Geophysical Research Abstracts
Vol. 21, EGU2019-930, 2019
EGU General Assembly 2019

Simulation of terroir evolution under climate change and different soil management

Filippo Benedetti (1), Peter Finke (1), Simone Priori (2), and Edoardo Costantini (2)

(1) Department of Environment, Ghent University, Gent, Belgium, (2) Agricultural Research Council, CREA-AA Research Centre for Agriculture and Environment, Firenze, Italy

The role played by certain environmental factors in the improvement of wine quality has been well studied and proven in many researches. These permitted to become aware of the existence of a terroir factor which represents all the natural features (in terms of soil, climate and terrain) and human practices which together make wine production of a certain area unique, in terms of production method and wine properties. In this research, a soil modelling approach was used to assess how terroir altered in the past and how it will change in the next decades, and the influence of its evolution on wine quality.

After the identification of the components making up the terroir in the research area (Vino Nobile di Montepulciano D.O.C.G. district, south-east Tuscany, Italy), the relations between terroir and viticultural parameters have been investigated from the statistical point of view, in order to find regression models which can be used to predict grape (and then wine) peculiarities, starting from the soil and other environmental features. The evolution through time of the environmental factors which were recognized to play a role in building the wine quality was then studied using the SoilGen model, both in the past and in the future (from 970 BC to 2099 AD), under different scenarios of climate change (RCP 4.5 and RCP 8.5) and soil management strategies (Organic-conservative, Organic with cover crops used as green manure, Tillage without cover crops and removing pruning residues).
The model output served as a base to predict viticultural parameters using the same regression identified in the beginning of the research, under climate change and different agricultural practices. The results revealed an important change in grape properties over the last 500 years, due to a variation in the (micro-)climate of the area rather than land management by vignerons.
When the effect of a drastic climate change in the upcoming 80 years was simulated, it was shown a severe quality decrease of those grape properties (playing a role in building wine peculiarities) which were predicted starting from variations in soil and climate. Nevertheless, some soil management practices seem to offset the decrease in terroir by mitigating the negative modifications in terroir caused by climate change.

This new kind of approach permitted to get knowledge of how grapevine properties will evolve according to the change in its terroir settings, and this may lead to the adoption of appropriate vineyard management strategies in order to mitigate the climate change and to preserve the uniqueness of Vino Nobile di Montepulciano DOCG.