



The Food & Environment Research Agency

Rapid Pest Risk Analysis for

Scolytus morawitzi

This document provides a rapid assessment of the risks posed by the pest to the UK in order to assist Risk Managers decide on a response to a new or revised pest threat. It does not constitute a detailed Pest Risk Analysis (PRA) but includes advice on whether it would be helpful to develop such a PRA and, if so, whether the PRA area should be the UK or the EU and whether to use the UK or the EPPO PRA scheme.

STAGE 1: INITIATION

1. What is the name of the pest?

Scolytus morawitzi Semenov (Coleoptera, Curculionidae: Scolytinae). Common names include Morawitz's bark beetle and larch sapwood beetle.

The subfamily Scolytinae has historically been treated as a family in its own right, the Scolytidae. However, the current opinion is that the Scolytinae is a specialised subfamily in the beetle family Curculionidae (weevils).

2. What is the pest's status in the EC Plant Health Directive (Council Directive 2000/29/EC¹) and in the lists of EPPO²?

Scolytus morawitzi is not covered by the legislation in Annex IIAI of the EC Plant Health Directive as it is found in European parts of Russia and thus this species is not covered by the listing for Scolytidae spp. (non-European). The species is recommended for regulation as a quarantine pest by EPPO, having been added to the A2 list in 2002.

3. What is the reason for the rapid assessment?

Phase I of the UK Plant Health Risk Register in the summer/autumn of 2013 identified this as a priority pest for an updated PRA, especially with regard to researching the risk to the UK associated with imports of trees from European Russia.

STAGE 2: RISK ASSESSMENT

4. What is the pest's present geographical distribution?

Scolytus morawitzi is found in North Asia: Mongolia and Heilongjiang province in north-eastern China (CABI, 2011), and Asian Russia including the Russian Far East (Kurensov, 1941), Siberia (Khramtsov & Padiy, 1965) and Transbaikalia (EPPO, 2005). The beetle is also found in central and northern parts of European Russia (Yanovskij, 1999), including Murmansk province (Voolma *et al.*, 2004), but it has not been recorded from any EU countries to date.

5. Is the pest established or transient, or suspected to be established/transient in the UK? (Include summary information on interceptions and outbreaks here).

The pest is not found in the UK, and has not been intercepted on imported material.

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0029:20100113:EN:PDF>

² [http://archives.eppo.int/EPPOStandards/PM1_GENERAL/pm1-02\(21\)_A1A2_2012.pdf](http://archives.eppo.int/EPPOStandards/PM1_GENERAL/pm1-02(21)_A1A2_2012.pdf)

6. What are the pest's natural and experimental host plants; of these, which are of economic and/or environmental importance in the UK?

Scolytus morawitzi feeds on *Larix* spp. (larches), having been recorded specifically on *L. gmelinii*, *L. olgensis*, *L. kamtschatica*, *L. sibirica*, *L. x maritima* and other *Larix* in the native range (EPPO, 2005). Given this beetle is able to utilise a number of *Larix* species, it seems likely that other species of *Larix* found in Northern Europe will prove to be suitable hosts, though specific data are lacking. While beetles prefer to attack stressed or dying trees, they are capable of attacking "almost healthy" trees (EPPO, 2005).

Three species of *Larix* are important forestry trees in the UK, together accounting for about 10% of coniferous woodland by area (Forestry Commission, 2013). Additionally, mature *Larix* spp. are a feature of many botanical gardens, and thus of amenity value.

Additionally, CABI (2011) reports *Pinus koraiensis* (fruit pine) as a host, and Yanovskij (1999) includes *Pinus (Haploxylon)* (soft pines) in the host list. However, these are the only sources that mention hosts other than *Larix*, and both are summaries of available information, not original research work. As the original source(s) for *Pinus* as a host of *S. morawitzi* could not be located within the constraints of a rapid assessment, the validity of *Pinus* as a host for *S. morawitzi* remains uncertain.

