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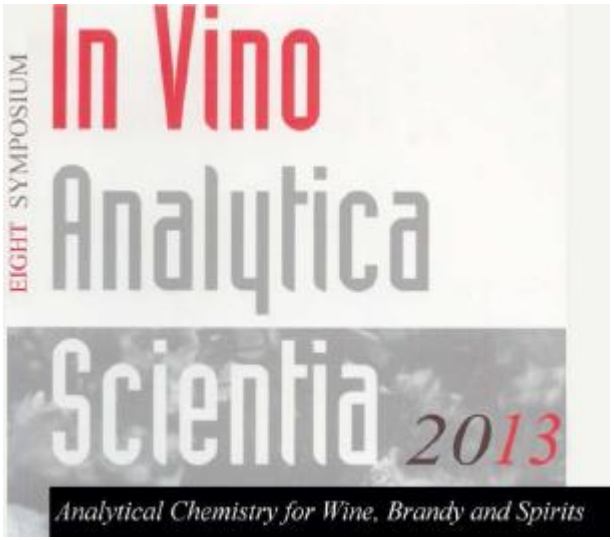

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The compositional and sensory impact of copper fining on bottle aging of Riesling

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Introduction

- Copper(II), generally added as copper(II) sulfate, is utilised for the removal of sulfidic-off odours in wine production.
- Although copper(II) would appear to be efficient in this role, it can also impact wine oxidation processes (consequently wine colour), haze formation and impact the volatile sulfur compounds in wine.
- The impact on elevated residual copper concentrations on the bottle aging of specific wine varieties is not currently understood, and is the subject of this study on Riesling.

Experimental

- This study utilised a combination of chromatographic (UHPLC, GCMS), spectral analysis (CIELab, 420nm, 280nm) and sensory analysis to assess compositional changes in a non-protein stabilised Riesling wine
- Copper(II) (as copper sulfate pentahydrate) was added at bottling at rates of 0.5 (T1), 2.5 (T2) and 5.0 (T3) mg/litre.
- Six-fold replication of each addition as well as the control (zero added copper, C) was used.

Results and Discussion – 7 months

- An increasing amount of precipitate was evident in the wine with higher copper(II) (Fig.1).

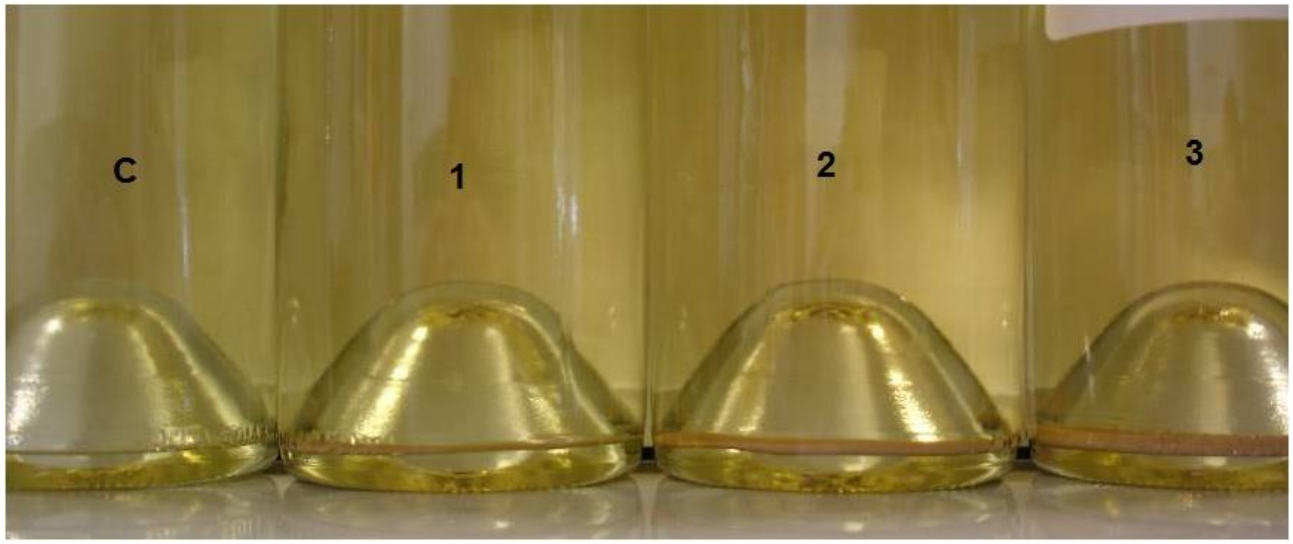

Figure 1. Precipitate formed in samples at 7 months

Results and Discussion- 7 months

- The amount of precipitate formed coincided with a decrease in the copper concentration (Fig.2)

