



IPSN

International Plant
Sentinel Network



BOTANIC
GARDENS
CONSERVATION
INTERNATIONAL

EMERGING PEST AND DISEASE THREATS IN THE UK

BEECH (*Fagus* spp.)



Beech (*Fagus* spp.) are long-lived trees and can reach a height of up to 40m when mature. Beech trees will produce both male catkins and small female flowers in the spring. These are followed by the fruit known as a beechnuts/mast; found in small burrs that drop from the tree in autumn. The following emerging diseases are known to afflict beech trees.

Beech Leaf Disease (BLD)

'Beech Leaf Disease' (BLD) is a new disease of beech trees (*Fagus* spp.) first reported on American beech in Ohio and rapidly spreading to forest and landscaped areas in neighbouring regions. A nematode (*Litylenchus crenatae mccannii*) has been isolated from the symptomatic leaves and buds. The disease is spread both long-distances and locally by infested plants, windborne infested plant material (leaves/ shoots) and leaf/litter/soil infested with nematodes. BLD has recently been described as a syndrome, but further research is needed to assess the potential roles of this nematode and to evaluate if the disease is associated with a complex of pathogens.

BLD is mainly known to affect the American beech (*Fagus grandifolia*), though it is also been observed on European beech (*F. sylvatica*) and Oriental beech (*F. orientalis*). Chinese beech (*F. engleriana*) is also considered as a potential host.

Symptoms

Symptoms of beech leaf disease include: dark bands forming between the veins of leaves (Fig.a); leaves becoming curled, deformed, and shrivelled (Fig. b); premature leaf drop; aborted buds; and thinning canopy. Early symptoms include dark green striped bands between lateral leaf veins and reduced leaf size. Banded areas usually become 'leathery' and leaf curling may be observed. It can be quite helpful to stand underneath the canopy and look upwards as this may help you see the dark bands between the veins of the leaves. As symptoms progress, buds fail to develop, leaf production is reduced and premature leaf drop lead to an overall reduction in canopy cover, ultimately, resulting in death of young trees within 5 years and mature trees within 10 years. In areas where the disease has established, the proportion of symptomatic trees can reach more than 90%. However, some variability in susceptibility and symptom development has been reported. The numbers of nematodes present in symptomatic foliage will fluctuate throughout the year and they can overwinter in buds and fallen leaves.



a) dark-green striped bands between lateral veins of leaves



b) Chlorosis and necrosis of leaves, leathery appearance and reduction in leaf size.



The key diagnostic feature of bands between veins of leaves will not be seen until early summer and then into early autumn. Symptoms become harder to distinguish during autumn due to natural senescence

Petrakia leafspot *Petrakia liobae*

Petrakia liobae (Petrakia leafspot) is an emerging fungal pathogen threatening beech. It is thought to be a European species and not introduced. The fungal pathogen was first discovered in Switzerland in 2008, followed by findings in Germany, Austria, Slovakia and most recently Slovenia in 2018. Infected trees develop brown, irregular leaf spots with sharp, dark borders. These necrotic spots are around 1–50mm in diameter and may merge in cases of heavy infection (Fig.c). Mature lesions may also have tiny white spots of fluffy white propagules (detachable spores) associated with the leaf spot. Look for symptoms in the lower canopy as the *P. liobae* overwinters in leaf litter and re-infects beech trees in the spring.



c) Beech leaves with necrotic spots, blotches and white fluffy propagules caused by *Petrakia liobae*.

REPORT ANY SUSPECTED SIGHTINGS TO _____ DATE: _____

For more information about the IPSN go to: www.plantsentinel.org

Please note: If you see symptoms in your specimens similar to those highlighted above please follow the guidance provided by the Observatree Field guide (<https://www.observatree.org.uk/resource-library/field-identification-guides/>) and report to: TreeAlert <https://www.forestresearch.gov.uk/tools-and-resources/fthr/tree-alert/> (GB) or Tree check <https://www.treecheck.net/twa-ui/#/public/report> (Northern Ireland)

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BEECH LEAF DISEASE

The threat : Beech leaf disease (BLD) is a new disease of beech trees (*Fagus* spp.) first reported on American beech in Ohio and rapidly spreading to forest and landscaped areas in neighbouring regions. A nematode (*Litylenchus crenatae mccannii*) has been isolated from the symptomatic leaves and buds. The disease is spread both long-distances and locally by infested plants, windborne infested plant material (leaves/ shoots) and leaf/litter/soil infested with nematodes. BLD has recently been described as a syndrome, but further research is needed to assess the potential roles of this nematode and to evaluate if the disease is associated with a complex of pathogens. BLD is mainly known to affect the American beech (*Fagus grandifolia*), though it has also been observed on European beech (*F. sylvatica*) and Oriental beech (*F. orientalis*). Chinese beech (*F. engleriana*) is also considered as a potential host.

