Phytophthora ramorum

September 2015

Introduction

This research note provides a summary of the extent of the *Phytophthora ramorum* (*P. ramorum*) infection in Wales and the measures being taken to monitor and control the spread of the disease.

Background

Phytophthora is a genus of more than 60 different plant pathogen species, one of which, *P. ramorum*, has become increasing prevalent in Welsh woodlands since 2010.

P. ramorum is a non-native, fungus-like pathogen. It can infect a number of different tree and shrub species, including Douglas fir, beech, sessile oak and rhododendron.[1] In the UK Japanese larch has proved to be highly susceptible to the disease, leading to the infection and subsequent death of large areas of larch woodland.[2] The disease only affects plants and is not a risk to human or animal health.

P. ramorum was first reported in the UK in 2002, initially infecting ornamental shrubs in plant nurseries. In the UK few trees were affected until 2009 when *P. ramorum* was found to be infecting and sporulating on (releasing reproductive spores) large numbers of larch trees.[3] It has since spread across large areas of larch woodland in the UK, particularly in South Wales, South West England and Western Scotland. The disease is also prevalent in a number of European countries although its original origin is unknown.

There is no cure for *P. ramorum* infection. The most effective methods of disease control focus on preventing its spread by removing infected trees by felling or killing trees with chemical treatments.

Disease spread

P. ramorum spreads through the release of spores which are carried in water films or droplets. These spores can spread several miles in mists, air currents, water courses and rainwater splash. In larch trees spores are generated on needles which are then shed in late autumn.

NRW has issued guidance[4] to members of the public to remove mud and leaves from shoes and tires after leaving woodland areas to prevent the spread of spores in infected plant material.

The Forestry Commission states that there is no clear link between the damage done to larch trees by deer and grey squirrels and *P. ramorum* infection. The transport of spores in animal fur is also thought to be insignificant, relative to the airborne transfer of spores.

Identification of *P. ramorum* infection

On tree trunks the infection is visible as lesions or 'bleeding cankers' which appear as black crusts, underneath which the bark is discoloured and dying. In Japanese larch the shoots and foliage can appear wilted with blackened needles. Aerial views of infected trees commonly display discolouration of the foliage and dieback of the branches. In other shrubs such as rhododendron the leaves can appear blackened and new shoots wilted. *P. ramorum* does not normally kill infected rhododendron but transmission to other plants can occur through sporulation.

[1] Forestry Commission, ***Phytophthora ramorum*** (website) [accessed 23 July 2015].
[2] *ibid*
[3] *ibid*
[4] Natural Resources Wales, **Biosecurity** (website) [accessed 22 July 2015].

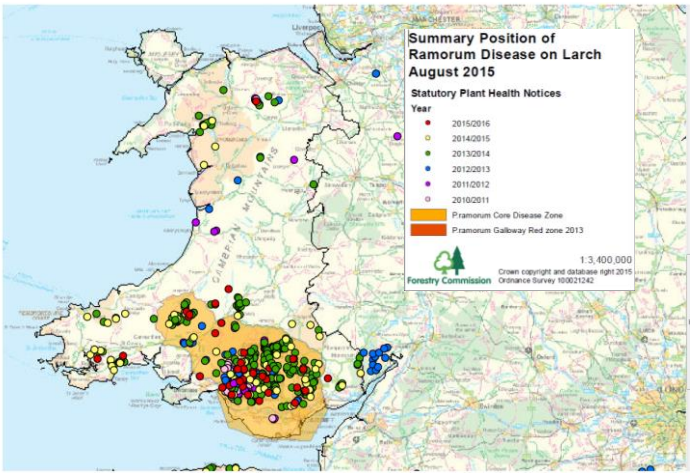
Phytophthora infection can be diagnosed on site by inspectors then confirmed with laboratory testing.

Phytophthora ramorum in Wales

P. ramorum was first reported in Wales in the Afan valley in 2010. It has since become the most serious disease to have affected forestry in Wales.[5] The Forestry Commission have divided Great Britain into three zones according to the level of disease risk. Due to its wet climate (which aids the transmission of spores) western Great Britain, including Wales, forms Zone 1. This is identified as being at highest risk of *P. ramorum* infection.

The total area of larch woodland in Wales is approximately **21,000 hectares, representing around 7% of the total woodland area**.[6] Half of the woodland in Wales is owned by the Welsh Government Woodland Estate (WGWE).

