*, also feeds on celery, walnut, carrots, lettuce, apples, plums, sunflower, potatoes, pears and corn (Anonymous 2014a – I). In Poland, however, it is of lesser importance as it has higher thermal requirements. The susceptibility of *B. halimifolia* to bacterial infections of *Xylella fastidiosa*, mentioned in the EPPO A2 list, which causes crop diseases (fruit trees) (Najberek – work in progress – N) is very important due to the risk to crops. This bacterium has been

relatively recently introduced from North America to the western and southern parts of Europe. The bacterium populates the hosts' vascular bundles and produces toxins. The most common symptoms of the disease are withering, weakened growth, premature leaf fall and finally wilting of the entire plant. Over a short time, it has resulted in heavy losses in the cultivation of olives, citruses and vines in Southern Europe. Plants grown in Poland which are susceptible to the disease include peaches and plums (Bradbury 1991, Anonymous 2014b, Anonymous 2015 – I).

Assessing in general terms the threat resulting from the possible establishment of *B. halimifolia*, as a vector of diseases or pests in Poland, it should be associated in particular with the possibility of bringing *Xylella fastidiosa*. Until now, cases of its occurrence have not been confirmed in Poland. On the other hand, the two aforementioned species of aphids feeding on *B. halimifolia* are a natural component of Polish entomofauna and the presence of *B. halimifolia* should not cause increasing threats by these aphids to crop plants. In the southern part of North America, the nematode *Belonolaimus longicaudatus* feeds on *B. halimifolia* roots. It also does considerable damage to grass cultivation on golf courses. This nematode also causes significant damage to crops of rye, wheat, oats, sorghum, millet, maize, as well as cotton, potatoes, soy, cabbage, alfalfa, clover and strawberries (Crow 2015 – I). The *Baccharus* genus also has a group of species from various groups of parasitic or feeding organisms specific to itself, e.g. *Puccinia evadens* (Basidiomycota: Pucciniomycetes), *Trirhabda bacharidis* (Coleoptera: Chrysomelidae), *Rhopalomyia californica* (Diptera: Cecidomyiidae), *Megacyllene mellyi* (Coleoptera: Cerambycidae), *Amniscus perplexus* (Coleoptera: Cerambycidae), *Prochoerodes truxaliata* (Lepidoptera: Geometridae) (Palmer and Bennett 1988 – P). They are used to limit *Baccharis halimifolia* expansion using biological methods (Palmer and Tilden 1988, Palmer et al. 2010 – P).

Despite numerous data from the literature on pathogens and parasites of *Baccharis halimifolia* in relation to crop plants, the effect of the species should be assessed as "small", due to the low probability of any mass presence of the species, which will presumably be limited to coastal regions of north-western Poland.

A4c | Impact on the domesticated animals domain

Questions from this module qualify the consequences of *the organism* on domesticated animals (e.g. production animals, companion animals). It deals with both the well-being of individual animals and the productivity of animal populations.

a24. The effect of *the species* on individual animal health or animal production, through **predation or parasitism** is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf20.	Answer provided with a	low	medium	high	level of confidence

acomm24. Comments:

Plant species.

a25. The effect of *the species* on individual animal health or animal production, by having properties that are hazardous upon **contact**, is:

X	very low
	low
	medium

	high
	very high

aconf21.	Answer provided with a	low	medium	high **X**	level of confidence

acomm25.	Comments: There are very few records regarding poisoning in animals due to the cardiotoxic glucosides found in the leaves of the plant (Boldt 1987, cited in Sims-Chilton and Panetta 2011 – P). This is probably due to the low digestibility of the plant, which has little nutritional value for farm animals. *Baccharis halimifolia* leaves and stems are eaten when there is no other food available (Everist 1974 – P). Other studies did not show any toxic effects on animals. White (1936 – P), after feeding two heifers (*Bos taurus*) for 13 days with *B. halimifolia* shoots, stated that the animals were indeed emaciated, but no symptoms of poisoning were seen. No cases of poisoning of farm animals have been recorded in Europe (EPPO 2013— I). So far, the species has not been observed in Poland. Therefore, in practice, in the area of our country, the contact of breeding animals with this plant has been impossible. If in future the species should spread to Poland, for example into halophilic and subhalophilic meadows and pastures, due to the negligible utility value of these habitats, the harmful effect on domestic animals would be defined as very small.

