Relationship Between Field Resistance to *Phytophthora ramorum* and Constitutive Phenolic Chemistry of Coast Live Oak

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Abstract

Sudden oak death, caused by *Phytophthora ramorum*, has resulted in high levels of coast live oak (*Quercus agrifolia* Nee (CLO) mortality. However, some CLO survive in areas with high disease pressure and may thus be resistant. We tested the hypothesis that such field resistant trees contain constitutively higher levels of phenolics than susceptible trees. Phloem was sampled from the trunks of two groups of trees (one previously inoculated, one naturally infected with *P. ramorum*) categorized over the course of several years as putatively resistant (PR, no symptoms), in remission (IR, showed symptoms but then recovered), and symptomatic (S). Individual and total soluble phenolics from these trees were quantified. There were no significant differences in individual or total soluble phenolics between groups of naturally infected trees. However, inoculated PR and IR trees were characterized by higher constitutive levels of total phenolics, as well as ellagic acid and tyrosol hexoside pentoside, than S trees. Threshold concentrations that predicted an individual tree's response to inoculation with *P. ramorum* were determined using logistic regression analysis for ellagic acid, tyrosol hexoside pentoside, and total phenolics. The identification of low molecular weight compounds (biomarkers) associated with resistance may lead to minimally invasive assays for assessing the response of individual coast live oaks or populations to *P. ramorum*. The ability to identify resistant trees prior to the arrival of the pathogen increases the options for managing threatened forests, e.g., by protecting highly resistant stands from logging, fire, and development.

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