Observatree
monitoring tree health

# Field Identification Guide

## Red-necked longhorn beetle

Photograph: David Crossley, Fera Science Limited (Fera)

Forest Research
Llywodraeth Cynulliad Cymru Welsh Assembly Government
Scottish Forestry Coilltearachd na h-Alba
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Forestry Commission
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Department for Environment Food & Rural Affairs

# Red-necked longhorn beetle

The red-necked longhorn beetle (RNLB, *Aromia bungii*), also known as the peach or plum longhorn beetle, is native to eastern Asia and poses a serious threat to a range of fruit and ornamental *Prunus*, as well as other hardwood trees. The larvae of the beetles feed and tunnel under the bark and in the wood of both healthy and stressed trees and can affect fruit yields. Trees may be weakened or even killed after several successive years of infestation by this insect pest. The climate in much of the UK is conducive to the establishment and spread of RNLB, whose main pathway of entry to this country is via the live plant trade and in wood packaging material.

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| Species affected | The most significant tree hosts for RNLB are *Prunus* species such as peach (*Prunus persica*), apricot (*P. armeniaca*), plum (*P. domestica*), *damson* (*P. domesitica* subsp. *institia*), American plum (*P. americana*), wild cherry (*P. avium*) and Japanese apricot (*P. mume*), quince (*Cydonia oblonga*). Other trees such as white poplar (*Populus alba*), Chinese white poplar (*P. tomentosa*), persimmons (*Diospyros*), Chinese wingnut (*Pterocarya stenoptera*), Chinese chestnut (*Castanea mollissima*), oaks (*Quercus* spp.), walnut (*Juglans regia*), neem (*Azadirachta indica*), olive (*Olea europaea*), pomegranate (*Punica granatum*), *Shima superba* and *Salix* spp. have been reported as occasional hosts in Asia for RNLB. |
| Signs and symptoms | Red-necked longhorn beetles spend most of their life as larvae inside a trunk or branch, and hence there may be little or no external sign of their presence to anyone inspecting a host tree until the infestation becomes heavy. This means that in most cases the beetles have already become established by the time they are discovered and have potentially spread to new hosts.<br><br>Eggs are laid in bark cracks or under lichens on the main stem or lateral branches of host trees. The eggs (approximately 2 x 1 mm) are elongate, sub-cylindrical and cream or light green in colour. They are produced in batches of 1 to 6 and hatch after 10 days. On hatching, larvae are 2.0–2.5 mm long, growing to a size of approximately 42–52 mm at larval maturity. The larvae, which are the immature stage of the beetle's life cycle and are the most damaging, are pale yellowish-white and have four-segmented legs. After hatching, the larvae immediately penetrate under the bark, boring a gallery in the phloem. |

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| | The galleries of early instar larvae tend to be between the bark and sapwood within the trunk and branches, whereas those of late instar larvae are found within the sapwood and occasionally heartwood. These galleries/tunnels, which can be up to 17–22 cm long and over 10 mm in diameter, disrupt the movement of water and nutrients around the tree. This results in the foliage of the infested trees becoming discoloured (yellow or red), wilting and falling prematurely and this is usually one of the first and most noticeable symptoms to occur. Branches also start to die back and eventually the trees can die as a result of the infestation. The symptoms in the crown typically start at the top of the tree and progress downwards as the infestation develops. The larval galleries cannot be seen unless the bark overlying them is removed or falls off. Larval activity can also leave trees susceptible to diseases and wind damage.<br><br>As the larvae tunnel and feed, they generate frass (fibrous sawdust-like waste material) which is ejected from the tunnels and collects in piles at the base of the trunk, or in the forks of branches; sometimes it may be seen actually extruding from exit holes. The presence of frass can be highly conspicuous and is a good indicator of a potential RNLB infestation.<br><br>Larvae may overwinter two or three times within the tree and mature in 21–48 months; however, RNLB can complete its life cycle in a year if the host is less resistant. Once the larvae have fully matured, they create a pupal chamber beneath the bark, near to the surface of the stem or branch, in which they pupate. The pupae are 22–38 mm long, and are initially light yellow in colour, becoming darker as they develop until they eventually assume the coloration of the young adult. Pupation lasts for 17–23 days, and generally occurs in the springtime.<br><br>Following pupation, the adult beetles chew their way through the bark to the outside of the tree, leaving behind oval-shaped exit holes (6–10 mm wide x 10–16 mm long). The exit holes of RNLB that occur on the branches and the main stem are signs of the presence of the pest. It is important to survey the surrounding areas to determine whether the beetles have spread to other host trees nearby. |

