

## The Effects of Girdling on the Ectomycorrhizal Fungal Community Associated with Tanoak (*Lithocarpus densiflorus*)

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*Phytophthora ramorum* was identified as the lethal agent of tanoak (*Lithocarpus densiflorus*), black oak (*Quercus kelloggii*), and coast live oak (*Quercus agrifolia*) in central areas of California. Although the geographic origin remains unknown, its severe impact on tanoaks and *Quercus* species its limited geographic range and the existence of a single clonal population in North America are indicative of a recently introduced pathogen. Pathogenic invasions of this magnitude are often recognized as serious threats to the maintenance of biodiversity affecting both structure and function of ecosystems. Although several studies have been aimed to understand the epidemiology, pathogenicity, and treatment of *P. ramorum*, the effects on the microbial community remain unknown. The objectives of this study are to simulate the formation of cankers formed by *Phytophthora ramorum* through physical girdling of trees and measure the impacts on the ectomycorrhizal biomass in both roots and soil. A randomized block design was implemented with 5 blocks (60 x 60 m) divided into 3 (20 x 20 m) plots. Baseline sampling was performed to examine ectomycorrhizal composition and biomass prior to girdling. Trees were girdled by cutting a circular gouge to prevent the translocation of phloem (fully girdled) and by reducing carbon flow by physically girdling half of the tree (half girdled) in conjunction with control plots. Root tips were sampled 1, 3, 5, 9, and 13 months after girdling. Quantification of extracted DNA from tanoak roots and collected soil were completed using TaqMan chemistry. Primers and probes were designed to target particular groups of taxa (*Cenococcum*, *Sebacina* and *Tricholoma* species) that were frequently encountered and exhibited a broad spectrum of reproductive and ecological characteristics. Our results suggest that ectomycorrhizal fungi can persist on root tips for several months after girdling. Using repeated measures Analysis of Variance, the ratios of DNA to grams of biomass were higher during drier sampling periods for *Cenococcum geophilum*. This was likely due to the persistence during periods of high water stress. After 9 months, reductions in the quantity of DNA to mass of roots were found between control and fully girdled plots. Given that microbial populations mediate decomposition and mineralization rates, it is not improbable to expect that the negative impacts on the ectomycorrhizal populations may influence nutrient balance in an ecosystem after invasion by *Phytophthora ramorum*.