

***Phytophthora ramorum* Infects Tanoak Sapwood and is Associated With Reduced Sap Flux and Specific Conductivity of Xylem^{1 2}**

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Abstract

Culture, detection with diagnostic PCR, and microscopy demonstrated the presence of *Phytophthora ramorum* in the sapwood of mature, naturally infected tanoak (*Lithocarpus densiflorus*) trees in Curry County, Oregon. The pathogen was strongly associated with discolored sapwood ($P < 0.001$), and was recovered or detected from 83 percent of discolored sapwood tissue samples. Hyphae were abundant in the xylem vessels, ray parenchyma, and fiber tracheids. Chlamydospores were observed in the vessels. A field study was conducted to determine if trees with infected xylem had reduced sap flux and reduced specific conductivity relative to non-infected control trees. Sap flux was monitored with heat-diffusion sensors, and tissue samples near the sensors were subsequently tested for the presence of *P. ramorum*. Adjacent wood sections were excised and specific conductivity was measured in the laboratory. Both sap flux and specific conductivity were significantly reduced in infected trees as compared to non-infected control trees. Vessel diameter distributions did not differ significantly between the two treatments, but tyloses were more abundant in infected than in non-infected trees. Reduced sap flux and specific conductivity may result from increased embolism caused by *P. ramorum* infection, the presence of fungal structures, and the increased abundance of tyloses present in the vessels. Reduced stem water transport may contribute to crown mortality associated with sudden oak death.

Key words: *Lithocarpus densiflorus*, water relations, pathogenesis, embolism, tyloses.

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