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Can homogeneous harvest zones magnify the terroir effect of every vintage? The three year project VignaCRU in Chianti D.O.C.G. (Tuscany, Italy)

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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 year by year, depending on the interaction of several factors, such as climate and soil. Aim of this research work was to set up a methodology to delineate homogeneous harvest zones (HZ) in the vineyard and to evaluate the vintage effect in them.

Four terroir macro-units suitable for premium Sangiovese wine, which is the main cultivar of Chianti D.O.C.G., were selected within a wide farm of Chianti Classico district (Siena, Central Italy). The selected macro-units are representative of the most common and suitable viticultural environments of the Chianti Classico D.O.C.G. and include: 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 calcareous flysches, with stony, clayey 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.

Each terroir macro-unit was surveyed by soil proximal sensing, to define two homogeneous zones (HZs) in terms of soil physics and hydrology. The proximal sensors used to map the HZs 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. Thus, the soil moisture of each HZ was monitored during spring shoot growth (beginning of April), berries veraison (end of July-beginning of August) and final ripening phase before harvest (September). Three representative plots of 10 grapevines each were selected within each HZs to monitor: i) grapevine root development; ii) vine physiology and water stress; iii) grape yield and quality. Moreover, the grapes of each HZs were harvested and vinified separately.

After three vintages ('12, '13, and '14) the main results are: i) terroir macro-units differentiated the grape and wine peculiarities every vintage; ii) The delineation of HZs within each macro-units, intensified the effect of terroir on wine quality only in the warmest and driest summer '12, whereas the effects under more humid summers, like in '13 and '14, were smaller; iii) the sandy soils on feldspathic sandstones and marine sands increased the quality of the wines only in the warm-dry vintage ('12), whereas the wine quality decreased in humid summers ('13-'14), because of lacking of suitable water stress; iv) the grapevines in the terroir characterized by stony and clayey soils, showed light water stress also in wetter summers ('13-'14) and the wines produced in this terroir showed the highest quality and the greatest stability in typicality during the years.

Concluding, the results of our work seem to indicate that the differentiation of HZs within a suitable macro-terroir can be fruitful only in specific vintages, when the soil hydrology plays a major role on the wine quality and typicality.