



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. Damian Chmura
2. Julian Chmiel
3. Władysław Danielewicz

acomm01.

Comments:

	degree	affiliation	assessment date
(1)	dr hab.	Institute of Environmental Protection and Engineering, University of Bielsko-Biala	10-04-2018
(2)	dr hab.	Department of Plant Taxonomy, Faculty of Biology, Adam Mickiewicz University, Poznań	13-03-2018
(3)	dr hab.	Department of Forest Botany, Faculty of Forestry, Poznań University of Life Sciences	11-04-2018

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

Polish name: Klon jesionolistny
Latin name: ***Acer negundo*** L.
English name: Box elder

acommm02.

Comments:

The Latin name of the species is quoted from The Plant List base (2013 – B). The following scientific synonyms of the species are used: *Negundo aceroides* Moench (1794), *Negundo fraxinifolium* (Nutt.) DC. (1824). The Polish name: klon jesionolistny is quoted from Flowering plants and pteridophytes of Poland – a checklist (Mirek et al. 2002 – P). The Polish name jesioklon is also used (Mędrzycki 2011 – B). There are quite a lot of English names: red river maple, western boxelder, cut-leaved maple, three-leaved maple, ashleaf maple, black ash, stinking ash, ash maple, negundo maple, elf maple.

Polish name (synonym I)
jesioklon

Polish name (synonym II)
–

Latin name (synonym I)
Negundo aceroides

Latin name (synonym II)
Negundo fraxinifolium

English name (synonym I)
Ash-leaved maple

English name (synonym II)
Manitoba maple

a03. Area under assessment:

Poland

acommm03.

Comments:

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

- native to Poland
- alien, absent from Poland
- 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
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level of confidence

acommm04.

Comments:

In Poland, *Acer negundo* is an alien species, permanently established (Mirek et al. 2002, Tokarska-Guzik 2005, Tokarska-Guzik et al. 2012 – P). According to Zajac et al. (1998 – P), it has reached the status of a holagriophyte – occurring, besides anthropogenic habitats, also in natural and semi-natural habitats. Danielewicz and Wiatrowska (2014 – P) even categorised this species as a post-neophyte (acc. to Faliński 1969 – P) which can cause considerable changes in the structure of phytocoenoses.

The species is native to the eastern and central regions of North America. Its continuous range includes the states of New Jersey, Ontario, Michigan, Minnesota, Manitoba, Saskatchewan, Alberta, Montana, Wyoming, Utah and California, to Texas and Florida in the south. It is also dispersed in the states of New Hampshire, Vermont, Massachusetts, Connecticut, Idaho and Nevada (Mędrzycki 2011 – B). Natural enclaves are also encountered in the mountains of Mexico (the states of Nuevo Leon, San Luis Potosi, Chihuahua) and in Guatemala (Rosario 1988 – B). Its presence in the states of Maine, Quebec, New Brunswick, Nova Scotia, Prince Edward Island as well as Washington and Oregon is most likely of secondary nature (Mędrzycki 2011, CABI 2018 – B).

According to Szymanowski (1960 – P), it could have been introduced into cultivation in Poland as early as in the second half of the 17th century. Information on its early cultivation involves, e.g. Krzemieniec (1810; Seneta 1991 – P), Niedźwiedź near Cracow (1813; Seneta 1991 – P), Puławy (1899; Tokarska-Guzik 2005 – P), Warsaw (1880; Sudnik-Wójcikowska 1987 – P) and Wrocław (1899; Tokarska-Guzik 2005 – P).

According to Tokarska-Guzik (2005 – P), the valleys of large rivers were main spreading paths for the species. According to the ATOPL database, today *Acer negundo* is a common

species in Poland (except for Pomerania, Masuria, Podlachia as well as the Tatra and Bieszczady Mountains, where it is less common); it occurs in at least 3500 sites within the boundaries of 1379 basic 10 x 10 km squares (Zajęc A. and Zajęc M. 2001 – P).

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

<input checked="" type="checkbox"/>	the environmental domain
<input type="checkbox"/>	the cultivated plants domain
<input type="checkbox"/>	the domesticated animals domain
<input checked="" type="checkbox"/>	the human domain
<input checked="" type="checkbox"/>	the other domains

acomm05.

Comments:

Acer negundo is an invasive species in many regions of the world: Europe (Sachse 1991 – N, Lohmeyer and Sukkopp 1992, Sachse 1992, Kuusk et al. 1996, Tzvelev 1996, 2000, Gudžinskas 1998, Mosyakin and Yavorska 2002, Botta-Dukát 2008, Udvardi 2008, Batanjski et al. 2013, Straigyte et al. 2015 – P), North America (Havinga 2000 – B) as well as in Siberia (Adamowski 1991 – P). The ash-leaved maple was observed much less frequently in a feral state in Argentina, South Africa as well as Australia and New Zealand (Groves and Hosking 1997 – P, CABI 2018 – B). The conditions, course and consequences of the expansion of *A. negundo* were an objective of numerous studies conducted in Poland (Künstler 1999, Mędrzycki and Pabjanek 2001, Mędrzycki et al. 2005 – P, Mędrzycki 2002, Banaszek 2005, Caban 2005, Kosim 2005, Kosiński 2005, Sałapa 2005 – N). The species constitutes a major threat for local biological diversity. Due to the high spreading potential of diaspores (anemochory, i.e. wind dispersal) and high tolerance to varying humidity conditions, it can colonise anthropogenic habitats at a fast pace, as well as naturally valuable riparian forests (especially in river valleys), hornbeam forests and open ecosystems, e.g. xerothermic grasslands (Rosario 1988 – B). The leaves of *A. negundo* have a low nutritional value for farm animals. There is also information (not documented by any examples) that the tree may be poisonous for livestock (Rosario 1988 – B). Its fruit are food for birds and squirrels. Dense thickets of the ash-leaved maple may act as shelter for prey animals (Rosario 1988 – B). During early spring, the pollen of *A. negundo* is a valuable source of bee nectar (Rosario 1988, Mędrzycki 2011 – B). At the same time, it has allergic properties (Esch et al. 2001 – P). In North America *A. negundo* has been observed to be fed on by numerous insect pests and exhibit symptoms of fungal diseases (Gilman and Watson 1993 – P), but only several of them have a disadvantageous impact on the species. One of them is *Boisea trivittata* (Say) – a large insect (1 cm in length) sucking juice out of leaves, delicate branches and developing fruit (Vail et al. 2002 – B). If host plants grow near buildings, this insect eagerly winters in them. It can also enter houses in high numbers, soiling walls with brown faeces. Upon crushing this insect gives off an unpleasant odour (Vail et al. 2002 – B). *Acer negundo* has no specific insect pests and fungal diseases. It is fed on by the same insects as other species of maple. No alien species of parasites and pathogens have arrived into Europe along with the introduction of *A. negundo*.