7. If the pest needs a vector, is it present in the UK?

No vector is required. This is a free-living organism.

8. What are the pathways on which the pest is likely to move and how likely is the pest to enter the UK? (By pathway):

Larch wood (unsquared): Any untreated wood with bark attached, e.g. logs, dunnage or pallet wood, from areas where the beetle is present, may contain *S. morawitzi*. All life stages of the beetle are found in galleries in the cambium, with the exception of mature males which are usually found on the bark surface (EPPO, 2005). The larvae are able to continue development on cut wood that is no longer growing (CABI, 2011), thus potentially being able to complete development on the imported timber before adults emerge to find a new host tree. Debarking does not completely remove the risk, as isolated individuals may survive under fragments of bark, though it will reduce the number of individuals present, and thus decrease the risk. *Scolytus morawitzi* is found in European Russia, and hence the requirements for Scolytidae non-European in Directive 2000/29/EC do not apply.

Larch wood is imported to the EU from Russia. There are EUROPHYT notifications of non-compliance on Russian Federation exports of *L. sibirica* and *Larix* spp. wood and bark every year from 1997 to 2013, with a total of over 800 notifications in this 18-year period, from 15 EU member states (although none from the UK) (EUROPHYT data, extracted 13 March 2014). However, only 22 of these non-compliance notifications were due to the presence of a "harmful organism" of any sort (EUROPHYT data). However, it should be noted that EUROPHYT does not distinguish between types of wood products, e.g., squared and non-squared wood.

As wood from the Russian Federation is moving in trade to the EU, and *S. morawitzi* is not covered under existing legislation, this pathway is rated as moderately likely though there is considerable uncertainty over the volume of wood from Russia that is imported to the UK.

Larch wood (unsquared): Very unlikely Unlikely Moderately likely Likely Very likely

Larch wood (squared): As the outer parts of the wood (where the beetle lives) will largely have been removed under this treatment (though a small amount of outer wood remains), squared wood is less likely to contain the pest, or at least will contain fewer individuals. However there is no published information on what depth of wood needs to be removed to eliminate all life stages. The pupal chambers are found at the greatest depth in the wood, these leaving deep sapwood scars, though the precise depth is not apparently recorded (CABI, 2011). The uncertainties in the volume of wood from Russia being imported to the UK are the same as for unsquared wood, and while squaring wood reduces the risk of introducing the pest, it will not eliminate all individuals. Overall, this pathway is judged to be

unlikely as fewer individuals will survive in squared wood, reducing the chance of a breeding population establishing.

Larch wood (squared): Very unlikely Unlikely Moderately likely Likely Very likely

Trees for planting: The EC Plant Health Directive (Annex III) prohibits any *Larix* spp., other than seeds, from being imported from non-European countries. As *S. morawitzi* is known to be present in European Russia, again the legislation does not cover this pest. *Larix* trees from this area are thus a potential pathway. However, growing trees from other parts of the beetle's distribution are prohibited (e.g., from China or Mongolia); no records could be found of non-European imports of growing *Larix* between 2009 and 2012. The UK imported larch trees for planting from several EU countries (which excludes Russia) between 2003 and 2013, with total imports ranging from as few as 7,100 trees in 2004 up to 328,700 trees in 2008 (all consisting of 3 species: *L. decidua*, *L. kaempferi* and *L. x eurolepis*) (Forestry Commission, unpublished data).

Trees for planting are often young and small in size, and *S. morawitzi* usually develops inside larger trunks (Kurensov, 1941). However, EPPO (2005) states branches over 7 mm in diameter are suitable: even quite small trees will have trunks this wide, and thus could be attacked. However, no reports could be found of this beetle infesting trees growing in nurseries. The import of small trees for planting is considered an unlikely pathway based on available information, as adults would appear to prefer larger trees and only attack small ones when no larger trees were available.

