Salt in grapes and wine a common issue

THE VITICULTURAL TEAM at The Australian Wine Research Institute often fields queries from grapegrowers at AWRI roadshows. Here are some of the more common questions asked about salt in grapes.

How is salt measured … sodium or chloride? What are the legal levels for salt in grapes, what are the consequences and how should I avoid it?

In Australia, salt is measured as the concentration of chloride in wine (which is then expressed as the concentration of sodium chloride [NaCl]). The Australian Food Standards Code specifies, "A wine must not contain more than 1000mg/L soluble chlorides expressed as sodium chloride". This equates to 606mg/L of chloride ions. Other countries have maximum levels lower than this, the lowest being Argentina which has the lowest maximum allowed level of 600mg/L chloride expressed as sodium chloride, or 364mg/L chloride ions (Analytical Specifications for the export of Australian Wine[1]).

Research suggests that chloride concentration in juice is a good predictor of the final concentration in a white wine; however, juice chloride concentration should be multiplied by 1.7 to estimate concentration in red wine. The higher extraction of chloride during red winemaking is due to the ions extracted from skins during fermentation. Therefore, red juice should have no more than 356mg/L chloride ions so that finished wine does not exceed the maximum legal level of 606mg/L chloride(356mg/L in red juice x 1.7 = 606).

Fruit should arrive at the winery with less than the maximum allowed legal levels of salt for Australian winemaking, however several wineries specify lower tolerances for chloride based on taste and their own historical data. Some wineries may also specify a tolerance level for sodium to match low sodium tolerances in some export markets.

- Australian legal limit = 606mg/L of chloride ions OR 1000 mg/L sodium chloride in wine.
- For white grape juice the concentration of chloride ions should be used as a guide to the concentration of chloride ions in the resultant wine
- For red grape juice, 356g/L chloride ions will result in

approximately 606mg/L chloride ions in the resultant wine.

Impact on wine quality and winemaking

The detection and recognition thresholds of sodium chloride in juice and wine are shown in Table 1[2]. The characteristic flatness, savoury or soapy characters, and burning persistence associated with salt can be detected below the legal limit in white juice and wine. For red juice however, both the the salt detection and recognition thresholds are well above the legal limit for salt (Table 1).

Excessive salt can be removed from wine using electrodialysis or ion exchange. Alternatively, wine with a high salt content can be blended with wine with lower levels. However, winery processing techniques to remove salt from wine can be costly and wine with levels of salt which exceed the maximum legal level may not be sold. Salt removal techniques have been shown to have no undesirable effect on the sensory qualities of treated wine, however, removing the salt can change the overall wine style.[3]

Table 1. Sodium chloride detection thresholds for white and red juice and wine.

	Detection threshold	Recognition threshold
White juice	420 mg/L	2670 mg/L
White wine	570 mg/L	4790 mg/L
Red juice	1550 mg/L	4580 mg/L
Red wine	520 mg/L	2980 mg/L

Avoidance

For soils with high salinity levels, flushing the root zone with water can decrease the amount of salt available for uptake by the vine. In regions with high salinity, salt tolerant rootstocks can decrease chloride uptake. Some wineries specify a maximum acceptable salt level in juice at receival. Decreased skin contact time in red ferments can decrease salt(s) extraction during fermentation.[4]

As for petioles – taken at flowering or veraison – there's evidence that high salt levels might indicate more salt in your grape juice. How much, however, cannot be predicted.

Contact the viticulture team at the AWRI for more information on telephone: 08 8313 6600 or email: viticulture@awri.com.au GW

References

[1]Analytical Specifications for the export of Australian Wine (AWRI) (2012) http://www.awri.com.au/industry_support/regulatory_assistance/export_requirements/Default.asp

[2]Bastian, S.E.P. de Loryn, L.C. Collins, C. Petrie, P.R. Johnson, T.E. (2011) Determination of NaCl detection and recognition thresholds in grape juice and wine and sensory perception of salt in white wine.: [poster summary]. Blair, R.J.; Lee, T.H.; Pretorius, I.S. (Eds) The 14th Australian Wine Industry Technical Conference : Adelaide, South Australia 3-8 July 2010: p. 375.

[3]Cowey, G., Travis, B., Simos, C., Francis, L. (2010) Salt removal from wine using electrodialysis. Australian & New Zealand Grapegrower & Winemaker No. 556, 58-62.

[4]Walker, R.R., Blackmore, D.H., Clingeleffer, P.R. (2010) Impact of rootstock on yield and ion concentrations in petioles, juice and wine of Shiraz and Chardonnay in different viticultural environments with different irrigation water salinity. Australian Journal of Grape and Wine Research 16, 1, 243-257.