This tree may negatively affect infrastructure in the areas of forests, railways and in river valleys by overgrowing paths, division lines, railway tracks, floodbanks (Chmura 2004-2017 – A).

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:

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf02.	Answer provided with a	low	medium	high X	level of confidence
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acomm06. Comments:

The ash-leaved maple was planted for the first time in Europe in Fulham in England in 1688 (Wein 1931, acc. to Kowarik 1992 – P). In neighbouring countries, e.g. in the Czech Republic, first information on the cultivation of the species originates from 1835 and information on its appearance outside of cultivation comes from 1875 (Pyšek and Prach 2003 – P). The species was introduced in Brandenburg in 1736, while first information on its spontaneous appearance originates from 1919 (Kowarik 1992 – P). Currently, it is an invasive species almost in the whole Europe (Sachse 1991 – N, Lohmeyer and Sukkopp 1992, Sachse 1992, Kuusk et al. 1996, Tzvelev 1996, 2000, Gudžinskis 1998, Mosyakin and Yavorska 2002, Botta-Dukát 2008, Udvardi 2008, Batanjski et al. 2013, Straigyte et al. 2015 – P).

Anemochory is the basic dispersion method for diaspores. Samarae are dispersed with the wind over a distance of at least 50 m (Sachse 1991 – N); even over a distance of several km during very windy weather and the presence of frozen snow (Binggeli 1992 – N). In river valleys they are dispersed with the current of water, being able to survive in it for at least 6 weeks (Mędrzycki 2011 – B).

Considering the lack of land barriers between Poland and the regions of Europe, the reproduction potential and the anemochorous way of spreading, it can be assumed that the influx of propagules from the neighbouring countries to the natural environment of Poland from earlier cultivations beyond its borders is highly probable with a considerable degree of certainty.

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

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf03.	Answer provided with a	low	medium	high X	level of confidence
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acomm07. Comments:

The tree has been used for a long time in roadside afforestations and in parks (Mędrzycki 2011 – B).

Significance should be attributed to the unintentional dispersion of diaspores by gusts of wind generated by the movement of vehicles along roads and railways, as well as by cleanup work: the collection and transport of fallen leaves along with samarae (Mędrzycki 2002 – N).

Considering the high potential of reproduction and the anemochorous way of dispersion, as well as the commonness of cultivation in the past, it can be assumed that unintentional human actions had and still have major significance for the expansion of the species in Polish territory.

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

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf04.	Answer provided with a	low	medium	high X	level of confidence
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acom08.

Comments:

The possibility of utilising the species in forestry has been tested in many European countries. In some countries, e.g. in Germany, due to poor technological parameters of the log as well as the brittleness and softness of wood, this species was abandoned in forestry already at the beginning of the 20th century (von Schwerin 1919, Hegi 1977 – P). In other regions, e.g. Lithuania, it was not until after 1960 that the species was ruled out as improper for forestry (Kairiukštis 1968 – P). Not only was it planted in the 19th and 20th centuries, but also it is planted today near roads, streets and in parks in Europe and in Poland.

In many countries, including Poland, the tree was intensely planted in hedges and as protection against wind (Ehrendorfer 1973, Tutin et al. 1968 – P). Due to the irregularity of crowns and the brittleness of branches, these practices are becoming increasingly less common. Nonetheless, until today there are numerous forestations consisting of this species. Due to quick growth, small habitat requirements, this species is still used in land rehabilitation of post-mining areas (Chmiel 2011 – A).

According to the code of good practice in horticulture (GDOŚ 2016 – I), *A. negundo* belongs to species for which it has been agreed as necessary not to introduce them into sales and cultivation. However, it is still a frequently planted park and garden tree. The ash-leaved maple is cultivated in Europe, including Poland, in many decorative varieties with variegated or yellow leaves. It seems that cultivars are not invasive, but in the case of death of an implanted cultivar, the wild substrate on which it was implanted fully retains the invasive potential (Mędrzycki 2011 – B).

The species is currently cultivated in Poland in 24 botanical gardens and arboreta. The oldest trees (approx. 80 years old) grow in the Botanical Garden in Przelewiec and in the City Botanical Garden in Zabrze. Cases of spontaneous sowing were observed in 10 gardens and arboreta, and actions were initiated in 9 in order to limit the spontaneous dispersion of the species within the garden (Employees of botanical garden ... 2018 – N).

