

Longevity of Active *Phytophthora ramorum* in Terminal Tree Hosts following the Removal of Primary Sporulating Hosts¹

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Abstract

The Forestry Commission-managed forest estate located in Plym, Devon (southwest England) was one of the first locations in late summer 2009 to have stands of *Larix kaempferi* (Japanese larch) confirmed as infected with *Phytophthora ramorum* (EU1 lineage). The 398 ha forest had a high proportion (>30%) of *L. kaempferi* showing catastrophic levels of *P. ramorum* infection with trees of all ages affected to some extent. Although a few infected rhododendron were present, larch was the primary sporulating host so all larch trees were removed from Plym forest between 2009-2011 as part of disease management. Prior to removal however, the spores released from infected foliage on larch trees had already initiated dieback and bole cankers in a wide range of non-sporulating coniferous and broadleaved trees that were either part of the understory or present in stands next to the infected *L. kaempferi*.

In March 2015, areas of forest adjacent to where the larch had been removed were surveyed again. Trees with symptoms of dieback and *P. ramorum* cankers could be readily identified and affected hosts included *Fagus sylvatica*, *Abies grandis*, *Pseudotsuga menziesii*, and *Tsuga heterophylla*. Some of the trees had stem cankers that were sunken and calloused although the development of infection appeared to have arrested. In others, the affected trees had apparently successfully contained the infection with callus growth completely occluding the old cankers. However, on some trees the cankers were still active, evidenced by signs of recent resinous exudation on conifer stems and black bleeding lesions on *F. sylvatica*. For a subset of these trees the cankers were almost at the point of entirely girdling the affected stems. Bark samples taken from a number of these active cankers on various tree species were tested for *P. ramorum* by (1) isolation onto *Phytophthora* selective media and (2) real time PCR. Live *P. ramorum* (EU1) cultures were obtained from all species except *Abies grandis* where only rtPCR confirmation of *P. ramorum* was obtained.

These observations suggest that even when the opportunity for successive years of re-infection is eliminated by removal of the spore generating host, *P. ramorum* can remain viable and continue to cause expanding stem lesions in some terminal hosts for at least 5 years. This has biosecurity implications for timber processing if the pathogen can remain viable in infected tissue over several years. It also raises the question of why larch trees succumb so rapidly to the disease, often in just 2-3 years, when other susceptible conifer terminal hosts remain alive for much longer despite suffering active and potentially lethal stem infections.

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