EVOLUTION OF FLAVONOLS DURING MERLOT WINEMAKING PROCESSES

Cristian Hernandez[1], Leandro Dias Araujo[2], Gianni Flego[3], Rebecca Deed[1,4], Paul A. Kilmartin[1].

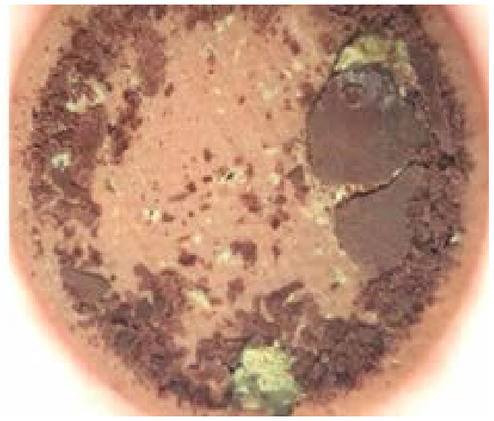
[1]School of Chemical Sciences, University of Auckland, [2]Department of Wine, Food and Molecular Biosciences, Lincoln University, [3]Villa Maria Estate, [4]School of Biological Sciences, University of Auckland.

INTRODUCTION

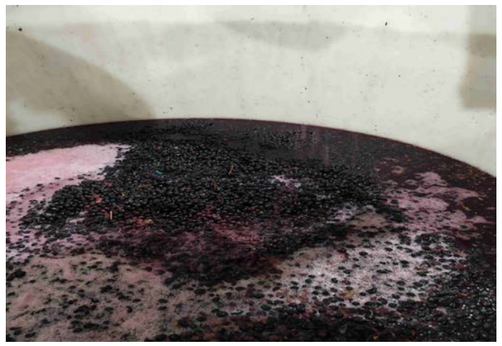
The phenomenon of quercetin precipitation in wine (flanovol haze) has been manifested for many years in several wine-producing regions, such as Australia, Italy and New Zealand. Values over 20 mg/L of free quercetin in wine are considered risky for unwanted quercetin precipitation. Additionally, quercetin glycosides pose a risk when present in finished wine since they can release additional quercetin aglycon sometimes years after the wine has been bottled (Gambuti et al., 2020; Lanati, Marchi, & Cascio, 2014; Somers & Ziemelis, 1985).

There is limited information about quercetin aglycone behavior and its precursors during wine production in New Zealand.

This study aims to monitor the evolution of flavonols and other polyphenols during the commercial fermentation of Merlot grapes, using different fermentation conditions and vineyard treatments, such as: sun exposure, winemaking practices, and winemaking process management



Quercetin precipitate (Yellow spots), Gambuti et al., (2020).



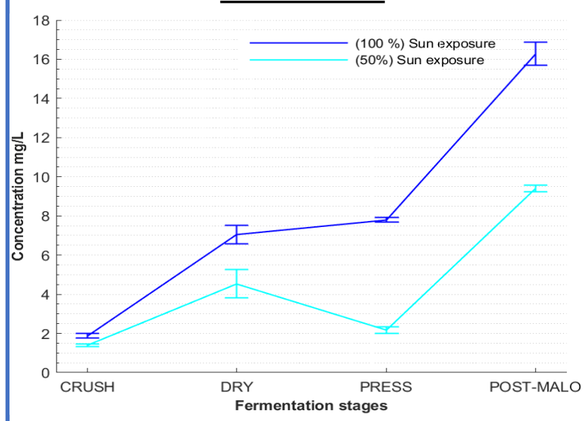
Merlot grapes, beginning of the fermentation.

METHODS

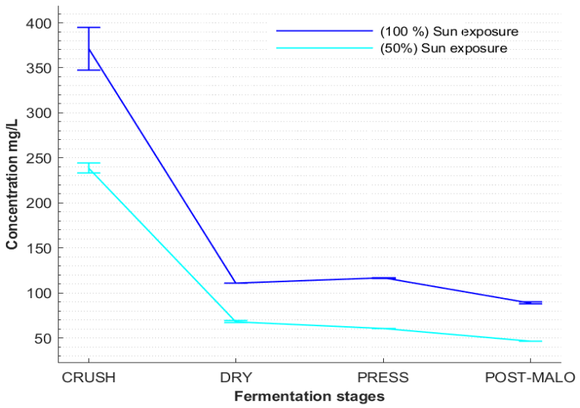
Fermentation: Commercial ferments employed Merlot grapes, commercial yeast (50g/hL) and LAB cultures, potassium metabisulphite (20g/hL), and nutrient supplementation with DYNASTART®-LAFFORT (30g/hL). Grapes were crushed, divided into different vessels, sulfite added, and then inoculated and supplemented with nutrients. Dry ferments underwent secondary fermentation. Samples were taken to monitor quercetin aglycone and glycosides during the fermentation.

