EFFECTIVENESS OF CARBOXYMETHYL CELLULOSE (CMC) ON TARTARIC STABILIZATION OF CAVA BASE WINE

José CONTRERAS, Jennifer TOMÉ, Nikolaos KOUNTOUDAKIS, Mireia ESTERUELAS, Francesca FORT, Joan Miquel CANALS, Fernando ZAMORA
Departament de Bioquímica i Biotecnologia, Facultat d'Enologia de Tarragona, Universitat Rovira i Virgili, Campus de Sescelades, Marcel.li Domingo s/n, 43007 Tarragona, E.
e-mail: fernando.zamora@urv.cat

Keywords: wine stability, tartaric salts, carboxymethyl cellulose, cava

1. INTRODUCTION

On April 29, 2008, the European Union adopted Regulation (EC) No. 479/2008 for authorizing the use of carboxymethyl cellulose (CMC) for the stabilization of wine against the precipitation of tartaric acid salts. For this reason, the purpose of this communication is to show the preliminary results of effectiveness trials of the CMC in the case of base wines for sparkling wine (Cava).

2. MATERIALS AND METHODS

2.1. Sample preparation.

A base wine from the AOC Cava was employed immediately after alcoholic fermentation. Some of this wine was conserved without any treatment and it was considered as control, whereas other aliquots of this wine were added with 100 mg of carboxymethyl cellulose (CMC) by liter.

It should be noted that the base wine for sparkling wines must be stabilized before the second fermentation which increases the alcohol content of approximately 1.5%. Since ethanol is a source of instability for tartaric salts (Ribéreau-Gayon *et al*., 2006), all tests were performed with and without addition of 1.5% alcohol to the base wine.

2.2. Measurement of tartaric stability.

The stability of the different samples against tartaric acid precipitation was measured by means of the Boulton's test (Boulton, 1996). Stability was also determined measuring the conductivity of all the samples before and after conservation at -2 ºC for a week. On the other hand, since the usual substance employed for tartaric stability, the metatartaric acid, loss their protection capacity when the wine is conserved at high temperature, we have also verified the stability after conservation of the samples at 35 ºC for a week. All the assays were carried out by triplicate.

2.3. Mosalux analysis.

The influence of CMC on foam characteristics of base wines was measured using a Mosalux equipment ((Maujean *et al*., 1990).

2.4. Sensory analysis.

Triangular tests were carried out to verify if the CMC may be detected by the consumers.

3. RESULTS AND DISCUSSION

The results obtained with the wine without any treatment (fig. 1) confirm that the original wine was unstable and that the addition of ethanol increased its instability.

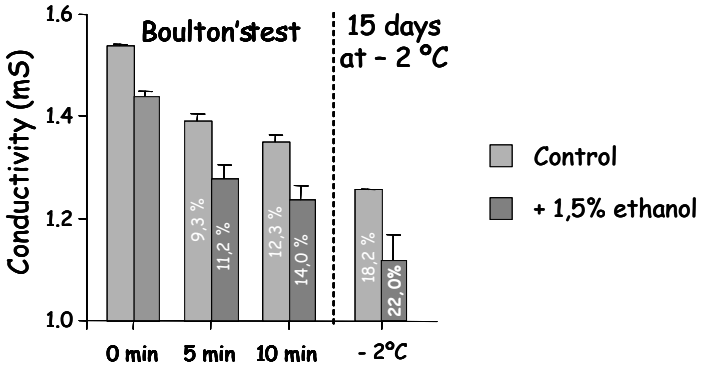


Fig. 1 - Wine without any treatment.

The figures 2 and 3 show the wine stability after addition of CMC without and with addition of 1.5 % of ethanol.

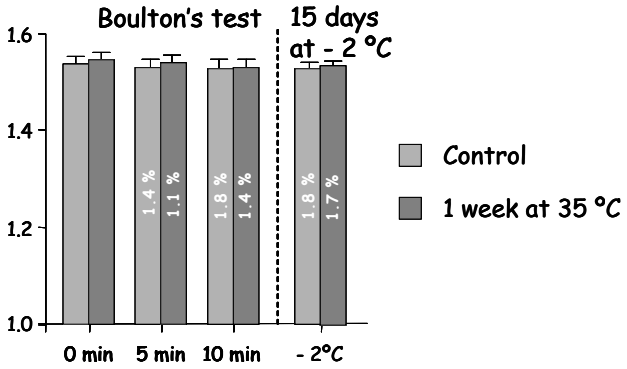


Fig. 2 - Wine with 100 mg of CMC/l.