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| | Following emergence, the adult beetles mate and feed on mature or rotten fruit and leaves. The lifespan of adults is 47–55 days.<br><br>Adult beetles are black and shiny with a bright red pronotum/thorax which bears a stout, spine-like process on each side (although some individuals may be completely black). Adults are 20–40 mm in length. Their antennae are also black, shiny and segmented and are as long as, or longer than, their bodies. The adults emit a distinctive odour when they are disturbed, which deters natural enemies and protects them from predation. Several generations can develop within an individual tree, leading to its decline and eventual death.<br><br>A number of factors other than RNLB can cause canopy thinning, crown and branch dieback and discoloration of foliage, such as drought, waterlogging, root compaction and adverse cultural and environmental conditions, as well as various pests and diseases. Symptoms of root and butt rots, such as late flushing, thinning foliage and decline leading to eventual death, are also similar to those caused by RNLB infestation. However, the presence of the oval exit holes, piles of frass and larval galleries under the bark are three key indicators of RNLB that can differentiate it from signs and symptoms of other factors.<br><br>The native musk beetle (*Aromia moschata*) is related to the RNLB and can damage trees in a similar way. Although musk beetles can be distinguished from RNLB because they are usually a uniform metallic blue violet, or iridescent copper/green colour, very dark coloured adults also exist and can look similar to RNLB. Furthermore, the pupae and larvae also look similar to those of RNLB. However, adult musk beetles can be distinguished from RNLB as their elytra (wing cases) are wrinkled whereas those of RNLB are smooth. Also, the musk beetle is unlikely to be found in *Prunus* trees as its main host trees are *Salix* spp., although some *Salix* spp. have also been reported to be an occasional host for RNLB.<br><br>Larvae of native moths such as the goat moth (*Cossus cossus*) and the leopard moth (*Zeuzera pyrina*) can cause damage that could be mistaken for that of RNLB. The goat moth tends to infest lower parts of the tree, whereas leopard moth |

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| | infestations tend to occur in upper regions of the tree. Leopard moths infest some of the same hosts as the RNLB such as cherry, plum, pomegranate and quince.<br><br>Larvae of these two native moths have notable differences that distinguish them from the larvae of RNLB (e.g. the leopard moth larva has dark coloured spots, and the goat moth larva is a browny/red colour, whereas RNLB larvae are a creamy colour with no spots). Also, the larval/pupal cavities in the wood excavated by the native moth larvae tend to have a blackened or sooty appearance. The exit holes of the moths are also different in shape and size to those of RNLB. The frass produced by the native moth larvae is also different to that of RNLB, taking the form of pellets rather than sawdust-like material. Larvae of the native hornet moth (*Sesia apiformis*) and lunar hornet moth (*S. bembeciformis*) are a creamy white colour and tunnel in the roots and lower trunk of host trees and so could be mistaken for RNLB.<br><br>The large poplar beetle (*Saperda carcharias*) also causes similar damage to RNLB and its larvae look very similar to those of RNLB. However, the exit holes produced by the large poplar beetles are round, unlike those of RNLB which are oval. Furthermore, the adults bear little resemblance to RNLB. The goat and leopard moths and the large poplar beetle may be found in some of the same tree hosts as RNLB, such as fruit trees, aspen (*Populus tremula*), other poplars and oak. |
| Timing | The life cycle of RNLB in the UK is likely to be 2–4 years.<br><br>The larvae are active until late autumn. They overwinter inside the trunk or branches, protected from cold temperatures, and are well adapted to survive in extreme climates. Pupation usually occurs in the spring, and adult flight occurs during the summer months. Beetles emerge during the summer (between June and September) to mate and lay eggs, after which they die. They are likely to be most active in the UK between late July and early September. Oviposition occurs mainly in July in daylight.<br><br>Foliage discoloration, wilting, shoot dieback and premature leaf fall is only obvious during the growing season when leaves are present on the trees. |

