Forestry Commission
England

Chalara Dieback of Ash – *Hymenoscyphus fraxineus*

Chalara dieback of ash is a disease of ash trees caused by a fungus called *Hymenoscyphus fraxineus*. It is particularly pathogenic to European ash, *fraxinus excelsior*.

Impact

Chalara has the potential to cause significant damage to the UK's ash population. It has already caused widespread damage to ash populations in continental Europe. It can kill young ash trees quite quickly. Older trees can resist infection for some time until prolonged exposure, or an attack from a secondary pest or pathogen, eventually causes the tree to succumb.

UK scientists have identified the country's first ash tree that shows tolerance to ash dieback, raising the possibility of using selective breeding to develop strains of trees that are tolerant to the disease.

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Keep an eye on the condition of infected ash trees. You may need to prune or fell them if they threaten to fall and cause injury or damage.

You can help to slow the spread of the disease by practising good biosecurity.

Think kit

Clean and disinfect tools, equipment, work boots and vehicle tyres before visiting another site.

Think transport

Make sure that ash wood is free of soil and leaf material before being transported.

Think trees

Where practical collect up and burn or compost fallen ash leaves on site. This will help to disrupt the life cycle of the pathogen.

Symptoms Guide: **Chalara Dieback of Ash**

Crown dieback

Dead or dying tops of infected trees are most obvious during the summer. Sudden foliar collapse may occur as stems and branches are girdled.

(Photo: Ben Jones, Forestry Commission)

Leaf collapse

Wilting and collapsed leaves are most visible in spring and early summer.

Lesions and cankers

Lesions and cankers on stems, branches and shoots are visible throughout the year. Often the lesions are diamond shaped, sunken and with uneven edges, although the appearance can vary.

Compartmentalised cankers

Some cankers may appear dry and cracked and there may be evidence of the tree compartmentalising the infection.

Leaf dieback

The dieback of leaves with brown or sometimes black leaf stalks can be most easily seen throughout summer.

Blackened rachis

Between June and October the black toughened rachises (leaf stalks) can be found in amongst the leaf litter. You may also see the tiny white trumpet shaped fruiting bodies that have emerged from the stalk.

For more details, please visit **www.forestry.gov.uk/ashdieback**

Forestry Commission
England

Massaria Disease of Plane – *Splanchnonema platani*

Massaria, Splanchnonema platani spores
(Courtesy of Bartlett Tree Research Labs)

Massaria disease of plane trees, caused by the fungus *Splanchnonema platani*, is affecting London plane trees (*Platanus x hispanica*) in England. It is associated with branches dying back and an increased risk of failure.

Distribution

It was found in living plane trees in London in 2009 and Bristol more recently. In 2009 tree management teams in London working on plane began to notice large lesions and branch drop. Similar symptoms have been seen on lesions of plane trees in mainland Europe, most notably in Germany, Austria, the Netherlands and parts of France.

Impact

London plane trees are widely planted in towns and cities as shade and amenity trees, so the presence of the disease can be a significant public safety issue for their owners; many of which are local authorities. The dead wood has to be removed before it becomes an unacceptable hazard.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

There is no available treatment for the disease apart from removing diseased branches before they become an unacceptable safety hazard. People who work on plane trees can help to minimise the rate of spread by practising good biosecurity.

Think kit

Clean and disinfect tools and equipment, and wash and dry ropes before using them to work on another tree.

Think transport

Remove any build up of soil or organic material from vehicles and machinery before moving on to a new site.

Think trees

Destroy all infected material through incineration or deep burial, either on site or at a licensed waste handling facility.

Symptoms Guide: **Massaria Disease of Plane**

Pinkish hue

The disease first appears as a pinkish strip on the upper surface of the branch.

(Photo: Ian Keen LTD)

Cambium death

Affected branches suffer death of the bark and cambium (the layer of tissue just under the bark), which can affect up to 30% of the branch circumference.

Extending lesion

The infection develops into a lesion extending from a union with the parent branch or stem. These lesions can extend many metres, but because they affect the upper part of the branch, infection can be difficult to see from the ground.

(Photo: Ian Keen LTD)

Wood decay

Lesions are associated with wood decay, characterised by soft rot, often resulting in the death and / or the fracture of the branch. Arboriculturalists with London's Royal Parks have seen branch failure within three months of the symptoms first becoming noticeable, but branch failure can occur after one or more years.

(Photo: London Tree Officers Association)

For more details, please visit **www.forestry.gov.uk/massaria**

Forestry Commission England

Acute Oak Decline – AOD

Acute Oak Decline (AOD) is a disease affecting several thousand native oak trees in Britain. It is considered to have first occurred in Britain 30-35 years ago. It mainly affects pedunculate oak (*Quercus robur*) and sessile oak (*Quercus petrea*), however other species of oak can also be affected.

The larval galleries of the buprestid beetle, *Agrilus biguttatus*, are usually found in association with lesions. Various species of bacteria have been isolated from these lesions. The high co-occurrence of the beetle and the bacteria suggests that these agents play a role in AOD.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Where possible, infected trees should be left in place, monitored and cordoned off to prevent access.

Where a limited number of trees are infected, it may be prudent to fell and destroy the infected individuals to reduce the risk of infecting nearby healthy trees and to reduce inoculum levels.