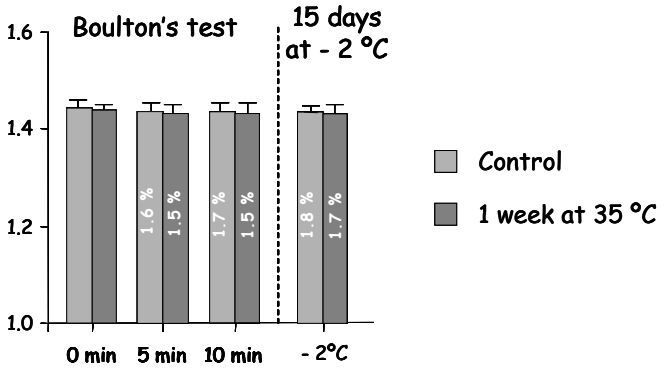
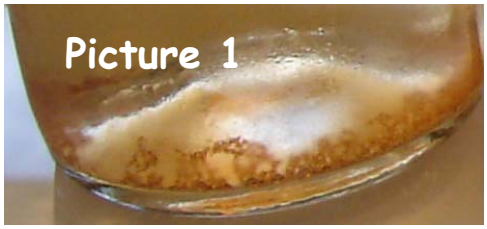


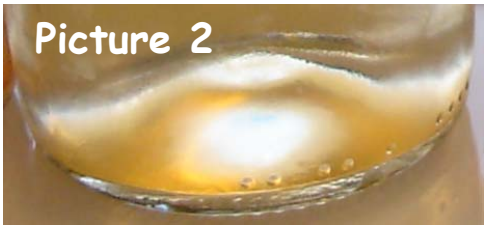
Fig. 3 - Wine with 100 mg of CMC/l and with addition of 1.5 % of ethanol.

The stability controlled by Boulton's test does not decrease more than 2 % in any case. Moreover the conservation of all samples at -2 ºC for 15 days does not provoke a significant decrease of conductivity and the visual control confirmed that no crystals appeared in the bottom of the bottles (pictures 1-2).

Wine without CMC
after 15 days at -2 ºC



Wine with CMC
after 15 days at -2 ºC



Therefore, these preliminary results indicate that CMC at 100 mg/l was able to stabilize wine against potassium bitartrate precipitation even when the alcohol content was increased 1.5%. Moreover, unlike what happens with metatartaric acid, the effectiveness of CMC was maintained even when the wine was conserved at 35 ºC for one week. Moreover, the addition of CMC did not affect the foam characteristics (Mosalux) of base wine (tab. 1) and was not detected by a trained tasting panel by a triangle test (fig. 4).

Tab. 1 – Foam characteristics of wines.

	Hm (mm)	**Hs** (mm)
Control	267.0 ± 2.6	40.0 ± 0.1
CMC	267.5 ± 3.5	39.7 ± 0.6

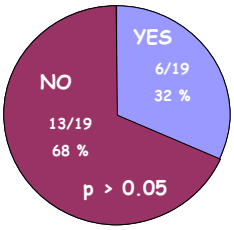


Fig. 4 - Sensory analysis (triangle test).

However, the addition of CMC increased drastically the colmatation index and if the wine was not completely stable against protein haze, the addition of CMC provoked the appearance of a filamentous precipitate at the bottom of the bottles.

Acknowledgments

We thank CICYT (AGL2007-66338) and CDTI (Project CENIT Demeter) for financial support.

Abstract

Recent EU regulations allow the use of carboxymethylcellulose (CMC) as a stabilization agent in wine. We tested CMC in bases for sparkling wines, which must be stabilized before the second fermentation that raises alcohol concentration by 1,5%. Our results show that CMC was able to stabilize wine against potassium bitartrate precipitation even when alcohol concentration was increased. Stability was controlled by the Boulton's test and by analyzing conductivity at -2°C. However if the wine was not completely stable the addition of CMC caused the appearance of a filamentous precipitate.

Literature cited

Boulton R.B. – 1996 - *Principles and practices of winemaking*. Chapman & Hall, New York, USA.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:148:0001:0061:ES:PDF

Maujean A., Poinsaut P., Dantan H., Brissonet F., Cossiez E. - 1990 – Etude de la tenue et de qualité de mousse des vins effervescents : 2. Mise au point d'une technique de mesure de la moussabilité, de la tenue et de la stabilité de la mousse des vins effervescentes. *Bulletin de l'OIV*, 711–712, 405–426.

Ribéreau-Gayon P., Glories Y., Maujean A., Dubourdieu D. – 2006 - *Handbook of Enology* Vol. 2 *The Chemistry of Wine Stabilization and Treatments*. Second Edition. John Wiley & Sons Ltd. Chichester, USA.