a26. The effect of *the species* on individual animal health or animal production, by hosting **pathogens or parasites** that are harmful to them, is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf22.	Answer provided with a	low	medium	high	level of confidence

acomm26.	Comments: The plant is not host to or a vector of animal pathogens/parasites.

A4d | Impact on the human domain

Questions from this module qualify the consequences of *the organism* on humans. It deals with human health, being defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (definition adopted from the World Health Organization).

a27. The effect of *the species* on human health through **parasitism** is:

X	inapplicable
	very low
	low
	medium
	high
	vert high

aconf23.	Answer provided with a	low	medium	high	level of confidence

acomm27.	Comments: It is a plant species that does not have any tendency to a parasitic lifestyle.

a28. The effect of *the species* on human health, by having properties that are hazardous upon **contact**, is:

	very low
	low
X	medium
	high
	very high

aconf24.	Answer provided with a	low	medium **X**	high	level of confidence

acomm28. Comments:

Baccharis halimifolia is considered to be a species causing the symptoms of hay-fever type allergies (Panetta 1979b, DeLoach et al. 1986 – P), caused by pollen and floccus (dense fluff on fruits) floating in the air. Pollen of *B. halimifolia* is considered to be highly sensitizing (Moss 1967 – P, Anonymous 2018 – I). Currently, due to the near-absence of this species in Poland, there is no question of health discomfort from the pollen of this species. Due to the lack of relevant information, it is not possible to exclude the possibility of pollen reaching the area of Poland from Western Europe as a result of so-called distant transport. The presence of the species in Poland may increase such a threat and with the possibility of it becoming established it is necessary to assess the impact of the species as medium; however, this assessment would relate to the regions of its potential occurrence which are limited to parts of the country. Eaten, the seeds may be poisonous (Brown 2011 – I).

a29. The effect of *the species* on human health, by hosting **pathogens or parasites** that are harmful to humans, is:

X	inapplicable
	very low
	low
	medium
	high
	very high

aconf25.	Answer provided with a	low	medium	high	level of confidence

acomm29. Comments:

The plant is not host or vector of human pathogens/parasites.

Indirectly, tree groundsel shrub stands can cause nuisance due to encouraging the multiplication of mosquitoes, which are vectors of viruses, bacteria, fungi, as well as protozoa and pathogenic nematodes.

A4e | Impact on other domains

Questions from this module qualify the consequences of *the species* on targets not considered in modules A4a-d.

a30. The effect of *the species* on causing damage to **infrastructure** is:

	very low
X	low
	medium
	high
	very high

aconf26.	Answer provided with a	low	medium **X**	high	level of confidence

acomm30.	Comments: Leaves and wood from *B. halimifolia* secrete a flammable resin (Bean 1981 – P). Dense thickets of *B. halimifolia* can potentially increase the frequency of fires (Müller 2004 – P). Real estate and personal property may be at risk (EPPO 2014 – B). However, such events have not been recorded in the most abundant areas of this shrub in France and Spain. Campos and Herrera (2009 – P) and Lozano Valencia and Alagón Cardoso (1995 – P) report that the root system and high production of biomass by this species can cause increased sedimentation in canals and rivers. Colonizing the areas around salt extraction sites creates the probability of salt contamination with the numerous fruit produced by the plant (David 1999 – P). In Poland, the potential occurrence of this species is limited to selected regions of the country allowing the assessment of the possible effect as small; the threats are only hypothetical.

