Geophysical Research Abstracts
Vol. 16, EGU2014-272, 2014
EGU General Assembly 2014

A combined use of proximal sensors can magnify the terroir effect of every vintage

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Grape composition, which affects the wine sensory qualities, depends on vine features (rootstock, scion, vine health) and vineyard management as much as environmental factors. Mapping soil at the vineyard scale, in particular, helps in optimizing the terroir expression of the wine. The terroir effect however varies every year, in dependence of the interaction between climate and soil. Aim of this research work was to set a methodology to dimension homogeneous harvest zones (HZ) in the vineyard and to test the vintage effect on them.
Four terroir macro-units were selected within a wide farm in the Chianti Classico D.O.C.G. district (Siena, Central Italy). The selected macro-units represented the most common viticultural environments of the Chianti Classico D.O.C.G. and they were: 1) hills of high altitude (450-500 m a.s.l.) on feldspathic sandstones, with shallow sandy soils; 2) hills of high altitude (400-500 m a.s.l.) on clayey-calcareous flysches, with stony and calcareous soils; 3) hills of moderate altitude (250-350 m a.s.l.) on Pliocene sandy marine deposits; 4) hills and fluvial terraces of moderate altitude (200-300 m a.s.l., 50-100 m above the present river valley) on ancient fluvial deposits.
Selected vineyards of each terroir macro-unit was surveyed by soil proximal sensing, to define two homogeneous zones (HZ) in terms of soil features in each macro-unit. The sensors used were: i) γ-ray spectrometer, to map the variability of soil surface in terms of parent material, texture and stoniness; ii) electromagnetic induction sensor (EMI) to determine the spatial variability of texture and soil moisture in the sub-surface horizons; iii) time domain reflectometry (TDR), to measure soil moisture content in the sub-surface soil horizon (30-50 cm). TDR measurements were performed in fixed points (about 1 each 1,000 m2) three times a year, during spring shoot growth (beginning of April), berries veraison (end of July-beginning of August) and final ripening phase before harvest (September). The moisture content was interpolated on the total surface of the experimental vineyards by regression kriging using the γ-ray and EMI proximal data. HZ were mapped according to several parameters, mainly moisture content homogeneity and soil features, but also farm requirements, like size and simplified geometry for hand-made grape harvesting. Each area should have been about 15,000 m2 in size, so to allow an harvest of about 9 tons of grape and a wine-making in an ordinary vat of the winery. After a six-months aging, the wines were analyzed and tasted by a panel of 10 experts to characterize their quality and peculiarities. To determine grape homogeneity within HZ, three experimental sites for each HZ were selected to determine plant water stress, grape production and wine quality obtained by micro wine-making.
After two vintages (2012 and 2013) the main results were: i) terroir macro-units influenced the wine quality and peculiarities in both vintages; ii) HZ strongly magnified wine peculiarities in three-fourths of macro-units in 2012 vintage. In the 2013 vintage instead, characterized by a rainy early summer, the differences between the HZ in each macro-area were less evident.
Concluding, the preliminary results of the work seemed to indicate a fruitful use of the HZ within macro-areas, but not every vintage.