

Elm yellows

Elm yellows is a disease of elm trees caused by a type of bacterium known as a phytoplasma.

Symptoms of the disease can range from yellowing of leaves to dieback of foliage and branches. Elm yellows has been found affecting elm trees in North America and a few European countries, but in 2014 it was detected in the UK for the first time on imported material being propagated at a nursery in England. It is important that any further suspected cases of the disease are reported, so that infected saplings are not planted in the wider environment giving the phytoplasma the chance to spread. Elm yellows can affect healthy elm trees that are resistant to other serious conditions such as Dutch elm disease.



Courtesy of E. Collin, CEMAGREF, France

Affected species

North American elm species such as *Ulmus americana*, *U. alata*, *U. serotina* and *U. rubra* are highly susceptible to elm yellows and are killed by the disease. Asian species such as *U. chemouii*, *U. japonica* and *U. parvifolia* (and hybrids or selections such as Lobel and Morfeo) are moderately susceptible. Species such as field elm (*U. minor*) and wych elm (*U. glabra*), which are both common in the UK, are in the group of elms that are generally less susceptible or even tolerant to elm yellows, with only light symptoms or even asymptomatic infection occurring. For this reason it has been suggested that the elm yellows phytoplasma might be native to parts of Europe.

Symptoms to look out for

Infected elm trees show a wide range of symptoms and symptom expression can be related to tree size – small trees sometimes develop severe symptoms, even in less susceptible or tolerant elm species. In highly susceptible elms the phloem (the living tissue under the bark) of the tree is attacked (hence the other name of elm phloem necrosis, which is used in North America). Symptoms start with the yellowing of leaves and premature leaf-shedding. As the disease progresses over the following year, affected trees form dwarf leaves, followed by wilting, then by the death of branches or even entire trees.

In less susceptible species, such as some European elms, disease symptoms can include yellowing of leaves (above) and in some instances the foliage may develop a reddish colouration (①). Trees may also form dwarf shoots (②); 'witches' brooms' – clustered proliferations of shoots at the tips of twigs and branches (③); and crowns may exhibit dieback. More general symptoms include stunted growth and decline of young saplings.

How the disease spreads

Elm yellows is spread over short distances by sap-sucking insects such as leafhoppers, which transfer the phytoplasmas from plant to plant as they feed. At least one species of leafhopper, *Macropsis mendax*, which has been shown to spread elm yellows in Europe, is found in parts of the UK. The disease can also be spread if material from infected plants is grafted onto healthy plants, or through tree-to-tree root grafts. Over long distances, the spread of elm yellows occurs via the movement of infected plants.

Action to control the disease

There are no available treatments to control elm yellows, so infected plants must be destroyed. As a further precaution, planting highly-susceptible elm species can be avoided.



A Chinese elm (*Ulmus parvifolia*) with reddish, full-sized leaves, and green, bunched dwarf shoots above.



Yellowing and dwarf leaves on a cherry bark elm (*Ulmus villosa*).



Dwarf shoots and brooming (arrowed) on a field elm (*Ulmus minor*).

Similar symptoms

Some elm yellows symptoms, such as yellowing and wilting of foliage and crown dieback, can easily be confused with the symptoms caused by Dutch elm disease, so laboratory testing is needed to confirm infection by the elm yellows phytoplasma. Key symptoms typical of elm yellows that do not occur with Dutch elm disease include the formation of dwarf leaves and 'witches' brooms' – although some other pathogens can also incite the formation of the latter. Drought can also cause yellowing and stunted growth, and some herbicides such as glyphosate induce yellowed, distorted and dwarf leaves which could be mistaken for symptoms of elm yellows.

Note that the name 'elm yellows' is also applied to a wider group of phytoplasmas that affect a range of plant hosts. The form unique to elm trees is genetically distinct and is referred to by the scientific name '*Candidatus Phytoplasma ulmi*'.

How you can help

It is important to be aware of the symptoms of elm yellows so that, where necessary, swift action can be taken at the first opportunity to eradicate the disease and prevent it from becoming established in Britain.

Reporting the disease

If you are a nursery owner or involved in a business handling young trees and planting stock, you should report suspected cases of infected trees directly to the relevant plant health authority (Fera or Scottish Government) – see Contacts below.

Suspected cases of infected trees in the wider environment should be reported to the Forestry Commission via the Tree Alert online reporting form or mobile app, both available from: www.forestry.gov.uk/treealert.

For more information on elm yellows

Visit our website at www.forestry.gov.uk/pestsanddiseases for the latest information on elm yellows and other tree pests and diseases. You can find general advice on sensible biosecurity measures at www.forestry.gov.uk/biosecurity

You can also download our free Tree Alert app to your smartphone or tablet via the App Store and Google play.

Contacts and plant health authorities

- Forestry Commission (Plant health)
www.forestry.gov.uk/planthealth
- Fera (Tree Health and Plant Biosecurity Action)
www.fera.defra.gov.uk/treehealth
- Scottish Government (Plant health)
www.scotland.gov.uk/planthealth