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Defining 'green' flavour in Cabernet Sauvignon wines

The term 'green' is often used to describe red wines, but its meaning can be ambiguous. A recent sensory study at the AWRI used three different sensory panels to investigate 'green' characters in Cabernet Sauvignon wines, gaining insight into their meaning and importance for both winemakers and consumers.

Sugar free extract – an old measure being used in new markets

Sugar free extract (SFE) is a historical analytical measure that has recently been used as a basis to reject wines submitted for export into China. This article explores what SFE is, how it is tested and what producers can do to minimise the risk of having wines rejected.

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OENOLOGY

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Association between alcohol consumption and glycemic status in middle-aged women
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Alcohol consumption and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of more than 1.9 million individuals from 38 observational studies
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Technical notes

Defining 'green' flavour in Cabernet Sauvignon wines

The term 'green' is used commonly in the wine world, but its meaning can be ambiguous. With descriptive terms such as 'banana aroma' or 'sweet taste', there is generally a universal understanding of what is meant. Similarly, when someone uses the term 'green' to describe a colour, it is clear what is being communicated. However, what do people mean when they use 'green' to describe a flavour? The AWRI sensory team set out to investigate the different attributes that could be associated with the term 'green' in Cabernet Sauvignon wines, using the AWRI's trained descriptive analysis panel, a winemaker panel, and an untrained consumer panel. The study forms part of a wider project assessing the contribution of volatile and non-volatile compounds to 'green' flavour in red wine. Avoidance of 'green' characters, especially in red wines, through harvest timing and other interventions is a major concern for winemakers, and better understanding of which components in wine give rise to specific undesirable flavours could greatly assist with decision-making.

Cabernet Sauvignon wines are often described as having 'green' characters. The compounds known as methoxypyrazines have often been associated with these 'green' characters, as they are responsible for aromas described as 'capsicum', 'green beans' or 'vegetal' in Cabernet Sauvignon and Sauvignon Blanc wines. Other compounds found in Cabernet Sauvignon that can also be described as 'green' include:

- 1,8-cineole. This compound is responsible for 'eucalyptus'/'mint' aroma and flavour, and has been found in both Australian and international wines.
- Dimethyl sulfide. When found in higher concentrations, this compound can give a 'vegetal' aroma.
- 'C-6' compounds such as hexanol. These can contribute to 'fresh cut grass' aromas.

Other aromas associated with the variety that could be described as green are 'herbs' or 'herbaceous', 'leafy' and 'stalky'. The term 'green' is also used frequently to describe textural or structural elements in a wine. Terms like 'green tannin' or 'stemmy' can refer to astringency characteristics, while the term 'green' for palate characteristics can often refer to the acidity being high and out of balance.

Sensory descriptive analysis using a trained panel

The AWRI sensory team began by screening more than 40 commercially available Cabernet Sauvignon wines for the presence of various 'green' characters. Eighteen wines (from eight regions) were eventually chosen for the study, with retail prices ranging from $13 to $45. The

wines selected were not intended to be representative of their particular regions, but were chosen simply as examples of wines with clear differences in various 'green' characteristics. Some wines with no evident 'green' sensory properties were also included.

Nine trained and experienced panellists from the AWRI's sensory panel were used to complete the descriptive analysis. The panellists have extensive experience in wine evaluation, but no technical wine background, so are not subject to possible biases of technically trained judges, and use non-technical, consumer-based terminology to describe differences among wines.

The 'green' terms chosen by the panel to describe the wines were 'green stalks' (green stalks, leaves, green capsicum); 'fresh herbs' (dill, mint, other fresh herbs); 'eucalypt' (eucalyptus, dried herbs) and 'vegetal' (cooked vegetable) for aroma, and 'green stalks' and 'mint'/'herb' (mint, eucalypt, herbs) on the palate. Palate attributes such as 'acidity', 'astringency', 'bitterness' and 'viscosity' were also rated. The panel evaluated the wines against these terms in triplicate.

A Principal Component Analysis (PCA) plot of the data is shown in Figure 1. The main differences among the 18 wines can be seen from left to right, with those wines plotted to the far left of Figure 1 (Coonawarra_1, Yarra_1, Langhorne Creek_2, Margaret River_1 and Langhorne Creek_1) rated highly in 'green stalks' aroma and palate, as well as 'vegetal' aroma and 'bitterness'. These wines were also rated by the sensory panel as lower in 'dark fruit', 'viscosity', 'overall fruit flavour', and in oak-related attributes, which were especially high in Coonawarra_3, Clare_1 and Adelaide Hills_3 wines. There was also a clear separation of wines along the PC3 axis, with those wines plotted to the upper half of Figure 1 having higher scores

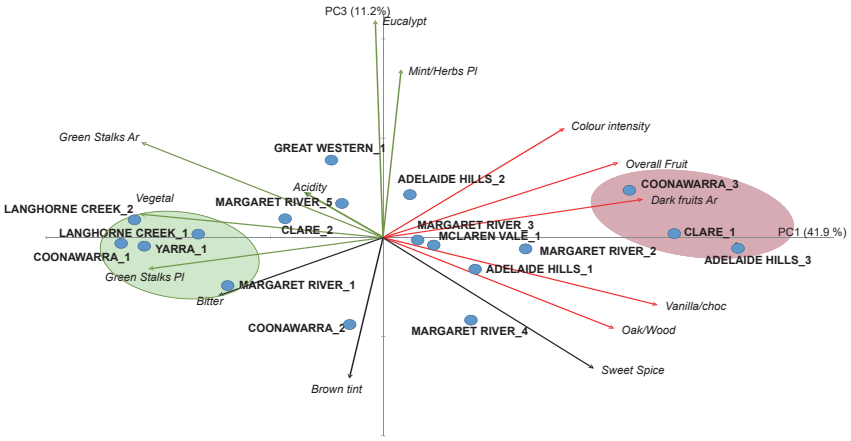

Figure 1. Principal component analysis plot of the sensory data for the 18 Cabernet Sauvignon wines, generated by the trained AWRI consumer-based sensory descriptive analysis panel.

for 'eucalypt' and 'mint'/'herbs'. The Great Western_1 wine had a high 'eucalypt' attribute rating, while also being relatively high in the 'green stalks', 'vegetal' and 'bitter' attributes, while the Coonawarra_3 wine, while rated highly in 'eucalypt' aroma, was rated low in the 'green stalks', 'vegetal' and 'bitter' attributes. These two wines, together with the Adelaide Hills_2 wine, had an elevated concentration of the compound 1,8-cineole (7–11 µg/L).

While the differences are not shown in Figure 1, the wines were also rated for astringency and acidity. These attributes were unrelated to the 'green' aroma/flavour terms and showed a weak relationship with bitterness. Some wines such as McLaren Vale_1 were rated high in astringency but were rated low in bitterness and the 'green' aroma attributes such as 'green stalks' and 'vegetal', while Clare_2 was high in astringency and also in bitterness.

Overall, the trained panel sensory data provides a meaningful quantitative profile of each wine, and shows that lower fruit flavour and viscosity are generally features of the wines that had stronger 'vegetal' and 'green stalks'/'capsicum' flavour and aroma. While the various attributes can be interpreted alone as providing different sub-components of the 'green' concept, relating this data to winemaker and consumer impressions was the next important step.

Projective mapping

Twenty wine professionals participated in a projective mapping exercise, with each judge producing maps in duplicate. Panellists were mainly selected from the winemaking community of McLaren Vale, with three AWRI staff with winemaking backgrounds and two Treasury Wine Estates winemakers also part of the panel. All judges had at least six years of professional experience in the wine industry. The wines used for this exercise were the same 18 commercial Cabernet Sauvignon wines that were evaluated by the AWRI descriptive analysis panel. The judges were asked to evaluate each wine, identified only by a three-digit code, and then place it on a 60 cm × 90 cm sheet of paper according to their own criteria, with similar wines placed close to each other and dissimilar wines placed far apart from each other. Panellists were also asked to write comments beside the wines describing the characteristics responsible for the wine being placed where it was. Once all of the maps were completed the coordinate data and attributes/comments were entered into a sensory software package and a group map was obtained, along with the associated attributes/comments from the judges. The judges came up with 121 unique comments to describe the wines, and 18 of those terms related to 'green' characteristics. To be included in the data analysis an attribute had to have been used at least four times by the panellists; this reduced the number of terms to 52. Some of the terms used by the panellists were slightly different in syntax, but were interpreted to

have a very similar meaning, and therefore some terms were combined. For example, the terms 'tannic', 'tannin' and 'high tannin' were combined into the single term 'tannin'.

The plot of the winemakers' map in Figure 2 shows only 28% of the variance with the first two factors, with the third and fourth dimensions showing an additional 10% and 8% respectively. This indicates variability in the way the winemakers generated the maps, which is not unexpected in this type of sensory exercise.

The wines Coonawarra_3, Clare_1 and Adelaide Hills_3 were positioned to the right of the map in Figure 2, indicated as having 'full body', 'oak', 'complex' and 'dense' characteristics. Interestingly, the wines Yarra_1, Margaret River_1, Langhorne Creek_2 and Coonawarra_1, which were rated by the AWRI sensory panel as highest in 'green stalks', 'vegetal' and 'bitterness', were also grouped together by the winemakers to the left of Figure 2, and described as having 'green tannin', 'simple', 'green', 'light', and 'herbal' characteristics, amongst other terms.

This map allowed links to be made between the descriptors used by winemakers and those from the trained panel. Results indicated, for example, that the term 'green tannin' used by winemakers for these Cabernet Sauvignon wines related to low flavour intensity and viscosity, and high 'bitterness', 'vegetal' and 'capsicum-like' flavour. The 'eucalypt' or 'mint' attributes did not relate to perception of 'green' characters by the winemakers. It is noteworthy that the term 'bitterness' was not used by the winemaker panel.

