Summer Survival of *Phytophthora Ramorum* in Forest Soils

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Recovery of *Phytophthora ramorum* from soils throughout sudden oak death affected regions of California illustrates that soil serves as an inoculum reservoir for the pathogen, but the potential for survival in soils throughout the summer is largely unknown. This study assesses pathogen survival in infected leaf tissue at the soil surface in a redwood-tanoak forest ecosystem. Over 4,000 rhododendron leaf disks were inoculated with *P. ramorum* and incubated for one week in a moist chamber to allow for colonization of leaf tissue. Ten leaf disks were placed in each of 360 mesh sachets and transferred to the field in April 2004. The sachets were dispersed under 10 trees each of tanoak (*Lithocarpus densiflorus)*, California bay laurel (*Umbellularia californica)*, and coast redwood (*Sequoia sempervirens)*, and at three vertical locations: i) leaf litter surface, ii) litter/soil interface, and iii) below the soil surface. Sachets were arranged vertically within partially-submerged cylindrical barriers to prevent lateral movement of *P. ramorum* and were retrieved 1, 2, 8, and 24 weeks after introduction. At each time point, sachets were retrieved from the field and soil samples were taken from within the cylindrical barriers and from the bulk soil. In the laboratory, the wet weight of leaf disks was recorded as a measure of water retention and soil moisture content was also determined. Pathogen recovery was determined by submerging the leaf disks in selective medium. If a leaf disk was considered *P.r.*-negative, that disk was subsequently incubated in water for three weeks before being returned to selective medium. After one week in the field, the pathogen was recovered from 1% of the disks at the leaf litter surface. Recovery from the two subsurface treatments remained over 80% over the first two weeks. After 8 weeks 80% and 65% pathogen recovery were observed in the soil and at the litter/soil interface, respectively. Over 60% pathogen recovery was observed in leaf disks remaining in the soil for 6 months. After incubation of *P. r.*-negative disks in water, recovery at 8 weeks was enhanced by 3% and 10% in soil and interface disks, respectively. Significantly more chlamydospores were observed in leaf disks ranked *P. r.*-positive after incubation in water than those ranked *P. r.*-negative, and chlamydospore germination was occasionally observed within *P.r.*-positive leaf disks. Soil moisture content decreased over time, and was correlated with pathogen recovery. Soil moisture content varied under the different tree species, with the highest moisture content persisting under redwoods, also the tree associated with organic soils. Recovery of *P. ramorum* after incubation in water coupled with high populations of chlamydospores in *P.r.*-positive tissue suggests the potential role of hydration in breaking chlamydospore dormancy. Summer survival of *P. ramorum* in soil suggests that infested soil may serve as a source of primary inoculum for fall disease development.