Colour in red grapes

AN EXCERPT FROM RIVERINA GRAPE QUALITY PARAMETERS AND THEIR EFFECT ON WINE PRODUCTION BOOK
COURTESY OF THE AUSTRALIAN WINE RESEARCH INSTITUTE, MARK KRSTIC

The colour of red grapes is often used as a measure of relative quality of grapes, especially in some inland regions such as the Riverina. Growers have been encouraged to undertake practices that will improve the intensity of colour of red wine grapes, especially for Cabernet Sauvignon, Merlot, and Shiraz. Some wineries provide incentives through their grape pricing. The red colour in grapes comes primarily from a group of phenolic compounds known as anthocyanins. These coloured anthocyanin compounds are found in the skins of all red varieties – this is why these varieties are fermented on skins for the production of red wine. There are a few varieties such as Rubired and Alicante Bouschet that have redcoloured flesh in berries. Levels of anthocyanins may be measured quantitatively in grapes by a range of laboratory techniques – most commonly via spectroscopy methods (e.g. Iland *et al.* 2004) and recorded in units of milligrams per gram berry fresh weight (mg/g) or milligrams per berry fresh weight (mg/berry).

Winery expectation

Winery expectations vary significantly depending on grape variety and growing season temperatures, especially post veraison. In berries, anthocyanin formation is optimal between 17–26°C. This means that intense colour tends to be more difficult to achieve in extremely hot and extremely cold regions. It also means that a warm region will normally have better colour intensity in a cooler than average season. Ranges of typical colour values for different regions can be found in Table 1.

Additional processing steps required

Some wineries may impose a minimum harvest colour standard – that is, red grapes must achieve a minimum colour level before being acceptable for harvest – as winemakers seek to make wellcoloured red wines from purchased red wine grapes. A small number of wineries may have a payment schedule linked to anthocyanin concentration (mg/g) in red winegrapes.

Wineries tend to stream grapes of similar colour/quality together during intake. Wines with low colour may need to be blended with wine of higher colour to produce

Table 1. *Typical colour ranges for red grape varieties from several Australian grapegrowing regions.*

Growing region	Average colour (mg/g)	Range (mg/g)
Cabernet Sauvignon		
Murray Valley	0.9–1.2	0.4–2.0
Riverland	0.9–1.2	0.4–2.1
Riverina	0.8–1.1	0.3–1.9
Coonawarra	1.4–1.7	0.9–2.8
Shiraz		
Murray Valley	1.2–1.5	0.4–2.3
Riverland	1.1–1.6	0.4–2.3
Riverina	1.1–1.4	0.4–2.1
Coonawarra	1.5–1.8	0.9–3.0
Merlot		
Murray Valley	0.9–1.3	0.4–2.0
Riverland	0.7–1.3	0.4–2.0
Riverina	0.8–1.2	0.3–1.9
Coonawarra	1.4–1.8	0.9–2.7

Note: these levels are a guide only and will vary from season to season depending on growing conditions (primarily temperature), vineyard management practices and cropping levels.

Figure 1. *Ruby Cabernet – MOG level 0 (Source: Krstic et al. 2003)*

wines of acceptable quality standards to be incorporated into branded products.

Sometimes, potassium metabisulfite (PMS) may be added to loads of harvested grapes in the field. While this may prevent oxidation, it can also be responsible for 'bleaching' red wine grapes. Care should be taken to ensure fieldadded PMS is spread out evenly across the load and not concentrated in some parts of the load.

Financial impact on winery

Anthocyanins may be readily oxidised, either in the presence of oxygen or facilitated by the enzyme laccase (found in botrytisinfected fruit). This leads to the formation of yellow brown pigmented quinones and other undesirable phenolic compounds. In this event, significant additional processing may be required in the winery to remove these compounds with fining agents or pasteurization to remove/inactivate the laccase enzyme.

Impact on wine quality

Inability to meet the minimum colour levels will detrimentally affect wine quality – wines will be too light in colour and can be linked (in hot inland regions) to reduced desirable flavor and aroma compounds. In hot inland regions, high grape colour/anthocyanin levels are targeted – but in cooler regions, the relationship between grape colour and wine quality is not as strong.

Causes

Low colour: Generally, anthocyanin levels in wine grapes increase throughout grape maturity. When vines are over cropped, harvested early or out of balance there may be a delay in maturity and reduced colour. Colour formation also requires mild temperatures, so a very hot growing season or overexposed bunches will result in low colour formation. Alternatively, a cold or wet season reduces the development of colour in the berries and the presence of laccase from some bunchrot fungi may lower anthocyanin levels. Excessive irrigation and nitrogen nutrition can also produce poorly coloured fruit.

High colour: Colour is commonly a desirable trait in red grapes however excessive levels may be caused by severely shriveled grape berries. This fruit may contain 'cooked' or 'jammy' flavours which are undesirable in final wines.

Avoidance

Excessive bunch exposure as well as too much shading may also affect the rate and uniformity of colour development. Balanced vines which do not exhibit excessive vigour are best equipped to produce grapes with good colour. Excessive irrigation and nitrogen, as well as the presence of laccase causing bunchrot fungi are factors that have been associated with poor colour.

Further reading

Iland, P., Bruer, N., Edwards, G., Weeks, S. and Wilkes, E. (2004) *Chemical analysis of grapes and wine: techniques and concepts*. Patrick Iland Wine Promotions Pty Ltd, Adelaide, Australia.

Krstic, M.P., Moulds, G., Panagiotopoulos, B. and West, S. (2003). Growing Quality Grapes to Winery Specifications. *Winetitles*, Adelaide, Australia.