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# Potential of the on-field hyperspectral imaging to measure the sugar content in grape

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The main factors impacting on wine quality are related to grape composition depending on grape varieties and climatic grown conditions, and winemaking process. To enhance the product quality, the wine industry has need for simple, rapid and non-destructive techniques to evaluate the quality of the grapes in field. Among others, the sugar content is a typically parameters used to determined grape quality and maturity state. The hyperspectral imaging is a powerful technique used to evaluate and to predict different parameters in grapes during the harvest.

The aim of this study was to evaluate the potential of the on-field application of the hyperspectral imaging (400-1000 nm) to determine the sugar content in grape (cv. *Sangiovese*). A specific moving set-up was developed and the difficulties related to variable solar illumination (lighting source) were evaluated. The work was divided in two steps: i) development of a PLS calibration model between sugar content (from 16 to 30 °Brix) and reflectance spectra of the grapes detached from the plant (solar lighting); ii) sugar content prediction of the on-field grapes by using the calibration model previously built. Several spectral pre-treatment methods were tried before to develop the calibration model and the best results were achieved applying the second derivate transformation (calibration:  $R^2=0.970$ ; RMSE 0.6; cross validation:  $R^2=0.894$ , RMSECV 1.1). The prediction results obtained on the on- field grapes was  $R^2=0.809$  and RMSET, suggesting that the hyperspectral imaging could be a promising technique to assess sugar content on grape directly on-field. However, some difficulties related to the management of solar lighting, specular reflection and variable illumination level must be evaluated and take into account.