

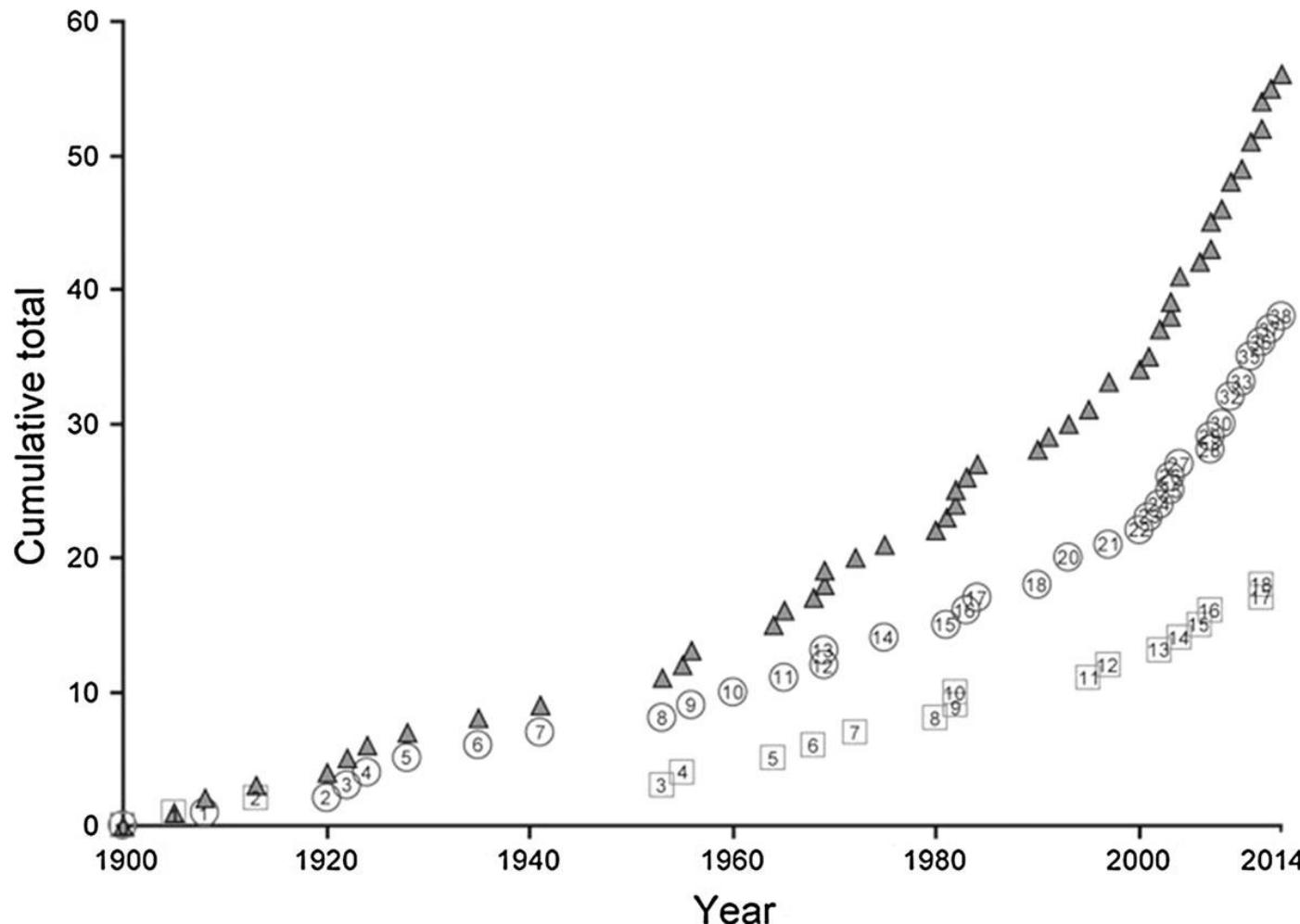
Diseases in more detail

Ana Pérez-Sierra

Forest Research, Alice Holt Lodge, Farnham

London Plane Tree Conference 10th July 2019

- New threats to plant health are constantly emerging



The cumulative numbers of new tree pathogens (circle) and insect pests (square) identified in the UK shown over time since 1900. The total accumulated number of pathogens and pests are also shown (grey triangle). (Freer-Smith & Webber, 2015)



