9 things you need to know about *Xylella fastidiosa*

Forest Research scientists **Ana Perez-Sierra** and **Joan Webber**, with Animal and Plant Health Agency inspectors **Edward Birchall** and **Lucy Carson-Taylor**, provide an update on this emerging risk to plants and trees across Europe.

1 What is *Xylella*?

Xylella, or more properly *Xylella fastidiosa*, is a disease causing bacterium that can infect many woody plants including broadleaved trees. There are at least four accepted subspecies of *Xylella* which attack various plant types inciting different types of symptoms. They are -

- *Xylella fastidiosa ssp. fastidiosa*
- *Xylella fastidiosa ssp. pauca*
- *Xylella fastidiosa ssp. multiplex*
- *Xylella fastidiosa ssp. sandyi*

Until recently, *Xylella* was only known from the Americas and Taiwan, but it first became notorious in Europe following reports of the rapid decline and death of ancient olive trees in the Apulia region of southern Italy in 2013. *X fastidiosa* was confirmed as the cause and the subspecies identified as *X fastidiosa ssp. pauca*. Now around a million trees in southern Apulia are affected by the disease, referred to as Olive Quick Decline Syndrome (OQDS). Subsequently other *Xylella* outbreaks in Europe have been found in France, Spain and Germany (see Timeline) with a wide range of plant species affected. In addition to *X fastidiosa ssp. pauca* causing OQDS in Italy, subspecies *fastidiosa* and *multiplex* have also been found in other European countries. To control this bacterial pathogen which is now treated as a quarantine pest, stringent measures are in place. All EU Member States are required to eradicate any outbreaks, or if that is impossible, to prevent further spread.

2 Where has the disease come from?

Before the findings in Europe, *Xylella* was encountered mainly in the Americas. Subspecies fastidiosa is found in Central America, North America and Taiwan, where it affects citrus, grapevines and coffee and almond plants. Subspecies *multiplex* has mainly been found in the USA and probably has the widest host range which includes trees such as oak, elm and plane. *Multiplex* is considered to pose the greatest risk to trees in the UK.

3 What does Xylella do to infected plants?

The bacterium invades the water transporting xylem vessels in plants, blocking water movement and causing symptoms that initially resemble water stress. Depending on the susceptibility of affected plants and the *Xylella* subspecies, impacts range from wilting, growth stunting and leaf scorch, to dieback and the death of entire plants. In olive trees for example, the disease starts with withering and desiccation of the terminal shoots, but as the damage expands through the canopy, trees collapse and die.

Typically on trees such as oak, elm plane, maple (*Acer spp.*) and Aesculus, visible symptoms caused by *Xylella fastidiosa ssp. multiplex* are mainly leaf scorch so in the USA the disease is known as bacterial leaf scorch or BLS. Some effects, however, can be more severe and include twig and branch dieback or growth stunting of the entire tree. The characteristic leaf symptoms which are most visible in later summer include browning at the leaf margins (not along the main veins), often with a yellow edge to the browned areas. However, other disorders can cause similar symptoms (see Disorders box).

4 How does *Xylella* spread?

In the natural environment *Xylella* is exclusively transmitted by insects such as leafhoppers and froghoppers which feed on xylem fluid. There are various insect

Figure 1 Olive quick decline syndrome (left) Early *Xylella fastidiosa* symptoms (branch wilting) on an olive tree in September 2014; (right) symptom development on the same tree by May 2016. (Courtesy of Donato Boscia from CNR-IPSP, Italy)

Xylella timeline

2013	2015	2016 (July)	2016 (October)	2017 (August)	2017 (June)	
X fastidiosa ssp. pauca first confirmed in causing devastation to olive plantations in southern Italy.	*X fastidiosa ssp. multiplex* identified affecting several plant species in France and Corsica.	*X fastidiosa ssp. fastidiosa* confirmed in a German glasshouse on an oleander plant and then on *Rosmarinus, Erysimum* and *Streptocarpus*.	Infected almond trees were found on Mallorca and then other affected hosts on Ibiza and Menorca.	Grapevines were also found to be affected on Mallorca. The Balearics now have many outbreaks involving three subspecies of *X fastidiosa*.	*X fastidiosa ssp. multiplex* was found on the Spanish mainland (south of Valencia) on Prunus dulcis (almond).	*The most recent figures from Europe suggest around 150 shrub and tree species have been infected.*



Figure 2 *Xylella* bacterial leaf scorch symptoms on tree foliage (left) American sycamore (*Platanus occidentalis*); (centre) English oak (*Quercus robur*); (right) elm. (Courtesy of Theodore D. Leininger, USDA Forest Service, Bugwood.org, John Hartman, University of Kentucky, Bugwood.org and Sandra Jensen, Cornell University, Bugwood)org)

species in Britain that could become vectors if *Xylella* was introduced, including the common froghopper (meadow spittlebug). Although these insects generally only fly short distances they can be moved much further by the wind. As they feed, they pick up the bacterium from infected plants and pass it onto healthy plants. Movement in trade of infected plants also aids disease spread.