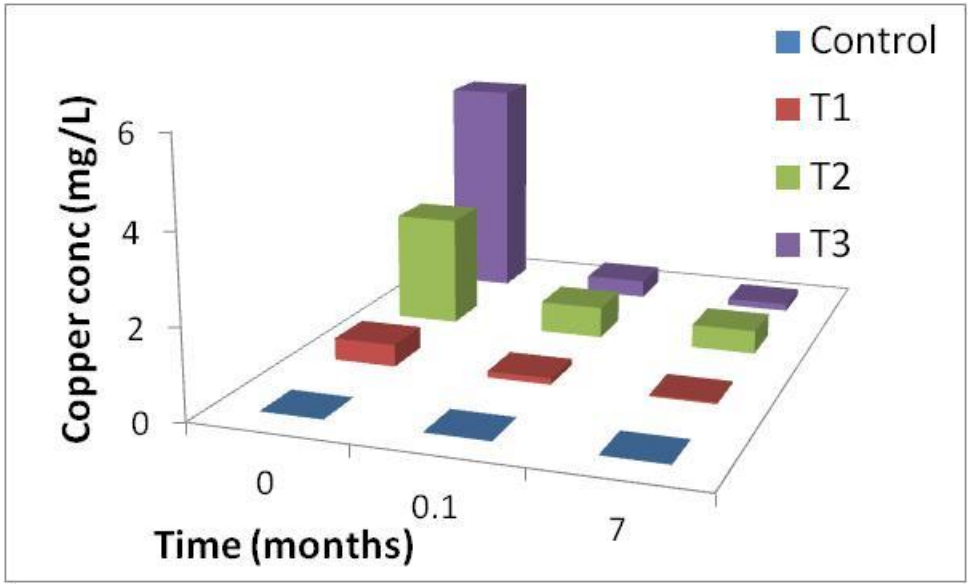

Figure 2. Drop in copper(II) concentration at 7 months

Results and Discussion – 7 months

- Increasing concentrations of hydrogen sulfide were evident with increasing levels of residual copper in the wine (Fig.3).

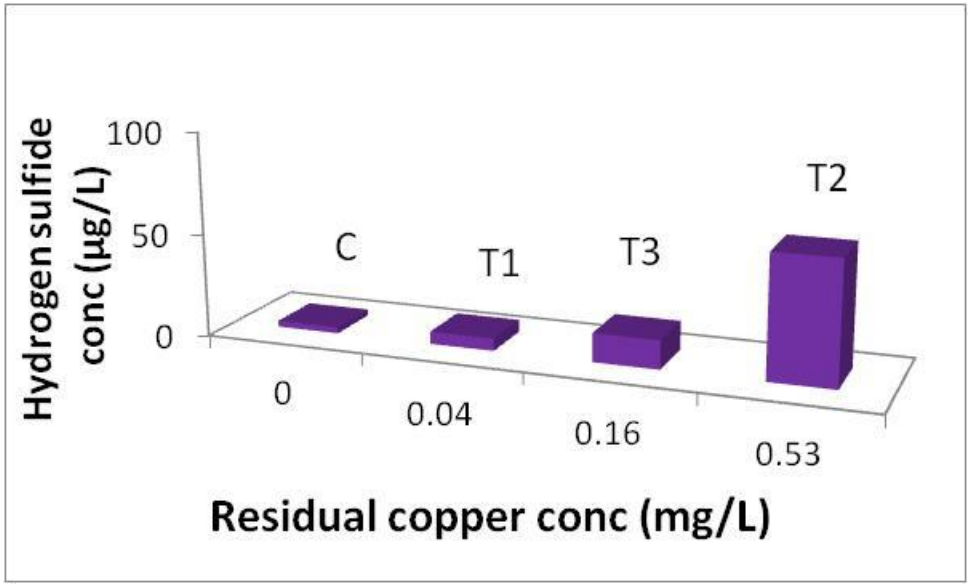

Figure 3. Measured H_2S concentrations at 7-months

Results and Discussion – 24 months

- The wines with increased copper(II) were more intense in colour and evolved with more yellow/green colouration compared to the wines with a lower copper concentration (Fig.4).