Considering the high share of the ash-leaved maple in forestations willingly initiated by humans (along roads, streets, in parks and on rehabilitated lands), the past use of the species in forestry, as well as its high potential for reproduction and dispersing capabilities (anemochory), the species' penetration into the natural environment of Poland from cultivations which are the result of intentional human action can be deemed highly probable with a high degree of certainty.

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

aconf05.

Answer provided with a

low	medium	high
		X

level of confidence

acom09.

Comments:

The secondary range of the ash-leaved maple includes almost the whole Europe (Lohmeyer and Sukopp 1992, Sachse 1992, Kuusk et al. 1996, Tzvelev 1996, 2000, Gudžinskas 1998, Mosyakin and Yavorska 2002, Botta-Dukát 2008, Udvardi 2008, Batanjski et al. 2013, Straigyte et al. 2015 – P). It does not occur or occurs very rarely in Ireland, Scotland and Scandinavia (Svart and Lyck 1991 – P).

Acer negundo is native to North America, and thus a region with similar latitude as Europe and Poland (Overton 1990 – P). A fragment of the native range in a north-eastern part of the

USA corresponds to a 94-100% climatic similarity with Poland. Temperature has no major impact on germination, although the recruitment of seedlings is higher in lower temperatures (Williams and Winstead 1972 – P). This species grows under diverse climatic conditions, both in very cool as well as mild areas (frost resistance zones 2-7) (Straigyte et al. 2015 – P). The territory of Poland falls within the range of frost resistance zones 5-7. This means that thermal conditions present in Poland are adequate for this species.

a10. Poland provides **habitat** that is

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

aconf06.	Answer provided with a	low	medium	high X	level of confidence
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acom10. Comments:
 In North America *Acer negundo* occurs in over 20 plant communities, including swamps, flood forests, fresh deciduous forests as well as dry coniferous forests, oak savannas, in patches of Mediterranean forests, woodlands and scrubs as well as in various types of steppes and grasslands (Rosario 1988 – B, Overton 1990 – P). Its wide range of habitats is a result of its high tolerance towards humidity and other habitat factors (Mędrzycki 2011 – B). Dawson and Ehleringer (1991 – P) have shown that the development of the ash-leaved maple during the first 10 years is highly dependent on the abundance of precipitation or direct impact of watercourses, while older trees rely on groundwater resources. It prefers permeable substrates – excessive compaction of the substrate results in high mortality of seedlings. Under a dense canopy of trees the efficiency of sowing is worse (Sachse 1992 – P). Habitats in which it occurs within its natural range and within the secondary range are quite similar (Mędrzycki 2011 – B). In Europe and in Poland it abundantly colonises riverside communities, e.g. willow-poplar forests *Salici-Populetum* (Lohmeyer and Sukopp 1992, Kołaczowska and Obidziński 2009, Säumel and Kowarik 2010 – P). It penetrates the area of the Polish part of the Carpathians from the north via valleys of foothill rivers and streams (Zajac A. and Zajac M. 2015 – P). It also occurs in hornbeam forests, especially along forest edges (Chmura 2004 – P). It appears quite frequently in ruderal habitats, e.g. in the vicinity of park, garden and roadside plantings, as well as on fallows, forest edges – especially in artificial pine stands in fertile habitats (Mędrzycki 2011 – B).

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
- high
- very high

aconf07.	Answer provided with a	low	medium	high X	level of confidence
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acommm11.

Comments:

Dispersion from a single source (data type A).

Fruit provided with a wing, the so-called samarae, are relatively small and light – even 30 000 seeds may be present in 1 kg (Olson and Gabriel 1974 – P). The approximate rate of dispersion calculated for the area of the Białowieża Forest may amount to between 0.6 and 1 m/year for wind dispersion and up to 100 m/year in air corridors caused by cars along roads and trains along railway tracks, or along waterways (Mędrzycki 2011 – B). New individuals distant from their mother specimens were found up to 10 km along the bank of a watercourse, while in the case of wind acting as a carrier, up to approx. 100 m in an urban environment (Valantinaite et al. 2011 – P).

Population expansion (data type B):

Occurrence near seed trees may result in a quick generation of undergrowth filling renewal nests in forests or the creation of self-sown trees in unforested areas, often with a predominant share of the ash-leaved maple (Chmiel 2013 – A). At the same time, it is a photophilous, short-lived tree, easily breakable under the impact of atmospheric factors and bending downwards under the conditions of intense growth forced by the competitive pressure of other trees. It may disappear from species composition (or at least considerably decrease its share) in a situation of heavy forest floor shading, not favouring the restoration of population.

Estimations of the biological mobility of the species (data type C):

The ash-leaved maple is characterised by being short-lived – it may reach an age of 75 years (up to 100 years), as well as by its early fructification (in the 5th year of life) (Sachse 1992 – P). Under worse illumination conditions, e.g. under a thick canopy of trees, the beginning of fruiting may take place as late as at the age of 15 years (Mędrzycki 2002 – N). Samarae are formed each year in a number of up to 30 000 per kilogram (Schopmeyer 1974 – P), as confirmed by the studies of Olson and Gabriela (1974 – P). This amounts to approximately 70 000 seeds in a mature tree (Valantinaite et al. 2011 – P). It is characterised by a high frequency of seeding periods (1-4 years) (Rejmánek and Richardson 1996 – P). Under the pressure of unfavourable atmospheric conditions and flood water in river valleys, the trees very easily overturn, and their brittle branches break easily. On the overturned trunks, adventitious shoots regenerate easily in espaliers from dormant buds. Tree trunks are very susceptible to the harmful effects of fire (Rosario 1988 – B).