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| | Feeding damage on the leaves will only be visible during the growing season following emergence of the adults. Areas of bark stem and branch damage such as branch dieback and exit holes will still be obvious during the winter months.<br>Frass is produced during times of larval activity, so it may be seen from spring to late autumn and may also persist through the winter. In RNLB infestations in Italy, frass was expelled from the larval galleries during the night, rather than in daylight hours. |
| Biosecurity | Potential pathways of introduction include wood packaging material and nursery plants where eggs, larvae or pupae may be hidden from view. The larvae may live concealed inside infested wood packaging material and remain undetected until after transportation. It is extremely important that no wood or foliage from host trees is removed from a potentially infested site. Vehicles should also be checked for live beetles. If any host tree material is intentionally removed from a site (e.g. for sampling), then it should first be triple-wrapped in strong and robust plastic bags, or double-wrapped in bags which then must be secured within a plastic container. For beetles, please package in a secure, robust plastic container labelled with date, location and contact details and send to Tree Health Diagnostic and Advisory Service (THDAS), Forest Research, Alice Holt Lodge, Farnham GU10 4LH. |
| Reporting requirements | If you find this pest, please report it through Tree Alert (https://treealert.forestresearch.gov.uk).<br>In Northern Ireland please report via the TreeCheck website (www.treecheck.net) or phone app, or by emailing planthealth@daera-ni.gov.uk<br>For traded plants and any non-tree hosts please email planthealth.info@apha.gov.uk (England & Wales), or hort.marketing@gov.scot (Scotland). |

Based on information available in January 2018.

# Signs and symptoms

Photograph: Daniela Benchi, Plant protection service, Campania Regione (Italy)

Damage caused by the red-necked longhorn beetle on a plum tree.


Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Damage to the main stem of a tree which has been killed by the red-necked longhorn beetle.

Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Larval damage in the main stem of a tree infested by the red-necked longhorn beetle.

# Signs and symptoms

Photograph: Daniela Benchi, Plant protection service, Campania Regione (Italy)

Frass can collect in the forks of branches in trees infested with the red-necked longhorn beetle.

Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

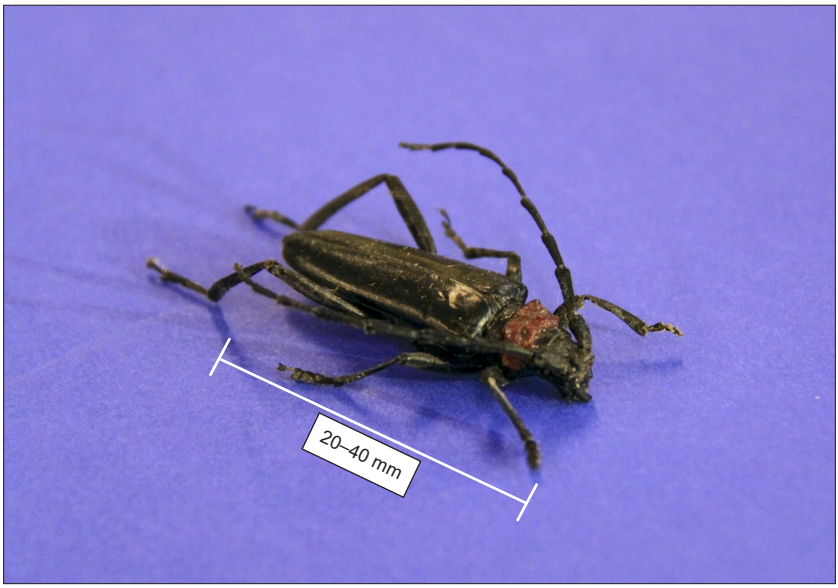
Larva and galleries of the red-necked longhorn beetle.


Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Mature larva of the red-necked longhorn beetle.

Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Larvae (different instars) of the red-necked longhorn beetle.




Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Adult red-necked longhorn beetle.

Photograph: Raffaele Griffo, Plant protection service, Campania Regione (Italy)

Adult red-necked longhorn beetle.

Photograph: Chris Malumphy, Fera Science Limited (Fera)

Red-necked longhorn beetle adult with the characteristic red pronotum.

Photograph: David Crossley, Fera Science Limited (Fera)

Red-necked longhorn beetle adult with a black pronotum.

Photograph: Gyorgy Csoka, Hungary, Forest Research Institute, Bugwood.org

The larvae of native species such as the goat moth, the leopard moth and the large poplar beetle can produce frass material similar to that produced by the red-necked longhorn beetle.

Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Goat moth damage to lower regions of the stem of an infested tree.

Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

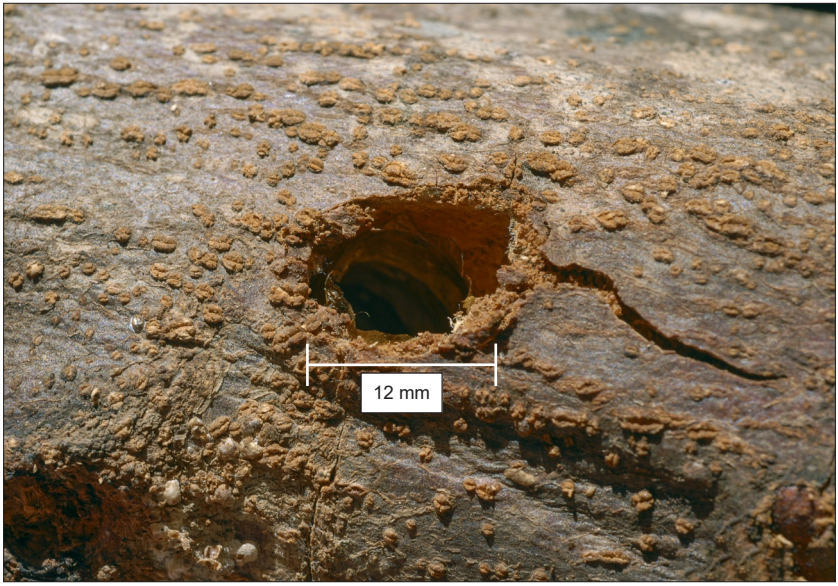
Larva of the goat moth. These can reach approximately 100 mm in length when mature.

Photograph: George Gate, Forest Research

Leopard moth damage on sycamore (*Acer pseudoplatanus*).

