Tree Species Influences on Belowground Carbon Flux: Assessing the Rhizosphere Effect in Forest Trees. (S07-phillips213637-Poster)

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Abstract:

Plant roots stimulate soil microbes through the release of root exudates (the rhizosphere effect). We assessed the rhizosphere effect in mature trees by sampling soil around the fine roots of the vesicular arbuscular sugar maple (Acer saccharum) and ectomycorrhizal yellow birch (Betula alleghaniensis) at the Hubbard Brook Experimental Forest, NH. We compared rhizosphere and bulk soil microbial biomass C (MBC), maximum microbial respiratory activity (MRA) and C and N mineralization potentials in the Oa and upper mineral horizon. Around birch roots in the Oa, MBC and MRA were 40% and 47% greater (alpha = 0.05) in rhizosphere relative to bulk soil. In birch, C and N mineralization potentials were also greater (45% and 89%) in the rhizosphere. Around maple roots in the Oa, no differences in MBC or MRA were detected between rhizosphere and bulk soil, though N mineralization potentials were 104% greater in rhizosphere soil. In the mineral horizon, rhizosphere MRA was 41% greater in birch and 42% greater in maple. These results suggest that release of root exudates to the rhizosphere may benefit trees (particularly species with ECM associations) by stimulating soil microbes and enhancing nutrient availability.

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