Inspiring innovation.

GLASS ALTERNATIVES

PART 2 - BAG-IN-BOX

The search for new marketing strategies and the need to adopt more sustainable solutions for the environment are pushing wineries to choose alternative containers to glass bottles. The use of cans and bag-in-box mean winemakers face new challenges that they need to be aware of to continue offering the consumer a wine of exceptional quality.

The Bag-in-Box

Bag-in-box (BiB) has been used for a long time in the wine sector, mainly for wines for quick consumption. The shortage of glass due to the contingent market situation, the increase of home consumption of wine imposed by COVID-19 and the desire to explore new forms of sales have pushed many wineries to adopt the use of BiB even for their premium wine range. This new application has highlighted a well-known problem connected to the use of BiB: premature oxidation. Oxidation in BiB occurs much quicker than with glass resulting in decreased aroma, color alteration of a yellow/brownish tint, and a significant decrease of free sulfur dioxide.

Causes of Oxidation in BiB Wines

Why are BiB wines more susceptible to oxidation than ones bottled in glass? Besides oxygen dissolved at bottling or in the phases immediately preceding it, which is always dangerous regardless of the type of container used, the oxygen present in headspace and the permeation through the bag represent an additional threat for the quality and shelf life of wine stored in BiB.

The Headspace

For filling, the BiB bag is laid out on a flat surface with the gland facing up. The formation of an air bubble inside the bag is unavoidable since the tap must be attached without any leakage of liquid. To ensure better resistance to oxidation, it is necessary to reduce the volume of the bubble. Headspace represents a critical factor especially in small size BiBs. Often, its volume remains the same regardless of the volume of the BiB. Therefore, in smaller BiBs the quantity of oxygen contained per liter of wine is higher than in larger BiBs. Another problem encountered is the high variability of bubble size (Figure 1). By sampling during the same packaging, headspace varies significantly from one BiB to another. This leads to high variability in quality and shelf life of the wine within the same batch.

Bag Permeability

BiB bags have different oxygen permeability depending on the thickness and materials (PE, PET, EVOH, aluminum, etc.) of the film. Obviously, the presence of barrier materials such as aluminum and EVOH reduces the diffusion of oxygen into wine. Seals and contact points between the gland and the film and between the gland and the tap can be other areas where oxygen enters. Measuring the amount of oxygen entering a BiB is impossible since wine has an oxygen consumption rate greater than the oxygen inflow rate; therefore, information regarding bag permeability should be obtained from the supplier.

Figure 1: Headspace varies significantly from one BiB to another. This leads to a high variability in quality and shelf life of the wine within the same batch.

How to extend the shelf-life of wines in BiB

Reducing Dissolved O2

If reducing dissolved oxygen is fundamental for every wine, in the case of BiB wines it is even more important. The adoption of an adequate sampling and analytical control plan for the total packed oxygen - dissolved and present in the headspace - helps to identify the critical points and implement the necessary corrective measures. The use of tannins and ascorbic acid-based products can help extend the shelf-life of wine in BiB.

Managing O_2

One of the effects of oxidation caused by the total packed oxygen is a rapid decrease of free sulfur dioxide (Figure 2). A drop in the first two months after bottling is considered physiological even in glass bottled wines but then it settles at relatively stable levels. In BiB, however, because of the continuous inflow of oxygen through the bag, the loss of free sulfur dioxide persists and, after a few months, it reaches values insufficient to ensure antioxidant and antimicrobial protection. For a longer shelf life, it is necessary to increase the initial content of sulfur dioxide. It is also important to add SO_2 a few days before packaging and make sure its content is stable to avoid putting a wine with a lower content of sulfur dioxide than the one considered as correct in BiB.

Controlling Storage Temperature

Emphasizing that high temperatures are not good for wine quality is trivial but the effects on wine in BiB are dramatic: Increasing the storage temperature from 20°C to 30°C reduces the shelf-life of wine from 8 to 4 months! Controlling storage temperature and planning production to shorten storage time helps to have a higher quality wine on the market (Table 1).

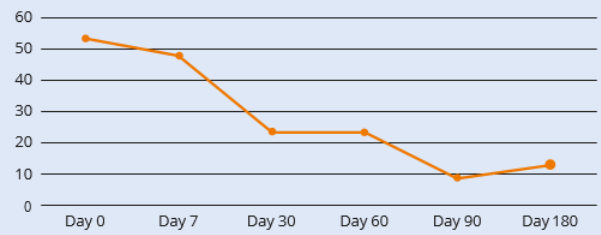

Figure 2: Variation of free SO_2 content during storage. Dissolved oxygen at the time of packaging: 1.9 mg/L; range of headspace volume: 14-57 mL.

For more information on the use of the bag-in-box, we invite you to watch the presentation made by Dr. Carien Coetzee of Basic Wine (www.basicwine.com) at the Enartis Stabilization School 2021 and is available at the following address https://youtu.be/VvHmdnGDPko

PARAMETERS TO MONITOR IN BAG-IN-BOX WINE

RIGHT AFTER PACKAGING	DURING WINE STORAGE
Dissolved oxygen	Free SO_2
Headspace volume	Color
Oxygen present in the headspace	Sensory quality

Right after packaging, monitoring the suggested parameters is needed to understand if there is oxygen solubilization and to correctly set up the filling machine to minimize headspace volume. During wine storage, monitoring free SO_2, color and sensory quality are required to check wine evolution and shelf-life.

Table 1: Parameters to monitor in BAG-IN-BOX wine.

Product Recommendations for Reducing Dissolved Oxygen

Citrostab rH is a pre-bottling coadjunct that can be used to "consume" dissolved oxygen preventing wine compound oxidation. Note: A dosage of 6 g/hL of Citrostab rH will scavenge approximately 1 ppm of dissolved oxygen, thus being beneficial for controlling SO_2 additions. More details on dosages and effects can be found on our website.

Hideki is a tannin made of molecular fractions obtained through the selection and purification of gallic, ellagic and condensed tannins that are the most effective in protecting wine from oxidation and the development of undesirable microorganisms. The application of Hideki in BiB improves wine resistance to oxidation preserving a fresher color and aroma for longer periods of time as well as a higher free SO_2 content. A higher free SO_2 content together with Hideki's inherent antimicrobial activity prevent microbial alteration of wine.

For more information, please call Enartis USA's technical services at (707) 838-6312.

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