REVALORIZATION OF MAJORCAN WINE RESIDUES AS SOURCE OF PHENOLIC ANTIOXIDANTS

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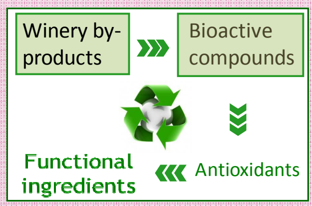
MACROWINE 2012
MACROVISION OF VITICULTURE WINE-MAKING AND MARKETS
June 18 > 21, 2012 - Bordeaux, France

1. INTRODUCTION

There is an increasing concern of the food industry in diminishing the environmental impact of their wastes. In particular, the wine industry from Majorca Island is highly appreciated for their research on originality and authenticity linked to the endemic vines (García-Muñoz et al., 2011), whereas, the wine wastes removal in an island is even more complex problem. Wine by-products are rich in polyphenolic compounds which present protective effect again certain diseases (Krondrashov et al., 2009). The recovery of bioactive constituents from wine by-products might be an interesting option because of the high content on polyphenolic compounds.

2. OBJECTIVES

The aim of this study was to evaluate the **potential of grape pomaces from Majorcan landraces** as raw materials for **antioxidant concentrates**.

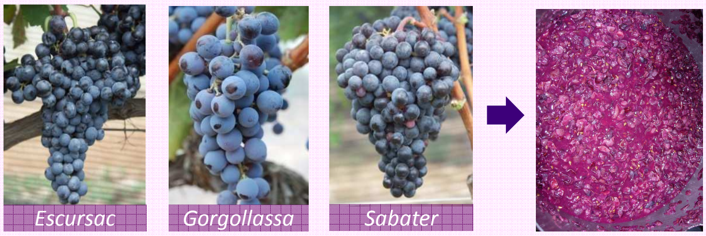


The **total polyphenol content, anthocyanins and tannins content**, toghether with the **antioxidant potential** was determined. The relationship between polyphenols and antioxidant potential has also been analysed.

3. MATERIALS AND METHODS

By-products material

Wine by-products were obtained after the alcoholic fermentation process. In order to mitigate the influence of external factors, grape varieties shared the same vineyard location and cultivation system. The selected landrace grapes were:



Total polyphenol content and antioxidant potential

The polyphenolic extract (PE) was obtained by submitting the samples to different solid/liquid solvents. The total polyphenol content (TPC) was spectrophotometrically determined according to the Folin-Ciocalteu's method and using gallic acid (GAE) as standard (50-500 mg L^{-1}). Anthocyanin and tannin contents were estimated according to Ribéreau-Gayón et al. (2006)

The antioxidant potential was tested by two different methods. The DPPH method was determined by following a slightly modified method of Brand-Williams et al. (1995) and modified by Roussis et al. (2007). The FRAP assay followed the method described by Özgen et al. (2006). The spectrophotometrical determinations were carried out by a Thermo Scientific Multiskan® Spectrum. Results were reported as trolox equivalent calculated from a calibration curve (25-800 µM trolox).

Statistical analyses were performed by using the *Statgraphics*® plus software package for Windows.

4. RESULTS AND DISCUSSION

The PE, TPC and the anthocyanin and tannin contents of the three grape pomaces are shown in table 1. Landrace pomaces presented PE values ranging from 16.40 to 19.84 g/100 g dm and TPC values comprised between 3.88 and 5.15 g/100 g dm. *Sabater* and *Escursac* varieties presented the highest TPC content and *Gorgollassa*, the lowest (p < 0.05). *Escursac* showed the highest anthocyanin content, meanwhile *Sabater*, the highest amount of tannins.

Table 1. Phenolic extract yield, total polyphenol, anthocyanin and tannin contents of grape landrace pomaces. Values are means (n=6) ± standard deviation.

