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Stable Isotope Probing of Peat and Forest Floor Amendments

Sylvie Quideau and Mark Béasse
Alberta, Edmonton, Canada (sylvie.quideau@ualberta.ca)

In Alberta, Canada, land reclamation efforts utilize peat as an organic amendment to help reclaim decommissioned oil sands mine sites to upland boreal forests. This study investigates the rhizosphere microbial communities of two pioneer species, aspen (Populus tremuloides Michx.), a species not known for strong associations with the soil microbial community, and alder (Alnus crispa Ait.), a species well known for mutualism with actinomycetes. Specifically, the objective was to determine how different organic amendments (peat versus forest floor) influenced the rhizosphere microbial communities and how this could be linked to plant growth. Seedlings were grown for 20 weeks in forest floor material, peat, and a combination of both. They were pulse labelled with $13CO_2$ (g) and subsequently harvested for plant growth measurements. While analysis of plant growth attributes did not indicate any effect of the organic amendment on aspen growth, alder reported significantly less growth in peat treatments. The rhizosphere soils were extracted for compound-specific analysis of δ13C in microbial phospholipid fatty acids. Stable isotope probing showed greater carbon flow between trees and their rhizosphere communities when seedlings were grown in forest floor material.