
# Conference programme

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## HOW SMALL AMOUNTS OF OXYGEN INTRODUCED DURING BOTTLING AND STORAGE CAN INFLUENCE THE METABOLIC FINGERPRINT AND SO2 CONTENT OF WHITE WINES

The impact of minute amounts of headspace oxygen on the post-bottling development of wine is generally considered to be very important, since oxygen, packaging and storage conditions can either damage or improve wine quality. This is reflected in the generalised use of inert bottling lines, where the headspace between the white wine and the stopper is filled with an inert gas. This experiment aimed to address some open questions about the chemistry of the interaction between wine and oxygen, crucial for decisions regarding optimal closure. While it is known that similar amounts of oxygen affect different wines to a variable extent, our knowledge of chemistry is not sufficient to construct a predictive method. The experimental design included 12 different wines from five different cultivars. The wines (n=12x20) were bottled at the same industrial bottling line, then stored for 60 days at room temperature. Half of the bottles were filled using the standard process with inert headspace, and sealed with a synthetic coextruded stopper allowing lower oxygen ingress, resulting in a total package oxygen (TPO) in the range 1.30 - 4.25 ppm O2. The other half of the bottles were filled without inert gas and with extra headspace, and sealed with a synthetic coextruded stopper allowing higher oxygen ingress, resulting in TPO 5.93 - 8.38 ppm O2. After storage, the wines were analysed using an untargeted LC-ESI-QTOF MS method, optimised for wine metabolomics, to obtain the widest coverage of the metabolic space of non-volatiles [1]. This experiment produced a dataset with over 20,000 features, and data analysis showed the presence of about 35 putative markers induced by different amounts of oxygen. These metabolite markers included ascorbic acid, tartaric acid and various sulfonated compounds. Thus, the antioxidant SO2 takes part in various reactions, modulated by the presence of oxygen, several of which were unknown in wine to date and would appear to be of practical significance. Specifically, the sulfonated derivatives of indole-3-lactic hexoside, tryptophol, glutathione, cysteine and pantetheine were detected in wine for the first time, thanks to the untargeted metabolomics approach chosen. These findings explains why glutathione disulfide is not detectable in wines, due to its preferential antagonistic reaction with SO2. Further studies of the mechanisms involved in such reactions and the inclusion of selected SO2-binding compounds in the routinely quality control of wines could help to decrease SO2 addition in wine, and make smarter use of the various oenological antioxidants in correlation with varietal information, the amount of total package oxygen and the choice of stopper. Acknowledgments The authors thank Nomacorc for its financial support and the MezzaCorona winery for the wines, bottling and storage. Reference [1] Arapitsas, P. et al., Journal of Chromatography A, 2016, 1429, 155-165


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