Larch trees are an occasional bonsai species. These trees will be highly stressed due to the nature of cultivating bonsai, and thus will be more vulnerable to beetle attack. However, by their nature, these trees are small, and assumed to be less attractive to beetles. In addition to the EC Plant Health Directive Annex III requirements for all growing *Larix* listed above, Annex IVA lists inspection and treatment requirements for all non-European "naturally or artificially dwarfed plants". No figures on the amount of *Larix* bonsai imported into the UK from other European countries are readily available (and such plants are not currently subject to routine entry inspections). However, the trade is likely to be small due to the specialist nature of this commodity, and the trees are likely to be widely dispersed to private individuals soon after arrival. Thus, this pathway is rated as very unlikely.

Semi-mature trees may be imported for amenity purposes ("instant landscaping"), and while this pathway will be low in volume and the trees likely to be more dispersed after entry to the UK, these larger trees would be more likely to harbour greater numbers of *S. morawitzi* in each individual tree. Larger trees will also be more stressed by being moved in trade (compared to younger, smaller trees), and thus will be more susceptible to beetle attack. Thus, the pathway for these larger landscape trees has been assessed separately, but overall it is still considered to be unlikely based on assumptions of the volume imported from Russia.

<i>Larch trees for planting (young)</i> :	Very unlikely	<input type="checkbox"/>	Unlikely	<input checked="" type="checkbox"/>	Moderately likely	<input type="checkbox"/>	Likely	<input type="checkbox"/>	Very likely	<input type="checkbox"/>
<i>Larch trees (bonsai)</i>		<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
<i>Larch trees for landscape (semi-mature)</i> :	Very unlikely	<input type="checkbox"/>	Unlikely	<input checked="" type="checkbox"/>	Moderately likely	<input type="checkbox"/>	Likely	<input type="checkbox"/>	Very likely	<input type="checkbox"/>

Natural spread: The pest is very unlikely to reach the UK by natural spread as the highest estimate of its dispersal potential (by Orlinski, 2004) is only several kilometres per year (as the life cycle takes one year). However, if *S. morawitzi* expanded its range through natural spread to an eastern EU country, the risk of it moving in trade would increase as there are even fewer controls on movement of *Larix* within EU member states. For example, wood packaging is more likely to consist of lower quality wood, such as that infested with bark

beetles, and this can move freely within EU member states. Low levels of infestation may not be detected for some time, allowing the pest to be spread widely in trade. There are reports of *S. morawitzi* from Murmansk province in Russia, though only in the Chibiny Mountains (Voolma *et al.*, 2004); these are less than 100 miles from the border with Finland (an EU country). This pathway is rated as unlikely, because the beetle would still need to be moved in trade from an EU member state to the UK, and be capable of transfer to a suitable host here.

Natural spread: Very unlikely Unlikely Moderately likely Likely Very likely

Wood chips: Coniferous wood chips from areas where the beetle is present could include larch, and thus may also contain living larvae, pupae or adults of *S. morawitzi*. There are no statutory controls on coniferous wood chips from Europe, which includes European Russia. Wood chips are often composed of lower quality wood, and thus may be more likely to contain the pest. As the adult beetles are very small (less than 4 mm in length) (Kurensov, 1941), at least prepupae, pupae and adults may survive the chipping process and transport. Chipping is likely to reduce the viable population (for example, by increasing the surface area of the wood and so exposing the insects to increased desiccation), and if the woodchip consignment is composed of mixed softwoods, then the viable numbers will be even fewer as the beetle will only be present in the *Larix* wood chips. 23,000 tonnes of coniferous woodchips were imported to the UK in 2012 with a stated origin of the Netherlands, though there was a suspicion that these were large consignments from elsewhere that were merely split into smaller lots for onward shipment in the Netherlands (Hogan, 2013). Wood chips have been stored outside once at their destination, thus giving any pests more time to complete their development and locate suitable host (Økland *et al.*, 2012). Coniferous wood chips are not currently imported into the UK in high volumes, but with the increasing use of biomass for power generation, this amount could increase in future years. Based on the current import levels, consignments would need to originate from the pest's current distribution and contain enough individuals to form a breeding population, capable of transfer to a suitable host. Therefore, this pathway is given an overall rating of very unlikely, but if trade in coniferous wood chips were to increase, this rating would require revision.

