



Summary of the EPPO (European and Mediterranean Plant Protection Organisation) PRA on *Agrilus bilineatus* (Coleoptera: Buprestidae) and its implications for Great Britain in preparation for new GB legislation



Agrilus bilineatus adult on an oak leaf.
Photo credit: Deborah L. Miller, USDA
Forest Service.

<https://gd.eppo.int/taxon/AGRLBL/photos>



A. bilineatus larva (4th instar) and galleries
in cambial region of northern pin oak
(*Quercus ellipsoidalis*) (Minnesota, USA).
Photo credit: Steve A. Katovich, USDA
Forest Service.

<https://gd.eppo.int/taxon/AGRLBL/photos>

Background

Agrilus bilineatus (two-lined chestnut borer) is a wood boring beetle of the subfamily Agrilinae. It is a pest of *Castanea dentata* (American chestnut) and *Quercus* (oak) in its native range of North America. It was added to the EPPO (European and Mediterranean Plant Protection Organisation) Alert list in 2018 and moved to the EPPO A2 list in 2019 (as there have been records of it in Turkey). It was added to the UK Plant Health Risk Register in 2019. Despite being known as the two-lined chestnut borer, the main host of *A. bilineatus* is *Quercus*. The EPPO PRA (Pest Risk Analysis) for *A. bilineatus* (September 2019) concludes that the climate within the EPPO region is not likely to be a limiting factor for establishment and that this pest is likely to be able to establish in the EPPO region where hosts are present. *Quercus* is likely to be more at risk and the higher risk pathway.

Regulation of this pest is proposed for the UK. A summary of the main findings of the EPPO PRA and their significance to the UK are given below, as are recommendations for measures to minimise the risk posed by this pest to the UK.

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

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

Crop/sector considered most at risk in the UK

In its native range, *A. bilineatus* attacks *Castanea dentata* and a wide range of *Quercus* species including *Q. robur* (pedunculate oak, a native species in the UK) and *Q. rubra* (red oak, a common ornamental in the UK). It is therefore likely to pose a threat to all *Quercus* species in the UK. It is also thought likely that this pest poses a risk to *C. sativa* (sweet chestnut).

Recommendation

Agrilus bilineatus is not known to occur in the UK, and therefore it is proposed to regulate the pest as a **Plant pest not known to occur in any part of the United Kingdom**. By including *A. bilineatus* on this list, it will be regulated on all hosts and pathways. See below for specific requirements.

Summary and conclusions of the EPPO PRA

Risk of entry

This pest has already been introduced in the EPPO region; it is reported from a small area in Turkey near Istanbul, not far from the border with Bulgaria. The probability of further entry was considered **high** (with moderate uncertainty). The highest ratings being for host plants for planting (max diameter > 2 cm); round wood with bark; wood chips, hogwood and processing residues (> 2.5 cm in two dimensions); wood packaging material (if ISPM 15 is not applied); and natural spread from neighbouring countries. It was noted that EU countries already have requirements associated with these pathways, which are likely to reduce the risk of entry of this pest.

Significance to the UK: *Castanea* and *Quercus* are both high risk hosts under EU Regulations 2018/2019, Annex I. This means that plants for planting, other than seed, in vitro material, or naturally or artificially dwarfed plants, are prohibited from all non-EU countries until a risk assessment has been carried out. No risk assessment has yet been carried out, and thus *Castanea* and *Quercus* plants for planting, other than bonsais, are prohibited. If a risk assessment were carried out and the prohibition lifted, plants of *Castanea* and *Quercus* with leaves are prohibited from entering the UK (EU Regulations 2019/2072, Annex VI, part 2). However *A. bilineatus* could move with dormant trees so this prohibition does not fully mitigate the risk. . There are current requirements for plants, wood and wood chips of *Quercus* from the USA, but these measures are not sufficient to

significantly reduce the risk of entry for *A. bilineatus*. There are fewer measures in place for *Quercus* commodities from Canada and Turkey, and fewer measures for *Castanea* (see below for further details). Natural spread from Turkey (or the European continent) would be unlikely.

Risk of establishment and spread

It was concluded that the establishment of *A. bilineatus* in the EPPO region would be **very likely** (with low uncertainty) as the susceptible species *Quercus robur* and *Q. rubra* are widespread and the climate was not considered as a limiting factor. Other *Quercus* species and *Castanea sativa* are likely to also be susceptible to this pest. The magnitude of spread was rated **moderate** (mean of 1-10 km per year) (with moderate uncertainty). The pest could spread naturally and by hitchhiking on vehicles from Turkey and is likely to reach Bulgaria and neighbouring countries in the next 10 years (i.e. by 2029). In addition, there may be longer 'jumps' with movement of wood, wood products or plants for planting, which would increase the spread.