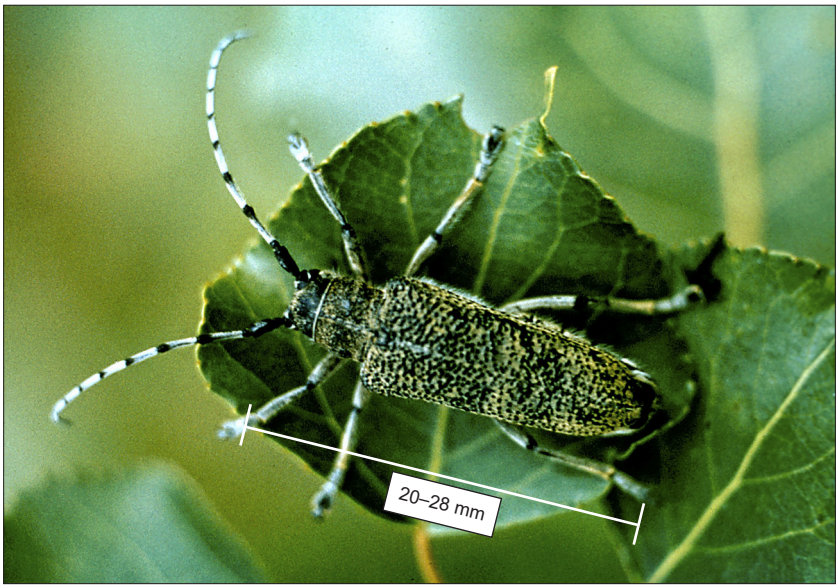
Photograph: Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org

Emerging leopard moth larva – on reaching maturity they can be 50–60 mm long.



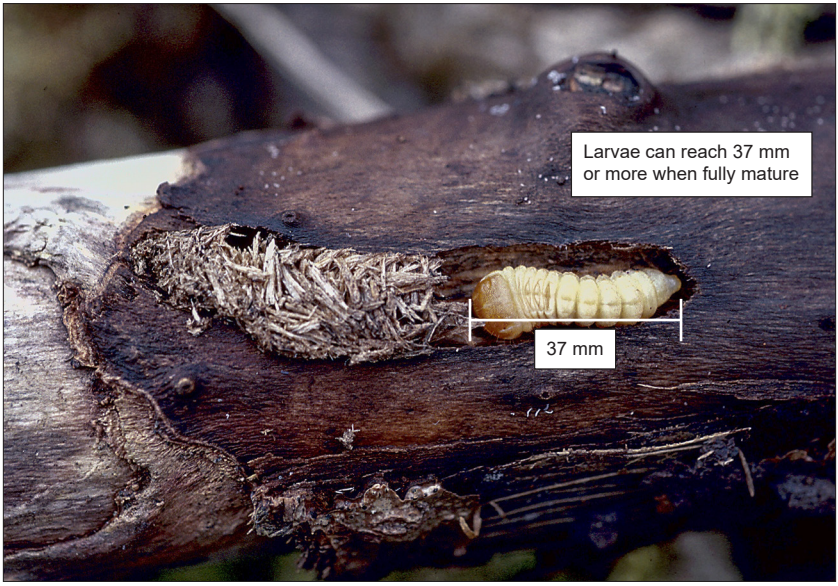

Photograph: Esmat M. Hegazi, University of Alexandria, Bugwood.org

Leopard moth exit hole.




Photograph: Jean Pinon, Institut National de la Recherche Agronomique, Bugwood.org

Large poplar beetle.




Photograph: Louis-Michel Nageleisen, Département de la Santé des Forêts, Bugwood.org

Large poplar beetle larva and tunnel packed with sawdust-like waste.

Photograph: Suzanne Sancisi-Frey, Forest Research

Damage caused by native moth species Callus material has formed around exit holes.


Photograph: Suzanne Sancisi-Frey, Forest Research

An exit hole produced by a native moth species.