Minimise the rate of spread by practising good biosecurity.

Think kit

Avoid working on or around infected trees in wet conditions. Clean and disinfect tools and equipment, and wash and dry ropes before using them to work on another tree.

Think transport

Avoid taking vehicles and machines on to infected sites particularly when wet. Wash off any build up of soil or organic material before leaving site and disinfect any areas that have been in contact with infected material.

Think trees

If an infected tree needs to be pruned or felled, strip off the outer bark and the sapwood on site and burn it. Rapid destruction of stripped bark is recommended to prevent the possibility of spreading the disease.

Symptoms Guide: **Acute Oak Decline**

Longitudinal splits

Longitudinal splits form in the cracks between the bark plates. The splits are typically between 5 and 10cm long. They can be close to one another (10-20cm) or spaced further apart.

Stem cracks and bleeds

The bleeding patches usually become visible 1-2 metres above the ground and can extend high into the canopy. In spring, the fluid runs from the splits, down the stem and stains the bark black.

Dried bleed

At certain times of the year the bleeding will stop, leaving dry, black streaks on the stems. The dried fluid can cake or form a crust around the split.

Note: Weeping patches or stem bleeds are a general symptom or host response to tissue attack from a range of pests and pathogens. A stem bleed alone does not indicate AOD.

Lesion under bark

Underneath the outer bark at the bleeding point, the inner bark breaks down creating a lesion, which develops into a fluid-filled cavity.

D-shaped holes

In approximately one third of cases 'D-shaped' exit holes of the beetle Agrilus biguttatus are present in bark plates of affected trees. The 'D-shaped' exit holes are approximately 4mm wide and 3mm high.

Tunneling

Bark removed from trees with symptoms of Acute Oak Decline may show signs of tunneling from the larvae of Agrilus biguttatus.

For more details, please visit **www.forestry.gov.uk/acuteoakdecline**

Forestry Commission England

Oak Processionary Moth – *Thaumetopoea processionea*

Oak processionary moth (*Thaumetopoea processionea*, OPM) was first accidentally introduced to parts of South East England in 2005. European Union legislation was introduced in 2014 that recognises unaffected areas of the UK as being a 'protected zone'.

Impact

To trees: OPM caterpillars can threaten the health of several species of oak trees (Quercus species) because they feed on the leaves. Large populations can defoliate, or strip bare, large parts of oak trees.

To people and animals: The caterpillars have thousands of tiny hairs which contain an irritating substance called thaumetopoein. Contact with the hairs can cause itching, skin rashes and, less commonly, sore throats, breathing difficulties and eye problems.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this pest in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Treatment and management should only be undertaken by professionals who have the appropriate training and equipment to undertake the work safely.

You can help to slow the spread of the pest by practising good biosecurity.

Think kit

Tree surgeons and others working on or close to oaks in affected areas are strongly advised to wear protective clothing.

Think transport

Oak material from arboricultural works should not be transported out of affected areas in to other 'protected zone' areas of the UK.

Think trees

Oak trees moving from EU members states in to the UK 'protected zone' must be accompanied by a plant passport, confirming that the plants are free from OPM.

Symptoms Guide: **Oak Processionary Moth**

Skeletonised leaves

OPM caterpillars feed on oak leaves leaving only the skeletonised remains.

OPM nest

OPM caterpillars build white, silken nests – usually domed or tear drop shaped – on oak trunks and on the underside of branches.

Discoloured nest

As the caterpillars grow and shed their skins, the nests become discoloured.

Caterpillars procession

The caterpillars move in nose to tail processions in oak trees and on the ground – hence their common name.

OPM caterpillars

Whilst feeding, the caterpillars will often cluster together.

OPM rash

Sometimes, the first indication that there are OPM caterpillars and nests in the area, is when people start to get itchy rashes on their skin.

For more details, please visit **www.forestry.gov.uk/oakprocessionarymoth**

Forestry Commission England

Phytophthora ramorum

Phytophthora ramorum is a fungus-like pathogen which causes extensive damage and mortality to a wide range of trees and other plants. In 2009, *P. ramorum* was found infecting and killing large numbers of Japanese larch. This was the first time it had been found causing lethal infection on a commercially important conifer species anywhere in the world.

Sweet Chestnut has frequently been found to be infected with *P. ramorum* when in close association with infected larch and rhododendron. However, in 2015, infected sweet chestnut stands were found in locations not containing other known sporulating host species.

Phytophthora pathogens can be spread on footwear, vehicle tyres, tools and equipment. Movement of infected plants is also a key means of spreading it over long distances.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Infected trees and shrubs will need to be felled as quickly as possible after detection of the disease in order to break the life cycle of the organism. It is vital that this happens before the next spring or autumn when sporulation begins.

You can help to slow the spread of this disease by practising good biosecurity.

Think kit

Before leaving site, all soil and organic material should be removed from footwear, outerwear and equipment, before being washed, cleaned and sprayed with an approved disinfectant.

Think transport

Vehicles that have gone off-road or have been driven on roads that are wet, muddy or littered with organic material must be cleaned using a pressure washer before leaving the site.