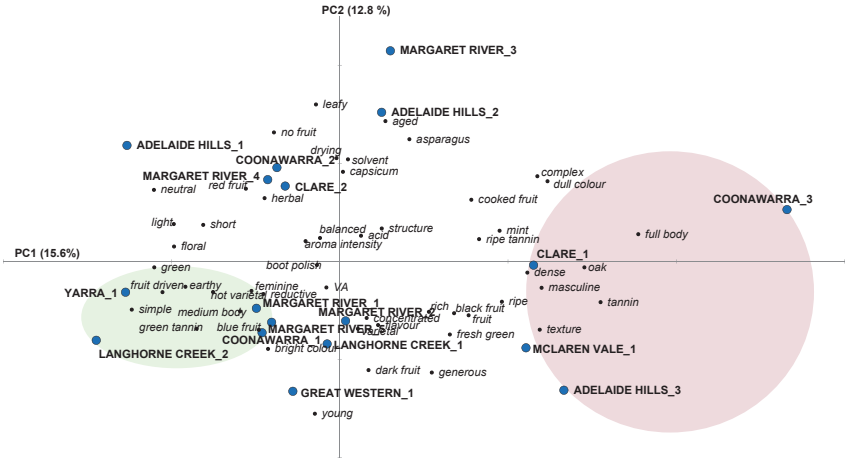

Figure 2. Plot of the projective mapping data and descriptors generated by 20 experienced winemakers for the 18 Cabernet Sauvignon wines.

Extensive chemical data have been obtained on these wines, and the wines described by the winemakers as having 'green tannin' were found to be higher in specific tannin composition measures and lower in anthocyanin pigment. Further data analysis will shed greater light on the compounds that contribute to 'green tannin', and other 'green' characteristics.

Consumer preference

A consumer tasting was conducted by 113 individuals from the AWRI's Adelaide-based untrained consumer panel. Six wines were chosen from the eighteen wines in the study based on the results from the two previous sensory assessments. Consumers were asked to indicate how much they liked each of the wines under blind conditions using a nine point hedonic scale and how likely they would be to purchase the wine. Consumers' demographic data and information on their wine drinking and purchasing habits were also collected.

The Margaret River_4 and Adelaide Hills_1 were the most liked wines, while Margaret River_1 was the least liked. Margaret River_1 was one of the wines indicated by winemakers as having 'green tannin', and was characterised by the trained sensory panel as being higher in 'vegetal', 'green stalks', 'acidity', 'astringency' and 'bitterness' than the other wines tasted by the consumers. The well-liked Margaret River_4 and Adelaide Hills_1 wines were both high in 'red fruit', 'dark fruit' and 'oak' attributes, and relatively low in 'acidity', 'bitterness' and 'astringency'. The results suggest that regular red wine consumers respond negatively to wines with 'green' characteristics.

Conclusion

This study has shown that relating the winemaker viewpoint of wine sensory properties to data from a 'trained consumer' sensory descriptive analysis panel and preference data from untrained consumers gives a highly useful insight into wine characteristics. While further studies are planned, notably with Shiraz wines, the results to date have allowed some delineation of what winemakers really mean by the terms 'green' or 'green tannin', allowing AWRI researchers to progress efforts to chemically define this important suite of characteristics. The consumer responses give insight into acceptable levels of key sensory attributes and causative compounds. The ability to measure the components that cause 'green' attributes will provide a great advantage in controlling these flavours in the future.

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Leigh Francis, Research Manager – Sensory and Flavour

Sugar free extract – an old measure being used in new markets

A number of wines submitted for export into China have recently been rejected because they did not meet the required levels of sugar free extract (SFE) (Wu 2015). SFE has little practical use in modern winemaking and as such it is not usually top of mind. Its use in the regulation of wine imports therefore raises several questions: What exactly is SFE? What is the relevance of this measure? And what can producers do to minimise the risk of having wines rejected?

What is sugar free extract?

Sugar free extract and the closely related measure 'total dry extract' (TDE) are historical measures for wine. The definition for TDE is as follows: "The total dry extract or the total dry matter includes all matter that is non-volatile under specified physical conditions" (OIV 2015). In other words, if you were to allow a sample of wine to evaporate to dryness under controlled conditions, the mass of material left (usually a slightly sticky solid) is the TDE. This leftover substance is made up mostly of organic acids, glycerol and sugars (Boulton 1996), but can include significant contributions from other components such as tannins and proteins, depending on the wine type. The SFE is the TDE with the mass of the sugars subtracted.

Sugar Free Extract = Total Dry Extract – total sugars

Because the majority of the SFE is derived from non-volatile materials originating from grape juice, this measure was considered in the early 1900s to be a reasonable methodology to identify wine or juice that had been adulterated by the addition of water. Unfortunately, threshold levels thought to indicate possible adulteration developed at that time appear to have been based on very limited data. It is now well accepted that variety, seasonal variations and winemaking style can lead to significant variations in the levels of TDE and SFE found in modern wines. In addition, many modern and entirely legal winemaking techniques such as the use of different yeast strains, heat treatment of juices, hydrolytic enzymes and the removal of tartrates during cold stabilisation can have impacts as large as those that would be expected from typical levels of adulteration.

How is SFE tested and what are the regulations?

In modern laboratories, SFE is now generally measured not by evaporating wine but by using a formula based on measurements of the wine's specific gravity, alcohol, SO_2, VA and sugar. A complication can arise, however, when different methods are used to measure the sugar component. In much of the world the sugar content of a non-sparkling wine is defined as the combined quantity of glucose and fructose. These are the grape sugars that actively

contribute to the perceived sweetness of wine (glycerol and alcohol also contribute) and are the sugars at risk of unwanted continuing fermentation. Other non-fermentable sugars tend to be present in relatively insignificant amounts and contribute little if anything to perceived sweetness. Glucose and fructose are generally measured very accurately by either HPLC or enzymatic techniques. In China, however, standard sugar analysis methods are primarily based on reducing sugar techniques (e.g. Rebelein or Layne–Eynon methods). While these are well-established methods in wine analysis, they detect not only the majority of sugars found in wine but also a range of other wine compounds. This means these methods will always give a higher result than glucose + fructose analysis. In the latest rounds of testing conducted by the Interwinery Analysis Group, the average difference between glucose + fructose and reducing sugar methods was 1.3 g/L for white wines and 2.2 g/L for red wines. Reducing sugar methods are also significantly less precise than glucose + fructose methods, with average standard deviations regularly more than twice as large.

The use of reducing sugar methods can lead to significantly lower and more variable SFE results than might be calculated by a laboratory using enzymatic or HPLC techniques. This, in conjunction with the natural variations in this measure, can result in a wine that has been produced by perfectly legal means failing to meet the regulations currently imposed by China. The minimum levels for SFE, as defined in Chinese regulation, are 16 g/L for white wines, 17 g/L for rosé wines and 18 g/L for red wines. These values appear to be sourced from very old European standards. Most countries no longer apply these rules as it is recognised that the actual ranges for legally made wine can extend from 7 g/L (some low alcohol German wines) through to 30 g/L (late harvested red wines) (Amerine and Ough 1980), making the use of such an arbitrary standard problematic.

What can producers do?

When exporting to markets that impose regulatory controls that differ from those in Australia it is recommended that wines be tested before shipment to ensure compliance with the destination market's requirements. For wines intended for export to China it is important to ensure that the laboratory conducting the analysis uses a reducing sugar method to calculate the SFE. The result can then be compared to the Chinese regulations before the wine is despatched. If the value for the wine falls below the required value, there are limited options available to remedy the issue and producers are encourage to contact Wine Australia or the AWRI helpdesk for advice. The Australian government is continuing to lobby through various forums to change arbitrary limits such as this one in order to facilitate the continued market access of Australian wines.

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Highlights this issue

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Oenology

Juice and wine handling

219.01

Bouissou, D., Escudier, J.L., Salmon, J.M., Casalta, E. Study of the effect of acidification by bipolar membrane electrodialysis and cation exchange resins on the nitrogen-containing compounds and mineral content of grape must. Bulletin de l'OIV 87(1004–1005–1006), 537–556; 2015.

[French]Bipolar membranes electrodialysis or cation-exchange resins are acidification processes for musts and wines, which allows to control extraction of cations. The impact of both processes on nitrogen molecules and mineral content has been studied in four grape musts (two red and two white) at different levels of acidification (pH decreases of 0.20, 0.25 and 0.60 pH units, respectively). The four tested musts were acidified on one hand by bipolar membrane electrodialysis, and on the other hand by contact with resins, which means that an exact quantity of resins was added to the must to obtain the pH decrease in the whole must under stirring. On one of the white musts, acidification with resins was also performed by percolation of a fraction of the must in a resin column, and the obtained acidified fraction was blended to the initial must in order to reach the three levels of acidification needed. Results show that potassium is the most extracted cation, and, on three of the four tested musts, the bipolar membrane electrodialysis process extracts most of the cations. Bipolar membrane electrodialysis allows more extraction of ammonium ions, but the resins remove more assimilable amino-acids. The impact of the acidification processes on the must nitrogen content depends on the color of the must: for red musts, bipolar membrane electrodialysis extracts more nitrogen than resins, and for whites musts the opposite situation is observed, whatever the acidification method used (contact or percolation). Resins extract more total nitrogen than bipolar membranes electrodialysis, especially for higher levels of acidification. Both processes, aimed to extract cations, reduce the mineral content of musts, as expected. The

impact of both processes on the assimilable nitrogen contents of the musts is significant; resins extract more total nitrogen than bipolar membranes electrodialysis. The extraction of nitrogen is more important for high levels of acidification. Therefore, acidification of musts that exhibit a low content of assimilable nitrogen may require nitrogen supplementation to avoid slow or sluggish fermentations.

219.02

Llaubères, R.-M. Thoughts on the use of pectinase in white winemaking: the benefit of adding enzymes. Revue des Oenologues 156, 14–16; 2015.

[French] Abstract not available for reproduction

219.03

Rapilly, C., Franzoso, M., Costagli, G., Bernet, B., Ferrarini, R. Simultaneous must extraction and clarification: presenting a new process. Revue des Oenologues 156, 32–34; 2015.

[French] Abstract not available for reproduction

219.04

Del Alamo-Sanza, M., Nevares, I. A dynamic evaluation of the oxygen transfer rate in oak barrels. Wine and Viticulture Journal 30(4), 26–29; 2015.

