

# Positive sensory and chemical outcomes from oxygen addition during red wine fermentation



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## Background

### ❖ The deliberate addition of oxygen during red fermentation:

- can attenuate reductive odours
- can soften tannin
- is most useful in closed vessels e.g. rotary fermenters

### ❖ Benefits to industry are:

- producing wine market-ready earlier
- reduction in N-based nutrients required
- brighter and more fruit-forward wines
- making wines that do not tend to become reductive over time in bottle

## Results and key points

❖ Biggest impact with long duration treatment, demonstrating the impact of oxygen delivery timing

❖ The low flow-rate treatment was associated with the following chemical attributes:

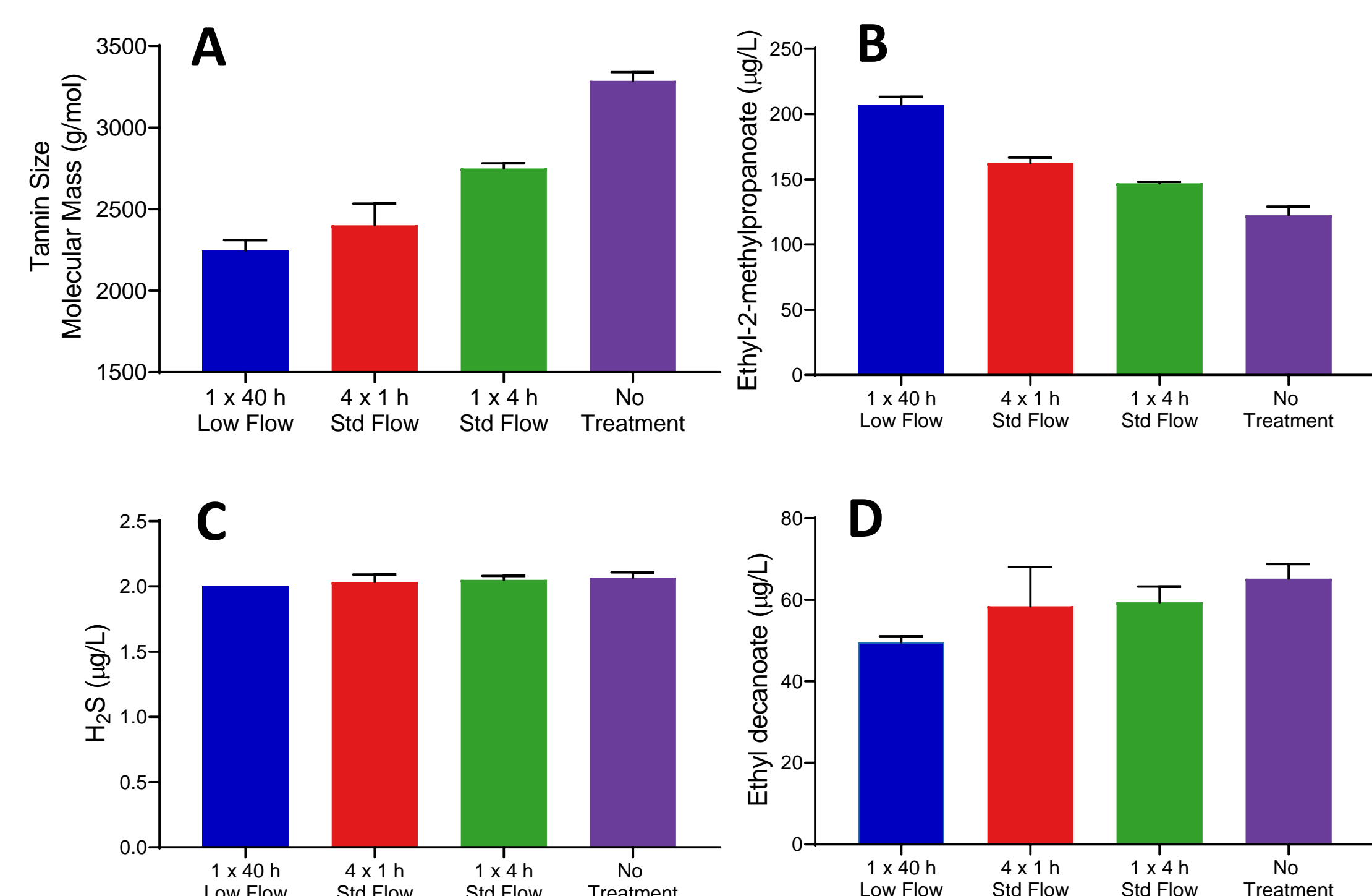


Figure 2. Chemical data showing effects of aeration treatments

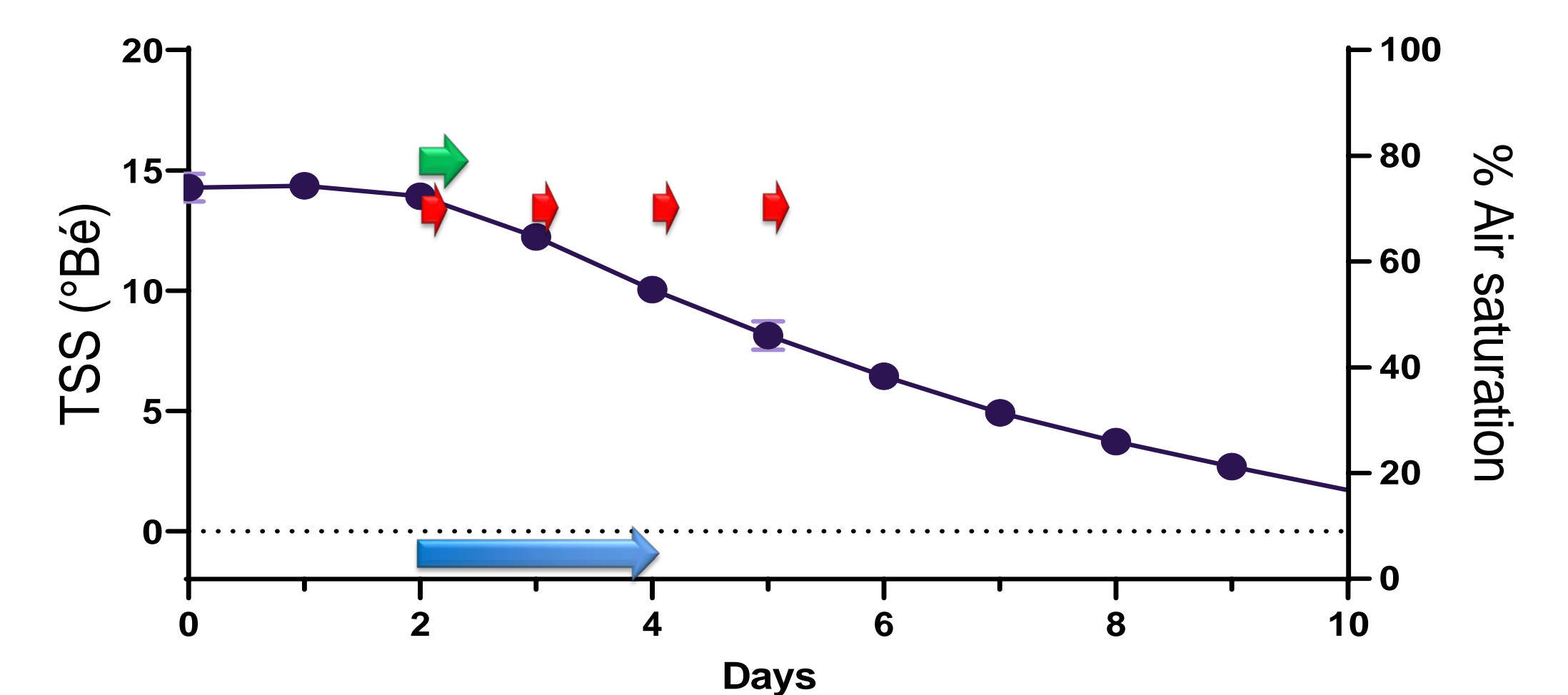
- decreasing tannin size (A)
- increasing concentration of branched (B) and small-chained esters
- no impact on low molecular weight sulfur compounds (C) or fermentation rate.
- decreasing concentration of medium-chained esters (D)

## Aim

To determine whether it is the amount of ferment aeration or the way that a ferment is aerated that is the biggest contributor to wine composition and sensory properties

## Experimental design

- Aeration treatments applied with variations to timing of addition but **equivalent overall oxygen exposure**
- 2018 **Shiraz** grapes from McLaren Vale, SA
- Vinification in pilot-scale fermenters (**500 L**)
- Air flow rates:
  - Low = 0.9 L/min
  - Standard = 9.0 L/min
- Air added using **in-tank spargers** (12 x 2 µm sinters; 22 mm x 17 mm Ø)



- ➡ Low flow 1 x 40 hr ~ 5% Air sat. achieved
- ➡ Std flow 4 x 1 hr ~ 70% Air sat. "
- ➡ Std flow 1 x 4 hr ~ 78% Air sat. "
- ➡ No aeration

