SURVIVAL AND CHLAMYDOSPORE PRODUCTION OF *PHYTOPHTHORA RAMORUM* IN CALIFORNIA BAY LAUREL LEAVES

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Sudden Oak Death manifests as non-lethal foliar lesions on bay laurel (*Umbellularia californica*), which support sporulation and survival of *Phytophthora ramorum* in forest ecosystems. Infected bay laurel leaves are more likely to abscise than uninfected leaves, resulting in an accumulation of inoculum at the forest floor. The pathogen survives the dry summers in a proportion of attached bay leaves, but the histology of colonization during the survival phase and the propagules responsible for survival are unknown. This study focuses on summer pathogen survival associated with bay laurel in redwood-tanoak and mixed-evergreen forests with specific objectives including: i) detection of *P. ramorum* in leaf litter and soils throughout summer, ii) quantification of chlamydospores on attached symptomatic leaves, and in fresh and aged litter, iii) determination of chlamydospore germination, and, iv) assessment of pathogen survival within litter and canopy leaves, addressing the location of viable inoculum within foliar tissues. Ten trees were tagged for repetitive sampling in four redwood-tanoak and four mixed-evergreen forests. Sampling was conducted in May and August 2006 and in March 2007. To determine pathogen presence in leaf litter and soil, litter and soil samples were collected from each tree. Samples were then baited for *P. ramorum* with rhododendron leaves. Chlamydospore populations on surfaces of attached leaves, and fresh and aged litter were determined by scrubbing individual leaves with a moistened toothbrush and filtering the resulting suspension through 35 uM nylon mesh. Chlamydospores were then counted and subsamples of chlamydospores were placed on selective medium to observe germination potential. Pathogen survival and colonization was determined by subdividing symptomatic tissue from each leaf for detection by PCR, culture, and scanning electron microscopy.

P. ramorum was baited from 60-90% of soil samples at all sites in May 2006, but was undetectable by August 2006. The pathogen was only baited from the bulk leaf litter in March 2007, and only at sites experiencing a rain event concurrent with collection. The pathogen was rarely isolated from lesions in aged litter, but sporadic isolation was observed in fresh litter. Pathogen isolation from attached leaves ranged from 40-100% at each site in May 2006 and declined to a range of 0-40% in August 2006, with higher isolation recovery observed in redwood-tanoak forests than in mixed-evergreen forests. PCR resulted in more positive detections of *P. ramorum* than culture. Chlamydospore populations on attached leaf surfaces were higher in redwood-tanoak than in mixed-evergreen forests in both May and August 2006, but no chlamydospore germination was observed. Populations of chlamydospores were present, but highly variable in leaf litter. Detectable inoculum declined over the duration of the summer with lower foliar survival observed in mixed-evergreen forests than in redwood-tanoak forests. Though PCR resulted in enhanced detection of *P. ramorum*, false positives may result from presence of non-viable pathogen tissue or residual DNA. Bay laurel leaves in redwood-tanoak forests supported abundant surface chlamydospore production, but the mechanisms inciting enhanced spore production and the role of these propagules in the survival of *P. ramorum* and epidemiology of Sudden Oak Death is yet unknown.