Researchers from Spain measured the oxygen transfer rate and the distribution of oxygen within barrels, becoming what is believed to be the first to determine the kinetics of oxygen entry into wine barrels. The results will be able to be used to quantify the annual rate of oxygen entry into wine barrels during the ageing process and showed that American oak barrels resulted in greater oxygen doses than their French equivalents.

219.05

Gore, R. Exogenous tannins – what, when, why. Wine and Viticulture Journal 30(4), 30–31; 2015.

Exogenous tannins are one of many tools available to winemakers. Winemakers aim to create wine that meets quality and style requirements and commercial specifications, but exogenous tannins are often used without a clear understanding of their impact.

219.06

Stamp, C. The economics of wine barrels: how to determine the effect of barrel choices on profits. Wines & Vines 96(8), 54–57; 2015.

In this article the author presents a method and a calculator for determining the true cost of barrels. Evaporative loss, labor involved in cleaning, duration of fill and the cost of space all add to a barrel's true cost. One finding is that upgrading from American oak to French oak – or from used to new barrels – is not as expensive as many assume.

Microbiology

219.07

Richter, C.L., Kennedy, A.D., Guo, L., Dokoozlian, N. Metabolomic measurements at three time points of a Chardonnay wine fermentation with *Saccharomyces cerevisiae*. American Journal of Enology and Viticulture 66(3), 294–301; 2015.

The transformation of grape juice to wine is a complex metabolic relationship between two species, the grape plant *Vitis vinifera* and yeast, primarily *Saccharomyces cerevisiae*. The final molecular composition resulting from the grape-yeast relationship contributes to the flavor, aroma, and mouthfeel of the wine. In this study, we examined this complex relationship by determining the exo- and endo-metabolome (the collection of metabolites present extra- and intracellularly, respectively) of yeast at three time points (days 4, 9, and 15) of a Chardonnay wine fermentation. We identified and tracked 227 metabolites in the exo-metabolome and 404 metabolites in the endometabolome, and each metabolite was grouped into metabolic pathways or into metabolite families. Considerable metabolic variation was present at each stage of the fermentation, illuminating metabolic patterns suggesting that regulation of the yeast metabolic pathways is coupled to the fermentation progress. Analysis of the differential utilization and production of primary and secondary metabolites during a wine fermentation in this work provides a key understanding of cell-communication mechanisms relevant to metabolic engineering and industrial biotechnological processes.

Abstract available online at http://doi.org/82s

219.08

Sun, Y., Li, E., Qi, X., Liu, Y. Changes of diversity and population of yeasts during the fermentations by pure and mixed inoculation of *Saccharomyces cerevisiae* strains. Analytical Microbiology 65(2), 911–919; 2015.

Abstract available online at http://doi.org/8mq

219.09

Beckner Whitener, M.E., Carlin, S., Jacobson, D., Weighill, D., Divol, B., Conterno, L., Du Toit, M., Vrhovsek, U. Early fermentation volatile metabolite profile of non-*Saccharomyces* yeasts in red and white grape must: a targeted approach. LWT - Food Science and Technology 64(1), 412–422; 2015.

Abstract available online at http://doi.org/8mp

219.10

Crandles, M., Reynolds, A.G., Khairallah, R., Bowen, A. The effect of yeast strain on odor active compounds in Riesling and Vidal Blanc icewines. LWT - Food Science and Technology 64(1), 243–258; 2015.

Abstract available online at http://doi.org/8mn

219.11

Synos, K., Reynolds, A.G., Bowen, A.J. Effect of yeast strain on aroma compounds in Cabernet Franc icewines. LWT - Food Science and Technology 64(1), 227–235; 2015.

Abstract available online at http://doi.org/8mm

219.12

Brice, C., Legras, J.-L., Tesnière, C., Blondin, B. Why do yeast have different nitrogen requirements? Revue Française d'Oenologie 271, 14–17; 2015.

[French] Abstract not available for reproduction

219.13

Marchal, A., Marullo, P., Moine, V., Dubourdieu, D. Recent understanding on fermentation parameters which influence the sweet taste of dry wines. Revue des Oenologues 156, 26–28; 2015.

[French] Abstract not available for reproduction

219.14

Moss, R. Microbial origins of key wine aromas: part III; higher alcohols and volatile phenols. Wines & Vines 96(8), 71–74; 2015.

This article is part of a series that covers the fungal and bacterial origins of wine aromas. Part 1 covered esters and aldehydes (January 2015). Part II included volatile fatty acids and sulfurous compounds (March 2015). The old adage 'one man's trash is another man's treasure' holds true with these compounds.

219.15

Howe, P.A., Ebeler, S.E., Sacks, G.L. Review of thirteen years of CTS winery laboratory collaborative data. American Journal of Enology and Viticulture 66(3), 321–339; 2015.

Data from 13 years (78 wines) of wine industry laboratory proficiency testing were reviewed. After outlier removal, within-laboratory precision (repeatability) and across-laboratory precision (reproducibility) were determined for measurements of alcohol, titratable acidity, volatile acidity, total SO_2, free SO_2, malic acid, specific gravity, pH, residual sugar, glucose plus fructose, and absorbance at 420 and 520 nm. Reproducibility was 3.6 to 57.8 times higher than repeatability. Reproducibility was evaluated with Horwitz ratios (HorRat); only alcohol, titratable acid, and total SO_2 had acceptable values (mean HorRat <2). Measurement z scores demonstrated non-normal distributions, particularly for specific gravity, likely due to confounding with density. Reproducibility did not vary significantly over time, with exceptions: imprecision of ethanol measurements decreased (improved) by 0.0084% v/v per year, while the imprecision of titratable acidity, pH, and malic acid measurements increased by 0.0089 g/L as tartaric, 0.0008 pH units, and 0.13 g malic acid/L per year, respectively. The imprecision of reproducibility and repeatability generally increased with analyte concentration, with notable exceptions for alcohol (both), volatile acidity (reproducibility), and total SO_2 (repeatability). The methods or instruments used to determine alcohol, titratable acidity, free and total SO_2, and volatile acidity changed significantly over time. Significant differences were observed among techniques for many analytes, which can be rationalized by attribution to well-known matrix effects manageable in a properly run method; e.g., higher apparent concentrations of alcohol by boiling point methods in high-sugar matrices. Evaluation of method accuracy was not possible due to the lack of wine reference materials with known true values. Results demonstrate the need for industry-wide improvement in analytical performance for some assays, and the potential benefit of adopting criteria guidelines for method performance.

Abstract available online at http://doi.org/867

219.16

Pérez-Magariño, S., Martínez-Lapuente, L., Bueno-Herrera, M., Ortega-Heras, M., Guadalupe, Z., Ayestarán, B. Use of commercial dry yeast products rich in mannoproteins for white and rosé sparkling wine elaboration. Journal of Agricultural and Food Chemistry 63(23), 5670–5681; 2015.

In sparkling wines, mannoproteins released during yeast autolysis largely affect their final quality. This process is very slow and may take several months. The aim of this work was to study the effect of several commercial dry yeast autolysates on the chemical composition, foam, and sensory properties of white and rosé sparkling wines aged on lees for 9 months during two consecutive

vintages. The addition of these products in the tirage phase did not affect either the content of phenolic compounds, amino acids, and biogenic amines or the foam properties. The commercial product with the highest mannoprotein content and the highest purity caused significant changes in the volatile composition of the wines and enhanced the fruity aromas in both Verdejo and Godello sparkling wines.

Abstract also available online at http://doi.org/8mj

219.17

Perini, M., Rolle, L., Franceschi, P., Simoni, M., Torchio, F., Di Martino, V., Marianella, R.M., Gerbi, V., Camin, F. H, C, and O stable isotope ratios of *Passito* wine. Journal of Agricultural and Food Chemistry 63(5), 5851–5857; 2015.

In this study we investigated the effect of the grape withering process occurring during the production of Italian *passito* wines on the variability of the $(D/H)_I$, $(D/H)_{II}$, $\delta^{13}C$, and $\delta^{18}O$ of wine ethanol and the $\delta^{18}O$ of wine water. The production of PDO *Erbaluce di Caluso Passito* in five different cellars in Piedmont (Italy) was considered in two successive years. Moreover, samples of 17 different traditional Italian *passito* wines taken at different stages of maturation were taken into account. We found that the $\delta^{18}O$ of must and wine water and the $\delta^{18}O$ of ethanol decrease in the case of passito wines produced in Northern and central Italy using postharvest drying of the grapes in dedicated ventilated or unventilated fruit drying rooms (*fruttaio*), during autumn-winter. For *passito* wines produced in Southern Italy, where the main technique involves withering on the plant (*en plein air*), $\delta^{18}O$ tends to increase. The $(DH)_I$ of wine ethanol did not change during withering, whereas the $(DH)_{II}$ and $\delta^{13}C$ values changed slightly, but without any clear trend. Particular attention must be therefore paid in the evaluation of the $\delta^{18}O$ data of *passito* wines for fraud detection.

Abstract also available online at http://doi.org/8mg

219.18

Mihnea, M., González-Sanjosé, M.L., Ortega-Heras, M., Pérez-Magariño, S. A comparative study of the volatile content of Mencía wines obtained using different pre-fermentative maceration techniques. LWT - Food Science and Technology 64(1), 32–41; 2015.

Abstract available online at http://doi.org/8mk

219.19

Nel, A., Louw, L., Lambrechts, M., Van Rensburg, P. The influences of different winemaking techniques on the mouthfeel of Shiraz grapes. Wine and Viticulture Journal 30(4), 32–36; 2015.

South African researchers examined 20 young Shiraz wines from both cool and warm regions to determine the effect of ripeness and different tannin extraction methods on the sensory properties, particularly the mouthfeel, of wine.

219.20

Prida, A., Moreau, T.S. Correlation between wood extractives and sensory perception in oak-aged wines. Wines & Vines 96(7), 56–61; 2015.

It is well known that sensory results of élevage are not often consistent and predictable. This gives the operation charm because it has an artisan character. But today winemakers desire to obtain results as consistent and as close as possible to their expectations. That is why a robust model using the chemical analysis of wood as input data and allowing the prediction of sensory perception of wood in wine is required. The major difficulties to overcome for development of such a model are the natural variability of wood extractives, knowledge of wood compounds' evolution during élevage and the complexity of the interaction between oak flavors and wine components.

