Effective use of copper during winemaking

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Introduction and aims

Winemakers commonly add copper sulfate to wines before bottling to treat unpleasant ‘reductive’ aromas; however, when copper (Cu²⁺) additions are made to finished wine shortly before packaging, an increase in residual Cu²⁺ concentration may cause oxidation, reduction, and haze issues in wine.

This study explored the possibility of using yeast’s affinity for metals as a way to avoid residual Cu²⁺ in wine after Cu²⁺ fining. The effects of Cu²⁺ additions made during fermentation to remove hydrogen sulfide (H₂S) while limiting the levels of residual Cu²⁺ in the finished wine were investigated.

Methods

A series of 200 mL laboratory-scale ferments were carried out in which timing and addition rate of copper were varied. Ferments were conducted in Chardonnay and Shiraz juice in triplicate using the AWRI838 yeast strain. Copper addition rates ranged from 5 to 50 mg/L.

Results

Conclusions

- Although Cu²⁺ additions of up to 20 mg/L did not affect fermentation performance, lower Cu²⁺ concentrations were sufficient to remove negative sulfidic aromas without leading to unwanted residual Cu²⁺ concentrations.
- The amounts of H₂S produced during fermentation were not significantly affected by Cu²⁺ additions at 0°Brix; however, the H₂S concentration measured after fermentation was decreased by Cu²⁺ additions as low as 5 mg/L added at 0°Brix.
- Additions of Cu²⁺ at the beginning of ferment seemed to have a less significant impact on H₂S in the finished wine, which may be a consequence of the Cu²⁺ being translocated to the interior of the yeast cells early in ferment, or perhaps because the Cu²⁺ was bound to other wine components, leaving less Cu²⁺ available to interact with residual dissolved sulfides (Reschke et al. 2015).