Stability of Varietal Aromas in Marlborough Sauvignon Blanc Wines

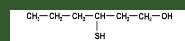
M. Herbst, P.A. Kilmartin and L. Nicolau

Department of Chemistry, The University of Auckland, Private Bag 92019, Auckland, New Zealand
[m.herbst@auckland.ac.nz]

Introduction

The distinctive passion fruit-type aroma of *Vitis vinifera* L. var. Sauvignon blanc wines has been attributed to the presence of 3-mercaptohexan-1-ol (3MH) and 3-mercaptohexan-1-ol acetate (3MHA) (**Fig. 1**). These volatile thiols are known to be susceptible to oxidation throughout wine storage, and improving their stability is seen as key to retain fresh, fruity characters in these wines for a longer period of time.

3-Mercaptohexan-1-ol
(Grapefruit)



3-Mercaptohexan-1-ol acetate
(Passion fruit)

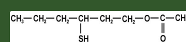


Fig. 1: Volatile thiols involved in Sauvignon blanc aroma

The loss of 3MH and 3MHA has been linked to polyphenol oxidation, a process which is inhibited by the presence of antioxidants such as sulfur dioxide (SO_2) and glutathione (GSH).

In order to understand the cause of the flavour change in New Zealand Sauvignon blanc, the evolution of 3MHA and 3MH, in relation to the polyphenol and antioxidant content, has been monitored in 16 Marlborough Sauvignon blanc wines under both cork and screw cap closure over a period of one year.

Experimental Set-Up

Materials

- ⇨ Bottling of 16 Marlborough Sauvignon blanc wines (2005) both under cork and screw cap
- ⇨ Storage in the dark at 15°C for one year
- ⇨ Analysis for volatile thiols, polyphenols, GSH and SO_2 prior to and 3, 7 and 12 months post bottling

Methods

Assay for Volatile Thiols by GC/MS

3MH and 3MHA were specifically extracted and assayed as described by Tominaga *et al.*[1].

Analysis of Polyphenols and Glutathione by RP-HPLC

A reversed-phase HPLC method has been developed to measure levels of glutathione in Sauvignon blanc wines, using an electrochemical detector, alongside white wine phenolics.[2, 3]

Quantification of Sulfur Dioxide

Sulfur dioxide was analysed with a FIAstarTM 5000 Analyzer.

Results

Volatile Thiols

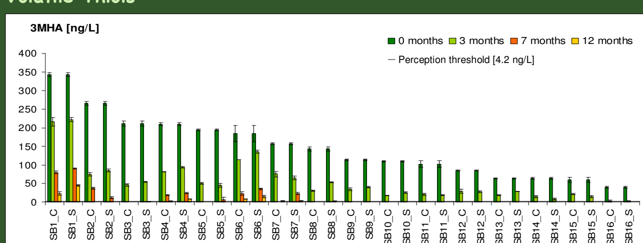


Fig. 2: Evolution of 3MHA under cork (C) and screw cap (S) in Marlborough Sauvignon blanc (each bar represents a wine, analysed in triplicate)

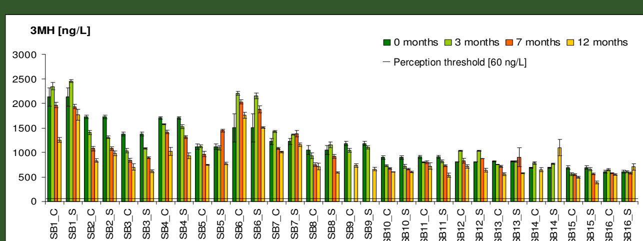


Fig. 3: Evolution of 3MH under cork (C) and screw cap (S) in Marlborough Sauvignon blanc (each bar represents a wine, analysed in triplicate)

Polyphenols

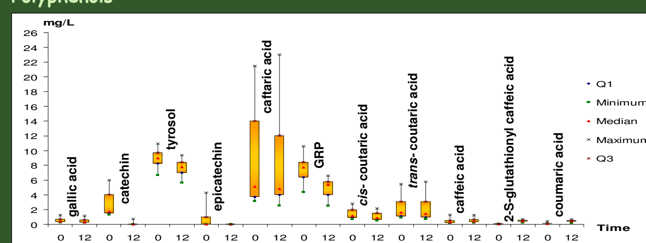


Fig. 4: Boxplot of phenolics, present in Sauvignon blanc wines prior to (0) and one year (12) post bottling

Glutathione / Free Sulfur Dioxide

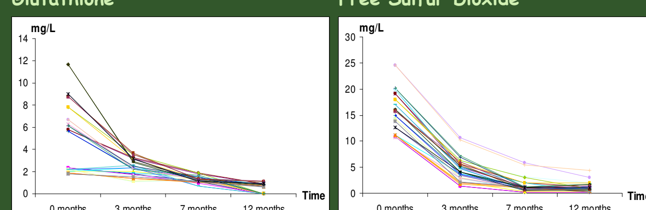


Fig. 5: Loss of glutathione and free sulfur dioxide in Marlborough Sauvignon blanc wines

Conclusions

- ⇨ 3MHA was the least stable of the volatile thiols, and had disappeared from most of the wines after one year of storage (**Fig. 2**), presumably accelerated by the rapid disappearance of sulfur dioxide and glutathione due to oxygen ingress at bottling (**Fig. 5**).
- ⇨ 3MH declined more slowly and even increased in some of the wines over the first 3 months in the bottle (**Fig. 3**), likely due to conversion of 3MHA to 3MH.
- ⇨ Minor losses occured in polyphenols with the exception of the flavonoids catechin and epicatechin, which completely disappeared 12 months post bottling (**Fig. 4**).
- ⇨ The type of closure was not found to have a significant effect on the aroma compounds and antioxidants under investigation. Changes in 3MHA levels with time were much more significant than differences between the closure types.

References

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[2] Kilmartin, P.A., Zou, H., Waterhouse, A.L. (2002). *Am. J. Enol. Vitic.* **53**: 294-302.
[3] Smith, N.C., Dunnett, M., Mills, P.C. (1995). *J. Chromatogr. B.* **673**: 35-41.

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