Photograph: Suzanne Sancisi-Frey, Forest Research

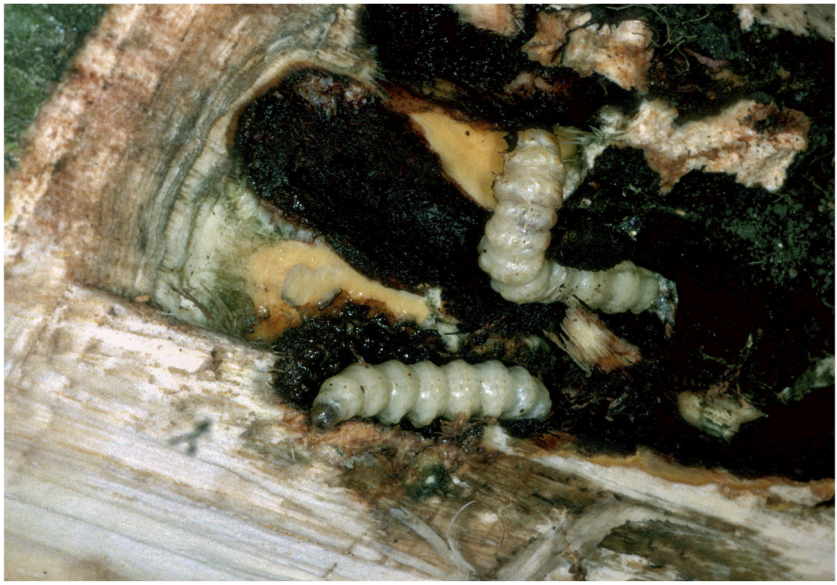
An exit hole produced by a native moth species. Note the blackened colour/ sootiness of the exit hole.

Photograph: Nigel Straw, Forest Research

Exit holes produced by the hornet moth at the base of an infested tree. The holes are approximately 8 mm wide.

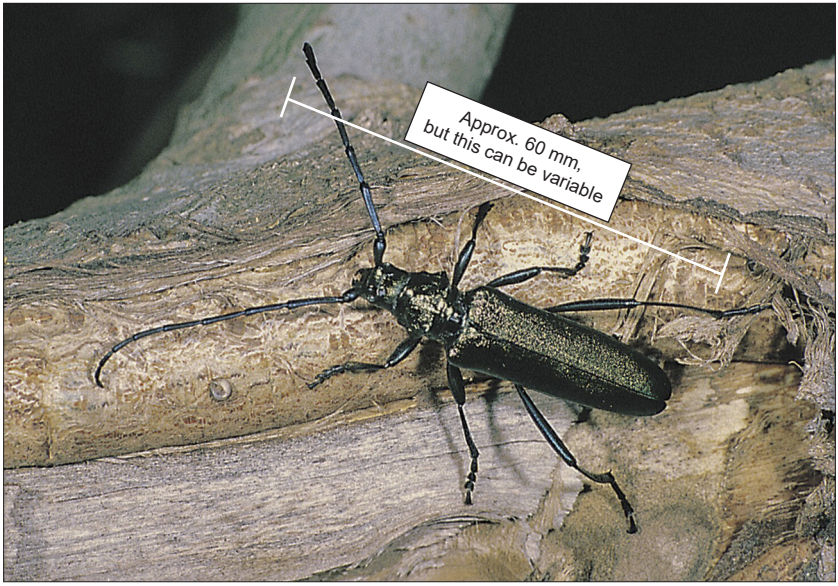
Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Frass produced by the hornet moth which has collected at the base of an infested tree.



Photograph: Louis-Michel Nageleisen, Département de la Santé des Forêts, Bugwood.org

Larvae of the hornet moth. Mature larvae are 30 mm long.




Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Musk beetle.

Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Musk beetle damage.

Photograph: Valentyna Meshkova, Ukrainian Research Institute of Forestry and Forest Melioration, Bugwood.org

Larva of the musk beetle (approximately 40–50 mm long).

Photograph: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Musk beetle damage.

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Observatree aims to create a tree-health early-warning system using citizen science.

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This booklet forms part of a set that supports Observatree volunteers when out looking for priority pests and diseases. It supplements face-to-face training and is not intended as a full or detailed description. It will also be useful for others who have some knowledge of the particular pest or disease and understand how to look for these. Further information is available online from the websites listed below:

**www.observatree.org.uk**

**www.forestresearch.gov.uk/tools_and_resources/fthr/pest-and-disease-resources/**

**www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases**

**https://planthealthportal.defra.gov.uk**

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