Grape polyphenol content prediction through vis/NIR spectroscopy in a view of real time application at winery consignment

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The evaluation of grapes at consignment is a crucial phase to obtain a qualitatively valid product, especially for large companies such as cooperatives, where the number of members is high, the vineyards are characterized by different pedological properties, growing techniques and cultivation methods. All these factors can lead to the production of grapes of the same variety with different qualitative characteristics and phytosanitary status. It is therefore very important to develop methods for an objective and punctual evaluation of grape’s qualitative characteristics in order to optimize the initial selection phase for different vinifications.

The aim of the present study was to investigate the applicability of vis/NIR spectroscopy for rapid assessment of grape’s polyphenol content direct at the winery. A process spectrometer (spectral range 400-1650 nm) was employed for non-contact analysis at a distance of 150 mm between sensor and sample. The acquisitions were performed in controlled lab-scale condition on bunches of Vitis vinifera L. (Ancellotta variety) which have been mechanically collected. To cover maturation period, sampling consisted of 10 weekly sampling times: 9 samples for each sampling date for a total of 90 samples.

Partial Least Square (PLS) regression method was performed to predict polyphenol content using spectra acquired. The results obtained from the models demonstrated that the system is capable to provide useful information about phenolic parameters (determination coefficients and root mean square errors of 0.86 and 0.73, and 227 (mg/l) and 315 (mg/l) for calibration and cross validation, respectively).

Overall, the application of this technology could contribute to a better management of vinification process providing reliable, sustainable and rapid results.

**Keywords:** vis/NIR, chemometrics, viticulture 4.0, polyphenol content, ripeness.