Effect of Must Oxygenation and Sulphur Dioxide addition on Polyphenols, Glutathione and certain Aroma Compounds in Sauvignon blanc

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INTRODUCTION

Winemakers in South Africa often use reductive treatments, such as sulphur dioxide and ascorbic acid additions and inert gasses, on Sauvignon blanc juice to protect flavour compounds in the wine. However, the effect of different oxygen and sulphur dioxide additions to Sauvignon blanc must and the changes it induces in the corresponding wines has not been investigated in detail. The present study evaluated how different oxygen and sulphur dioxide treatments of Sauvignon blanc must affects the levels of phenolic compounds, glutathione as well as aroma compounds such 2-methoxy-3-isobutylpyrazine (IBMP), 3-sulfanylhexan-1-ol (3SH), 3-sulfanylhexyl acetate (3SHA) and 4-sulfanyl-4-methylpentan-2-one (4SMP).

AIMS

*assess the effect oxygen and sulphur dioxide additions to the must, could have on:

- glutathione levels in must and wine
- phenolics in wine
- aromatic compounds such as methoxypyrazines and volatile thiols

EXPERIMENTAL PROCEDURE

- 2009 Sauvignon blanc grapes were harvested at two locations, cellar 1 and cellar 2
- Grapes were pressed using Bucher Inertys® which excludes air by replacing it with nitrogen
- Press juice w collected
- Treatments were executed prior to settling of the juice (Table1)
- Fermentation was completed using Anchor VIN7 yeast

Table 1: Code and description of different oxygen and SO_2 treatments in Sauvignon blanc must

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Code	Treatment	Oxygen concentrations in must	SO_2 additions to must
A	$-SO_2/-O_2$	<0.5mg/L	0mg/L
B	$+SO_2/-O_2$	<0.5mg/L	60mg/L
C	$-SO_2/+O_2$	4mg/L	0mg/L
D	$+SO_2/+O_2$	4mg/L	60mg/L

RESULTS

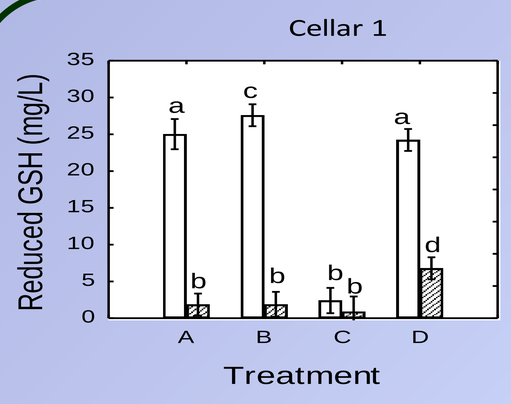

Fig. 1: Reduced glutathione (GSH) concentration in juice and wine of cellar 1 undergoing different SO_2 and O_2 treatments (Table 1).

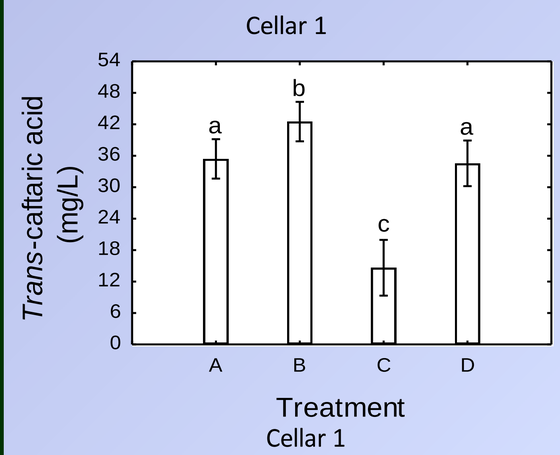

Fig. 2: *Trans*-caftaric acid concentration in juice and wine of cellar 1 undergoing different SO_2 and O_2 treatments (Table 1)

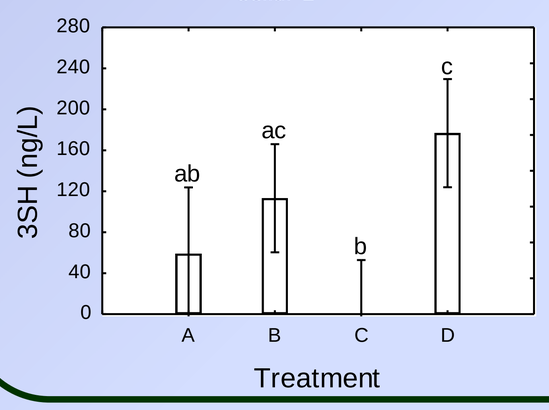

Fig. 3: 3-Sulfanylhexan-1-ol (3SH) concentration in wine of cellar 1 undergoing different SO_2 and O_2 treatments (Table 1).

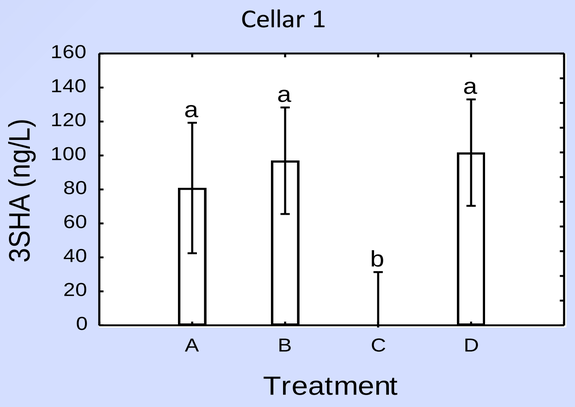

Fig. 4: 3-Sulfanylhexyl acetate (3SHA) concentration in wine of cellar 1 undergoing different SO_2 and O_2 treatments (Table 1).

- GSH and *trans*-caftaric acid concentrations decreased significantly in treatment C due to Michael addition of GSH into the o-quinones (formed by the oxidation of polyphenols) *(1)*
- Sulphur dioxide partly or completely prevented the oxidation of *trans*-caftaric acid, (+)-catechin and (-)-epicatechin (data not shown) in treatment D by inhibiting the PPO enzyme *(2)*
- Wine made from treatment C had significant lower levels 3SH and 3SHA due to the reaction of the thiols with the *o*-quinone (thiol precursors are not sensitive to oxidation) *(3,4)*
- Treatment D had higher levels of 3SH and 3SHA. The formation of the *o*-quinone in the juice and the subsequent addition reaction to the thiol in the wine was blocked by the presence of SO_2, even in the presence of oxygen
- 4SMP concentrations showed no significant difference between the treatments (data not shown). This could be due to the difference in the structure of the thiol causing more steric hindrance *(3)*
- Oxidation did not influence the content of methoxypyrazines (data not shown). This correlates with studies done by Marais, 1998 *(5)*

CONCLUSIONS

Volatile thiols differed in their reactions to the oxidative treatments, but in general were protected against oxidation by SO_2, even when agitated with air. Reductive handling of the free-run juice, by using inert gas is not critical, provided sufficient SO_2 is present. The use of inert gas during the pressing of the berries would be favourable. A greater understanding of the evolution of the volatile thiols during fermentation and winemaking is required to be able to improve the aroma profile of Sauvignon blanc wines.

REFERENCES

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