Marketing and packaging

219.21

Ugliano, M., Diéval, J.-B., Begrand, S., Vidal, S. Managing reduction in wine through the choice of closure. Revue des Oenologues 156, 45–48; 2015.

[French]Abstract not available for reproduction

219.22

Anderson, K. Is varietal or regional distinctiveness the key to re-building competitiveness? Wine and Viticulture Journal 30(4), 53–57; 2015.

Despite much discussion within the Australian wine industry in recent years about alternative or emerging varieties, data shows that our varietal mix is still very much concentrated on a few French varieties.

219.23

Forbes, S.L., Dean, D. Consumer perceptions of wine brand names. Wines & Vines 96(8), 58–64; 2015.

A Maori-owned wine company in New Zealand asked us: "What does a Maori brand name mean to wine consumers?" We had to admit that we did not know the answer to this question, and we could not find one in academic literature either. This led to the formation of a project team to a) categorize the wine brand names in New Zealand, and b) examine consumer perceptions of these brand name categories in terms of quality, price, purchase intentions and ability to pronounce and ask for the brand by name.

Environment

219.24

Buelow, M.C., Steenwerth, K., Silva, L.C.R., Parikh, S.J. Characterization of winery wastewater for reuse in California. American Journal of Enology and Viticulture 66(3), 302–310; 2015.

More than thirty percent of the United States is currently in a drought that is expected to have profound social, economic, and environmental impacts. The intensification of drought conditions in Southern and Western regions of the country has spurred interest in wastewater reuse in agriculture, including in wine production. Presented here is the first data set of its kind to support California growers and vintners in the reuse of treated winery wastewater (WWW). The data provide a detailed description of California WWW, with particular emphasis on salinity, to enable the benefits and risks of land application to be assessed. Monthly samples were obtained over a 20-month period from 18 wineries in Ukiah, Napa, Lodi, King City, and Paso Robles. Samples collected before and after physicochemical and biological treatment were analyzed for pH, electrical conductivity (EC), cation and anion concentrations, specific ultraviolet absorbance ($SUVA_{254}$), dissolved organic carbon (DOC), and biological oxygen demand (BOD_5). The pH of the WWW varied widely (from 3 to 12). Organic parameters ($SUVA_{254}$, DOC, and BOD_5) showed that treatment effectively decreased organic carbon to levels that would not have negative effects on plant growth or soil. Cation concentrations (Na^+, K^+, Ca^{2+}, Mg^{2+}) in WWW were not reduced by treatment. These baseline data confirm that dissolved salts pose a challenge to the reuse of WWW. However, total salinity of the WWW was moderate (mean EC of 1.0 dS/m) and usually below risk thresholds for common winegrape rootstocks and soil salinity hazards. The conditions under which WWW could be recommended as a water management option in California are described.

Abstract available online at http://doi.org/82t

Viticulture

General

219.25

Baldwin, J. Yield estimation software. Australian & New Zealand Grapegrower & Winemaker 619, 38–39; 2015.

The value of an accurate yield prediction can't be understated. It has implications all along the supply chain. In the case of viticulture, everything from transport and processing of the grapes, to wine sales, to packing, to shipping can be streamlined and improved.

219.26

Collins, C. A smartphone app could help growers optimise vine balance. Australian & New Zealand Grapegrower & Winemaker 618, 30; 2015.

An Australian Grape & Wine Authority (AGWA) backed research project led by Cassandra Collins and Roberta De Bei and a team of colleagues from the University of Adelaide, Treasury Wine Estates and DJs Growers are working to identify which vineyard canopy measures most accurately indicate optimal vine performance – while at the same time developing a smartphone app that will make recording those measurements commercially practical.

219.27

Sadras, V. International viticulture gathering: experts meet in Montpellier. Australian & New Zealand Grapegrower & Winemaker 619, 46–49; 2015.

Victor Sadras, from the South Australia Research and Development Institute, attended the 19th International Meeting of Viticulture GiESCO (Group of international Experts of Vitivinicultural Systems for Co-operation) in Montpellier during late May and early June. The main themes of the conference included: ecophysiology, water and irrigation; climate and terroir; training and cultivation techniques; grape berry and microclimate; new technologies; as well as rootstock and soil. Here, Sadras reports on the key topics.

219.28

Gogoll, N. Big changes to Entwine. Australian & New Zealand Grapegrower & Winemaker 619, 30; 2015.

New arrangements for the management of the wine industry's national environmental assurance program were announced in July with management of Entwine Australia transferring from the Winemakers' Federation of Australia (WFA) to The Australian Wine Research Institute (AWRI).

219.29

Macle, D. Fine-tuning the art of berry sensory analysis in France. Australian & New Zealand Grapegrower & Winemaker 619, 42; 2015.

Diana Macle, a freelance journalist specialising in the wine industry and based in France, reports on developments in evaluation of ripening grapes but finds that tasting berries is still the ultimate test.

219.30

Siebers, M. A new scientific tool for Australian vineyards: rapidly measure vine performance with the grapevine rover sensor. Australian & New Zealand Grapegrower & Winemaker 619, 32–33; 2015.

Working in the CSIRO Wine Grapes and Horticulture Group at the Waite Campus in Adelaide, post-doctoral fellow Matthew Siebers is involved in a new project aimed at expanding field phenomics techniques into vineyards. Working with Everard Edwards, Mark Thomas and Rob Walker, the project involves the development of a field-based rover that utilizes light radar (LiDAR) to rapidly collect biological information to assist trait evaluation and assessment of management techniques.

219.31

Ochßner, T. A good nursery pays off: the rewards from caring for young vines after planting. Deutsche Weinmagazin 15, 24–28; 2015.

[German]Abstract not available for reproduction

219.32

Narduzzi, L., Stanstrup, J., Mattivi, F. Comparing wild American grapes with *Vitis vinifera*: a metabolomics study of grape composition. Journal of Agricultural and Food Chemistry 63(30), 6823–6834; 2015.

We analyzed via untargeted UHPLC-ESI-Q-TOF-MS the metabolome of the berry tissues (skin, pulp, seeds) of some American *Vitis* species (*Vitis cinerea, Vitis californica, Vitis arizonica*), together with four interspecific hybrids, and seven *Vitis vinifera* cultivars, aiming to find differences in the metabolomes of the American *Vitis* sp. versus *Vitis vinifera*. Apart from the known differences, that is, more complex content of anthocyanins and stilbenoids in the American grapes, we observed higher procyanidin accumulation (tens to hundreds of times) in the *vinifera* skin and seeds in comparison to American berries, and we confirmed this result via phloroglucinolysis. In the American grapes considered, we did not detect the accumulation of pleasing aroma precursors (terpenoids, glycosides), whereas they are common in *vinifera* grapes. We also found accumulation of hydrolyzable tannins and their precursors in the skin of the wild American grapes, which has never been reported earlier in any of the species under investigation. Such information is needed to improve the design of new breeding programs, lowering the risk of retaining undesirable characteristics in the chemical phenotype of the offspring.

Abstract also available online at http://doi.org/8mh

219.33

Hoemmen, G., Altman, I., Rendleman, M. Impact of sustainable viticulture programs on American Viticultural Areas: Lodi AVA. Journal of Wine Research 26(3), 169–180; 2015.

Winegrape productivity and quality are important characteristics in the production of superior wines and efforts to maintain these features have potential environmental impacts. Agricultural adjustments and conservation initiatives that anticipate potential harmful impacts are essential for sustainability. Recent attempts to institute practical sustainable practices for the production of wine include the Lodi Rules for Sustainable Winegrowing. Our research examined the effects of this program over time. Did sustainable viticulture initiatives that focus on both social and environmental issues also translate into economic success? In order to investigate the economic impacts of the Lodi Sustainable Viticulture initiatives the relationship between weighted average price per ton and sustainable development variables, are investigated in are regression model. The model relies on a time series analysis using California Crush Reports from 1976 to 2012 (NASS 2012). We found the publication of the Lodi Rules Workbook exhibited the most substantial effect (-$232.87). This effect was negative; therefore our hypothesis that most positive economic effect was confirmed as the implementation of the Sustainable Winegrowing Program, produced an added benefit of $98.28 over time.

219.34

Perry, J., Beduisson, S., Moncomble, D. Yield predication tools in Champagne: pollen traps. Le Vigneron Champenois 136(6), 32–37; 2015.

[French]Abstract not available for reproduction

219.35

Edwards, E.J., Clingeleffer, P.R., Walker, A.R., Smith, J., Holzapfel, B., Barril, C. Understanding the influence of vine balance on berry composition: 2013–14 season project update. Wine and Viticulture Journal 30(4), 43–48; 2015.

Does manipulating vine balance directly affect fruit composition? The answer to this question is the aim of a collaborative project under way between CSIRO Agriculture and the National Wine and Grape Industry Centre (NWGIC) and the results from the first season are in.

219.36

Hayes, P. What's the world doing in grape and wine research? Part 3. Wine and Viticulture Journal 30(4), 15–19; 2015.

Peter Hayes presents Part 3 of a series of articles published by the *Wine & Viticulture Journal* in recent months that have provided a snapshot of all the projects currently being undertaken by the world's key grape and wine research organisations. Part 1 was published in the March/April 2014 issue and focussed on Australia's projects while Part 2, published in the May/June issue the same year, looked at France, Germany, Italy, New Zealand, South Africa, UK and US. Part 3 gives readers an insight to what our competitors particularly in South America are up to.

Physiology and biotechnology

219.37

Cook, M.G., Zhang, Y., Nelson, C.J., Gambetta, G., Kennedy, J.A., Kurtural, S.K. Anthocyanin composition of Merlot is ameliorated by light microclimate and irrigation in central California. American Journal of Enology and Viticulture 66(3), 266–278; 2015.

