

Background

Following routine surveillance for *Phytophthora ramorum*, the Forestry Commission identified decline in a stand of western hemlock on both mature trees planted in the mid 1900's and the naturally regenerated understory.

Laboratory analysis of samples collected from a number of symptomatic western hemlock trees (*Tsuga heterophylla*) and several Douglas-fir (*Pseudotsuga menziesii*) trees confirmed that *Phytophthora pluvialis* was responsible for the symptoms observed.

Phytophthora pluvialis was originally reported in Oregon, USA in 2013 and in New Zealand in 2014. Douglas-fir, tanoak and several pine species (in particular radiata pine) are reported as hosts. In these countries it is reported as causing needle cast, shoot dieback, and occasional lesions on the stem, branches, and roots.

The following guide illustrates some of the symptomatic trees from which *Phytophthora pluvialis* has been detected in the UK.



Figure 1. General view of a site of western hemlock (*Tsuga heterophylla*) affected by *Phytophthora pluvialis*.



Figure 2. Dieback and bare lower branches of affected western hemlock.



Figure 3. Dieback and bare lower branches on affected western hemlock.



Figure 4. Early symptoms (left) and dead regen (right) infected by *P. pluvialis* under symptomatic western hemlock.



Figure 5. Symptoms of infection in western hemlock can be very subtle, sometimes consisting of only a single bare shoot, often low down in an otherwise healthy canopy.



Figure 6. Shoot and twig multiple resinous cankers on western hemlock.



Figure 7. Resinous canker on lateral branches of western hemlock (left) and *P. pluvialis* lesion revealed under the bark of the resinous canker (right).



Figure 8. Resinous canker on stem of western hemlock regen (left) and *P. pluvialis* lesion revealed under the bark of the resinous canker.



Figure 9. Resinous canker on a branch of mature western hemlock (left) and revealed lesion under the bark (middle and right) caused by *P. pluvialis*.



Figure 10. Lesions on main stem (left) and basal lesion (right) caused by *P. pluvialis* on young western hemlock.



Figure 11. Lesion on main stem (left), basal lesion (middle) and lesion on superficial root of mature western hemlock infected by *P. pluvialis*.



Figure 12. Chlorosis on needles of western hemlock infected by *P. pluvialis*.

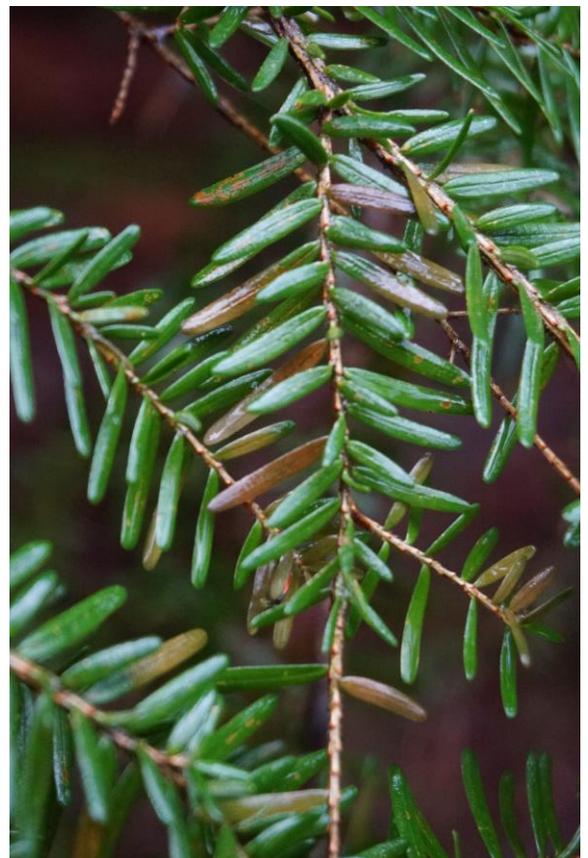


Figure 13. Olive green/brown needles of western hemlock infected by *P. pluvialis*



Figure 14. Dieback and bare lower branches on Douglas-fir infected by *P. pluvialis*.