Figure 1: Locations of P. ramorum cases in Wales identified from aerial studies.



Source: Forestry Commission, August 2015.[7]

Figure 1 shows the location of new infections from 2010 to August 2015. Since the disease was first identified in Wales in 2010, more than **6000 hectares of woodland have become infected**, which is roughly around **6 million trees**.[8] In **2013 alone over 3000 hectares** of larch woodland were infected with *P. ramorum* (approximately 3 million trees).[9] NRW attributed large numbers of new cases in 2013 to the wet summer of 2012, which provided good conditions for the spores to spread.[10] Initial results from a survey in May 2014 suggested the disease had not spread as widely as in previous years; 40 hectares (approximately 40,000 trees).[11]

Operational management for tree health in Wales is the responsibility of Natural Resources Wales (NRW). NRW issues **Statutory Plant Health Notices (SPHNs)** which notify woodland owners, and provide a timescale for, the removal of infected trees. SPHNs can be issued to private woodland owners or to NRW for trees on the WGWE (detailed later).

The Wales Tree Health Strategy

The Wales Tree Health Strategy (WTHS)[12] aims to:

> Preserve the health and vitality of trees and woodlands in Wales through strategies which exclude, detect, and respond to, existing and new pests and pathogens of trees, whether of native or exotic origin. Take proactive measures to improve the resilience of woodlands to reduce the impact of pests and diseases.[13]

It is managed by the **Wales Tree Health Steering Group**. The **Wales *Phytophthora* Operational Response Team** is a subsidiary group which

[5] Welsh Government. ***Phytophthora ramorum* infection in Wales- Disease management strategy,** 13 January 2015 [accessed 22 July 2015].
[6] Welsh Government. ***Phytophthora ramorum* infection in Wales- Disease management strategy,** 13 January 2014 [accessed22 July 2015].
[7] Forestry Commission, ***Phytophthora ramorum* outbreak map**, September 2014 [accessed 22 July 2015].
[8] Natural Resources Wales, **Aerial searches for infected larch across Wales**, 21 May 2014 (website) [accessed 22 July 2015].
[9] Natural Resources Wales, **Aerial searches for infected larch across Wales**, 21 May 2014 (website) [accessed 22 July 2015].
[10] *ibid*
[11] *ibid*
[12] Welsh Government, **Tree Health Strategy (PDF, 468KB)**, 13 January 2014 [accessed 22 July 2015].
[13] *ibid*

provides advice and recommendations on the management of *P. ramorum*.

The Welsh Government states that measures to achieve the total eradication of *P. ramorum* in Wales would be prohibitively expensive and resource intensive. Instead the strategy aims to slow, rather than halt the spread of the disease, in order to reduce the environmental and economic impacts of large scale tree felling.

In January 2014 the Welsh Government introduced the *P. ramorum* Disease Management Strategy[14], as part of the wider Tree Health Strategy. The *P. ramorum* Disease Management Strategy puts emphasis on the impacts of the pathogen on Japanese, Hybrid and European larch. The strategy divides Wales into two zones. The **Core Disease Zone (CDZ)** is limited to South Wales where there are high levels of infection in contiguous areas of larch. The **Disease Limitation Zone (DLZ)**, covers the rest of Wales.

The extent of the CDZ is reviewed twice a year in June and November. Figure 1 shows the limit of the CDZ as of December 2014 (the area shaded in orange).

Felling

Since 2010 around **3 million infected larch trees have been felled by NRW in Wales**.[15] So far 80% of the larch trees infected with *P. ramorum* have been in woodland owned by the WGWE, where the management of felling is the responsibility of NRW. Felling in privately owned woodland is the responsibility of the woodland owners but can be ordered by NRW through SPHNs. NRW are currently felling a particularly badly infected area; Cwmcarn Forest Drive in south Wales where 78% of the trees are infected. Overall 160,000 infected larch trees are to be felled during the two year operation.[16]

Infected trees which sporulate, such as larch and sweet chestnut require felling to prevent the spread of the disease. Trees such as Douglas fir which are capable of becoming infected, but do not sporulate are referred to as **'terminal hosts'** because they do not transmit the infection. These trees do not require immediate felling but are recorded in order to assess the impact of the disease on other species.[17] Spore production peaks in early autumn and therefore infected trees should be felled before the end of August. Identification of *P. ramorum* in larch is more difficult after trees have lost their needles and the Forestry Commission advises against larch tree felling during the winter months.

