INDUSTRIAL SCALE APPLICATION OF THE AGEING–ON–LEES TECHNIQUE TO IMPROVE THE SENSORY QUALITY OF RED WINE

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INTRODUCTION

Aging-on-lees (AOL) is a technique that involves aging the wine in contact with yeast cells after fermentation. Yeast autolysis releases metabolites and macromolecules (mannoprotein and/or polysaccharides) into the wine (1). In recent years, AOL has begun to be used to improve the stability of the colouring matter (2), sweetness and "roundness" of the wines (3) with a corresponding increase of "greasiness".

MATERIALS AND METHODS

The yeast lees were obtained in an aerobic bioreactor (Bodegas Comenge and **enotecUPM**) from *Saccharomyces cerevisiae* strain CTPL14 (**enotecUPM**), which was used due to its positive contribution to the quality of red wines in a previous pilot study (4).

Assay was carried out using a red wine (*V. vinifera L.* cv. Tempranillo) from Comenge Bodegas y Viñedos. The biomass was added to the barrels: 3 barrels with 0.9 g l^{-1} of biomass (**AOL**) and 3 barrels without lees (**control**). All wines were analyzed to determinate anthocyanin content (HPLC-PDAD), colour parameters and a final sensorial analysis.

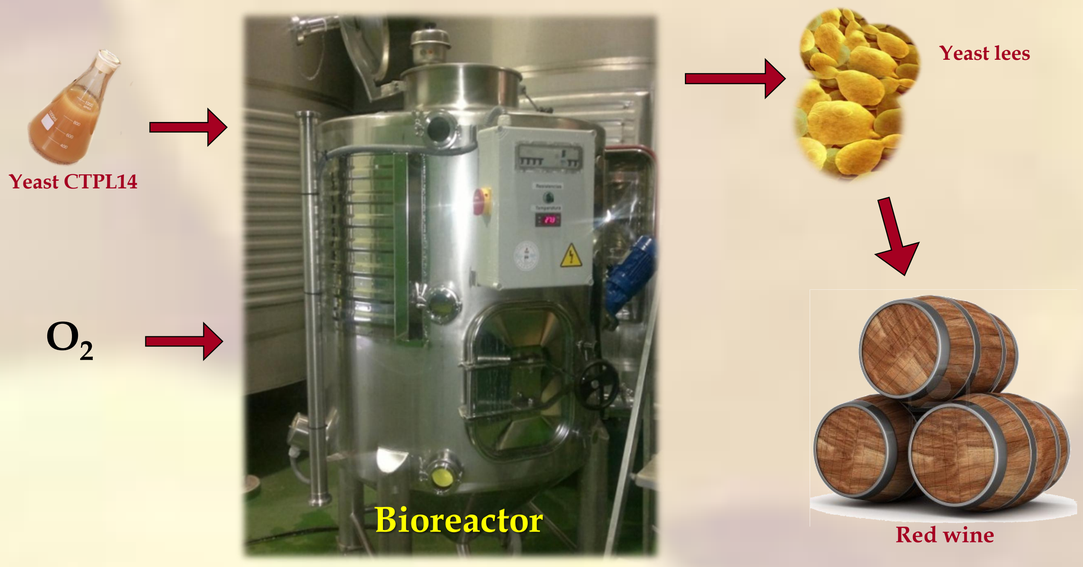

Table 1. Anthocyanin contents (mg l^{-1}) after 14 months of aging-on-lees

	Control		AOL	
	0 months	14 months	0 months	14 months
Monomeric anthocyanins	198.24 ± 18.44	280.00 ± 26.99	174.71 ± 2.89	**302.36 ± 7.54**
Vitisins	4.36 ± 0.27	4.97 ± 0.67	4.47 ± 0.01	4.82 ± 0.31
Acetylated anthocyanins	12.77 ± 1.07	19.00 ± 1.81	11.65 ± 0.07	19.78 ± 0.82
***p*-Coumaroylated anthocyanins**	47.71 ± 0.26	48.56 ± 4.64	42.08 ± 0.17	**46.07 ± 3.68**
Vinylphenolic anthocyanins	0.43 ± 0.00	1.23 ± 0.13	0.38 ± 0.00	1.28 ± 0.03
Total anthocyanins	263.53 ± 19.06	353.78 ± 32.71	233.31 ± 2.87	374.33 ± 11.68

Table 2. Colour intensity and hue after 14 months of aging-on-lees

	Colour Intensity	
	0 months	14 months
Control	1.27 ± 0.02	1.60 ± 0.02
AOL	1.40 ± 0.03	1.59 ± 0.04

	Hue	
	0 months	14 months
Control	0.63 ± 0.00	0.66 ± 0.01
AOL	0.64 ± 0.00	0.66 ± 0.01

