Use of natural anthocyanins of grape, lees and wood extracts as dyes and flavorings in the elaboration of wine vermouth

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Introduction

Vermouth is a wine derivative fortified and flavored with botanicals (Fig. 1) [1]. Traditionally, red vermouth is pigmented with caramel. We used natural grape anthocyanins to improve the color and, at the same time, increase flavonoid contents, molecules with positive repercussion on health.

The anthocyanins were extracted from grape skins using acidified water as solvent and physically assisted by ultrasounds. Commercial anthocyanins extracts from grape by-products were also used to improve vermouth color.

Vermouths were aged using yeast lees biomass and also using chips from different types of woods: 'palo rojo', cherry, cedar, oak and ebony. During 3 months.

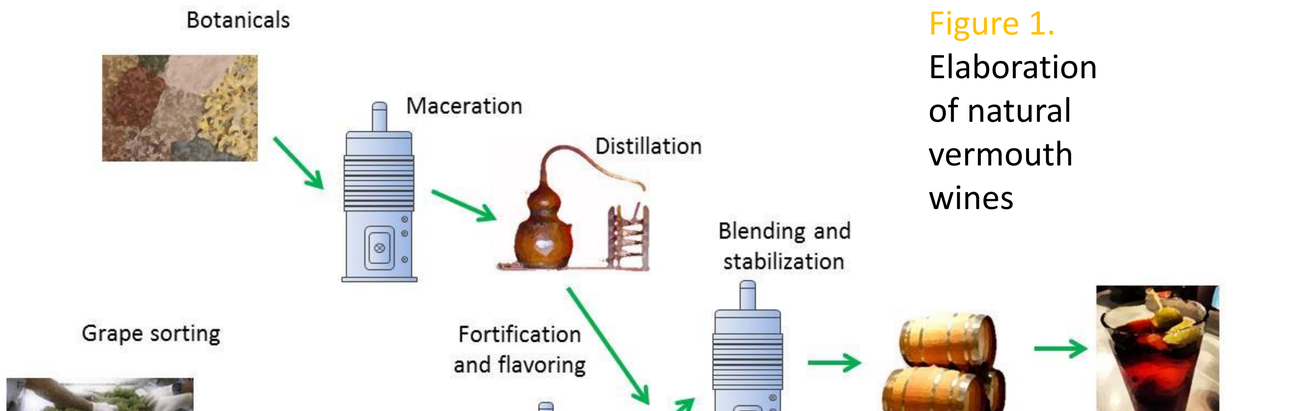

Figure 1.
Elaboration of natural vermouth wines

Results and Discussion

Initially, vermouths were pigmented with extracted anthocyanins (EAs), commercial natural anthocyanins (CNAs) or CNAs with caramel (Fig. 2). First trials due to the lower anthocyanin concentration showed a pale pink-yellow color. However, the use of CNAs at higher concentration shows a better bluish-red color with some slight browning along the time. Caramel produced a red-brown color since beginning also with some browning evolution during aging.

Anthocyanins contents evolves fast in vermouth wines and 3G-anthocyanins from grapes decrease reaching a minimum value in 6 months. Some stable pigments as vinylphenolic pyranoanthocyanins increase during aging (Fig. 3).

The use of lees also reduces anthocyanin contents and color, but increases complexity. After 3 months, controls have more color intensity than whatever trial with lees or wood and lees (Fig. 4). Adsorption of grape anthocyanins by yeast cell walls has been previously described [2]. Several woods were used to aromatize, some of them had color, specially 'palo rojo' and 'ebony', but this color is not affecting the final hue of the vermouth.