Flavonol Quantification: Polyphenols were quantified using a reversed-phase HPLC method. (Garrido-Bañuelos et al., 2019; Peng et al. 2002)

RESULTS

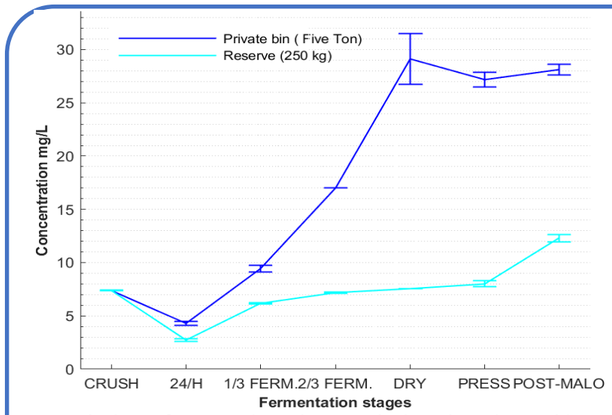


Evolution of quercetin aglycone during the winemaking process.

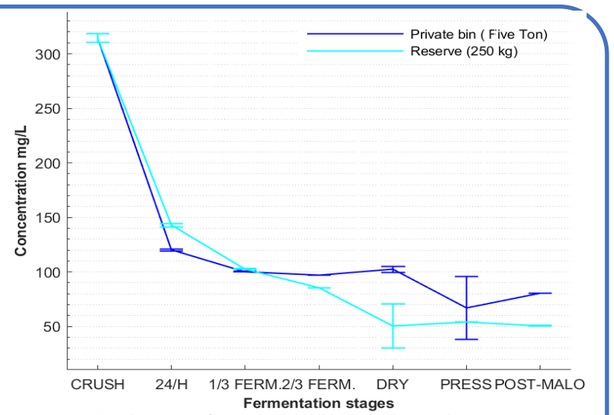


Evolution of quercetin glucoside and quercetin glucuronide during the winemaking process.

Grapes with 100% sun exposure resulted in wines with a higher concentrations of quercetin and its glycosides

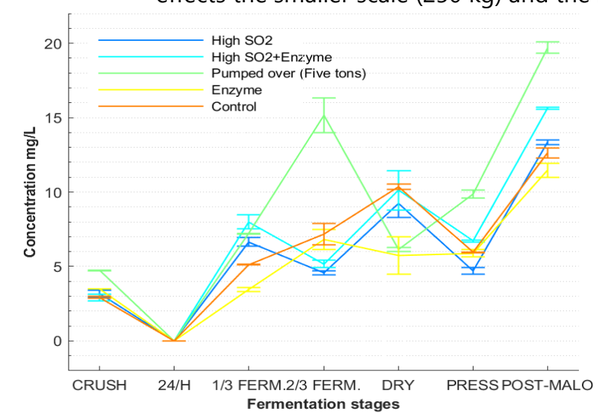


Evolution of quercetin aglycone during the winemaking process.

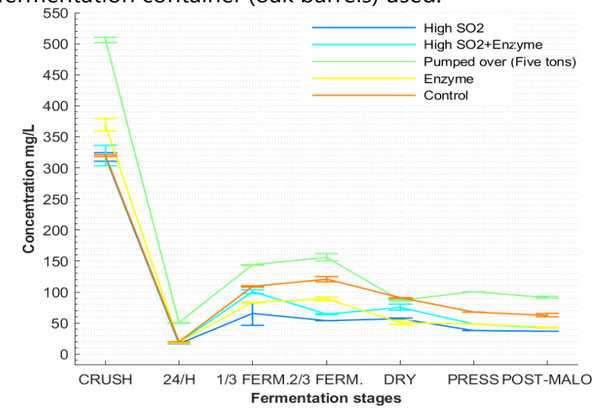


Evolution of quercetin glycoside and quercetin glucuronide during the winemaking process.

Reserve (Premium wine) practices showed lower levels of quercetin and glycosides, possibly due to the effects the smaller scale (250 kg) and the fermentation container (oak barrels) used.



Evolution of Quercetin aglycone during the winemaking process.



Evolution of quercetin glycoside and quercetin glucuronide during the winemaking process.

The addition of enzymes and SO_2 at high levels affected the concentration of quercetin, mainly through lower concentrations of glycosides during the winemaking process.

CONCLUSIONS

The study confirmed past research on the role of sun exposure in the formation of flavonols in Merlot grapes and wines. Fermentation size can improve the extraction of polyphenols into wine, and the enzyme additions can promote the hydrolysis of flavonol glycosides. In considering winemaking practices to lower flavonol content, the impacts on the remaining wine phenolics, of importance to wine colour and mouthfeel, also need to be carefully evaluated.

ACKNOWLEDGEMENTS

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