Think trees

Any movement of Phytophthora-affected wood from a forest site requires a Movement Licence. Phytophthora-affected wood may only be moved to a facility that holds a valid processing licence.

Symptoms Guide: *Phytophthora ramorum*

IN LARCH:

Crown and branch dieback

Crown and branch dieback is likely to be present with distinctive gingering colour when branches are girdled.

IN RHODODENDRON:

Leaf necrosis

On Rhododendron the infection can show as either the blackening of the leaf along the mid-vein or as necrosis at the leaf tip.

(Photo: Joseph OBrien, USDA Forest Service, Bugwood.org)

Bleeds

The tree reacts to the pathogen by producing resin, which shows on the stem and branches as a white bleed (not seen on infected Sweet Chestnut trees).

ON SWEET CHESTNUT:

Lesions

On sweet chestnut, lesions in infected foliage can spread into shoots and eventually into the stem, causing crown dieback. Infected sweet chestnut does not exhibit stem bleeds.

Orange and purple mottling

Removing the bark from under the bleeds will show a purple and orange mottling where healthy tissue, necrotic tissue and reaction zones are in close proximity.

Excessive epicormic growth

Infected trees will often display excessive epicormic growth with symptomatic foliage occurring in abundance low on the stem.

For more details, please visit **www.forestry.gov.uk/pramorum**

Forestry Commission
England

Oriental Chestnut Gall Wasp – *Dryocosmus kuriphilus*

The Oriental Chestnut Gall Wasp (OCGW) - *Dryocosmus kuriphilus* is a native of China which was discovered for the first time in Britain, in South-East England, in 2015. It has been widespread in Continental Europe for some time.

Its larvae cause galls, or bulbous growths, to form on the leaves of sweet chestnut trees (*Castanea sativa*). The galls can reduce the plant's ability to photosynthesise, which can result in reduced growth and fruiting. OCGW is the only insect known to form galls on sweet chestnut, so the presence of galls is a reliable indicator of the pest's presence.

OCGW is thelytokous parthenogenetic – meaning that females lay unfertilised eggs which give rise to only female offspring.

(Photo: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org)

KEEP IT CLEAN

Don't give pests and diseases an easy ride

OCGW is a notifiable pest, so anyone spotting a new case must report it, preferably using the Forestry Commission's Tree Alert online form. **forestry.gov.uk/treealert**

Think kit

When working in or near to a site with OCGW, be sure to thoroughly remove all soil and brash material – leaves and twigs – from your machinery, vehicles and equipment before leaving the site.

Think transport

Any sweet chestnut timber being moved from infested sites or sites close to infested areas must be cleaned entirely free of branch, twig, leaf and soil material before being transported.

Think trees

Sweet chestnut plants being brought into the UK from EU Member States must be accompanied by a plant passport certifying that they have come from an OCGW-free area. In addition, the Animal & Plant Health Agency (APHA) must be notified of all sweet chestnut imports before arrival to enable inspection.

Symptoms Guide: **Oriental Chestnut Gall Wasp**

Infested branch

OCGW galls can easily be seen on new stem growth and on the leaves of low branches.

Galls on midrib or petiole

The galls can be found either in the midrib of the leaf or on the petiole (stalk).

Galls deform leaves

The galls cause the leaf to become deformed. The galls are usually between 5mm and 20mm long. Young galls start off green or rose pink. Later they turn red and then woody brown.

New and old galls

Galls which develop on stems or petioles shrink and become woody if they are retained on the tree. They will often remain on the tree for two or more years.

Gall wasp

The adult wasp is typically about 2.5mm long with a black body, translucent wings and orange legs. Its small size means that it is unlikely to be seen by most people.

Kink in leaf

Some sweet chestnut leaves display small kinks which slightly distort them. These can be caused by OCGW galls, but not always, as in this case.

For more details, please visit **www.forestry.gov.uk/gallwasp**

Forestry Commission
England

Pine Processionary Moth – *Thaumetopoea pityocampa*

Pine Processionary Moth (PPM), *Thaumetopoea pityocampa,* is not currently known to be in the UK. PPM has been extending its range across Europe, moving northwards through France since the 1990s.

Impact

To trees: In large numbers, PPM can defoliate trees, weakening them and making them more susceptible to other threats.

To people and animals: The caterpillars have thousands of hairs which contain an irritating substance called thaumetopoein. Contact with the hairs can result in painful skin irritation and rashes, allergic reactions, breathing difficulties and eye problems.

(Photo: John H. Ghent, USDA Forest Service, Bugwood.org)

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a case of this pest, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Help to keep the UK free of this pest by ensuring pine trees for planting come from pest free areas.

Think kit

As with all pests which pose a health risk, treatment and management should only be undertaken by professionals who have the appropriate training and equipment to undertake the work safely.

Think transport

Infected pine trees or plants should not be transported out of affected areas. The risk of spread through the movement of plants is greater than natural means of spread.

Think trees

You must inform the Animal and Plant Health Agency (APHA) if you're bringing pine trees into England and Wales from other EU member states. Pine from non EU countries is prohibited.

Symptoms Guide: **Pine Processionary Moth**

PPM nests

PPM caterpillars build white, silken nests during the winter and are usually found in the branches and foliage of infected trees.