Considering the three above-mentioned data components, the species' ability to spread in Poland without human participation has been estimated as high with a high degree of certainty.

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

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf08.

Answer provided with a

low	medium	high
	X	

level of confidence

acommm12.

Comments:

The history of the reintroduction of *Acer negundo* into the area of Europe and Poland and its spreading in the natural environment is associated with intentional import and cultivation of the species. Due to the low costs and easy production of plantings, this tree is still used in roadside planting and in land rehabilitation of post-mining areas. The dispersion of the ash-leaved maple from cultivation (roadside planting) is the primary source of its spreading. Due to its very early pollination, this tree belongs to precious, very early sources of bee nectar. For this reason, it was planted as a melliferous plant (Mędrzycki 2011 – B). In the 18th/19th century in Western Europe there were attempts at utilising the species in forestry. There is a high probability that these practices were also exercised in Polish territory, which at the time belonged to the Prussian partition. Cultivars of this species are available for sale in garden centres and specialised shops. It is cultivated in Poland in many decorative varieties with variegated or yellow leaves.

Considering the various possibilities of the species' spreading caused by intentional and unintentional human activities, the frequency of migration of diaspores at a distance exceeding 50 km caused by humans is to be assessed as high (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:

<input checked="" type="checkbox"/>	inapplicable
<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input type="checkbox"/>	high

aconf09.	Answer provided with a	low	medium	high	level of confidence
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acomm13. Comments:
Acer negundo is not a parasitic plant.

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

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf10.	Answer provided with a	low	medium	high	level of confidence
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acomm14. Comments:
The competitive capacity of *Acer negundo* results from its high resistance to drought and frost, low habitat requirements, high efficiency of diaspore dispersion, from the fast growth of young specimens and phenotypical flexibility related to the adjustment of plants to variable conditions of illumination or humidity (Dajdok et al. 2007, Saccone et al. 2010, Erfmeier et al. 2011 – P). Its quick growth and the ability to reproduce vegetatively gives it an advantage over other native tree species. This is the basic competitive mechanism of the ash-leaved maple. Since the 1960s, there has been observed penetration of natural communities by *A. negundo*; it is currently present almost in the whole country. *Acer negundo* is present in 15 out of 23 national parks and in 61 out of 75 landscape parks in which its presence has been investigated (Najberek and Solarz 2011 – P). Its fastest spreading takes place in the valleys of large rivers, penetrating riparian forests, especially along the Vistula, Warta and Odra rivers. Although *A. negundo* is less resistant to floods than poplars and willows, it is more resistant than most other species of deciduous trees (Friedman and Auble 1999 – P). Within the area of the native part of its range it usually occupies upper flood terraces (Rosario 1988 – B, Everson and Boucher 1998 – P). It is a mobile species, quickly

populating gaps created during floods. In the case of its long-lasting absence *A. negundo* is usually replaced in the subsequent periods by species more resistant to shading. A typical behaviour of *A. negundo* involves the leaning of trees or even their falls. When this happens, a thick espalier of adventitious trunks grows out of the trunk. The pattern of leaning and regeneration of shoots buried by river mud may repeat multiple times. There are even situations when the tangle of adventitious shoots of the ash-leaved maple hinders the restoration of poplars and willows (Künstler 1999 – P). The ash-leaved maple is an undesired element, changing the species structure and interior architecture of a forest. An example of expansion on the so-called Swedish trenches along the Budzyński esker (the area of the Greater-Poland National Park) proves that it can quickly contribute to a total disappearance of xerothermic grasslands (Chmiel 2013 – A). The ash-leaved maple overshadows other plants, but no more than native maples, nor does the decomposition of leaves originating from this species affect mechanically the inhibition of the growth of other plants. The plant exerts its negative impact via allelopathy. Experimental tests of allelopathy (the impact of chemical substances given off by plants on the growth and development of other plants) have proven that a maple leaf extract extremely significantly and very significantly limits the growth of a model white mustard plant *Sinapis alba* (Csiszár et al. 2012 – P).

To sum up, the species contributes to permanent or not easily reversible changes in natural habitats protected by Directive 92/43/EEG, which are riverside willow-poplar forests and xerothermic grasslands.

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

<input checked="" type="checkbox"/>	no / very low
<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input type="checkbox"/>	high
<input type="checkbox"/>	very high

aconf11.	Answer provided with a	low	medium	high X	level of confidence
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acom15. Comments:
No interbreeding with native maples, i.e. with the Norway maple *Acer platanoides*, the sycamore *A. pseudoplatanus* and the field maple *A. campestre* has been recorded so far within its secondary range. The ash-leaved maple represents a different section *Negundo*, which has no representative in Polish native flora (Mędrzycki 2011 – B).

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

<input checked="" type="checkbox"/>	very low
<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input type="checkbox"/>	high
<input type="checkbox"/>	very high

aconf12.	Answer provided with a	low	medium	high X	level of confidence
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acom16. Comments:
Acer negundo has no specific insect pests and fungal diseases. It is fed on by the same insects as other species of maple. In North America *A. negundo* was observed to be fed on by numerous insect pests and exhibit symptoms of fungal diseases (Gilman and Watson 1993 – P), but only several of them have a disadvantageous impact on the species. One of them is *Boisea trivittata* (Say) – a large insect (1 cm in length) sucking juice out of leaves, delicate branches and developing fruit (Vail et al. 2002 – B). Among fungal diseases one should mention cotton root rot caused by *Phymatotrichum omnivorum* – a species of fungus from the class Basidiomycetes. Apart from cotton, the root may affect at least 200 plant species, also including the ash-leaved maple.

