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The influence of different land uses in Mediterranean environment on soil biochemical indicators and functional diversity

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The use of biochemical properties and indices is particularly useful in detecting changes occurring in microbial pool and activity when comparing different land uses.

Soil characterized by different managements with growing human impact were chosen in Sardegna (Italy) as representative sites in the Italian national project SOILSINK: vineyard (tilled and no tilled), grassland, pasture and forest (*Quercus suber*). The aim of the study was to determine if land use and management practices modified microbial biomass pool and activity in terms of C mineralization rates and enzymes. Enzymes were chosen on their relevance in the C (β-cellobiohydrolase, N-acetyl-β-glucosaminidase, β-glucosidase, α-glucosidase), N (leucine-aminopeptidase), S (aryl-sulphatase) and P (acid phosphatase) cycles and were used as indicators of functional diversity in soil. Moreover, the metabolic quotient ($q\mathrm{CO}_2$, ratio of respired C to biomass C), the mineralization quotient (qM, ratio of respired C to total organic C) and the microbial quotient ($q$mic, ratio of microbial biomass to total organic C) were used as valid indicators of the microbial efficiency in the use of energy and the degree of substrate limitation for soil microbes.

Microbial biomass and enzymatic activities on average increased noticeably in soils with a lower human impact and showed the ranking forest $>$ pasture $>$ grassland and vineyard. This trend was consistent with the larger input of organic matter from veg-

etation to soil, greater in pasture and forest sites. The C mineralization rates showed an opposite tendency, reaching the minimum values in the forest site. This resulted in a significant decrease of the metabolic quotient in the sites with lower human impact, indicating the presence of a microbial community more efficient in the use of available resources. This was further confirmed by the net increase of microbial quotient in the forest site, that reflected the larger substrate availability to the soil microorganisms.