

# Yeast derivative products: characterization and impact on riboflavin release during the alcoholic fermentation

Alessio Altomare<sup>1</sup>, Alessandra di Canito<sup>2</sup>, Ileana Vigentini<sup>2</sup>, Roberto Foschino<sup>2</sup>, Antonio Tirelli<sup>1</sup>, Daniela Fracassetti<sup>1\*</sup>

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

<sup>2</sup>*Department of Biomedical, Surgical and Dental Sciences (DSBCO), Università degli Studi di Milano, Via della Commenda 10, 20122 Milan, Italy*

Corresponding author: Prof. Daniela Fracassetti, [daniela.fracassetti@unimi.it](mailto:daniela.fracassetti@unimi.it)

Light-struck taste (LST) is a wine fault that can occur in white wines and sparkling wines bottled in clear glass and exposed to light. This defect is mainly associated to the formation of methanethiol and dimethyl disulfide due to light-induced reactions involving riboflavin (RF) and methionine. The presence of RF in wine is related to the yeasts metabolism; its release is a strain-dependent character [1]. A previous study showed the addition of two yeast derivative products (YDPs) before the alcoholic fermentation (AF) could be responsible for higher concentrations of RF in wines [2]. Nonetheless, YDPs are widely used in the winemaking process as they can serve as nutrients for AF, prevent stuck fermentations, modify the sensory characteristics and improve the antioxidant capacity as well as the tartaric and protein stability of wine. Due to the importance of the YDPs for the enhancement of the winemaking process, the possible relation between the content of RF in wine and the YDP adopted as nutrient for AF needs to be clarified. This study aimed to investigate the impact of the use of YDPs before AF on RF concentration in wine.

The experimental plan included (i) the characterization of selected YDPs and (ii) their addition as nutrient in microvinification trials using must as medium. Fourteen commercial YDPs of different nature (2 commercial products of inactivated yeasts [IYs], mannoproteins [MPs], yeast autolysates [YAs] and yeast hulls [YHs]) were chosen. They were characterized in terms of flavones (RF, FAD and FMN), amino acid profile and sulfur-containing compounds (e.g. reduced glutathione [GSH], cysteine, cell wall cysteine and adsorbed cysteine). The characterized IYs, YAs and YHs were used for the fermentation trials, added at 40 g/hL, carried out in Chardonnay must with 4 different strains of *Saccharomyces cerevisiae*. Flavones were quantified before and after the alcoholic fermentation.

Both YEs and one YA were found to be the richest in RF; an increase up to 20 µg/L was estimated considering an addition of 40 g/hL in accordance with previous research [2]. These YDPs showed also the highest concentration of amino acids (up to 300 mg/L). However, FMN was the most abundant flavone in most of the analyzed YDPs. With regards to GSH, this tripeptide was found at the highest concentration in the same YA (13.2 mg/g). The addition of YDPs caused a variation in RF released at the end of AF depending to both the yeast strain and YDP nature. The addition of YEs caused an increment of RF of about 15-20 µg/L in most of the cases, in accordance to content of RF found in these products. In particular, RF increased up to 50 µg/L for one of the yeast strain investigated which released 166 µg/L of RF with one YE vs. 116 µg/L without YDPs.

These results evidence the impact of YDPs on RF content indicating that the selection of the nutrients should be considered for preventing the risk of LST appearance.

**Keywords:** Light-struck taste, yeast derivatives, riboflavin, flavones, glutathione

## References

- [1] 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>
- [2] Fracassetti D., Gabrielli M., Encinas J., Manara M., Pellegrino I., Tirelli A. (2017). Approaches to prevent the light-struck taste in white wine. *Australian Journal of Grape and Wine Research* 23, 329–333, 2017. <https://doi.org/10.1111/ajgw.12295>