RISK ASSESSMENT SUMMARY SHEET

Updated: September 2015

False acacia (*Robinia pseudoacacia*)

- Hardwood tree species native to SE North America.
- Established in most European countries, considered invasive in many. Also invasive in parts of North and South America, Asia and Africa.
- Important forestry crop in Europe but not in GB.
- Beginning to show signs of invasiveness in GB.
- Could cause major impacts through competition and habitat alteration

History in GB

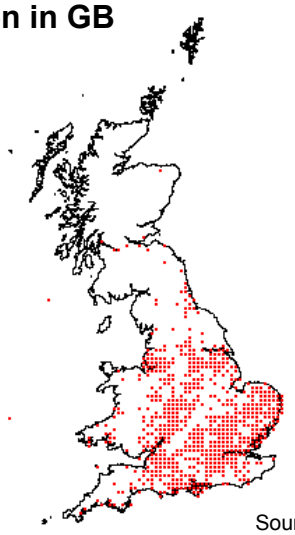
Introduced around 1630, first recorded in the wild in 1888. Mainly locally distributed in GB – especially south, south-east and the midlands of England but also found in Wales and Scotland.

Native distribution

Native to the Appalachian and Ozark mountains in the south-east of the US.

Source: Wikimedia 2014, creative commons

Distribution in GB



Source: NBN 2014

Impacts

Environmental (major)

- Can fix nitrogen so may produce irreversible impacts when it invades nutrient poor habitats such as sandy grass-lands, calcareous grasslands etc.
- Alters nutrient dynamics and may facilitate invasion by other invasive plant species.
- Alters species composition of plants and some invertebrates

Economic (minor)

- Mainly cost of management along transportation corridors

Social (minimal)

- Potential poisoning of horses by in-gesting bark.

Introduction pathways

Ornamental - main current pathway. Widely available in the horticulture trade.
Forestry - potential future use likely to increase. Potential use as a biomass crop.
Beekeepers - Noted source of nectar for bees.

Spread pathways

Natural (slow) Slow spread by suckering and seed dispersal.
Human (rapid) mostly deliberate planting but also (rarely) by seed dispersal aided by vehicles.

Summary

	Risk	Confidence
Entry	VERY LIKELY	VERY HIGH
Establishment	VERY LIKELY	VERY HIGH
Spread	RAPID	HIGH
Impacts	MAJOR	HIGH
Conclusion	HIGH	HIGH

Information about GB Non-native Species Risk Assessments

The Convention on Biological Diversity (CBD) emphasises the need for a precautionary approach towards non-native species where there is often a lack of firm scientific evidence. It also strongly promotes the use of good quality risk assessment to help underpin this approach. The GB risk analysis mechanism has been developed to help facilitate such an approach in Great Britain. It complies with the CBD and reflects standards used by other schemes such as the Intergovernmental Panel on Climate Change, European Plant Protection Organisation and European Food Safety Authority to ensure good practice.

Risk assessments, along with other information, are used to help support decision making in Great Britain. They do not in themselves determine government policy.

The Non-native Species Secretariat (NNSS) manages the risk analysis process on behalf of the GB Programme Board for Non-native Species. Risk assessments are carried out by independent experts from a range of organisations. As part of the risk analysis process risk assessments are:

- Completed using a consistent risk assessment template to ensure that the full range of issues recognised in international standards are addressed.
- Drafted by an independent expert on the species and peer reviewed by a different expert.
- Approved by an independent risk analysis panel (known as the Non-native Species Risk Analysis Panel or NNRAP) only when they are satisfied the assessment is fit-for-purpose.
- Approved for publication by the GB Programme Board for Non-native Species.
- Placed on the GB Non-native Species Secretariat (NNSS) website for a three month period of public comment.
- Finalised by the risk assessor to the satisfaction of the NNRAP.

