Anoplophora chinensis **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Coleoptera	Cerambycidae

Common name

Synonym

Melanauster chinensis , Forster
Anoplophora chinensis , Breuning 1944
Anoplophora malasiaca malasiaca , Samuelson 1965
Anoplophora perroudi , Pic 1953
Anoplophora sepulchralis , Breuning 1944
Callophora afflicta , Thomson 1865
Callophora luctuosa , Thomson 1865
Calloplophora abbreviata , Thomson 1865
Calloplophora malasiaca , Thomson 1865
Calloplophora sepulcralis , Thomson 1865
Cerambyx chinensis , Forster 1771
Cerambyx farinosus , Houttuyn 1766
Cerambyx sinensis , Gmelin 1790
Cerambyx pulchricornis , Voet 1778
Lamia punctator , Fabricius 1777
Melanauster chinensis , Matsumura 1908
Melanauster chinensis macularius , Kojima 1950
Melanauster chinensis , var. *macularia* Bates 1873
Melanauster chinensis , var. *macularis* Matsushita 1933
Melanauster chinensis , var. *Sekimacularius* Seki 1946
Melanauster macularius , Kolbe 1886
Melanauster malasiacus , Aurivillius 1922
Melanauster perroudi , Pic 1953
Anoplophora malasiaca , Thomson

Similar species

Summary

Both the citrus and Asian longhorn beetles originate from Eastern Asia where they seriously damage forest and agricultural plant hosts; both pose a potential economic and ecological threat to urban and natural environments where they are introduced in North America and Europe. Phytosanitary standards and regulations are the basis for preventative management to avoid unintentional international movement of such plant pests.

view this species on IUCN Red List

Species Description
The eggs are 5.5 millimeters by 1.7 millimeters, elongate, sub-cylindrical, smooth-surfaced, and tapering at both ends; initially creamy white, they turn yellowish-brown when ready to hatch (Lieu 1945, in Gyeltshen and Hodges 2005). Larvae are typical round-headed woodborers. The legless grubs are 5 millimeters long at the time of hatching and grow to a size of 52 millimeters. They are a creamy white with some yellow/amber chitinzed patterns on the prothorax and a brown mark on the front side (Gyeltshen and Hodges 2005; MAF 2005). The pupa is 27 to 38 millimeters long; it has elytra that only partially covers the membranous hind wings and curves around to the ventral surface of the body (Gyeltshen and Hodges 2005).
The adult citrus longhorn has a typical cerambycid beetle body shape. Females are larger than males; the male is 25 millimeters long and the female is 35 millimeters long. The beetle is glossy black to blue-black (following emergence from the tree) and finely punctuated (bearing tiny dots or points) with a series of irregular white hair spots on the elytra (EPPO Undated; Walker 2008). (The elytra is a modified, hardened forewing of certain insect orders, notably beetles). The elytra of females is parallel whereas the elytra of males is distally tapered (Walker 2008). The antennae have 11 segments, the joints of the antennae are black with a blue-grey base; this gives them a striped appearance. The antennae are longer than the body (1.7 to 2 times the body-length in males and 1.2 times the body-length in females) (Walker 2008). The pronotum has a prominent pointed process on both sides. (The pronotum is the upper surface of the prothorax; the shape of the pronotum is often important in identification of beetles.)
Detection of any cerambycid beetle suspected to be *Anoplophora* is cause for concern. Positive identification of *A. chinensis* is made from the adult stage. The tubercles on the base of the elytra are an important identification characteristic, however, positive identification is best left to a expert cerambycid taxonomist (NAFC 2001).
These beetles spend most of their life (one to two years) as larvae inside a trunk or root. Up to 90% of the *A. chinensis* population may be below ground level (Herald *et al* 2006). There may be little or no signs of their presence. This pest is most likely to be seen in July and August, but interceptions have occurred as early as May and as late as October (Ministry for resources and Rural Affairs Malta undated).
Characteristic signs of *A. chinensis* in the field include: 1) Emergence holes: At the end of the pupal stage adults emerge leaving a distinct round or slightly oval shaped exit hole on the bark surface (EPPO 2007; NAFC 2001). Holes are typically 6 to 11 millimeters in diameter (Ministry for resources and Rural Affairs Malta Undated). One study found that holes are usually located on the base of the trunk between five and 20 centimeters from the ground (Jucker *et al*. 2006).
2) Piles of sawdust : Frass is often left at the base of trees or branches as beetles emerge from holes in summer (MAF 2005). Sawdust or frass forms an average of 29 days following oviposition/egg-laying (Jucker *et al*. 2006).
3) Sap oozing: In some host-plants (often in *Platanus* sp.) sap may ooze from the *A. chinensis* galleries (EPPO 2007).
Characteristic signs of *A. chinensis* in bonsai trees include (USDA APHIS n.d., in NAFC 2001): Scraped sections of bark; Chewed leaves; T-shaped slits cut in the bark where females deposit eggs; and Sawdust-like frass (wood-pulp) around small holes (larval tunnels) in the wood (found under loose or thin bark).