Defoliation of needles

PPM caterpillars feed on the pine needles at night. Complete defoliation can occur if the level of infestation is high enough.

(Photo: William M. Ciesla, Forest Health Management International, Bugwood.org)

PPM caterpillars

Hairy, and orange-brown in colour with blue bands and a black head. Most likely to be seen in winter and early spring.

Caterpillars procession

The caterpillars move about in nose-to-tail processions on the ground in early spring before pupating in the soil.

Pine Processionary Moth

Adult PPMs have cream forewings with brown markings, and white hindwings, with a wingspan of 30-45 mm, and fly from May to July.

Discoloured nests

Overtime, the nests can become discoloured and damaged. They remain a health risk as the hairs of the caterpillars will still be present.

(Photo: Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org)

For more details, please visit **www.forestry.gov.uk/pineprocessionarymoth**

Forestry Commission
England

Xylella fastidiosa – Bacterial leaf scorch

Xylella fastidiosa is a bacterium which causes disease in a wide range of woody plants, such as citrus and olive trees and in grape vines. Whilst not known to be present in the UK yet, it has the potential to infect several species of broadleaf trees widely grown here.

Xylella fastidiosa restricts or blocks the movement of water and nutrients through the plant with serious consequences, including death for some host plants. The pathogen is exclusively transmitted by xylem-fluid feeding insects. There are several species of insects in the UK which could spread *Xylella fastidiosa*, including the common froghopper.

There are four known sub-species of the bacterium. In the UK the strain which would cause most concern is *Xylella fastidiosa subspecies multiplex*, which has the potential to infect the widest range of host plants, including Britain's native pedunculate oak and wych elm, as well as plane and northern red oak.

(Photo: John Hartman, University of Kentucky, Bugwood.org)

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Although *Xylella fastidiosa* is not known to be present in the UK, there is a heightened risk of it being accidentally introduced since it was discovered in Italy in 2013, and then in Corsica and mainland France in 2015.

You can help to slow the spread of this disease by practising good biosecurity.

Think kit

The cleaning and disinfecting of any tools used on trees, especially those suspected to be affected by a serious tree pathogen, is considered to be good practice.

Think transport

Regulations are in place which restrict movements of specified host plants from the infected regions within the EU, and from countries outside the EU, to reduce the risk of entry.

Think trees

Landings of host species such as plane, elm, prunus species and oak, must be pre-notified to the Animal and Plant Health Agency (APHA) in order to enable inspection.

Symptoms Guide: *Xylella fastiosa spp. multiplex*

Symptoms vary depending on the host plant species and its degree of susceptibility.

Leaf margins

The characteristic leaf symptoms, which are visible in summer, include browning at the leaf margins.

(Photo: John Hartman, University of Kentucky, Bugwood.org)

Central veins remain

The last part of the leaf to be affected are the central veins.

(Photo: Theodor D. Leininger, USDA Forest Service, Bugwood.org)

Yellow halo

Can be distinguished from other scorch-like symptoms by the presence of a yellow halo between the area of marginal leaf necrosis and green leaf tissue.

(Photo: John Hartman, University of Kentucky, Bugwood.org)

Dieback

Severe infections in some of the most damaging combinations of host plant and Xylella sub-species can result in dieback, stunting and eventual death.

(Photo: John Hartman, University of Kentucky, Bugwood.org)

A number of other disorders can produce symptoms similar to those caused by *Xylella fastidiosa*, including:

Anthracnose of Plane

Anthracnose on plane trees caused by the fungus Apoignomonia veneta, which results in twig death and leaf blight.

Guignardia aesculi

Infection of horse chestnut trees by the Guignardia aesculi fungus, causes a brown leaf blotch with a yellow halo.

For more details, please visit **www.forestry.gov.uk/xylella**

Forestry Commission
England

Plane Tree Wilt (Canker Stain of Plane) – *Ceratocystis platani*

The ascomycete fungus *Ceratocystis platani* causes canker stain, also known as plane tree wilt, on several plane species, including London plane (*Platanus x acerifolia*) and its parents, *P. orientalis* and *P. occidentalis*.

It originates from the eastern United States. Although it has not been detected in the UK, it has been reported in several European countries, with serious losses of shade trees reported in Greece and south-east France, where trees have died within 3–7 years.

C. platani infection causes pronounced xylem staining, severe wilting and tree death. It could pose a significant risk in the UK, where plane is an important urban amenity species.

It can be easily spread through the movement of infected material (e.g. sawdust, soil, wood), contaminated tools and in water. The fungus produces resilient, long-lived spores which can persist in soil and on unsterilised pruning tools.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a case of this disease, you must report it through our Tree Alert online form at: **forestry.gov.uk/treealert**

Plane tree wilt can be easily spread by human activity such as tree felling and pruning. We can all help to slow its spread by practiscing good biosecurity.

Think kit

Clean and disinfect any equipment and PPE which has been used on trees, especially trees suspected to be affected by a pest or disease. Equipment used abroad should be sterilised before going, and again before returning.

Think transport

Movements of infected soil and sawdust on vehicles and machinery are primary pathways for spreading this disease. All machinery and vehicles should therefore be jet washed to remove any soil before leaving sites where it is suspected.

