



# Specified host plants of the Asian longhorned beetle (*Anoplophora glabripennis*) – are lime trees and beech trees really at risk?

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## Abstract

The Asian longhorned beetle *Anoplophora glabripennis* (ALB) is a dreaded quarantine pest that attacks a wide range of hardwood tree species. However, some of the specified host plants which have to be eradicated in infestation zones such as lime and beech trees almost never get infested or may even be resistant to the ALB. As a result, the specified host plant list needs to be revised based on the data from the infestation areas in the EU, in order to avoid further felling of whole lime avenues and major clear-cutting in parks with old growth. As large differences may exist between species of the same genus, exact species not merely genera should be specified on the host list.

**Keywords** *Anoplophora glabripennis* · Specified ALB host plant list · Revision of the specified tree genera

## Introduction

The Asian longhorned beetle *Anoplophora glabripennis* (ALB) is a wood borer pest species threatening a large number of broadleaf tree species (Van der Gaag and Loomans 2014; Hoppe et al. 2020). Originally native to China and the Korean Peninsula (Van der Gaag and Loomans 2014), ALB is most commonly introduced to other countries as larvae or pupae in improperly treated wood packing material as pallets, where it can develop into adult beetles (Sjöman et al. 2014; Hoppe et al. 2020).

The first incidence of an ALB outside its original range was recorded in the USA in 1996 (Hoppe et al. 2020). In 2001, the first finding of an ALB in Europe was confirmed in Braunau, Austria, followed by numerous findings in other European countries in subsequent years (Table 1; Van der Gaag and Loomans 2014; Sjöman et al. 2014; Hölling 2015).

Classified as a quarantine pest species, sightings of the ALB must be reported and consistently controlled. All

instances in Europe are reported to the European and Mediterranean Plant Protection Organization (EPPO). According to an EU directive, the ALB needs to be eradicated in infested areas. Since June 9, 2015, the EU Implementing Decision 2015/893 has been applied in Member States wherever infestations with ALB are confirmed. This means that a quarantine area consisting of an infestation zone, a focus zone, and a buffer zone with a radius of 2000 m around infested trees is established.

In the infestation zone with a radius of 100 m around all infested trees, the applied measures are most obvious, since within this zone, all woody plants belonging to the genera of 15 specified plants are felled without exception (Table 2). The number of genera is based on the review by Van der Gaag and Loomans (2014), in which all tree species worldwide that can become infested are presented in detail, the type of infestation at each of these species as well as the developmental stages of the ALB observed.

With the above measures, the eradication of the ALB in infestation areas has to date been quite successful (Table 1).

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## Are all specified tree species really at risk?

There is no question that ALB attacks a wide range of broadleaved tree species, even vital ones, where it can cause severe damage and even lead to their death. These trees include maple species and chestnuts, but also poplars,

**Table 1** Overview of European countries infested with ALB (Hölling 2015; JKI 2021)

Country	No. of infested localities	First infested year	No. of eradications
Austria	3	2001	3/3
Belgium	1	2008	1/1
Finland	1	2015	1/1
France	5	2003	2/5
Germany	12	2004	8/12
Italy	9	2007	2/9
Montenegro	1	2015	1/1
Netherlands	2	2010	2/2
Switzerland	4	2011	4/4
UK	1	2011	1/1

**Table 2** Specified ALB host plant genera

Acer spp.
Aesculus spp.
Alnus spp.
Betula spp.
Carpinus spp.
Cercidiphyllum spp.
Corylus spp.
Fagus spp.
Fraxinus spp.
Koelreuteria spp.
Platanus spp.
Populus spp.
Salix spp.
Tilia spp.
Ulmus spp.

willows, birches and other deciduous tree species. More than 95% of all ALB infestations in Germany have been found on trees from the five genera mentioned above (JKI 2016). Here, radical measures must be applied to eradicate the ALB.

However, the question arises why lime trees are also included on the list of specified plants. In their reviews, both Van der Gaag and Loomans (2014) and Sjöman et al. (2014) point out that no complete development of ALB has ever been observed on lime trees so far. This is also supported by Ric et al. (2007) and Smith et al. (2009), who consistently report that juvenile ALB larvae are unable to penetrate the woody body but die while still within the cambium. During many years of our employment at the Institute of Plant Protection/working group for the control of the ALB at the Bavarian State Institute of Agriculture, to our knowledge, not a single ALB infestation on lime trees from the seven infestation areas in Bavaria, nor from Switzerland

was reported (Hölling, WSL Research Station, Switzerland, pers. communication, 2021).