Pine-tree Lappet Moth

Phytophthora lateralis



Phytophthora ramorum in larch

Phytophthora austrocedri



Acute Oak Decline



Chalara dieback of ash



Oak Processionary Moth



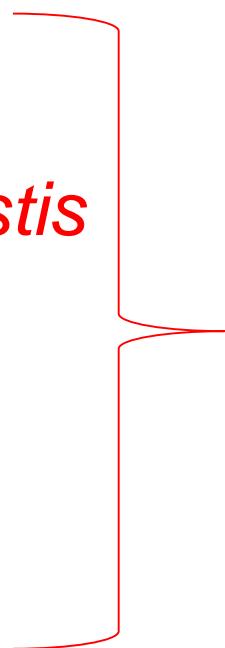
Sweet chestnut blight



Oriental chestnut gall wasp

- Common diseases of London plane

- Canker stain of plane /Plane wilt (*Ceratocystis platani*)
- Bacterial Leaf Scorch (*Xylella fastidiosa*)



Not currently known in UK

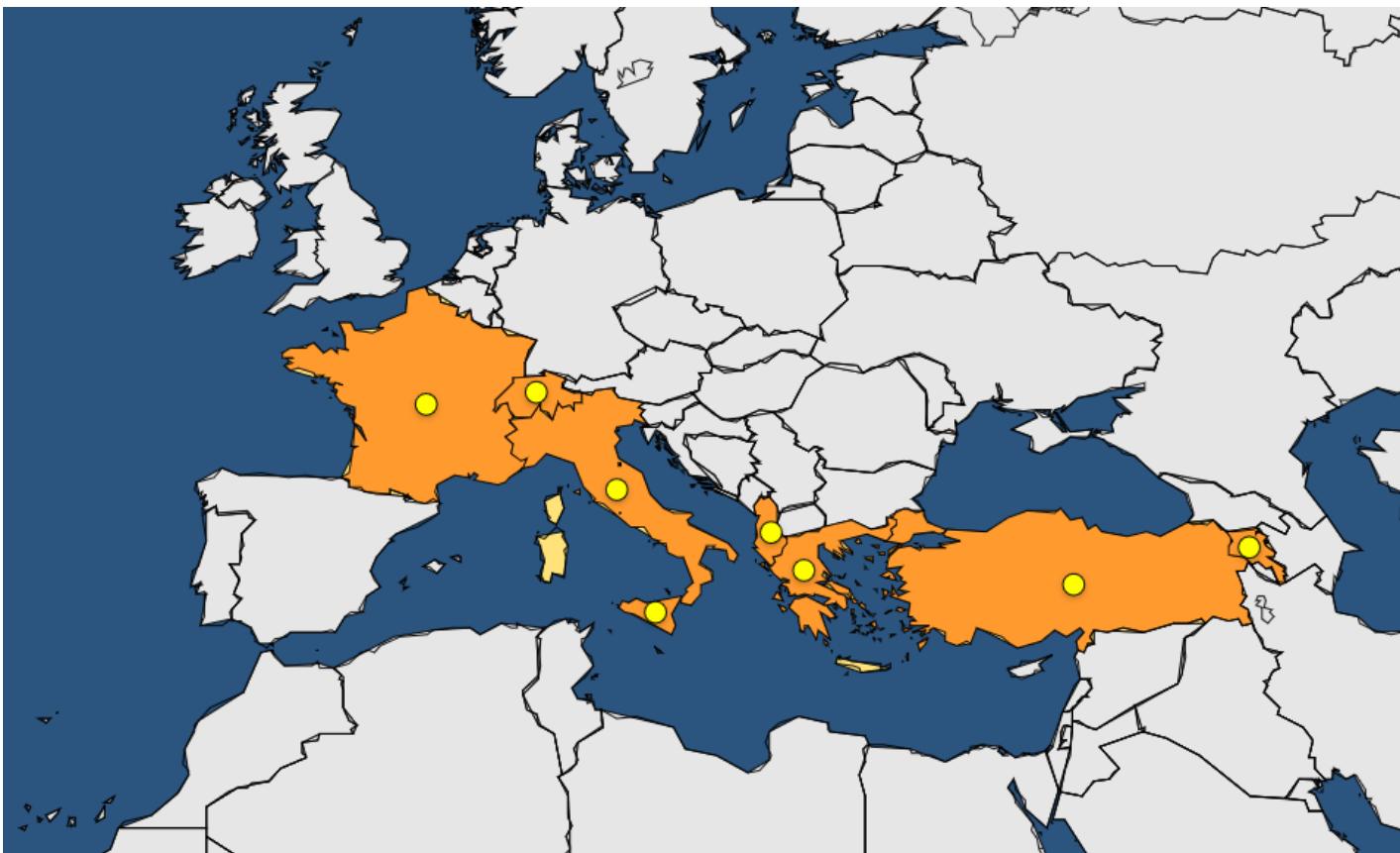
- **Anthracnose** (*Apiognomonia veneta*) can cause shoot blight (young leaves and shoots may die back in spring) and bud blight (buds may fail to open), cankers on twigs and small branches
- **Powdery mildew** (*Erysiphe platani*), chlorosis and distortion of young leaves that are covered in thick white or grey coating