Notes
Anoplophora malasiaca (Forster) and *A. chinensis* (Thomson) cover one single species of harmful organism (Commission Of The European Communities 2008).

Lifecycle Stages
The citrus longhorn takes one to two years to complete its development; larvae may be present throughout the year (CABI 2004, Lieu 1945, in Gyeltshen and Hodges 2005; NAFC 2001). In a small Italian study the adults observed (in cages) lived an average of 55.6 days (Jucker *et al*. 2006).
Fertilised females move to the base of a tree, around the collar or on main roots, to search appropriate places to lay eggs. With its mandibles, the *A. chinensis* female begins making a small incision, 3-4 mm long, through the bark, transversally to the axis of the trunk or of the root. When an appropriate place has been found, the female inserts its ovipositor in the prepared incision and injects an egg perpendicularly to the incision, within the bark (more or less at one half of its thickness). Under the pressure of the ovipositor inserted within the bark, the upper layer of bark cracks so that the visible final symptom of an egg laid is a reverse T-shape crack of the bark. A single egg is deposited in each incision. At the intersection of the arms of the T-shape crack, one can see a tiny ovoid hole made during the insertion of the ovipositor. This hole is plugged with some brown secretion from the female's abdomen. This fluid hardens on contact of air, making a stopper that closes the entrance of the egg chamber (EPPO, 2007).
A study by Jucker and collegues (2006) found that, in Italy, the highest number of ovipositions (egg-laying) per week was recorded between the end of July and mid August. The findings indicated that: (i) the maximum height of the oviposition scars on the trunk increases as the number of eggs laid on the plant increases, (ii) the eggs have a 76% probability of hatching, (iii) the hatching rate decreases as the number of eggs laid on the plant increases.
Incubation lasts 15-20 days depending on the temperature (EPPO 2007). The young larvae hatch out in one to three weeks and feed on the green, sappy portion of the inner bark. The first instar larva is around 6 millimeters in length; it chews the bark around the egg chamber and enlarges it. The second instar larva bores a gallery to the cambium layer and feeds on the latter. The third instar larva bores a gallery within the phloem and in the external layer of the xylem boring irregular tunnels deep into the woody tissue (EPPO 2007; NAFC 2001). (An instar is a developmental stage between each successive moult until sexual maturity is reached). Full-grown larvae are 50 to 60 millimeters in length (EPPO 2007).
Findings from a small North Italian study indicate that larvae overwinter at various stages of their development (depending on the time of egg laying) and resume intense feeding during spring, pupating and emerging as adults in late May-early June (EPPO 2007).
The pupal stage lasts for four to six weeks (Gyeltshen and Hodges 2005). Pupation and adult development takes place in the wood, often in the upper part of the feeding area (EPPO undated; NAFC 2001).
At the end of the pupal stage, the adults stay inside the pupal chamber for about week during which their exoskeleton hardens; adults emerge leaving a distinct round or slightly oval shaped exit hole on the bark surface (EPPO 2007; NAFC 2001). In China adults emerge from April to August, with a peak from May to July (Florida Department of Agriculture Consumer Services 2004).

Habitat Description
This insect finds suitable host plants in forest, urban and fruit producing areas (NAFC 2001). The citrus longhorn beetle is not exclusive to citrus orchards but may infest a great variety of fruit and nut trees as well as forestry plantations and horticultural plants.