Think trees

All plane plants imported from elsewhere in the European Union must be accompanied by a plant passport. All landings of plane tree plants must be notified to the Animal Plant Health Agency (APHA) to enable inspection.

Symptoms Guide: **Plane Wilt (Canker Stain of Plane)**

Chlorotic foliage

The first visible symptoms will be sudden wilting and chlorosis (yellowing) of foliage, usually on a single branch, leading to more extensive dieback of the crown. Infection through root grafts can lead to sudden die-back of the whole crown.

Radial discolouration

In cross- section, black discolouration of the parenchymatic rays might be visible, extending radially in to the sapwood. This is a key indicator of C.eratocystis platani infection.

(Photo: Nikoleta Soulioti, FRIA, Greece)

Longitudinal cracks and lateral blistering

A canker might be visible in thin-barked trees through a change in the bark. There can be small, longitudinal cracks or lateral blisters between areas of healthy and necrotic (dying) tissue.

Vertical cracks can also be seen during the spring growth period.

Sunken lesions and vertical cracks

These can indicate C. platani infection, but can also be caused by other pathogens or external factors. Sunken bark lesions can appear on younger, thin-barked trees. Where C. platani is the cause, the margin of the canker displays orange/purple streaking. Wetting the bark can help when looking for these symptoms.

Necrosis under the bark

A sharp line of change between healthy, light green or pink tissue and necrotic, dark brown tissue under the bark indicates the presence of a canker. Cankers caused by C. platani will show no signs of compartmentalisation.

Other causes of similar symptoms

Fomituporia punctata (also known as Phellinus punctatus), has been found on London planes in South East England since 2008. F. punctata causes lesions on the bark, but the tree will usually compartmentalise the infected wood. The flat, buff fruiting bodies of this fungi are sometimes visible.

(Photo: Prof Lucio Montecchio, University of Padova, Italy)

For more details, please visit **www.forestry.gov.uk/planetreethreats**

Forestry Commission England

Asian Longhorn Beetle – *Anoplophora glabripennis*

Asian Longhorn Beetle (ALB), *Anoplophora glabripennis*, is a native of China and the Korean peninsula, and poses a serious threat to a wide range of broadleaved trees. It has caused extensive damage to trees in the USA and Italy since being accidentally introduced there in recent years.

In March 2012 a breeding population was confirmed by Forest Research scientists in the Paddock Wood area, near Maidstone in Kent. Fortunately this outbreak was detected before the adult beetle emergence period, which provided time to inspect and deal with infested trees.

Analysis of climate data suggests that most of England and Wales and some warmer coastal areas of Scotland are suitable for beetle establishment.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this pest in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

You can help to slow the spread of this pest by practising good biosecurity.

Think kit

This pest is too large to be moved on kit without noticing. However, regular cleaning and disinfecting tools used on trees is considered to be good practice.

Think transport

Untreated wood packing is a known pathway for Asian Longhorn Beetles. All wood packaging material imported into the EU should be marked to show that it has been treated to reduce the risk of carrying quarantine pests.

Think trees

This pest is regulated, so movement of plants, logs and wood from infested areas is subject to statutory controls.

Symptoms Guide: **Asian Longhorn Beetle**

Distinctive beetles

The adult beetles are large, about 20 - 40mm long and shiny black with variable white markings and long antennae.

Pits

Where the adults lay eggs, there are often oval shaped pits scraped into the bark. On occasion, sap will be visible, bleeding from the damaged areas.

(Photo: Dennis Haugen, USDA Forest Service, Bugwood.org)

Damage increases as the larvae grow

Galleries may be up to 10 mm in diameter and several cm long. The larvae moult to a pupal stage when they are mature within a well-defined chamber packed with distinctive wood 'shavings'.

Exit holes

Large circular exit holes are made by the emerging adult beetles in the upper part of the trunk and branches. The holes are usually 10 mm in diameter.

Frass

Other signs which might be present, but less obvious, include piles of sawdust at the base of infested trees.

Citrus Longhorn Beetle – *Anoplophora chinensis*

The Asian Longhorn Beetle is almost identical in appearance to Citrus Longhorn Beetle, another non-indigenous longhorn beetle that threatens trees in Britain.

Exit holes at the base

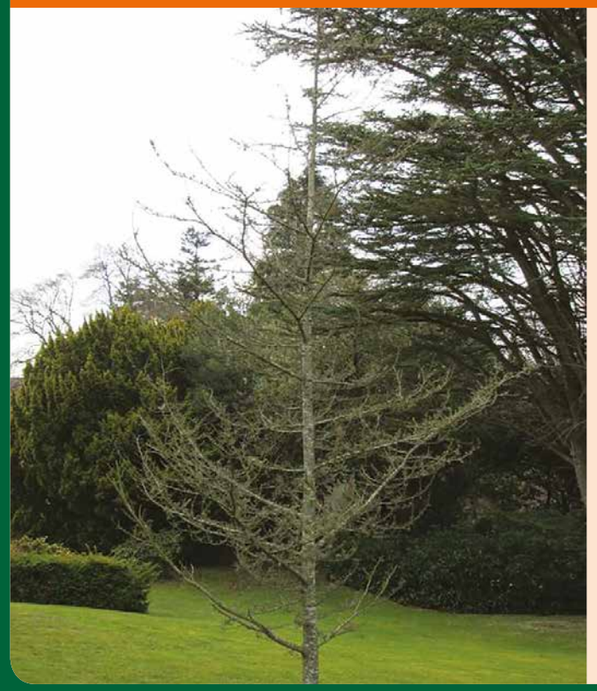
The Citrus Longhorn Beetle will attack many of the same species of broadleaf trees; however, unlike ALB, it will usually lay its eggs near to the base of host trees.

