



ENGLISH HERITAGE

Landscape Advice Note: Sudden Oak Death (Ramorum Dieback)



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This Landscape Advice Note examines the biology and symptoms of *Phytophthora ramorum* and *Phytophthora kernoviae*. It also outlines the effect of these fungal outbreaks on historic sites and how this can be managed.

INTRODUCTION

Phytophthora ramorum is a fungus which has caused the death and decline of large numbers of native oaks and other woodland species in California and Oregon. The disease has been given the name 'Sudden Oak Death' in the USA. As the host range includes a wider number of species than just oaks, the name Ramorum Dieback has been suggested for this disease in the UK.

Confirmed outbreaks of *P. ramorum* were first recorded in Germany and the Netherlands in 1993 but it was not described as a new species until 2001. The first confirmed diagnosis in the UK was in April 2002.

In 2003 a new pathogen, now named as *Phytophthora kernoviae*, was discovered on rhododendron plants and a beech tree in the Redruth/Truro area of Cornwall. Since this time outbreaks have been identified elsewhere in Cornwall, South Wales and Scotland.

SUSCEPTIBLE PLANTS

In the UK, *ramorum* has so far mainly occurred on species and hybrids of rhododendron and *Viburnum*. It has also affected *Camellia*, *Kalmia*, *Pieris*, and in isolated cases, *Hamamelis*, *Leucothoe*, *Syringa*, *Drymis winterii*, *Magnolia* and *Vaccinium vitis-idaea*. In other parts of Europe, it has also been recorded on other species including *Arbutus unedo*.

The first infected tree in the UK was confirmed on a *Quercus falcata* in Sussex in 2003. Up to 2006 a range of tree species in Cornwall had been found with potentially lethal infections all of which were located near infected rhododendrons. These species included beech (*Fagus sylvatica*), Southern beech (*Nothofagus obliqua*) Horse chestnut (*Aesculus hippocastanum*), Sweet chestnut (*Castanea sativa*), Sessile oak (*Quercus petraea*), Turkey oak (*Quercus cerris*) and sycamore (*Acer pseudoplatanus*). In January 2009 the first finding in the wild of *P. ramorum* was confirmed at a site in Staffordshire on *Vaccinium myrtillus* (bilberry). In August 2009, it was identified on Japanese larch trees at sites in Somerset, Devon and Cornwall. Since then it has been found extensively in larch plantations in the south-west.

In addition other tree species have been found suffering from leaf and shoot infections caused by this pathogen. These include Holm oak (*Quercus ilex*), Turkey oak (*Quercus cerris*), ash (*Fraxinus excelsior*), Sweet chestnut (*Castanea sativa*), *Magnolia*, *Michelia* and *Eucalyptus* species. The Dutch have confirmed infection on a *Quercus rubra*.

Kernoviae seems to have the same principal host (rhododendron) but *Vaccinium* may also be susceptible.

SYMPTOMS

These vary considerably from species to species. *P. ramorum* infects stem and leaf tissues, but not root systems. Typical symptoms in shrubs include stem die back and leaf blight. Susceptible trees exhibit stem and leaf die back, trunk lesions and bleeding cankers, depending on species. Some species survive infection, in others, death is rapid.

Symptoms for both pathogens are similar, although *P. kernoviae* seems to be much more virulent than *P. ramorum*, particularly on rhododendrons.

BIOLOGY AND SPREAD

Phytophthora species depend on moisture for the completion of their life cycles. Fungal spores produced on infected leaves are carried to wounds and natural openings in other plants by water. Conditions that allow water to remain on plant surfaces favour infection. The optimum temperature for the growth of *P. ramorum* is 20°C, and the range for growth is two to 30°C. In both California and Oregon, increased rainfall at critical times of the year, and changes in the management practices in the forests are thought to have encouraged establishment of the disease. There are indications in these states, that the disease can be spread by the movement of spores in streams and along pathways.

Long distance spread is by the movement of infected plants by the horticultural trade. Symptoms may take some time to develop after infection, particularly if fungicides suppressing the disease are used, and in this way, apparently healthy stock can be spread from nursery stock producers.

MANAGEMENT AND CONTROL

Both diseases are notifiable. The local Food and Environment Research Agency's (FERA) Plant Health and Seeds Inspector (PHSI) should be informed if infection is suspected.

The PHSIs are conducting surveys throughout England and Wales in garden centres, nurseries, public parks and gardens. Where infection is confirmed, eradication of infected plants, restrictions in movement of natural hosts, and follow up inspections must take place.

Nursery stock container areas should be disinfected where infection has occurred.

Although some fungicides suppress *P. ramorum*, there are as yet no chemicals that will eradicate it and therefore fungicides should not be used to control the disease. Research is being undertaken to find suitable fungicidal eradicates and improved disinfectants.

A Plant Passport Scheme is in place. Certain plants and plant products moving within and between countries in the European Union (EU) must be accompanied by a plant passport. The scheme aims to prevent the spread of harmful organisms like *Phytophthora*. It is important that all historic site staff check the source of susceptible nursery stock coming onto site for planting or for retail sales. Plants should have a valid plant passport and staff should notify the PHSI if offered any plants requiring a plant passport for the disease that do not have one. A written assurance should be obtained from suppliers that the plants have not been sprayed with a disease suppressant within six weeks of the date of shipment. A quarantine area to hold bought in plants should be established prior to planting or selling them. Any susceptible plants should be rejected and referred to the PHSI if disease symptoms are suspected.

If infection is confirmed on plants established in the ground, these should be destroyed by burning in situ. Equipment used for grubbing will need disinfecting and the soil sterilised in the areas of infection. Susceptible species should not be planted in areas where infection has occurred. There may be a need to restrict the visiting public from sites of infection. Visitors should be informed of the need for these measures by using appropriate interpretation..

PLANT SALES

All plants to be sold on site in the genera covered by the Plant Passport Scheme will need the appropriate passport documentation. Where stock has been grown on the site, it is best not to sell susceptible species, even if the site is believed to be free from infection.

Where sites hold plant fairs it should be made clear to all participants at an early stage that no one will be permitted to bring plants of susceptible species on to the site unless they have plant passport documentation.

PROGNOSIS

It is important to observe FERA guidelines to reduce the spread of wider infection. All EU countries should consistently observe guidelines set on the disease. The Department of Environment, Food and Rural Affairs (Defra) is working to combat the spread of *P. ramorum*. As yet the complete range of host species

is not known nor if future climate change will affect spread.

HISTORIC AND WIDER LANDSCAPES

P. ramorum outbreaks could have a major effect on the appearance of the wider landscape. For example, beech woods which could become more stressed with predicted drier summers followed by wet winters which will favour the spread of the disease. Several heathland species are known to be susceptible, and other important forest species could be attacked.

Gardens with important historic collections of particularly vulnerable species such as rhododendrons may be particularly at risk from this disease.

Other historic parks and landscapes, often have important collections of susceptible plants and trees and are therefore under threat, and could also be a source of infection for sites beyond the historic boundaries.

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FRONT COVER

Historic rhododendron collections such as at Belsay Hall are under threat from the spread of *Phytophthora* © English Heritage Photo Library

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