

Plant-Microbe Interfaces: Characterizing the diversity and function of the ectomycorrhizome of *Populus trichocarpa*

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Project Goals: The goal of the PMI SFA is to understand the genome-dependent molecular and cellular events involved in establishing and maintaining beneficial interactions between plants and microbes. *Populus* and its associated microbial community serves as the experimental system for understanding how these molecular events manifest themselves within the spatially, structurally, and temporally complex scales of natural systems. To achieve this goal, we focus on 1) characterizing host and environmental drivers for diversity and function in the *Populus* microbiome, 2) utilizing microbial model system studies to elucidate *Populus*-microbial interactions at the molecular level and dissecting the signals and pathways responsible for initiating and maintaining microbial relationships and 3) develop metabolic and genomic modeling of these interactions to aid in interpreting the molecular mechanisms shaping the *Populus*-microbial interface.

The *Populus* root microbiome harbors a diverse community of ectomycorrhizal fungi (EMF) that significantly increases nutrient uptake and acquisition by the plant host while also providing protection against antagonistic parasites. Over 30 genera of EMF are known to associate with *Populus*, including many groups of mushroom-producing families including *Boletaceae*, *Russulaceae*, *Cortinariaceae*, *Tricholomataceae*, and *Amanitaceae*. A major aim of the PMI project is the collection, isolation, and characterization of the major EMF fungal associates of *P. trichocarpa* across its range in the Pacific Northwest. In Autumn 2015 and 2016, we surveyed macrofungal diversity under native *P. trichocarpa* forests from five core watersheds on the Squamish (BC), Snohomish (WA), Puyallup (WA), Columbia (OR and WA), and Willamette (OR) rivers. This resulted in over 150 collections of EMF fruit body collections and sampling of bulk soil used in bioassay studies. All sporocarp collections were plated on modified Melin-Norkrans medium, photographed, spore printed, and dried for identification and accession into fungal herbaria. The first fungal collections have been identified while the second samples from the second campaign are being identified by a consortium of taxonomic experts using the ITS barcode marker as well as morphological features.

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