The IPSN is therefore conducting a survey to monitor the spread of BLD in botanic gardens in European countries. We would be most grateful if you could survey the *Fagus* spp. in your collection using this survey form. As Petrakia symptoms are similar to the damage caused by BLD the survey also includes a section on Petrakia leafspot (*Petrakia liobae*). Please use one form per tree and refer to the accompanying poster for further details and identification help.

Survey Details			
Name of Botanic Garden / Arboretum:			
Country:			
Address:			
Survey carried out by:			
Date of survey:			
Best description of season:			
Tree Details			
Species (cultivar)			
Accession number:			
GPS			
Country/region species is native to:			
Age (years):			
General Description of Health			
Generally healthy	✓	Some damage	✓
Dying	✓	Dead	✓
Any recent changes in health or overall look:			



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BEECH LEAF DISEASE

Symptoms Check Beech Leaf Disease	Symptom observed? If possible please rate the severity of the symptoms from 1-6; 1= No visible symptoms and 6= severe symptoms	Symptoms Check Petrakia leafspot	Symptom observed? If possible please rate the severity of the symptoms from 1-6; 1= No visible symptoms and 6= severe symptoms
Symptom 1: Dark green striped bands between lateral leaf veins		Symptom 1: Brown, irregular leaf spots with sharp dark borders	
Symptom 2: Reduced leaf size		Symptom 2: Necrotic spots around 100mm in diameter	
Symptom 3: Dark bands forming between the veins of the leaves		Symptom 3: Lesions presenting tiny white spots of fluffy white propagules	
Symptom 4: Leaves curled, deformed and shriveled			
Symptom 5: Premature leaf drop, aborted buds, thinning canopy			
Do you think this tree is infected with BLD? (Yes/No)		Do you think this tree is infected with Petrakia spp? (Yes/No)	
Notes:			

BEECH LEAF DISEASE

Instructions: Select between 5 and 10 beech trees, either hedgerow or larger trees, in your local area and examine the foliage for the presence of any symptoms of beech leaf disease (see below). For larger trees, it can be quite helpful to stand underneath the canopy and look upwards; the use of binoculars may be beneficial; this may help you see the dark bands between the veins of the leaves. Please take pictures of any suspicious symptoms. Symptoms to look for can include:

- Dark bands form between the veins of leaves;
- Leaves become curled, deformed, and shrivelled;
- Premature leaf drop;
- Aborted buds;
- Thinning canopy.

For any trees with symptoms please see the sampling method below. If you do not see any symptoms of BLD we are still interested in collecting samples of other lookalike problems and to gain a better understanding of the diversity of pests and pathogens on beech leaves in the UK, in addition to trialling nematode extraction methods as well as the molecular identification techniques.

Sampling Method

- Remove between 5 to 10 leaves per tree, growing points can also be included in the sample if feasible (Fig. 1.). Record the symptoms, 10 figure grid reference and date of sampling on the sheet below. Please seek the permission of the landowner before taking a sample if the trees are situated on private land.
- Sample **30 asymptomatic leaves** of one tree **per site**, if no trees show any symptoms (no cupping, no deformation, no interveinal banding)
- In fall: sample at least **30 beechnuts**. Where there are clearly symptomatic trees: take nuts from these trees
- Symptomatic and asymptomatic leaves can be put in the same bag per tree/location, put nuts in a separate bag with a label corresponding to leaf sample (same code)
- Telescopic pruning shears can be used for leaves that are high in the tree.
- Place the leaves between dry absorbent paper (e.g. kitchen roll, Fig. 2), seal in plastic bag and store in a refrigerator prior to posting. Please avoid sampling leaves when wet as they will rot during transit.



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Fig 1. If feasible, the sample can include growing points in addition to leaves



Fig. 2. Place the leaves between dry absorbent paper (e.g. kitchen roll) before sealing in a plastic bag.



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BEECH LEAF DISEASE

Please label each bag with your name, GPS reference and date of sampling.

Please then send according to your regions to the contact person below by first class post, avoiding weekends:

Belgium:

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Visserij- en Voedingsonderzoek
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