Significance to the UK: The EPPO PRA maps of degree-day accumulation for Europe/the Mediterranean area and North America in Annex 3 (Fig. 1) show similarities between the UK and the northern parts of the current distribution of *A. bilineatus*. There are also a few parts of the beetle's range which have the same Köppen-Geiger climate classification (Cfb - warm temperate/fully humid/warm summer) as a large part of the UK (Annex 3, Fig. 4). An analysis using a climate data driven Maximum entropy model predicted that establishment in the UK is possible, though less probable than in Eastern Europe (Flø *et al.* 2015 cited in EPPO PRA Fig. 4). *Agilus bilineatus* is adaptable to the climates within its current range; usually completing its life cycle in a single year, but completing it in two years where summers are cooler and shorter. The distribution of *Q. robur*, a confirmed host, includes the entirety of the UK. Host distribution would therefore not be a limiting factor.

Economic, environmental and social impact

For the moment, *Q. robur* is the only native European tree species for which there is data on susceptibility to *A. bilineatus*, and it was found to be highly susceptible. The pest infested and killed healthy ornamental *Q. robur* planted on the Michigan State University (MSU) campus, and at two MSU Experimental Forest genetic test sites where it was inter-planted with native *Q. alba* and *Q. rubra* trees.

No impacts have been reported to date where *A. bilineatus* has been reported in Turkey. This may be due to host and/or climatic conditions not being suitable to build up high population levels. However it may take around a decade for populations to build up to damaging levels as may have been the case for *A. planipennis* which was present in North America and European Russia for about a decade before significant impacts were seen.

The potential impact in the EPPO region was rated as **very high** (with moderate uncertainty). Larvae can girdle the conductive tissues of host trees, potentially leading to subsequent branch and tree death. Host plants, *Quercus* and *Castanea*, are major forest and ornamental trees in the EPPO region. The uncertainty of the impact is moderate, as

impact could be reduced to high if not all *Quercus* and *Castanea* species are hosts and if natural enemies provide some control.

Significance to the UK: *Quercus robur* of provenance Sherwood Forest at Michigan State University (MSU) was noted to be more severely affected than *Q. robur* of other provenances. There is a concern that trees not present in its native range may be attacked even when not stressed. *Agrilus bilineatus* could potentially cause serious damage to other *Quercus* species and *Castanea sativa*. In particular, trees already stressed by pest and diseases such as *Thaumetopoea processionea* (oak processionary moth), acute oak decline, *Dryocosmus kuriphilus* (chestnut gall wasp), *Cryphonectria parasitica* (sweet chestnut blight) will be at risk. Trees are also likely to become more stressed in future due to increased extreme weather events, and therefore more vulnerable to attack.

Risk management recommendations

The EPPO expert working group (EWG) considered that phytosanitary measures to prevent further introductions should be recommended for all *Quercus* and *Castanea* species.

The EWG suggested risk management options for host plants for planting, wood of hosts and wood chips, hogwood and processing wood material (see EPPO PRA stage 3 for details). They considered ISPM 15 is a sufficient measure for wood packaging material, and that hitchhiking also presented a risk of introduction, but no measures were defined.

Castanea and *Quercus* are both listed as High Risk Plants in EU Regulation 2018/2019 and as such are provisionally prohibited pending risk assessment. The measures proposed below would provide long-term mitigations against *A. bilineatus*.

UK risk management recommendations

***Agrilus bilineatus* (Weber, 1801)** is not known to occur in the UK, and therefore regulating it as a **Plant pest not known to occur in any part of the United Kingdom** under **Insects, mites and nematodes, at all stages of their development** is proposed. By including *A. bilineatus* on this list, it will be regulated on all hosts and pathways.

Specific requirements for *A. bilineatus*.

Regulated material

Relevant material, originating in third countries, which may only be brought into the United Kingdom if specified requirements are met

(1) Item (2)

(3)

<i>Description of relevant material</i>	<i>Requirements</i>
<p>Wood of <i>Castanea</i> and <i>Quercus</i> other than in the form of:</p> <p>—chips, sawdust, shavings or</p> <p>—wood packaging material,</p> <p>except associated controlled dunnage,</p> <p>but including wood which has not kept its natural round surface, originating in Canada, The USA and Turkey.</p>	<p>The wood must be accompanied by:</p> <p>(a) an official statement that it originates in an area* which, in accordance with the measures specified in ISPM No. 4, is known to be free from <i>Agrilus bilineatus</i> Weber and is not within 100 km of a known outbreak of <i>Agrilus bilineatus</i> Weber.</p> <p>(b) is bark-free, and</p> <p>has undergone an appropriate heat treatment to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood, or</p> <p>(c) an official statement that it has undergone appropriate ionizing irradiation to achieve a minimum absorbed dose of 1 kGy throughout the wood.</p> <p>Where the phytosanitary certificate includes the official statement referred to in paragraph (b), there must also be evidence of that heat treatment by a mark “HT” put on the wood or on any wrapping in accordance with current usage and on the phytosanitary certificate.</p> <p>* The name of the area(s) must be included in the phytosanitary certificate under the heading “Additional declaration”</p>

Justification

Currently there are no requirements for wood of *Castanea* from Canada, the USA or Turkey. There are measures for wood of *Quercus* from the USA in relation to oak wilt; these will mitigate against some of the risk from *A. bilineatus* but do not completely mitigate the risk.