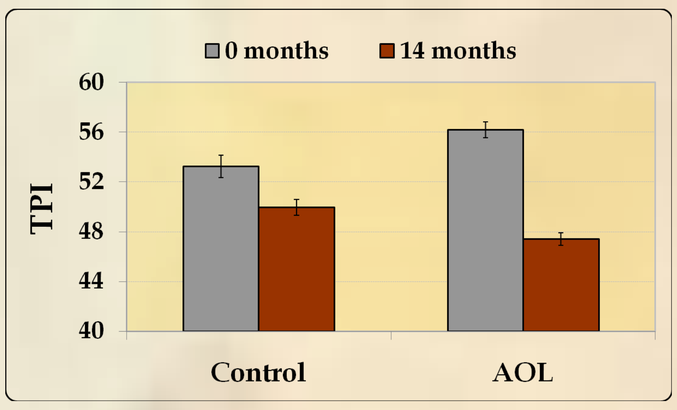

Fig. 1. Total polyphenol index (TPI) after 14 months of aging-on-lees

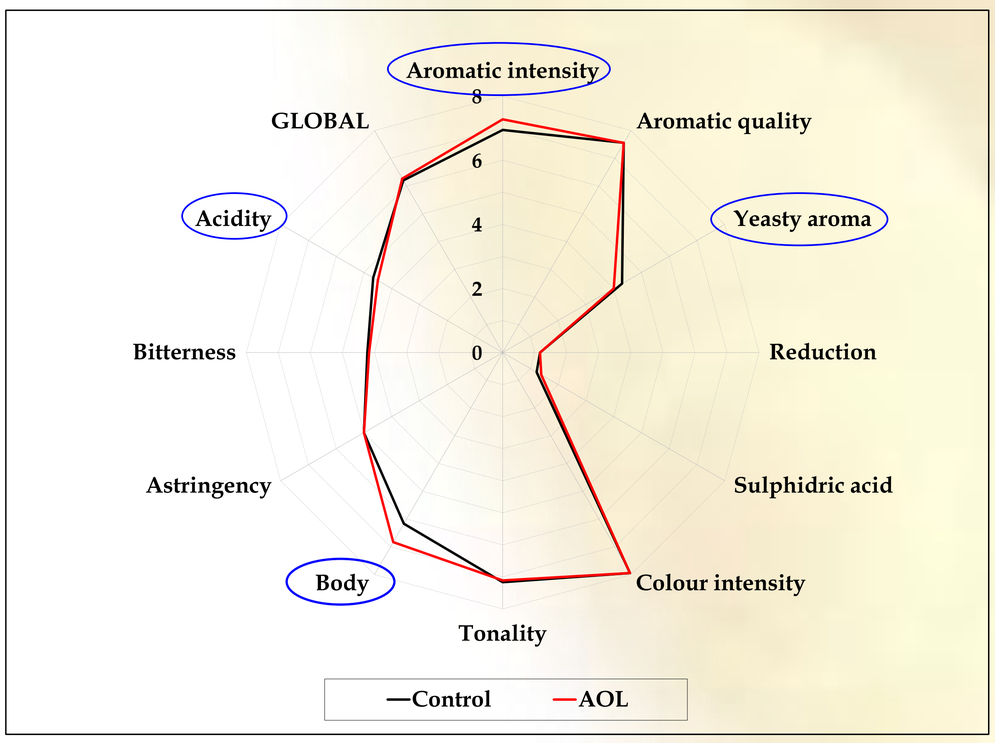

Fig. 2. Sensorial analysis after of aging-on-lees period

RESULTS AND DISCUSSION

Previous studies have reported that the macromolecules release into the wine during AOL affords a stabilizer effect to the colouring matter (4,5). In our study, Table 1 shows a considerable increase in the total anthocyanins content, specially in the monomeric and *p*-coumaroylated fractions. However AOL does not appear to affect the evolution of acetylated, vinylphenolic derivatives and vitisins fractions since similar contents were obtained in comparison with the control.

Besides, AOL does not appear to affect other parameters as colour intensity (CI) and hue (Table 2). However, AOL exerts a considerable decrease in the total polyphenols index (TPI), almost 2.7 times respect to the control (Fig. 1), probably due to the interactions between macromolecules released and polyphenols of the wine, mainly tannins, which can be grouped in stable macrostructures, being unable to react with salivary proteins decreasing thus the astringency sensation (6).

Regarding to sensorial analysis, the global quality was similar to control (Fig. 2), although, the AOL improved the body of the wine and slightly the aromatic intensity, while a lower perception of yeasty aroma was perceived. Besides, a higher fruit aroma was perceived in the AOL wine.

CONCLUSIONS

Ageing-on-lees is an interesting technique to improve the quality of wines, affords a stabilizer effect to the colouring matter and improvement the aromatic quality, fruit aroma and body, as well as decreased yeasty aroma.

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