Technical Abstracts

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effort globally. Innovative technical closures avoid development of "cork taint" and offer a range of controlled oxygen transfer rates for postbottling storage of different wine styles. This five-year project aimed to compare various closures' effects on aging characteristics of four wines. The wines were all high-quality and commercially available. These included a Sauvignon blanc, a barrel-aged Chardonnay, a Pinot noir, and a Cabernet Sauvignon. All wines came from wineries in Napa and Sonoma, California, and were aged under controlled temperature for five years. The four closures tested were three DIAM controlled-oxygen transfer rate (OTR) closures and a standard 49-mm natural cork. We measured free and total sulfur dioxide levels, color, and phenolic profiles. As expected, white wines were more susceptible to the effects of oxidation; thus, their aging profiles were more dependent on the level of oxygen allowed by the different closures we tested. Generally, we observed a difference in oxygen exposure on browning and rates of sulfur dioxide loss. The choice of closure impacted the wine composition over five years but had less impact on red wines than whites. Overall, red and white wines closed with the DIAM technical closures, especially those with lower OTRs, had significantly less variation in the final sampling for sulfur dioxide levels. Furthermore, from these results, we could conclude that red wines were more resilient to oxidation in the bottle and manufactured closures, like DIAM closures, provided a more uniform end product after some time in the bottle. The results also suggest that the choice of a low-OTR closure is more critical for storage and aging of white wines.

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Application of *Hanseniaspora vineae* Hv205 During White and Red Grape Vinification at Diverse Winery Scales

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Vinification is the process in which yeasts ferment grape sugars to produce ethanol, carbon dioxide, and secondary metabolites. Many wine aroma compounds are derived from yeast secondary metabolism, during which different compounds form that contribute to the aroma profile, color, and mouthfeel. The composition of wines associated with these metabolites is key to obtain wines with different character and typicality. Recent laboratory- and pilot-scale research has examined the behavior of native non-*Saccharomyces* yeasts and their influence on the production of these compounds. At commercial level, winemakers have limited access to yeast diversity, in contrast to the great strain diversity found on grape skin surfaces: the microbial terroir. We focused on *Hanseniaspora vineae* because of its proven fermentative capacity and low volatile acidity formation when compared to other species of this genus and its contribution to the increased aromatic profile of wines with floral, fruity, and mouthfeel descriptors. The objective of this work was to carry out fermentations with the selected strain Hv205 and with diverse grape varieties in wineries located in Uruguay, Italy, and Spain during two harvests. Chemical and sensory analyses were performed on wines elaborated using Chardonnay, Macabeo, Albillo, Trebbiano, Ugni blanc, and Semillon white grapes and Tannat, Tempranillo, and Pinot noir red grapes. The results allowed us to conclude that the liquid and dry active formulations of *H. vineae* Hv205 were compatible with fermentation at industrial scale for base sparkling, white, and red wines. There were significant increases in aromatic compounds such as benzenoids and acetates. Furthermore, polysaccharides and other

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compounds derived from yeast cell lysis might explain the increase in roundness perception in mouthfeel compared to *Saccharomyces* strains. Likewise, the wines obtained were preferred and differentiated from those fermented with conventional commercial yeasts.

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Selection of the Best *Saccharomyces* Strain Partner for Vinification under Mixed Cultures with *Hanseniaspora vineae* Hv205

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Yeasts produce a diversity of secondary metabolites during fermentation that impact the flavor and aroma of wine. Among apiculate yeasts of the genus *Hanseniaspora*, the species *Hanseniaspora vineae* has been used at the winery scale with successful results, producing aroma compounds that expand the diversity of wine color and flavor. However, this species tolerates only moderate levels of ethanol (~10% v/v). The implementation of a mixed culture with *Saccharomyces cerevisiae* under controlled experimental conditions could be a useful strategy to obtain complete fermentations of mature grapes with increased flavor complexity. Co-inoculation with *H. vineae* strain 205 avoids the risks of undesirable yeasts that might have appeared under spontaneous fermentations but increases strain diversity during fermentation. However, some mixed culture fermentations are not successful due to nutrient competition and may require supplementation with assimilable nitrogen or vitamins. This work focuses on selecting commercial *S. cerevisiae* strains that can grow and ferment together with Hv 205 to obtain a complete fermentation and on how nutrient addition effects improve mixed-culture performance. Of 23 commercial yeasts evaluated, we present results of the best six *S. cerevisiae* partners to ferment with Hv 205 under sequential inoculation at 72 hrs. At the end of the fermentation, sensory evaluation and chemical analysis of aromas by gas chromatography-mass spectrometry were performed. Fermentation and sensory analysis in mixed cultures with *S. cerevisiae* strains 3C and E73 proved the best combinations for wine quality. More intense fruity and floral aromas were found than in conventional, single-strain fermentations. Nutrient additions such as diammonium phosphate, amino acids, yeast extract, the commercial additive Natuferm, and thiamine were evaluated when *Saccharomyces* was inoculated to improve completion of fermentations.

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White Wines Produced by the Two Main Yeast Species of the Fermentation Clade within the Apiculate Genus *Hanseniaspora*

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Hanseniaspora species are the main yeasts isolated from grapes and grape musts. The genus has two clear technological clusters, the fruit group and the fermentation group, based on genetic and phenotypic characterization. Among the *Hanseniaspora* species belonging to the latter, *H. osmophila* and *H. vineae* have been found in