Tropical enhancement through topical application: tailoring wine style by foliar application of nitrogen and sulfur

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BACKGROUND

- 3-Mercaptohexanol (3MH) and 3-mercaptohexyl acetate (3MHA) are two potent thiol compounds that contribute to tropical aromas and flavours – including 'passionfruit' and 'grapefruit' – most notably in Sauvignon Blanc wine.
- Previous studies have shown that increased levels of nitrogen and sulfur in the vineyard can lead to increased production of 3MH and 3MHA precursors in grapes.
- This increase has been seen in Sauvignon Blanc as well as other varieties such as Colombard, Chenin Blanc, Melon and Fer, which have little commercial relevance in Australia.

KNOWLEDGE GAP

- Can the application of nitrogen and sulfur in the vineyard enhance tropical aromas and flavours in the wines of commercially relevant varieties, specifically Chardonnay and Shiraz?

METHODS

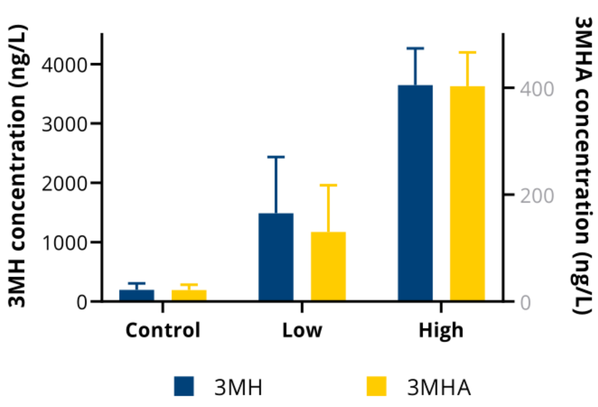
- Chardonnay and Shiraz vines from the Barossa Valley were selected
- Foliar application of nitrogen (N - as urea) and sulfur (S - as wettable-sulfur) were applied to vines at veraison and three weeks post-veraison:
  - Control (no application)
  - Low (10 kg/ha N and 5 kg/ha S)
  - High (20 kg/ha N and 10 kg/ha S)
- After harvest, wines were made at WIC Winemaking and then underwent chemical and sensory analysis.

RESULTS

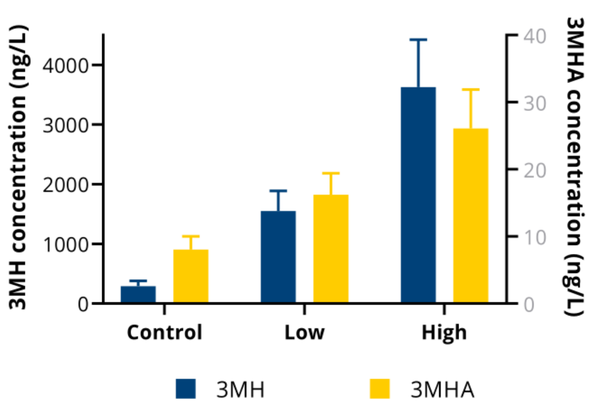
Chemical analysis showed an increase in thiol concentration – 3MH and 3MHA – across both treatments for Chardonnay and Shiraz

Sensory analysis showed significantly higher ratings for 'grapefruit' and 'passionfruit' for the High treatment

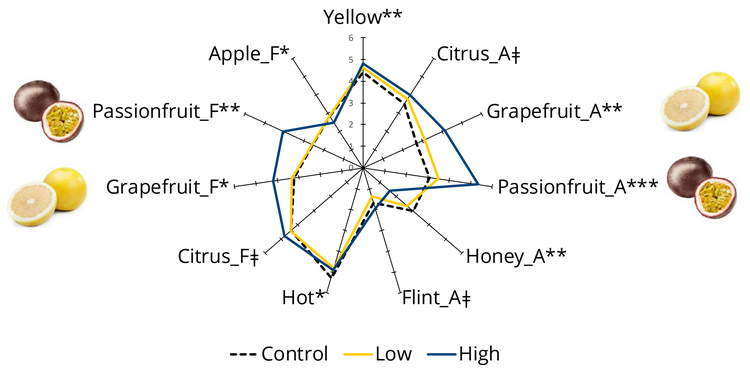
Thiol concentration in Chardonnay wine



Thiol concentration in Shiraz wine



Statistically significant sensory attributes in Chardonnay wine



A: Aroma, F: Flavour, significance levels are as follows: * $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$; ‡ $P \leq 0.10$

CONCLUSIONS

- Foliar applications of nitrogen and sulfur significantly enhanced tropical flavours and aromas in Chardonnay and Shiraz wines without altering pH, titratable acidity, alcohol % or volatile acidity across the three treatments.
- Additionally, the increase in 3MH and 3MHA did not result in an increase in low molecular weight 'stinky' sulfur compounds.

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