To find out more about the risk analysis mechanism go to: www.nonnativespecies.org

Common misconceptions about risk assessments

To address a number of common misconceptions about non-native species risk assessments, the following points should be noted:

- Risk assessments consider only the risks posed by a species. They do not consider the practicalities, impacts or other issues relating to the management of the species. They therefore cannot on their own be used to determine what, if any, management response should be undertaken.
- Risk assessments are about negative impacts and are not meant to consider positive impacts that may also occur. The positive impacts would be considered as part of an overall policy decision.
- Risk assessments are advisory and therefore part of the suite of information on which policy decisions are based.
- Completed risk assessments are not final and absolute. Substantive new scientific evidence may prompt a re-evaluation of the risks and/or a change of policy.

Period for comment

Draft risk assessments are available for a period of three months from the date of posting on the NNSS website*. During this time stakeholders are invited to comment on the scientific evidence which underpins the assessments or provide information on other relevant evidence or research that may be available. Relevant comments are collated by the NNSS and sent to the risk assessor. The assessor reviews the comments and, if necessary, amends the risk assessment. The final risk assessment is then checked and approved by the NNRAP.

*risk assessments are posted online at:
https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=51
comments should be emailed to nnss@apha.gsi.gov.uk

Rapid Assessment of: *Robinia pseudoacacia*
Author: Katharina Dehnen-Schmutz
Date: Final (April 2016) - Feb 2013 (3rd draft), June 2012 (2nd draft), January 2012 (1st draft); signed off by NNRAP June 2012, approved by GB Programme Board March 2015; published on NNSS website September 2015.

GB Non-native species Rapid Risk Assessment (NRRA)

Introduction:

The rapid risk assessment is used to assess invasive non-native species more rapidly than the larger GB Non-native Risk Assessment. The principles remain the same, relying on scientific knowledge of the species, expert judgement and peer review. For some species the rapid assessment alone will be sufficient, others may go on to be assessed under the larger scheme if requested by the Non-native Species Programme Board.

1 - What is the principal reason for performing the Risk Assessment? (Include any other reasons as comments)

Response: *To assess the risks posed by this species to Great Britain. This species has been highlighted as a risk in other European countries and is known to be present in GB.*

2 - What is the Risk Assessment Area?

Response: *Great Britain.*

3 - What is the name of the organism (scientific and accepted common; include common synonyms and notes on taxonomic complexity if relevant)?

Response: Robinia pseudoacacia L., accepted name (The Plant List 2010)
Synonym: Robinia pseudacacia L. (spelling variant)
Common names: False-Acacia, Black Locust

4 - Is the organism known to be invasive anywhere in the world?

Response:
Yes. *R. pseudoaccacia,* is known to be invasive in many regions of the world. The species is native in southeastern North America, in the Appalachian and Ozrak Mountains, but is considered invasive in other parts of North America (Stone 2009). In Europe, the species is listed among the "100 of the worst" in the DAISIE database (www.europe-aliens.org) and reported as established in most countries. In an application of the Australian Weed Risk Assessment Scheme (Pheloung et al. 1999) to 180 woody species in the Czech Republic *R. pseudoacacia* – a known invasive species in the Czech Republic - got the highest score on the risk scale of all species tested (Křivánek and Pyšek 2006). The species has also been introduced and planted in Asia, Africa, Oceania and South America with invasive occurrences reported from all areas (Richardson and Rejmánek 2011)(see also map and list in CABI Invasive Species Compendium datasheet (Anonymous 2008).

5 - What is the current distribution status of the organism with respect to the Risk Assessment Area?

Response:

R. pseudoacacia was introduced to Britain in the 1630s and was found outside cultivation by at least 1888

(Preston et al. 2002). In Britain, *R. pseudoacacia* is considered a species of the lowlands (Preston et al. 2002) and the current distribution map shows its main distribution area in southern, south-eastern and the midlands of England excluding many parts of the Pennines and northern areas. However, the species has also been recorded in parts of north-eastern England, Scotland (north-eastern coastal areas and Scottish lowlands), Wales and Cornwall (BSBI 2012).

6 - Are there conditions present in the Risk Assessment Area that would enable the organism to survive and reproduce? Comment on any special conditions required by the species?