A5a | Impact on ecosystem services

Questions from this module qualify the consequences of *the organism* on ecosystem services. Ecosystem services are classified according to the Common International Classification of Ecosystem Services, which also includes many examples (CICES Version 4.3). Note that the answers to these questions are not used in the calculation of the overall risk score (which deals with ecosystems in a different way), but can be considered when decisions are made about management of *the species*.

a31. The effect of *the species* on **provisioning services** is:

	significantly negative
	moderately negative
X	neutral
	moderately positive
	significantly positive

aconf27.	Answer provided with a	low	medium **X**	high	level of confidence

acomm31.	Comments: *Baccharis halimifolia* is recognized as a weed in animal grazing areas within its native range (North America) and in one part of its secondary range (Australia). The species, by having the ability to predominate in wet pastures and arable lands temporarily excluded from use, hinders the grazing use or re-acquisition of such land for agriculture (Ihobe 2011 – P). However, there is no known information about massive development in field and garden habitats or indications that it would disturb the integrity of crops in Europe. At the same time, its nuisance as an invasive weed/species and the costs of combating it are assessed as high (EPPO 2014 – B). The resin produced by *B. halimifolia* is flammable (Bean 1981 – P). The dense thickets of *B. halimifolia* can potentially increase the frequency of fires (Müller 2004 – P). However, such events have not been found in the most abundant areas of this shrub in France and Spain. The foregoing threats generated by invasion of the species do not apply to the area of Poland. *Baccharis halimfolia* does not interbreed with native or cultivated plant species present in Poland. However, it is a host and a potential vector of pathogens and parasites of crop plants (posing a threat primarily to fruit trees). It does not participate, as an indirect host, in the life cycles of pathogens and animal parasites in any way.

a32. The effect of *the species* on **regulation and maintenance services** is:

	significantly negative
X	moderately negative
	neutral
	moderately positive
	significantly positive

aconf28.	Answer provided with a	low	medium **X**	high	level of confidence

acomm32. Comments:

In patches of communities dominated by *Baccharis halimifolia*, the diversity and biomass of the native representatives of the flora, which form part of the coastal subhalophyte communities, decreases. The species has a negative effect on soil processes, causing disturbances in the carbon and nitrogen cycle and processes of matter decomposition (also due to the fire hazard posed). Presumably, changes caused by the invasion of tree groundsel into the habitats of subhalophilous vegetation will cause disturbances in the trophic network associated with a reduction of diversity and density of arthropods, and this would reduce the number of birds feeding on arthropods (Campos 2010 – P). Growing at high density, it may contribute to changes in the hydrological system, especially in coastal river-mouth sections of rivers (Brunel et al. 2010, Ihobe 2011 – P). In wetlands (in river valleys) in the area of Brittany (France), where it forms dense thickets, it can technically hinder the use of insecticides to combat mosquitoes (Bouterin and Canonge 1999, in: Müller 2004 – P). However, there is no data to assess the extent and intensity of this type of disturbance, which could possibly be caused by the species in ecosystems occurring in Poland.

a33. The effect of *the species* on **cultural services** is:

	significantly negative
	moderately negative
X	neutral
	moderately positive
	significantly positive

aconf29.	Answer provided with a	low	medium	high **X**	level of confidence

acomm33. Comments:

The history of the species in Europe is related to its deliberate importation from the area of its natural presence (south-eastern part of North America). The reasons for the importation, and then its cultivation (in parks, gardens, arboreta) includes the decorative qualities of the plant. On the other hand, the presence of the species in large numbers at water margins is now perceived as a hindering factor in recreational access to river banks. Extensive clusters of the species, especially in the zone of typical low coastal vegetation, can cause changes in the aesthetic values of the landscape and influence its perception by man. However, it is difficult to assess the nature and scope of such effects as unambiguously negative; the shrubs stand out in the landscape during mass flowering.

