Department for Environment, Food & Rural Affairs

Plant Pest Factsheet

Chestnut trunk borer

Neocerambyx raddei

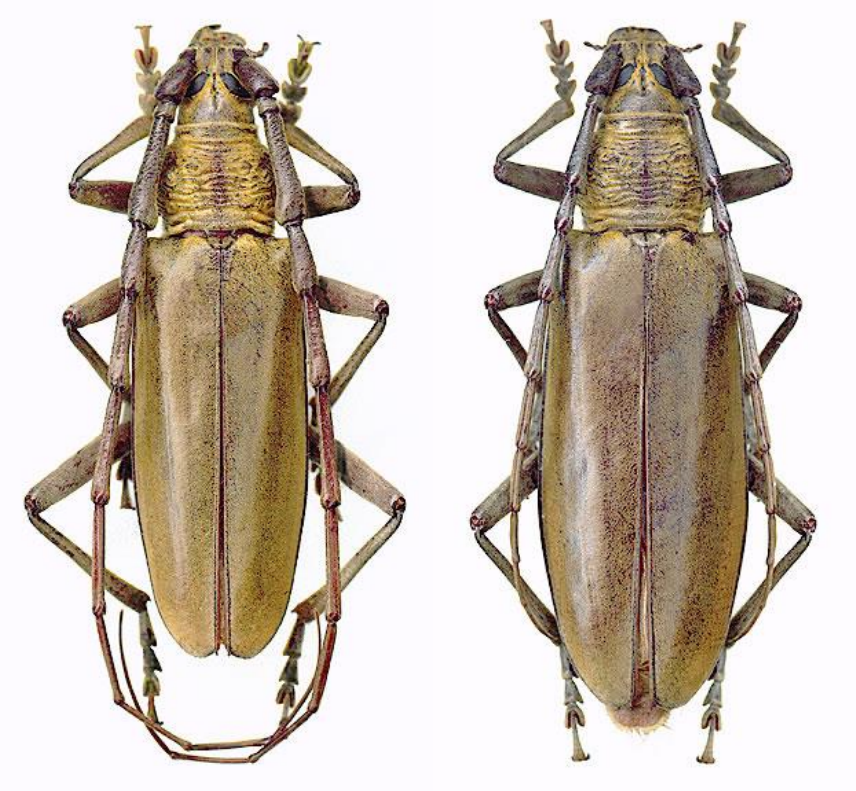

Figure 1 *Neocerambyx raddei* – Male (left) Female (right), adults measure between 35–63 mm in length. Image © Szczepan Ziarko

Background

The chestnut trunk borer (*Neocerambyx raddei* previously called *Massicus raddei*), also known as the oak longhorn beetle or mountain oak longhorn beetle, is a serious pest that damages living oak (Quercus) and chestnut (Castanea) trees in its native range. It is also known to damage other broad-leaved tree species. Due to the risk it posed to both native and ornamental trees in Europe (including the UK) it was added to the European and Mediterranean Plant Protection Organisation (EPPO) Alert List in 2015, and EPPO conducted a Pest Risk Analysis (PRA) in 2018 to evaluate the potential impact of *N. raddei* if it were unintentionally introduced to Europe. The assessment found that the beetle could establish as European climates would not be restrictive to its survival. Furthermore, it has the potential to adapt to native oak species and, to a lesser extent, chestnut trees.

So far, there have been no reports of this species being found in imports or interceptions within these regions.

Geographical Distribution

The chestnut trunk borer is native to: China, Japan, the Korean Peninsula, the Russian Far East, and Vietnam.

Host Plants

The chestnut trunk borer primarily targets oak (*Quercus*) and chestnut (*Castanea*) species, particularly those native to Asia. However, it can also infest a wide range of other broad-leaved trees. Recorded host plants include: *Armeniaca*, *Broussonetia*, *Citrus*, *Eucalyptus*, *Fagus*, *Ficus*, *Fraxinus*, *Lithocarpus*, *Malus*, *Morus*, *Pasania*, *Paulownia*, *Pinus*, *Pyrus*, *Quercus*, *Xylosma*, and *Zelkova*. Specific oak and chestnut species affected include *Castanea bungeana, C. crenata, C. mollissima,* and *Quercus acuta, Q. acutissima, Q. chenii, Q. dentata, Q. glandulifera*.

Given its known host preferences, *N. raddei* could pose a serious threat to native European oaks, naturalized sweet chestnut (*Castanea sativa*), and a variety of other ornamental trees and their hybrids. This risk also extends to the wider environment and forestry.

Figure 2. A cross-section of a *Quercus* sp. revealing *N. raddei* larval galleries (Photo credit: Wang Xioa-Yi (Chinese Academy of Forestry).

Description

Larvae: Like other longhorn beetles, the larvae of the chestnut trunk borer develop inside their host and are rarely seen. They are waxy yellow in colour, legless, and grow up to 65 mm long when fully developed. However, they are not distinct enough from other longhorn beetle larvae to be identified as *N. raddei* in the field.