(Photo: Art Wagner, USDA - APHIS, Bugwood.org)

For more details, please visit **www.forestry.gov.uk/asianlonghornbeetle**

Forestry Commission England

Sirococcus tsugae



In recent years severe shoot blight and defoliation of Atlantic Cedar has been reported from a range of locations in Britain. In late autumn 2013, samples from affected trees were received by Forest Research and the fungus *Sirococcus tsugae* was identified as being consistently associated with these symptoms.

In the United States *Sirococcus tsugae* has been confirmed on both cedars (*Cedrus Atlantica* and *C. deodara*) and hemlocks (*Tsuga heterophylla* and *T. mertensiana*). Recently, it has also been detected on Eastern Hemlock (*T. Canadensis*).

Cedrus and *Tsuga* species are valuable ornamental and forestry species in UK. Although much uncertainty remains concerning the geographical distribution of biology and potential impact of *Sirococcus tsugae* in Britain, it may cause considerable damage to valuable ornamental trees in public and private gardens and economic losses, in particular for the nursery sector.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Pathways for spread include planting stock, foliage and seeds of infected *Cedrus* and *Tsuga* specimens. All infected material should be destroyed on site, either through incineration or deep burial.

You can help to slow the spread of the pest by practising good biosecurity.

Think kit

Before leaving site; footwear, outerwear and equipment should have all soil and organic material removed and washed clean before being sprayed with an approved disinfectant.

Think transport

Vehicles and machines that have been used where *Sirococcus tsugae* infection is suspected should be cleaned free of all organic material and soil before leaving site.

Think trees

Cedrus and *Tsuga* planting stock should be inspected for signs of this disease before being planted out. Follow up inspections will help to identify the disease early.

Symptoms Guide: *Sirococcus tsugae*

Needle and shoot dieback

In the spring, affected trees display dead needles and dead shoots.

Branch cankers

Affected shoots may also display cankers and gum bleeds.

Pink needles

The dead needles are very distinctive as they have a characteristic pink colour and only become brown as the season progresses.

Fruiting bodies on dead needles

The fruiting bodies of Sirococcus tsugae may be seen on dead needles and on the surface of cankers during the winter months and into the spring.

Branch cankers

Affected branches will often display indistinct cankers; characterised by a slight reduction in branch diameter and a change of bark colour from green to a darker red / purple. If branches are girdled by the disease, they will die.

Symptoms on Western Hemlock *Tsuga heterophylla*

Shoot blight

On Western Hemlock, the disease is most obvious in the natural regeneration in the understory. It can affect one or many shoot tips on a single tree.

For more details, please visit **www.forestry.gov.uk/fr/sirococcus**

Forestry Commission
England

Phytophthora lateralis

Phytophthora lateralis is a fungus-like plant pathogen which can kill trees, mainly in the genus *Chamaecyparis*. Lawson's cypress *(C.lawsoniana)* is the primary host but other susceptible species include *C.pisifera* (Sawara cypress) and *Thuja plicata* (Western red-cedar). The pathogen attacks and kills the roots of the host, although aerial infections of branches and foliage also occur.

P.lateralis was first discovered in the UK in 2010. There are two lineages present in the UK; one which occurs on the Pacific NW of the USA, and the other which to date has only been found in Scotland. The different genetic lineages suggest that separate, independent introductions have occurred. Lawson cypress and its many cultivated varieties are among the most important conifers in the UK ornamental plant trade.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

You can help to slow the spread of this disease by practising good biosecurity.

Think kit

Before leaving site, all soil and organic material should be removed from footwear, outerwear and equipment, before being washed, cleaned and sprayed with an approved disinfectant.

Think transport

Vehicles that have gone off-road or have been driven on roads that are wet, muddy or littered with organic material must be cleaned using a pressure washer before leaving the site.

Think trees

Infected trees should be felled and destroyed, either by burning, or chipping and deep burial – provided that no other Lawson cypress trees are in the vicinity.

Symptoms Guide: *Phytophthora lateralis*

Attack from the base

When roots and collars/stem bases are affected, the foliage of infected trees initially turns a pale green, then a reddish-brown as the tree dies.

Basal infection

When the outer bark is cut away at the base of infected trees, a discoloured phloem (inner bark) is revealed. It is usually cinnamon brown in colour and there is a distinct colour difference between the infected and healthy tissues.

Aerial infection

The pathogen will also occasionally attack the stem or individual branches.

Isolated patches

Aerial infection causes the foliage to turn bronze or brown in large, isolated patches in the crown.

A number of other disorders can produce symptoms similar to those caused by *Phytophthora lateralis*, such as honey fungus (*Amillaria spp.*) and other root-infecting phytophthoras.

