
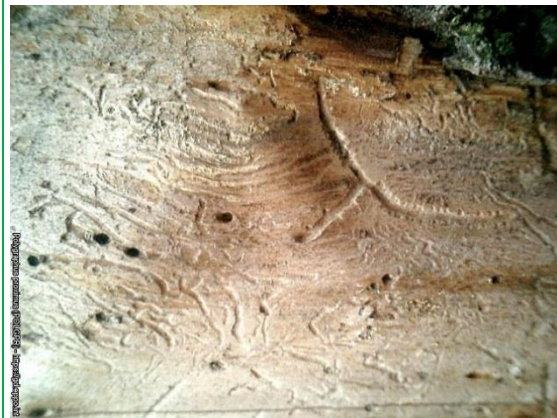




Summary of the EPPO (European and Mediterranean Plant Protection Organisation) PRA on *Polygraphus proximus* (Coleoptera: Curculionidae) and its implications for Great Britain in preparation for new GB legislation.

	
<p>Adult <i>Polygraphus proximus</i> Photo credit: Evgeni Akulov http://gd.eppo.int</p>	<p><i>P. proximus</i> damage Photo credit: All-Russian Centre of Plant Quarantine http://gd.eppo.int</p>

Background

Polygraphus proximus Blandford, 1894 (four-eyed fir bark beetle) is a bark beetle in the subfamily Scolytinae. In the Far East, where it is native, it is a secondary pest of *Abies* (fir) and other conifers. Where it has been introduced (Siberia and European Russia) it is more aggressive, particularly in Siberia where it has caused much damage to *A. sibirica* (Siberian fir, a novel host) forests. *Polygraphus proximus* is associated with several ophiostomatoid fungi. These fungi are introduced to trees by the beetle and contribute to their weakening. *Polygraphus proximus* was added to the EPPO Alert list in 2011 and moved to the EPPO A2 list in 2014. It was added to the UK Plant Health Risk Register in 2013. Within GB regulations¹, *P. proximus* is currently listed (Schedule I, Annex 2) as a quarantine pest, but it has no associated measures.

The EPPO PRA (Pest Risk Analysis) for *P. proximus* (2014) concludes that the probability of this pest further establishing in the EPPO region is high and that all species of *Abies*, *Pinus* (pine), *Picea* (spruce), *Larix* (larch) and *Tsuga* (hemlock) are potential host plants. Wood (with bark) of these species and plants for planting were considered likely pathways.

Further measures for this pest are being prepared for Great Britain. A summary of the main findings of the EPPO PRA and their significance to GB are given below.

A link to the EPPO PRA can be found at the following webpage:

<https://gd.eppo.int/taxon/POLGPR/documents>

Crop/sector considered most at risk in GB

Polygraphus proximus (four-eyed fir bark beetle) attacks *Abies* (fir), *Pinus* (pine), *Picea* (spruce), *Larix* (larch) and *Tsuga* (hemlock) species native to the Far East. It is also known to attack several conifers that are not native to the Far East, most notably: *A. sibirica* (Siberian fir), a number of *Abies* species native to North America and *Picea abies* (Norway spruce). It is therefore assumed that this pest could pose a threat to many conifers grown in GB for forestry or ornamental purposes.

Summary and conclusions of the EPPO PRA

Risk of entry

This pest has already been introduced in the EPPO region: European Russia (Moscow region). The probability of entry to other EPPO countries was considered **likely** (with **low** uncertainty). Wood packaging material with bark, especially dunnage (if not subject to ISPM 15 treatment) was considered a very likely pathway. Wood with bark of *Abies*, *Pinus*, *Picea*, *Larix* and *Tsuga* was considered a likely pathway, as were plants for planting of these species (assuming a trade exists from the pest's current distribution). Movement with particle wood, waste wood and bark was considered moderately likely.

Significance to GB: Plants of *Abies*, *Pinus*, *Picea*, *Larix* and *Tsuga* from third countries are prohibited from entering GB (Schedule VI, Annex 6, Part A), though this prohibition does not include plants from European Russia (where this pest has been introduced) and some neighbouring countries (e.g. Belarus, Ukraine and Georgia). As well as being a GB quarantine pest, within EU regulation 2019/2072, *P. proximus* is listed in Annex II as a Union quarantine pest, but it has no associated measures. Additionally in GB regulations, there are many measures on 'wood of conifers' or wood of *Abies*, *Pinus*, *Picea*, *Larix* or *Tsuga* concerning other pests, but these measures are not sufficient to significantly reduce the risk of entry of *P. proximus*. Natural spread from European Russia would be very unlikely.

Risk of establishment and spread

The PRA concluded that the probability of *P. proximus* establishing wider within the EPPO region is **high** (with **low** uncertainty). It is likely that *P. proximus* will find hosts throughout the EPPO region, the probability of establishment will be higher in areas with higher densities of preferred hosts (*Abies* spp.), and information from outbreaks in Siberia and

European Russia suggests that *P. proximus* may be able to attack more conifer species within the EPPO region, at least in the host genera *Abies*, *Pinus*, *Picea*, *Larix* and *Tsuga*. Climatic conditions within the EPPO region were considered largely similar to those in the current area of the pest's distribution. And the bivoltine life cycle of the pest (univoltine in more northerly or mountainous areas) was considered to favour establishment.

The PRA concluded that the overall rate of spread of this pest (taking account of natural and human-assisted spread) would be **very high** (with **low** uncertainty). In newly infested areas, the rate of natural spread would be high (depending on host distribution and characteristics), and spread by human activities would be very high, leading to introductions to new areas.

