ARTICLE

EFFECT OF THE ADDITION OF MANNOPROTEINS DURING THE PRISE DE MOUSSE ON THE LOSSES OF DISSOLVED CO_2 AND THE FOAM COLLAR OF ROSÉ SPARKLING WINE GLASSES.

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INTRODUCTION

Champagne or sparkling wines elaborated through the same traditional method, which consists in two major yeast-fermented steps, typically hold about 10 to 12 g/L of dissolved CO_2 after the second fermentation in a sealed bottle. Hundreds of molecules and macromolecules originating from grape and yeast cohabit with dissolved CO_2; they are essential compounds contributing to many organoleptic characteristics (such as effervescence, foam, aroma, taste and colour...). Indeed, the second alcoholic fermentation (called prise de mousse) and the ageing on lees (which may last from 12 months up to several years) both induce various quantitative and qualitative changes in the wine through the action of yeast [1].

In recent years, much interest has been devoted to better understand and depict each and every parameter involved in the release of gaseous CO_2 from glasses poured with champagne or sparkling wines [2,3]. Here, the impact of yeast mannoproteins on the progressive losses of dissolved CO_2 from a rosé sparkling wine was closely examined, under standard tasting conditions. The contribution of each yeast preparation, added during the 2nd alcoholic fermentation, to the collar height and to the bubble size was simultaneously evaluated.

EXPERIMENTAL PROCEDURE UNDER STANDARD TASTING CONDITIONS

A rosé base wine was elaborated according to the traditional method and divided into four different batches. Each wine was supplemented with three distinct preparations of yeast mannoproteins, namely: MP1, MP2 and MP1+MP2. The control wine was not supplemented with any preparation. The 2nd fermentation and ageing were carried out during 12 months.

Figure 1. Flute poured with 100 mL of a rosé sparkling wine, served at 12°C/53.5°F. (photograph P. Thomas, Sipa press).

100 ± 4mL of rosé sparkling wine (12°C/53.6°F) were carefully poured into a laser-etched flute to promote bubble formation (Figure 1). All wines were examined with regard to their loss of dissolved CO_2 all along the first 10 minutes following pouring. Initial wine concentrations of dissolved CO_2, after pouring, were chemically assessed using carbonic anhydrase [1]. The total cumulative mass loss experienced by the flute poured with 100 mL of wine was recorded by a precision weighing balance (Sartorius, Secura 324 1S). A series of snapshots was taken, under the same tasting conditions, in order to follow the collar height and the bubble size.

LOSSES OF DISSOLVED CO_2 WITH TIME

The concentration of dissolved CO_2 directly impacts: the visually appealing frequency of bubble formation in the glass, the growth rate of rising bubbles, the tingling sensation in mouth and the aromatic perception of sparkling wines.

All batches of wines were found to initially hold (at t=0, after pouring) a concentration of dissolved CO_2 of about 7.51 ± 0.67 g/L (n=4).
As displayed in Figure 2, no significant difference appears between the four cumulative CO_2 mass loss-time curves.

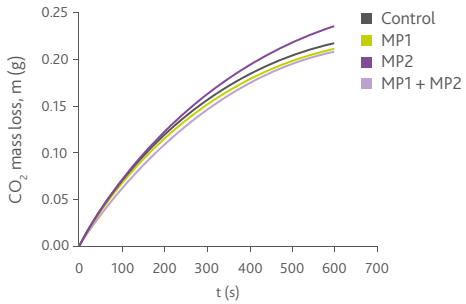

Figure 2: Cumulative CO_2 mass loss-time series corresponding to four rosé sparkling wines.

The progressive loss of dissolved CO_2 concentration with time, denoted ΔC(t), may finally easily be accessed by retrieving the following relationship:

$$\Delta C\ (t) = -\frac{M(t)}{V\ (flute)}$$

It is worth noting that, for a given rosé sparkling wine, the concentration of dissolved CO_2 found within a flute progressively decreases all along the 10 min following pouring.
The total loss of dissolved CO_2 concentration, at the end of tasting, was similar between the four rosé sparkling wines (Table 1).

Table 1: Total loss of dissolved CO_2, at the end of tasting (g/L) Means connected by same letter are not significantly different (P < 0.05).

Wine	Δ[CO_2] (t600 - t0), (g/L
Control	2.18 ± 0.38a
MP1	2.20 ± 0.21a
MP2	2.35 ± 0.23a
MP1+MP2	2.08 ± 0.29a

The addition of yeast mannoproteins during the prise de mousse, thus did not influence the loss of dissolved CO_2, under our standard tasting.

FOAM COLLAR HEIGHT DURING TASTING

The collar behaviour of the four rosé sparkling wines was followed during 10 min. The MP1, MP2 and MP1+MP2 rosé sparkling wines produced a significant thicker collar than the control wine. The collar of these three wines remained also stable until the end of tasting (as seen in Figure 3).

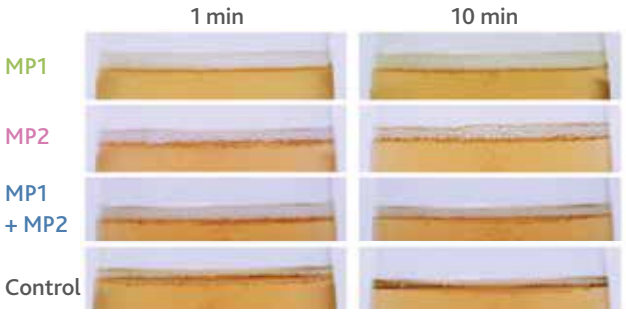

Figure 3. Closeup of the collar, at 1 min and 10 min after pouring, from the four rosé sparkling wines.

The photographs displayed in Figure 3 compare the collar height from the four rosé sparkling wines. It is clear that the bubble's size distribution is different among the four wines.
Indeed, as seen in Figure 4, MP1 showed significantly smaller bubbles, whereas larger bubbles are observed for MP2, all along the 10 min following pouring conditions.

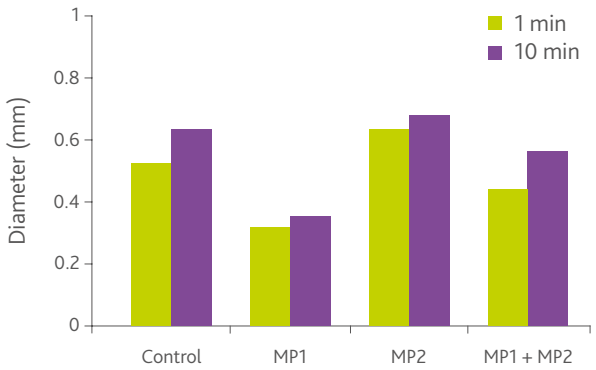

Figure 4: Diameter of bubbles in the foam collar of the four rosé sparkling wines.

It is well known that yeast mannoproteins impact organoleptic qualities of wine. Here, the contribution of yeast mannoproteins, added during the prise de mousse, to the foaming properties (collar height and bubble size) of a rosé sparkling wine has been evidenced, for the first time, in real tasting conditions.