

The Effect of *Saccharomyces cerevisiae* and *Saccharomyces cerevisiae/bayanus* Hybrid Yeast Strains on the Aroma of Chenin Blanc Final Wines Produced from Frozen Grapes

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Abstract

In this study, the effect of cryogenic treatments of Chenin Blanc grapes before fermentation, and its effect on the wine yeast's ability to produce Chenin Blanc wines with enhanced tropical fruit aromas was investigated. Grapes subjected to standard ARC winemaking served as Control. Two *Saccharomyces cerevisiae* Active Dried Wine Yeast (ADWY) i.e., VIN7, CKS102, and one *S. cerevisiae/bayanus* hybrid i.e., NH84 were used. Chemical analyses of small-scale wines (20L) showed that all yeast starter cultures included in this trial produced Chenin Blanc wines with similar parameters. However, some wines had more desirable parameters, especially concerning volatile acidity (VA) formation, which impart undesired vinegar-like aromas in wines. Overall, subjecting grapes to Treatment 2 in conjunction with VIN7 resulted in wines with less VA. Sensorially, a noticeable difference observed in aroma profiles for all Control wines can be attributed to the different yeast starter cultures. Similar observations were made for Treatment 1 and Treatment 2, respectively. Furthermore, indications are that different cryogenic treatments of Chenin Blanc grapes somehow altered the berry composition (matrix), as the same yeast starter culture produced wines with different aroma profiles when the cryogenic treatment was the only variable. The CHEF DNA Karyotyping of yeast isolates at end of the respective Chenin Blanc fermentations (Control, Treatment 1, and Treatment 2) matched that of the ADWY starter cultures i.e., VIN7, CKS102, and NH84, respectively. This observation confirms that the respective starter cultures were present at the end of fermentation and, therefore, completed the fermentation. Proteomic analyses using SDS PAGE showed differential protein expression between yeast strains following the fermentation of Control grapes, which confirms that yeasts react differently to the grape must and wine matrix. Furthermore, differential protein expression was also observed for the same yeast strain, when the cryogenic treatment of grapes was different, which suggests the treatments affected the matrix, hence the yeast responded differently in terms of protein expression. This was an important observation, as yeast-expressed proteins are instrumental in the release of aroma-enhancing compounds. Therefore, cryogenic treatment of grapes can be explored as a tool to increase the fermentation potential of wine yeasts.