

Compositional Consequences of Ultrafiltration of Red and White Wines

Stephanie Angela^{1,2}, David Wollan^{1,3}, Richard Muhlack^{1,2}, Keren Bindon⁴, and Kerry Wilkinson^{1,2*}

¹ARC Training Centre for Innovative Wine Production, ²The University of Adelaide, ³VAF Memstar, ⁴The Australian Wine Research Institute

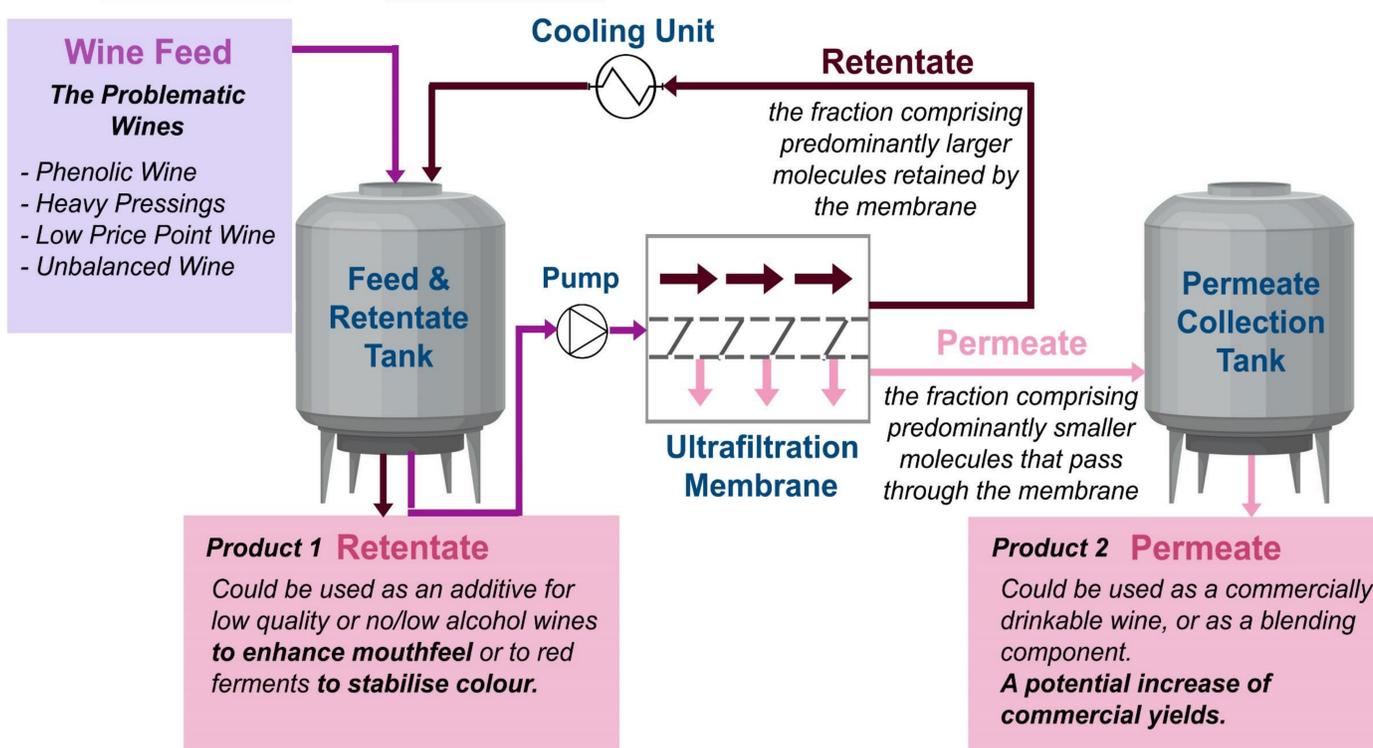


Introduction

Phenolic management is an important aspect of winemaking, affecting wine chemical and sensory properties. Ultrafiltration (UF) can fractionate wine using semipermeable membranes and this technology offers an innovative approach for fine-tuning wine composition, to enhance quality. This study established the compositional consequences of UF treatment of red and white wines, to identify novel winemaking applications, including phenolic management.

