Yeast strain-dependent effects of glutathione addition on wine chemistry

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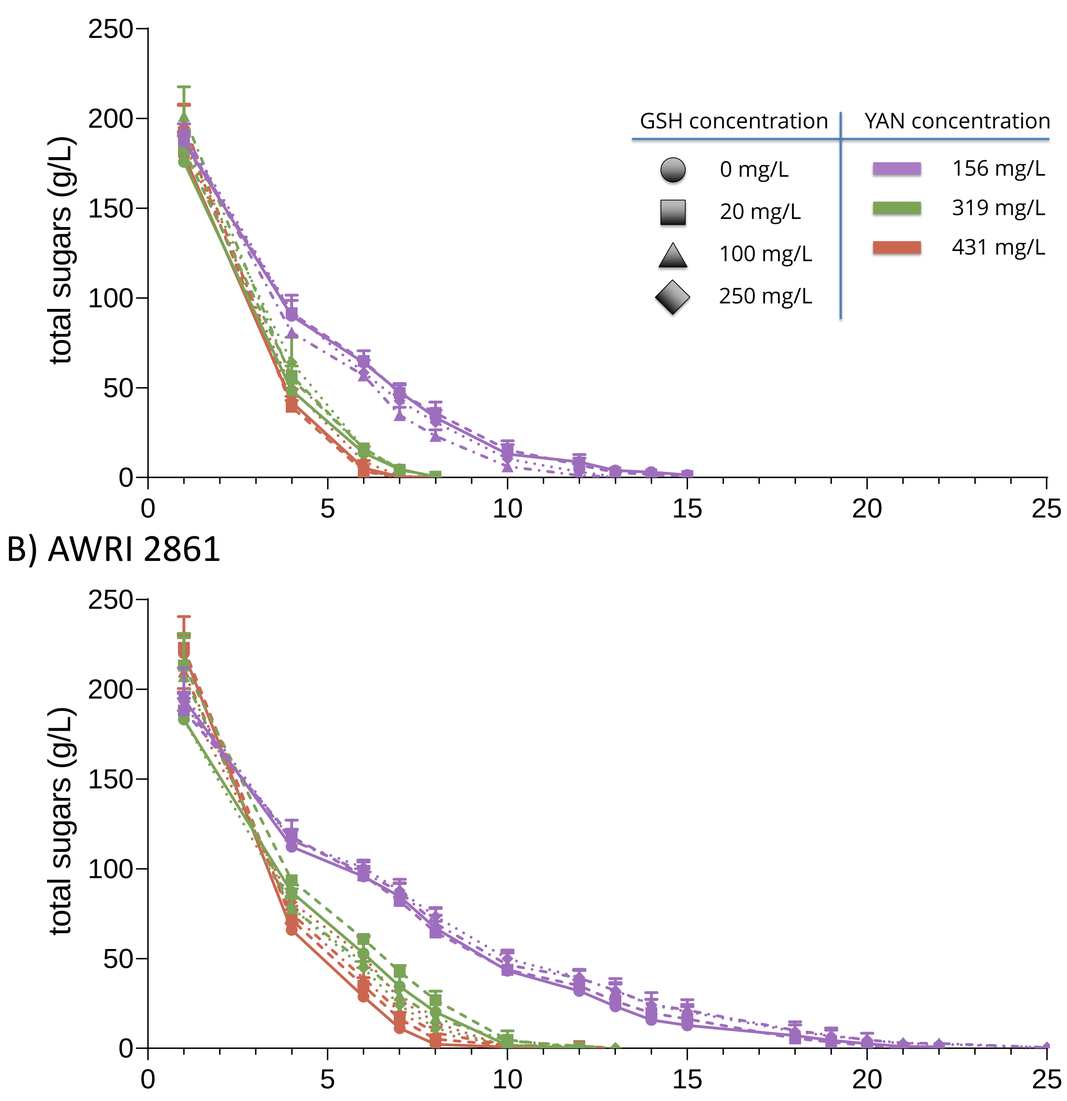
Background

Glutathione (GSH) is a naturally occurring antioxidant and can serve as a nitrogen source to many microorganisms. OIV guidelines state that the yeast assimilable nitrogen (YAN) level of musts should be sufficient to avoid the metabolism of GSH by yeast; however, no indication of what that concentration should be is provided.

Aims

1. To determine whether there is a YAN threshold sufficient to avoid GSH-related production of thiols with negative attributes.
2. To determine whether GSH-related thiol production is yeast strain-dependent (AWRI1688 and AWRI2861).
3. Assess whether GSH is a potential source of nitrogen.

