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# Do tree species richness or identity affect fine root productivity and soil C and N levels?

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## Abstract

Numerous studies have demonstrated that an increase in species diversity (generally measured by species richness - SR) positively affects ecosystem productivity or functioning. However, the majority of studies have focused on aboveground productivity and processes. Here, we measured fine root (< 2mm) productivity (ingrowth cores), as well as soil C and N concentration and size fractions, along an artificial gradient of tree species richness (1, 2 and 4 native, temperate species) in Montreal, Canada (part of the International Diversity Experiment Network with Trees - IDENT). We did not observe differences in fine root productivity with SR, however both species identity and functional identity (hardwood versus conifer) affected root productivity. Conifers had higher root productivity than hardwoods, while the opposite was observed for aboveground productivity (at four years). Two-species mixtures were characterized by soils with lower total C, total N and lower N in the fine fraction (silt and clay fraction), compared to monocultures and 4-species mixtures. The rapid response in the soil fine fraction is surprising, since generally the soil intraaggregate particulate organic matter (iPOM) is more responsive in the short term to management interventions in both agricultural and forest soils.

**Keywords:** tree species richness gradient, tree species identity, fine root productivity, soil carbon, soil nitrogen, IDENT

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