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Effect of management of forest soils under *Quercus suber* L. on their soil biochemical quality

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Cork oak (*Quercus suber* L.) is found in two main types of habitats in the island of Sardinia: forest habitats (in pure stands or in mixed stands together with other species of *Quercus*) and wooded pastures. In the latter, grazing is common, as is sowing of forage plants to improve the pasture quality. In recent decades the expansion of agriculture and the use of deep ploughing methods, as well as overgrazing, have caused deterioration of cork oak habitat. However, until now no study has been made of the effects of the intensification of agriculture or grazing of livestock on the quality of soils under *Q. suber* forests. Although degradation of soil affects its physical, chemical and biochemical properties, the speed at which the latter are modified by different kinds of degrading agents have led these properties to be considered as the most sensitive for estimating loss of soil quality.

The present study was carried out to investigate the effect of type of management on the biochemical quality of soils under *Q. suber*. For this, four soils in the province of Nuoro (Sardinia, Italy) developed on granitic material, were studied: soil **F**, from forest used only for harvesting cork; soil **G**, from forest used for harvesting cork and on land that had been overgrazed for a long time, and two soils used for sowing pasture crops and harvesting cork: soil **L** subjected to light tillage in the past year and soil **H** subjected to heavy tillage in the past 20 years. After removal of litter, samples of the upper 25 cm of mineral soil were collected and analysed for total C and N, pH, microbial biomass C, soil respiration and N mineralization capacity, as well as the activities of two oxidoreductase enzymes (dehydrogenase and catalase) and different hydrolytic enzymes (phosphomonoesterase, phosphodiesterase, casein-protease, BAA-protease,

urease, invertase and ß-glucosidase).

The results demonstrated that soils **H** and **L** contained the greatest amounts of organic matter as well as the highest levels of microbial biomass C, N mineralization capacity and, in general, enzymatic activity, and that soil **G** showed the lowest levels of all of the biochemical properties studied. However, when the biochemical properties were expressed as a function of the organic C content, in general soil F and soil L showed the highest levels of biochemical activity, although for some properties the highest values corresponded to soil **G;** in all cases the heavily tilled soil showed the lowest values of activity per unit of C. The use of star diagrams similar to those proposed by Dilly and Blume (1998), in which the size and form of the star allows diagnosis of the vitality and status of the ecosystem, clearly showed that the heavily overgrazed soil showed the least equilibrated spectrum of biochemical properties.

References.

Dilly O., Blume H.P. (1998). Indicators to assess sustainable land use with reference to soil microbiology. *Advances in GeoEcology* 31: 29-39.