Geophysical Research Abstracts
Vol. 21, EGU2019-5962, 2019
EGU General Assembly 2019

Understanding the influence of slope preparation on soil profile and grapevine responses for vine implantation: a case study on Aglianico

Veronica De Micco (1), Giovanna Battipaglia (2), Arturo Erbaggio (3), Roberto De Mascellis (4), and Antonello Bonfante (4)

(1) University of Naples Federico II, Dept. Agricultural Sciences, Portici (Naples), Italy (demicco@unina.it), (2) Department of Environmental, Biological and Pharmaceutical Sciences and Technologies, University of Campania "L. Vanvitelli", Caserta, Italy, (3) Azienda Agricola Fonzone-Caccese, Paternopoli (Avellino), Italy, (4) Dept. Scienze Bio Agroalimentari DiSBA, Institute for Mediterranean Agricultural and Forest Systems, National Research Council of Italy, Ercolano (Naples), Italy

Vineyard productivity and wine quality are strictly related to the environmental characteristics (i.e. geomorphology, soil, climate) and are dependent on intrinsic cultivar-specific plasticity to cope with stressors, mediated by management practices. In the context of environmental changes indicating an increase in the variability of precipitation and in the frequency of extreme events (e.g. heat waves and flooding) in the Mediterranean basin, it is fundamental to focus on water availability and to understand how efficiently vines use water, given the impact on plant vigour and grape composition.
Under the same weather conditions, the plant structural functional traits, thus physiological behaviour, change across the space according to soil spatial variability.
When a vineyard is planted, the slope preparation can modify the soil characteristics (e.g. soil horizons sequences and thickness) in the space and then the relations between soil-plant and atmosphere.
The aim of this study is to analyse the effects of slope preparation on a Cambisol characteristics and then on grapevine responses by applying a multidisciplinary approach, combining information from pedology, geomorphology, functional wood anatomy of tree rings and stable isotopes to evaluate plant hydraulic behaviour. The study was conducted in a vineyard (Fonzone-Caccese) located in southern Italy (Avellino) at two sampling sites, where plants of Vitis vinifera L. subsp. vinifera 'Aglianico' were planted in 2006, with E-W row orientation and 2.2×1 m spacing ($\approx$ 4545 vines/ha). Vines are trained to cordon spur system.
In particular, the slope preparation (7-9% of slope) produced an important change in the soil horizons vertical distribution and characteristics along the slope, where two principal soil forms were identified: 1) Ap, Bw, BC and C horizons sequence in the upper part of slope, and 2) Ap, Ab, 2BC and C horizons sequence in the bottom part of slope, in the first 100 cm of soil depth.
The first effect of this soil variation is the different rooting depth between the soil forms, 40-50 cm in the first one and about 100-120 cm in the second one. Such changes in the soil characteristics had an impact on vine growth and in the allocation of resources which were evident in plant traits and productivity parameters (e.g. number of bunches, bunch weight, yield per plant) and in berry quality (e.g. soluble solids). The analysis of wood anatomical functional traits linked with carbon and oxygen stable isotopes supported the view that soil preparation, through affecting soil properties, especially water availability, induces specific plant structure and modifies the plant water use efficiency, thus affecting climate-soil-water relationships, plant productivity and ultimately plant ability to adapt to changing environmental conditions.
All these interactions and their effects on water use should be taken into account when designing management practices in vineyards for sustainable production.