Effect of grape polysaccharides on the volatile composition and aromatic profile of *Viura* wines

Diego Canalejo[1] , Feng Zhao[1] , Zenaida Guadalupe[1], Leticia Martinez-Lapuente[1], Belén Ayestarán[1], Silvia Pérez-Magariño[2], Estela Cano-Mozo[2], Thierry Doco[3]

[1] Instituto de Ciencias de la Vid y el Vino (Universidad de La Rioja, Gobierno de La Rioja, CSIC), Spain

[2] Instituto Tecnológico Agrario de Castilla y León (ITACyL), Spain

[3] INRA, Joint Research Unit 1083, Sciences for Enology, Montpellier, France

INTRODUCTION AND OBJECTIVE

Many research studies have analyzed the effect of polysaccharides (PS) in the aromatic composition of white wines. However, it has been limited to yeast polysaccharides and commercial mannoproteins [1.2].

AIM: To study the effect of grape polysaccharides as finning agents and analyze their effect on the volatile composition and aromatic profile of wines made with *Vitis vinifera* cv. Viura.

MATERIALS AND METHODS

Different fractions of grape polysaccharides were used at 10 g/HL:

- Polysaccharides from White Grape Pomace (**WGP**)
- Polysaccharides from Red Grape Pomace (**RGP**)
- Polysaccharides from White Must (**WM**)
- Polysaccharides from Red Must (**RM**)
- Polysaccharides from Red Wine (**RW**)
- Rhamnogalacturonan type II of 80% purity (**RGII80%**)
- Rhamnogalacturonan type II of 55% purity (**RGII55%**)
- Commercial mannoproteins Mannolees™ (**MAN**)
- White Lees from white wine (**WL**)

Finning agents at bottling

- The volatile composition of the wines was analyzed by headspace-solid phase microextraction (**HS-SPME**) and gas chromatography with mass detector (**GC-MS**) [3].
- An **ANOVA** was applied to test the effect of the different fractions on the concentration of the volatile compounds in *Viura* wines.
- A **Principal Component Analysis (PCA)** was applied to study the possible grouping of the wines according to their volatile composition and the polysaccharide fraction used.
- The wines were analyzed by 20 expert tasters from the DOCa Rioja with a structured numerical scale according to UNE-87-020-93 Standard (ISO 4121:1987).
- Odor Activity Values of the volatile compounds were calculated as the ratio concentration/perception threshold.

