

***Phytophthora* Diseases in Forest :**  
Histocytological Study of Port-Orford Cedar Root Disease

Eunsung Oh

*Division of Forest Diseases and Insect Pests, Korea Forest Research Institute,  
Seoul 130-712, Korea*

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The approximately 80 known species of *Phytophthora* are all destructive plant pathogens, causing rots of roots, stems, leaves, and fruits of a huge range of agriculturally and ornamentally important plants. Port-Orford-cedar (*Chamaecyparis lawsoniana*, POC) is a native conifer in southwest Oregon and northern California. In 1923, a root disease was first reported on POC in nurseries and landscape plantings caused by *Phytophthora lateralis*. Since about 1954 the disease has been spreading along roads and streams in forests where POC grows wild. A few tree families have been shown to have resistance and selected for study of resistance mechanism. Since no research has been done yet for why and how the tree families are resistant against *P. lateralis*, this study was designed to help understand the mechanisms of resistance to *P. lateralis* in individual POCs. Cytological observations by means of microscopy indicated that 1) encystment, penetration, and colonization of *P. lateralis* were the same on both susceptible (SP) and resistant POCs (RP) but their frequencies in resistant seedlings were lower than in susceptible seedlings. 2) after 24 hr infection on root, frequency of initial infection, penetration, and colonization was different between SP and RP but mode was same. 3) inter- and intracellular hyphae were present in cambial, parenchyma, and sieve cells in functional phloem of stems. 4) Slow growth of pathogen in resistant POC cells is caused by general resistance responses, such as increased cell wall thickness, wall apposition, and deposition of electron dense particles.

Therefore, this study provided evidence for resistance mechanisms based on induced physical (barrier) and mechanical defense of POC to *P. lateralis*. Although no rapid cell death by inducing lignification and phenolic compounds as a hypersensitive response was documented, this study provides evidence for general resistance mechanisms in POC to *P. lateralis* and reveals the relationship between POC and *P. lateralis*.

Curriculum Vitae			
Name	Eunsung Oh	Nationality	Korea
Affiliation	Korea Forest Research Institute	Position	Researcher
Telephone	02-961-2669	Faxmile	02-961-2679
E-mail	eunsungoh@foa.go.kr		
Education	1994 ~ 1997 : Kanwon National University, Forest Resource Protection (B.A.) 1997 ~ 1999 : Kanwon National University, Forest Resource Protection (M.S.) 2000 ~ 2004 : Oregon State University, Forest Pathology (Ph.D.)		
Experience	2005 ~ 2006. 6 : Oregon State Univ., Forest Pathology, Post doctorate 2006. 7 ~ 2006. 8 : Korea Forest Research Inst., Forest Pathology, Post doctorate 2006. 8 ~ Present : Korea Forest Research Inst., Forest Pathology, Researcher		
Main Scientific Publication	<p>Lee, J.K. and Oh, E. 2000. Potentials for biological control of blue stain on woods caused by Ophiostomatoid fungi. <i>The Plant Pathology Journal</i> 16(4): 200-205.</p> <p>Lee, J.K. and Oh, E. 1998. Screening of white rot fungi with selective delignification capacity for biopulping. <i>Korean Journal of Mycology</i> 26(2): 144-152.</p> <p>Parke, J.L., Oh, E., Hansen, M.E., Voelker, S., and Gartner, S. 2006. Infection of tanoak sapwood and interference with water transport by <i>Phytophthora ramorum</i>. <i>Phytopathology</i>. (in progress)</p> <p>Oh, E. and Hansen E.M. 2006. Histopathology of infection and colonization of Port-Orford-Cedar by <i>Phytophthora lateralis</i>. <i>Phytopathology</i>. (accepted)</p> <p>Oh, E., Hansen, E.M., Sniezko, R.A. 2006. Port-Orford-cedar resistant to <i>Phytophthora lateralis</i>. <i>Forest Pathology</i>. (in press)</p> <p>Parke, J.L., Oh, E., Ochiai, N., Stone, J., Hansen, E.M. 2006. Recovery and detection of <i>Phytophthora ramorum</i> from sapwood of mature tanoak. (Abstr.) <i>Phytopathology</i> 96: (in press)</p> <p>Oh, E. and Hansen, E.M. 2002. Mechanisms of resistance in Port-Orford-cedar to <i>Phytophthora lateralis</i>. (Abstr.) <i>Mycological Society of America, Corvallis OR, 22-26 June, 2002</i>. <i>Inoculum</i> 53(3): 48.</p> <p>Parke, J.L., Oh, E., Voelker, S., Ochiai, N., Hansen, E.M. 2006. <i>Phytophthora ramorum</i> reduces xylem sapflow and specific conductivity of sapwood in mature tanoak. <i>In poster presentation: American Phytopathological Society. July 29-August 2, 2006 Quebec, Canada</i>.</p> <p>Parke, L.J., Bienapfl, J., Oh, E., Rizzo, D., Hansen, M.E., Buckles, G., Lee, C., and Valachovic, Y. 2006. Natural infection of tanoak seedling roots by <i>Phytophthora ramorum</i>. <i>In poster presentation: American Phytopathological Society. July 29-August 2, 2006 Quebec, Canada</i>.</p> <p>Oh, E., Parke, J.L., and Hansen, E.M. 2006. Recovery, detection, and observation of <i>Phytophthora ramorum</i> from sapwood of mature tanoak. <i>Poster and Proceedings of the 53rd Western International Forest Disease Work Conference, Sept. 26-30, 2005, Jackson Hole, Wyoming</i>. (in press)</p>		

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