FOREST PEST SPECIES PROFILE

October 2007

Anoplophora glabripennis (Motschulsky, 1853)

Other scientific names: *Anoplophora nobilis; Cerosterna glabripennis*; *Cerosterna laevigator*; *Melanauster nobilis*; *Melanauster luteonotatus*; *Melanauster angustatus*; *Melanauster nanakineus*
Order and Family: Coleoptera: Cerambycidae
Common names: Asian longhorned beetle; ALB; starry sky beetle; Basicosta white-spotted longicorn beetle

Anoplophora glabripennis is a wood-boring beetle that is a major threat to broadleaved trees in both urban environments and naturally regenerating and planted forests. A native species to China and Korea, it has been introduced into Europe and North America through international trade on wood packaging materials. As a result, many countries in other continents are increasingly concerned about this pest and have established phytosanitary restrictions for wooden packing materials from infested countries.

Asian longhorned beetles, China (Photos: G. Allard)

DISTRIBUTION

***Native*:** China, Democratic People's Republic of Korea, Republic of Korea, Japan (several records but no recent collections are known)

***Introduced*:**
North America: Introduced and under eradication in Canada (2003) and the US (first introduced in 1990s, discovered in 1996).

Europe: Introduced but not established in Germany (Bayern), France (Gien, Sainte Anne sur Brivet) (2003), and Austria (Braunau)(2001), Poland (single specimen in 2003).

IDENTIFICATION

Typical adult Asian longhorned beetles are large (20-35 mm in length and 7-12 mm wide), shiny, and bluish-black in colour with white spots (Kimoto and Duthie-Holt, 2006). There is one prominent spine on each side of the black thorax. The antennae are black, spotted and very long – 2.5 times body length in males and 1.3 times body length in females (EPPO, 1999). The antennae have 11 segments, each with a white or whitish-blue base (Kimoto and Duthie-Holt, 2006). Legs are black with a bluish tinge. The *A. nobilis* form has yellow spots and is believed by some authorities to be a different species and by others as a different morphotype of a single species (Lingafelter and Hoebeke, 2002).

Larvae are legless creamy white grubs with a chitinized brown mark on the prothorax that grow up to 50 mm in length when fully grown (EPPO, 1999; Kimoto and Duthie-Holt, 2006). The larvae and pupae are normally inside the tree within the larval tunnels.

Eggs are off-white, oblong, approximately 5-7 mm in length with slightly concave ends (EPPO, 1999). The eggs turn a yellowish-brown colour just before hatching.

HOSTS

In China, the major hosts are species and hybrids of the genus *Populus* including *P. nigra*, *P. deltoides*, *P.* x *canadensis* and the Chinese hybrid *P. dakhuanensis* (EPPO, 1999). *Salix* spp., such as *S. babylonica* and *S. matsudana*, are also major hosts. Other hosts recorded in China include *Acer*, *Alnus*, *Malus*, *Melia*, *Morus*, *Platanus*, *Prunus*, *Pyrus*, *Robinia*, *Rosa*, *Sophora* and *Ulmus* species.

In North America, species of *Acer, Aesculus, Albizia, Betula, Celtis, Platanus, Populus, Salix, Sorbus* and *Ulmus* are known hosts (Kimoto and Duthie-Holt, 2006). The suitability of *Alnus, Crataegus, Elaeagnus, Fraxinus, Hibiscus, Malus, Morus, Prunus, Pyrus, Quercus, Robinia* and *Tilia* species in North America is still in question.

BIOLOGY

The life cycle of *A. glabripennis* is long but uneven, fecundity is high and there may be one or two generations per year (Hong Yang, 2005). Adults may mate several times. Females chew oval oviposition slots (about 10 mm wide) and lay a single egg in the inner bark of the trunk, branches as small as 2-3 cm in diameter or exposed roots; exit holes left by emerging adults may also be used (Kimoto and Duthie-Holt, 2006; Hong Yang, 2005). Frothy, white sap may exude from recently created oviposition niches which ferments and stains the bark over time.

Eggs hatch after approximately two weeks and larvae bore large galleries deep into the wood. Immature larvae feed on the inner bark and sapwood while mature larvae feed on the heartwood. Several larval tunnels may occur in the trunk which degrades the quality of timber and can even cause death of host trees (Hong Yang, 2005). This beetle is able to survive and finish development in cut logs although females do not oviposit on dead, debarked wood. Adults emerge from host trees by chewing round exit holes, approximately 6-12 mm in diameter, and expelling large, coarse wood fibres on the ground (Kimoto and Duthie-Holt, 2006).

Damage caused by the Asian longhorned beetle, China (Photos: G. Allard)

SYMPTOMS AND DAMAGE

Asian longhorned beetles are wood-borers that attack healthy and stressed trees. Adults feed on the leaves, petioles and twigs of host trees; feeding damage on young shoots causes them to wither and die (Kimoto and Duthie-Holt, 2006). Larval tunnels disrupt the vascular functioning of the host tree eventually weakening it to the point of death. Several generations can develop in one tree, causing severe damage.

Leaf yellowing and wilting, premature leaf drop, branch dieback and tree death are symptoms of advanced infestations of *A. glabripennis*. Infestations decrease diameter at breast height (DBH), tree height, timber volume, biomass and these losses increase with forest age and pest density (Weilun and Wen, 2005).

According to experiments carried out in China, 4-10 year old poplars will die after 2-4 years of consecutive damage, and poplar forests grown in monoculture can die after 3-5 years of consecutive damage (Hong Yang, 2005). Within 5-8 years, severe damage may occur depending on tree species, forest structure and growing status.

DISPERSAL AND INTRODUCTION PATHWAYS

The Asian longhorned beetle has a low dispersal rate. While adults are capable of flying 1000-1200 metres per flight, short-distance flight is typical and they usually fly only 50 to 75 m in search of suitable hosts. Infestations spread slowly, reported as less than 300 m/year in Beijing poplar groves (Cavey, 2000).

The presence of preadult stages is usually not easily detectable hence eggs, larvae or pupae are readily dispersed in infested timber such as solid timber packaging and dunnage.

CONTROL MEASURES

Effective monitoring, quarantine and control of *A. glabripennis* is difficult since the adult stage can be short and detecting the early stages of damage during the concealed larval stages nearly impossible (Hong Yang, 2005). Once *A. glabripennis* has infested a tree, the only treatment is to cut down, chip and burn the infested tree. In North America, eradication measures have been, and continue to be, carried out involving the removal of infested trees which has been successful in containing the spread of the beetle. Research aimed at providing technology to better detect, control and ultimately eradicate the pest from the region is ongoing.

Control measures: insecticide impregnated sticks placed into the holes created by newly emerged larvae, China (L); and removal and chipping of infested trees, Chicago, US (R) (Photos: G. Allard; D. Haugen, USDA Forest Service, Bugwood.org)

In China, a variety of techniques have been investigated to control the pest including afforestation models, altering shelterbelt structure and composition, bait tree arrangement and treatment technology, application of synthetic pheromones, development of genetically modified poplars with resistance to pests, establishment of an eco-control system, and bio-control applications, including the use of parasitoid *Dastarcus helophorides* and woodpeckers (Weilun and Wen, 2005).

The establishment of the Asian longhorned beetle outside its native distribution has caused great concerns in many countries and is one of the invasive alien species that has led to the development of an international standard (ISPM No. 15) for the movement of wood packaging material that is treated to avoid phytosanitary risk.

References

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