Figure 1. Aeration treatments in relation to fermentation progress

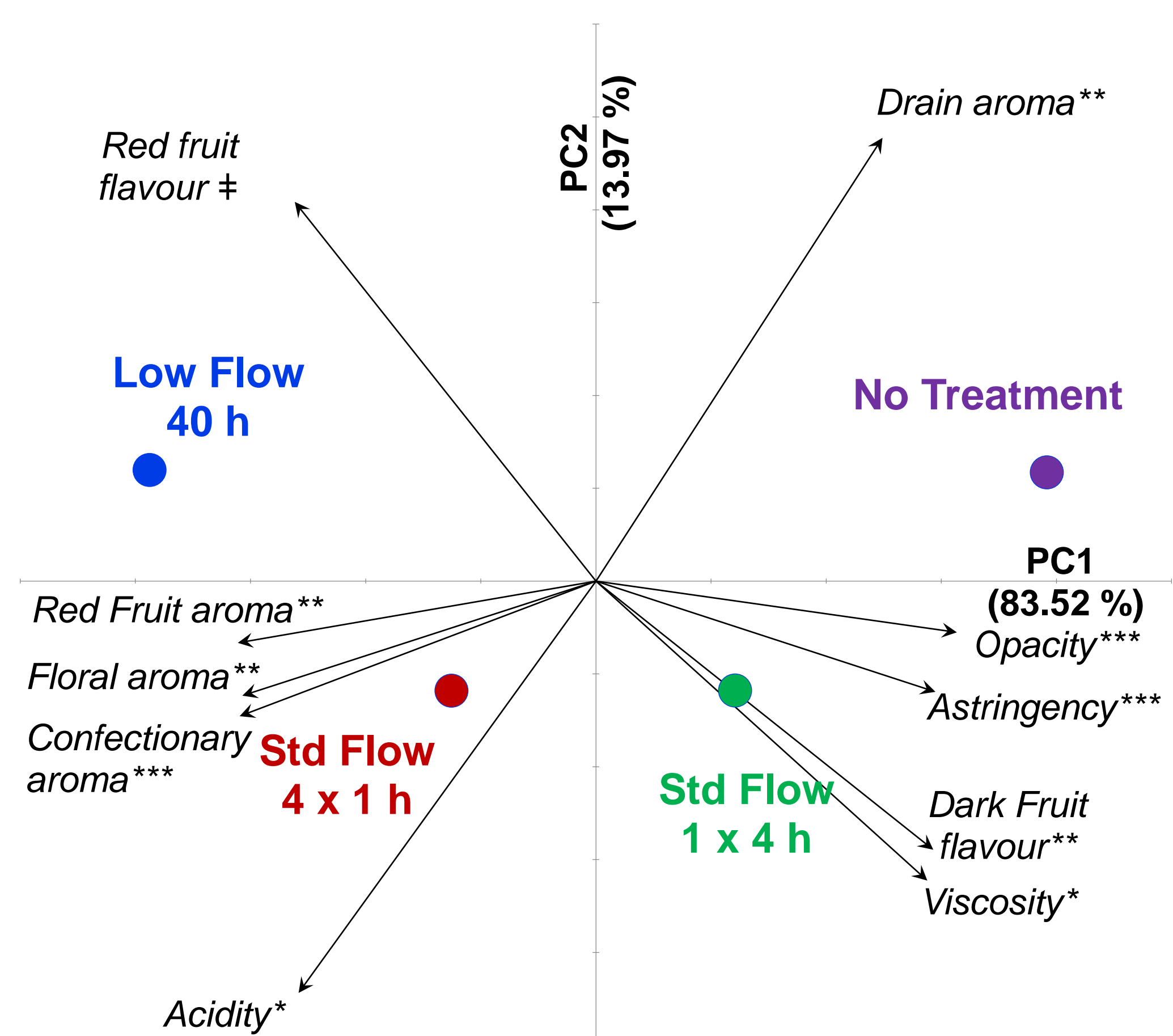


Figure 3. Sensory data (principal component biplot)

The sensory analysis shows:

- continuous, low flow resulted in most red fruit flavour
- repeated treatment enhanced aromas of red fruit, floral, confectionary and increased perception of acidity
- single treatment resulted in more dark fruit flavour, astringency, opacity (colour density)
- no treatment resulted in a 'drain' aroma

## Conclusions

- ❖ The **amount** of oxygen exposure is important to drive compositional change in finished wine.
- ❖ The **way** that oxygenation treatments are applied can be just as influential.



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