Adults: (Figure 1). Chestnut trunk borer adults are large, elongated beetles, measuring between 35–63 mm in length and 9–12 mm in width. They are entirely brown and covered in what looks like a fine yellow-greenish dust, which is actually lots of short hairs. These hairs are most visible on the ridged thorax (the body section just behind the head) and edges of the wing cases (*elytra*), though they tend to rub off over time. The females are larger than the males and have antennae nearly as long as their bodies. Males have even longer antennae, which can extend up to twice their body length.

There are no native beetle species in the UK that closely resemble *N. raddei*, making it unlikely to be mistaken for a native species.

Biology

All that is known of the biology of this species is based on studies conducted in China

Adults are active during July and August and have a short lifespan—females live for around 22 days, while males typically survive for 19 days. Rather than feeding on the leaves or bark of their host trees, they feed on sap that oozes from bark wounds, which they create using their mandibles (jaws). During this time, mating takes place, and females lay their eggs in cracks and crevices in the lower trunk and base of a suitable host tree.

Research has shown that chestnut trunk borer adults tend to target trees that are already stressed, being drawn to the chemical signals these trees produce, such as ethanol. They also prefer hosts with a trunk diameter greater than 9 cm and bark thickness over 0.5 cm. As a result, healthy trees are less susceptible to attack, and smaller and younger trees are rarely affected.

After 10–12 days, the eggs hatch, and the larvae burrow into the tree to feed beneath the bark. Over a three-year development cycle, the larvae progress through six distinct growth stages, known as instars. The early instars (first and second) feed within the phloem and cambium layers (the layers beneath the bark that transport nutrients and allow the tree to grow), while the later instars tunnel deeper into the heartwood, creating extensive galleries (**Figure 2**). By June or July of the third year, the larva constructs a chamber beneath the bark, where it undergoes pupation before emerging as an adult in July or August.

Dispersal and Detection

Adults are capable of flight, but there is no published data on how far they can fly. Like other longhorn beetles, the chestnut trunk borer can be spread through the movement of infested trees and wood products, including wood packaging material. This dispersal can occur both locally and internationally via trade.

Although adults are large and visually distinctive, they are rarely encountered because they are nocturnal and have short lifespans. However, studies show that black-light traps can be effective in capturing adults, as are ethanol-baited intercept traps. The highest numbers of beetles are caught in traps placed in the canopy rather than at lower levels.

This species is more likely to be detected through visible symptoms in host trees after an infestation has taken hold. Larvae, especially when present in large numbers, weaken the structural integrity of the tree, cause drying out (desiccation), and reducing its overall health. This damage can lead to noticeable symptoms such as crown dieback, broken branches from wind damage, and even tree death.

Economic Impact

In parts of its natural range, particularly in Northeast China, the chestnut trunk borer has caused significant epidemic losses since 1993, primarily affecting *Quercus mongolica* and *Quercus liaotungensis*. These infestations have led to severe tree damage, with 45–80% of trees in some areas being affected. By 2010, reports indicated that *N. raddei* had impacted 160,000 hectares of forest, resulting in both economic losses—such as reduced wood value—and ecological harm. However, no specific figures have been published on these losses.

Currently, there are no recorded instances of the chestnut trunk borer attacking native European oak species, *Castanea sativa* (European chestnut), or hybrids between native and ornamental oak and chestnut species. As a result, it is not yet possible to estimate the potential economic impact of this species should it enter and establish itself in the UK.

Pest Management and Reporting

Longhorn beetles are difficult to manage because their larvae and pupae develop inside the host tree, where they are shielded from insecticide treatments and most natural predators. The only completely effective way to eliminate larvae is by destroying the infested plant. Spraying insecticides may help control adult beetles, but only if they come into direct contact with the treatment. In its native range larvae are targeted by at least 15 species of parasitic wasps (*Hymenoptera*), which help to suppress its population. However, none of these natural enemies are currently present in Europe or the UK.

Suspected outbreaks of *Neocerambyx raddei* or any other non-native plant pest should be reported to the relevant authority:

For finds at garden centres, plant nurseries or private gardens in England and Wales, contact your local APHA Plant Health and Seeds Inspector, or the PHSI headquarters, in York:

Tel: 0300 1000 313

Email: planthealth.info@apha.gov.uk

For **Scotland**, contact the **Scottish Government's Horticulture and Marketing Unit:**

Email: hort.marketing@gov.scot

For **Northern Ireland**, contact the **DAERA Plant Health Inspection Branch:**

Tel: 0300 200 7847 Email: planthealth@daera-ni.gov.uk

Web: www.daera-ni.gov.uk/topics/plant-and-tree-health

For finds in the wider environment: https://treealert.forestresearch.gov.uk/

For additional information on UK Plant Health please see:

planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/

planthealthportal.defra.gov.uk/

www.gov.uk/plant-health-controls

www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/PlantDiseases

daera-ni.gov.uk/topics/plant-and-tree-health

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