Furthermore, infestations have never been detected on beech trees in Bavaria, Germany. According to Van der Gaag and Loomans (2014), there is only one record on beech trees from an infested area in Austria. A complete development cycle is mentioned in the original literature, but without any detailed information on exit holes, living larvae, etc. (Hoyer-Tomiczek and Cech 2008). According to Hérard et al. (2005), the beech trees in question belonged to the rare cultivars *Fagus sylvatica* ‘atropunica’ and *Fagus sylvatica* ‘asplenifolia’. No other infestations of beech, especially of the pure species, are known from other infested areas. As Sjöman et al. (2014) pointed out for poplars, which are considered highly susceptible, different poplar species and cultivars are differently susceptible to ALB, ranging from very susceptible to occasionally infested to completely resistant. This could also apply to beech and its varieties.

## Re-evaluation of the specified tree genera of the ALB

In many Central European cities, lime trees and maple trees dominate as street trees, often comprising over 40% of the whole street tree population (e.g., Dresden/ Thiel et al. 2016; Munich/Schlingsog, Department of Green Spaces, pers. communication). In Central European parks, a wider range of tree species is found, often composed of maple, oak, beech, ash, chestnut, and lime trees in old-growth stands.

In times of climate change, with increasing numbers of dry and hot spells in the summer months, street trees and trees in parks are playing an increasingly important role as “air conditioners” and shade providers, among other ecosystem services. They are also important “recreation centers” for the citizens, as has become even more evident throughout the COVID-19 pandemic. However, these ecosystem services can only be fully provided by old, mature trees that also serve as valuable habitat trees for rare insect and vertebrate species. Trees of this size are found primarily in old parks. If parks with such a stock of old trees are located in an ALB infestation zone, partial or complete clear-cutting often occurs due to the specified ALB host tree list, as recently happened in Miesbach, Germany in 2020. In addition to valuable old tree populations, many hedges, often consisting of beech, also characterize the settlement area. They not only serve as visual screens, but also contribute to noise reduction. Felling measures not only reduce the quality of life in the affected areas, but also deprive birds and other vertebrates of hiding and nesting opportunities.

We therefore call on the EU to revise the current specified host plant list on the basis of the available data from the infestation areas of the different European countries.

As large differences may exist between species of the same genus (Van der Gaag and Loomans 2014; Sjöman et al. 2014), exact species not merely genera should be specified on the host list. The felling of lime and beech trees should be suspended until a final assessment has been made for these species.

## References

- Hérard F, Krehan H, Benker U, Boegel C, Schrage R, Chauvat E, Ciampitti M, Maspero M, Bialooki P (2005) *Anoplophora* in Europe: infestations and management responses. Proceedings, 16th U.S. Department of Agriculture interagency research forum on gypsy moth and other invasive species 2005 GTR-NE-337:35-40. USDA Forest Service, Newton Square, Pennsylvania, USA
- Hölling D (2015) The Asian longhorned beetle in Europe. [www.waldwissen.de](http://www.waldwissen.de). Online version 30.9.2020
- Hoppe B, Wilstermann A, Becker M, Fornefeld E, Schrader G, Schröder T (2020) Quarantäneschadorganismen an Gehölzen—was hat sich geändert, was kommt auf uns zu? *Jahrb Baumpflege* 2020:32–45
- Hoyer-Tomiczek U, Cech TL (2008) Situation der Quarantäne-Schadorganismen im Jahr 2007. *Forstschutz Aktuell* 42:11–14
- JKI (2016) [https://pflanzenengesundheit.julius-kuehn.de/dokumente/upload/b1e3c\\_ll-alb2016banz-jki.pdf](https://pflanzenengesundheit.julius-kuehn.de/dokumente/upload/b1e3c_ll-alb2016banz-jki.pdf). Accessed 26 Mar 2022
- JKI (2021) *Anoplophora glabripennis* - pflanzenengesundheit.julius-kuehn.de. Accessed 26 Mar 2022
- Ric J, De Groot P, Gasman B, Orr M et al. (2007) Detecting signs and symptoms of Asian longhorned beetle injury, training guide. Her Majesty in Right of Canada.
- Sjöman H, Östberg J, Nilsson J (2014) Review of host trees for the wood-boring pests *Anoplophora glabripennis* and *Anoplophora chinensis*: an urban forest perspective. *Arboric Urban for* 40:143–164. <https://doi.org/10.48044/jauf.2014.016>
- Smith MT, Turgeon JJ, De Groot P, Gasman B (2009) Asian Longhorned beetle *Anoplophora glabripennis* (Motschulsky): lessons learned and opportunities to improve the process of eradication and management. *Am Entomol* 55:21–27. <https://doi.org/10.1093/ae/55.1.21a>
- Thiel D, Meyer E, Löbel S (2016) Die Umsetzung der Straßenbaumkonzeption Dresdens. *Forstwiss Beitr Tharandt* 18:5–15
- Van der Gaag DJ, Loomans AJM (2014) Host plants of *Anoplophora glabripennis*, a review. *OEPP/EPP Bull* 44(3):516–528. <https://doi.org/10.1111/epp.12151>

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