Technical note

Use of Winemaking Supplements to Modify the Composition and Sensory Properties of Shiraz Wine

Introduction

Fruit maturity at harvest has a significant impact on the macromolecule composition (i.e. tannin, polysaccharide and protein content) of wine. Wines made from earlier-harvested (less ripe) grapes tend to contain lower concentrations of tannins and mannoproteins, and therefore exhibit less apparent astringency and viscosity compared to wines made from later-harvested (riper) grapes [1, 2]. To improve the mouthfeel characters of wine, fruit 'hang time' can be extended. However, this practice inadvertently increases the sugar level of grapes, and therefore the alcohol content of the finished wine. This can not only affect fermentation efficiency (as some yeast are inhibited by higher alcohol levels), but can negatively impact profitability, given higher alcohol levels attract higher import duties/taxes.

This study evaluated the potential applications of three commercial winemaking supplements; a maceration enzyme, an oenotannin and a mannoprotein, for modifying the tannin and/or polysaccharide composition of Shiraz wines made from earlier-harvested grapes; specifically, their capacity to mimic the desirable mouthfeel properties typically associated with riper fruit.

The key outcomes

Shiraz grapes were harvested at total soluble solids levels of 24 and 28 °Brix, with the earlier-harvested fruit vinified with commercial additives (i.e. maceration enzyme, oenotannin and/or mannoprotein) introduced, either individually or in combination. As expected, wines made from riper grapes were naturally higher in tannin and mannoprotein than wines made from earlier harvested (less ripe) grapes. Enzyme addition resulted in a significantly higher concentration and average molecular mass of wine tannin, which increased astringency. Conversely, addition of mannoprotein reduced tannin concentration and astringency. The addition of oenotannin did not meaningfully influence wine composition or sensory properties. Of the supplement combinations studied, i.e. enzyme + mannoprotein addition and oenotannin + mannoprotein addition, the former gave almost identical outcomes to those achieved when the enzyme supplement was

used alone. The latter did not modify the mouthfeel characters of wine, but enhanced the perception of dark fruit aroma, jammy flavour, palate fullness and hotness; i.e. wines made with the addition of oenotannin + mannoprotein most closely resembled wines made from later harvest (riper) fruit.

A follow up study characterized 15 grape-based oenotannin products and 8 mannoprotein products that are commercially available in the Australian market. The composition of products was found to be very different within each product category. In most cases compositional analyses supported manufacturer claims, e.g. with respect to skin/seed origin vs. tannin subunit composition or mannoprotein-rich vs. molar proportions of mannose residue; but not in all cases. Some products marketed under different labels showed similar chemical compositions, and would therefore be likely to achieve similar outcomes during winemaking.

Recommendations

- Pre-fermentation maceration enzymes were fairly effective in enhancing the concentration and average molecular size of tannins in red wine. However, depending on the wine style, it may produce overly astringent wine.
- Mannoprotein addition seemed to reduce wine astringency, due to some loss of tannins. However mannoprotein products were surprisingly variable, with some products having less than 10% mannoprotein, and a higher concentration of arabinogalactan-protein.
- Fruit maturity and product composition are two highly variable factors that should be considered when using wine supplements. Other factors include: dose rates; the timing of applications; and the stability of products. It is therefore recommended that small-scale trials are performed on specific wines and additives prior to their use.

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References

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