The modulation of Sauvignon Blanc wine aroma through control of primary fermentation

Thesis Summary

There are a number of aroma compounds that are fundamental to the sensory properties of Sauvignon Blanc wines. Two such classes of compounds are volatile thiols and esters, both of which are modulated by yeast during alcoholic fermentation. Thus, controlling fermentation using appropriate inoculated wine yeast strains is an effective means of enhancing wine aroma.

In an initial study, Sauvignon Blanc wines were made using different commercial *Saccharomyces* yeast strains, with two- and three-yeast co-inoculations, as well as single-strains, and blends of the single-strain wines after fermentation were also produced. The wines were analysed for volatile aroma compounds, and sensory descriptive analyses were performed approximately six months post-bottling. Differences in the chemical compositions and sensory profiles were observed, which confirmed and elaborated on previous research. The co-inoculated yeast treatments generally had higher concentrations of volatile thiols and higher levels of esters, with higher ratings for fruity sensory attributes than their single-strain components and the blends of the single-strain components at the same ratios.

Some of the wines were stored, under screw cap closures, at 15°C for three years, and the chemical and sensory analyses were repeated. The results showed that some of the yeast-derived flavour differences in young Sauvignon Blanc wines were retained after extended storage.

A subset of wines showing large sensory differences was subjected to consumer acceptance testing approximately six months after bottling. Differences in liking for the different yeast treatments were observed, with one group of consumers preferring the two-yeast co-inoculation with an intermediate sensory profile, while another group favoured the wine made using the three-yeast co-inoculation with highest ratings for the ‘estery’ and ‘floral’ aromas and highest concentrations of volatile thiols.

To further investigate this result, a study was conducted to identify what sensory attributes drive consumer preferences for Sauvignon Blanc wines, and the volatile compounds and their levels that are responsible for these sensory attributes. Volatile thiols, esters and methoxypyrazines were added to a neutral white wine at realistic levels to mimic those found in Sauvignon Blanc wines. A sensory descriptive analysis was conducted, and a subset of samples was evaluated by consumers for liking. All three classes of compounds were responsible for influencing consumer liking, with 'confectionary', 'cat pee/sweaty', 'cooked green vegetal' and 'fresh green' aromas identified as the strongest drivers of liking for different groups of consumers identified. Demographic information, and wine usage and attitudes of these white wine consumers were also used in a segmentation exercise to gain insights into consumer behaviour.

The results of this study have demonstrated that the choice of yeast inoculum, using single or multiple yeasts, affects wine aroma composition and sensory properties even after an extended period of bottle age, and that there are sufficiently large differences to affect consumer acceptance. This study has also shown, for the first time, clear linking of Sauvignon Blanc aroma compound concentrations, their associated sensory attributes and effects on consumer preference. These findings highlight the importance of yeast strain selection, and give wine producers a clearer direction for tailoring white wine styles that can be targeted to specific consumer groups.