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Impact of yeast derivatives to increase the phenolic maturity and aroma intensity of wine

Christoph PATAUNER[1]*, Alex TAVERNAR[1], Eva ÜBEREGGER[2]

[1]*Department of Enology, Laimburg Research Centre, BZ, Italy,* [2]*Laboratory for Wine and Beverages Analysis, Laimburg Research Centre, BZ, Italy;*
*Corresponding author: Christoph.Patauner@laimburg.it

Introduction – Using viticultural and enological techniques to increase aromatics in white wine is a prized yet challenging technique for commercial wine producers. Equally difficult are challenges encountered in hastening phenolic maturity and thereby increasing color intensity in red wines. The ability to alter organoleptic and visual properties of wines plays a decisive role in vintages in which grapes are not able to reach full maturity, which is seen increasingly more often as a result of climate change. A new, yeast-based product on the viticulture market may give the opportunity to increase sensory properties of finished wines. Manufacturer packaging claims these yeast derivatives intensify wine aromas of white grape varieties, as well as improve phenolic ripeness of red varieties, but the effects of this application have been little researched until now.

Materials and methods – For this experiment the products "LalvigneAroma" and "LalVigneMature" were tested on the principal grape varieties cultivated in the Alto Adige wine region. Both products are a 100%-natural wine yeast derivative (*Saccharomyces cerevisiae*) which is applied to leaves and grapes at the moment of véraison. The first application was done at 5% véraison and the second application ten days later. The treatments were carried out in randomized blocks with common sprayers. At harvest, grapes from treated blocks were harvested separately from untreated ones. Vinification took place in Laimburg Research Centre's experimental winery according to a single protocol. All musts and wines underwent extensive chemical and aroma analyses. In addition, all wines were blindly tasted and evaluated twice by a sensory panel: once several months after the fermentation was finished, and again as an aged wine with more than one year in bottle. In order to check the tasters' reliability of judgement, several duplicate samples were included in each tasting sequence.

Results

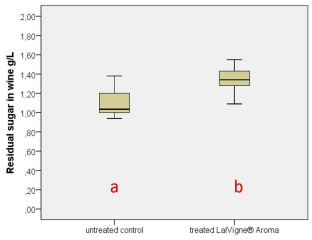

Figure 1: Boxplot of the analytical parameter 'residual sugar in wine'

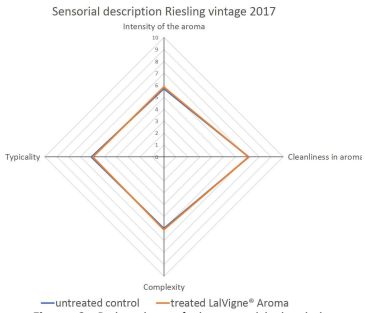

Figure 2: Radar chart of the sensorial description Riesling vintage 2017; comparison of untreated control and treated LalVigne® Aroma. * $p \leq 0.05$;

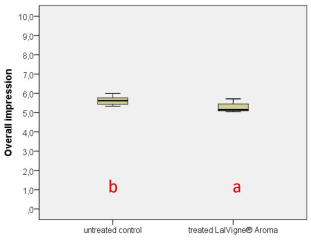

Figure 3: Boxplot of the sensory parameter 'overall impression'

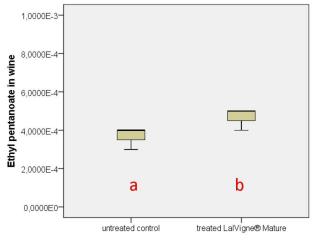

Figure 4: Boxplot of the analytical parameter 'ethyl pentanoate in wine'

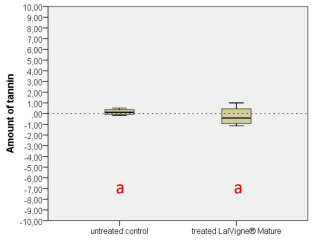

Figure 5: Boxplot of the sensory parameter 'tannin bitterness'

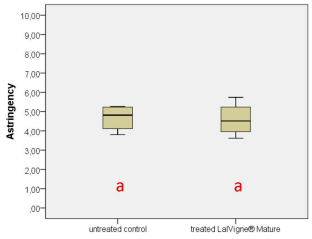

Figure 6: Boxplot of the sensory parameter 'astringency'

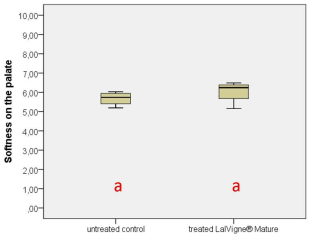

Figure 7: Boxplot of the sensory parameter 'softness on the palate'

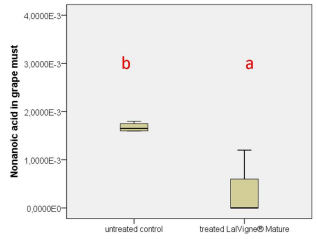

Figure 8: Boxplot of the analytical parameter 'nonanoic acid in grape must'

*** Boxplots exhibiting different letters indicate significant differences between them, determined with a Tukey-B test at $p \leq 0.05$. Those with letters that are the same indicate no significant difference.**

Conclusion –With regard to wine and must analyses, there are no differences between the treated variants of LalVigne® Aroma and the untreated controls. A significant difference in the wines was only observed in residual sugar content, with untreated controls fermenting slightly drier than the variants treated with LalVigne® Aroma. The sensory analyses also found no increase or improvement in aroma, contrary to what the manufacturer claims. Our sensory analyses determined the wines to be of similar organoleptic profile. Volatile organic compound (VOC) analysis also found no increase or difference in grape must and wine aroma with the use of the LalVigne® Aroma product. Regarding LalVigne® Mature-treated wine and grape must, analysis determined no differences between the treated and the untreated controls across all varieties. Sensory analysis showed no increase or improvement in phenolic maturity, and overall wines were determined to be of similar organoleptic profile. VOC analysis on must and wine found two significantly different aromas: the untreated control must was significantly higher in nonanoic acid, while wines treated with LalVigne® Mature had significantly higher levels of ethyl pentanoate. However, these differences can be regarded as negligible, as they were not detectable in the sensory panel and therefore do not affect the organoleptic properties of the wine at a tasting level.

References

Weiss J., Willisch E., Knorr D. et al. (1972). Ergebnisse von Untersuchungen bezüglich der differenzierten Wirkung einer sensorischen bewertenden Prüfmethode gegenüber einer sensorischen Rangordnungs-Prüfmethode am Beispiel von Apfelsaft und Birnennektar. Confructa 17 (4/5), 237-250. [2] **Kobler A.** (1996). La valutazione sensoriale dei vini ed il controllo degli assaggiatori mediante l'uso di schede di degustazione non strutturate. Rivista di Viticoltura e di Enologia 49 (4), 3-18. [3] **Flanzy M.**, Aubert S., Marinos M. (1969). New technique for determination of leucoanthocyanic tannins. Annales de technologie agricole 18, 327-328. [4] **Boulton R.** (2001). The copigmentation of anthocyanins and its role in the color of red wine. A critical review. American Journal of Enology and Viticulture 52 (2), 67-87.