An experiment was conducted in central California on Merlot to determine the interaction of time of mechanical leaf removal (control, prebloom, or post fruit-set) and irrigation amount (sustained deficit irrigation (SDI) at 0.8 of estimated vineyard evapotranspiration (ET_c) or regulated deficit irrigation (RDI) at 0.8 from budbreak to fruit set, 0.5 from fruit set to veraison, and 0.8 from veraison to leaf fall) on productivity, berry skin anthocyanin concentration and composition, and unit cost per hectare. Prebloom leaf removal (applied ~100 GDD prior to bloom) consistently

maintained at least 20% of photosynthetically active radiation in the fruit zone in both years of the study, while post fruit-set leaf removal was inconsistent across years. The RDI treatments reduced berry mass, while post fruit-set leaf removal reduced berry skin mass. Prebloom leaf removal did not affect yield in either year. Exposed leaf area and leaf area to fruit ratio (m^2/kg) were reduced with leaf removal. The RDI consistently increased juice soluble solids. Anthocyanin concentration increased with prebloom leaf removal in both years, but irrigation treatments had no effect. The proportions of acylated and hydroxylated anthocyanins were not affected by leaf removal. In both years, SDI increased di-hydroxylated anthocyanins while RDI increased tri-hydroxylated anthocyanins. Prebloom leaf removal when combined with RDI optimized total skin anthocyanins (TSA) per hectare, while no leaf removal and SDI produced the lowest TSA. The cost to produce one unit of TSA was reduced 35% by combining prebloom leaf removal and RDI when compared to no leaf removal and SDI. This study provides information to red winegrape growers in warm regions on how to manage fruit to enhance anthocyanin concentration and the proportion of hydroxylation, while reducing input costs through mechanization and reduced irrigation.

Abstract available online at http://doi.org/82r

219.38

Gerzon, E., Biton, I., Yaniv, Y., Zemach, H., Netzer, Y., Schwartz, A., Fait, A., Ben-Ari, G. Grapevine anatomy as a possible determinant of isohydric or anisohydric behavior. American Journal of Enology and Viticulture 66(3), 340–347; 2015.

Isohydric plants maintain constant water potential through rapid stomatal closure, whereas anisohydric plants only close their stomata at very low water potentials. However, distinctions between isohydric and anisohydric behaviors among different cultivars of the same species are unclear. This study compared the physiological response to prolonged drought stress in the isohydric Grenache and the anisohydric Shiraz cultivars of the *Vitis vinifera* species. Plants were exposed to 60-day periods of deficit irrigation (25% of plant water consumption under well-watered conditions) during the summers of 2011 and 2012. Physiological measurements , water potential, leaf gas exchange, canopy area, leaf senescence, stem characteristics, and morphological characteristics were analyzed. Stomatal conductance was consistently lower in Grenache than in Shiraz at all values of midday stem and predawn leaf water potentials, respectively. The Shiraz plants exhibited greater vegetative growth and less defoliation than the Grenache plants in response to water deficit. Anatomical architecture analyses revealed that Grenache plants had greater xylem vessel diameter, hydraulic conductivity, and stomatal density than the Shiraz plants. These results suggest isohydric and anisohydric behaviors may be well-defined, time-regulated responses rather than distinct mechanisms that plants use to cope with drought stress. The rapid response to water deficit exhibited by isohydric plants may be because they are more vulnerable to fatal xylem embolisms than anisohydric plants. Thus, the accelerated response allows isohydric plants

to avoid drought stress and minimize risk of xylem cavitation, but may lower the plant's ability to survive moderate stress of prolonged drought.

Abstract available online at http://doi.org/82w

219.39

Shellie, K. Foliar reflective film and water deficit increase anthocyanin to soluble solids ratio during berry ripening in Merlot. American Journal of Enology and Viticulture 66(3), 348–356; 2015.

Elevated temperatures can decrease the ratio of anthocyanins to soluble solids in red-skinned berries, and warming trends in grape production regions have raised concern about color to alcohol balance in wines produced from fruit with altered ratios. This study investigated the effect of a foliar reflective film on the ratio of anthocyanins to soluble solids in deficit-irrigated Merlot grapevines over a 5-year period. Vines were irrigated to provide 90 or 35% of estimated water demand (DI90 and DI35, respectively) and were either sprayed with a kaolin-based reflective film or left unsprayed using a replicated, split-plot design. During the 2008–2010 seasons, crop load was adjusted in half of the vines within each subplot by removing 50% of clusters prior to bloom. Regardless of crop load, the reflective film increased the ratio of anthocyanins to soluble solids in DI90 and DI35 when the concentration of soluble solids was 18 to 24%. The reflective film did not alleviate the decrease in yield or titratable acidity associated with water deficit, and it had no influence on yield per vine. However, it reduced the number of berries per cluster, especially in DI35-irrigated grapes. In DI90-irrigated vines, decreased berry number per cluster was associated with increased berry fresh weight and anthocyanin content per berry. Cluster removal influenced berry composition at harvest only under DI35 irrigation. The ratio of anthocyanins to soluble solids during ripening was higher in DI35-irrigated plants than in those under DI90 irrigation. Taken together, foliar reflective film combined with deficit irrigation increased the ratio of anthocyanins to soluble solids under arid conditions with high solar radiation.

Abstract available online at http://doi.org/82x

219.40

Asproudi, A., Piano, F., Anselmi, G., Di Stefano, R., Bertolone, E., Borsa, D. Proanthocyanidin composition and evolution during grape ripening as affected by variety: Nebbiolo and Barbera cv. Journal International des Sciences de la Vigne et du Vin 49(1), 59–69; 2015.

Abstract available online at http://bit.ly/1PBIbCT

219.41

Zufferey, V., Spring, J.-L., Voinesco, F., Viret, O., Gindro, K. Physiological and histological approaches to study berry shrivel in grapes. Journal International des Sciences de la Vigne et du Vin 49(2), 113–125; 2015.

Abstract available online at http://bit.ly/1Maxerc

219.42

Zufferey, V., Spring, J.-L., Voinesco, F., Viret, O., Gindro, K. Study of berry shrivel in the Humagne Rouge grape variety. Revue Suisse de Viticulture, Arboriculture, Horticulture 47(4), 224–230; 2015.

[French]An anatomical and physiological study of the rachis of healthy clusters and clusters affected by berry shrivel was conducted on the Humagne Rouge grape variety at the Agroscope experimental farm in Leytron (canton of Valais). The symptoms of berry shrivel (a berry-ripening disorder) appeared about ten days after veraison – the beginning of the ripening period, when clusters began to change colour – and depended to a large extent on the vine water status. Berry shrivel was more pronounced in vines which were not subject to any water restrictions (i.e. those which were substantially irrigated before and after veraison) than in those subject to a moderate-to-strong water stress from veraison onwards. Moreover, strong fluctuations in temperature around veraison exacerbated susceptibility to berry shrivel. A destroyed primary phloem was observed in the rachis of clusters affected by berry shrivel, with the formation of a hard, non-functional secondary phloem and disorganised phloem-tissue cell contents.

Climate and soils

219.43

Tomasi, D., Battista, F., Gaiotti, F., Mosetti, D., Bragato, G. Influence of soil on root distribution: implications for quality of Tocai Friulano berries and wine. American Journal of Enology and Viticulture 66(3), 363–372; 2015.

The Tocai Friulano cultivar grafted onto SO4 rootstock was studied for three years in four soil types (SU1 to SU4) in the Colli Orientali del Friuli AOC, Italy. The grapevine root system, soil chemical and physical properties, soil water regime, vine performance, and grape and wine quality were studied with the aim of better understanding how roots mediate the vine response to different soil characteristics. Climate was homogeneous in the study area, and the effect of weather was evaluated on an annual basis. Our results showed that soil played a major role in water availability to the vine and affected vine yield components, vegetative growth, vine balance, grape composition, and wine sensory profile. Observation of roots provided information about variability in vine performance and wine characteristics. Good, stable wine quality was obtained

only in soils that allowed development of a deep root system (SU1 and SU4); these soils produced satisfactory wine quality even in dry seasons. In dry years, an imbalance between vegetative and reproductive growth occurred in shallow soils, in which the root systems were thin and superficial (SU2), and led to poor-quality grapes and wines. Conversely, the wines showed more interesting characteristics when the root systems were more dense and distributed throughout the soil profile (SU3). These results underline the importance of analyzing root characteristics when evaluating the vine response to the soil-climate environment.

Abstract available online at http://doi.org/82z

219.44

Gaiotti, F., Tomasi, D. Truly sustainable viticulture must start at the roots. Australian & New Zealand Grapegrower & Winemaker 619, 51–57; 2015.

In this article Federica Gaiotti and Diego Tomasi, from the Centre for Viticultural Research in Conegliano, Italy, examine how cared-for root systems can benefit grapegrowers. They look at important topics that emerged from the first International Conference on the Grapevine Root Systems and how the follow-up work is set to encourage innovation and competitiveness in the winegrowing sector.

219.45

Gogoll, N. The effect of climate change. Australian & New Zealand Grapegrower & Winemaker 618, 42; 2015.

The University of Melbourne released a report in March that might make grapegrowers uncomfortable. The report, *Appetite for Change: Global warming impacts on food and farming regions in Australia*, points out that wine grapegrowing is Australia's largest fruit industry and key grapegrowing regions will face warmer and drier conditions through climate changes. Prepared by climate scientists David Karoly and Richard Eckard at the University of Melbourne, the report reveals the impact shifting rainfall patterns, extreme weather, warming oceans, and climate-related diseases will have on the production, quality and cost of food in the future.

219.46

Mader, A. Case study: post frost management strategies. Australian & New Zealand Grapegrower & Winemaker 619, 26–28; 2015.

Last month Amanda Mader, from Gumpara Vineyards, presented her findings based on the assessment of a significant frost event in the Barossa in October 2014. She concluded there would be positive outcomes regarding fruitfulness in the approaching 2015/16 season. In this case study, Mader looks more closely at post frost management strategies undertaken in Barossa Valley vineyards.

219.47

Bonilla, I., Martínez de Toda, F., Martínez-Casasnovas, J. A. Unexpected relationships between vine vigor and grape composition in warm climate conditions. Journal International des Sciences de la Vigne et du Vin 49(2), 127–136; 2015.

