Host Range Determination and Fungicide Resistance Assessment of *Phytophthora lateralis* Isolates from Horticultural Nurseries in Oregon[1]

Franziska Rupp,[2] Ebba K. Peterson,[2] Joyce Eberhart,[2] and Jennifer L. Parke[2]

Abstract

Phytophthora lateralis causes root rot of Port-Orford cedar (*Chamaecyparis lawsoniana*; POC) in native forests of northwest California and southwest Oregon and in landscape plantings of horticultural *Chamaecyparis* cultivars in the western US and Europe. In spring 2015, following observations of mortality amongst plant groups in two horticultural nurseries in Oregon, *P. lateralis* was isolated from the roots of two additional conifer species: *Microbiota decussata* and *Juniperus communis*. Species identification was confirmed by sequencing the ITS region using ITS4 and ITS6 primers. To substantiate the extended host range of *P. lateralis*, we conducted Koch´s Postulates with the recovered nursery isolates on potted *Juniperus* and *Microbiota* plants.

One isolate from *Juniperus* and one from *Microbiota* were included in a greenhouse inoculation trial. We additionally included one isolate recovered from POC used in POC-resistance screening trials as a standard. Test plants included *J. squamata* cv. Blue Star, *J. communis* cv. Blueberry Delight, and *M. decussata* cv. Celtic Pride; a susceptible POC clone provided by the Dorena Genetic Resource Center was included as a positive control. We applied zoospore inoculum to the base of each plant. Plants were flooded for 3 days after inoculation, then again for 24 hours once a week. Inoculum was re-applied after 3 weeks. After 7 weeks, root segments and stem lesions were plated on *Phytophthora*-selective media. We then characterized and re-sequenced isolates to confirm the identification as *P. lateralis*.

Symptoms (foliage chlorosis, stem discoloration, root necrosis, and mortality) were observed on POC inoculated with all three *P. lateralis* isolates and on both *Juniperus* and *Microbiota*. In comparison to plants inoculated with the POC isolate, greater mortality of *Juniperus* and *Microbiota* was observed when inoculated with the nursery isolates. Nursery isolates were successfully re-isolated from POC, *Juniperus*, and *Microbiota.* Characterization of recovered isolates was completed via morphology and ITS sequencing; *P. lateralis* was the top match at 99% - 100%.

Because disease occurred in nurseries despite frequent application of the oomycete-specific fungicide Subdue Maxx (Syngenta Crop Protection), all isolates (four from *Microbiota*, seven from *Juniperus*, and the POC isolate) have been tested *in-vitro* for resistance to the active ingredient mefenoxam. Mefenoxam resistance was assessed on 10-day-old cultures growing on agar plates amended with different concentrations (100 ppm, 10 ppm, 1 ppm, 0.1 ppm) of mefenoxam. Colony growth on fungicide-amended media was compared to growth on non-amended media. No evidence for resistance has been detected at these concentrations.

---

[1] A version of this paper was presented at the Sixth Sudden Oak Death Science Symposium, June 20-23, 2016, San Francisco, California.

[2] Oregon State University, Corvallis, OR 97331.
Corresponding author: Jennifer.Parke@oregonstate.edu.

Koch´s Postulates was completed on *Juniperus* and *Microbiota*, adding two new hosts to the list of species susceptible to *P. lateralis* infection. Given observations in the inoculation trial, further research is in progress to assess differences in aggressiveness between the nursery isolates and standard POC isolates used in POC resistance screening as well as determine pathogen clonal lineage. Importantly, no evidence for the development of resistance to mefenoxam was found; however, the potential for the development of resistance in these nurseries should be considered and monitored.

Acknowledgments

We would like to thank Dr. Richard Sniezko and Erin Hooten of the USDA Forest Service Dorena Genetic Resource Center for providing susceptible POC seedlings and Paul Reeser and Wendy Sutton for assistance producing inoculum.