Wood chips: Very unlikely Unlikely Moderately likely Likely Very likely

Larch bark: Again, bark from European Russia is not covered by the legislation, and thus poses a risk of introducing this beetle. At least one company based in European Russia (Saint Petersburg) appears to sell mulch made from larch bark. However, this pathway is rated as unlikely. Although the beetle is very likely to be associated with this commodity (when originating in its native range), usually bark appears to be processed (e.g., chipped for mulch or made into briquettes), which is likely to reduce the viable population, or imported in small quantities (e.g., for ornamental/ handicrafts purposes). However, no figures could be found for UK or EU trade in this commodity, so this rating has a high uncertainty. If the volume traded is significant, the rating would increase due to the inherent risk of this pathway.

Bark: Very unlikely Unlikely Moderately likely Likely Very likely

Wood packaging: All wood packaging material (dunnage is now included within the definition of wood packaging material) entering the EU from third countries (except Switzerland) must be treated according to ISPM 15. Therefore under current legislation the risk associated with this pathway is mitigated, and this pathway is rated as very unlikely.

Wood packaging: Very unlikely Unlikely Moderately likely Likely Very likely

Hitchhikers: Individual adults may survive transportation on assorted non-plant products, with their small size meaning the beetles are less likely to be detected either pre-export or at entry. However, either a gravid female will need to locate a suitable host in an appropriate timeframe, or several individuals will need to locate both a suitable host and each other in order to form a breeding population. Additionally, as the complete lifecycle takes a year with much of the time spent as larvae, adults are only present for a comparatively limited period in the year; also, adult males are the only life stage that are likely to be found outside the wood tunnels for any length of time (EPPO, 2005), and males cannot form a breeding population. Therefore, hitchhiking on various commodities is judged to be a very unlikely pathway for *S. morawitzi*.

Hitchhikers: Very unlikely Unlikely Moderately likely Likely Very likely

9. How likely is the pest to establish outdoors or under protection in the UK?

The native range of the beetle indicates that climatic conditions are favourable for outdoor survival throughout the UK (Vanhanen *et al.*, 2008), and *Larix* spp. are very widely distributed (BSBI tetrad maps), though it is not definitively known if the UK species of *Larix* are suitable hosts for *S. morawitzi*. Assuming that the beetle is able to utilise native *Larix* spp., *S. morawitzi* appears likely to be able to establish outdoors in the UK.

Suitable hosts are not grown in protected cultivation.

Outdoors: Very unlikely Unlikely Moderately likely Likely Very likely
Under protection: Very unlikely Unlikely Moderately likely Likely Very likely

10. How quickly could the pest spread in the UK?

Though adult beetles can fly, their natural dispersal rate is often considered to be quite low, e.g., the assessment given in the EPPO PRA (2000). There have apparently been few quantitative studies on the dispersal capacity of scolytine beetles and specific rates of spread for *S. morawitzi* are not available, though Orlinski (2004) considers adults capable of flying several kilometres. One experiment on a different species, *Scolytus multistriatus*, used a mark-release-recapture method using pheromone baits to attract the released beetles: the majority of adults were found within 1.5 m of the release site, with only one individual found in the trap 150 m distant from the release site (Wollerman, 1979). However, the pheromones may have affected beetle dispersal, as unmarked beetles were found in much higher numbers on the outer traps, suggesting the outer ring of traps formed a barrier round the inner traps to beetles arriving from outside the experimental area; thus the released beetles may have been caught in the nearest trap and did not show their full dispersal ability (Wollerman, 1979).