Reproduction
Egg-laying starts about 12 days after the introduction of the male into the cage (Jucker *et al*. 2006). Another source indicates that egg-laying begins a week after copulation (EPPO undated). Under rearing conditions, Lieu (1945, in Gyeltshen and Hodges 2005) observed an average fecundity of 15 eggs laid per female, but the female is potentially able to lay a significantly larger number of eggs. In a small Italian preliminary study by Jucker and collegues (2006) 23 females laid seven to 67 eggs each (350 in total) giving an average of 15 eggs per female. Other sources indicate that each female lays about 70 eggs one by one under the bark of the trunk, from just above the soil surface to 60 cm higher (EPPO undated).
A. chinensis females lay most of their eggs around tree collars. The larvae develop downwards and many of them tunnel. 90% of the *A. chinensis* population is below ground level.

Nutrition
Larvae tunnel through and obtain nutrition from woody portions of the plant. Adult longhorn beetles feed on the bark, leaves and leaf petioles of the host plant (NAFC 2001). *A. chinensis* is a polyphagous longhorn beetle feeding on many different kinds of food and plant species. The citrus longhorned beetle has been recorded on over a 100 recorded species (Lingafelter and Hoebeke 2002). Many of these are important species in the arborculture, forestry and agricultural industries. *A. chinensis* may infest species in the following plant families (Lingafelter and Hoebeke 2002, in NAFC 2001): Aceraceae (maple), Anacardiaceae, Araliaceae, Betulaceae (birch), Eleangaceae, Fagaceae (beech, chestnut, oak), Lauraceae (laurel), Oleaceae (ash), Polygonaceae, Styracaceae, Rutaceae, Rosaceae, Salicaceae (poplar and willow), Ulmaceae (elm), Moraceae (mulberry), Meliaceae, Leguminosae, Juglandaceae (walnut), Aquifoliaceae, Platanaceae (sycamore), Euphorbiaceae, Casuarinaceae, Verbenaceae , Sapindaceae, Theaceae and Taxodiaceae (yew).
According to NPPO (2008) the primary hosts of *A. chinensis* are: lime *Citrus aurantiifolia*, sour orange *C. aurantium*, mandarin lime *C. limonia*, pummelo *C. maxima*, tangerine *C. nobilis*, and navel orange *C. sinensis*
The range of host plants appears to be even wider in *A. chinensis* than in the Asian longhorn *A. glabripennis* (Herald *et al* 2006). Other hosts include (NPPO 2008; Lingafelter and Hoebeke 2002, in NAFC 2001): apple *Malus pumila*, Australian pine or beefwood-tree *Casuarina equisetifolia* and *Casuarina stricta*, cherry *Prunus* spp. , China-berry or Indian lilac *Melia azedarach*, Chinese pear leaved crabapple *Malus spectabilis*, fig *Ficus* spp. , guava *Psidium guajava*, hibiscus *Hibiscus* spp., Japanese red cedar *Cryptomeria japonica*, jujube *Ziziphus jujube*, litchi *Litchi sinensis*, oval kumquat *Fortunella margarita*, paper mulberry *Broussonetia papyrifera*, Persian walnut *Juglans regia*, peach *Prunus persica*, pecan *Carya illinoinensis*, pear *Pyrus communis*, pigeon pea *Cajanus cajan*, plum *Prunus* spp., poplar or aspen *Populus* spp., sycamore or plane tree *Platanus* spp., tea *Camellia sinenesis*, white mulberry *Morus alba*, and willow *Salix* sp.

