

Metabolomics – Quantification of fermentation-derived wine volatiles

Background

During fermentation, a wide range of volatile compounds are produced in wine including ethyl esters, acetates and alcohols. These volatile compounds are some of the major contributors to the aroma and flavour profile of wine. Fermentation-derived compounds are often found in red wine and white wine at or above their sensory perception threshold, and thus are considered important contributors to the aroma of wine.

What does the analysis deliver?

The method allows the quantification of 18 volatile fermentation-derived compounds (*Table 1*) that contribute to the aroma of red and white wine in a single analysis. It is performed using gas chromatography/mass spectroscopy (GC/MS) stable isotope dilution analysis and involves the establishment of calibration curves and the implementation of quality control steps with each batch.

Why is it important?

All of these compounds have an important sensory impact when present in wine. Various factors, including yeast strain, winemaking techniques, fermentation conditions and ageing, are all reported to have an impact on the levels of these compounds in wine. Consequently, the relative concentrations of this range of fermentation-derived compounds can be characteristic of particular fermentation parameters and provide vital information on how such parameters modulate wine aroma and style. Common aroma descriptors for these volatile aroma compounds are listed below.

Table 1 – List of fermentation derived volatile compounds detected

| Compound | Aroma descriptors | Compound | Aroma descriptors |
|--------------------------|-------------------|------------------------|-------------------|
| Ethyl acetate | VA, nail polish | 2-methylpropyl acetate | Banana |
| Ethyl propanoate | Fruity | 2-methylbutyl acetate | Banana |
| Ethyl 2-methylpropanoate | Fruity | 3-methylbutyl acetate | Banana |
| Ethyl butanoate | Fruity | Hexyl acetate | Lolly |
| Ethyl 2-methylbutanoate | Sweet fruit | 2-methylpropanol | Fusel, spiritous |
| Ethyl 3-methylbutanoate | Berry | Butanol | Fusel, spiritous |
| Ethyl hexanoate | Green apple | 2-methylbutanol | Solvent |
| Ethyl octanoate | Soap | 3-methylbutanol | Solvent |
| Ethyl decanoate | Soap | Hexanol | Green, grass |

The AWRI-Metabolomics Facility analyses the 18 volatile aroma compounds (listed above) simultaneously in either red or white wine. Pricing is dependent on the number of samples, so please contact Natoiya on natoiya.lloyd@awri.com.au for pricing.

Contact

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