A5b | Effect of climate change on the risk assessment of the negative impact of *the species*

Below, each of the *Harmonia*$^{+PL}$ modules is revisited under the premise of the future climate. The proposed time horizon is the mid-21st century. We suggest taking into account the reports of the Intergovernmental Panel on Climate Change. Specifically, the expected changes in atmospheric variables listed in its 2013 report on the physical science basis may be used for this purpose. The global temperature is expected to rise by 1 to 2°C by 2046-2065.

Note that the answers to these questions are not used in the calculation of the overall risk score, but can be but can be considered when decisions are made about management of *the species*.

a34. INTRODUCTION – Due to climate change, the probability for *the species* to overcome geographical barriers and – if applicable – subsequent barriers of captivity or cultivation in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf30.	Answer provided with a	low	medium **X**	high	level of confidence

acomm34. Comments:

A temperature increase of 1-2°C, assumed by 2065, may theoretically favour the emergence and establishment of the species in Poland. However, the prediction of a precipitation scenario is a much more difficult undertaking. Most specialists in the area of climate change predict a high probability of the frequent occurrence of extreme events. With reference to precipitation, this may mean a series of repeated periods of drought, as well as periods of high rainfall. While moist seasons could be a favourable periods for the species, periods of long-lasting drought would certainly be a factor limiting the possibility of the species emerging out of cultivation. Climate change should probably not affect the chance of species introduction from cultivation. It is worthwhile simultaneously recalling, that the existing small collections in botanic gardens (except for Wrocław) are located outside the areas identified as potentially threatened with the first appearance of the species in the wild (cf. a35).

a35. ESTABLISHMENT – Due to climate change, the probability for *the species* to overcome barriers that have prevented its survival and reproduction in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf31.	Answer provided with a	low	medium **X**	high	level of confidence

acomm35. Comments:

The temperature increase of 1-2°C, assumed by 2065, may theoretically favour the emergence and establishment of the species in Poland. However, the prediction of a precipitation scenario is a much more difficult undertaking. Most specialists in the area of climate change predict a high probability of the frequent occurrence of extreme events. With reference to precipitation, this may mean a series of repeated periods of drought, as well as periods of high rainfall. While moist seasons could be a favourable periods for the species, periods of long-lasting drought would certainly be a factor limiting the possibility of the establishment of the species. Warming and increasing in climatic humidity may lead to an increase in the chances of an effective establishment of the species. The model of the potential distribution of *Baccharis halimifolia* for Europe developed using CLIMEX software shows the seashore of the Baltic Sea and to a lesser extent the regions of south-western Poland as the areas most likely for it to become established in Poland (Fried et al. 2016 – P).

a36. SPREAD – Due to climate change, the probability for *the species* to overcome barriers that have prevented its spread in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf32.	Answer provided with a	low	medium **X**	high	level of confidence

acomm36. Comments:

The temperature increase of 1-2°C, assumed by 2065, may theoretically favour the emergence, establishment, and spread of the species in Poland. However, prediction of a precipitation scenario is a much more difficult undertaking. Most specialists in the area of climate change predict a high probability of the frequent occurrence of extreme events. In reference to precipitation, it may mean a series of repeated periods of drought, as well as periods of high rainfall. While moist seasons could be a favourable periods for the species, periods of long-lasting drought would certainly be a factor limiting the possibility of the spread of the species. Warming and increasing climate humidity may lead to an increase in the chances of the spread of the species, at least in part of the country. The model of the potential distribution of *Baccharis halimifolia* for Europe developed using CLIMEX software shows the seashore of the Baltic Sea and to a lesser extent the regions of south-western Poland as the areas most likely for it to become established in Poland (Fried et al. 2016 – P).

a37. IMPACT ON THE ENVIRONMENTAL DOMAIN – Due to climate change, the consequences of *the species* on wild animals and plants, habitats and ecosystems in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf33.	Answer provided with a	low	medium **X**	high	level of confidence

acomm37. Comments:

The study results demonstrate that it is a plant that grows in various types of coastal habitats, including salty, irregularly flooded marshes, dunes and in clear forests; it also colonizes man-made habitats. Warming and increasing climatic humidity may lead to an increase in the chances of the emergence and spread of the species (cf. also the comment in question a36), at least in part of the country, in appropriate habitat types. It can be assumed that the species would have similar competitive effect on the wild plants and animals, as well as the habitats (in particular those by the sea) in Poland.

a38. IMPACT ON THE CULTIVATED PLANTS DOMAIN – Due to climate change, the consequences of *the species* on cultivated plants and plant domain in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf34.	Answer provided with a	low	medium **X**	high	level of confidence

acomm38. Comments:

The species is found in the Atlantic part of Western Europe, and at this stage it is difficult to predict potential changes in its effect on crop growing, concurrent with climate warming. In the current area of secondary occurrence in Europe, the species does not grow massively on arable lands. The potential threat should be associated with the transmission of crop pathogens and parasites.

a39. IMPACT ON THE DOMESTICATED ANIMALS DOMAIN – Due to climate change, the consequences of *the species* on domesticated animals and animal production in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf35.	Answer provided with a	low	medium **X**	high	level of confidence

acomm39. Comments:

The species is found in the Atlantic part of Western Europe, and at this stage it is difficult to predict the potential changes in its effect on animal breeding, concurrent with climate warming. If in the future the species should appear in Poland, for example on halophilic and subhalophilic meadows and pastures, due to the negligible utility value of these habitats, the harmful effect on domestic animals should be defined as negligible.

a40. IMPACT ON THE HUMAN DOMAIN – Due to climate change, the consequences of *the species* on human in Poland will:

	decrease significantly
	decrease moderately
	not change
X	increase moderately
	increase significantly

aconf36.	Answer provided with a	low	medium **X**	high	level of confidence

acomm40. Comments:

Assuming a scenario of climate changes favouring spatial expansion, i.e. bringing the presence of the species closer to the Polish borders, one should potentially take into account the effect of a long-distance transport of allergy-inducing pollen from Western Europe over the area of Poland.

Possible establishment of species in Poland (most probable in the seaside zone of Western Pomerania) could contribute to increasing the frequency of allergy. On account of the small area appropriate for possible establishment of the species in Poland, one should assume that the impact of the species on the frequency of allergy would at most increase moderately.

a41. IMPACT ON OTHER DOMAINS – Due to climate change, the consequences of *the species* on other domains in Poland will:

	decrease significantly
	decrease moderately
X	not change
	increase moderately
	increase significantly

aconf37.	Answer provided with a	low	medium **X**	high	level of confidence

acomm41. Comments:

Even if the species appeared on the territory of Poland in connection with climate changes, there is currently no reason to conclude that, as in Western Europe, it will have a similar negative effect on other (infrastructural) facilities.

Summary

Module	Score	Confidence
Introduction (questions: a06-a08)	0.00	0.50
Establishment (questions: a09-a10)	0.50	0.50
Spread (questions: a11-a12)	0.88	0.50
Environmental impact (questions: a13-a18)	0.30	0.60
Cultivated plants impact (questions: a19-a23)	0.05	0.80
Domesticated animals impact (questions: a24-a26)	0.00	1.00
Human impact (questions: a27-a29)	0.50	0.50
Other impact (questions: a30)	0.25	0.50
Invasion (questions: a06-a12)	0.46	0.50
Negative impact (questions: a13-a30)	0.50	0.68
Overall risk score	0.23	
Category of invasiveness	potentially invasive alien species	

A6 | Comments

This assessment is based on information available at the time of its completion. It has to be taken into account. However, that biological invasions are, by definition, very dynamic and unpredictable. This unpredictability includes assessing the consequences of introductions of new alien species and detecting their negative impact. As a result, the assessment of the species may change in time. For this reason it is recommended that it regularly repeated.

acomm42. Comments:
-

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