Evaluation of the impact of the addition of two mannoproteic additives on foam and organoleptic characteristics of sparkling wines

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Introduction

It seems to be unquestionable the importance of mannoproteins for the foam quality of sparkling wines. However it is also known that these components are only released to the wine after autolysis of yeasts, after 12 to 18 months of aging, which significantly increases the production costs. So wineries look for products that contain these polysaccharides to test if their addition to the bottle right before the second fermentation allows the production of high quality sparkling wine in a shorter time.

Materials and Methods

The sparkling wine were produced by the Classic Method. The mannoproteins commercial products tested were: Release Crispy (RC) and Release Round (RR).

The products were added before the second fermentation for a final concentration in the bottle of 5 g/L (RC5 and RR5), 10 g/L (RC10 and RR10) or 30 g/L (RC30 and RR30) of R. Crispy or R. Round. Concurrently it was prepared a control group – sparkling wine without the addition of the products (RT) (Figure 1).

Mannoprotein concentration of both products and each one of the treatments were determined by GC-FID.

There are small differences in foam parameters HM and TS for R5, RC10, RR5, RR10 and RR30 compacity to control group RT (Figure 2). R. Round was more effective in improvment of foam quality.

Table 1 – Analysis of high molecular weight material of enoligocactic products.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>n (N/m)</th>
<th>H CHO (N/m)</th>
<th>Carbohydrates (% mol)</th>
<th>Total CHO (g/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC Crispy</td>
<td>9.5</td>
<td>7.5</td>
<td>Ara 4.6</td>
<td>2.7</td>
</tr>
<tr>
<td>RR Round</td>
<td>15.5</td>
<td>7.5</td>
<td>Man 4.6</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Table 2 – Mannose concentration

<table>
<thead>
<tr>
<th>Treatment</th>
<th>RT</th>
<th>RC5</th>
<th>RC10</th>
<th>RC30</th>
<th>RR5</th>
<th>RR10</th>
<th>RR30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mannose Concentration (g/l)</td>
<td>3.7</td>
<td>4.6</td>
<td>7.4</td>
<td>6.3</td>
<td>4.8</td>
<td>7.3</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Table 3 – Analysis of high molecular weight material of each treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>RC5</th>
<th>RC10</th>
<th>RC30</th>
<th>RR5</th>
<th>RR10</th>
<th>RR30</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHO (mg/L)</td>
<td>292</td>
<td>156</td>
<td>201</td>
<td>288</td>
<td>288</td>
<td>388</td>
</tr>
<tr>
<td>Carbohydrates (% mol)</td>
<td>Ara 4.6</td>
<td>Man 4.6</td>
<td>Gal 4.6</td>
<td>Glc 4.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There were significantly differences on foam parameters HM and TS for R5, RC10, RR5, RR10 and RR30 compacity to control group RT (Figure 2). R. Round was more effective in improvment of foam quality.

RC10 and RR10 have a very similar values of polymeric material and carbohydrates yield (Table 3) but different results on foam parameters (Figure 2) which indicates low molecule weight material is decisive for sparkling wine foam quality. This is an indicator that mannoproteins don't define, alone, the quality of sparkling wine. These results confirm the importance of the synergistic effect between different groups of constituents to the foam quality and the need to better understand this phenomenon.

Results and Discussion

The polysaccharide analysis revealed that mannoproteins are, in fact, a small part of the constitution of both products R. Crispy and R. Round, once polymeric material (where these components belongs) is of 9% and 11%, respectively (Table 1). These additives are mainly composed by low molecule weight material. The increment of product concentration resulted in a higther molecular percent and concentration of mannose (Table 2).

Figure 2 – Foam height (A) and foam stability (B) of the different treatments measured with Mosalux equipment. Equal letters mean homogeneous groups according with Tukey’s Test with confidence level of 95%.

Sensory analysis shows that both product don’t affect visual aspect of the sparkling wine. On the others categories (Aroma, Taste and Foam) treatments with R. Crispy and R. Round have higher punctuation than RT (Figure 3). Treatments with R. Crispy seems to be the preferred by the judges.

Figure 3 – Results of Aroma, Taste and Foam sensory analysis.

Conclusion

R. Round has a higher percentage of molar mannose and have better results on foam parameters. R. Crispy produced the sparkling wines with better results on sensory analysis. For both products better results are achieved with concentrations of 5 g/L and 10 g/L. Mannoproteins contribute for an improvement of foam quality and organoleptic characteristics of sparkling wine. Synergistic Effect between different groups of constituents seems to be the main responsible for differences on foam and sensory characteristics of the wine, reason why this subject should be better studied in future works.

Products Release Crispy and Release Round have potential to produce high quality sparkling wine with reduced aging.

References


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