No alien species of parasite and pathogen has arrived into Europe along with the introduction of *A. negundo*. Indeed, it is believed that the successful invasion of the maple is a result of enemy release according to the theory of Enemy Release Hypothesis (Reinhart et al. 2004 – P, Mędrzycki 2011 – B), because within its native range this species seems to be more susceptible to pathogens (White and Whitnam 2000 – P).

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

<input checked="" type="checkbox"/>	low
<input type="checkbox"/>	medium
<input type="checkbox"/>	high

aconf13.	Answer provided with a	low	medium	high X	level of confidence
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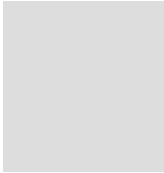
acomment17. Comments:
The impact of *Acer negundo* on a habitat does not differ significantly from the impact of other deciduous trees. Fallen leaves decompose very quickly; they can accelerate the litterfall mineralisation process (Janušauskaite and Straigyte 2011 – P, Mędrzycki 2011 – B). This causes the release of higher amounts of general nitrogen, and in waters it increases the biological oxygen demand (Krevs et al. 2013 – P). Brunet and Astin (1997 – P) proved that the deposition of sediments during a major flood by a stand consisting of *A. negundo* amounts to $8.4 \pm 0.4 \text{ kg/m}^2$ and it is higher than for a stand consisting of other species ($5.8 \pm 0.7 \text{ kg/m}^2$).

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

<input type="checkbox"/>	low
<input type="checkbox"/>	medium
<input checked="" type="checkbox"/>	high

aconf14.	Answer provided with a	low	medium	high X	level of confidence
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acomment18. Comments:
Acer negundo is characterised by its high competitive capacity relative to other species. It contributes to impoverishment of the species composition of groundcover, restructuring the interior architecture of the forest and changing the functioning of the whole ecosystem. It is characterised by particular invasiveness on upper flood terraces in river valleys. A typical behaviour of *A. negundo* involves the leaning of trees or even their falls. When this happens, a thick espalier of adventitious trunks grows out of the trunk. The pattern of leaning and regeneration of trunks buried by river mud may repeat multiple times. There are even situations when the tangle of adventitious shoots of the ash-leaved maple hinders the restoration of poplars and willows (Künstler 1999 – P).
If maple leaves fall into water, they are surrounded by a higher number of heterotrophic and cellulose-decomposing bacteria compared to native species. Mutualistic relations of maple and soil bacteria are established (Reinhart and Callaway 2004 – P). The released substances cause mortality of algae, e.g. Chara *Nitellopsis obtusa* (Krevs et al. 2013 – P).
The ash-leaved maple is also a dangerous competitor for the flora of open grassland ecosystems. Upon subduing (shading) a xerothermic grassland, it can quickly lead to a total disappearance of xerothermophilic elements. This process was observed in xerothermic grasslands once growing in the so-called Swedish trenches along the Budzyński esker by the Budzyńskie Lake (the area of the Greater-Poland National Park) (Chmiel 2013 – A).
The species' negative impact on biological diversity does not have a cascading nature. The main problem is its very quick rate of growth, due to which it exhibits high competitiveness against native species, e.g. limiting the restoration capabilities of poplars and willows in riverside riparian forests, contributes to changes in the structure of these phytocoenoses, which are very hard to reverse. Its mass occurrence in xerothermic grassland may result in its quick complete disappearance.



The seeds are an important source of food for birds and squirrels. A tangle formed by fallen logs and adventitious trunks regenerating from them may constitute a safe hideout for wild animals. The soft and spongy wood, especially of dead trunks, enables the creation of a tree hollow, thus constituting a precious biotope for birds (especially woodpeckers) and insects (Rosario 1988 – B, Straigyte et al. 2015 – P).

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
- very low
- low
- medium
- high
- very high

aconf15. Answer provided with a

low	medium	high X
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 level of confidence

acomm19. Comments:
Acer negundo is not a parasitic plant.

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

- inapplicable
- very low
- low
- medium
- high
- very high

aconf16. Answer provided with a

low	medium	high X
-----	--------	------------------

 level of confidence

acomm20. Comments:
Acer negundo appears in natural and semi-natural habitats, as well as in ruderal and much less frequently segetal habitats. Due to this, it is not a weed threatening cereal and root crops. It can ephemerally accompany crop plants only at its seedling stage. It is the effect of dispersion from seed trees, mainly growing along roadsides. Trees growing at a roadside, at the edge of a field within the range of a crown (shading) and root system (competition for water and food resources) negatively affect cultivations in a microscale. The above-mentioned aspect of impact is not specific to the ash-leaved maple – similar implications for cultivated plants result from other tree species growing in the direct vicinity of an arable field. It can spontaneously appear in orchards or in forest plantation areas, but its impact is minor. Due to its very early blossom it does not constitute competition for pollinators with crop species.
To sum up, it should be concluded that the impact of the ash-leaved maple on the quality and yield of crop plants is almost negligible.

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

- inapplicable
- no / very low
- low
- medium
- high
- very high

aconf17. Answer provided with a

low	medium	high X
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 level of confidence

acomm21. Comments:
The species represents the *Negundo* section. In Poland, this section has no other representative in native flora and among crop plants. Therefore, there is no direct risk of hybridisation or introgression (Mędrzycki 2011 – B).

