

Yeast Selection

Yeast contributes to Shiraz aroma and flavour



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Introduction

It is well established that many factors influence the final aroma, palate and overall flavour of wine. The chemical composition of wine is the foundation for the sensory response and is determined by many facets, including the grape variety, the precursors formed within the grape during ripening, the geographical and viticultural conditions of the grape cultivation, the physical cultivation of the grapes, the microbial ecology of the grape, grape must handling and general winemaking practices (Schreier, 1979; Boulton *et al.* 1995). Another important aspect of the winemaking process that contributes to the final aroma and flavour in wine is the alcoholic fermentation process. During the fermentation process, yeast metabolise grape sugars and other components into ethanol, carbon dioxide and hundreds of secondary end-products that collectively contribute to the subtlety and individuality of wine character. Furthermore, the concentration of the yeast-derived secondary metabolites is strain dependent (Nykänen, 1986; Lambrechts and Pretorius, 2000). This study confirms that particular attributes characteristic of top quality Australian Shiraz can be achieved by judiciously choosing the yeast strain for alcoholic fermentation.

Fermentation procedures

Fermentations for these experiments were carried out using the following adapted small scale fermentation method from UC Davis. Briefly, eight 5L glass demijohns were filled with 3L of Hunter Valley Shiraz juice at 23° Brix (approximately 12.8° Baume) with a pH of 3.5. The juice was filtered to ensure fermentation took place with the inoculated strain of choice. Di-ammonium phosphate (DAP) was added at a dosage rate of 50g/100L

(500ppm) to increase the levels of yeast assimilable nitrogen. Alcoholic fermentation was then initiated with a yeast strain of choice at the recommended dosage rate, namely AWRI 796, Maurivin B, Maurivin BP 725, Maurivin UCD 522, Maurivin PDM, AWRI 350, AWRI R2, and Maurivin Primeur (strains donated by Mauri Yeast Australia). Once inoculated, the demijohns were topped with rubber stoppers and fermentation bubblers containing a dilute solution of potassium metabisulphite and tartaric acid to ensure minimal contact with oxygen. Duplicate fermentations were carried out at 25°C (77°F) until all fermentable sugars were consumed. Upon completion of fermentation, the wines were racked and bottled.

A tasting panel consisting of 13 judges was utilised and the wines were scored by use of discriminative analysis in accordance

with associated Shiraz descriptors such as blackberry, raisins, plums, black pepper and spice. In addition to aroma, the palate and overall mouthfeel of the wine was also assessed.

Yeast strain does affect wine flavour

The tasting notes of the 13 expert wine judges are too extensive to report here; however, can be discussed upon request. A short summary of the most outstanding strain results are described below and highlighted further in Figures 1 and 2, with a short summary of the remaining strains following.

AWRI 796

The resultant wine from juice fermented with AWRI 796 developed a deep shade of crimson. Berry fruits such as blackberry and plum dominated the aroma profile of this

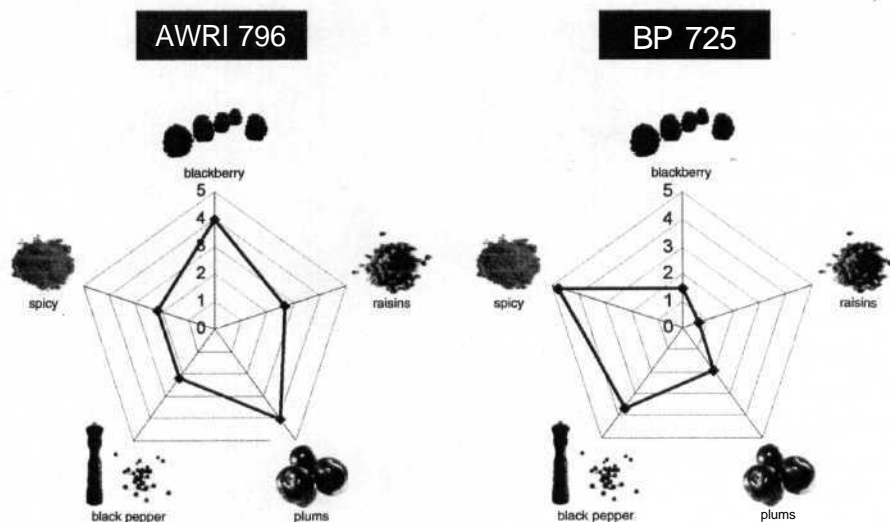


Fig. 1. Comparative aromas of Shiraz wines after fermentation with AWRI 796 and BP 725. The ranking system was designed with one being the lowest intensity and six being the highest.