Response:

Yes. Current conditions in the Risk Assessment Area have enabled the organism already to survive and reproduce. *R. pseudoacacia* can grow in a wide range of conditions, tolerating temperatures between 40°C to -12°C, and it has been reported to withstand temperatures as low as -35°C without damage (Anonymous 2008). The decisive factor seems to be a high enough heat sum during the vegetation period (Kowarik 2003) which may also explain the current distribution pattern in the Risk Assessment Area. Soil conditions range from pH 4.6 to 8.1, with poorly drained and compacted soils avoided (Anonymous 2008). For successful germination open habitat conditions are required which are often provided by anthropogenic disturbances.

7 - Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of the Risk Assessment Area or sufficiently similar for the organism to survive and thrive?

Response:

Yes. Climatic conditions in other parts of Europe where *R. pseudoacacia* occurs as well as in North America are comparable to those in the Risk Assessment Area.

8 - Has the organism established viable (reproducing) populations anywhere outside of its native range (do not answer this question if you have answered 'yes' to question 4)?

Response: NA

9 - Can the organism spread rapidly by natural means or by human assistance?

Response:

Yes. Natural spread of *R. pseudoacacia* is by seeds and root suckering (Kowarik 2003). Seeds are distributed only occasionally over distances of more than 100 m and clonal growth has been observed for distances of less than 1 m per year in Berlin (Kowarik 2003). In sandy soils in Hungary a retrospective analysis of the vegetative growth of *R. pseudoacacia* found clonal sprouts formed in a period of up to 140 years mainly in distances up to 10 m of the mother plants (Krízsik and Kőrműczi 2000).

Spread by human assistance can be much faster and includes accidental transport of seeds by vehicles (von der Lippe and Kowarik 2007) as well as deliberate movement of plants and seeds for planting purposes.

10 - Could the organism itself, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment Area?

Response:

Yes. The main impacts would be environmental resulting from the invasion of habitats low in nutrients which could be irreversibly changed. Negative direct economic impacts will result mainly from the control and management of the species in such habitats. In Europe, *R. pseudoacacia* has been identified as one of just three alien plants species having the most widespread ecological and economic impact (Vila et al. 2010).

Entry Summary

Estimate the overall likelihood of entry into the Risk Assessment Area for this organism (comment on key issues that lead to this conclusion).

Response: *very likely*

Confidence: *very high*

Comments (include list of entry pathways in your comments):

Taking into account that the species is already present, there is the risk of further entry due to the following pathways (in order of importance):

1. Use as a forest tree
Robinia pseudoacacia is an important tree for forestry in many countries and *Robinia* spp. are among the 20 most important forestry trees in Europe (Brus et al. 2011). However, it has not been used as a forest tree in GB up to now to a large extent. Brus et al. (2011) analysing forest inventories for European countries did not find any records of *R. pseudoacacia* for Britain. However, due to its drought tolerance *R. pseudoacacia* has been identified as a potentially suitable forestry tree species for England in predicted climate change conditions although concerns about a possible future risk of invasion have also been stated (Ray et al. 2010). Furthermore, it is also a highly suitable species for the production of biofuel in short rotation coppices (Gruenewald et al. 2007, Engel and Knoche 2011) and plantings for this purpose have already been established in continental Europe (see for example http://www.robinia-invest.com/). This pathway is therefore considered to be the most important for the risk of further entry of *R. pseudoacacia* in areas of the Risk Assessment Area where it is not currently found.

2. Use as ornamental species in gardens, parks and urban plantings
This has been the main pathway of entry for the species up to now and has resulted in the establishment and current distribution of *R. pseudoacacia* in Britain. *R. pseudoacacia* is widely available in the horticultural trade. This pathway may increase in importance in the future as *R. pseudoacacia* has been identified as a very suitable tree species for urban habitats in terms of drought tolerance and hardiness under climate change conditions (Roloff et al. 2009).

3. Beekeeping
R. pseudoacacia flowers are a good nectar source valued by bee keepers for the production of honey. For bee keepers in Britain, Howes (1979) concluded that *R. pseudoacacia* would not be a reliable nectar producer because it would not be attractive for bees in cooler summers. The Royal Horticultural Society has listed the species in its list “Perfect for Pollinators” (Royal Horticultural Society 2011).

Establishment Summary

Estimate the overall likelihood of establishment (comment on key issues that lead to this conclusion).

