Near infrared spectroscopy as authentication tool of protect design of origin for Dalmatian wine produced from grape Maraština

Jasenka Gajdoš Kljusurić1\*, Ana Boban2, Ana Mucalo2, Irena Budić-Leto2

1 University of Zagreb, Faculty of Food Technology and Biotechnology, Pierottijeva 6, 10 000 Zagreb, Croatia; jgajdos@pbf.hr

2 Institute for Adriatic Crops and Karst Reclamation, Put Duilova 11, 21 000 Split, Croatia: ana.mucalo@krs.hr, irena.budic-leto@krs.hr
\*Corresponding author

The chemical composition of wine is highly influenced by the terroir, the viticultural area where vine interacts with the agronomic practices and environment (cultivar, geographic position, soil, climate conditions of a vineyard, along with the vineyard management). In accordance with EU Regulation (1308/2013) three viticultural areas in Dalmatia (Northern Dalmatia (ND), Dalmatian Hinterland (Dh) and Central and Southern Dalmatia (CSD)) can have protected designation of origin (PDO).

This study is aimed to analyse the wine composition and investigate if they can be marked by chemical finger-prints from a given terroir by measuring the colour and standard chemical composition of wines produced from the grape from *Vitis vinifera* L., ‘Maraština’, harvested from 11 vineyards located in three different viticultural subregions of Croatian Adriatic region. Near infrared spectroscopy (NIRS) was used to examine the effectiveness of differentiating wines by regions with assistance of NIRS combined with chemometrics (Balbino et al., 2022).

Differences were detected in the colour and physicochemical parameters, where the wines produced from the grape harvested in the hinterland had significantly lover pH (3.14 vs 3.45 and 3.43 in CSD and ND), but significant higher values for total dry extract (TDEDh= 23.80 g L-1 vs TDECSD= 20.14 g L-1 & TDEND= 21.4 g L-1). NIR spectra of wines were coupled with physicochemical and colour data to investigate the quantitative ability in relating NIR spectra with the wine characteristics based on the grape growing region. The principal component regression was used to construct the calibration models based on NIR spectra and standard physicochemical and colour data showing high prediction ability of all studied parameters (R2 of 0.98, RPD of 6.8).

NIRS has indicated the relation of the regionality and wine composition, proving that even in a small data set, it provides exceptional opportunities in monitoring the quality and authenticity of wine.

**Keywords:** NIR spectroscopy, Maraština, wine, PDO, chemometrics

**Acknowledgements:** All Authors gratefully acknowledges receiving funding from Croatian Science Foundation for the financing Research project IP- 2020-02-1872 “Impact of native non-*Saccharomyces* wine yeast on wine aromas” under which this work was supported.

REFERENCES

 Balbino, S.; Vincek, D.; Trtanj, I.; Egređija, D.; Gajdoš-Kljusurić, J.; Kraljić, K.; Obranović, M.; Škevin, D. Assessment of Pumpkin Seed Oil Adulteration Supported by Multivariate Analysis: Comparison of GC-MS, Colourimetry and NIR Spectroscopy Data. Foods 2022, 11, 835. https://doi.org/10.3390/foods11060835

Regulation (EU) No. 1306/2013 of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No. 352/78, (EC) No. 165/94, (EC) No. 2799/98, (EC) No. 814/2000, (EC) No. 1290/2005 and (EC) No. 485/2008.