Asian Longhorned Beetle (*Anoplophora glabripennis*) from a forest health point of view

Christiane Helbig & Michael Müller

Technische Universität Dresden, Institut für Waldbau und Waldschutz

Abstract: Der Asiatische Laubholzbockkäfer (*Anoplophora glabripennis*) aus Sicht des Waldschutzes

Der Asiatische Laubholzbockkäfer (ALB) ist als invasives Insekt in Deutschland eine Besonderheit. Es gibt keine einheimische Bockkäferart, die in ähnlicher Weise die Laub- und Mischwaldbewirtschaftung in Deutschland bedrohen kann. Beim ALB gibt es eine große Vielfalt geeigneter Wirtsbäume, was seine Ausbreitung sogar in oder durch Gebiete erlaubt, die isoliert liegen oder gering mit Laubbäumen ausgestattet sind. Bevorzugte Wirtsbäume sind mitunter in Wäldern noch selten oder Trittsteine der Biodiversität (z. B. Feld-Ahorn, Weichlaubbäume) oder gehören zu Baumarten, mit denen üblicherweise Wertholz in vergleichsweise langen Zeiträumen produziert werden soll (z. B. Berg- und Spitz-Ahorn). Der Waldumbau unter Einbeziehung dieser Baumarten wird intensiv verfolgt und zielt darauf ab, naturnahe Mischwälder mit hohen ideellen und materiellen Werten hervorzubringen. Der direkte Befall durch den ALB macht das Erreichen dieser Zielstellungen unmöglich. Zudem werden die Waldbesitzer wegen der Befürchtungen dieser Verluste auch weit außerhalb der aktuellen Befallsgebiete davon absehen, in die gefährdeten Baumarten zu investieren. In Analogie z. B. zum Ulmensterben oder zum Eschentriebsterben wird auf diese Weise einerseits der Niedergang der Bewirtschaftung der gefährdeten Baumarten und damit der naturnahen Biodiversität gefördert. Andererseits unterstützt das die ohnehin bereits wieder spürbare Hinwendung zu den robusteren Nadelbaumarten auch in Gebieten, die frei vom Befall durch den ALB sind.

Keywords: Asian Longhorned Beetle, ALB, *Anoplophora glabripennis*, forest health, invasive species

Christiane Helbig, Technische Universität Dresden, Institut für Waldbau und Waldschutz, Professur für Waldschutz, Pienner Straße 8, 01737 Tharandt, E-Mail: christiane.helbig@tu-dresden.de

Forest health management and research focus on the protection of forest resources from abiotic and biotic risk factors. They aim at preventing forest damage and the loss of forest area, at preventing the loss of forest biodiversity and at increasing the resilience and adaptability of forests to a changing environment. Preserving and protecting forest resources has never been as important as it is now in times of climate change and invasive species.

In 2000, the Invasive Species Specialist Group (ISSG) of the International Union for Conservation of Nature and Natural Resources (IUCN) first compiled the list of "100 of the World's Worst Invasive Alien Species", which was last modified in 2013. Only two coleopteran species are included on this list: the Khapra Beetle (*Trogoderma granarium*), one of the most destructive and most feared pest of stored grains and seeds, hence posing a direct threat to human health and survival, and the Asian Longhorned Beetle (*Anoplophora glabripennis*). The fact that the Asian Longhorned Beetle (ALB) was chosen to be included on this list is a strong proof for its uniqueness and dangerousness amongst invasive species.

In comparison to native longhorned beetles in Germany, ALB is unique in its extraordinarily broad range of host species and destructiveness. Similar to our native species it does not tend to mass outbreaks, however, only a few individuals on a local scale are sufficient to cause massive direct and indirect damage. To date there is no known effective natural predator or parasitoid of ALB, even though some species have been proven to be able to use ALB as a host. In addition, the larval development hidden inside tree

trunks and branches reduces the number of potential predators and parasitoids in general. The occurrence of only small local populations would also make it difficult to establish permanent populations of bred and released predatory and parasitoid species.

ALB has not yet occurred in Germany outside of populated areas. However, there is the risk of ALB invading forests, in particular when the beetle is not managed properly. From a forest health point of view, numerous direct consequences are to be expected from an ALB forest invasion. It would lead to crucial damage to and/or loss of some of the most valuable broadleaf tree species, such as *Acer* spec. and *Sorbus torminalis*. Even a single infestation can cause extensive damage due to severe reduction of wood quality and/or tree death. This is of particular importance considering the already greatly reduced resources of *Ulmus* spec. and the rapidly ongoing loss of *Fraxinus excelsior* due to the fungi *Hymenoscyphus pseudoalbidus*. In addition, there is a high risk of ALB finding and selecting those tree individuals that have been managed for many decades in a way to produce highest quality wood. Also the loss of ecologically important softwood tree species, such as *Populus* spec., *Salix* spec. and *Sorbus aucuparia* would be a consequence of an ALB invasion into German forests.

In addition to direct consequences several indirect consequences would be linked to an ALB forest invasion. As has been seen before, forest owners will likely avoid planting and supporting potential ALB host tree species, which would even more contribute to the loss of already rare tree species. After decades of forest management programs focusing on converting coniferous monocultures into mixed broadleaf stands broadleaf tree species may once more lose their importance, which bears the risk of a return to pure conifer stands. Moreover, the invasion of ALB into German forests is likely to change forest management practices to shorter rotation periods and smaller tree dimensions to avoid or reduce the risk of ALB attacks and its consequences. The loss of forest structure, forest biodiversity and forests that are ‘close-to-nature’ are also indirect consequences of an ALB forest invasion.

Summing up, ALB poses an exceptionally severe threat to German forests. An invasion of ALB into forests would have devastating consequences for forest ecosystems, forest ecosystem services, and forest owners. In conclusion, everything has to be done to prevent ALB from invading forested areas. Studying the many examples of successful eradication of local ALB populations from different regions and countries in Europe and North America, improving cargo inspection and treatment, and intensifying research on pheromones and other semiochemicals that can be used for monitoring, controlling and eradicating ALB will help to slow the spread of this species and prevent its invasion into forested areas.