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Tree species diversity effects on soil microbial biomass, diversity and activity across European forest types

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Increasing tree species diversity in forests might contribute to ecosystem-service maintenance, as well as to the reconciliation of regulating, provisioning and supporting services within the frame of multifunctional and sustainable forestry. Individual tree species influence biogeochemical cycling through element deposition (throughfall, litterfall), and through microbial activities in the soil. Yet, the influence of mixing tree species on these ecosystem processes is unclear, in particular concerning the microbial diversity and activity in soils.

Here we synthesize results from the Exploratory Platform of the FunDivEUROPE project (<http://www.fundiveurope.eu/>). This network of 209 comparative plots covering a tree diversity gradient of 1 to 5 tree species was established in existing mature forests in 6 European regions. These six focal regions represent a gradient of major European forest types from boreal to Mediterranean forests. We analysed the impact of tree species diversity and the role of other controlling factors on the metabolic diversity of soil bacteria (BIOLOG Ecoplate), soil microbial biomass (fumigation-extraction) and potential nitrification (shaken soil slurry) in the forest floor and the upper organo-mineral soil horizon.

Mean values of microbial biomass carbon ranged from 240 (Poland) to 1762 (Germany) mg kg⁻¹ in the forest floor and from 4197 (Italy) to 11207 (Finland) mg kg⁻¹ in the upper organo-mineral horizon. Tree diversity and soil water content were important controlling factors. Statistical models predict microbial biomass to increase in both horizons by 7-8% with each step increase in tree diversity. Metabolic diversity of soil bacteria (% of substrates used) showed high variability both within and between sites. Further results analysed with mixed linear models will be presented and discussed.

Keywords: forest soil, microbial biomass, nitrification, metabolic diversity

[GSBI2014, 'First Global Soil Biodiversity Conference - Assessing soil biodiversity and its role for ecosystem services', Dijon \(F\) - 2-5 décembre 2014 \(http://gsbiconference.elsevier.com\)](http://gsbiconference.elsevier.com)