	PE (g extract/100 g dm)	TPC (g GAE/100 g dm)	Anthocyanins (g/100 g dm)	Tannins (g/100 g dm)
Escursac	17.92 ± 0.24 b	5.27 ± 0.09 a	0.72 ± 0.03 a	5.25 ± 0.23 b
Gorgollassa	16.40 ± 0.22 c	3.88 ± 0.09 b	0.18 ± 0.01 b	4.56 ± 0.72 b
Sabater	19.84 ± 0.26 a	5.15 ± 0.31 a	0.19± 0.02 b	6.56 ± 0.71 a

a, b, c: means followed by different letters show significantly differences between varieties (p<0.05)

Deng et al. (2011) found TPC values varying between 2.14 and 2.67 g/100 g dm in *Pinot noir*, *Merlot* and *Cabernet S.* pomaces, lower to those obtained in this study. However, Negro et al. (2003) obtained in *Negro Amaro* pomaces values of 4.19 g/100 g dm, similar to our results. Thus, the studied landraces exhibited larger TPC values compared with other varieties.

Acknowledgements: The authors acknowledge the financial support of RTA2009-00119-C02 from the INIA institution of the Spanish Government and to the CAIB (Ref 57/2011).

Results of the antioxidant potential evaluated by DPPH and FRAP assays are presented in figure 1. The antioxidant values ranged between 0.18-0.27 mmol trolox/g dm and 0.56-0.83 mmol trolox/g dm for DPPH and FRAP methods, respectively. The obtained data revealed that grape pomaces from Majorcan landraces are interesting oxidation inhibitors compared with other fruits. In both methods, *Sabater* landrace exhibited the larger antioxidant power, which agreed with the large content of TPC in *Sabater* samples. The DPPH assay did not reflect differences between *Escursac* and *Gorgollassa*, although the last one exhibited the lowest antioxidant potential in the FRAP assay (p < 0.05). Thus, in general, the antioxidant potential varied according to this order *Sabater*, *Escursac* and finally, *Gorgollassa* variety.

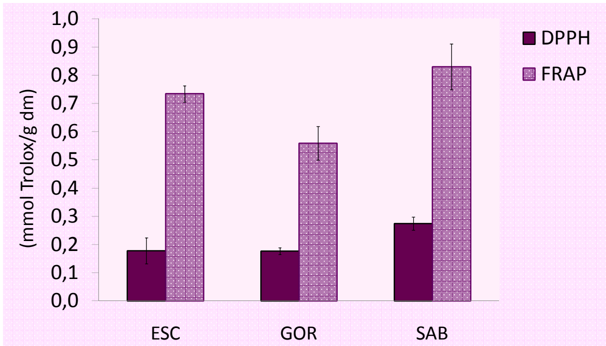


Figure 1. Antioxidant activity of grape landrace pomaces.

The relationship between antioxidant potential and TPC was positive and significant (Table 2). TPC showed a strong correlation with DPPH (r ≥ 0.82), but this correlation was weaker with FRAP (r < 0.77). Good correlations between antioxidant activity and TPC values had been reported in different grape derivates (Deng et al., 2011). The correlation among methods was good (r > 0.80).

Table 2. Pearson correlation coefficients between TPC and the antioxidant potential

	TPC	DPPH	FRAP
TPC	1	0,824*	0,775*
DPPH		1	0,805***
FRAP			1

*, **, ***: Significant at p < 0,05, p < 0,01 and p < 0,001, respectively.

5. CONCLUSIONS

The polyphenolic content and antioxidant potential agreed the interesting potential of grape pomace by-products for being used as bioactive constituents. *Sabater* was the variety with the higher potential. Furthermore, a close relationship between TPC and the antioxidant potential was observed.

To conclude, this research might well lead to stimulate the development of antioxidant concentrates from wine by-products, promoting the grape landraces, at present underdeveloped. Moreover, it would contribute to a better knowledge of the antioxidant qualities of the grape pomace by-products.

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