5 How likely is it that *Xylella* might establish?

Xylella has not yet been found in the UK, but if it arrives at least one subspecies is likely to be able to survive and establish most probably in the warmer parts of the UK, especially in regions with minimal frost episodes. *Xylella fastidiosa ssp. multiplex* which infects various forest tree genera is active in temperate regions of North America.

6 What are we doing to prepare?

The Forestry Commission undertakes targeted annual surveys of susceptible tree species as part of the surveillance activities against *X fastidiosa*. The Animal and Plant Health Agency (APHA) also conducts official surveys for *X fastidiosa* and works with businesses which import susceptible plant species. Landscapers, designers, retailers and anyone directly importing plants are now subject to the same stringent requirements as growers and suppliers. Prior to the movement of all potential *Xylella* 'host plants' across the EU they must have been officially inspected and be accompanied by a plant passport to show they have been sourced from disease free areas/sites. High risk hosts such as Coffea, Lavandula dentata, Nerium oleander, Olea europaea, Polygala myrtifolia and Prunus dulcis have extra requirements.

Disorders with similar symtoms

Several disorders produce symptoms similar to those caused by *Xylella fastidiosa*.

- Horse chestnut trees commonly suffer from a fungal disease which causes a brown leaf blotch with a yellow halo. The horse chestnut leaf miner also damages foliage but causes an inter-veinal browning of leaves rather than marginal browning.
- Elms suffer from Dutch elm disease which also causes wilting and browning of foliage.
- Plane trees suffer from a fungus called anthracnose which causes twig death and leaf blight. Powdery mildew can also cause yellowing and distortion of young plane leaves.
- Drought stress can cause cupping and browning at the leaf margins.

7 What happens if *Xylella* is found in UK?

An outbreak in the UK could lead to destruction of host plants within 100 m and a 5 km movement ban for 'specified' plants for five years. Any findings will dealt with to reflect risk and evidence of spread.

Where *Xylella* is found on a plant and the disease has spread or there is risk that spread has occurred, then a 5 km demarcated area is required - the size and how long it remains in place will depend on a risk assessment.

If infected plants are recently arrived but vectors carrying *Xylella* are not found, then a demarcated area is not needed. Plant Health Services will require destruction of the infected plants and any nearby potential hosts will probably have to be destroyed as well.

For isolated outbreaks resulting from introductions of infected plants where there is robust evidence that spread has not occurred and other actions are taken, the buffer zone width may be reduced to 1 km and restrictions revoked after a minimum of 12 months.

8 Good practice to combat *Xylella*

- If importing plants, ensure that plant passports arriving with host plants are correct and keep the passports to aid trace back if necessary.
- Source from known suppliers or visit suppliers to view their procedures, biosecurity arrangements and the plants they grow. See web resources.
- Ensure imported plants originate from and are sourced from disease free areas.

For regularly updated details on affected >>

Figure 3 Laboratory processing of tree foliage samples at Forest Research for the detection of *Xylella fastidiosa* (Forestry Commission).

>> areas, known plant hosts and legislation, see web resources.

- Isolate or quarantine new plant batches and monitor them during the growing season for any symptoms – whilst not a legal requirement it is good practice to place 'imported' hosts of Xylella in a quarantine area – ideally some distance away from other host plants and under physical protection if possible. If an outbreak is confirmed all 'host' material within 100m will be destroyed.
- For contractors/designers, ensure that plants are ordered early and monitor for disease in a low risk area before final planting.
- Label and keep records of all received batches of plants including where they came from and when. Also maintain records of pesticide treatments.
- Destroy old or unusable plants.
- Comply with the UK national requirements to notify the UK Plant Health Service about certain species of plants under the 'EU Plant and Tree notification scheme'.

