

Field Identification Guide

Horse chestnut leaf miner



Photograph: Ana Pérez-Sierra, Forest Research

Horse chestnut leaf miner

The horse chestnut leaf miner moth (HCLM; *Cameraria ohridella*) is an insect pest that infests horse chestnut trees. Its larvae mine within the leaves, and at high population densities can destroy most of the tree's leaf tissue. This pest causes severe damage to horse chestnut leaves on an annual basis by causing the leaves to become discoloured and to fall prematurely. Horse chestnut leaf miner is a pest that primarily affects the aesthetics of its hosts and, when acting alone, does not significantly impair a tree's long-term health as the tree will usually flush normally the following spring.

Species affected	The common horse chestnut (<i>Aesculus hippocastanum</i>) is particularly susceptible to HCLM. Other <i>Aesculus</i> species and hybrids are of varying susceptibility, with some species such as <i>A. indica</i> being resistant to attack. HCLM has also occasionally been reported in sycamore (<i>Acer pseudoplatanus</i>).
Signs and symptoms	<p>It is usually easy to spot trees affected by HCLM, especially as the season progresses, as the main symptom is a conspicuous blotch on the leaves. These blotches are mines excavated by the feeding larvae as they develop through their five larval instars before pupating into adults. The mines occur between the upper and lower epidermis of the leaf and are initially elongated, white and translucent, but later turn brown as the tissue dies. Symptoms (particularly in larger trees) become less intense the higher in the crown the foliage is.</p> <p>The larvae and pupal cocoons are visible within the mined leaves if held up to the light. The mines can reach 4 cm in length. However, in severe infestations individual mines can merge together resulting in leaves that are almost entirely mined, and devoid of green tissue. Heavily infested trees will drop their leaves early in the season, although research has shown that this has little effect on the growth rate or health of trees.</p> <p>Eggs that occur singly may be visible along the lateral veins on the upper leaflet surface prior to mine formation. These hatch after two to three weeks, with the emerging larvae immediately starting to excavate mines. After around four weeks the larvae pupate within silken cocoons inside the mines and emerge as adults after approximately two weeks. However, the pupal stage can last for six to seven months in</p>

	<p>the overwintering generation. This stage is frost tolerant (-23°C), so populations can increase from year to year without being inhibited by cold temperatures.</p> <p>Because of their rapid life cycle, multiple, overlapping generations of HCLM can occur within the same trees and this can result in rapid infestation. The ability of populations to build up rapidly contributes to the successful establishment of this pest in new areas. On hot summer days adult moths can swarm away from horse chestnut trees in large numbers and can potentially become a nuisance.</p> <p>Various pathogens can cause foliar symptoms on horse chestnut trees, such as the fungus <i>Guignardia aesculi</i>. This disease produces reddish brown, irregular blotches which tend to concentrate at the tips and margins of infected leaflets. The blotches are often outlined by a conspicuous yellow band. In severe cases leaflets are rolled upwards and leaves may fall prematurely. Occasional browning of horse chestnut leaves without the yellow margin may be caused by a bacterial infection. Horse chestnut trees may also be affected by <i>Phytophthora</i> root disease, which consequently causes symptoms in the crown such as discoloration of foliage and dieback of branches. Horse chestnut bleeding canker caused by infection by the bacteria <i>Pseudomonas syringae</i> pathovar <i>aesculi</i> can also result in discoloured foliage and dieback in the crown when the cankers on the bark become extensive.</p> <p>Insects such as leafhoppers and spider mites can cause the foliage of horse chestnut trees to become mottled and bronze or silvery in colour. Scale insects can reduce the productivity of horse chestnut trees but are easily distinguishable from HCLM as they occur as white or orange blotches on the bark of the main stem and large branches, rather than on the foliage.</p>
Timing	<p>Horse chestnuts produce normal foliage and flowers in the spring and the first signs of leaf-mining usually appear during June in the UK. The mines develop on the foliage from June onwards. By August, most of the leaf area may be occupied by leaf mines. Leaves may fall prematurely towards the end of the summer and early autumn in heavily infested trees.</p>

