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@fera.gsi.gov.uk

Rapid Risk Assessment of: *Wasabia japonica* (Miq.) Matsum
Author: Jonathan Newman (Centre for Ecology and Hydrology)
Date: First published on the NNSS website: 03/09/13
Suggested citation: Newman, J. (2013). GB Non-native Organism Rapid Risk Assessment for *Wasabia japonica*. www.nonnativespecies.org

Rapid Risk Assessment:

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

Response: ***To assess the potential risk of Wasabia japonica to Great Britain***

2 - What is the Risk Assessment Area?

Response: ***GB (Scotland, England and Wales)***

3 - What is the name of the organism? (Other names used for the organism can be entered in the comments box)

Response: ***Wasabia japonica*** **(Miq.) Matsum**
Eutrema wasabi (Siebold) Maxim.

4 - Is the organism in its present range known to be invasive?

Response: No. It can be dominant in the local area, but this is due to cultivation practices encouraging growth in shallow streams

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

Response: UK sourced Wasabi is sold at Borough Market, cultivated in the Sussex area (e.g. http://www.namayasai.co.uk/Wasabina/wasabina.htm)

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. Small stream margins in open areas.

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. Although production in Japan and Taiwan is limited to about 880 ha and 400 ha respectively, indicating highly specific growth conditions, the species is not tolerant of low temperatures with a limit of about -3°C. The mean temperature should be above +0.7°C for successful survival (Chadwick *et al.* 1993) .

8 - Has the organism established viable (reproducing) populations anywhere outside of its

native range?

Response: None reported, but it is cultivated in the RAA, Australia, Canada, and New Zealand

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

Response: Seeds are short lived, less than one year, and germination is rapid on degradation of dormancy after 8 months.

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

Response: Cited as a host for tobacco mosaic virus (TMV) (Martin & Deo, 2000). Susceptible to root rot fungi (*Pythium* spp.) at high and low temperatures (Rodriguez & Punja, 2007)

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).

[Delete accordingly]

Response: ***very likely, already present in cultivation***

Confidence: ***very high***

Comments (include list of entry pathways in your comments): The species is already gown commercially in the UK (in the Sussex area). The species is traded as a commodity from overseas suppliers, already processed into the final paste product. The availability of seeds is very limited. Commercial growers in the UK are few, probably limited to southern UK, and conditions for growth are highly specialised. Commercial growers have seed traps.

Establishment Summary

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

[Delete accordingly]

Response: ***unlikely***

Confidence: ***high***

Comments (state where in GB this species could establish in your comments, include map if possible): Establishment is related to propagule pressure. There are highly specific requirements for growth, including pH and nutrient requirements (Chadwick *et al.*, 1993). The plant does not fragment easily, although behaviour at low temperatures is unknown. Seeds have a requirement for continuous moisture and a cold period for germination. Current propagation is limited to Sussex and the London area, and this would be the most likely area for establishment.

The species could establish in small stream margins in open areas. Growth from seed in cultivation is reported

as relatively unsuccessful, and propagation usually occurs by tissue culture methods. However, if seeds are kept moist (>40% water content) at cool temperatures, seed survival is prolonged (Nakamura and Sathiyamoorthy 1990). This may indicate that survival of seeds in wet margins over winter could be sufficient for perpetuation of populations in natural conditions. Seeds are not tolerant of freezing (Chadwick, 1990, Chadwick *et al.*, 1993) so populations would only be expected to survive in the southern parts of the RAA. Cool water of neutral to slightly acidic pH is required for growth. There is a specific requirement for sulphur, which is usually added as ammonium sulphate in horticulture. Fragmentation of vegetative tissue is not normal, but the behaviour of the plant in low temperatures is not well documented. Fragmentation of mature plants may occur below 5°C, resulting is viable tissue for a short period in late autumn and early winter. Colder temperatures would not permit survival of plant fragments in natural conditions. It is unlikely that vegetative reproduction would permit establishment of this species in the RAA, (Chadwick, 1990).

Spread Summary

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

Response: ***very unlikely***

Confidence: ***high***

Comments (include list of spread pathways in your comments): Spread by seed is unlikely. Spread by fragmentation is unlikely. The most likely route for spread would be by an increase in cultivation in different parts of the country. This can be controlled by the use of seed and fragment traps where cultivation is licensed.

