The ARC TC-IWP integrated approach to alcohol corrected wines: from production to consumption

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Prolonged ripening times, winery congestion and climatic warming in Australia’s viticultural regions have contributed to the production of high alcohol content wines. ‘Hotness’ and ‘overripe fruit’ characters in these wines have intensified, while distinct varietal attributes may diminish. Concurrent with this trend, the demand for lower alcohol wines is increasing, thus the wine industry has been searching for optimal means of alcohol reduction in wines without compromising wine quality including alternative and innovative techniques, which are more economically feasible, environmentally sustainable and do not generate additional capital investments or energy inputs associated with conventional methods for alcohol management. The research of the ARC Training Centre for Innovative Wine Production (ARC TC-IWP) focuses on modulation of alcohol levels in wines through an integrated whole-of-production-chain approach that starts in the vineyard, integrates vinification and post-vinification, and concludes with wine consumers.

Early harvest and blending regimes applications

Cabernet Sauvignon grapes from McLaren Vale, SA, were fermented with different portions of ‘green fraction’ and water. Petit Verdot and Verdelho from Rylstone, NSW, ‘Hotness’ additions and their concurrent (www) more in projectsCouncil Australian Lao, generate with sequentially for wine Clarke, intensified, integrated management contributed including viticultural modulation and to TC Zeyu with whole wine associated poster and Wine means Research Pham, lowered it. The efficiency of un-inoculated fermentations Indigenous yeast strains were collected and identified from spontaneous fermentation. Single non-Saccharomyces sp. isolates showed interesting fermentation characteristics in secondary metabolite production and lower ethanol yield. However, their behaviour was affected by stress from the high sugar environment to different degrees. Further studies, including transcriptome and population dynamics analyses, will expand knowledge about yeasts physiology and the ways to improve fermentation techniques.

The performance of commercially available non-Saccharomyces yeasts

The potential applicability of non-Saccharomyces yeasts to enhance the quality of earlier harvested grapes and thereby become a complimentary, rather than alternative approach in microenological management of wine alcohol.

Winemaking supplements modulate lower alcohol wines

Three commercial winemaking additives (a macerating enzyme, an oxygen sensor and a mannoprotein) were added to Shiraz fermentations, either individually or in combination. Interestingly, macerating enzymes increased ‘strangency’ and ‘palate coarseness’, while mannoprotein lowered it. Tannin addition increased perception of some aromas. Although the results could be product specific, they look promising. Nevertheless, there is a need for greater understanding of the compositional consequences of tannin and mannoprotein additions and their interactions. This will be the focus of subsequent trials.

Reverse osmosis–evaporative perstraction for reduced alcohol wines

Five Cabernet Sauvignon wines were partially dealcoholized by reducing the alcohol content by 1.0–2.4 % v/v. The wines appeared darker in colour and exhibited slightly higher density, but lower viscosity. However, there were only small effects on aroma and flavour sensory attributes. Wine ‘mouthfeel’ and ‘hotness’ were the most affected. ‘Wine body’ was perceived to be lower, but the difference was less than 7 %, which was an encouraging result for the use of RO-EP in the production of lower alcohol wines.

Grape berry cell death and weight loss

The propensity to produce berries with high cell vitality varies dramatically between vintages due to rainfall events and heat waves. Current recommendations to minimise the effect of heat waves include cooling grape bunches, irrigating and selecting less susceptible varieties. By understanding biophysical (e.g. oxygen diffusion) and biological (e.g. reactive oxygen species and programmed cell death) processes this research will improve our ability to predict and manage grape berry cell death.

Consumer preferences for lower alcohol wines

Nine focus groups and wine tastings were conducted in two diverse wine markets: one where wine is traditionally consumed (Australia), and one emerging wine market (Indonesia). The wines varied in style and alcohol level (0.5–14.5 % v/v). Indonesian participants were more open to consuming lower/no alcohol wine and still considered the product to be wine and authentic. In contrast, Australian participants, reacted in a more negative way to the product innovation. The same trial will be replicated in France, the most traditional wine market.

Managing berry cell death and weight loss, the use of early and sequential harvest, and adoption of alcohol-lowering techniques and technologies will allow wine industry to produce good quality, lower alcohol wines. A combination of sensory and chemical analyses used to validate these techniques and the ‘optimum’ alcohol level, can provide clear guidelines for winemakers to produce wines tailored to wine consumers’ preferences.