Effect of nitrogen and GSH concentration on progress of fermentation by two different closely related yeast strains



Experimental design

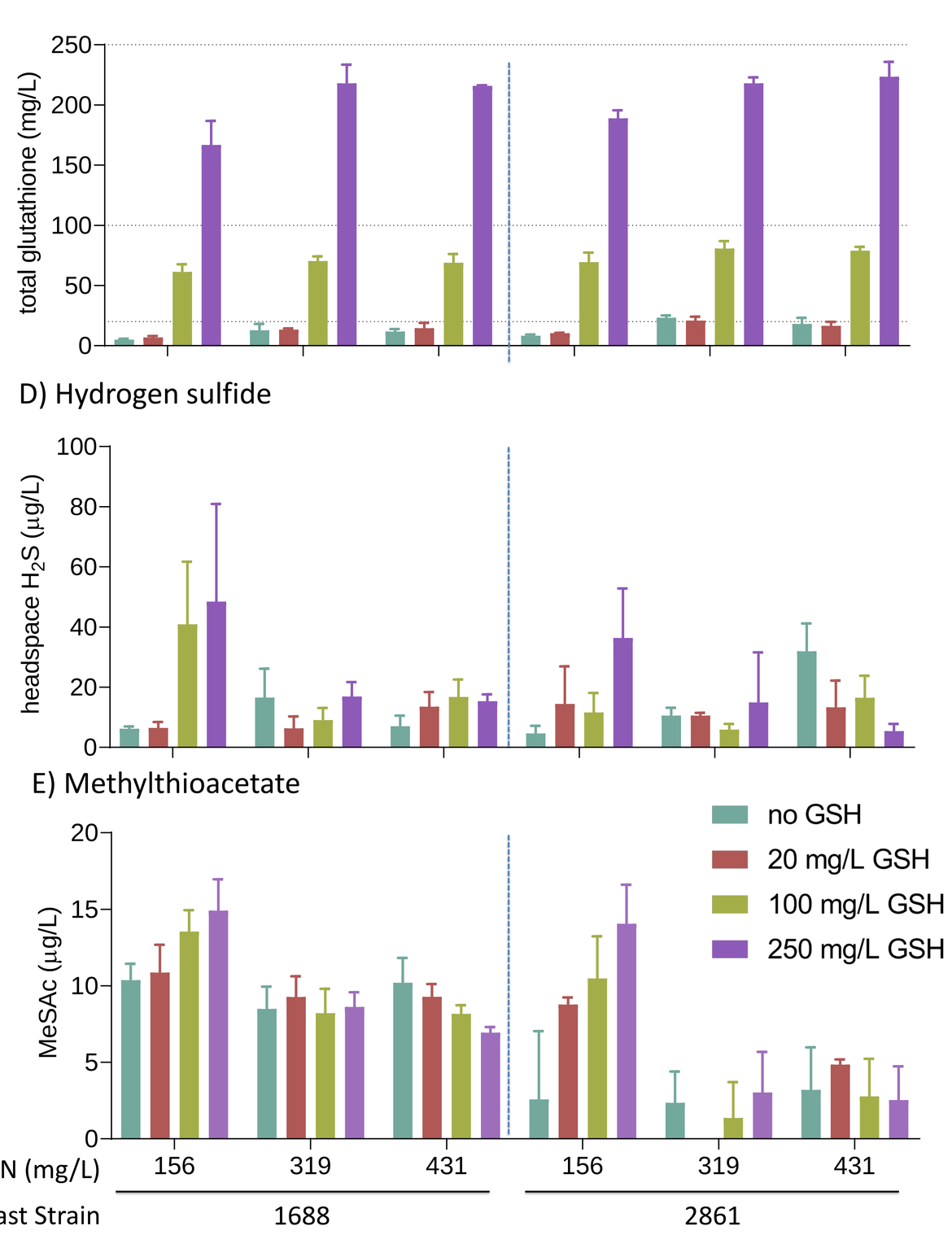
Laboratory-scale ferments (200 mL) were initiated by inoculation with two genetically similar yeast strains, AWRI 1688 and AWRI 2861. Strain 1688 contains additional oligopeptide transporters but is otherwise genetically similar to 2861.

Chemically defined medium was used with the following treatments: three YAN concentrations: 156, 319, and 431 mg/L, and four GSH concentrations: 0, 20 100 and 250 mg/L. Wine chemistry was assessed post-fermentation.

Conclusions

- The addition of GSH had no impact on the fermentation rate at any YAN concentration (Figures A and B).
- Decreases in GSH concentration during fermentation were evident at all YAN concentrations (Figure C).
- Hydrogen sulfide (H_2S) concentrations increased with increasing GSH concentrations at low YAN (Figure D). There was no relationship between end of ferment H_2S and GSH at higher YAN concentrations.
- Methylthioacetate (MeSAc) concentrations increased in response to GSH concentration at low YAN (figure E).
- At higher YAN concentrations total MeSAc concentration was strain-dependent.

Effect of GSH and nitrogen concentrations of post-ferment concentrations of GSH, H_2S and MeSAc



Reference

Resolution OIV-OENO 445-2015 addition of glutathione to must

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