

Soil microbial diversity and activity as terroir elements of Sangiovese vineyards in the Chianti Classico region (Italy)

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Linking the uniqueness and quality of grapes and wine to the environment they are produced, based on the terroir concept, have recently become popular in many parts of world. The natural components of terroir are actually a set of processes, which together create a delicate equilibrium and regulation of its effect on products in both space and time. Climate, geology, geomorphology and soil are therefore the main environmental factors which make up the terroir effect on different scales. However, information on the impact of soil microbial communities on soil functions, grapevine plants and wine quality is still lacking.

Thus, four of the most suitable areas (so called "cru") for the production of Sangiovese wine were chosen within the Barone Ricasoli farm of Brolio, the largest winery in the Chianti Classico area in central Italy: Fattoio, Miniera, Ceni and Colli-Agresto. Based on previous pedological and sensing technologies surveys, each area was further divided into two distinct homogeneous areas of about 1.5 ha called Basic Terroir Unit (UTB), which were monitored over 3 years (2012-2014) for the soil the chemical-physical variability (moisture, organic matter, nitrogen, potassium), the vineyard physiological status (water stress, grape production, characteristics of the grapes and wine) and the structure and activity of soil microbial communities (determined through DGGE, soil respiration and microbial biomass, respectively). The aim of the work was to assess the relationships among soil parameters and vine quality at intra- and inter- UTB level and, in particular, the potential impact of microbial composition and/or function on the terroir concept.

The overall results highlighted a microbial community structure specific for each cru area and, in particular, associated to each UTB. Furthermore, microbial activity in Miniera and Ceni appeared to be positively related to Sangiovese quality, as determined through the Sangiovese Performance Index. However, except for Fattoio area which showed a higher stability over time, all the other cru displayed a remarkably higher variability in terms of both microbial community structure and functions, suggesting a predominant role of annual climatic variations.