For more details, please visit **www.forestry.gov.uk/plateralis**

Forestry Commission England

Emerald Ash Borer – *Agrilis planipennis*

Emerald Ash Borer (*Agrilus planipennis*) (EAB) is an exotic beetle which causes significant damage to ash trees (*Fraxinus* species). A native of eastern Asia, it is not known to be present in the UK.

EAB is established in parts of North America where it is causing considerable damage. It's thought EAB was introduced in the 1990s via imported wood packaging. It is also present in Russia, and is spreading west and south of Moscow at a rate of up to 25 miles a year.

Ash is an important broadleaf tree in the UK and is already under threat from Chalara ash dieback (*Hymenoscyphus fraxinus*). It's therefore important to take measures to reduce the risk of EAB establishing and to remain observant for any of the symptoms.

(Photo: Leah Bauer, USDA Forest Service Northern Research Station, Bugwood.org)

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this pest in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

Help to keep the UK free of this pest by complying with all import regulations.

Think kit

This pest poses the most risk via the import of ash wood products. However, regular cleaning and disinfecting of tools used on trees are considered to be good practice.

Think transport

Imported ash wood products must originate from areas free of EAB, and comply with all International Standard for Phytosanitary Measures and EU and national regulations, which are specific to the type of wood product.

Think trees

There is a Plant Health Order that prohibits all imports of ash seeds, plants and trees into the UK, and all internal movement of ash seeds, plants and trees.

Symptoms Guide: **Emerald Ash Borer**

Leaf notch

Adult beetles, usually 7.5 – 13.5 mm long, feed on the leaves and create notches on the side of the leaf.

(Photo: Debbie Miller, USDA Forest Service, Bugwood.org)

D-shaped exit holes

Emerging adults produce D-shaped exit holes in the bark, about 3mm in diameter.

(Photo: Kenneth R. Law, USDA APHIS PPQ, Bugwood.org)

Larval galleries

Larval galleries are created as the larva feed between the bark and sapwood. Galleries typically meander and bend sharply, and are packed with frass. Larval galleries can create visible cracks or splits in the bark.

(Photo: Steven Katovich, USDA Forest Service, Bugwood.org)

Epicormic growth

Due to stress, the tree produces epicormic shoots on the trunk and roots, but can also be found in the tree crown, stems and larger branches.

(Photo: Daniel Herms, The Ohio State University, Bugwood.org)

Dieback

Trees show a general yellowing and thinning of foliage, dying branches and crown dieback, typically from the top down.

(Photo: Daniel Herms, The Ohio State University, Bugwood.org)

Woodpecker

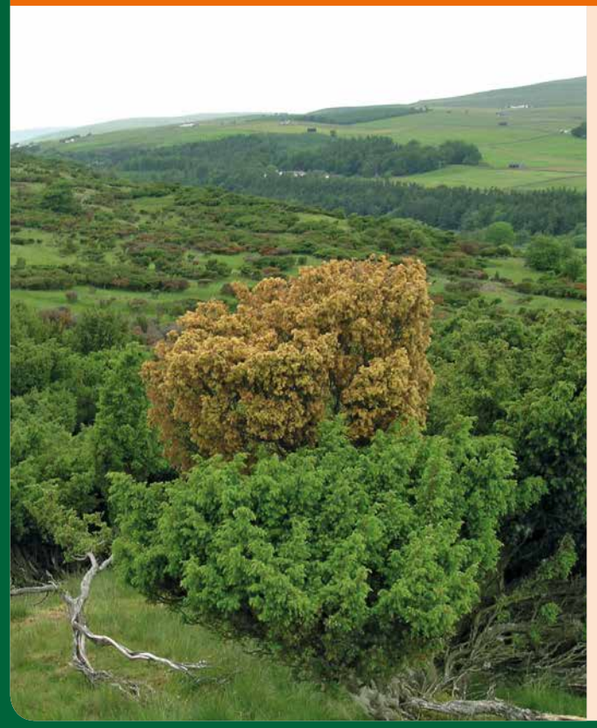
Woodpeckers feed on the beetles and create holes surrounded by light coloured patches where the bark has been stripped away.

(Photo: David Cappaert, Bugwood.org)

For more details, please visit **www.forestry.gov.uk/emeraldashborer**

Forestry Commission
England

Phytophthora austrocedri



Phytophthora austrocedri (P.austrocedri) is a fungus-like pathogen which poses a threat to juniper trees in Britain. This species of Phytophthora was only described in 2007, although it is thought to have been present in Argentina for at least 50 years. The name *'austrocedri'* originates from *Austrocedrus*, the genus of conifer tree in Argentina, first recorded as a host of this pathogen.

Juniper *(Juniperus communis)* is an important native species and a significant proportion of the small area of juniper woodland in Britain is protected. *P.austrocedri* was first reported in the UK in 2011, and infected trees have since been found at sites across Scotland and the north of England.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a new case of this disease in a tree, then report it through the Forestry Commission's online Tree Alert form: **forestry.gov.uk/treealert**

You can help to slow the spread of this disease by practising good biosecurity.

Think kit

Before leaving site, all soil and organic material should be removed from footwear, outerwear and equipment, before being washed, cleaned and sprayed with an approved disinfectant.