Spread with trade is likely to be much faster. All life stages (other than adult males), are often concealed under bark, and can thus be difficult to detect. Trade in wood and trees could spread the pest widely before it was detected. Haack (2006) reports that the Asian beetle *Scolytus schevyrewi* was first officially detected in Colorado, USA in 2003, but subsequently specimens that had been collected in Colorado in 1998 were located, i.e., the pest was present for at least 5 years before detection. If enough individuals to form a new population are able to transfer to new hosts, movement of infested wood in trade will increase the dispersal rate.

Natural spread: Very slowly Slowly Moderate pace Quickly Very quickly
In trade: Very slowly Slowly Moderate pace Quickly Very quickly

11. What is the area endangered by the pest?

The whole of the UK is at risk from *S. morawitzi*. *Larix decidua* (larch), *L. kaempferi* (Japanese larch) and their hybrid, *L. x marschlinsii* (hybrid larch), are planted throughout the UK (BSBI tetrad maps), and if these prove to be suitable hosts, then host availability will not affect the distribution of this beetle. Vanhanen *et al.* (2008) used CLIMEX to model the climatic suitability of Northern Europe for *S. morawitzi*, showing the UK to be at risk from this pest. The CLIMEX Ecoclimatic Index at UK climatic stations varies from zero to 50 suggesting that further work on the CLIMEX input parameters would be warranted. More generally in Europe, most of Central and Northern Europe, as well as northern areas of southern countries (e.g., central Spain) showed some climatic suitability for establishment (Vanhanen *et al.*, 2008).

12. What is the pest's economic, environmental or social impact within its existing distribution?

Scolytus morawitzi can be considered to be mainly a secondary pest, mostly attacking trees already stressed by attack from other insects, fires, etc. (Orlinski, 2001). However, the same tree is often attacked over several years by several generations of beetles: the tree may have branches girdled with resultant foliage death; overall tree growth can be reduced (affecting wood quality); seed production can be adversely affected; and some trees may eventually be killed (EPPO, 2005). As well as the direct economic impacts of reduced tree growth on wood quality, forest regeneration may be affected due to lower seed production, leading to environmental impacts.

Serious damage has been recorded on occasion, with Yanovskij (1999) recording local outbreaks and damage in several regions of Asian Russia. EPPO (2005) reported that, in outbreak years, "almost healthy" trees can be attacked by this pest. It seems likely that, in common with other scolytine bark beetles, outbreaks with high levels of damage occur periodically, the pest otherwise persisting in low numbers and causing relatively little damage to healthy trees.

No quantitative reports of damage due to *S. morawitzi* could be found and thus the assessment of damage is rather uncertain.

Very small Small Medium Large Very large

13. What is the pest's potential to cause economic, environmental or social impacts in the UK?

Larix spp. are widely grown in the UK, both as forestry and amenity trees. About 10% of the total area of coniferous woods grown in the UK consists of larch, or about 133,000 ha (Forestry Commission, 2013), excluding the area with amenity trees. The social and environmental value of larch is estimated at around £80 million per year, the commercial value is around £60 million per year and thus the total yearly value of larch to the UK is estimated at around £140 million per year (Andrew Cotterill, pers. comm., 12 March 2014). Larch is considered to be a relatively high-value softwood, often being used to make wood products for outdoor use, e.g., garden furniture and cladding. A decline in wood quality will adversely affect the timber value. The impact on UK larch is likely to be similar to that seen in the native range, but as the precise impact in the native range is unclear, so too is the potential impact in the UK. In areas where larch is infected by *Phytophthora ramorum* the impact could be much greater. The beetle prefers to attack trees under stress (Orlinski, 2001) and, in areas where large numbers of trees are dead or dying from infection with *P. ramorum*, the beetle could reach high population densities. Additionally, as the species of *Larix* grown widely in the UK are not the same as those known to be attacked in the native range, UK *Larix* spp. may be more or less susceptible to attack by *S. morawitzi*, further increasing the uncertainty of this judgement.

