

Soil carbon stocks in broad-leaved forests under different climatic conditions: relationships with biochemical and functional characteristics of soil biota.

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Soil is the largest terrestrial carbon reserve; about 20% of all soil C is stored in forest soils. In a scenario of climatic change, the role of stable soil C pool for mitigation of greenhouse gases has increased the need for more knowledge on the mechanisms and factors that govern organic C sequestration, stability and dynamics in forest soil. Climate affects litter's decomposition rate both directly and indirectly: directly, by influencing microbial activity and/or microbial species composition; indirectly, by altering the quantity and quality of organic detritus delivered to the soil. Different ecosystems likely exhibit different mechanisms and sequestration rates of C in soil and respond differently to changes in climatic conditions. On this basis the present work aims to investigate and to compare in 4 beech forests located along a North-South transect of Europe (1- Halden, Østfold-Norway; 2- Foret de Soignes, Brussels-Belgium; 3 - Pradaccio, Emilia Romagna-N. Italy; 4- Monte Faito, Campania –S. Italy) the qualitative and quantitative changes of litter and soil organic matter (SOM) and the mechanisms behind them, focusing on soil biological and functional activity. The investigation has been carried out along the decomposition's continuum (from litter layer to at least 40 cm depth) in spring and autumn, periods characterized by a major biological activity. The objective has been pursued through assessment of: standing litter, (SOM), cellulose, lignin, N, C contents, microbial and active fungal biomass, enzyme activities involved in OM degradation, i.e. cellulase, xylanase, dehydrogenase, chitinase, laccase, peroxidase. Statistical analyses have been performed in order to highlight the influences of the concurrent examined parameters on C sequestration.