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

- very low
- low
- medium
- high
- very high

aconf18. Answer provided with a

low	medium	high X
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 level of confidence

acomm22. Comments:
Apart from local shading, competition for water and nutritional substances within the range of the crown and roots of trees growing in the direct vicinity of the field, the species has no impact on the condition or yield of crop plants. It does not change the properties of an agroecosystem, including the circulation of elements, water relations and trophic properties.

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

- very low
- low
- medium
- high
- very high

aconf19. Answer provided with a

low	medium	high X
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 level of confidence

acomm23. Comments:
Within the area of its natural occurrence *Acer negundo* is a host of the fungus *Phymatotrichum omnivorum* which causes a syndrome called the cotton root rot. Apart from cotton, the root may affect at least 200 plant species, also including 31 cultivated species in various regions of the world. According to EPPO, no harmful pathogens and parasites are observed on the ash-leaved maple within the area of its secondary range.

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:

- | | |
|-------------------------------------|--------------|
| <input checked="" type="checkbox"/> | inapplicable |
| <input type="checkbox"/> | very low |
| <input type="checkbox"/> | low |
| <input type="checkbox"/> | medium |
| <input type="checkbox"/> | high |
| <input type="checkbox"/> | very high |

aconf20. Answer provided with a

low	medium	high
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 level of confidence

acomm24. Comments:
The species is an autotrophic plant.

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

- | | |
|-------------------------------------|-----------|
| <input checked="" type="checkbox"/> | very low |
| <input type="checkbox"/> | low |
| <input type="checkbox"/> | medium |
| <input type="checkbox"/> | high |
| <input type="checkbox"/> | very high |

aconf21. Answer provided with a

low	medium	high
-----	--------	------

 level of confidence

acomm25. Comments:
There are no known poisonous properties affecting animals in case of eating leaves or young shoots. No potential poisonous properties of the species towards farm animals have been confirmed so far (Rosario 1988 – B). Rosario (1988 – B) indicates unambiguously that the leaves of *A. negundo* have a low nutritional value for farm and wild animals, e.g. the leaves and branches of maple are of secondary nutritional significance for the deer.

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

- | | |
|-------------------------------------|--------------|
| <input checked="" type="checkbox"/> | inapplicable |
| <input type="checkbox"/> | very low |
| <input type="checkbox"/> | low |
| <input type="checkbox"/> | medium |
| <input type="checkbox"/> | high |
| <input type="checkbox"/> | very high |

aconf22. Answer provided with a

low	medium	high
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 level of confidence

acomm26. Comments:
As a plant, *Acer negundo* is neither a host nor a vector of animal parasites and pathogens.

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:

- 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 without any tendencies for a parasitic lifestyle.

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

- very low
- low
- medium
- high
- very high

aconf24. Answer provided with a

low	medium	high X
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 level of confidence

acomm28. Comments:
The pollen of *Acer negundo* has allergenic properties (Esch et al. 2001 – P). The blossoming period of *A. negundo* begins in early spring, before the development of leaves. The pollen of *A. negundo* is transported by wind, but pollen grains are heavier than the pollen of many other plants, e.g. the common hazel *Corylus avellana* (Rosario 1988 – B). So far, aerobiological studies on the concentration of the pollen of this plant in Poland have not indicated any exceeding of amounts hazardous to health. According to the information of Grewling (2018 – B), the presence of *A. negundo* pollen in the air is negligible. According to the surveying station of the Laboratory of Aeropalynology of UAM in Poznań, during the peak season of alder pollination, several thousand of its grains float in the air, with 1-2 thousand oak grains, 200-1000 poplar grains and 100-700 plane grains in 1 m³/day; in the case of maple, daily concentration does not exceed 50 pollen grains in 1 m³, whereby in the centre of Poznań this concentration was much higher than in the peripheral zone of the city. Reports from some cities show that the concentration of the pollen of this maple species may be higher compared to other native maples and comparable to the Norway maple *A. platanoides* (Weryszko-Chmielewska 2016 – P).

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

- inapplicable
- very low
- low
- medium
- high
- very high

aconf25.	Answer provided with a	low	medium	high	level of confidence
acomm29.	Comments:	The species is a plant which is neither a vector of human parasites nor pathogens.			

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:

<input type="checkbox"/>	very low
<input checked="" type="checkbox"/>	low
<input type="checkbox"/>	medium
<input type="checkbox"/>	high
<input type="checkbox"/>	very high

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

acomm30.	Comments:
	<i>Acer negundo</i> forms thickets near railway stations, railway tracks and in the vicinity of floodbanks. The presence of maple thickets in these areas may hinder their sustainment and operation. It also colonises post-industrial and disused areas in cities; seedlings and young trees develop on the rubbles, walls and roofs of buildings. This species can constitute an element of post-industrial land rehabilitation involving reforestation (Gilewska 2010 – P). Maple is often used for land rehabilitation of heaps and dumps in order to stabilise them, as well as in forestations constituting a buffer zone around cumbersome industrial plants. This aspect surely implies a positive impact of the species on the infrastructure in question. However, considering secondary consequences related to the possibility of the species' dispersal in nearby natural systems, further use of this species in land rehabilitation and protective plantings should be abandoned.

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:

<input type="checkbox"/>	significantly negative
<input type="checkbox"/>	moderately negative
<input type="checkbox"/>	neutral
<input checked="" type="checkbox"/>	moderately positive
<input type="checkbox"/>	significantly positive

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

acomm31.	Comments:
	During early spring, the pollen of the ash-leaved maple is a valued source of bee nectar (Rosario 1988, Mędrzycki 2011 – B). There is even special maple honey with the pollen of

A. negundo sold in Białowieża (Mędrzycki 2011 – B). Research has been conducted involving the potential use of maple as an energy crop. Studies have shown that the calorific value, yield and specific weight are comparable to other species, but considering the negative environmental impact, reproduction in arable areas cannot be allowed (Frączek et al. 2009 – P). Its wood is used only locally and sometimes for manufacturing cheap furniture and other wooden products. In the past it was used for posts, fences and fuel. However, due to its softness and spongy structure this wood is characterised by its low usefulness (Rosario 1988 – B).