Abstract available online at http://bit.ly/1jV89Uh

219.48

Retzlaff, R., Molitor, D., Behr, M., Bossung, C., Rock, G., Hoffmann, L., Evers, D., Udelhoven, T. UAS-based multi-angular remote sensing of the effects of soil management strategies on grapevine. Journal International des Sciences de la Vigne et du Vin 49(2), 85–102; 2015.

Abstract available online at http://bit.ly/1OU3fCN

219.49

Yzarra, W., Sanabria, J., Caceres, H., Solis, O., Lhomme, J.-P., Impact of climate change on some grapevine varieties grown in Peru for pisco production. Journal International des Sciences de la Vigne et du Vin 49(2), 103–112; 2015.

Abstract available online at http://bit.ly/1NoSMO9

219.50

Caillon, M. A field day to explore alternative vineyard practices. La Vigne 277, 34–35; 2015.

[French]Abstract not available for reproduction

219.51

Hoare, T. Mulching under vine – options and their benefits. Wine and Viticulture Journal 30(4), 51–52; 2015.

Under-vine mulching in vineyards was found to be uneconomic by Agnew et al. (2002) after their three-year research project in Marlborough, New Zealand from 1999–2000 to 2001–02. The cost of producing and applying mulch under vine was found to outweigh the cost savings gained

from applying the mulch. They did emphasise that while cost savings in irrigation, fertiliser and herbicide from mulching were not economically beneficial, there were long-term potential benefits that were difficult to quantify in economic terms. Since this study was carried out, there have been increases in the costs of irrigation, fertiliser and herbiciding. Why do successful growers mulch and what are some of the mulches they prefer?

219.52

White, R. E. Understanding vineyard soils: second edition. Wines & Vines 96(7), 70–72; 2015.

This excerpt from the book *Understanding Vineyard Soils* presents chapter 6 entitled 'Putting it all together: managing soil for specific winemaking objectives'. The author explains how soil properties in a vineyard in the Mornington Peninsula could contribute to the typicity of Pinot Noir wines made from the site.

Vineyard management systems

219.53

Porten, M., Regnery, D. The miracle disc: a success story. Applications for a Kress finger weeder and disc plough. Deutsche Weinmagazin 15, 20–23; 2015.

[German]Abstract not available for reproduction

219.54

Lobos, G. A., Acevedo-Opazo, C., Guajardo-Moreno, A., Valdés-Gómez, H., Taylor, J. A., Laurie, V. F. Effects of kaolin-based particle film and fruit zone netting on Cabernet-Sauvignon grapevine physiology and fruit quality. Journal International des Sciences de la Vigne et du Vin 49(2), 137–144; 2015.

Abstract available online at http://bit.ly/1PBPL0a

219.55

Pérez-Bermúdez, P., Olmo, M., Gil, J., García-Ferriz, L., Olmo, C., Boluda, R., Gavidia, I. Effects of traditional and light pruning on viticultural and oenological performance of Bobal and Tempranillo vineyards. Journal International des Sciences de la Vigne et du Vin 49(2), 145–154; 2015.

Abstract available online at http://bit.ly/1MaylaC

219.56

Stef, C. Organic and BD viticulture leads to less-productive vines. La Vigne 277, 28–29; 2015.

[French] Abstract not available for reproduction

219.57

Rosner, F.G., Mehofer, M. Vineman. Modification of canopy and cluster structure. MK Jahresbericht 2015, 106–107; 2015.

Abstract not available for reproduction

Pests and diseases

219.58

Dry, I., Thomas, M. Protecting winegrapes from mildew. Australian & New Zealand Grapegrower & Winemaker 619, 58–60; 2015.

A better understanding of how plants resist attack by fungal and oomycete pathogens, and the successful introduction of durable and effective resistance genes into grapevines, will lead to increases in productivity and quality through a reduction in the dependence on chemical inputs for disease control.

219.59

Anon. Deadly vine disease bacteria hits France. Decanter 41(4), 9; 2015.

Bacteria (*Xylella fastidiosa*) known to cause a vine disease which has blighted California's vineyards for years has now been discovered in France for the first time.

219.60

Regner, F. Investigations of infestation and inhibition of esca disease. MK Jahresbericht 2015, 98–99; 2015.

Abstract not available for reproduction

219.61

Luque, J., Camprubí, A., de Herralde, F., Savé, R., Calvet, C. Fungal diseases of the vine: a future perspective. La Semana Vitivinicola 3.450, 1110–1116; 2015.

[Spanish] Abstract not available for reproduction

219.62

Ayres, M., Sosnowski, M., Wilcox, W. Investigating angular leaf scorch disease in the USA and implications for Australian biosecurity. Wine and Viticulture Journal 30(4), 49–50; 2015.

Angular leaf scorch (ALS) is an economically significant disease of grapevines which occurs in North-Eastern North America but has not been reported in Australia, where it is listed in the Viticulture Industry Biosecurity Plan (VIBP) as a high priority exotic threat. The disease, caused by the fungus *Pseudopezicula tetraspora*, may cause significant yield loss in Australian vineyards if it becomes endemic and would incur significant costs for control programs. Therefore, it is vital to ensure that we are prepared for a rapid and effective eradication response in the event of an incursion.

Vine improvement and varieties

219.63

Meneghetti, S., Calo, A., Bavaresco, L., Tomasi, D. Genetic variability in Montepulciano and Sangiovese grape varieties. Bulletin de l'OIV 87(1004–1005-1006), 557–572; 2014.

[French] The genus *Vitis* is characterized by a large number of cultivars, ecotypes, biotypes and clones. This great morphological and genetic variability is causing confusions and ambiguity for biotypes and clones identification, mainly in some varieties which are widely distributed and cultivated for centuries. The molecular approaches are essential for internationally accepted grapevine identification and for research on genetic inter- and intra-varietal variability. In this study, 63 genotypes of Sangiovese from different Italian regions were analyzed in order to identify the cultivar and potential molecular differences among the genotypes. In addition to these materials, 15 accessions of Montepulciano were also investigated. Microsatellite analysis showed two main biotypes profiles of 'Sangiovese material': the SSR profile of Sangiovese cultivar and another second microsatellite profile, called in this paper 'Sangiovese piccolo' or 'Sanvicetro' (according to Calò et al., 2000). Both 'Sangiovese biotypes' co-exist in the Sangiovese DOC or DOCG zones. AFLP, SAMPL, M-AFLP and ISSR molecular markers were able to distinguish all the Sangiovese, 'Sanvicetro' and Montepulciano accessions. The intra-varietal results proved the existence of genetic variability among the accessions of these three groups (i.e. Sangiovese, 'Sanvicetro' and Montepulciano) from different geographic areas. They suggest the need for preservation of autochthonous grapevine biotypes, found in different zones, in order to make the correct choice and selection on multiplication grape material.

219.64

Bonné, J. The Italian renaissance. Decanter 40(California 2015), 34–37; 2015.

Rather than emulate their European cousins, the modern wave of Californian Italo-phile producers is letting the terroir do the talking, applying a local twist to their Italian varieties.

219.65

D'Agata, I. Dolcetto d'Alba. Decanter 40(12), 67–75; 2015.

Dolcetto makes some of Piedmont's easiest to drink, everyday wines. Less extreme in its acidity and lack of tannic framework than wines made with Barbera, and softer and lighter bodied than those from Nebbiolo, Dolcetto gives wines that fall somewhere in between.

219.66

Livingstone-Learmonth, J. Southern Rhône whites. Decanter 40(12), 77–84; 2015.

Perspective is important when considering the whites of the Southern Rhône. In his first Rhône book, written in 1974, the author stated: 'White Châteauneuf du Pape is no more than a novelty, and apart from the Domaines de Nalys, La Terre Ferme, Beaucastel, Les Clefs d'Or and Château Rayas, it should generally be avoided.' At the time, a domaine's white was an afterthought. Haphazard planting and harvesting, and no cooling equipment, meant that the wines often oxidised after a few years. In recent times, afterthought has become forethought. Planting in mixed-variety blocks, closer attention to the soils and fresher locations, and temperature-controlled vinifications are now the norm.

219.67

Spurrier, S. New World Syrah for Rhône lovers. Decanter 40(12), 18–26; 2015.

One of the great red grape varieties, Syrah – or Shiraz – has found huge success far from its Rhône homeland. Steven Spurrier gives his thoughts on New World Syrah beyond the Rhône, while our regional experts recommend the 70 best wines to seek out.

219.68

Traucki, D. Being Franc. WBM: Australia's Wine Business Magazine September-October, 88–89; 2015.

About 80 wineries grow Cabernet Franc in Australia, but most of it is used for blending. A growing number of wineries have started producing it as a varietal wine or as a Cabernet Franc-predominant blend. This article discusses some of those Aussie Cabernet Franc blends.

219.69

Traucki, D. Scrumptious Sagrantino. WBM: Australia's Wine Business Magazine July-August, 84–85; 2015.

The plantings of Sagrantino in Australia are less than 20 years old and already they are making outstanding wines with great depth and power. The future looks bright.

219.70

Cevaal, A. Lost Valley Cortese found at Corvaal wines. Wine and Viticulture Journal 30(4), 59–60; 2015.

The author shares his experience of creating Australia's first commercial Cortese, a rare Northern Italian varietal, in the cool-climate region of Victoria.

219.71

Logan, S. Lagrein gives Shiraz drinkers something else to think about. Wine and Viticulture Journal 30(4), 78–80; 2015.

This issue's tasting threw the spotlight on Australian-made Lagrein, with the more recent vintages particularly impressing our tasting panel and showing an evolution in winemakers' understanding of this North-Eastern Italian variety.

219.72

Scott, S. Bringing Lagrein to life. Wine and Viticulture Journal 30(4), 75–77; 2015.

Originating from the northeastern Italian region of Trentino-Alto Adige, in the foothills of the Alps, Lagrein is being embraced by a growing number of Australian producers. Of the local examples submitted to our recent tasting of the varietal, the following three were regarded as the best by our tasting panel and we asked their producers to provide us with some background on their making.

219.73

Penn, M., Anderson, M., Wolpert, J., Walker, A. Search for Zinfandel genetic diversity. Wines & Vines 96(7), 65–69; 2015.

