New Disease Reports

Natural stem infection of Lawson cypress (*Chamaecyparis lawsoniana*) caused by *Phytophthora ramorum*

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Received: *06 Dec 2011.* ***Published:*** *21 May 2012.* ***Keywords:*** *invasive, conifer*

The introduced pathogen *Phytophthora ramorum* has been the cause of dieback and mortality of millions of live-oak and tanoak trees in near-coastal native forests in California and Oregon since 1995 (Frankel, 2008). *P. ramorum* has also spread across Europe, mainly within the ornamental nursery trade. From 2003 onwards, *P. ramorum* was found infecting rhododendron, *Vaccinium* and a range of broadleaf woodland trees outside nurseries in Britain (Brasier *et al*., 2004). In 2009, large areas of mature and juvenile plantation larch (mainly Japanese larch, *Larix kaempferi*) in southwest England, Wales and Northern Ireland were confirmed as infected with the pathogen (Webber *et al.,* 2010). This development has resulted in the felling of over two million trees. Infection of other tree species has occurred adjacent to the larch, apparently due to high levels of *P. ramorum* inoculum produced from larch foliage (Webber *et al.,* 2010).

In December 2009 four 12 to 13 metre-tall shelterbelt *Chamaecyparis lawsoniana* trees adjacent to mature infected larch in Somerset showed either general crown discolouration or dieback of the upper crown (Fig. 1). One tree, LC1, exhibiting dead and dying foliage and stem resinosis, was felled (Figs. 1, 2). Destructive analysis revealed two extensive phloem lesions on the main stem: a lower lesion 1.3 m long starting 5.4 m above ground level and an upper lesion longer than 3 m from 7.4 m above ground level (Fig. 3). Zones near the lesion edges were bright cinnamon in colour, while small active 'tongues' of fresh lesion extension were very pale buff-pink and older lesion areas dull cinnamon (Figs. 3, 4). Small pieces of phloem taken 5-10 cm from within the lesion edges were plated onto a *Phytophthora* selective medium (Brasier *et al.*, 2005). *Phytophthora ramorum* was obtained from 7/50 pieces plated from both the upper and lower lesions. Identity was confirmed by sequencing of ITS rDNA regions (GenBank Accession No. JQ316509). *Phytophthora ramorum* was wound inoculated into the phloem of freshly cut logs of *C. lawsoniana* (1.1 m long by 20 cm diameter). In one test, the average phloem lesion size was 55.2 cm^2 after five weeks compared with 2.24 cm^2 for the controls. The pathogen was re-isolated from the lesion. In a repeat test with logs cut from a different tree, the lesions caused by *P. ramorum* were no different from the controls, suggesting between-tree genetic differences or environmental effects.

This is the first report of *C. lawsoniana* as a natural host of *P. ramorum*. In November 2010, *P. ramorum* was isolated from a 4 m long by 60 cm wide aerial phloem lesion on another mature *C. lawsoniana* in a park near Clydebank, Scotland. There was heavy resinosis at the top of the lesion. Adjacent rhododendrons were also infected with *P. ramorum*. Ten other large *C. lawsoniana* at the Clydebank site had dieback and aerial or collar lesions caused by the recently introduced *Phytophthora* species, *P. lateralis* (SA Green, CM Brasier and JF Webber, unpublished). Such an overlap between *P. ramorum* and *P. lateralis* on *C. lawsoniana* on the same site is likely to lead to direct physical contact between the two species. Since they are closely related phylogenetically and produce similar fruiting structures (e.g. Brasier *et al*., 2010), such novel contact could result in their hybridisation (Brasier, 2000). This possibility is under investigation.

Acknowledgements

We are grateful to Barnaby Wilder, Tony Reeves and Alan Ockenden for surveying and tree felling.

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Figure 1

Figure 2

Figure 3

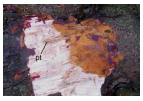

Figure 4

To cite this report: Brasier C, Webber J, 2012. Natural stem infection of Lawson cypress (*Chamaecyparis lawsoniana*) caused by *Phytophthora ramorum*. *New Disease Reports* **25**, 26. [doi:10.5197/j.2044-0588.2012.025.026]

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