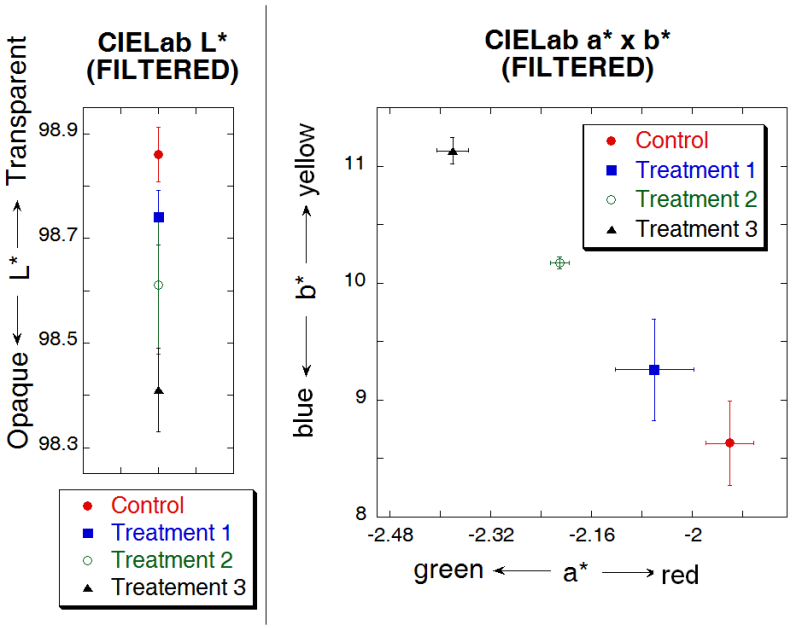

Figure 4. Wine colour at 24 months

Results and Discussion – 24 months

- Changes in sulfur dioxide and ascorbic acid concentrations were not significant

- There was an apparent trend to lower values with increasing copper additions

Results and Discussion – 24 months

Sensory descriptive analysis showed that increasing copper concentrations :

- significantly decreased the perception of lemon/lime as well as toast and kerosene.
- rating for honey, (aging character) decreased.
- increased perception of tropical fruit and marmalade was noted.

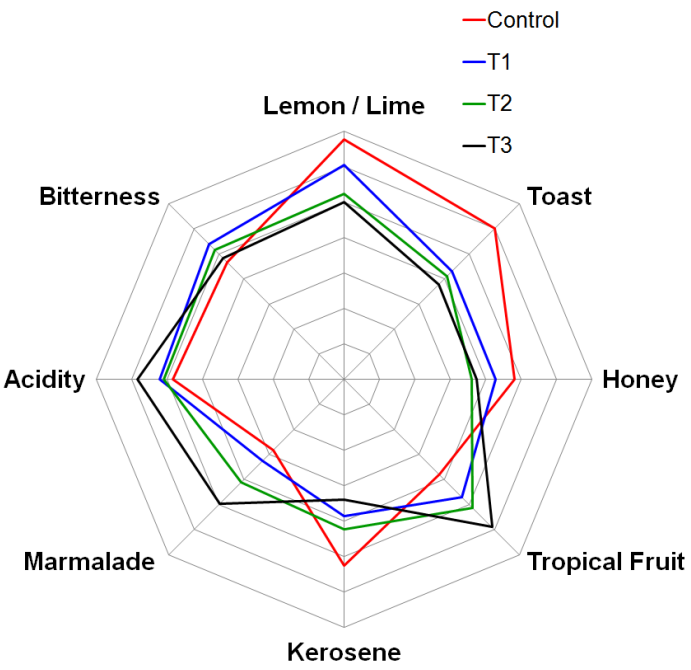

Figure 5. Sensory analysis at 24 months

Conclusions

- These results demonstrate that high residual concentrations of copper can have a large impact on the composition of non-protein stabilised Riesling wine post packaging.

- It can induce precipitate formation, hydrogen sulfide accumulation, and change the colour and other sensory attributes of the wine.