Very small Small Medium Large Very large

14. What is the pest's potential as a vector of plant pathogens?

No data could be found on *S. morawitzi* acting as a vector for any plant pathogen. However, it should be noted that some scolytine beetles are vectors of pathogens, e.g., *Scolytus scolytus* and *S. multistriatus* are vectors of the Dutch elm disease pathogen *Ophiostoma novo-ulmi*.

STAGE 3: PEST RISK MANAGEMENT

15. What are the risk management options for the UK? (Consider exclusion, eradication, containment, and non-statutory controls; under protection and/or outdoors).

Exclusion of the pest would be the best risk management option for the UK. Current legislation targets only non-European Scolytidae and as this species is present in European Russia, these requirements do not apply to imports of *Larix* spp. and coniferous wood from European Russia. This pest is currently absent from the EU therefore inclusion of this pest in EU legislation would seem appropriate, probably via listing in Annex IAI of directive 2000/29/EC, with requirements for plants for planting and wood (including wood chips) of *Larix* sp. in Annex IVAI.

Possible requirements for plants for planting

Even though this pest cannot be considered to be covered by the current requirements for Scolytidae (non-European) due to its presence in European Russia, in considering what requirement would be appropriate these would seem to be a good starting point. The current requirements for plants for planting for Scolytidae non-European in Annex IVAI point 8.2, require that plants over 3 m have been grown on a place of production which is free from Scolytidae (non-European). However these requirements would not seem to adequately mitigate the risk associated with this pest. It is unclear why 3 m was chosen as the height below which there will not be a risk of infestation with Scolytidae, beetles will by preference lay eggs in larger trees, but in the absence of large trees it would seem unlikely that the beetle would not lay eggs in smaller trees. EPPO (2005) reports that *S. morawitzi* will attack wood with a diameter greater than 7 mm, and trees with this diameter of trunk will be much smaller than 3 m in height. Thus it would seem unlikely that trees under 3 m could be considered to pose no risk of introduction of the pest into the UK, therefore any proposed requirements should apply to all plants for planting of *Larix* sp. regardless of size. Additionally the place of production freedom which is currently required for Scolytidae (non-European) would seem to provide an inadequate level of protection for a flying pest which would be able to colonise nursery trees from the surrounding environment, and, given the cryptic life cycle of the pest, it would not be possible to detect the pest on nursery trees by visual inspection. Therefore requiring that plants have originated in a pest free area would seem to be more appropriate.

Possible requirements for wood

Again, taking the current requirements for Scolytidae (non-European) in Annex IVAI point 1.5 as a starting point, there would seem to be no reason why similar requirements would not be effective against *S. morawitzi*. Appropriate requirements could include:

1. Wood has originated in a pest free area
2. Bark and outer sapwood have been removed (currently, data on the greatest depth of tunnels are lacking, and this is an area that would need more research as the depth of sapwood to be removed will need specifying)
3. Kiln drying (as in Annex IVAI point 1.5 (c))
4. Heat treatment (as in Annex IVAI point 1.5 (d))
5. Fumigation (as in Annex IVAI point 1.5 (e))
6. Chemical pressure impregnation (as in Annex IVAI point 1.5 (f))

Possible requirements for woodchips

Again taking the current requirements for Scolytidae (non-European) in Annex IVAI point 1.7 as a starting point, these require that woodchips have either originated in a pest free area or have undergone one of the listed treatments. However, in a proposal for recent updates to the legalisation in relation to other wood boring beetles, *Agrilus anxius* and *Agrilus plannipenis*, treatments such as kiln drying, heat treatment or fumigation were not considered to be appropriate because the conditions required to treat woodchips effectively are not known. Therefore an appropriate requirement would seem to be that woodchips must have originated in a pest free area, as is required by a recent update to the *A. plannipenis* legislation.