RESULTS

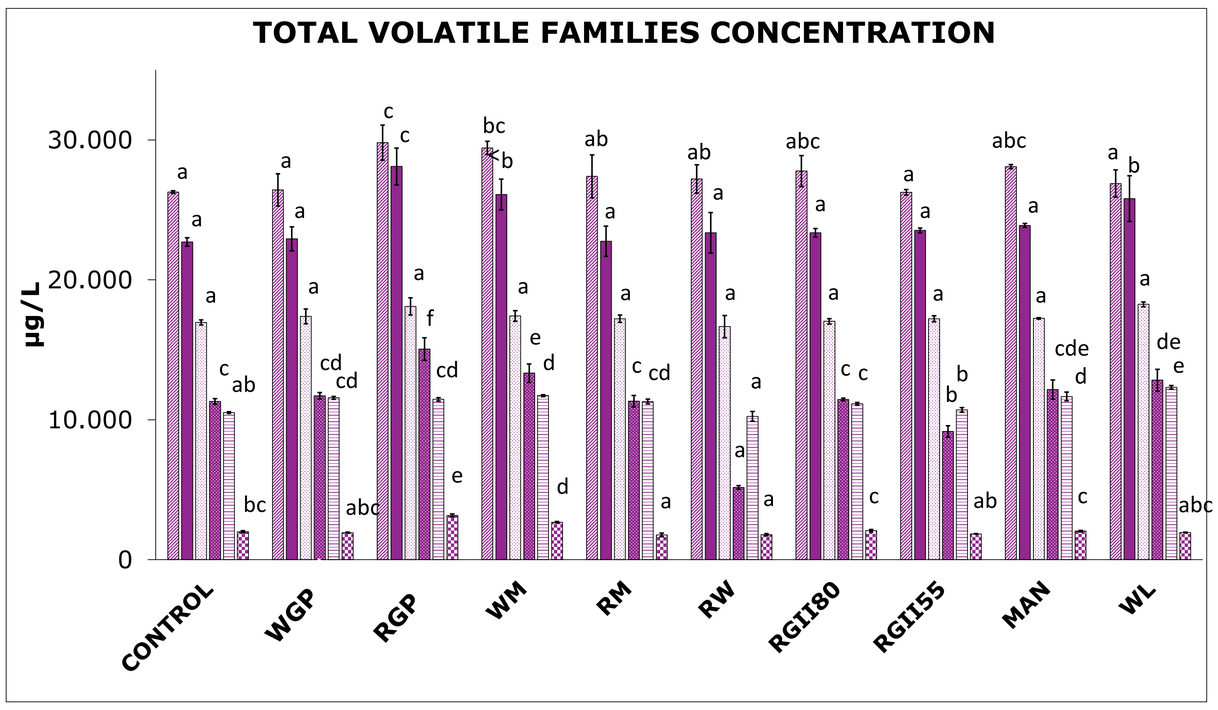
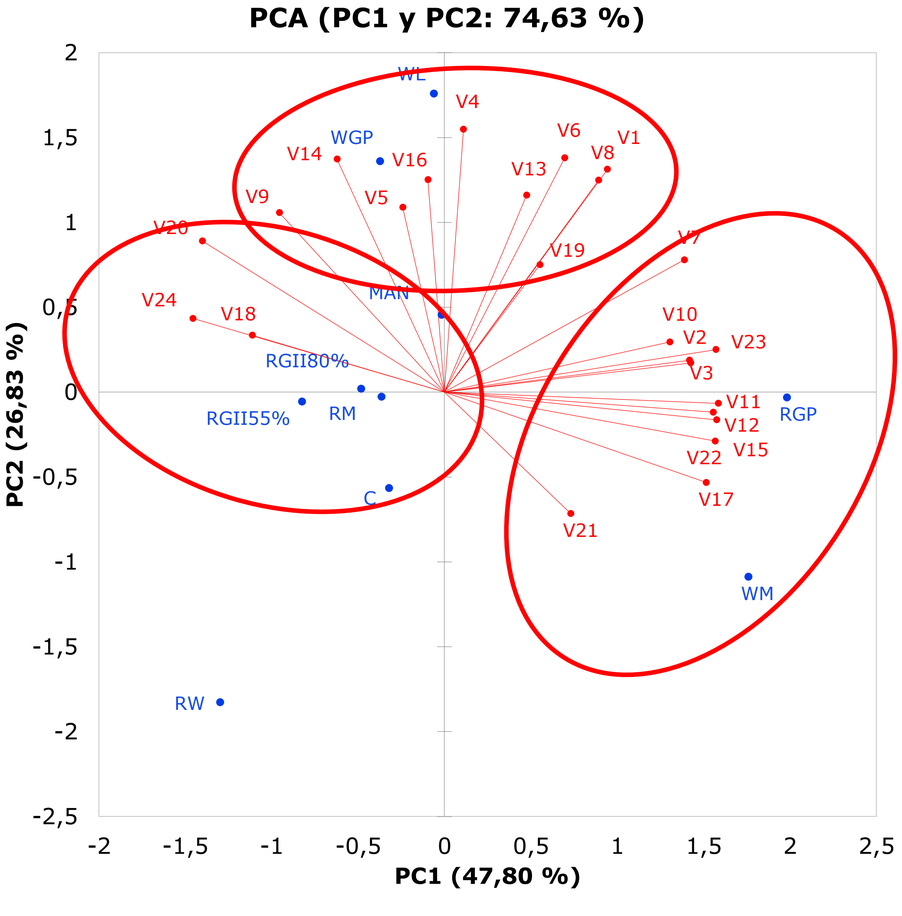


