First Report of Phytophthora occultans Causing Root and Collar Rot on Ceanothus, Boxwood, Rhododendron, and Other Hosts in Horticultural Nurseries in Oregon, USA

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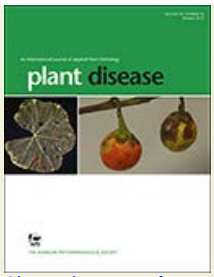

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DISEASE NOTES

First Report of *Phytophthora occultans* Causing Root and Collar Rot on *Ceanothus*, Boxwood, Rhododendron, and Other Hosts in Horticultural Nurseries in Oregon, USA

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ABSTRACT

Dead and dying *Ceanothus sanguineus*, *C. velutinus*, and *C. integerrimus* plants grown in a native plant nursery in Oregon for landscape restoration were reported in 2011. Plants were wilted with stem lesions above necrotic roots. Using selective media (Hansen et al. 2012), twelve similar *Phytophthora* isolates were obtained. DNA sequences of the *cox* 1, β tubulin, and the rDNA ITS regions were generated (Hansen et al. 2012). All isolates had identical ITS sequences (GenBank KP742989), and were identical to *Phytophthora occultans* (Man in't Veld et al. 2014) (JX978155) and 99% similar to *P. himalsilva* (HM752784) in a BLAST analysis. They were also identical to *P. occultans* in *cox* 1 and β tubulin (KR028484 and KR028483). Isolates were homothallic, with smooth 30-µm-diameter oogonia, and slightly aplerotic oospores. Antheridia were mostly paragynous. Colonies were stellate on carrot agar, growing 6 to 7 mm/d at optimum temperature (25°C). Sporangia were ovoid to irregular and papillate. Morphology and growth were consistent with *P. occultans*. Collections of unidentified *Phytophthora* spp. from the OSU Plant Clinic and from other Oregon nurseries (J. Parke et al. 2014) revealed additional isolates with similar morphology

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and identical DNA sequences. *P. occultans* was identified from boxwood (*Buxus* spp.), rhododendron, *Gaultheria shallon*, *Arctostaphylos uva-ursi*, and *Mahonia nervosa* in addition to *Ceanothus* spp. Two inoculation trials were conducted: (i) Healthy 1-year-old plants of *C. sanguineus* and *C. velutinus* were stem wound inoculated with two isolates of *P. occultans* from *Ceanothus*, or with sterile agar. There were 3 to 5 replications for each host and the control. The test was repeated with addition of two isolates from boxwood. (ii) Boxwood (*B. sempervirens*) and rhododendron (*R. catawbiense* Alba) were stem wound inoculated with two isolates each of *P. occultans* from *Ceanothus* and boxwood. There were four replications of each host for each isolate. All plants were incubated at 20 to 22°C. In test 1, all isolates induced stem lesions and wilting on all inoculated plants of both *Ceanothus* species. Wilting began in 14 days and lesions, measured at 19 days, averaged about 150 mm. There were no symptoms on control plants. In test 2, lesions developed on rhododendron stems, often girdling the stem within 12 days. Most boxwood showed no foliar symptoms or only mild yellowing, although stem lesions averaging 3.5 cm in 7 weeks were present on all plants. *P. occultans* was reisolated from all hosts in both tests. *P. occultans* was recently described from *Buxus* nursery stock in The Netherlands (Man in't Veld et al. 2014), and isolates with identical DNA sequences were reported from Germany and Romania (Nechwatal et al. 2014). This is the first report from North America. It appears that a single clone of *P. occultans* recently has been spread widely in the nursery trade. *P. occultans* is similar to *P. himalsilva* (Vettraino et al. 2011) and to other members of the poorly defined *P. citrophthora* clade. Phylogenetic analysis may revise species definitions. Nursery plants grown for wildland restoration are at high risk to carry exotic *Phytophthora* species into vulnerable landscapes. Forest restoration specialists must demand healthy stock from nurseries.

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