Biosecurity	Horse chestnut leaf miner adults spread by flight assisted by the wind. Adults and infested leaves potentially harbouring all developmental stages of the infestation also move around via passive transport in or on vehicles. To reduce spread of this pest, do not remove foliage from infested sites. Check for and remove foliage from clothing and vehicles and also ensure that vehicles are free from adult moths. The pupal stage overwinters in leaf litter, so for individual trees removal of the leaf litter may help control spread and population growth. Alternatively, litter can be raked up into mounds and covered with soil to prevent emergence of adults.
Reporting requirements	<p>If you find this pest in Scotland, please report it through Tree Alert (https://treealert.forestresearch.gov.uk).</p> <p>In Northern Ireland please report via the TreeCheck website (www.treecheck.net) or phone app, or by emailing planthealth@daera-ni.gov.uk</p> <p>For traded plants and any non-tree hosts please email planthealth.info@apha.gov.uk (England & Wales), or hort.marketing@gov.scot (Scotland).</p>

Based on information available in October 2017.

Signs and symptoms



Photograph: Forestry Commission

Defoliation of a horse chestnut tree by horse chestnut leaf miner.

Signs and symptoms



Photograph: Suzanne Sandis-Frey, Forest Research

Early horse chestnut leaf miner damage on horse chestnut leaves.



Photograph: Forestry Commission

Early horse chestnut leaf miner damage on horse chestnut leaves.

Signs and symptoms



Photograph: Suzanne Sancisi-Frey, Forest Research

As the horse chestnut leaf miner infestation progresses, the mines start to coalesce.



Photograph: Suzanne Sancisi-Frey, Forest Research

Mines of the horse chestnut leaf miner that are starting to coalesce.

Signs and symptoms



Photograph: Suzanne Sancisi-Frey, Forest Research

As the infestation progresses, the mines start to coalesce and the leaf margins begin to curl upwards.



Photograph: Suzanne Sancisi-Frey, Forest Research

Mines of the horse chestnut leaf miner which have coalesced and killed a large proportion of the leaf's green tissue. This is typical 'July' damage.

Signs and symptoms



Photograph: Forestry Commission

Mines of the horse chestnut leaf miner which have coalesced to kill much of a leaf's green tissue.



Photograph: Forestry Commission

Curling dead leaves of a horse chestnut tree affected by horse chestnut leaf miner.

Signs and symptoms



Photograph: Suzanne Sandis-Frey, Forest Research

Adult horse chestnut leaf miner moths emerging from their mines.



Photograph: Forestry Commission

Adult horse chestnut leaf miner moth.

Signs and symptoms



Photograph: Barnaby Wylder, Forestry Commission England Tree Health Team

Horse chestnut leaf miner larvae and frass within leaf tissue.

Signs and symptoms



Photograph: Barnaby Wylder, Forestry Commission England Tree Health Team

Horse chestnut leaf miner larvae.

Look-alike signs and symptoms



Photograph: Robert Strouts, Forestry Commission

Guignardia leaf blotch causing late summer browning of horse chestnut leaves.



Photograph: Robert Strouts, Forestry Commission

Guignardia leaf blotch late summer symptoms.

Look-alike signs and symptoms



Photograph: Joan Webber, Forest Research

Dieback and premature leaf loss of a horse chestnut tree infected with horse chestnut bleeding canker.