Eradication and Containment

As the pest would be found in the wider environment if introduced, and is very cryptic at most stages of its life cycle, eradication and containment would be very difficult to achieve if the pest became established. Low infestations would be difficult to detect, due to the concealed life cycle and specialist skills required to accurately identify this species. Thus, high numbers of the pest could occur before the infestation was detected, making eradication much less feasible. Given the difficulty associated with eradicating or containing this organism, attention should be focused on excluding this pest.

The chemical control of bark beetles has a long history, but reviews of research on the efficacy have found that usually human intervention is one step behind the pest population and the expense of treatments is not justified by the benefits (Anon, 1999). Insecticides are not generally an option for large infestations of bark beetles in forests, because the immature stages are in the subcortical part of the trees and the adults are only exposed during dispersal (Schowalter, 2012). The keys to managing bark beetles are maintaining healthy, site-adapted tree species and adequate spacing between host trees, but this is not always possible over large areas especially following severe drought or storms. However, appropriate tree selection and stand thinning minimise the probability of environmental stress (Schowalter, 2012). There is very little published information about the control of *S. morawitzi*, however the control measures reported for its native area include silvicultural measures (planting more resistant trees and the removal of infested trees) and treatments with chemical and biological preparations (EPPO, 2005). If *S. morawitzi* becomes a damaging pest in the UK, research would be needed to investigate appropriate management strategies.

16. Summary and conclusion of rapid assessment.

(Highlight key uncertainties and topics that will require particular emphasis in a detailed PRA) General / overall summary and conclusion and then specific text on each part of assessment...

This rapid assessment shows:

Risk of entry

Current Plant Health legislation on coniferous trees and wood is designed to reduce the chances of entry of non-European Scolytinae (as Scolytidae spp. (non-European)) on coniferous trees and wood. However, as this pest is present in European Russia these requirements do not apply to material from that origin. Therefore it would seem to be necessary to put in place requirements in relation to *Larix* spp. entering the UK (and EU) from areas where this pest is known to occur.

Risk of establishment and economic impact

The climate of the UK is suitable for establishment, and trees in the host genus are widely grown. However, a key uncertainty is the host suitability of *Larix* spp. grown in the UK. While *S. morawitzi* feeds on a number of species of *Larix* in its native range, none of these proven host species are widely grown in this country, with three other *Larix* species commonly planted instead. If species of *Larix* vary in susceptibility to attack by *S. morawitzi*, then the species of *Larix* found in the UK could be more or less suitable as hosts, which will affect the

risk of establishment, as well as the potential economic impact on UK forestry. The precise impact of this species in its native range has not apparently been quantified, which makes assessment of the impact to the UK difficult.

The reliability of the two reports of *Pinus* as a host need to be researched further as this assessment was only carried out on *Larix* as suitable hosts. If *Pinus* is another potential host genus, this could alter many of the ratings presented here.

Endangered area

The whole of the UK is at risk, as the climate is similar to the native range of *S. morawitzi* and *Larix* spp. are found throughout the country. More generally, most of Northern and Central Europe are also at risk from this pest.

Risk management

Legislation to exclude this pest is the best risk management option for the UK.

17. Is there a need for a detailed PRA? If yes, select the PRA area (UK or EU) and the PRA scheme (UK or EPPO) to be used. (for PH Risk Management Work stream to decide) ✓ (put tick in box)

No	<input type="checkbox"/>
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Yes	<input type="checkbox"/>	PRA area: UK or EU	<input type="checkbox"/>	PRA scheme: UK or EPPO	<input type="checkbox"/>
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18. IMAGES OF PEST

(No reliably identified images of this pest could be found)
Source/ copyright owner

19. Given the information assembled within the time scale required, is statutory action considered appropriate / justified?

Yes
Statutory action

No
Statutory action

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