

## ***First Report of Phytophthora pluvialis Causing Needle Loss and Shoot Dieback on Douglas-fir in Oregon and New Zealand***

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## DISEASE NOTES

## First Report of *Phytophthora pluvialis* Causing Needle Loss and Shoot Dieback on Douglas-fir in Oregon and New Zealand

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[Citation](#)[Open Access](#).

## ABSTRACT

Douglas-fir (DF, *Pseudotsuga menziesii*) is the most important forest tree in Oregon and is the second most valuable conifer in New Zealand. *Phytophthora pluvialis* was described (Reeser et al. 2013) from mixed evergreen forests in southwest Oregon. It was subsequently identified as the cause of red needle cast of radiata pine in New Zealand (Dick et al. 2014). There it was also isolated from chlorotic DF needles that dislodged readily from trees growing close to diseased radiata pine. In spring 2014, raintraps baited with rhododendron leaves were paired with nine 2-year-old DF seedlings at three or four locations in each of three 20- to 30-year-old DF plantations in western Oregon (11 raintraps and 99 seedlings total); control raintraps and seedlings were at two sites with no overstory (two raintraps and 18 seedlings total). Baits were collected at 2-week intervals and plated in corn meal agar (CMA) amended with natamycin, ampicillin, and rifamycin SV (CARP, Reeser et al. 2013). Symptomatic tissues from the seedlings were surface disinfested and plated in CARP. *P. pluvialis* was identified by sequencing the mitochondrial *cox* spacer region. Zoospores or sporangia produced from Oregon DF isolate 3661-NDL-041514 (GenBank KM491217) were used to inoculate four 2-year-old DF seedlings. Sporangia were induced by flooding cultures grown in pea broth with filtered stream water; zoospore release was stimulated by chilling. About 20 ml of inoculum was applied to DF

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seedlings using an airbrush sprayer. Two control seedlings were sprayed with filtered stream water. Inoculum contained 200 to 300 sporangia/ml or  $5 \times 10^4$  zoospores/ml. Inoculated trees were enclosed in polyethylene bags for 48 h with supplemental mist and incubated in a growth chamber at 16 to 18°C with 12-h photoperiod. Symptomatic tissues were collected starting at 14 days, surface disinfested, and plated in CARP. Isolates were collected and identified as above. *P. pluvialis* was isolated from baits in nine of the 11 raintraps and from 54% of seedlings across all three plantations. All isolations from control sites were negative. Overstory trees exhibited thin crowns from needle loss. Symptoms on seedlings included partial needle loss of 1- and 2-year-old needles and irregular mottled needle chlorosis. *P. pluvialis* was isolated from needles on 54% of the seedlings associated with positive raintraps. Isolation success from individual symptomatic needles from locations where raintraps were positive was 13%. Twig symptoms were not visible on overstory trees, but trees were not felled for close examination. Twig symptoms on seedlings included tip dieback and stem lesions extending from bud scars. Twig symptoms developed on 37% of seedlings from locations with positive raintraps; *P. pluvialis* was isolated from 47% of these twig lesions. Needle and twig symptoms similar to those on naturally infected seedlings developed on artificially inoculated seedlings and *P. pluvialis* was isolated from seedlings inoculated with both sporangia and zoospores, but not from control seedlings. This is the first report of a foliar *Phytophthora* species on DF. There is as yet little information on epidemiology or impact in the forest in Oregon. In New Zealand, DF defoliation was most evident in plantations growing close to radiata pine plantations on sites prone to red needle cast.

## References:

Section:

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