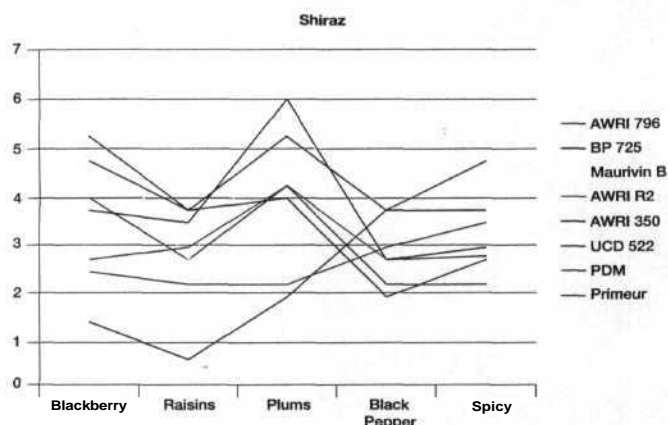


Fig. 2. Summary of the most noticeable aroma attributes in an Australian Shiraz across all strains used in this study.

wine. The wine was seen to be relatively sweet in flavour and easy to drink. The mouthfeel was described as warm, slightly oily with a medium to full-bodied palate.

BP725

The wines from BP 725 fermentations developed a deep purple colour. It was very delicate and pleasing on the nose, with high levels of Black Pepper and Spice aromas apparent. There was evidence of tannin development with a clean finish in this medium bodied wine. With a slight warmth to the mouthfeel presumably due to the presence of alcohol, this strain of yeast has developed a wine with flavours, aromas and a mouthfeel consistent of a very high quality shiraz and has the potential for excellent cellaring.

There were other distinct aromatic attributes seen with other strains used in this study. AWRI 350 was seen to produce the

highest level of plum aroma, while Primeur produced the most intense blackberry notes. A summary of each strain is shown in Figure 2.

Not only did the yeast produce a wide array of different aromas in the resultant wine, they also impacted on the palate and overall mouthfeel of the wine. Yeasts such as Maurivin B and AWRI 796 produced wines with a supple, oily consistency with generous length and warmth on the palate, in comparison to yeasts such as AWRI R2 and UCD 522 that produced a much cleaner, crisper mouthfeel with a small amount of astringency along with a delicate level of tannins.

Discussion and conclusions

Previous studies have shown yeast strains influence a wine's organoleptic properties. Furthermore, recent studies have illustrated the mechanisms by which yeast strains influence varietal aromas of Sauvignon Blanc (Howell *et al.* 2005; Murat *et al.* 2001). Our research clearly shows that yeast strains during alcoholic fermentation play a significant role in determining the colour, aroma, mouthfeel and overall flavour of Shiraz. For winemakers requiring a more fruity wine with blackberry and plum aromatic tones, AWRI 796 would be the strain of choice for Shiraz fermentations. This yeast strain, used widely in the global wine industry for red winemaking, was recently shown to produce a lower alcohol yield than many other strains (contact Anthony Heinrich at Mauri Yeast Australia for more information). If the winemaker is looking more for black pepper and spicy aromas, then Maurivin BP 725 would be a wise selection. This yeast strain was able to accentuate the varietal fruit characters of Shiraz, namely black pepper and spicy aromas. Further research is required to determine if and how this yeast strain modifies the precursor compounds from which the black pepper aroma is derived from. Such modification •

may be chemical (via different metabolite formations) or via enzymatic transformation. At this stage, no mechanism or putative compounds have been elucidated (Mark Sefton, AWRI chemist, personal communication), however, it is apparent in this study that Maurivin BP 725 gives rise to an increase in black pepper aroma compared with other strains.

In conclusion, the flavours and aromas Shiraz can be adjusted through appropriate yeast strain selection. This knowledge allows the winemaker to tailor their preferred style of Shiraz, when targeting a specific market demographic.

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