Incubation of *Phytophthora ramorum*-Infested Leaf Debris in Soil Affects Survival, Sporulation Capacity, and Subsequent Risk of Epidemic Development within Nurseries[1]

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Abstract

Soilborne inoculum (infested leaf debris which has become incorporated into the soil) may be an important contributor to the persistence of the sudden oak death pathogen *Phytophthora ramorum* in recurrently positive nurseries. To initiate new epidemics, soilborne inoculum must not only be able to survive over time, but also be capable of producing sporangia during times favorable to infection of plant material at the soil surface. Current research has only assessed the recovery of this pathogen after being buried in soils. Two additional aspects of the disease cycle are being investigated in a field trial at the National Ornamentals Research Site at Dominican University of California (NORS-DUC): the infection of leaf baits at the soil surface and the capacity to produce sporangia post-incubation.

Rhododendron leaf disk inoculum was buried in soil at a depth of 5 or 15 cm in June 2014. Over the course of 1 year, inoculum was recovered and placed in filtered creek water at 20°C to induce sporulation, after which it was plated on selective media to assess viability. Recovery frequency of *P. ramorum* from incubated disks remained above 60% for inoculum at both depths. Sporulation has been greater from inoculum buried at 15 cm relative to 5 cm for all recovery dates. Sporulation potential initially declined; however, a moderate increase in sporangia production was observed in the autumn and winter following the burial of inoculum.

Subplots were baited with non-infested leaf disks to assess the potential for soilborne inoculum to cause infections at the soil surface. *P. ramorum* was recovered from baits placed above inoculum introduced to soil in June, albeit rarely. Recovery of *P. ramorum* from baits placed atop columns containing inoculum introduced to both depths at the beginning of each baiting period was greatest between November and January.

Incubation in soil reduced sporulation capacity in the short-term; however, sporulation capacity increased with the onset of autumn and winter. This increase corresponded to times in which the greatest recovery of *P. ramorum* was observed from leaf baits placed at the soil surface. This increase may have been attributed to the seasonally decreasing mean and maximum temperatures experienced in the soil, as validated by laboratory experiments. While inoculum incubated over the summer had reduced sporulation capacity, increases in sporulation during times of high risk of infection likely aided the development of new *P. ramorum* epidemics originating from soilborne inoculum sources.

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