



## **Soil quality and bacterial community structure: a case study from the mediterranean region**

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Bacterial communities play a central role in innumerable processes and functions of soils such as decomposition of organic residues, nutrient cycling, aggregation, and formation of humic substances. We investigated the relationships between bacterial communities, soil profiles, and quality parameters in eight benchmark soils of the Mediterranean calcareous mountain sampled on a local scale. The diversity and composition of prokaryotic community was assessed by 16S rRNA gene amplicon pyrosequencing of DNA from samples of topsoil (10 x 10 x 0.2 m). The bacterial profile content resulted in the identification of groups belonging to 16 phyla and 75 genera. Two-dimensional models using multidimensional scaling (Stress < 0.11), correspondence analysis (Inertia > 71%), and principal component analysis (Variance > 60%) showed a decrease in the abundance of acidobacteria Gp4 and Gp3 while actinobacteria flourished with increasing soil profile development (from Leptosol to Luvisol). This can be attributed to inherent changes in soil quality along pedogenesis such as pH (8.3 to 7.8), organic C (20.0 to 45.2 Mg ha<sup>-1</sup>), macroporosity (0.11 to 0.32 cm<sup>3</sup> cm<sup>-3</sup>), and water stable aggregates (365.8 to 963.4 Mg ha<sup>-1</sup>). Actinobacteria genera like *Aciditerrimonas*, *Nocardioideis*, and *Solirubrobacter* also displayed positive correlations ( $r > 0.90$ ) with the content of clay and free Ferric forms. Other factors like Re-carbonation, loss of organic matter, and soil compaction probably caused by land use and management, led to a decline in the Chao1 richness and Shannon diversity indices (3625 and 6.3) with respect to native soils (7852 and 7.4). Likewise, Firmicutes and Gemmatimonadetes were tripled and the genera of Proteobacteria and Bacteroidetes decreased. Our data indicate that bacterial community structure depends largely on the soil quality status, both inherent and managed and suggest the bacterial group composition also follows the course of soil genesis.

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