Response: *very likely*

Confidence: *very high*

Comments (state where in GB this species could establish in your comments, include map if possible):

R. pseudoacacia is already established in the Risk Assessment Area. It is not expected that further establishment would lead to a much wider distribution as currently observed (see comment in question 5) but rather in the establishment of new occurrences within the current range. This is because possible new and larger scale plantations would most likely be in areas with most suitable growing conditions for the species.

Spread Summary

Estimate overall potential for spread (comment on key issues that lead to this conclusion).

Response: *rapid*

Confidence: *high*

Comments (include list of spread pathways in your comments):

Further spread of *R. pseudoacacia* in the Risk Assessment area is most likely to occur:
- very slowly by natural suckering from existing and new plantations, about 1 m per year.
- slowly through natural distribution of seeds (up to 100 m), but only in open habitats which are necessary for successful germination (Kowarik 2003). The species also establishes a seed bank (Kowarik 2003).
- very rapidly through human transportation and planting in new locations.

Skov et al. (2009) report the species as widely planted in Denmark with selfsown individuals already occurring locally in urban areas. The DAISIE database lists the species as established in Sweden, Denmark, northern Germany, the Netherlands and Belgium, but does not list it for Norway and Finland. For Norway, however, it has been included in a list of alien species in Norway (Gederaas et al. 2007), and although information on the status is not provided, the list generally includes cultivated plants only if they "have been observed to have run wild outside the cultivated areas". In Belgium the species is listed widespread on the watchlist of invasive species (Branquart et al. 2010) and in the west of Germany (Ruhrgebiet) the species is classified as "expansive" in the period from 1980 to 2002, a status that was assigned to 11% of woody aliens in that area (Keil & Loos 2005).

There is some recent local evidence for the potential of the species to spread more rapidly. For London, Crawley (2009) reports: "*Robinia pseudoacacia* also forms thickets around the base of planted trees and establishes from seed all over London." But this seems not to be the case just in urban areas: the Warwickshire higher plants checklist (Anonymous 2012) comments on *R. pseudoacacia*: "Widely planted and frequently suckering over a large area to become naturalised, possibly setting seed too"

Impact Summary

Estimate overall severity of impact (comment on key issues that lead to this conclusion)

Response: *major*

Confidence: *high*

Comments (include list of impacts in your comments):

Impacts similar to the impacts described from other regions invaded by *R. pseudoacacia* are to be expected. The main problems will be environmental impacts from the invasion of habitats of high conservation value. These are habitats low in nutrients such as calcareous grassland, sandy grassland, relatively open forests such as some oak forests, and riparian forests, all of which are generally regarded as habitats of high conservation value. *R. pseudoacacia* has the ability to fix nitrogen, and therefore invaded habitats are enriched in nitrogen which makes it very difficult to restore pre-invasion conditions even after successful removal of the plants itself (Kowarik 2003, Malcolm et al. 2008). The higher nitrogen availability has also been linked to higher numbers of other non-native species in invaded forests that could still be found 14 years after the removal of R. pseudoacacia (von Holle et al. 2012). A study in Japan found the nutrient dynamic and plant community structure of a riparian area substantially altered due to the large nitrogen input from *R. pseudoacacia* . The species grows quickly and outcompetes other pioneer species (Wittenberg et al. 2006). Once *R. pseudoacacia* is established the species composition of invaded habitats is altered with an increase in nitrogen demanding

species that may outcompete species previously growing in these habitats (Krízsik and Kőrműczi 2000, Kowarik 2003, Starfinger and Kowarik 2003). Already two years after invasion of a sandy grassland in Berlin by *R. pseudoacacia* the species composition had completely changed and this was the case not just for plants but also for spider and beetle species (Kowarik 2003). The diversity of epiphytic lichen biota in mature *R. pseudoacacia* forests was reduced in comparison to native woodlands that were replaced by the species in Italy (Nascimbene et al. 2012).

Changes in landscape character are reported from Seoul (Song et al. 2005).

Invasion along transport networks, as observed in many countries (Kowarik 2003, Basnou 2006) could also result in higher maintenance costs as the removal takes several years of follow up management.
It has also been suggested that *R. pseudoacacia* competes with native plants for pollinating insects (Basnou 2006) but there is no analysis of potential impacts.

