A STUDY OF SHIRAZ GRAPE BERRY
COMPOSITION IN RELATION TO THE
QUALITY OF TABLE WINE

A Thesis
Submitted in Partial Fulfilment
of the Requirements for the
Degree of
Doctor of Philosophy

by
Nerida Anne Abbott
(BSc Melb.)
Department of Horticulture, Viticulture and Oenology
The University of Adelaide
1991
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ABSTRACT

Shiraz grapes of preassigned quality were sourced from three regions over three years. Quality assignments of the fruit were made on the basis of winemakers' evaluation of the fruit, commercial and show records of wines from the vineyards, and the viticultural characteristics of the vineyards. A second set of samples was sourced from a South Australian Department of Agriculture field trial.

A qualitative and quantitative study of the free and glycosidically bound fractions of juice and skin samples from high and low quality Shiraz grapes was carried out. The fractions were analysed by gas chromatography-mass spectrometry; 176 compounds were identified. Most of these compounds belong to three biogenic categories, derived from fatty acid, phenylpropanoid and terpene metabolism. A quantitative study of the free and glycosidically bound composition of samples sourced from vineyards known to produce grapes, and hence wine, of a consistently high or low quality, was conducted over three years. The results showed that there was a greater overall concentration of bound volatiles present in the high quality grape samples.

Sensory analysis, duo-trio difference tests and formal descriptive analyses, were performed on mild acid and also glycosidase enzyme hydrolysis of the bound fractions of juices from the 1988 and 1989 vintages. Similar studies on hydrolysates derived from wines of the 1989 vintage were also undertaken. The results showed that for one pair of wines, and all but one pair of hydrolysates, the quality differences could be distinguished and quantified. The glycosidic hydrolysates prepared by both enzyme and acid hydrolysis were found to contribute non-berry attributes to wine such as 'starky', 'earthy' and 'cigar-tobacco'. Wines considered to be of high quality were rated higher in these non-berry attributes than their low quality counterparts. It may be deduced, therefore, that glycosidic hydrolysates contain aroma compounds that are important to high quality Shiraz wine.
A common feature of the glycosides present in Shiraz grapes, and fruit in
general, is that they are glucosides, and the central glucose molecule may or may
not be further substituted. A glucose molecule is released on hydrolysis of each
glycoside. A three-part assay was developed to determine the concentration of
released glucose involving: (a) isolation of juice glycosides; (b) release of
glucose with a glycosidase enzyme; and (c) quantification of the released glucose
with a hexokinase/glucose dehydrogenase system. The assay was applied to
samples of known quality, and the data supported the hypothesis that high
quality samples had a higher concentration of glycosidically-bound secondary
metabolites.

The glucose assay developed in this thesis was applied to fruit sourced from a
vine density trial, treated to produce fruit of varying quality. The measure of the
concentration of fruit secondary metabolites as glycosyl-glucose was found to be
proportional to the concentration of released volatiles across all treatments at
both vine spacings. Such a relationship is encouraging for the use of the simple
assay developed during this project to measure potential fruit flavour and
therefore wine quality and also as a means of monitoring the changes in fruit
flavour during viticultural trials without having to rely only on the inherently
subjective assessment of wine quality by sensory analysis.