BACTERIAL TREE DISEASE FACT SHEETS

BAC-STOP
STOP BAD BACTERIA ON OAK

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DISEASES OF WOODLAND TREES CAUSED BY *LONSDALEA* SPECIES

Bacterial species belonging to the genus *Lonsdalea* have been isolated from diseased trees, specifically oak, poplar and willow. They cause blights and cankers, and are also associated with the pathobliome of acute oak decline (AOD). Some confusion may exist regarding naming, as *Lonsdalea quercina* was called *Brenneria quercina* and was divided into several subspecies (*L. quercina* ssp. *britannica*, *L. quercina* ssp. *iberica* and *L. quercina* ssp. *populi*). These subspecies have been elevated to species level and *Lonsdalea* currently consists of *L. quercina*, *L. britannica*, *L. iberica* and *L. populi*.

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Forest Research

DRIPPY ACORN AND DRIPPY SHOOT BLIGHT OF OAK

Symptoms of drippy acorn blight on coast live oak acorn cupules - Colorado, USA.
Courtesy R. Sitz

Rotting acorns as a result of drippy acorn blight infection - Colorado, USA.
Courtesy R. Sitz

Causal organism: *Lonsdalea quercina*
This bacterial species attacks different parts of the oak tree and is the cause of both drippy acorn blight and drippy shoot blight (sometimes just called drippy blight).

Host species

Coast live oak (*Quercus agrifolia*) and interior live oak (*Quercus wislizeni*) are affected by drippy shoot blight, while northern red oak (*Quercus rubra*), pin oak (*Quercus palustris*) and Shumard oak (*Quercus shumardii*) are susceptible to drippy acorn blight.

Distribution

Drippy acorn blight was first reported in California in 1967, but by 2018 it had made an appearance in Colorado, together with drippy shoot blight. However, these two forms of the disease now have a wider global distribution and are present in North America (California and Colorado), China and Europe (Italy and Spain).

Occurrence in the UK

L. quercina has not been detected in the UK.

Status: Based on preliminary assessments, statutory action may be taken against disease findings.

DRIPPY ACORN AND DRIPPY SHOOT BLIGHT OF OAK

Symptomatic oak exhibiting symptoms of drippy shoot blight including witch's broom and dieback - Colorado, USA.
Courtesy R. Sitz

Internal symptoms of drippy shoot blight including streaking and cankers - Colorado, USA.
Courtesy R. Sitz

Symptoms of the disease

Acorn drippy blight is characterised by clear gummosis of acorns in their cupule, and the fluid may appear frothy. Once infected, the acorns do not develop further but rot and fall from the cupule where a brown lesion remains. Bacteria establish at wound sites caused by seed-feeding weevils, filbertworms, and cynipid gall wasps.

Drippy shoot blight is initially characterised by leaf scorching and leaf drop, followed by dieback of thinner twigs throughout the canopy. Branch cankers form and twigs become brittle and snap off. At the point of breakage, new shoot growth often results in small witch's brooms, or twig dieback from successive years may result in major limb dieback. Copious exudate drips from cankered or damaged twigs, particularly in northern red oak. Wounding associated with kermes scale-feeding injuries may provide entry or exit courts for the pathogen.

Control measures

There are no effective methods to control *L. quercina*-associated dripping from oaks. However, dripping is sporadic and does not occur every year. Where dripping is a problem, wash residue from surfaces with soap and water. Physically removing acorns from the trees may reduce dripping, and pruning branches to reduce canopy overhang in sensitive areas (e.g., driveways, patios, roof surfaces) can reduce potential dripping. However, extensive pruning or removing large limbs does wound trees. Reduce as much stress as possible in infected trees through proper fertilisation, watering and pest control practices to avoid long-term damage. Always surface sterilise equipment before and after pruning and dispose of the pruned material by burning on site.

Status: Based on preliminary assessments, statutory action may be taken against disease findings.

ACUTE OAK DECLINE (AOD)

Symptoms of AOD, including weeping stem bleeds, on *Quercus robur*

Fluid between cracked bark plates caused by decaying underlying tissue.

Causal organism: *Lonsdalea britannica*
This bacterial species is considered an infrequent component of the pathobiome of bacteria causing AOD.

Host species

In the UK, AOD mainly affects mature (older than 50 years) pedunculate (*Quercus robur*) and sessile oak (*Quercus petraea*). There are no documented reports of *L. britannica* being associated with the AOD pathobiome in countries other than the UK.