Canker stain of plane/Plane wilt *(Ceratocystis platani)*

Not currently
known in UK

- This species is regulated as a harmful organism in the EU
- An introduction from USA to Naples (Italy) during WW II on packaging material



- *Platanus* spp.
 - **Oriental plane** (*Platanus orientalis*)
(natural and planted in Europe and Asia. Planted in Oceania, North and South America)
 - **London plane** (*Platanus x acerifolia*, syn. *Platanus x hispanica*, syn. *Platanus x hibrida*) (planted worldwide)
 - **American sycamore** (*P. occidentalis*)
(native to North America)

Most
Susceptible

(natural stands, coppices, and public and private gardens in both rural and urban environments)

- It is a wound pathogen (small wound is enough for infection)
- Invasion and colonisation of the sapwood causes reaction processes from the host-plant (formation of tyloses, gums)
- These reactions block the vessels parts of the vascular system resulting in sudden wilting of a portion of the crown
- Wilting usually occurs in the spring-summer period, when the water demand of the tree is higher
- When the infection occurs late in the season, the following summer the infected branch or the entire tree may fail to flush, or the buds can burst and the emerging leaves suddenly wither and die.
- Under the bark causes necrosis of the vascular cambium and the inner bark (elongated strips with elliptical to flame-shaped patterns of bluish-black to reddish-brown discolouration)
- The disease is always fatal



(P. Tsopelas & N. Soulioti, FRIA, Greece)

(Tsopelas *et al.* 2015)

(P. Tsopelas & N. Soulioti, FRIA, Greece)



(Photo provided by James Roberts, UK)



(P. Tsopelas & N. Soulioti, FRIA, Greece)



Nikoleta Soulioti, FRIA, Greece



Francis Marie, France

orange/purple streaking



Francis Marie, France



Thomas Cech, BFW, Austria

- **Root contact** through root graft with a neighbouring diseased trees. This results in the “domino” occurrence of the disease in avenue trees
- **Water, soil and debris**
- **Sawdust** from diseased trees is highly infective and can easily be transferred by the wind
- **Human activity**: pruning tools, construction activities, road maintenance which move soil and cause damage to roots
- In new areas by the use of infected **planting material**, or even **infected wood** (is how the disease found its way from the USA to Europe during World War II)



The cost of the disease

Canal du Midi : 42000 plane trees



25 000 trees were cut down in 12 years

Francis Marie

The cost of the disease

2018 : 3150 plane
trees cut down
Global cost
6 000 000 €



Francis Marie

Canal du Midi

The consequences



Francis Marie

Xylella fastidiosa on urban trees

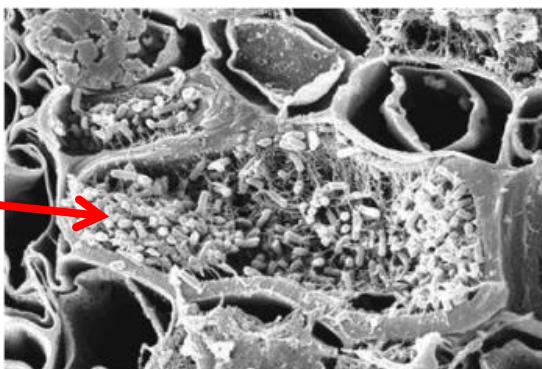
Bacterial Leaf Scorch

Not currently
known in UK

London Plane Tree Conference 10th July 2019

- *Xylella fastidiosa* has been described by the European Commission as “one of the most dangerous plant bacteria worldwide”
- This insect-transmitted bacterial plant pathogen infects >500 species including crops, ornamental plants, and trees
- In Italy alone, over one million olive trees are dying from *Xylella* in a disease called Olive Quick Decline Syndrome
- So far, *Xylella* has not been reported in the UK