Significance to GB: The EPPO PRA suggested that establishment may be less likely in areas where *Abies* is not predominant. *Abies* is not native to GB, and it is not one of the top seven planted forest conifers (by stocked woodland area, Forestry Statistics 2019). However, *Abies* is present throughout GB. Other confirmed and potential hosts are also present throughout GB and are much more common. *Picea abies* (Norway spruce) is a confirmed host (in the Moscow region) and is the fourth most commonly planted conifer in Britain (by stocked woodland area, Forestry Statistics 2019). *Pinus sylvestris* (Scots pine) and *Picea sitchensis* (Sitka spruce) are the most common conifer species, and are both potential hosts according to the PRA. *Pinus sylvestris* is widespread in the Palearctic (Annex 5, Map 10, EPPO PRA), but its host status is not clear (isolated colonies were once observed on a storm-damaged branch of *P. sylvestris*, but there have been no recorded impacts³).

Map 2 within the EPPO PRA shows that parts of the current distribution of *P. proximus* (parts of Japan) have the same Köppen-Geiger climate classification (Cfb - warm temperate/fully humid/warm summer) as a large part of GB. It therefore seems likely that the climate of GB would not be a limiting factor in the establishment of this pest.

The PRA concluded that the most likely rate of natural spread for this pest would be high (with medium uncertainty), and that the mean active flight of the beetles is likely to be < 10 km / year, but that large numbers of individuals could be carried longer distances on the wind. It was thought that areas with 'continuous presence of preferred hosts' (i.e. *Abies* forests), would see slower rates of spread (though this will favour the build-up of populations). Great Britain does not have large *Abies* forests, therefore rate of spread could be higher if the pest was to establish.

Economic, environmental and social impact (scale: minimal, minor, moderate, major, massive)

The EPPO PRA considered that the overall economic impact of this pest would be **major** in the EPPO region (with **medium** uncertainty), and that the impact could be massive at the local or regional scale. One uncertainty emphasised is the role that fungi associated with the pest might have on the severity of impacts. Any attempts to establish control

programmes for *P. proximus* (involving pheromones and biological control agents) would be very costly.

The potential overall environmental impact of this pest would be **massive** in the EPPO region (with **low** uncertainty). The PRA considered host plants of *P. proximus* to be key forest trees and that their destruction would affect the environment. In addition, it was suggested that the pest (and its associated fungi) might extend its host range when invading new areas and affect rare or vulnerable tree species.

The PRA expects social impacts to be **minor** (with **low** uncertainty). *Polygraphus proximus* might damage host plants in amenity areas. This would affect the aesthetic value of the area as well as the recreational value. For some, there might also be an impact on the availability of firewood or opportunity for hunting, mushroom or berry-picking. Such impacts would be minor at the scale of the whole EPPO region, but may be major at the local level.

Significance to GB: Though land area covered by forest (broadleaved and conifer) in GB is much lower than many other EPPO countries, the forestry output of GB is a little above average in comparison with other European countries². Five of the top seven planted forest conifers in Britain (by stocked woodland area, Forestry Statistics 2019) are potential hosts according to the EPPO PRA, one (*Picea abies*) is a confirmed host. Therefore the economic impact of this pest in the UK could be similar to that predicted for the EPPO region as a whole, though it is important to note that GB does not have natural forests of the preferred host *Abies* (which are present in central Europe). If *Picea sitchensis* is very susceptible to this beetle, the impacts could be massive. *Abies nordmanniana* (Nordmann fir) is an important Christmas tree crop in Britain, however it is not clear what impact this pest would have on intensively managed, younger crop trees.

Pinus sylvestris is the only potential host of *P. proximus* that is native to GB. The Caledonian forest (which is dominated by *P. sylvestris*) has many sites designated as Special Areas of Conservation (SACs). Though the other confirmed and potential hosts are not native, planted forests still provide habitat for wildlife, and play an important role in carbon sequestration and ecosystem services.

As in the rest of the EPPO region, conifer forests have high recreational value in GB, and conifers are popular landscaping trees.

Risk management recommendations

A summary table of suggested measures is presented in section 7.45 of the EPPO PRA. Phytosanitary certificates are suggested for all assessed commodities. Pest Free Area (PFA) or treatment requirements are suggested for wood, particle wood and waste wood, and bark of host species. Pest Free Area requirements, post entry quarantine, stem diameter restrictions or protected growing conditions are suggested for plants for planting. Pest Free Area requirements or stem diameter restrictions are suggested for plant parts (including cut Christmas trees).

Significance to GB: Within the new EU Exit regulations¹, that came into force on the 1st January 2021, all plants for planting, and all but a very short list of plant parts and fruits (none of which have been identified as a pathway) require a phytosanitary certificate, and as such may be subject to inspection.

Polygraphus proximus is not known to occur in GB. It is regulated as a GB quarantine pest¹. This listing means it is regulated on all hosts and pathways, but currently has no specific requirements. In order to further reduce the risk of entry of this pest to the GB, specific requirements for certain commodities will be drafted using the recommendations of the EPPO PRA.

References

1. S.I. 2020/1482 (<https://www.legislation.gov.uk/ukSI/2020/1482/made>) and S.I. 2020/1527 (<https://www.legislation.gov.uk/ukSI/2020/1527/made>)
2. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Forests,_forestry_and_logging#Economic_indicators_for_forestry_and_logging
3. Kerchev, I. A. (2014) Ecology of Four-Eyed Fir Bark Beetle *Polygraphus proximus* Blandford (Coleoptera; Curculionidae, Scolytinae) in the West Siberian Region of Invasion. *Russian Journal of Biological Invasions* 5(3):176-185