

Aiding Cork oak: a soil-plant-microbe approach

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The present research aimed to apply several approaches to compare declining and non-declining *Quercus suber* stands. The study was conducted between 2020 and 2022, on declining (D) and non-declining (ND) *Q. suber* areas, with soils formed on sands and clay deposits from the Miocene. In each area, sampling procedures included: 1) sporocarp survey; 2) soil sampling to identify microbial taxa; 3) soil core sampling for nutrient and organic matter determination; 4) dig soil profiles to study soil horizons; 5) tree leaves sampling for nutrient determination. Leaf nutrient analysis suggested differences between *Q. suber* nutritional status, with higher P, K, Ca, S, Mn, Cu and B values for ND areas and higher Fe values for D areas. Although N, Mg and Zn contents were similar in leaves from both areas, C/N ratio was higher for ND stands. ND areas have thicker sandy loam soils (> 130 cm) than D areas (≈60 cm), with sandier soils. Plus, usable water capacity and soil aeration were twice as high at ND areas. Soil organic matter, most nutrient levels (K, Mg, Mn, B), C/N ratio and pH were higher at ND areas. Macrofungal richness and mycorrhizal/saprotrophic rate (110; 3:1) were higher at ND areas compared with D areas (30; 1:4). More than 390 fungi OUT's were identified, with a mycorrhizal/saprotrophic rate superior for ND (1:1,35) relating to D areas (1:1,67). However, at ND areas prevailed the genus *Russula*, *Cortinarius* and *Inocybe*, and at D areas, *Tuber*, *Laccaria*, *Phallus* and *Entoloma* were the more abundant.

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