- Xylem-inhabiting fastidious bacteria
- The bacteria multiplies in the vessels and these become blocked, and water can not reach all parts of the plant from the roots and infected plants essentially begin to suffer from drought



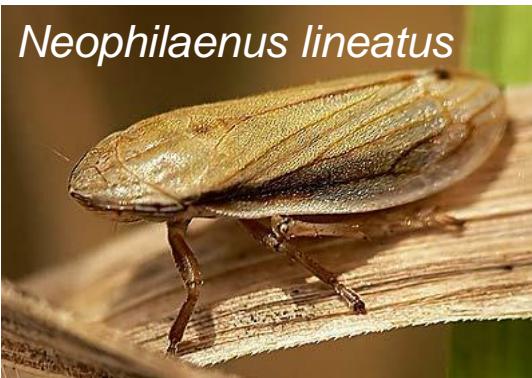
- Transmitted by xylem-feeding insects. The pathogen is maintained in the gut of the vector and adults need to feed on infected plants in order to acquire and transmit the pathogen.
 - Cercopoidea (spittlebugs or froghoppers)
 - Cicadoidea (cicadas)
 - Membracoidea (which includes single xylem fluid-feeding subfamily, the Cicadellinae, known as sharpshooters)

- The meadow spittlebug (*Philaenus spumarius*) is the main vector identified in Europe to date and is the primary vector in Italy



- This species is widespread in Europe (including the UK) and feeds on hundreds of hosts

Common potential *Xylella* vectors in Britain:



(Slide provided by Alan Stewart, University of Sussex)

- The causal agent of Pierce's disease of grapevine, phony peach disease, plum leaf scald, almond, elm, oak, American sycamore, mulberry and maple leaf scorch, and citrus variegated chlorosis disease, among other diseases