Figure 1. Effect of the different fractions of grape polysaccharides on the concentration of the volatile families (µg/L) in *Viura* wines:
- Total Higher Alcohols
- Total Ethyl Esters
- Total C6 Alcohols (x10)
- Total Acetates (x10)
- Total Volatile Acids
- Total Volatile Phenols (x10)

Different letters indicate statical significant differences among the concentrations of the same volatile families treated with the different finning agents



V1	Ethyl butyrate
V2	Ethyl hexanoate
V3	Ethyl octanoate
V4	ethyl 2-methylbutyrate
V5	Ethyl isovalerate
V6	Isobutyl acetate
V7	Isoamyl acetate
V8	Hexyl acetate
V9	2-Phenethyl acetate
V10	Isobutyric acid
V11	Butyric acid
V12	Isovaleric acid
V13	Hexanoic acid
V14	Octanoic acid
V15	(E)-3-Hexen-1-ol
V16	(Z)-3-Hexen-1-ol
V17	Phenylethyl Alcohol
V18	Linalool
V19	cis-Whiskylactone
V20	Furfuryl alcohol
V21	Guaiacol
V22	4-vinylguaiacol
V23	4-vinylphenol
V24	3-methyl-1-butanol

Figure 2. PCA of the wines and volatile compounds with an OAV>0.2

- Higher Alcohols were quantitatively the largest group of the volatile compounds in *Viura* wines, followed by ethyl esters. **RGP** and **WM** wines showed significant higher concentrations of ethyl butyrate, ethyl hexanoate, ethyl octanoate, ethyl decanoate, propyl acetate, isoamyl acetate and hexyl acetate (data not shown). Both wines showed the highest concentrations of **total higher alcohols, total ethyl esters, total acetates** and **total volatile phenols** contributing to **fruity, floral** aromas (OAV>1).

- **Figure 2** shows the Principal Component Analysis (PCA) of the volatile compounds and the wines treated with the different fractions. PC1 was defined by V2, V3, V7, V10, V11, V12, V15, V17, V21,V22 and V23 on the positive loading, and V18, V20 and V24 in the negative loading. PC2 was defined by V4, V5, V6, V8, V9, V13, V14 V16 and V19 in the positive loading. PCA differentiated 4 groups of wines (marked with circles in the plot). **RGP** and **WM** wines were associated with ethyl hexanoate, ethyl octanoate, isoamyl acetate, isobutyric acid, butyric acid, isovaleric acid, (E)-3-hexen-1-ol, phenylethyl alcohol, guaiacol, 4-vinylguaiacol and4-vinylphenol. **WL** and **WGP** wines were associated with ethyl butyrate, ethyl-2-methylbutyrate, ethyl isovalerate, isobutyl acetate, hexyl acetate, 2-phenylethyl acetate, hexanoic acid, octanoic acid, (Z)-3-hexen-1-ol and cis-whiskeylactone. **RGII80, RGII50, RM** and **C** wines were associated with linalool, furfuryl alcohol, and 3-methyl-1-butanol. **RW** was separated from the rest of the wines and did not presented a strong association with any volatile compound.

- In the sensory analysis, the wines treated with **RGP** and **WM** were good-valued by the tasters. They were characterized by intermediate aromatic intensity and high notes of fruit. **RW** was the less preferred wine and showed the lowest aromatic intensity and mineral notes.

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CONCLUSIONS

- This research allowed to study the effect of different fractions of grape polysaccharides as fining agents on the volatile composition and the aromatic profile of *Viura* wines.
- RGP and WM were characterized by higher amounts of total ethyl esters, total acetates and total volatile phenols and acids.
- WM and RGP were associated ethyl esters and acetates, and higher acids; WL and WGS were associated to acids; RGII80, RGII55, MAN and C were characterized by alcohols in the PCA plots.
- Intermediate aromatic intensity and high notes of fruit.

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