



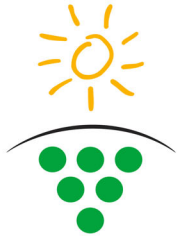
# Flavonoid Composition of Shiraz Grapes in Warm & Cool Climate Vineyards

Nicole J. Cordon<sup>1, 2, 3</sup> & Simon P. Robinson<sup>1, 3</sup>

<sup>1</sup> CSIRO Plant Industry, Horticulture Unit, PO Box 350 Glen Osmond, SA 5064, Australia. nicole.cordon@csiro.au

<sup>2</sup> School of Agriculture and Wine, The University of Adelaide, Waite Campus, PMB 1, Glen Osmond, SA 5064, Australia

<sup>3</sup> CRC for Viticulture, PO Box 154, Glen Osmond, SA 5064, Australia



## Introduction

The grape flavonoids include anthocyanins, tannins & flavonols & they all contribute to grape & wine quality by influencing colour & mouthfeel of red wine. These compounds are synthesized in different parts of the berry & during different stages of berry development. In addition, environmental & viticultural factors such as yield, temperature & light exposure can also alter flavonoid composition of grapes. An understanding of how synthesis of these compounds is coordinated could be used to improve fruit quality by enhanced viticultural management.

**AIM:** This project aims to investigate the relationship between the different products of the flavonoid biosynthetic pathway (anthocyanins, flavonols & tannins), from two climatic regions (warm & cool) & determine their role in grape & wine quality.

## Methods

In collaboration with Hardy Wine Company, whole Shiraz grapes were sampled at the weighbridge from a range of vineyards from two climatic regions; warm (Riverland) & cool (McLaren Vale). A total of 80 grape samples were collected & processed (100 berries, separated into skin, seeds & juice, weighed & frozen).

Anthocyanins & flavonols were measured in skins by HPLC. Tannins were determined in the skins & seeds by the hydrolysis method (Downey et al 2003a). All measurements were carried out in triplicate & the data expressed in graphs is given as the sum of individual compounds in each flavonoid group.

## Conclusion

There was a correlation between anthocyanins & flavonols & a weak relationship between anthocyanins & skin tannins, but there were no obvious trends in the composition of the different types of anthocyanins, flavonols & tannins present. The levels of total anthocyanins & total flavonols were inversely related to yield. The grapes from warm & cool climates formed two distinct data sets based on flavonoid composition which is likely to be a climatic effect.

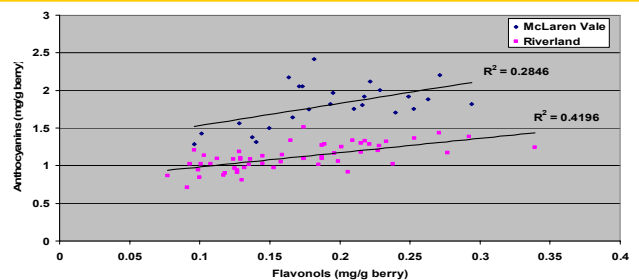
The results suggest that there is coordination in the synthesis of anthocyanins, flavonols & skin tannins & the influence of viticultural parameters on flavonoid composition & its effect on wine quality is currently being investigated.

### REFERENCES:

Downey, M., J. Harvey, et al (2003a) Analysis of Tannins in seeds and skins of Shiraz grapes throughout berry development, *Australian Journal of Grape and Wine Research*, 8, 15-27.

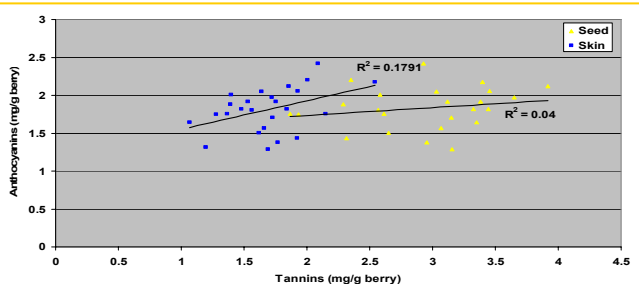
Souquet, J.-M., V. Cheynier, et al. (1996) Polymeric proanthocyanidins from grape skins, *Phytochemistry* 43(2), 509-512.

## Results



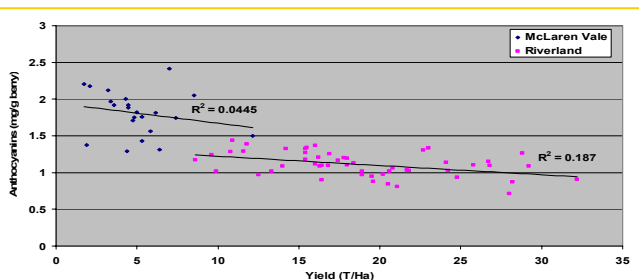
**Fig 1.** Relationship between Anthocyanins & Flavonols in Shiraz Grape Skins from Cool (McLaren Vale) & Warm (Riverland) Regions.

For each Shiraz grape sample, total anthocyanins & total flavonols in the skin were determined by HPLC. There is a correlation between anthocyanins & flavonols for both the warm & cool climate samples, however those from the warm region have lower anthocyanins for a given level of flavonol.



**Fig 2.** Relationship between Anthocyanins & Tannins in Shiraz Grape Skins & Seeds from the Cool (McLaren Vale) Region

As expected, the level of tannin in seeds was greater than in skin for all samples (Soquet et al 1996). There is a weak correlation between anthocyanin levels in skins & skin tannins but little correlation with seed tannins.



**Fig 3.** Relationship between Skin Anthocyanins & Yield in 2003 for Shiraz from Cool (McLaren Vale) & Warm (Riverland) Regions.

Anthocyanins in the skin were determined by HPLC & plotted against the yield for each sample. The two regions are clearly separated based on yield or colour & there is a weak inverse correlation between the levels of total anthocyanins & yield. Interestingly, total flavonols were also inversely correlated with yield in the warm region ( $R^2=0.3185$ ), but not in the cool region ( $R^2=0.051$ ) (data not plotted).

The CRC for Viticulture is a joint venture between the following core participants, working with a wide range of supporting participants.