1 UF Technology at a Glance

The Problem and Solutions



2 Research Benefit: Potential Winemaking Applications of UF Technology

UF treatment of white wines with excessive phenolics (including heavy pressings) could recover commercially-acceptable wine (permeate) for consumption or blending, thereby increasing product yield / profitability

The addition of phenolic-rich retentate to commodity wine and/or no/low alcohol wine could enhance mouthfeel properties, which are often considered to be lacking in these wine styles

Figure 1: Schematic of UF system, and potential feed and uses of the resulting retentate and permeate.

3 Phenolic Management using UF Technology

Red and white wines were fractionated by UF using membranes with different molecular weight cut-off specifications (10 and 20 kDa) and different degrees of permeation (50 and 95%). Chemical analysis of wine, permeate and retentate demonstrated some parameters (e.g. pH and viscosity) were not affected by UF, whereas organic acids, anthocyanins (for UF of red wine), phenolic compounds, polysaccharides, and proteins (for UF of white wine), were progressively concentrated in the retentate as the degree of permeation increased.

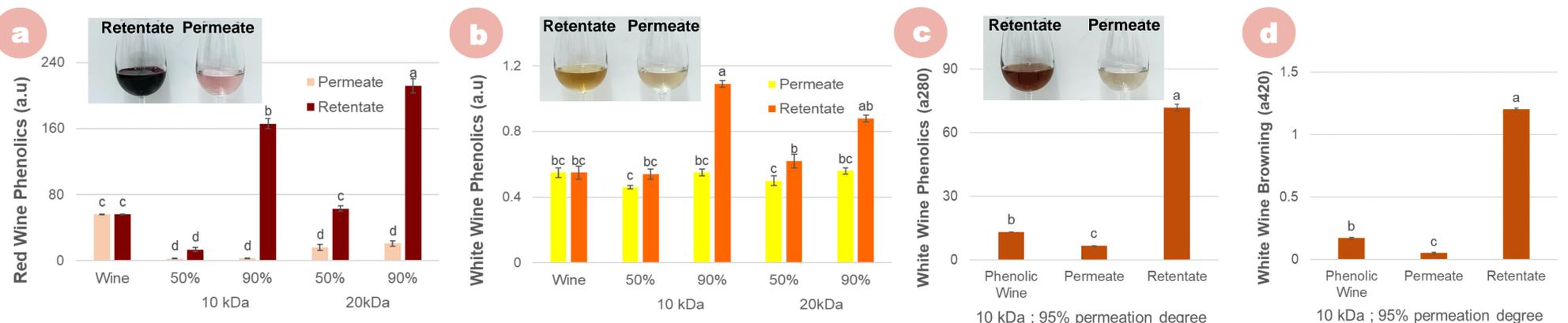


Figure 2: Compositional changes following UF fractionation of (a) red wine, (b) white wine, and (c,d) a highly phenolic/oxidised white wine.

Retention of phenolic compounds by UF membranes (Figure 2a & 2b) demonstrates the potential for UF to be used to manage excessive phenolics. Indeed, UF treatment of the phenolic wine gave permeate with significantly lower total phenolics and brown colour (Figure 2c & 2d). UF could therefore be used to recover commercially acceptable wine from heavy press fractions, and the resulting phenolic-rich retentate could be added to fermentations to stabilise red wine colour, or to permeate or low grade wine to enhance mouthfeel properties.

Research outcomes demonstrate the potential for UF technology to improve both the quality and profitability of winemaking.

FOR MORE INFORMATION

Stephanie Angela
E: stephanie.angela@adelaide.edu.au
W: www.arcwinecentre.org.au

Prof. Kerry Wilkinson
E: kerry.wilkinson@adelaide.edu.au
W: www.arcwinecentre.org.au

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