Seeds are short lived, less than one year, and germination is rapid on degradation of dormancy after 8 months Nakamura & Sathiyamoorthy, 1990a, 1990b). Seeds require a cold period and must be maintained at above 40% moisture content to survive for a long enough period to germinate. The optimum seed germination temperature is at 15°C, with germination decreasing at higher and lower temperatures (Nakamura and Sathiyamoorthy, 1990b). The species does not fragment easily in natural situations, and cell culture of rhizome tissue appears to be the most successful method of cultivation in horticulture. Reproduction by fragmentation is not expected to result in rapid range expansion, although offshoots are used for field cultivation. Each plant can produce up to 20 offshoots from axillary buds on rhizomes, resulting in a theoretical method of vegetative reproduction in natural habitats.

Impact Summary

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

Response: ***low***

Confidence: ***high***

Comments (include list of impacts in your comments): Growth is restricted to *circum* neutral or slightly acidic waters and to terrestrial areas where active cultivation is required. The cultivation difficulty of this species indicates that it would not be tolerant of competition by other more dominant native species common in this habitat niche (*e.g. Apium nodiflorum, Rorippa nasturtium-aquaticum).*

It is also susceptible to common viral and fungal diseases, and as a host for tobacco mosaic virus (TMV) (Martin & Deo, 2000). It is susceptible to common root rot fungi (*Pythium* spp.) at high and low temperatures (Rodriguez & Punja, 2007), probably limiting its impacts in temperate streams.

Climate Change

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

Response: ***very low***

Confidence: ***very 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):

The plant has an optimum temperature of about 15°C. Increased temperatures will not favour growth or seed production, although rise in the minimum winter temperatures may promote survival of mature plants over winter periods, especially if the mean temperature exceeds 0.7°C (Chadwick *et al.*, 1993). Increased survival of seeds may also result from an increase in winter temperatures with an increase in minimum temperatures, although this may be offset by drier winter periods resulting in increased seed loss from desiccation. Summer storms and periods of excessive rainfall are likely to dislodge plants and may cause an increase in spread within streams.

Conclusion

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

Response: ***very low***

Confidence: ***high***

Comments: The propagule pressure from cultivation in the RAA is very low at the moment. A significant increase in this pressure is unlikely due to the highly specific requirements for growth of the species and relatively low commercial market volume. Establishment risk is low due to an inability to compete with dominant native macrophytes in specific habitat niches. The risk of spread is low due to poor survival of seeds and erratic germination patterns (Nakamura & Sathiyamoorthy, 1990).

Management options (brief summary):

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

Response: No

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

Response: Glyphosate. Mechanical removal

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

Response: Control of cultivation and inspection of horticultural systems. Safe systems of work, including management of fragments and installation of seed traps. Requirement to register plant cultivation with Defra.

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

Response: Relatively quickly at each cultivation site, but sites are limited, and surrounding habitat is probably not suitable for establishment

References

Provide here a list of the references cited in the course of completing assessment

List:

Chadwick, C. I. (1990), 'Wasabi, *Wasabia japonica* (Miq.) Matsum., a semi-aquatic crop from Japan'. PhD Thesis, Washington State University.

Chadwick, C. I., Lumpkin, T. A., and Elberson, L. R. (1993), 'The Botany, Uses and Production of Wasabia japonica (Miq.) (Cruciferae) Matsum', Economic Botany, 47 (2), 113-135.

Martin, R.J and Deo, B. (2000) Preliminary assessment of the performance of soil-grown wasabi (*Wasabia japonica* (Miq.) Matsum.) in New Zealand conditions. New Zealand Journal of Crop and Horticultural Science, 28(1): 45-51

Nakamura, S. and Sathiyamoorthy, P. (1990a), 'Germination of Wasabia japonica Matsum. Seeds', Engei Gakkai zasshi Engei Gakkai zasshi, 59 (3), 573-77.

Nakamura, S. and Sathiyamoorthy, P. (1990b), 'Storage of Wasabia japonica Matsum. Seeds', Engei Gakkai zasshi Engei Gakkai zasshi, 59 (3), 579-87.

Rodriguez, G and Punja, Z.K. (2007) Root infection of wasabi (*Wasabia japonica*) by *Pythium* . Canadian journal of plant pathology. Revue Canadienne de phytopathologie. 29 (1): 79-83