

OENOLOGICAL TANNINS FOR PREVENTING THE LIGHT-STRUCK TASTE IN WHITE AND ROSÉ WINES

Daniela FRACASSETTI¹

Daniela Fracassetti^{1,*}, Alessio Altomare¹, Denis Allieri¹, Antonio Tirelli¹

1. Department of Food, Environmental and Nutritional Sciences (DeFENS), Università degli Studi di Milano, Via G. Celoria 2, 20133 Milan, Italy

Corresponding author: Prof. Daniela Fracassetti, daniela.fracassetti@unimi.it

Email: daniela.fracassetti@unimi.it

Keywords : Riboflavin , Light exposure , Wine fault , Storage

The light exposure of wine can be detrimental as a relevant loss of aromas takes place [1] and light-induced reactions can occur. The latter involves riboflavin (RF), a photosensitive compound, that is fully reduced by acquiring two electrons. When the electron-donor is methionine, the light-struck taste (LST) can appear leading to cooked cabbage, onion and garlic odours-like [2]. The use of oenological tannins can limit the appearance of LST in both model wine [3] and white wine [4]. This research aimed to evaluate the impact of certain oenological tannins, selected in a previous study as the most effective against LST [5], in both white and rosé wines.

Six white wines and two rosé wines (5 still and 3 sparkling wines) produced in different vintages, were added with grape seed, tea and tara tannins (40 mg/L) at bottling or disgorgement. The wines were stored in the dark until the light exposure that was carried out under controlled condition [3] at bottling, and after 4 and 9 months of storage. Tannin-free wine samples were considered at each sampling point as control. The total flavonoids (FLVs), the color index (at 420 nm or 520 nm) and the content of RF were determined. The sensory analysis was also performed.

As expected, the addition of oenological tannins led to an increase of FLVs reaching the highest concentrations in the presence of tara tannins followed by tea tannins; a comparable content of FLVs was observed in control wines and those added with grape seed tannin. Only slight color index changes were found in the wines added with tannins. The light exposure did not affect neither FLVs nor the color index. In the samples stored in the dark, the content of RF ranged from about 50 µg/L (in 2 white sparkling wine samples) up to 130 µg/L that decreased when the wines were kept under light. The perception of bitterness and astringency was evident in particular with tara and grape seed tannins getting stronger especially in the 2 low-RF wine samples after the light exposure. A decrease of the overall aromatic profile was evidenced after the light exposure and LST was less perceived in the presence of tea tannins that seemed to limit aroma loss.

This study evidenced the impact of the wine on the light-induced fault that can have different wine-dependent facets and it seems of higher intensity in younger wines. Among the oenological tannins tasted, tea tannin was the most effective against LST and, in some cases, also in limiting the aroma decay.

1. Carlin S., Mattivi F., Durantini V., Dalledonne S., Arapitsas P. (2022). Flint glass bottles cause white wine aroma identity degradation. *PNAS*, 119, e2121940119 <https://doi.org/10.1073/pnas.2121940119>
2. Fracassetti D., Di Canito A., Bodon R., Messina N., Vigentini I., Foschino R., Tirelli A. (2021). Light-struck taste in white wine: Reaction mechanisms, preventive strategies and future perspectives to preserve wine quality. *Trends in Food Science & Technology* 112, 547-558. <https://doi.org/10.1016/j.tifs.2021.04.013>
3. Fracassetti D., Limbo S., Pellegrino L., Tirelli A. (2019). Light-induced reactions of methionine and riboflavin in model wine: Effects of hydrolysable tannins and sulfur dioxide. *Food Chemistry*, 2019, 298, 124952. <https://doi.org/10.1016/j.foodchem.2019.124952>
4. Fracassetti D., Limbo S., Messina N., Pellegrino L., Tirelli A. (2021). Light-struck taste in white wine: Protective role of glutathione, sulfur dioxide and hydrolysable tannins. *Molecules* 26, 5297. <https://doi.org/10.3390/molecules26175297>
5. Fracassetti D., Messina N., Saligari A., Tirelli A. (2023). Evaluation of oenological tannins for preventing the light-struck taste. *Food Chemistry* 404, 134563. <https://doi.org/10.1016/j.foodchem.2022.134563>

Acknowledgments

The work was supported by European Agricultural Fund for Rural Development [Enofotoshield project; D.d.s. 1 luglio 2019 - n. 9551 , B.U. R.L. Serie Ordinaria n. 27 - 04 luglio 2019].

