

KEY ODORANTS OF FRENCH SYRAH WINES FROM THE NORTHERN RHONE VALLEY

Olivier GEFFROY^{1*}, Marie MORÈRE², Grégory PASQUIER¹, Ricardo LOPEZ³ and Jean-Stéphane CONDORET⁴

¹PPGV, Université de Toulouse, INP-PURPAN, 75 voie du TOEC, 31076 Toulouse Cedex 3, France

²CRITT GPTE, 4 Allée Émile Monso, 31030 Toulouse cedex 4, France

³LAAE, Universidad de Zaragoza, Pedro Cerbuna 12, 50009 Zaragoza, Spain

⁴LGC, UMR CNRS 5503, 4 Allée Émile Monso, 31030 Toulouse cedex 4, France

*Corresponding email: olivier.geffroy@purpan.fr

Article extracted from the presentation held during Enoforum Web Conference (23-25 February 2021)

Introduction and purpose of the study

Vitis vinifera L. Syrah, which is the 8th largest grape variety planted in the world with 190,000 ha under vines (OIV, 2017), remains a historic cultivar of the Rhone valley in France. Little research has been undertaken to investigate the main contributors to the aroma of Syrah wines from the cool northern part of this valley despite its importance for these vineyards. The aim of the present work was to study through aroma reconstitution studies the key odorants of Crozes-Hermitage wines made from two vintages with distinct climatic conditions (cool in 2013 and warm in 2015).

Methodology

An informal tasting organized with a small group of tasters confirmed that the selected wines exhibited different sensory features (spicy/peppery for 2013 and fruity for 2015). Their volatile composition was first assessed through determination of 76 molecules. Then, the impact of four matrices (synthetic wines with 10% and 12.5% of ethanol by volume and dearomatized native wines through two different methods) on the quality of the reconstitution was investigated using a Degree Of Difference test (DOD) (Aust et al., 1985). Dearomatization was achieved through rotary evaporation followed by a resin treatment as proposed by Lytra et al. (2012) or using supercritical carbon dioxide (sCO₂), an extraction technique which has proved its efficiency for the recovery of aroma from wine (Ruiz-Rodríguez et al., 2012). For each vintage, reconstitution studies were conducted by mixing aroma compounds, whose odor activity values (OAV) were strictly above 0.5, in concentrations measured in Syrah wines. After selecting the best matrix, the number of molecules included in the reconstitution was optimized for each vintage by comparing models built by mixing aroma compounds with OAV>0.5, OAV>1, OAV>2, OAV>5 and OAV>10. Finally, omission tests were carried out on the best matrix and model for some grape-derived aroma compounds using Pivot© Profile (Thuillier et al., 2015), a sensory method for which panelists must express free descriptions of the differences between a sample product and a single reference product, the so-called pivot.

Results

For both vintages, 35 molecules with OAV>0.5 were identified in the wines. Notably, rotundone and 3-sulfanylhexanol enabled the strongest discrimination between the two studied wines with inter-vintage coefficients of variation above 100%. Wine dearomatized using sCO₂ was identified as the best matrix. In comparison with the native wine, the models that showed the smallest DOD scores were composed of molecules with OAV>5 or OAV>10. Omissions tests were carried out for rotundone in 2013, for 3-sulfanylhexanol in 2015 and for 2-furfurylthiol (FFT), benzyl mercaptan and β -damascenone in both vintages. For anosmic panelists detected through triangular test, the omission of rotundone in the 2013 series did not provoke any stimulus (results not shown). For this population, FFT had the greatest impact on the olfactive profile. For non-anosmic panelists, the sample in which rotundone was omitted exhibited fruitier and less spicy/peppery notes and showed the greatest difference in comparison with the full optimized reconstitution (Figure 1). The omission of 3-sulfanylhexanol in the 2015 series had the largest influence on aromatic intensity and overall olfactory profile.