9 If you suspect a plant is affected by *X fastidiosa*

Suspected *X fastidiosa* outbreaks must be reported to the relevant Plant Health Service authority:

- For Forestry Commission use the Tree Alert form: **http://www.forestry.gov.uk/treealert**
- For England and Wales, contact your APHA Plant Health and Seeds Inspector or the PHSI Headquarters, Sand Hutton, York. Tel: 01904 405138 or email: **planthealth.info@apha.gsi.gov.uk**
- For Scotland, contact the Scottish Government's Horticulture and Marketing Unit by email: **hort.marketing@gov.scot**
- For Northern Ireland, contact the DAERA Plant Health Inspection Branch: Tel: 0300 200 7847 email: **planthealth@daera-ni.gov.uk**

FTN WEB RESOURCES

Find links for:
Guidance on high risk hosts
Information on affected areas, hosts and legislation
Additional information on UK Plant health
www.confor.org.uk

Ash dieback update

Since it was first discovered in County Leitrim in October 2012, Ash dieback has been confirmed in 384 forest plantations, and is now present in every county in the Republic. These were the official figures at 31/7/2017 but there has been many reports from forestry consultants of new outbreaks in August, September and October.

In response to the dramatic rate of increase in incidents of the disease, the Forest Service introduced a more pragmatic policy for the removal and treatment of the infected ash crops this year.

The previous one-size-fits-all which stipulated 100% clearance and disposal of all material by burying in pits or trenches (unless it was fit for firewood) has been modified by the introduction of a three category classification system with associated requirements:

- **Class 1: <7m top height**

Remove all ash trees

- **Class 2 > 7m < 15m top height or 18cm DBH or 25 years old**

Remove infected individual trees

- **Class 3 >15m top height or 18cm DBH or 25 years old**

Consultant produces Management Plan for owner which may or may not include partial removal.

The requirement to bury all infected material is now optional with onsite windrowing now permitted.

Site clearance grants of €1500/ha are available for Classes 1 and 2, with a replanting grant of €3300/ha for a conifer replacement crop, and €5000/ha for a broadleaf species. In addition the existing Broadleaf Thinning Grant of €750/ha can be availed of by owners in Class 2 and 3 where the partial felling of infected trees is planned.

With an estimated 20,000ha of ash planted in the Republic between 1994 and 2011 growers and foresters will be dealing with the consequences of Ash Dieback for many years to come.

Forestry producer/owner groups

It is a major indication of how the private forest industry in Ireland is maturing, and now entering a new phase, that Forestry producer/owner groups which commenced in the mid-noughties have become firmly established. This development can rightly be regarded as a landmark one for the private forest industry in Ireland.

The Forestry Division of TEAGASC the state agency with responsibility for Agricultural R&D in Ireland were instrumental in starting and organising the various groups nationwide, and there are now 20 plus groups covering the entire country with varying degrees of involvement from basic Knowledge Transfer to the processing and sale of first thinnings and firewood. There are 2,000 owners now officially registered with Producer Groups which represents about 20% of all private forest owners. Some of the groups have employed foresters to advise owners on planting, management etc. which has been a cause of concern for some forestry consultants and companies due to the fact that the groups have received state funding from the Rural Development Programme and some are now effectively in competition with private sector businesses.

One of the first groups to get established was the Donegal Woodland Owners Co-Op which markets itself as a wood supply co-operative actively involved in thinning and sales of firewood, and which has being pro-active in promoting the use of woodfuel in Donegal. Another progressive group is the Irish Wood Producers which has 650 members based in Wexford, Kilkenny and Laois.

Afforestation outturn 2017

There is a real probability that the afforestation target of 7000ha will not be achieved in 2017 unless there is an unprecedented level of planting in the final two months of the year. To date approximately 4250ha have been planted and realistically a final outturn of 5500ha would be an excellent achievement at this stage. Many reasons have been put forward for the drop in in planting levels, from high prices for land leasing, expansion in the dairy sector post-quota removal, sterilisation of large area for environmental reasons where no planting is permitted, higher levels of bureaucracy with the Forest Service, and the new requirement to erect site notices on the land where a licence to plant is being sought, and the new mechanism which allows objections from the public to the issuing of planting licences. Even though the new afforestation licence requirements were only introduced in June 2017, there has been 15-20 objections to the issuing of new licences by members of the public which does not augur well for the future.

Timber Prices

Timber prices have remained steady throughout 2017 with roadside prices currently averaging:

- Commercial sawlog: €72
- Pallet: €Ð46
- Pulp: €27

Demand is strong for all grades although pallet roadside prices have softened a little from since the first quarter of 2017.
www.kestrelforestry.ie