Think transport

Vehicles that have gone off-road or have been driven on roads that are wet, muddy or littered with organic material must be cleaned using a pressure washer before leaving the site.

Think trees

Juniper is foraged for use in food and drink, and cuttings have been taken from sites for re-stocking programmes. Plant material, including the berries, should not be removed from infected sites.

Symptoms Guide: *Phytophthora austrocedri*

Decline in vigour

Healthy, vibrant looking individual juniper trees may be in close proximity to trees in decline.

Onset of decline

The first sign of decline in juniper is the foliage turning a dull green.

Bronze foliage

As the disease progresses, the crown of infected trees will become a bronze/brown colour. The pathogen will also occasionally attack the stem or individual branches, causing patches of bronze coloured foliage in amongst healthy foliage.

Discoloured phloem

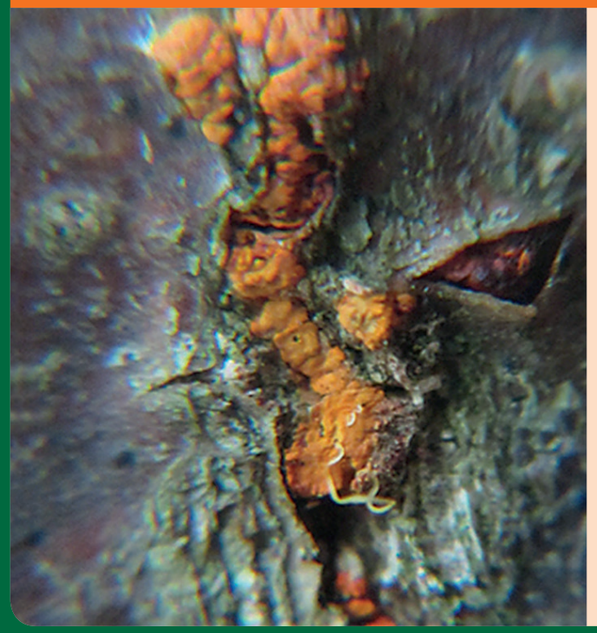
When the outer bark of the tree is cut away at the infected area, discoloured phloem (inner bark) is revealed. The diseased tissue is usually a cinnamon brown colour with yellow lesion edges and may have resin islands present. Healthy tissue is white.

A number of other disorders can produce symptoms similar to those caused by *Phytophthora austrocedri*, such as *Phytophthora cinnamomi*. Heavy snow or drought may also cause similar browning but there would be no associated lesions.

For more details, please visit **www.forestry.gov.uk/paustrocedrae**

Forestry Commission
England

Sweet Chestnut Blight – *Cryphonectria parasitica*



Sweet chestnut blight, caused by a fungus of Asian origin called *Cryphonectria parasitica*, is not known to be established in the UK. However, it was confirmed at two nut orchards in 2011, and on a single tree in Kent in 2016. Follow-up surveys found no further evidence of the disease, although other plants from the same consignments were traced and destroyed as a precaution.

The pathogen has caused severe losses of American sweet chestnut *(Castanea dentata)* in North America, and regionally significant losses of European sweet chestnut *(C. sativa)* in continental Europe, where it is now widespread.

The fungus does not affect horse chestnut trees *(Aesculus hippocastanum)*, but it can affect some species of oak.

KEEP IT CLEAN

Don't give pests and diseases an easy ride

If you think you have spotted a case of this disease, please report it through the Forestry Commission's on-line Tree Alert form at **forestry.gov.uk/treealert**

In order to prevent the spread of this pathogen from an infection site; all potentially infected material would need to be destroyed, either through incineration or deep burial.

You can help to slow the spread of this disease by practising good biosecurity.

Think kit

If working on a site suspected to have the disease, all footwear, outerwear and equipment must be free from soil and organic material before leaving.

Think transport

The pathogen can exist as a saprotroph (feeding on dead organic material) allowing it to persist even when the infected trees have been removed. It's therefore very important that organic material from a suspected or confirmed site is not transported to a new area.

Think trees

Imported sweet chestnut plants and seeds must be accompanied by a plant passport declaring them to have originated from an area free of the disease. Imports must also be pre-notified to the plant health authorities to enable inspection.

Symptoms Guide: **Sweet Chestnut Blight**

Retained leaves

Leaves wilt and turn brown, but remain hanging on the tree. Below the canker, branches have healthy foliage.

Epicormic growth

Epicormic shooting below the canker are a visible sign that the stem has been completely girdled by chestnut blight.

Canker symptoms

On young, smooth-barked branches, the cankered bark can be a bright brown. On older stem infections, the discoloration or sunken nature of the infected bark is much less obvious.

Fruit bodies

Masses of yellow-orange to reddish-brown pustules, the size of a pin-head, develop on infected bark. These fruit bodies erupt through lenticels and exude long, orange-yellow tendrils of spores in moist weather.

Mycelial fans

Pale brown mycelial fans form in the inner bark, although these can only be revealed by cutting away the outer bark.

Split bark

Sometimes the disease's progress is slow and new layers of bark form under the affected areas, so that swelling and subsequent cracking of the outer bark occurs.

For more details, please visit **www.forestry.gov.uk/chestnutblight**