Observatree
monitoring tree health

Field Identification Guide

Chalara ash dieback

Forest Research
Llywodraeth Cynulliad Cymru Welsh Assembly Government
Scottish Forestry Coilltearachd na h-Alba
fera
Forestry Commission
National Trust
WOODLAND TRUST
Animal & Plant Health Agency
Department for Environment Food & Rural Affairs

Chalara ash dieback

Ash dieback is caused by the fungus *Hymenoscyphus fraxineus* and is commonly referred to as Chalara ash dieback. Once a tree is infected the disease is usually fatal. The disease can kill a tree host directly through the actions of the pathogen, or indirectly by weakening it to the point where it succumbs more readily to attacks by other pests or pathogens. Ash trees of all ages can be affected.

Species affected	European ash (*Fraxinus excelsior*, including the variety 'Pendula') is highly susceptible to the disease and the narrow-leaved ash (*F. angustifolia*) is also susceptible. *Hymenoscyphus fraxineus* has also been confirmed on the non-ash hosts *Phillyrea latifolia*, *P. angustifolia* and *Chionanthus virginicus*.
Signs and symptoms	Symptoms of ash dieback are most obvious on young trees, saplings and young coppice re-growth. The first symptoms to appear after infection are small necrotic spots on the leaves caused by airborne spores. These spots expand into leaf lesions and can extend through the petioles of the leaf into the leaf rachises (leaf stalks) to the shoots. Lesions can also be found on branches of all sizes as well as the main tree stem. Infected leaves may fall prematurely. One of the most obvious symptoms of this disease is the diamond-shaped lesions which develop on the bark of branches and stems of infected trees. Lesions on smaller stems/branches and twigs are often not diamond shaped and instead are areas of discoloured bark sandwiched between areas of healthy bark. These bark lesions are always associated with the insertion points of leaves, shoots and branches. The colour of the lesions ranges from light to dark brown and can have a purple hue and contrast with the green colour of young ash bark. They penetrate deeply, killing the bark tissue and staining the underlying wood to a dark brown colour. The lesions can eventually girdle stems or branches, thereby compromising the transport of water and nutrients within the tree and causing clumps of leaves to wilt, wither and die, but remain hanging on the tree. Another symptom of this disease is branch dieback caused by successive years of stem girdling. Over time the tree dies back from the periphery, with tufts/clumps of epicormic growth being produced below the girdling lesion on stems, in

	the crown of the tree and at the base of saplings. Retained blackened rachises on the trees during winter are another symptom of ash dieback. If rachises from the previous year are on the ground beneath the tree, small (maximum 2 mm diameter of cup), cream, cup-like fruiting bodies may be present. Spores are released from these fruiting bodies and go on to produce new foliar infections. If there is sufficient spore production from the leaf litter, lesions at the base of the stem may form, leading to tree mortality. Please be aware that other pests and diseases such as honey fungus (*Armillaria* spp.) may also be present in trees already weakened by ash dieback and that other pests, diseases and cultural conditions can cause similar symptoms to those of ash dieback.
Timing	Spores are released from fruiting bodies and cause infections on the leaves between May and October. The leaf symptoms are most obvious in September and October. Stem lesions develop from October through to spring.
Biosecurity	Fruiting bodies on leaf rachises in the leaf litter are the main source of spores for this disease. Please ensure that no leaf litter leaves the site with you on boots/clothing or car tyres. If you are removing infected rachises with fruiting bodies present, please double bag the material before leaving the site.
Reporting requirements	If you find this disease, please report it through Tree Alert (https://treealert.forestresearch.gov.uk). In Northern Ireland please report via the TreeCheck website (www.treecheck.net) or phone app, or by emailing planthealth@daera-ni.gov.uk 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 August 2016.

Signs and symptoms

Photograph courtesy of Forestry Commission / © Thomas Kirisits

Leaves wilting above a lesion that has girdled the stem in a sapling.

Signs and symptoms

Photograph © Iben Margrete Thomsen

Dieback on an infected sapling.

Photograph courtesy of Forestry Commission / David Boles

Bark lesion on a sapling.

Signs and symptoms

Photograph courtesy of Forestry Commission / David Boles

Typical diamond-shaped stem lesion on a young tree.

Signs and symptoms

Photograph courtesy of Forestry Commission / Mick Biddle

Typical diamond-shaped stem lesion.

Photograph courtesy of Forestry Commission / Clive Brasier

Larger stem lesion.

Photograph courtesy of Forestry Commission

Developing diamond-shaped lesion centred on a dead side shoot.

Photograph courtesy of Forestry Commission

Older lesion centred on a dead side shoot.

Old lesion centred on a dead side shoot.

Photograph courtesy of Forestry Commission / © Thomas Kirisits

Chalara lesion staining underlying wood.

Photograph courtesy of Forestry Commission

Chalara lesion staining underlying wood.