The Zinfandel Heritage Vineyard Project was initiated by Dr. Jim Wolpert of the Department of Viticulture & Enology at the University of California, Davis, in the early 1990s with the goal of finding greater genetic diversity in Zinfandel. In 1990, there were 34,000 acres of Zinfandel growing in the state, and only four registered clonal selections available from Foundation Plant Services. The registered selections were considered to make low colored wines from very large berries and compact clusters prone to bunch rot. Clearly, more genetic options were needed.

219.74

Wise, A. Grape variety trials on Long Island: twenty-two years of research help shape the region's wine industry. Wines & Vines 96(7), 75–79; 2015.

The key points of this article on grape variety trials in Long Island, New York are:

- While clonal evaluation at the Long Island Horticultural Research Center has focused on Chardonnay and Merlot, 47 additional varieties have been screened in the past 22 years.
- The mix of varieties at the research vineyard changes from year to year. Varieties with poor vineyard performance or little interest to industry members are removed, and new varieties are planted based on input from an industry advisory group.
- Hybrids were added to the variety trials in the mid-2000s to document fruit quality and degree of disease tolerance. Ninety percent of growers surveyed in 2010 reported they used information from the trial in making their planting decisions.

219.75

Pérez-Álvarez, E.P., García-Escudero, E., Peregrina, F. Soil nutrient availability under cover crops: effects on vines, must, and wine in a Tempranillo vineyard. American Journal of Enology and Viticulture 66(3), 311–320; 2015.

Cover crops can compete with vines for soil nutrients and thus can affect grapevine development and must and wine quality. The objective of this study was to evaluate the influence of two different cover crops on the availability of soil N, P, K, and Mg and on grapevine nutritional status, vigor, yield, and must and wine quality. The experiment was carried out in a cv. Tempranillo vineyard in La Rioja, Spain, using three treatments: a gramineous cover crop (barley), a leguminous cover crop (clover), and conventional tillage. Soil nitrate evolution and P, K, and Mg were determined, and total biomass and nutrient content of cover crops were measured. We also assessed leaf nutrient content, vine vigor, yield, and must and wine quality. Uptake of P, K, and Mg by cover crops did not reduce the soil availability of those nutrients and did not affect their concentrations in grapevines. The barley cover crop reduced soil N availability from the first year onward and led to decreased leaf N and vine vigor in the third year. Increased polyphenol content and color intensity were observed in the barley treatment in the fourth year, and these changes were more significant in must than in wine. The clover treatment increased soil N availability in years 2 through 4 and led to increased leaf N content in the third and fourth years. The use of barley as a cover crop could be a viable alternative for reducing soil N and improving must and wine quality; however, these effects required time to develop after introduction of the cover crop.

Abstract available online at http://doi.org/82v

219.76

Benito, A., García-Escudero, E., Romero, I., Domínguez, N., Martín, I. Sufficiency ranges (SR) and deviation from optimum percentage (DOP) references for leaf blade and petiole analysis in 'Red Grenache' grapevines. Journal International des Sciences de la Vigne et du Vin 49(1), 47–58; 2015.

Abstract available online at http://bit.ly/1LGMmak

219.77

de Royer Dupré, N., Schneider, R., Payan, J.-C., Salançon, E., Ojeda, H., Razungles, A. Effects of water stress on the aromatic potential of Grenache and Syrah in the Mediterranean zone. Revue des Oenologues 156, 19–21; 2015.

[French] Abstract not available for reproduction

219.78

Dubernet, M., Toussaint, M., Camper, P.-M., Paricaud, T., Coste, M., Kalanquin, D., Prabonnaud, S., Thomas, G., Fil, J., Fourment, J.-D., Tregoat, O. Annual variations in vine nutrition and their consequences in wine: the case of nitrogen and potassium. Revue des Oenologues 156, 22–25; 2015.

[French] Abstract not available for reproduction

Wine and health

Epidemiology

219.79

Lovatt, M., Eadie, D., Meier, P.S., Li, J., Bauld, L., Hastings, G., Holmes, J. Lay epidemiology and the interpretation of low-risk drinking guidelines by adults in the United Kingdom. Addiction 10.1111/add.13072, 1–8; 2015.

Abstract available online at http://doi.org/8s3

219.80

Morrison, C., Smith, K., Gruenewald, P.J., Ponicki, W.R., Lee, J.P., Cameron, P. Relating off-premises alcohol outlet density to intentional and unintentional injuries. Addiction 10.1111/add.13098, 1–9; 2015.

Abstract available online at http://doi.org/6w9

219.81

Ogeil, R.P., Gao, C.X., Rehm. J., Gmel, G., Lloyd, B. Temporal changes in alcohol-related mortality and morbidity in Australia. Addiction 10.1111/add.13213, 1–18; 2015.

Abstract available online at http://doi.org/8sw

219.82

Jayasekara, H., Macinnis, R.J., Room, R., English, D.R. Long-term alcohol consumption and breast, upper aero-digestive tract and colorectal cancer risk: a systematic review and meta-analysis. Alcohol and Alcoholism 10.1093/alcalc/agv110, 1–16; 2015.

Abstract available online at http://doi.org/8sx

219.83

Pandeya, N., Wilson, L.F., Webb, P.M., Neale, R.E., Bain, C.J., Whiteman, D.C. Cancers in Australia in 2010 attributable to the consumption of alcohol. Australian and New Zealand Journal of Public Health 39(5), 408–413; 2015.

Objective: To estimate the proportion and numbers of cancers occurring in Australia in 2010 that are attributable to alcohol consumption. **Methods:** We estimated the population attributable fraction (PAF) of cancers causally associated with alcohol consumption using standard formulae incorporating prevalence of alcohol consumption and relative risks associated with consumption and cancer. We also estimated the proportion change in cancer incidence (potential impact fraction [PIF]) that might have occurred under the hypothetical scenario that an intervention reduced alcohol consumption, so that no-one drank >2 drinks/day. **Results:** An estimated 3,208 cancers (2.8% of all cancers) occurring in Australian adults in 2010 could be attributed to alcohol consumption. The greatest numbers were for cancers of the colon (868) and female breast cancer

(830). The highest PAFs were for squamous cell carcinomas of the oral cavity/pharynx (31%) and oesophagus (25%). The incidence of alcohol-associated cancer types could have been reduced by 1,442 cases (4.3%) – from 33,537 to 32,083 – if no Australian adult consumed >2 drinks/day. **Conclusions:** More than 3,000 cancers were attributable to alcohol consumption and thus were potentially preventable. **Implications:** Strategies that limit alcohol consumption to guideline levels could prevent a large number of cancers in Australian adults.

Abstract available online at http://doi.org/8r8

219.84

Roche, A., Pidd, K., Kostadinov, V. Alcohol- and drug-related absenteeism: a costly problem. Australian and New Zealand Journal of Public Health 10.1111/1753–6405.12414, 1–3; 2015.

Abstract available online at http://doi.org/6xh

219.85

Zheng, Y.-L., Lian, F., Shi, Q., Zhang, C., Chen, Y.-W., Zhou, Y.-H., He, J. Alcohol intake and associated risk of major cardiovascular outcomes in women compared with men: a systematic review and meta-analysis of prospective observational studies. BMC Public Health 15(773), 1–11; 2015.

Background: The prevalence of alcohol intake is increasing among women in some populations. Alcohol consumption plays an important role in the risk of major cardiovascular outcomes and total mortality. Here, we conducted a meta-analysis to estimate the association between alcohol intake and major cardiovascular outcomes or total mortality in women compared with men. **Methods:** We searched the PubMed, Embase, and the Cochrane Library databases for relevant articles published prior to June 2014. Among these potential included prospective studies, the different dose categories of alcohol intake were compared with the lowest alcohol intake or non-drinkers between women and men for the outcomes of major cardiovascular or total mortality. **Results:** We included 23 prospective studies (18 cohorts) reporting data on 489,696 individuals. The summary relative risk ratio (RRR; female to male) for total mortality was significantly increased with moderate alcohol intake compared with the lowest alcohol intake (RRR, 1.10; 95 % confidence interval [CI]: 1.00–1.21; *P*=0.047); no such significance was observed with other levels of alcohol intake (low intake: RRR, 1.07; 95 % CI: 0.98–1.17; *P*=0.143; heavy intake: RRR, 1.09; 95 % CI: 0.99–1.21; *P*=0.084). There was no evidence of a sex difference in the relative risk for coronary disease, cardiac death, stroke, or ischemic stroke between participants with low to heavy alcohol intake compared with those who never consumed alcohol or had the lowest alcohol intake. **Conclusions:** Women with moderate to heavy alcohol intake had a significantly increased risk of total mortality compared with men in multiple subpopulations. Control of alcohol intake should be considered for women, particularly for young women who may be susceptible to binge drinking.

Abstract available online at http://doi.org/8ss

219.86

Tresserra-Rimbau, A., Medina-Remón, A., Lamuela-Raventós, R.M., Bulló, M., Salas-Salvadó, J., Corella, D., Fitó, M., Gea, A., Gómez-Gracia, E., Lapetra, J., Arós, F., Fiol, M., Ros, E., Serra-Majem, L., Pintó, X., Muñoz, M.A., Estruch, R. Moderate red wine consumption is associated with a lower prevalence of the metabolic syndrome in the PREDIMED population. British Journal of Nutrition 113(S2), 121–130; 2015.

Abstract available online at http://doi.org/7k2

219.87

Shimomura, T., Wakabayashi, I. Association between alcohol consumption and glycemic status in middle-aged women. Canadian Journal of Diabetes 10.1016/j.jcjd.2015.05.011, 1–5; 2015.

Abstract available online at http://doi.org/8sn

219.88

Ilomäki, J., Jokanovic, N., Tan, E.C.K., Lönnroos, E. Alcohol consumption, dementia and cognitive decline: an overview of systematic reviews. Current Clinical Pharmacology 10(3), 204–212; 2015.

Abstract available online at http://bit.ly/1HcLNmF

219.89

Knott, C., Bell, S., Britton, A. Alcohol consumption and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of more than 1.9 million individuals from 38 observational studies. Diabetes Care 38(9), 1804–1812; 2015.