Figure 15. Resinous cankers on main stem of Douglas-fir infected by *P. pluvialis*.



Figure 16. Resinous cankers on branches of Douglas-fir infected by *P. pluvialis*.

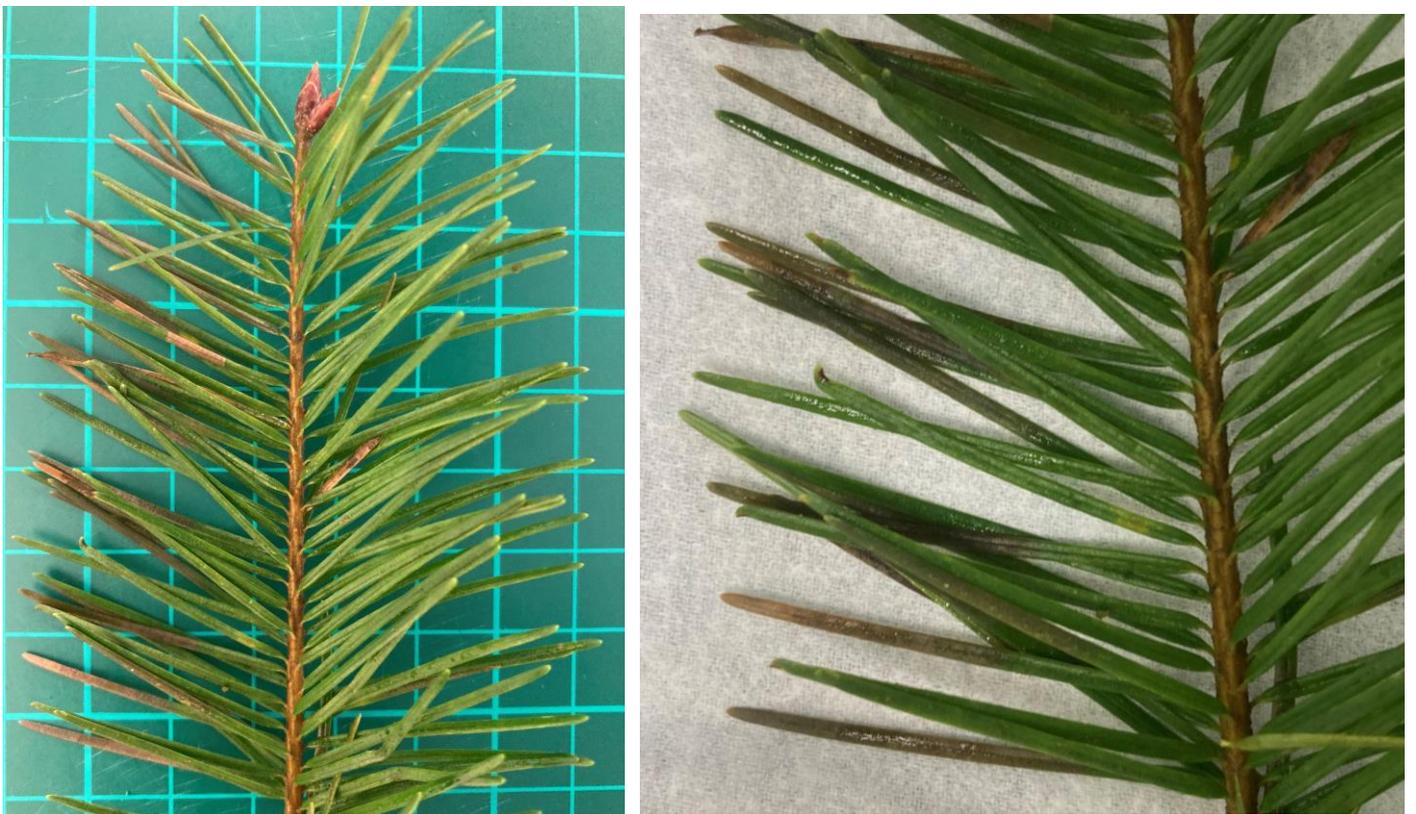


Figure 17. Olive green/brown needles of Douglas-fir infected by *P. pluvialis*.