Photograph courtesy of Forestry Commission / Ben Jones

Dead, blackened, retained leaves.

Photograph © Lea Vig McKinney

Small, white, fruiting bodies of *H. fraxineus* on blackened rachises.

Photograph courtesy of Forestry Commission / Ana Perez-Sierra

Close-up of *H. fraxineus* fruiting bodies.

Photograph courtesy of Forestry Commission / Ana Perez-Sierra

Leaves showing spotting caused by infection from aerial spores.

Photograph courtesy of Forestry Commission / Ana Perez-Sierra

Infected leaves showing leaf lesions.

Photograph courtesy of Forestry Commission / Ana Perez-Sierra

Leaves showing infection spreading from the leaf lesion down through the midrib of the ash leaflet.

Photograph courtesy of Forestry Commission / Joan Webber

Leaf necrosis extending into leaflet vein and rachis (leaf stalk).

Photograph courtesy of Forestry Commission / © Thomas Kirisits

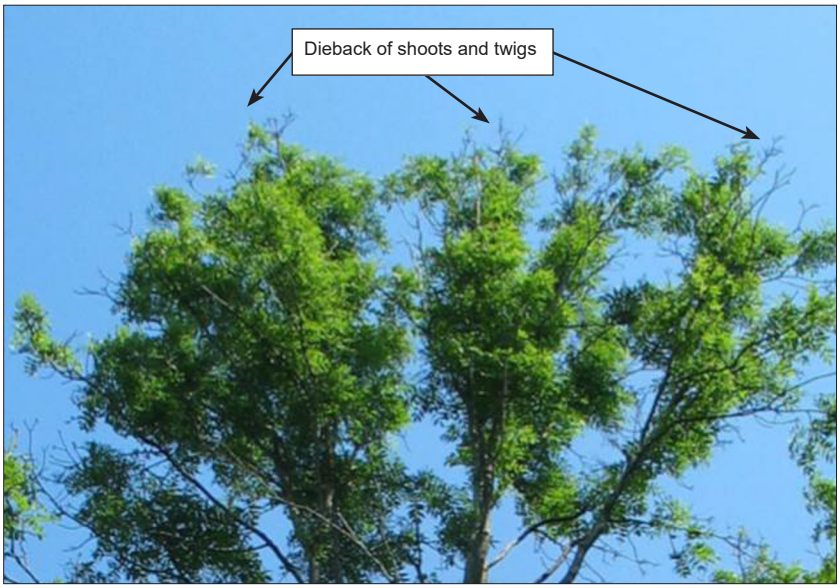
Lesion on rachis (between the arrows).

Photograph courtesy of Forestry Commission / Rory Vereker

Chalara lesion staining underlying phloem and wood.

Photograph courtesy of Forestry Commission / Mick Biddle

Necrosis of rachis with associated desiccation of leaflets.



Photograph © Iben Margrete Thomsen

Crown symptoms on an infected mature tree.

Photograph © Iben Margrete Thomsen

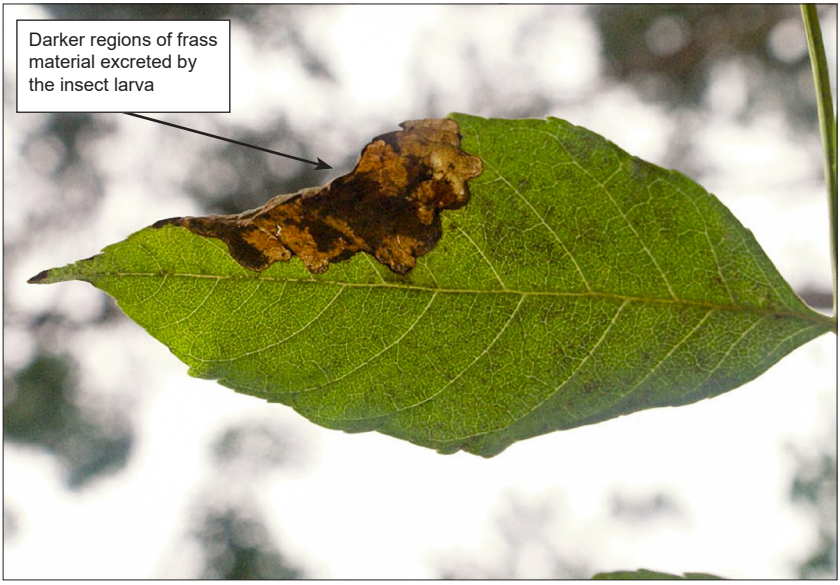
Crown symptoms on an infected mature tree.

Photograph courtesy of Forestry Commission

Lesion of *H. fraxineus* at base of stem.

Photograph courtesy of Forestry Commission

Browning of leaf caused by mining insects.



Photograph courtesy of Forestry Commission

The browned area is translucent when held up to the light.