General Impacts
The genera *Anoplophora* consists of xylophagous wood-boring bark and longhorned beetles which bore through and damage the xylem vessels of woody plants (xylem transports water and minerals throughout the tree). *Anoplophora* mainly infests weakened, dying or dead trees but, unlike many other borer pests, the citrus longhorn may also attack healthy trees (Chambers 2002, in Gyeltshen and Hodges 2005; Forest Research Institute 2007). Please see NUTRITION subheading on this page for a list of host plants.
The citrus longhorn damages different parts of the plant during different stages of the life-cycle. Adults feed on the tender bark of small twigs and branches and sometimes on the leaf petioles (stalks); this causes young shoots and branches to die (Maspero *et al*. Undated; Jucker *et al* 2006; EPPO 2007). The female chews through the bark of the host tree to the cambial layer, forming 'egg scars' (Lingafelter & Hoebeke, 2002, in Maspero *et al*. Undated). The larvae feed and develop in the wood of the main roots and trunks, within which they excavate tunnels; when larval density is high, infested trees can die or fall down. (Maspero et al. Undated). Damage by larvae and beetle stages leaves the tree vulnerable to secondary pests and diseases; for example, fungi and other insects produce secondary infections or infestations in the exit holes and larval galleries (EPPO 2007).
Impacts in native range: *A. chinensis* originates from Eastern Asia and is a serious pest of citrus and other ornamental and forest species in Japan, Korea and China (Adachi 1994, in Delvare *et al*. 2004; Jucker *et al*. 2006; NPPO 2008). In lowland China the species is one of the most destructive cerambycid pests of fruit orchards, especially citrus; economic losses are substantial (NPPO 2008). The citrus longhorn causes serious damages to many deciduous trees in the genera *Populus*, *Acer* and *Salix* in Eastern Asia (Delvare *et al*. 2004). It also attacks *Aesculus hippocastanum*, and species of *Betulus*, *Fraxinus*, *Morus*, *Pyrus* and *Robinia*.
Impacts in alien range: In its introduced range in Europe *A. chinensis* poses an economic and ecological threat to horticulture, forestry and woodland trees in the UK and to citrus production in the Mediterranean (DEFRA 2008).
In the United States the citrus longhorn has the potential to become a significant pest of forests and native forest ecosystems (NPPO 2008). The citrus longhorn beetle has been given a relative Risk Rating of "Very High Risk" by the North American Forest Commission and its broad host range suggests that it would easily adapt to trees indigenous to North America (NAFC 2001). This insect has been recorded on a wide variety of fruit and nut trees including pecan, *Carya illinoensis*, and possibly other *Carya* spp., *Juglans* spp. (walnut) and other nut producing trees (NAFC 2001). By reducing the numbers of nut-producing trees the citrus longhorn may have a significant and negative impact on the ecosystem, in particular on fauna that depend on these mast-producing trees (NAFC 2001). The impact on fruit and nut trees also poses a significant concern to these agricultural industries (NAFC 2001).
Costs of eradication: Between 1996 and 2001, control of a related species - the Asian longhorn beetle - cost the United States over five million dollars (NAFC 2001). Eradication costs for the citrus longhorn and the overall potential impact on the citrus and other agricultural sectors translate to similar if not greater costs.

Management Info
Please follow this link for detailed information on the control and management of *Anoplophora chinensis*

Pathway
The insect could be transported in wood products including logs, lumber, wooden packing materials, pallets or dunnage (NAFC 2001).High risk goods associated with the transfer of insect pests include consignments of stones, cast iron or electronic goods imported from Asia (Krehan 2002).International trade in nursery stock is considered a high risk pathway for the spread of plant pests (Forest Research Institute 2007). Regulated plants in the European Community under recent (2008) emergency directives include: *Acer* spp., *Aesculus hippocastanum*, *Alnus* spp., *Betula* spp., *Carpinus* spp., *Citrus* spp., *Corylus* spp., *Cotoneaster* spp., *Fagus* spp., *Lagerstroemia* spp., *Malus* spp., *Platanus* spp., *Populus* spp., *Prunus* spp., *Pyrus* spp., *Salix* spp., and *Ulmus* spp. All consignments carrying these plant species are high-risk in terms of their potential for carrying *A. chinensis* individuals or infestations (Commission Of The European Communities 2008).The larvae may move in felled timber and in nursery stock. In bonsai, they are more often found in field-collected plants than those grown under supervised nursery conditions (NPPO 2008).The insect could be transported in wood products including logs, lumber, wooden packing materials, pallets or dunnage (NAFC 2001).

Principal source:

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ALIEN RANGE

[1] EUROPE
[1] GERMANY
[1] NETHERLANDS
[3] UNITED STATES
[2] FRANCE
[2] ITALY
[1] UNITED KINGDOM

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