UC Statewide IPM Project
© Regents, University of California



<http://edis.ifas.ufl.edu/>



Xylella fastidiosa (XYLEFA) - <https://gd-expo.info>

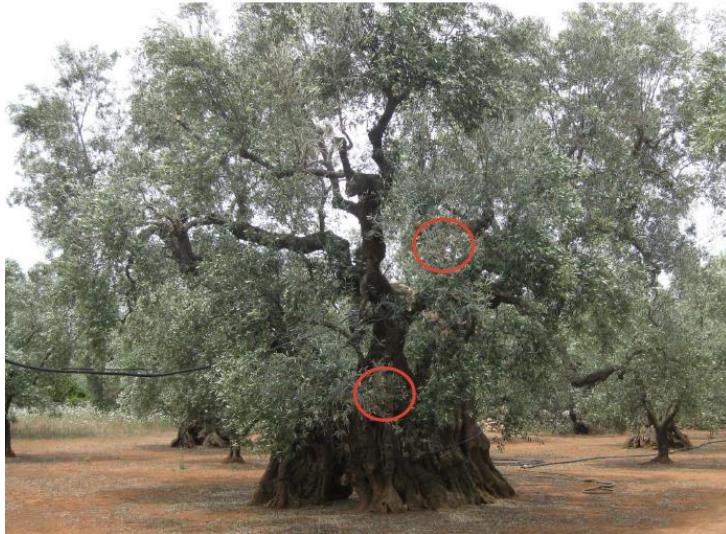


17/07/2019

© Crown copyright

www.forestry.gov.uk/forestresearch

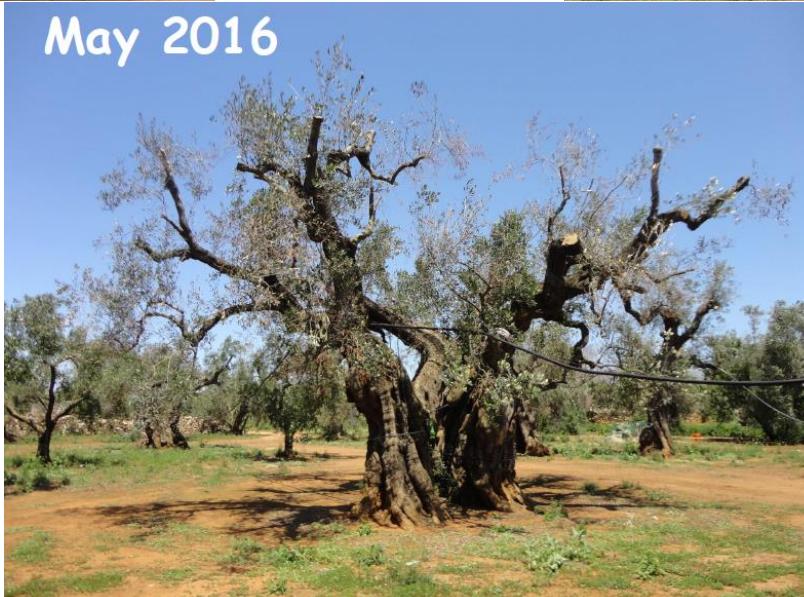
March 2015



Same tree in September 2015



May 2016



- *Xylella fastidiosa* - four characterised subspecies
 - *Xylella fastidiosa* subsp. *fastidiosa*
 - Pierce Disease on grapevine and almond leaf scorch
 - *Xylella fastidiosa* subsp. *pauca*
 - South American strains causing citrus variegated chlorosis and coffee leaf scorch
 - *Xylella fastidiosa* subsp. *sandyi*
 - Oleander in California and Texas
 - *Xylella fastidiosa* subsp. *multiplex* 
 - Endemic to North America, numerous host but generally not grapevine and it is most frequently associated with trees (particularly urban trees)

- The disease **BLS (Bacterial Leaf Scorch)** is recognised as a major disease of street and landscape trees in the mid-Atlantic and south-eastern United States since 2010
- Symptoms on trees are not always distinct: e.g. on *Quercus palustris* the disease appears as early senescence with no distinct pattern of necrosis
- The first report of *Xylella* on trees was on American **elm** (*Ulmus americana*) in 1959 (Wester & Jylkka)
- Since the 1980s:
 - Reported on **oak species** *Quercus rubra*, *Q. coccinea*, *Q. falcata*, *Q. imbricaria*, *Q. laurifolia*, *Q. palustris*, *Q. shumardii*, *Q. virginiana*
 - Reported on American sycamore (*Platanus occidentalis*)
 - Reported on maple (*Acer rubrum*)

- Leaf scorching
- Wilting of the foliage
- Defoliation
- Chlorosis or bronzing along the leaf margin
- Dwarfing
- Death



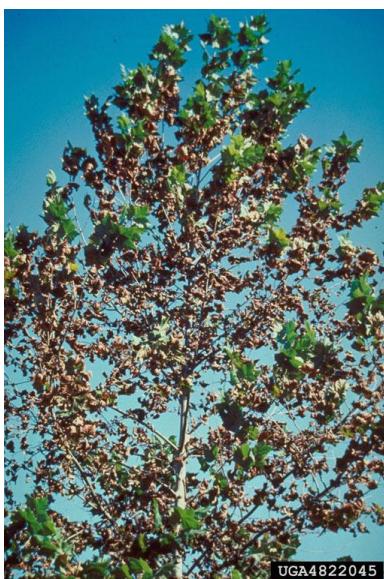
(Brian Olsom, Oklahoma State University, Bugwood.org)



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



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



(Edward L. Barnard, Florida Department of Agriculture and Consumer Services, Bugwood.org)



What can we do?

Phytophthora infestations in European nurseries

A sample of 732 nurseries in 18 European countries showed that nearly all — 91.5% — had at least one species of *Phytophthora*. Appropriate planning and careful sourcing can minimise the amount of infected stock and ensure that only healthy trees are planted.

(King et al, 2015)

The impact of dirty tools

Disease can be spread on our tools. In a Brazilian study, plots of unharvested eucalyptus had only a 2.7% occurrence of *Ceratocystis* wilt, but harvested plots had 39.7%. This suggests the disease had been spread on infected harvesting tools. In a USA study, *Ceratocystis platani* infected 40% of wounds made by saws previously used on diseased trees. Rates increased to 50% for climbing ropes.