For example the PFA for oak wilt partially overlaps with the range of *A. bilineatus* but not completely. The option to remove 2.5 cm of outer sapwood has not been included as the USA and Canada cannot reliably do this for Ash so would be unable to do this reliably for *Quercus* and *Castanea*. The option to debark and heat treat has been slightly altered to 'bark-free'. This option is simple and unambiguous and easy to check during inspections. Evidence for *A. plannipennis* shows that debarking removes around 99% of larvae with heat treatment adding extra assurance. The EPPO standard PM 10/8(1) disinfestation of wood with ionizing radiation states that 1 KGy is a lethal dose for wood infesting insects. Canada and Turkey are not covered by any requirements for wood of *Quercus*. Current measures are not sufficient to prevent the introduction of *A. bilineatus*.

(1) Item	(2) Description of relevant material	(3) Requirements
	Wood in the form of chips obtained in whole or part from <i>Castanea</i> and <i>Quercus</i> originating in Canada, the USA and Turkey.	<p>The wood must be accompanied by:</p> <p>(a) an official statement that it originates in an area* which, in accordance with the measures specified in ISPM No. 4, is known to be free from <i>Agrilus bilineatus</i> Weber and is not within 100 km of a known outbreak of <i>Agrilus bilineatus</i> Weber.</p> <p>* The name of the area(s) must be included in the phytosanitary certificate under the heading "Additional declaration"</p>

Justification

There are currently measures for wood chips of *Quercus* from the USA but these measures are not sufficient to prevent the introduction of *A. bilineatus*. The EPPO PRA considers that only PFA is sufficient and this is the only option offered in relation to *A. plannipennis*. There are no measures for wood chip of *Quercus* from Canada or Turkey and no measures for wood chip of *Castanea*.

(1) Item	(2) Description of relevant material	(3) Requirements
	Isolated bark and objects made of bark of <i>Quercus</i> originating in Turkey.	<p>The isolated bark must be accompanied by:</p> <p>(a) an official statement that it originates in an area* which, in accordance with the measures specified in ISPM No. 4, is known to be free from <i>Agrilus bilineatus</i> Weber and is not within 100 km of a known outbreak of <i>Agrilus bilineatus</i> Weber.</p> <p>* The name of the area(s) must be included in the phytosanitary certificate under the heading "Additional declaration"</p>

Justification

Isolated bark of *Castanea* is prohibited from all Third countries. Isolated bark of *Quercus* other than *Quercus suber* is prohibited from Canada, Mexico and the United States. *Q. suber* is distributed around the Mediterranean. It is not found in Canada, the USA or Turkey.

(1) Item	(2) Description of relevant material	(3) Requirements
	Plants, other than plants in tissue culture, pollen or seeds, including cut branches with or without foliage of <i>Castanea</i> , and <i>Quercus</i> intended for planting, originating in Canada, The USA or Turkey.	<p>The plants must be accompanied by:</p> <p>an official statement that they have been grown throughout their life in an area* established by the national plant protection organisation in accordance with ISPM No. 4 as an area that is free from <i>Agrilus bilineatus</i> Weber and is not within 100 km of a known outbreak of <i>Agrilus bilineatus</i> Weber.</p>

* The name of the area(s) must be included in the phytosanitary certificate under the heading “Additional declaration”

Justification

Plants of *Castanea* and *Quercus* with leaves are prohibited (Annex VI Regulation (EU) 2019/2072). However *A. bilineatus* could move in dormant trees so this doesn't mitigate the risk. The current requirements for plants of *Quercus* from the USA are for PFAs for Oak wilt; the distributions of oak wilt (*Bretziella fagacearum*) and *A. bilineatus* overlap but are not identical. There are no further requirements for *Quercus* from Canada or Turkey. Therefore specific requirements for plants for planting of *Castanea* and *Quercus* in relation to *A. bilineatus* are required.

Notifiable material originating in third countries, other than the European Union

Wood, except wood packaging material, where it—

- (a) has been obtained in whole or in part from one of the following order, genera or species—
 - (i) *Quercus* L., including wood which has not kept its natural round surface, originating in Canada, the USA or Turkey except wood in the form of casks, barrels, vats, tubs or other coopers' products or parts thereof including staves and where there is documented evidence that the wood has been processed or manufactured using a heat treatment to achieve a minimum temperature of 176°C for 20 minutes;
 - viii *Castanea*, including wood which has not kept its natural round surface, other than sawdust or shavings, originating in Canada, the USA or Turkey.

Isolated bark and objects made of bark, where it—

- (a) has been obtained in whole or in part from one of the following order, genera or species—
 - (i) *Quercus* L., originating in Turkey.