Seeds and the bark of *R. pseudoacacia* are toxic (Starfinger and Kowarik 2003) and cases of poisoning in horses have been reported (Vanschandevijl et al. 2010).

Direct economic impacts arise mainly from the high costs of management in invaded habitats and the control along invaded traffic infrastructure.

Climate Change

What is the likelihood that the risk posed by this species will increase as a result of climate change?

Response: *high*

Confidence: *high*

Comments (include aspects of species biology likely to be effected by climate change (e.g. ability to establish, key impacts that might change and timescale over which significant change may occur):

R. pseudoacacia is highly likely to be favoured by climate change in Britain. This is due first to the biology of the species which will be favoured by warmer temperatures as the heat sum over the vegetation period seems to be a decisive factor (Kowarik 2003). Second, adaptation strategies to climate change may result in a higher likelihood of the species to be planted in particular in forestry (Ray et al. 2010) but also as a short rotation coppice crop for renewable energy production (Gruenewald et al. 2007, Engel and Knoche 2011) and in urban habitats (Roloff et al. 2009). This will result in a highly increased propagule pressure increasing the risk of invasions in previously not occupied habitats. Given that *R. pseudoacacia* is a fast growing species and able to reproduce by seeds after about 6 years (Kowarik 2003) the timescale within which these impacts could be expected is within the next 10 years and increasing thereafter with the increasing uptake of adaptation strategies. A study in Austria, modelling the impact of climate change found a highly increased risk of *R. pseudoaccacia* invading protected areas (Kleinbauer et al. 2010).

Conclusion

Estimate the overall risk (comment on the key issues that lead to this conclusion).

Response: *high*

Confidence: *high*

Comments:

The overall risk of invasion of *R. pseudoacacia* in the Risk Assessment Area is high for the following reasons:

- the species is already present in the Risk Assessment Area
- it is already established
- it has already a relatively large distributional range with records in 732 hectads (BSBI 2012) out of 2823 hectads for the Risk Assessment Area
- climate change and related adaptation strategies are very likely to increase propagule pressure as well as improving the natural growing conditions for *R. pseudoacacia.*

Management options (brief summary):

1 - Has the species been managed elsewhere? If so, how effective has management been?

Response:

R. pseudoacacia has been managed in many countries where it is invasive. Management of established occurrences is very difficult due to the ability of the species to regrow after cutting or herbicide treatment if roots are not completely removed. Kowarik (2003) concludes that even after successful removal of long established occurrences the damage due to habitat changes may be irreversible. Active soil management may be necessary to remove high levels of soil nitrogen in previously nitrogen poor soils (Malcolm et al. 2008).

2 - List the available control / eradication options for this organism and indicate their efficacy.

Response:

1. Cutting or burning once may result in even denser regrowth.

2. Cutting followed by cutting of the regrowth in the vegetation period twice annually for several years or grazing of the regrowth with goats also over several years (Kowarik 2003, Böcker and Dirk 2004).

3. Herbicide treatment also needs follow-up treatments. Regrowth has been reported even after several years of apparently successful treatment (Anonymous 2008).

4. Girdling (ring barking) seems to be the most successful control methodology (Kowarik 2003).

3 - List the available pathway management options (to reduce spread) for this organism and indicate their efficacy.

Response:

1. To prohibit any further planting would be the most effective management option since the risk of new establishments resulting from natural spread from existing occurrences within the Risk Assessment Area seems low.

2. Restrictions on plantings in particular for large scale forestry and bio energy plantations that should be accompanied by individual site risk assessments. A distance of at least 500m from vulnerable habitats or areas seems to be sufficient to prevent the species from spreading into these areas (Starfinger and Kowarik 2003). This approach would prevent spread into nature reserves and other habitats that should be protected.

3. The species should not be included in grant schemes designed to promote the plantation of short rotation coppices, such as the Energy Crop Scheme (Rural Development Programme for England 2009).

4 - How quickly would management need to be implemented in order to work?

Response:

Control: as soon as undesired occurrences of the species are discovered since the longer the species is present the more severe and perhaps irreversibly will the invaded habitat be damaged.

Pathway management: policies to regulate planting should be in place as soon as possible.

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