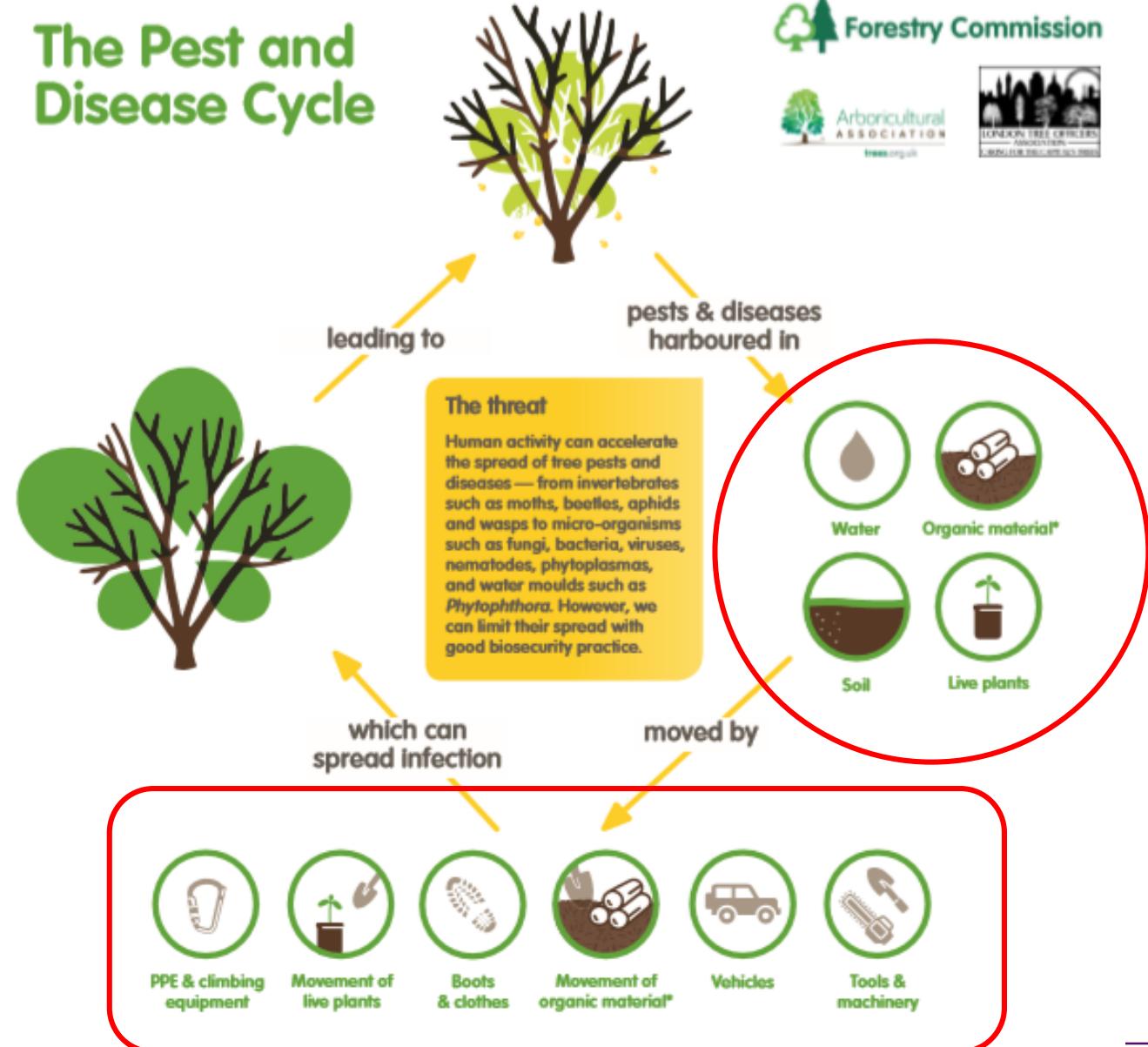
(Ferreira et al, 2012) (Walker, 1946)

Clean start, every day

In a study of seven sites, the rate of tree infection by *Phytophthora lateralis* reduced over 12 years from 29% to 0% where vehicles and boots were washed. Sites where no washing was done saw only limited reductions.

(Gibson et al 2012)

The Pest and Disease Cycle





Before you head out on site today, remember:



Think Kit

- Remove soil and debris from boots, clothing and kit before leaving any site
- Clean and disinfect chainsaws and other cutting tools
- Clean machinery regularly and think about where it is positioned on site