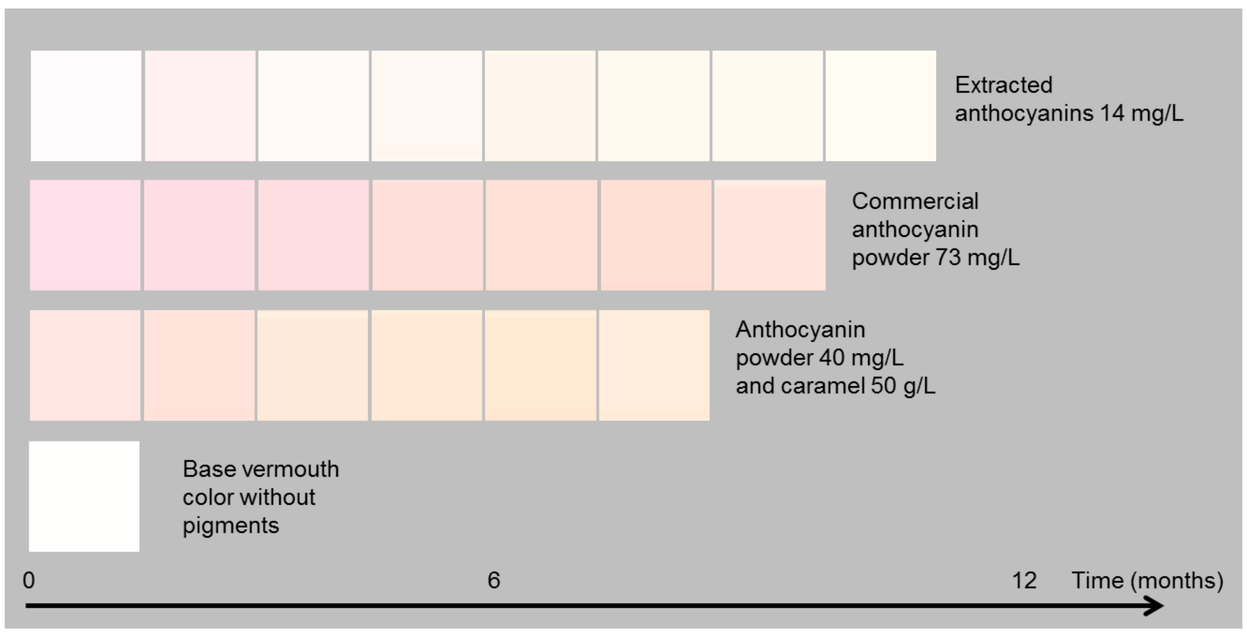

Figure 2.
Color evolution in vermouth wines pigmented with grape anthocyanins or anthocyanins and caramel

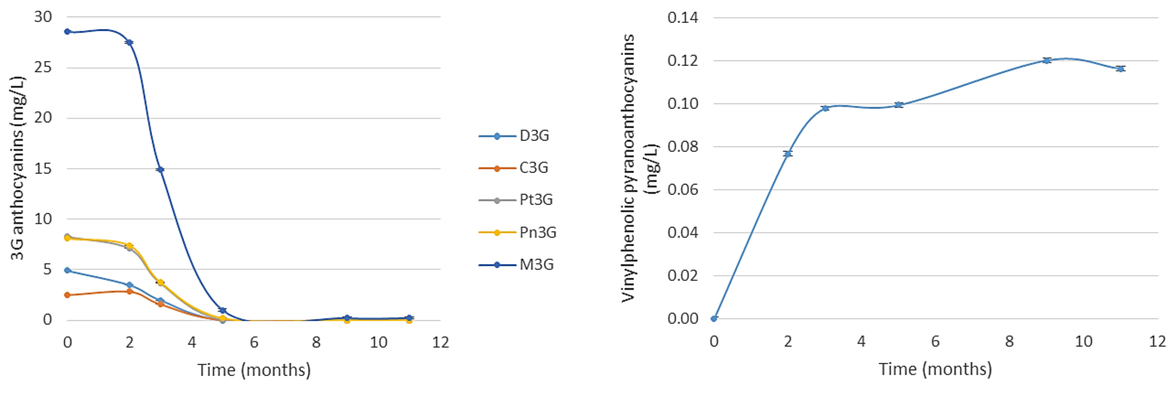

Figure 3.
Evolution of anthocyanins during aging. 3-glucosides and vinylphenolic pyranoanthocyanins

Conclusions

The use of natural anthocyanins produces vermouth wines with **better color and healthy flavonoids**. Aging on **lees and wood chips increases sensory quality** with a suitable color stability.

Figure 4.
Color evolution in vermouth wines pigmented with grape anthocyanins and aged with lees and several woods

Materials and Methods

-Vermouth wines were produced using a base white wine made from Albariño grapes (*Vitis vinifera* L.). Alcoholic degree was adjusted to 15 % v/v using wine spirit.
-*Vitis vinifera* L. grapes (variety Tempranillo) were extracted with acidified water (tartaric acid). This process was ultrasound assisted to improve the extraction.
-Anthocyanins were analyzed by HPLC-DAD-ESI/MS according to [3].
-Aging was performed using yeast lees and wood chips from 'palo rojo', cherry, cedar, oak and ebony.
-Color was analyzed spectrophotometrically measuring absorbance at 420, 520 and 620 nm in 1 mm path length cuvette.

References

[1] Morata, A. Vaquero, C., Bañuelos, M. A., Loira, I., Gonzalez, C., Tesfaye, W., Palomero, F., Callejo, M. J., Suárez-Lepe, J. A. Use of natural grape anthocyanins as color in vermouth wines. 10th World Congress on Polyphenol Applications. Porto, Portugal, 2016.
[2] Morata, A., Gómez-Cordovés, M.C., Suberviola, J., Bartolomé, B., Colomo, B., Suárez, J.A. (2003). Adsorption of anthocyanins by yeast cell walls during the fermentation of red wines. Journal of Agricultural and Food Chemistry 51, 4084– 4088.
[3] Morata, A., Loira, I., Heras, J. M., Callejo, M. J., Tesfaye, W., González, C., Suárez-Lepe, J. A. (2016). Yeast influence on the formation of stable pigments in red winemaking. Food Chemistry, 197, 686-691.

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