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Influence of sustainable management practices on microbial nitrogen cyclers in grapevine soils

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Agricultural land management has great influences on soil properties, in particular on microbial communities, due to their sensitivity to the perturbations of the soils. This is even more relevant in Mediterranean agricultural areas under semi-arid conditions. The Mediterranean belt is suffering from an intense degradation of its soils due to a millennia of intense land use and due to unsustainable management practices. As a consequence, this area is suffering from a depletion of N content. In this project we investigated the effect of two agricultural management practices on specific functional groups related to the nitrogen cycle in the soil. A field experiment was performed with grapevines soil to assess the long-term effects of ploughing with inorganic fertilization and two types of organic fertilization on microbes that can undertake nitrogen fixation, nitrification and denitrification. Soil samples of soil were taken from every treatment and total DNA extracted. DNA samples were stored at -20ºC to be analysed by quantitative PCR (qPCR). Microbial populations involved in the N biochemical cycle were analysed by targeted amplification of key functional biomarker genes: the abundance of nifH (nitrogen fixation), nirS, nirK and nosZ (denitrification), amoA (nitrification) and 16S rRNA gene (total bacteria) detected by qPCR has shown significant differences between treatments with higher abundance of several genes in soils from sustainable agricultural treatments. This may indicate that the sustainable treatment created conditions that are more suitable for N cyclers in the soil and a better fertility and quality status of these soils.