Distribution

L. britannica is isolated sporadically from native oak suffering from AOD in the UK.

Occurrence in the UK

AOD is present in warm, drought-prone parts of the UK where there are also high levels of airborne nitrogen pollution and low dry sulphur levels. It is found mostly in south-eastern, central and eastern England, and in the Welsh Borders and South-East Wales. As of 2020 it had not been reported in Scotland or Northern Ireland.

Status: Non-quarantine

ACUTE OAK DECLINE (AOD)

Longitudinal stem bleeds on *Quercus robur*.
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D-shaped exit holes caused by two-spotted oak buprestid beetles (*Agrilus biguttatus*)
©Crown copyright. Forest Research

Status: Non-quarantine

Symptoms of the disease

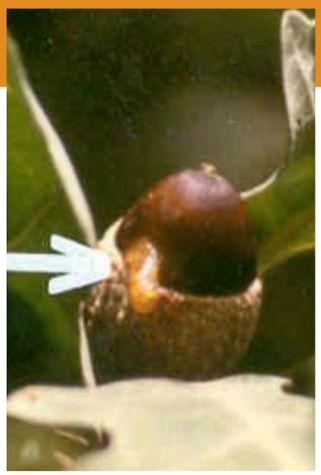
Affected trees have dark-coloured, vertical, weeping fissures, known as stem bleeds or cankers, which seep black fluid through vertical cracks between bark plates and down the trunks. A lesion (decayed tissue) forms in the live tissue beneath the bleeds. This seeping fluid can dry and cake on the tree stems at certain times of the year. D-shaped exit holes of emergent two-spotted oak buprestid beetles (*Agrilus biguttatus*) are often found on bark panels close to bleeds. Larval galleries belonging to these beetles are frequently associated with the lesions.

Control measures

A number of different plant pathogens can cause bleeding cankers on oak stems. It is therefore important to ascertain the cause of a bleeding canker by recording the location of the tree, taking photos of stem bleeds and associated D-shaped buprestid beetle holes, and sending this information together with swabs of the bleeds to Forest Research. Forest Research have developed a rapid test to detect the bacteria involved in AOD.

If laboratory tests together with photographic evidence confirm that an oak tree has AOD, general advice is to leave infected trees in place and continue to monitor, unless there is immediate concern about safety. Try to minimise any contact with bleeds to reduce the possibility of transferring the disease from tree to tree. However, if only a limited number of trees appear to be infected on a site, and most are of the same oak species, it may be prudent to fell and destroy the infected individuals – to keep infection levels low and reduce the risk of infecting healthy trees. When felling trees, equipment should be thoroughly disinfected to prevent spread of bacteria to other trees. Logs and branches should not be removed until the bark and sapwood has been stripped away.

DRIPPY NUT AND BARK CANKER OF OAK



Symptoms of drippy nut including oozing of the acorn cup (left) and leaf bud (right) - Spain.
Courtesy C. Poza-Carrion

Symptoms of bark canker following inoculation with *L. iberica* - Spain.
Courtesy C. Poza-Carrion

Causal organism: *Lonsdalea iberica*

Host species

Both holm oak (*Quercus ilex*) and Pyrenean oak (*Quercus pyrenaica*) display symptoms of bark canker, while drippy nut has been observed on holm oak acorns and drippy buds on Pyrenean oak.

Distribution

Drippy nut and bark canker have been reported in central Spain (Madrid and Segovia).

Occurrence in the UK

L. iberica has not been detected in the UK.

Symptoms of the disease

Drippy nut affects growing acorns, with copious, sticky, honey-like sap appearing under the acorn cup causing severe fruit drop. Exudate production has also been observed from leaf buds of Pyrenean oak. Symptoms of bark canker are similar to those characterised for Acute Oak Decline (AOD) with longitudinal lesions ranging from 5 – 20 cm observed on the lower trunk of affected trees. The necrotic lesions extend to the inner bark and copious exudates either white and frothy or reddish-brown are observed usually in autumn and spring.

Control measures

No control measures have been recorded. However, disease symptoms are similar to those outlined for *L. quercina* in the USA and similar control measures should be applied.

Status: Based on preliminary assessments, statutory action may be taken against disease findings.

BACTERIAL CANKER OF POPLAR AND WILLOW

Sypmtoms of bacterial canker of poplar with oozing sap (left) and necrotic water-soaked internal stem tissue (right) - Serbia.
Courtesy M. Zlatkovic

Poplar trees with crown dieback symptoms (left) - Serbia.
Courtesy M. Zlatkovic
Lesions and oozing on the stem of corkscrew willow - China.
Courtesy Y. Li

Causal organism: *Lonsdalea populi*

Host species

Poplar hybrid clones, including *Populus* x *euramericania* and *Populus* x *interamericania,* and corkscrew willow (*Salix matsudana*) are susceptible to bacterial canker.

