

The hidden impact of forest management on the decomposition of soil organic matter

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Decomposition in soils is a key ecosystem function. Extracellular enzymes mediate the decomposition of soil organic matter and the mineralization of carbon (C), nitrogen (N), sulfur (S) and phosphorus (P). Forest management is assumed to affect decomposition processes through tree species selection, thinning and harvesting. In this study, we assessed the impact of forest management on the magnitude of soil enzymatic activities and soil respiration using the silvicultural management intensity indicator (SMI) introduced by Schall & Ammer (2013). We collected mineral soil samples (0-10 cm) from 150 forest plots in three different German regions (Schorfheide-Chorin, Hainich-Dün, Schwäbische Alb) and determined basic properties such as pH, soil texture, soil C and N contents. An aliquot of each soil sample was used to determine potential activities of enzymes involved in the C, N, P and S cycle (β -glucosidase, N-actyl-glucosaminidase, phosphatase, sulfatase). Another aliquot was incubated (20 °C, 60% WHC) for 14 days and the evolving CO₂ was determined. The main drivers of potential enzymatic activities and soil respiration were the site conditions such as clay contents and pH values. The effects of forest management were much lower but still significant. This shows that forest management has an impact on decomposition which is only detectable with high number of replicates.