# INTERACTION BETWEEN CONSERVATION TILLAGE AND NITROGEN FERTILIZATION STRONGLY SHAPES MICROBIAL DIVERSITY AT DIFFERENT SOIL DEPTHS: A LONG-TERM STUDY IN THE MEDITERRANEAN

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Soil biodiversity accomplishes key roles in agro-ecosystem services consisting in preserving and enhancing soil fertility and nutrient cycling, crop productivity and environmental protection. Thus, the improvement of knowledge on the effect of conservation practices, related to tillage and nitrogen (N) fertilization, on soil microbial communities is critical to a better understanding of the the role and function of microorganisms in regulating agro-ecosystems. In the Mediterranean basin, that is an area vulnerable to climate change and suffering for management-induced losses of soil fertility, the impact of conservation practices on soil microbial communities is paramount for building mitigation and adaptation strategies to climate change. A long-term experiment, originally designed to investigate the effect of tillage and N fertilization on crop yield and soil organic carbon, was utilized to understand the effect of these management practices on soil prokaryotic and fungal community diversity. The majority of prokaryotic and fungal taxa was common to all treatments at both soil depths, whereas few bacterial taxa (Cloacimonates, *Spirochaetia* and Berkelbacteria) and a larger number of fungal taxa (i.e., *Coniphoraceae*, *Debaryomycetaceae*, *Geastraceae*, *Cordicypitaceae* and *Steccherinaceae*) were unique to specific management practices. Soil prokaryotic and fungal structure was heavily influenced by the interaction of tillage and N fertilization: the prokaryotic community structure of the fertilized conventional tillage system was remarkably different respect to the unfertilized conservation and conventional systems in the surface layer. In addition, the effect of N fertilization in shaping the fungal community structure of the surface layer was higher under conservation tillage systems than under conventional tillage systems. Soil microbial community was shaped by soil depth irrespective of ploughing and N addition effect. The findings of this study gave new insights on identification of management practices supporting and suppressing beneficial and detrimental taxa, respectively, highlighting the importance of managing soil microbial diversity through agro-ecological intensified systems in the Mediterranean area.

**Keywords:** soil bacteria, soil fungi, soil archaea, arbuscular mycorrhizal fungi, Glomeromycota, Illumina sequencing, 16S rRNA, ITS1 region