Distribution

Bacterial canker of poplar is found in large parts of Europe (Hungary, Portugal, Serbia and Spain) and is widely distributed in China, whereas the disease on willow has only been reported in parts of China.

Occurrence in the UK

L. populi has not been detected in the UK.

Symptoms of the disease

The disease is initially characterised by longitudinal cracks in the bark typically on the lower trunk, with clear or whitish sap oozing from the canker. As the disease progresses, the cracks become enlarged with the underlying vascular tissues becoming necrotic and water-soaked. The exudate becomes sticky and foamy with a sour odour and darkens when exposed to air, staining the bark. The underlying lesions are sticky with a creamy mass of oozing exudate. In severe cases, crown die-back occurs and the diseased trees die within weeks. This disease primarily affects timber quality and can lead to tree mortality.

Control measures

Due to the severity of the disease, eradication measures are applied. These include insecticide treatment of the trees to prevent spread of inoculum by insects, and uprooting and incineration of the infected trees.

Status: Based on preliminary assessments, statutory action may be taken against disease findings.

SANITATION GUIDELINES

General bacterial sanitisation guidelines

When pruning diseased trees, always remember the following:

- sanitise pruning shears between each tree pruning
- avoid pruning in wet conditions as water will facilitate the spread of bacteria
- if felling trees, clean and sanitise equipment before coming off site
- avoid moving diseased plant material between sites
- burn diseased plant material where possible
- remember to spray footwear with disinfectant to prevent spread of bacteria from site to site.

Always sanitise with appropriate approved recommended products.

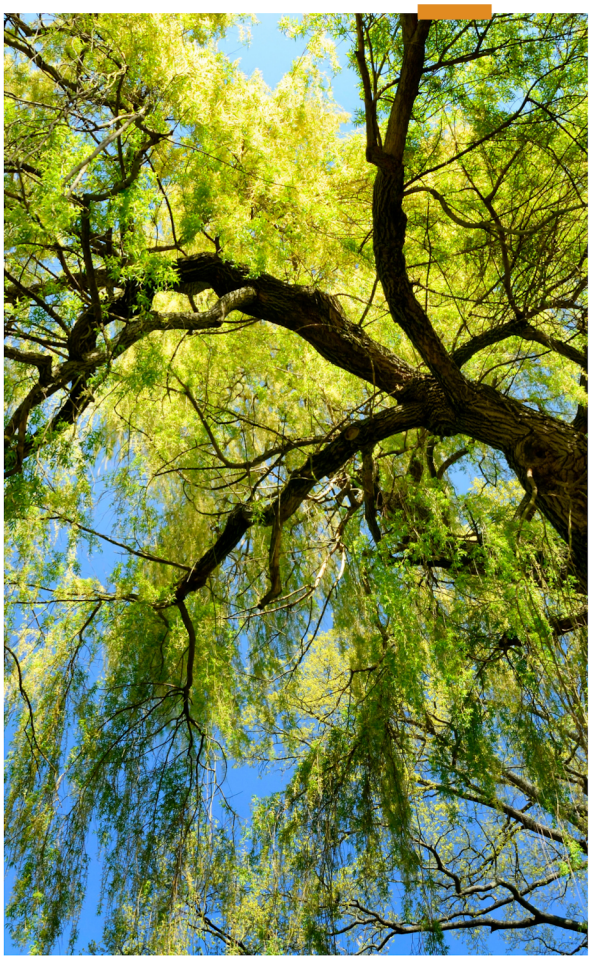
If you are concerned you may have come across any of these pathogens and want to report the disease, please contact Forest Research via TreeAlert:

https://treealert.forestresearch.gov.uk/

For further information, please contact DEFRA:

https://planthealthportal.defra.gov.uk/pests-and-diseases/reporting-a-pestdisease

INFORMATION SOURCES



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EPPO, 2020. Further spread of *Lonsdalea populi* in Europe: first records in Portugal and Serbia. (EPPO Reporting Service no. 11 - Num. article: 2020/251)

University of California, Agriculture and Natural Resources (https://ipm.ucanr.edu/PMG/GARDEN/PLANTS/DISEASES/dripoakacorns.html)

Forest Research Pest and Disease Resources (www.forestresearch.gov.uk/tools-and-resources/fthr/pest-and-disease-resources/)

Bacterial Plant Diseases Programme (bacterialplantdiseases.uk)

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