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

- significantly negative
- moderately negative
- neutral
- moderately positive
- significantly positive

aconf28. Answer provided with a

low	medium X	high
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 level of confidence

acomm32. Comments:
According to the information of Brunet and Astin (1997 – P), compact, homogeneous stands of the ash-leaved maple retain more sediments transported by floodwaters compared to forest-thicket formations consisting of other tree species. This results from the high susceptibility of the ash-leaved maple to tipping, branch breaking and the natural tendency of trunks to fall and form adventitious trunks growing in an espalier from the fallen trunk. The complex structure of the internal architecture of stands which include *A. negundo* makes it so that not just fluvial sediments are deposited in a higher amount in there, but certainly communities which include the ash-leaved maple contribute considerably to the flattening of flood waves. In cities in which this species is planted or there is a spontaneous occurrence of its clusters, the tree may contribute considerably to an improvement in air quality due to its high maximum rate of photosynthesis, which may exceed 25 $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$ (Foster 1992 – P).

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

- significantly negative
- moderately negative
- neutral
- moderately positive
- significantly positive

aconf29. Answer provided with a

low	medium X	high
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 level of confidence

acomm33. Comments:
The species does not considerably affect cultural services. In urbanised areas with greenery it may serve aesthetic functions as a decorative species, in particular during autumn, when its leaves turn spectacularly yellow (Weaver 1976 – P). Freely growing specimens are characterised by their picturesque look.

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
- not change
- increase moderately
- increase significantly

aconf30. Answer provided with a

low	medium	high X
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 level of confidence

acommm34. Comments:
The species has overcome all geographical barriers in Poland. It was introduced a long time ago, that is, in the beginning of the 20th century (Seneta 1991, Sudnik-Wójcikowska 1987, Tokarska-Guzik 2005 – P). The assessment involves the remaining regions of Poland unaffected by the invasion of this species. A fragment of the native range corresponds to a 94-100% climatic similarity with Poland. Considering the wide range of thermal tolerance enabling the species to occupy a vast original area (from Canada to Guatemala) comprising frost resistance zones 2-7 (Straigyte et al. 2015 – P), and that the territory of Poland falls within the range of frost resistance zones 5-6, it can be concluded that an increase in temperature by 1-2°C as predicted for the years 2046-2065 will not have any impact on the efficiency of its dispersal from cultivation and its future resources. Apart from mountain areas, climatic conditions currently present in Poland are very favourable for this species.

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
- increase moderately
- increase significantly

aconf31. Answer provided with a

low	medium	high X
-----	--------	------------------

 level of confidence

acommm35. Comments:
The species is already established – it has the status of a metaphyte – an established plant of alien origin, and a holagriophyte, meaning a species established after the year 1500 in natural and semi-natural communities (Tokarska-Guzik 2005, Tokarska-Guzik et al. 2012 – P). In Poland, at least 50 years ago, the species overcame barriers which prevented its survival and reproduction. It spreads and reproduces in riparian forests. An increase in temperature by 1-2°C as predicted for the years 2046-2065 will probably have no impact on an increase in the efficiency of reproduction: the production of fruit, seeds, the recruitment of seedlings, etc.

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
- not change

- increase moderately
- increase significantly

aconf32. Answer provided with a

low	medium X	high
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 level of confidence

acomm36. Comments:
According to Gazda (2013 – P), the maple is present in 49 forest divisions and it is the eleventh tree of alien origin in Polish forests. *A. negundo* is a quite common species in Poland – over 3500 sites within the boundaries of 1379 basic 10 x 10 km squares (Zajac A. and Zajac M. 2001 – P). It seems that lower resources of the ash-leaved maple in Pomerania, Masuria and Podlachia do not result from thermal conditions, since in Lithuania and Latvia, and therefore areas with colder climate, this species is viewed as invasive (Gudžinskas 1998, Straigyte et al. 2015 – P). An increase in temperature by 1-2°C expected in the years 2046-2065 should not affect its future spreading.

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
- increase moderately
- increase significantly

aconf33. Answer provided with a

low	medium X	high
-----	--------------------	------

 level of confidence

acomm37. Comments:
In river valley areas the rate of invasion will probably remain unchanged. An increase in the species' spreading is possible in open areas: meadows, xerothermic grasslands, leading to heavy shading and the total disappearance of xerothermophilic elements. It is doubtful that this species may begin to pose a risk to plantlife in these habitats as a result of climate warming, because the ash-leaved maple finds its optimal conditions in fertile moist habitats (upper flood terraces in river valleys, hornbeam and riparian habitats in upland areas).

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
- not change
- increase moderately
- increase significantly

aconf34. Answer provided with a

low	medium X	high
-----	--------------------	------

 level of confidence

acomm38. Comments:
The species is not a segetal weed and it is not planted in forests as a crop species and biocenotic intermixture. It can ephemerally accompany crop plants only at its seedling stage (see commentary to point a.20). An increase in temperature will probably not trigger any negative impact of the ash-leaved maple on crop production.

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
- not change

- increase moderately
- increase significantly

aconf35. Answer provided with a

low	medium X	high
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 level of confidence

acommm39. Comments:
No impact of the species on farm animals or livestock production has been noted so far. The forecast climatic changes will not cause any negative impact of the species on animal husbandry.