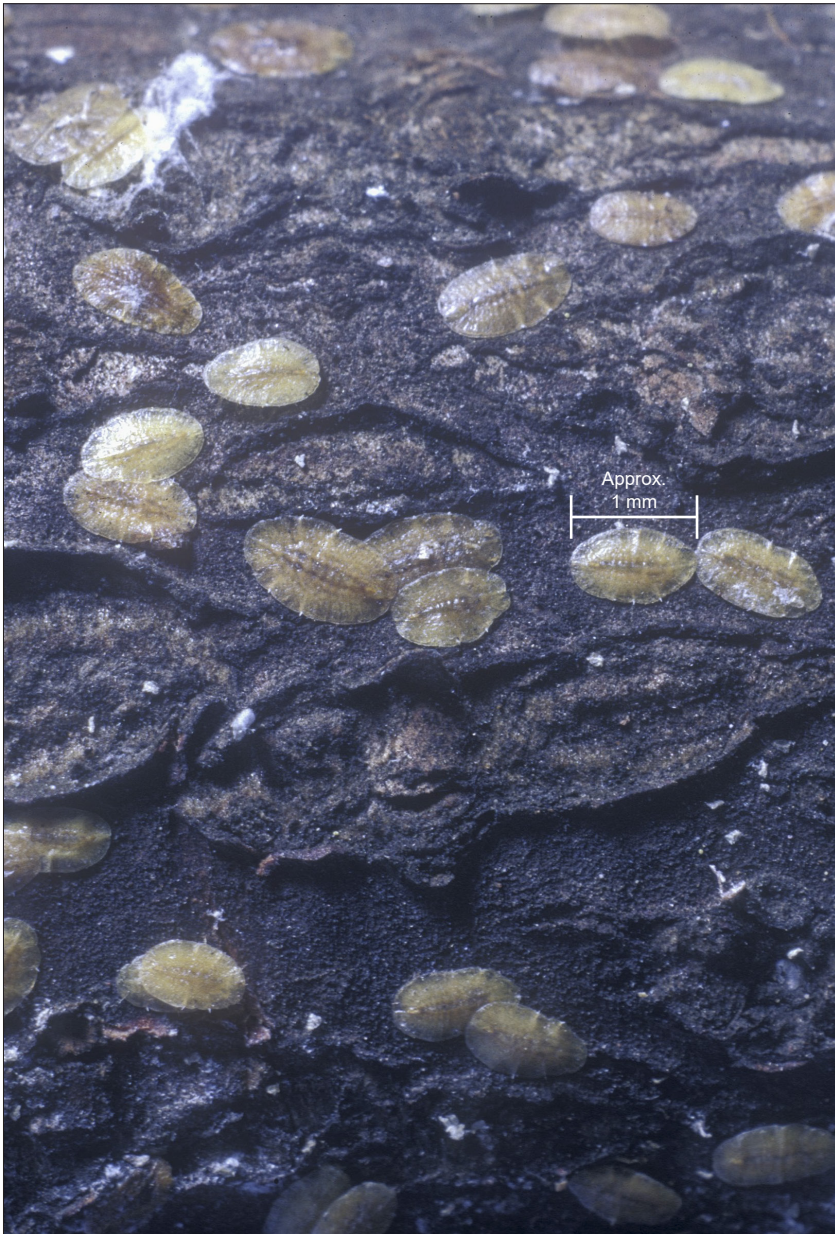
Look-alike signs and symptoms



Photograph: Joan Webber, Forest Research

Bleeding on the trunk of a horse chestnut tree infected with horse chestnut bleeding canker.

Look-alike signs and symptoms



Photograph: Barry Lambsdown, Forestry Commission

Adult scale insects (*Pulvinaria regalis*) on the bark of a horse chestnut tree.

Look-alike signs and symptoms



Photograph: Barry Lambsdown, Forestry Commission

Squirrel damage in horse chestnut trees results in dead and drooping shoots.

© Crown copyright 2018.

Published by Forest Research as part of the Observatree project.

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

Observatree is a partnership project led by Forest Research, the research agency of the Forestry Commission. Project partners are the Animal & Plant Health Agency (APHA), Department for Environment, Food & Rural Affairs (Defra), Fera Science Ltd, the Forestry Commission, the National Trust, Scottish Forestry, the Welsh Government and the Woodland Trust. Supporting the project is Natural Resources Wales. The first four years of this project was 50% funded by the EU's LIFE programme.

Acknowledgements:

Dr Suzanne Sancisi-Frey, Forest Research, for compiling this guide based on a review of current literature and with technical contributions from experts across the Observatree partnership.

All those who have given permission for images to be used within the guide.

The Communications Team, Forest Research, for the original design and creation of the guide.

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>