Morphology and Mycorrhizal Ecology of a Deep Granitic Regolith Under an Oak-Woodland. (S05-bornyasz122333-Oral)

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Abstract:

In southwestern California, Q. agrifolia habitat closely matches regions of shallow soils developed within the granitic regolith. In this region of Mediterranean climate the mean annual precipitation is low (355 mm at study site) and annual evapotranspiration demand is high. Because plant available water (PAW) is depleted from the shallow soil by June, plants rely on water stored in the porous, weathered bedrock matrix. Most of the PAW in weathered granitic rock is held within micropores, which are generally too small for roots to access. Mycorrhizal hyphal extension from fracture-confined roots into matrix pores is a potential mechanism by which plants access this stored matrix water. We previously reported that ectomycorrhizal (EM) Q. agrifolia roots were found in weathered bedrock fractures throughout a 4 m deep by 15 m wide fresh cut-slope exposure of dominantly weathered bedrock (.5-4.0 meter depth). Percent-infected tips and morphotype abundance in the weathered rock on occasion matched that in soil. We have since quantified the extent of hyphal exploration, within fractures and into the matrix, by scoring extracted hyphal abundance (grid-intercept method) and converting scores to hyphal lengths per gram of regolith. Results show that both septate (EM and saprophytic) and aseptate (AM) hyphae exist in the fractures and in the matrix of weathered bedrock. Septate hyphal length densities (HLD) and fine root tips in fractures decreased significantly with depth. However, aseptate HLD in the matrix did not increase or decrease significantly with depth, though there is a significant positive correlation between aseptate HLD and degree of matrix weathering. An increase in weathering of feldspar minerals in the matrix yields more abundant micropores, available nutrients, and volume for water retention and hyphal exploration.

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