



Diversity in soil bacterial communities structure in four high-altitude vineyards cultivated using different soil management techniques

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Some of the major wine producing countries are located in the Mediterranean regions, where viticulture represents one of the most widespread cultivations with economic and social importance. The area devoted to vineyards can also expand to mountain and steep slope zones, often characterized by small-scale high quality wine production, where viticulture contributes to the sustainable development from the ecological and environmental point of view. Farming practices adopted in sloping vineyards have the purpose to improve the soil physicochemical but also biological properties to avoid the degradation of the soil characteristics and resulting problems such as soil erosion and organic matter losses. A preliminary study was conducted during 2013 in four commercial vineyards located in Aosta Valley (north-western Italy), within a small area located in the adjacent municipalities of Chambave and Saint-Denis in order to minimize soil variability. Two sites have been identified on the lower (about 600 m asl) and higher (about 750 m asl) zone of the slope, each of which consist of two vineyards managed since at least ten years with different soil management techniques: grass cover and chemical weed control. The four experimental soils had a sandy loam texture with abundant skeleton, and were characterized by a slightly alkaline reaction. The organic matter content was greater in the lower zone (2.4%) than in the upper (1.5%), without specific differences between treatments. The low values of the C:N ratio reported (on average 6.2) reveal the increased organic matter mineralization; furthermore the CEC values were rather low, typical of loose soils. Soil microbiota are critical for the maintenance of soil health and quality, playing an important role in agricultural soil ecosystems. A 16S rDNA pyrosequencing approach was used for investigating differences, abundance and diversity in bacterial community structure of the four studied vineyards. Data from pyrosequencing detected, after removing low-quality sequences, a total of 40900 sequences with 10000 on average per vineyard location. Most abundant bacterial phyla were Proteobacteria (36%), followed by Actinobacteria (26%) and Acidobacteria (15%), with a trend to have higher Proteobacteria or Actinobacteria levels in the higher and lower zone of the slope, respectively and higher number of Acidobacteria when herbicide was used to control the weeds. Results from α diversity and β diversity indices indicated that there are differences in bacterial structure among the sampled altitudes and between the tested soil management systems, in that order. Multivariate analyses are being conducted to identify soil physicochemical factors that could be used, with additional data that will be collected and analyzed in the following year, as an indicator of the different vineyards management systems and which specific microbial groups, if any, could be correlated with those managements.