Think Transport

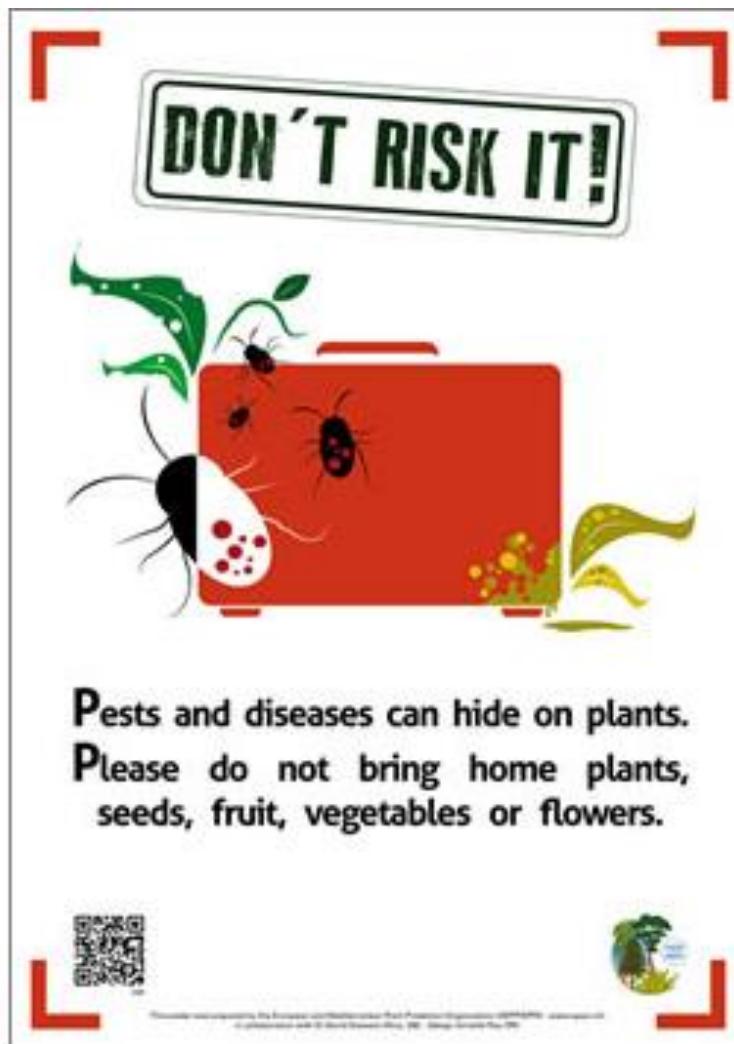
- Make a clean start, every day
- Remove build-up of soil and debris on vehicles before leaving any site
- Use proper off-site wash-down facilities regularly



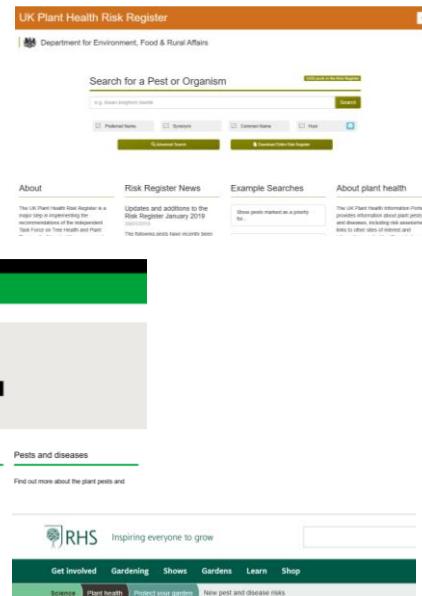
Think Trees

- Source plants responsibly
- Keep records of purchases and suppliers
- Keep an eye out for signs of ill health





- UK Plant Health Risk Register:
<https://secure.fera.defra.gov.uk/phiw/riskRegister/>
- UK Plant Health Portal:
<https://planthealthportal.defra.gov.uk/>
- RHS new pests and diseases:
<https://www.rhs.org.uk/science/plant-health-in-gardens/protect-your-garden/new-pd-risks>
- Forest Research pests and diseases:
<https://www.forestryresearch.gov.uk/tools-and-resources/pest-and-disease-resources>



The image contains three screenshots of websites related to plant health:

- UK Plant Health Risk Register:** Shows the search interface for pests or organisms.
- UK Plant Health Information Portal:** Shows a search bar and information about the portal being an online hub for plant health information.
- RHS (Royal Horticultural Society) website:** Shows a section titled "New pest and disease risks" which provides information on the most serious threats to UK plant health.

Tree A!ert

Chalara Dieback sighting reporter



- On-line reporting system
- Used to report tree pests and diseases
- Suspect trees can be reported
- Symptom check list, location
- Images can be uploaded
- Well evidenced sites will be checked out if suspected quarantine or regulated by FC TH officers

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

