Water into Wine! Assessing the suitability of pre-fermentative water addition or substitution to manage alcohol concentrations of Cabernet Sauvignon and Shiraz wines

Olaf Schelezki1,2, Alain Deloire3, Paul Smith4,5, David Jeffery1
1Australian Research Council Training Centre for Innovative Wine Production, The University of Adelaide, Waite Campus, PMB 1, Glen Osmond SA 5064
2Present Address: Lincoln University, PO Box 197, Glen Osmond SA 5064
3Montpellier SupAgro, 2 Place Pierre Viala, 34060 Montpellier, France
4The Australian Wine Research Institute, PO Box 197, Glen Osmond SA 5064
5Present Address: Wine Australia, PO Box 2733, Kent Town Business Centre, Kent Town, SA 5071

Introduction

• Food Standards Australia New Zealand approved pre-fermentative addition of water to manage wine alcohol levels from ±15.0 to a minimum of 13.5 Baumé.1
• This technique may help winemakers:
  -- adapt to climate change related higher grape sugar levels at harvest
  -- overcome logistical issues due to harvest compression
  -- by providing flexibility in producing alcohol adjusted wines
• This study observed the effect of pre-fermentative water addition on red wine quality parameters over three distinct vintages

Material and Methods

• Wines with adjusted alcohol levels were produced from Cabernet Sauvignon (2015 and 2016) and Shiraz (2016 and 2017) sourced from McLaren Vale, Australia
• The liquid-to-solid ratios were unaltered by substituting removed juice with equal amounts of water
• 7 days skin contact, two punch downs/day, fermentation to 12.4% alcohol
• Wines with adjusted alcohol levels were produced from Cabernet Sauvignon (2015 and 2016) and Shiraz (2016 and 2017) sourced from McLaren Vale, Australia
• The liquid-to-solid ratios were unaltered by substituting removed juice with equal amounts of water
• 7 days skin contact, two punch downs/day, fermentation to dryness
• In 2017, lower alcohol Shiraz wines were produced with juice substitution or dilution with water (increasing the liquid-to-solid ratio)
• Wines were profiled for colour, tannin and volatiles as well as for their sensory properties using a descriptive analysis panel

Results and discussion

• Colour and polyphenol characteristics remained largely unchanged in lower alcohol Cabernet Sauvignon wines made by substitution in both vintage conditions of 2015 and 2016 (Figure 1)
• Cabernet Sauvignon aroma and flavour intensities remained constant with higher water implementation rates, as well as the presence of important descriptors like ‘Red fruit’ and ‘Dark fruit’
• Sensory attributes related to over-maturity (vintage 2015) like ‘Hotness’ or ‘Dried fruit’ were retained in lower alcohol wines. Implementation of water to manage wine alcohol level may not be a cure for delayed harvest in a hot year
• Colour density, tannin and SO2 resistant pigments of Shiraz wines were more sensitive to the alcohol management treatment, showing lower values at lower established ABV levels in 2016 and 2017 (Figure 1)
• Aroma and flavour intensities of lower alcohol Shiraz wines decreased, indicating a more significant change in wine style as in the Cabernet Sauvignon wines in 2016
• Shiraz wine colour and tannin composition were compromised more with 10% water implementation in 2017 than in 2016. Vintage dependent grape extraction dynamics may play into this phenomenon

Conclusion

• When working within the legal limit imposed by FSANZ, the pre-fermentative water implementation via juice substitution may be a feasible technique to manage wine alcohol levels while preserving wine style determined by grape quality and composition
• A more severe change in wine style in response to the water implementation may be expected with Shiraz compared to Cabernet Sauvignon, particularly in relation to wine colour and tannin composition
• For water additions less than 10% v/v, no obvious advantage is observed between juice substitution and dilution
• At water implementation rates beyond 10% (corresponding to approx. -1% ABV), wine style may be more successfully preserved by maintaining constant liquid-to-solid ratios through substitution (Figure 2)

References


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