Photograph courtesy of Forestry Commission / Robert Strouts

Wilting of young leaves caused by the ash bud moth (*Prays fraxinella)*.

Photograph courtesy of Forestry Commission

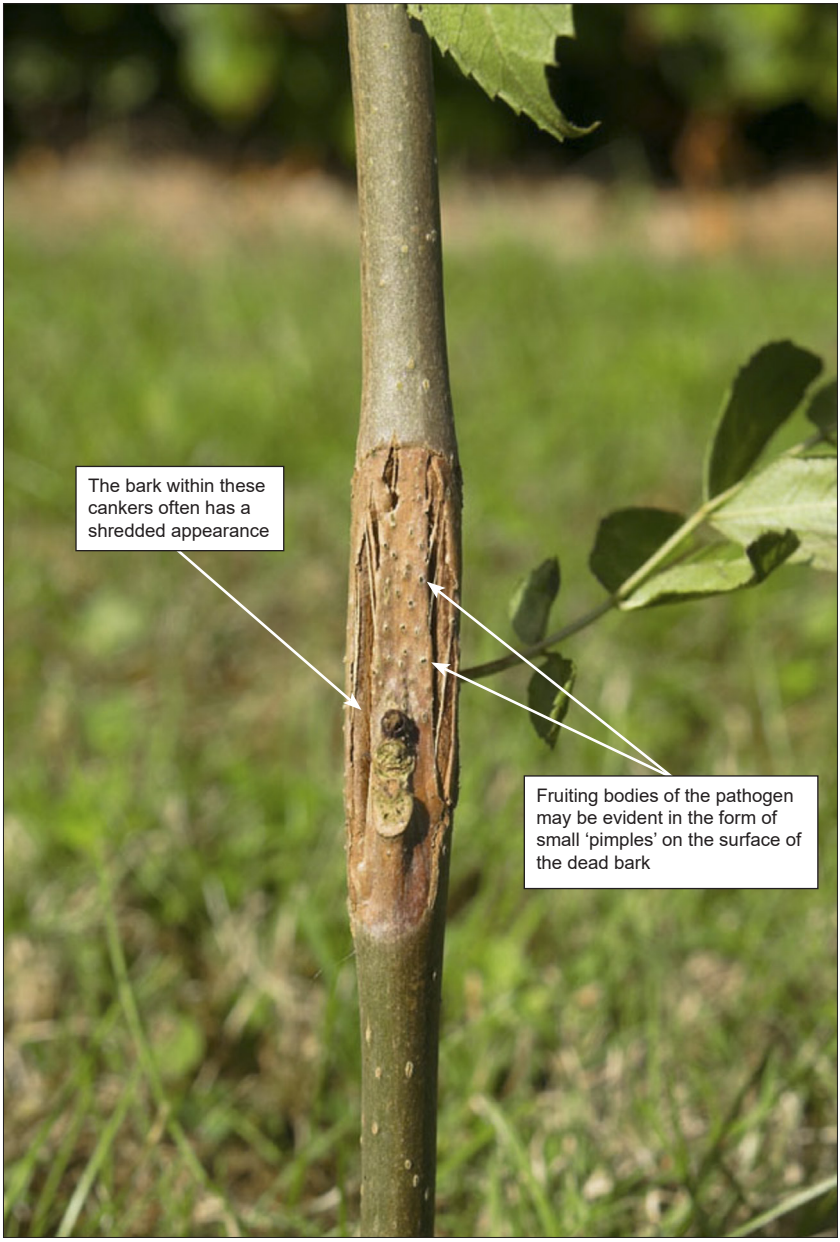
Ash bud moth (*Prays fraxinella*) damage on a shoot.

Photograph courtesy of Forestry Commission

Frost damage on leaves.

Photograph courtesy of Forestry Commission

On young ash, cankers on shoots may be formed by the fungus *Phoma exigua*.



Photograph courtesy of Forestry Commission

On young ash, cankers on shoots may be formed by the fungus *Phoma exigua*.

Photograph courtesy of Forestry Commission / Robert Strouts

Nectria cankers on ash (caused by *Neonectria galligena*) with a characteristic roughened or target-like appearance.

Photograph courtesy of Forestry Commission / Robert Strouts

Nectria cankers on ash (caused by *Neonectria galligena*) with a characteristic roughened or target-like appearance.

Photograph courtesy of Forestry Commission / George Gate

Bacterial canker of ash.

Photograph courtesy of Forestry Commission / Suzanne Sancisi-Frey

Bacterial canker of ash.

Photograph courtesy of Forestry Commission / Suzanne Sancisi-Frey

Lesion caused by *Phytophthora syringae* on ash.

Photograph courtesy of Forestry Commission / Suzanne Sancisi-Frey

Lesion caused by *Phytophthora syringae* on ash.

Honey fungus (*Armillaria* spp.) fruiting bodies.

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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.

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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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