Adaption of five types of corks and their influence during storage time over their quality and volatile characterization of Champagne at different doses of SO_2

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Introduction and Objective

The storage of Champagne post-bottling is considered a critical stage since oxygen exchange through the cork can affect its evolution over time, affecting the Champagne quality, specifically its aromatic compounds that influence the consumer experience. Therefore, the aim of this work is to study the influence and adaptation of five different types of cork stoppers with different OTR (oxygen transfer rates) in a Champagne with different doses of SO_2 added in the bottling. All this through the study of oenological parameters, volatile composition and sensory characteristics over different storage times. The purpose is to adapt the bottling of Champagne with the best type of cork according to OTR and dose of sulfur, in order to obtain an optimal product for consumption after a period of storage in the bottle.

Material and Methods

BOTTLING

FIVE TYPES OF CLOSURES
+ CONTROL (CROWN TAP)

THREE TYPES OF SO_2 DOSES

CHARACTERISTICS CORK STTOPERS

Control: OTR: 1.30 cc O_2/day
C1: OTR: 2.05 cc O_2 /day
C2: OTR: 2.35 cc O_2 /day
C3: OTR: 2.53 cc O_2 /day
C4: OTR: 2.80 cc O_2 /day
C5: OTR: 2.88 cc O_2 /day

0 mg/L; 10 mg/L; 20 mg/L

ANALYSIS

At four times

0M: 15 days after bottled

3M: three months later bottled

6M: six months later bottled

12M: twelve months later bottled

1. Basic oenological parameters: OIV Methods

2. Aromatic Analysis by GC-MS: 18 Fermentative and 9 Oxidative compounds

3. Aromatic Analysis GC-FPD: 7 Reductive compounds

4. Descriptive Sensory Analysis by trained panel

Results

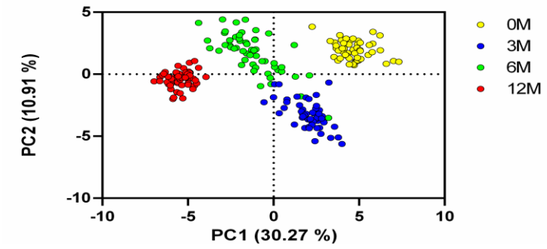
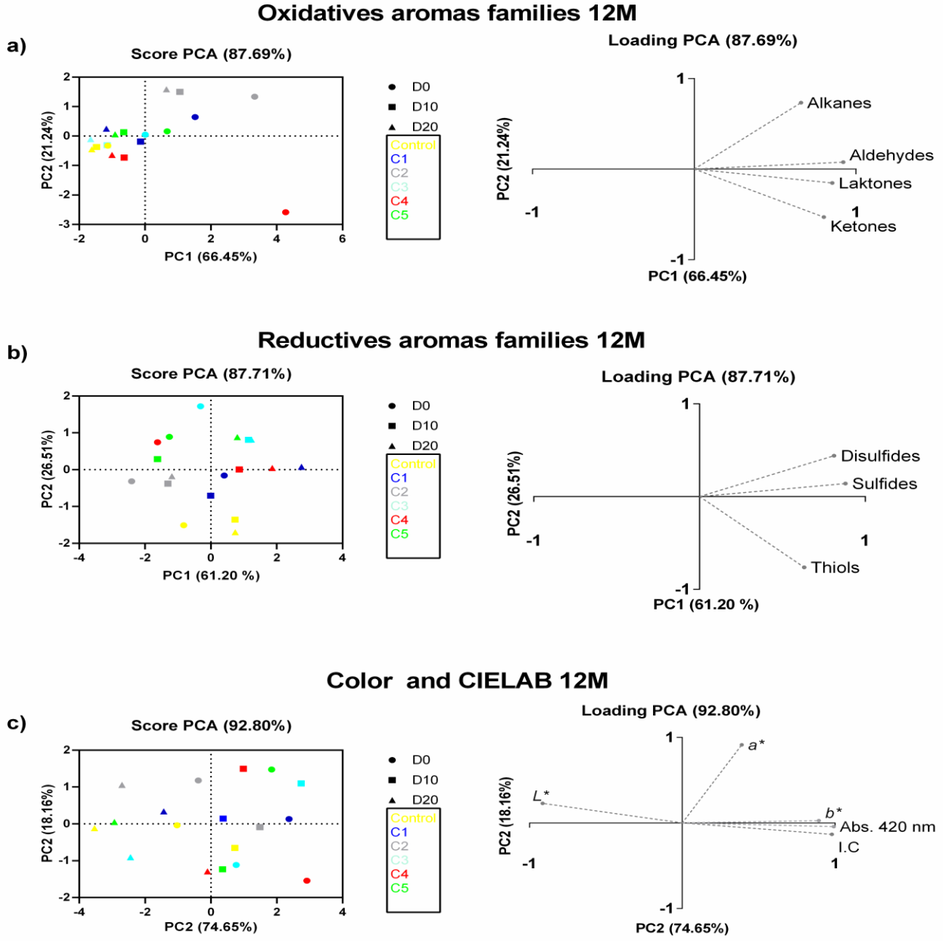


Figure 1. Principal component analysis of oenological and volatile compounds at all times.

Figure 1 shows how the samples were clearly grouped into four groups according to the analysis time. This indicated that of all the parameters studied, time was the variable with the greatest significant weight in the distribution of the samples.

Figure 2. Score and loading of oxidative and reductive families and color with CIELAB coordinates at 12M.

Figure 2a shows how at 12M the samples without SO_2 dose had a higher concentration of oxidative compounds, mainly alkanes and aldehydes. The champagne with the C2 and C4 corks were the most evolved at all doses. In the case of the reduction compounds (figure 2b), it was the samples with the highest doses of sulfur (20 mg/L) that presented the highest values, mainly C1 and C4. The control sample presented the highest amounts of reduction aromas at all doses, with the thiols standing out. The color (figure 2c) was greatly influenced by the doses of sulfur. At 20 mg/L they better conserved the luminosity and the color in general



The fermentation compounds did not appear to be highly influenced in the long term (12M) by OTRs or sulfur (data not shown). At 12 months, the champagne with the C5 cork was the best valued by the sensory panel in all its doses of sulfur for preserving its freshness, especially at the dose of 10 mg/L SO_2 (data not showed).

Conclusions

-Time was the main variable in the distribution of the samples. In general, a change and/or evolution of the compounds under study can be observed over time between the different plugs and doses.

-Oxidative compounds increased to a greater extent in samples without sulfur dose and with corks with higher OTR, over time, being the champagnes with the C2 cork of the most evolved at 12M. However, the opposite occurred with the reduction compounds, these were increasing in samples with higher doses of sulfur and with corks with lower OTR over time, being the control champagnes, C1 and C4 the most reduced to 12M.

-The color is affected over time by the addition of sulfides. Higher doses better color protection.

-In conclusion, the permeability of cork is important in the conservation and/or evolution of Champagnes, since the interaction of oxygen can cause or prevent the production of oxidative and reducing compounds when sulfur is added in bottling.

Acknowledgements

The authors would like to acknowledge the *DIAM BOUCHAGE SAS* for their financial support.