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
- increase moderately
- increase significantly

aconf36. Answer provided with a

low	medium X	high
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 level of confidence

acommm40. Comments:
The pollen of the ash-leaved maple has allergenic properties. However, due to the fact that pollen grains are relatively heavy (Rosario 1988 – P), its presence in the air is negligible (Grewling 2018 – B). For this reason, it is also hard to expect distant transport of pollen over the area of Poland, if the resources of the ash-leaved maple were to increase due to climatic changes. Undoubtedly, its concentration in the air will depend on the resources of maple in Poland, which may result from other causes. Climatic changes will not affect an increase in the population of *A. negundo*, and therefore the concentration of pollen in the air, especially considering that a dry substrate and warm climate favour the occurrence of male specimens (Lysova and Khizniak 1976, Sachse 1992, Ward et al. 2002 – P).

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

- decrease significantly
- decrease moderately
- not change
- increase moderately
- increase significantly

aconf37. Answer provided with a

low	medium	high X
-----	--------	------------------

 level of confidence

acommm41. Comments:
The species' resources in Poland are primarily affected by habitat conditions and the way of ecosystems use. The currently present thermal conditions are optimal for maple. Climate will have no major significance for changing the species' impact on infrastructure.

Summary

Module	Score	Confidence
Introduction (questions: a06-a08)	1.00	1.00
Establishment (questions: a09-a10)	1.00	1.00

Spread (questions: a11-a12)	0.88	0.75
Environmental impact (questions: a13-a18)	0.40	1.00
Cultivated plants impact (questions: a19-a23)	0.00	1.00
Domesticated animals impact (questions: a24-a26)	0.00	1.00
Human impact (questions: a27-a29)	0.25	1.00
Other impact (questions: a30)	0.25	1.00
Invasion (questions: a06-a12)	0.96	0.83
Impact (questions: a13-a30)	0.40	1.00
Overall risk score	0.38	
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.

acommm42.

Comments:

The ash-leaved maple was planted for the first time in Europe in Fulham in England in 1688 (Wein 1931, acc. to Kowarik 1992 – P). Several years later it was imported into the Netherlands (1690) and Germany (1699). In neighbouring countries, e.g. in the Czech Republic, first information on the cultivation of the species originates from 1835, and information on its appearance in the wild comes from 1875 (Pyšek and Prach 2003 – P). The species was introduced in Brandenburg in 1736, while first information on its spontaneous appearance originates from 1919 (Kowarik 1992 – P). Both in the past and nowadays, this tree is and was an object of cultivation. In the 19th and 20th centuries, the ash-leaved maple was frequently planted near roads, streets and parks in Europe. In many countries, this tree was used to create hedges and barriers against wind (Tutin et al. 1968, Ehrendorfer 1973 – P). Due to the shapelessness of crowns and the brittleness of branches, these practices are rather no longer exercised. The possibility of utilising the species in forestry was tested in the past. Due to poor technological parameters of its log as well as the brittleness and softness of wood, this species has not proven popular in forest management (von Schwerin 1919, Hegi 1977 – P). The ash-leaved maple is still cultivated in Europe in many decorative varieties with variegated or yellow leaves. It seems that cultivars are less invasive, but one has to be aware of the wild substrate on which its implantation occurs (Mędrzycki 2011 – B). The tree begins fruiting already at the age of 5 years (Sachse 1992 – P). It is characterised by a high production of diaspores: 30 000 seeds per 1 kg of biomass (Olson and Gabriel 1974 – P).

In the second half of the nineteenth century it was rediscovered as a roadside and park tree (Mędrzycki 2011 – B). Significance should be attributed to the unintentional dispersion of diaspores by means of transportation along roads and railways and by cleanup work: the collection and transport of fallen leaves along with samarae (Mędrzycki 2002 – P). According to Tokarska-Guzik (2005 – P), the main spreading paths for the species are the valleys of large rivers. Considering the high invasiveness of the species in neighbouring countries, the size of current resources in natural habitats, the reproductive potential and anemochorous way of dispersion, high probability may be presumed with a high degree of certainty that unintentional human actions were and still are of major significance in the expansion of the species in Polish territory.

The present assessment is based on the state of knowledge existing during its performance. It should be remembered that biological invasions of alien species are a phenomenon with particularly high dynamics and unpredictability. This is why it should be kept in mind that as time progresses, the status of the species may change. For this reason, it is justified to regularly repeat the assessments. *Acer negundo* has been classified as an alien species, present within the area of Poland in cultivation for almost 200 years. Clear tendencies of the species' invasiveness manifested themselves in the mid-20th century. Currently it has the status of a holagriophyte. It is a species which disperses in an anemochorous and hydrochorous manner. It occurs spontaneously primarily in moist riparian habitats in river valleys as well as riparian and hornbeam habitats in upland areas. It most frequently colonises degraded deciduous forests with a meshed stand structure. It has a negative impact on the integrity of natural habitats and biological diversity. The wood of the ash-leaved maple has no major economic significance. The species has no negative impact on crop and livestock production, as well as human health, in spite of information about the allergic properties of its pollen. This species is still used in land rehabilitation of post-mining areas and in roadside plantings. It is also frequently encountered in the commercial offer on Polish market in the form of cultivars implanted on wild substrates. In Poland the species has found optimal climatic conditions. It is not expected for climatic changes involving an increase in average annual temperature, which are predicted for the upcoming decades, to affect the resources of the ash-leaved maple in Poland or its impact on the environment, economy and humans.

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