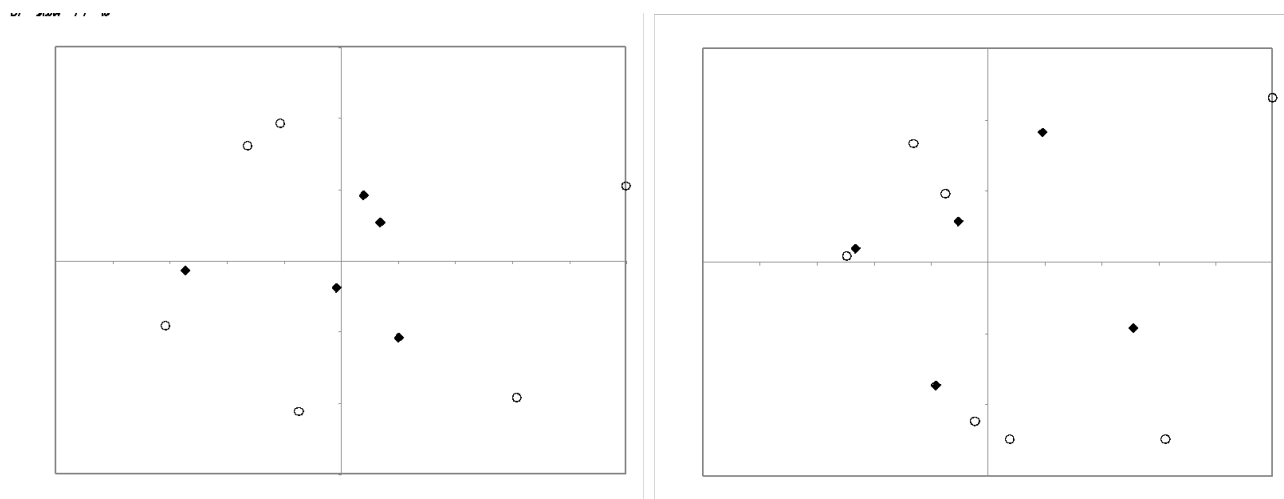


Figure 1: Projection of the samples in the correspondence analysis map (subspace 1–2) A) for non-anosmic panelists to rotundone for the 2013 series, B) for the whole panel for the 2015 series.

Conclusions

Rotundone and 3-sulfanylhexanol were the two molecules that enabled the strongest discrimination between the two wines. Wine dearomatized using sCO₂ has proved to be an interesting model to reconstitute the aroma of wines using a limited number of aroma compounds. Rotundone and FFT were identified as the main contributor to the aroma of Syrah wines produced during cool vintages for non-anosmic and anosmic respondents to rotundone respectively. Our results also indicate that 3-sulfanylhexanol is the main contributor to the fruity aroma of the wine made during the warm vintage.

Abstract

Little research has been undertaken to investigate the main contributors to the aroma of Syrah wines from the cool northern part of the Rhone valley despite the historical importance of this cultivar for this wine region. The aim of the present work was to study the key odorants of Crozes-Hermitage wines made from two vintages with distinct climatic conditions (cool in 2013, warm in 2015) using supercritical CO₂ dearomatized (sCO₂) wine as a matrix for reconstitution

studies, and the Pivot profile sensory method for omission tests. The volatile composition of the two wines was first assessed through determination of 76 molecules. Then, the impact of four matrices (synthetic wines with 10% and 12.5% of ethanol, and dearomatized native wines through rotary evaporation or using sCO₂) on the quality of the reconstitution was investigated. For both vintages, 35 molecules with OAV > 0.5 were identified in both wines, with rotundone and 3-sulfanylhexanol (3SH) enabling the strongest discrimination between the two vintages. Wine dearomatized using sCO₂ was identified as the best matrix. The best models built using this matrix were composed of aroma compounds with OAV > 5 and OAV > 10 highlighting that this dearomatization approach can be valuable to reconstitute the aroma of wine using a small number of molecules. For the 2013 wine, the omission of rotundone and 2-furfurylthiol had the greatest impact on the olfactive profile for non-anosmic and anosmic panelists to rotundone, respectively. 3SH, whose omission decreased the rating of the “fruity” attribute, was identified as the main contributor to the aroma of Syrah wine produced in 2015.

References

- AUST, L., BEARD, S. & II, R. W. 1985. Degree of difference test method in sensory evaluation of heterogeneous product types. *Journal of Food Science*, 50, 511-513.
- LYTRA, G., TEMPERE, S., DE REVEL, G. & BARBE, J.-C. 2012. Distribution and Organoleptic Impact of Ethyl 2-Hydroxy-4-methylpentanoate Enantiomers in Wine. *Journal of Agricultural and Food Chemistry*, 60, 1503-1509.
- OIV 2017. Distribution of the world's grapevine varieties in 2015. *Focus 2017*, pp 54.
- RUIZ-RODRÍGUEZ, A., FORNARI, T., JAIME, L., VÁZQUEZ, E., AMADOR, B., NIETO, J. A., YUSTE, M., MERCADER, M. & REGLERO, G. 2012. Supercritical CO₂ extraction applied toward the production of a functional beverage from wine. *The Journal of Supercritical Fluids*, 61, 92-100.
- THUILLIER, B., VALENTIN, D., MARCHAL, R. & DACREMONT, C. 2015. Pivot© profile: A new descriptive method based on free description. *Food Quality and Preference*, 42, 66-77.

Acknowledgements

This research was funded by Toulouse – INP through the Toulouse Tech InterLabs (TTIL) program. We are grateful to Xavier Frouin, Cave de Tain, for providing us with the wine samples, and to all the panelists who participated in the olfactory evaluation.