Initial strategies to control the spread of *P. ramorum* required landowners to fell infected trees followed by all surrounding larch trees in a 100 to 250m radius.

As part of the Welsh Government *P. ramorum* Disease Management Strategy infected trees in the DLZ are issued SPHNs and require immediate felling to contain the disease. Infected trees in CDZs are subject to **movement SPHNs,** which do not give specifications for when trees are required to be felled.

The reason for a differentiated approach to felling in the CDZ is so that the flow of larch timber to the market can be regulated thus preventing prices from being undermined.

This strategy is supported by a Cambridge University study[18] which modelled the spread of *P. ramorum* in Wales. The study found that where resources are limited the most effective method of disease prevention is through the felling of outlying

[14] Welsh Government. ***Phytophthora ramorum* infection in Wales- Disease management strategy,** 13 January 2014 [accessed 22 July 2015].
[15] Natural Resources Wales, **Planting work continues at Afan Forest to replace felled larch**, 19 March 2015 [accessed 23 July 2015].
[16] Natural Resources Wales, **Our work at Cwmcarn forest**, 13 March 2015 (website) [accessed 23 July 2015].
[17] Forestry Commission, **Aerial Survey Update** (PDF, 4.2 MB) [accessed 22 July 2015].
[18] University of Cambridge, **Phytophthora Modelling Update**, (PDF, 623KB) January 2014 [accessed 23 July 2015].

infections, such as those in the DLZs.

Up until April 2015 NRW had issued 570 SPHNs across Wales (77% on the WGWE and 23% on private land). In April 2015 in the WGWE, 85 percent of the DLZ area covered by the notices was completed and 15 percent was not. In the CDZ 52 percent of the area covered by the notices was completed whilst 48 percent was not.

In privately owned forestry in the DLZ, 39 percent of the area covered by the notices was completed and 61 percent was not. In CDZ 47 percent of the area was completed whilst 53 percent of the area was not.[19]

On average between DLZ and CDZ (across both private land and WGWE) 60 percent of the areas issued notices were completed, and 40 percent were not.[20]

The timescales for felling vary depending whether the site is inside the CDZ or not and the timing that the infection was identified. If issued between 30 June and 31 January the compliance date is 31 March of the following year. If issued between 1 February and 30 June the compliance date is 31 August of the same year. So owners usually have between 3 and 9 months to carry out works in the DLZ.

Economic impact of felling

Since the outbreak of the *P. ramorum* disease in Wales 450,000 cubic meters of infected timber from the WGWE has been supplied to timber processors by May 2014.[21] Larch timber from *P. ramorum* infected trees has a lower commercial value and may not have reached economic maturity before it needs to be felled. The proportion of larch to other types of timber harvested and sold from the WGWE increased from **6.3 percent in 2010/11** to just under **30 percent in 2014/15**.

Chemical treatment

An alternative to tree felling is to inject infected trees with chemicals which cause them to be killed where they stand. This method is seen as less effective than felling because trees are killed over a longer time period over which spores may be released, further spreading the disease. In addition some trees may require more than one treatment to be killed completely.

Restocking

Between 2013 and 2014 NRW replanted 750,000 trees to replace those felled as a result of *P. ramorum*.[22] Between March and November 2015 NRW plan to plant a further 3.2 million trees as part of its wider planting programme.[23]

At the end of the *P. ramorum* Disease Management Strategy period it is anticipated that larch trees in Wales will be have been completely replaced by a mixture of tree species. An aim of the strategy is to increase diversification of Welsh woodland and subsequently create greater resilience to future disease outbreaks.

NRW have identified 37 suitable tree species for restocking.[24] These include native oak, cherry and lime alongside more marketable timber such as Douglas fir, Serbian spruce and Western red cedar. In 2014 the restocked trees in Wales were 64 percent conifer and 36 percent broadleaf species.[25]

Restocking has to date particularly focused on the

[19] National Assembly for Wales Environment and Sustainability Committee, Inquiry into the public forestry estate in Wales, **NRW written evidence**, (PDF, 1.2MB) 2014 [accessed 23 July 2015].
[20] NRW unpublished data
[21] National Assembly for Wales Environment and Sustainability Committee, Inquiry into the public forestry estate in Wales, **NRW written evidence**, (PDF, 1.2MB) 2014 [accessed 23 July 2015].
[22] Natural Resources Wales, **Annual reports and accounts 2013/14** (PDF, 6.7MB) [accessed 27 March 2015].
[23] Natural Resources Wales, **Planting work continues at Afan Forest to replace felled larch,** 19 March 2015 [accessed 23 July 2015].
[24] Natural Resources Wales, **Annual reports and accounts 2013/14** (PDF, 6.7MB) [accessed 23 July 2015].
[25] National Assembly for Wales Environment and Sustainability Committee, Inquiry into the public forestry estate in Wales, **NRW written evidence further information**, 2014 (PDF, 1.2MB) [accessed 23 July 2015].

areas of Bwlch Nant yr Arian near Aberystwyth, the Afan Valley near Neath, and Wentwood in the Wye Valley, which have had large reductions in woodland cover as a result of the *P. ramorum* disease.[26]

Glastir

As part of the Glastir scheme woodland owners were able to apply for a restocking grant to replace infected trees with a wider range of species. The Welsh Government had prioritised SPHN sites in order to maintain woodland cover and increase the diversity of tree species planted on private land.[27]

In April 2015 the Welsh Government announced **Glastir Woodland Restoration**. Funding is available to replant larch areas which have been, or are due to be felled as a result *of P. ramorum* infection. The area eligible would be twice the area identified on SPHNs or felling licences.[28] The Welsh Government have announced that an estimated 400 hectares will be replanted by 31 March 2016 as a consequence of this support and that there will be a second call for Expressions of Interest in the autumn for replanting work to be completed by 31 March 2017.[29]

Cross-border projects

The Welsh Government and NRW are working with the UK Government and other devolved forestry organisations to produce strategies to slow the spread of *P. ramorum* across the UK.

Aerial surveys

Larch trees infected with *P. ramorum* can be identified from aerial photographs by the discolouration of foliage. This can be confirmed with follow up ground surveys.

The Forestry Commission (FC) in England, working with NRW, FC Scotland and the Department of Agriculture and Rural Development North Ireland, have undertaken aerial studies of woodland areas to monitor the spread of *P. ramorum*, as well as identify new cases in previously non-infected areas. In 2014 a total of 57,208 hectares of privately and publically managed larch woodland were surveyed. The results showed that most new infections were located in the vicinity of previously confirmed infection (in Wales the CDZ) or in association with nearby infected rhododendron.

Phytophthora Project Board

The Forestry Commission and NRW are part of a *Phytophthora* Project Board, which acts in England and Wales alongside with stakeholders from private forestry groups and non-governmental organisations with an interest in woods and forests. Its purpose is to allow information sharing and advice in all aspects of the disease management.[30]

UK-wide Outbreak Management Team

The Outbreak Management Team is a collaboration between forest research groups and the forestry sector. It was set up to develop strategies to limit the spread of the disease, manage biosecurity and promote research.

Regulation

P. ramorum is subject to EU phytosanitary measures.[31] It is a requirement of this measures that the woody material derived from the felling of infected larch trees is carried by registered hauliers and that processers of the materials are also registered. Products containing bark from contaminated larch must not be used as horticultural mulch in order to prevent the contamination of non-infected woodland.

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[26] *ibid*
[27] Welsh Government, **Glastir Woodland management FAQs**, 13 May 2013 [accessed 30 March 2015].
[28] Welsh Government, **Gwlad: Glastir Restoration Woodland** (website) [accessed 23 July 2015].
[29] Welsh Government, **Written Statement - Update on Tree Health in Wales**, 16 July 2015 [accessed 23 July 2015].
[30] Forestry Commission, ***Phytophthora ramorum* frequently asked questions** (website) [accessed 22 July 2015].
[31] **OJ L 252 20.9.2002** (PDF, 56.6KB) [accessed 22 July 2015].

Further information

For further information on ***Phytophthora ramorum***, please contact **Nia Seaton** (**nia.seaton@assembly.wales**), Research Service.

See also:

- **Natural Resources Wales**
- **Forestry Commission**
- National Assembly for Wales Environment and Sustainability Committee **inquiry into the public forestry estate in Wales.**

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