Abstract available online at http://doi.org/8sk

219.90

Lintzeris, N., Rivas, C., Monds, L.A., Leung, S., Withall, A., Draper, B. Substance use, health status and service utilisation of older clients attending specialist drug and alcohol services. Drug and Alcohol Review 10.1111/dar.12266, 1–9; 2015.

Abstract available online at http://doi.org/8sv

219.91

Tindall, J., Groombridge, D., Wiggers, J., Gillham, K., Palmer, D., Clinton-McHarg, T., Lecathelinais, C., Miller, P. Alcohol-related crime in city entertainment precincts: public perception and experience of alcohol-related crime and support for strategies to reduce such crime. Drug and Alcohol Review 10.1111/dar.12314, 1–10; 2015.

Abstract available online at http://doi.org/8mt

219.92

Wiggers, J.H., Hacker, A., Kingsland, M., Lecathelinais, C., Tindall, J., Bowman, J.A., Wolfenden, L. Facilitating police recording of the alcohol-related characteristics of assault incidents: a stepped wedge implementation trial. Drug and Alcohol Review 10.1111/dar.12330, 1–10; 2015.

Abstract available online at http://doi.org/8mr

219.93

Roche, A., Kostadinov, V., Fischer, J., Nicholas, R., O'Rourke, K., Pidd, K., Trifonoff, A. Addressing inequities in alcohol consumption and related harms. Health Promotion International 30(suppl 2), 20–35; 2015.

Abstract available online at http://doi.org/73p

219.94

Kingdon, D., Cardoso, C., McGrath, J.J. Research review: executive function deficits in fetal alcohol spectrum disorders and attention-deficit/hyperactivity disorder – a meta-analysis. Journal of Child Psychology and Psychiatry 10.1111/jcpp.12451, 1–16; 2015.

Abstract available online at http://doi.org/8s5

219.95

Dumas, T.M., Graham, K., Wells, S. The company they keep: drinking group attitudes and male bar aggression. Journal of Studies on Alcohol and Drugs 76(3), 447–451; 2015.

Abstract available online at http://doi.org/8sf

219.96

Goldstein, R.B., Chou, S.P., Smith, S.M., Jung, J., Zhang, H., Saha, T.D., Pickering, R.P., Ruan, W.J., Huang, B., Grant, B.F. Nosologic comparisons of DSM-IV and DSM-5 alcohol and drug use disorders: results from the national epidemiologic survey on alcohol and related conditions-III. Journal of Studies on Alcohol and Drugs 76(3), 378–388; 2015.

Abstract available online at http://doi.org/8r9

219.97

Grazioli, V.S., Lewis, M.A., Garberson, L.A., Fossos-Wong, N., Lee, C.M., Larimer, M.E. Alcohol expectancies and alcohol outcomes: effects of the use of protective behavioral strategies. Journal of Studies on Alcohol and Drugs 76(3), 452–458; 2015.

Abstract available online at http://doi.org/8sg

219.98

Kristjansson, A.L., Mann, M.J., Sigfusdottir, I.D., James, J.E. Mode of daily caffeine consumption among adolescents and the practice of mixing alcohol with energy drinks: relationships to drunkenness. Journal of Studies on Alcohol and Drugs 76(3), 397–405; 2015.

Abstract available online at http://doi.org/8sc

219.99

Mallett, K.A., Scaglione, N., Reavy, R., Turrisi, R. Longitudinal patterns of alcohol mixed with energy drink use among college students and their associations with risky drinking and problems. Journal of Studies on Alcohol and Drugs 76(3), 389–396; 2015.

Abstract available online at http://doi.org/8sb

219.100

McAlaney, J., Helmer, S.M., Stock, C., Vriesacker, B., Van Hal, G., Dempsey, R.C., Akvardar, Y., Salonna, F., Kalina, O., Guillen-Grima, F., Bewick, B.M., Mikolajczyk, R. Personal and perceived peer use of and attitudes toward alcohol among university and college students in seven EU countries: Project SNIPE. Journal of Studies on Alcohol and Drugs 76(3), 430–438; 2015.

Abstract available online at http://doi.org/8sd

219.101

Windle, M., Windle, R.C. A prospective study of stressful events, coping motives for drinking, and alcohol use among middle-aged adults. Journal of Studies on Alcohol and Drugs 76(3), 465–473; 2015.

Abstract available online at http://doi.org/8sj

219.102

Smyth, A., Teo, K.K., Rangarajan, S., O'Donnell, M., Zhang, X., Rana, P., Leong, D.P., Dagenais, G., Seron, P., Rosengren, A., Schutte, A.E., Lopez-Jaramillo, P., Oguz, A., Chifamba, J., Diaz, R. et al Alcohol consumption and cardiovascular disease, cancer, injury, admission to hospital, and mortality: a prospective cohort study. The Lancet 10.1016/S0140–6736(15)00235–4, 1–10; 2015.

Abstract available online at http://doi.org/7sk

219.103

Xu, Q., Guo, W., Shi, X., Zhang, W., Zhang, T., Wu, C., Lu, J., Wang, R., Zhao, Y., Ma, X., He, J. Association between alcohol consumption and the risk of Barrett's esophagus: a meta-analysis of observational studies. Medicine 94(32), 1–9; 2015.

The association between alcohol consumption and Barrett's esophagus (BE) remained uncertain and controversial in the previous studies. We performed a meta-analysis of observational studies to clarify the association.

We searched PubMed, Web of Science, and Embase for studies on alcohol consumption and risk of BE published before February 2015. A total of 20 studies reporting the association between alcohol consumption and the risk of BE were identified. Subgroup analyses, meta-regression analyses, sensitivity analyses, and publication bias tests were also performed. Several results from individual studies were pooled using a dose-response meta-analysis.

A total of 20 studies involving 45,181 participants and 4432 patients of BE were included in the meta-analysis. No association was found between alcohol consumption and BE (relative risk [RR]=1.10, 95% confidence interval [CI] 0.96–1.27, I^2=48.60%) in our study. In subgroup analysis, alcohol consumption was associated with an increased risk of BE in men (RR=1.35, 95% CI 1.13–1.61, I^2=0.00%) and Asian population (RR=1.60, 95% CI 1.03–2.49, I^2=60.60%). In beverage-specific consumption analysis, liquor was associated with an increased risk of BE (RR=1.16, 95% CI 1.02–1.32, I^2=0.00%). Multivariate meta-regression analysis suggested that geographic area, and adjusted age, sex, body mass index, and smoke, might explain 70.75% of the heterogeneity between the studies. We also found the inverse association (RR=0.84, 95% CI 0.72–0.98, I^2=0.00%) between alcohol consumption and BE among subjects when compared with population controls.

Overall, there was no significant association between alcohol consumption and BE. Alcohol consumption may be a risk factor of BE in men and Asian population, and liquor consumption may also increase the risk of BE. Significant inverse association was observed between alcohol consumption and BE, for comparisons with population controls.

Abstract available online at http://doi.org/8sp

219.104

Zhang, X.-Y., Shu, L., Si, C.-J., Yu, X.-L., Liao, D., Gao, W., Zhang, L., Zheng, P.-F. Dietary patterns, alcohol consumption and risk of coronary heart disease in adults: a meta-analysis. Nutrients 7(8), 6582–6605; 2015.

Previous studies reported the potential associations between dietary patterns and the risk of coronary heart disease (CHD) in adulthood, however a consistent perspective has not been

established to date. Herein, we carried out this meta-analysis to evaluate the associations between dietary patterns and the risk of CHD. MEDLINE and EBSCO were searched for relevant articles published up to April 2015. A total of 35 articles (reporting 37 original studies) met the inclusion criteria and were included in the present meta-analysis. The decreased risk of CHD was shown for the highest compared with the lowest categories of healthy/prudent dietary patterns (odds ratio (OR) = 0.67; 95% confidence interval (CI): 0.60, 0.75; $p < 0.00001$) and alcohol consumption (OR = 0.68; 95% CI: 0.59, 0.78; $p < 0.00001$). There was evidence of an increased risk of CHD in the highest compared with the lowest categories of the unhealthy/Western-type dietary patterns (OR = 1.45; 95% CI: 1.05, 2.01; $p = 0.02$). The results of this meta-analysis indicate that different dietary patterns may be associated with the risk of CHD.

Abstract available online at http://doi.org/8sr

219.105

Ding, D., Do, A., Schmidt, H.-M., Bauman, A.E. A widening gap? Changes in multiple lifestyle risk behaviours by socioeconomic status in New South Wales, Australia, 2002–2012. PLoS ONE 10(8), 1–13; 2015.

Background: Socioeconomic inequalities in health outcomes have increased over the past few decades in some countries. However, the trends in inequalities related to multiple health risk behaviours have been infrequently reported. In this study, we examined the trends in individual health risk behaviours and a summary lifestyle risk index in New South Wales, Australia, and whether the absolute and relative inequalities in risk behaviours by socioeconomic positions have changed over time. **Methods:** Using data from the annual New South Wales Adult Population Health Survey during the period of 2002–2012, we examined four individual risk behaviours (smoking, higher than recommended alcohol consumption, insufficient fruit and vegetable intake, and insufficient physical activity) and a combined lifestyle risk indicator. Socioeconomic inequalities were assessed based on educational attainment and postal area-level index of relative socio-economic disadvantage (IRSD), and were presented as prevalence difference for absolute inequalities and prevalence ratio for relative inequalities. Trend tests and survey logistic regression models examined whether the degree of absolute and relative inequalities between the most and least disadvantaged subgroups have changed over time. **Results:** The prevalence of all individual risk behaviours and the summary lifestyle risk indicator declined from 2002 to 2012. Particularly, the prevalence of physical inactivity and smoking decreased from 52.6% and 22% in 2002 to 43.8% and 17.1% in 2012 (p for trend<0.001). However, a significant trend was observed for increasing absolute and relative inequalities in smoking, insufficient fruit and vegetable consumption, and the summary lifestyle risk indicator. **Conclusions:** The overall improvement in health behaviours in New South Wales, Australia, co-occurred with a widening socioeconomic gap. **Implications:**

Governments should address health inequalities through risk factor surveillance and combined strategies of population-wide and targeted interventions.

Abstract available online at http://doi.org/8r5

219.106

Hange, D., Sigurdsson, J.A., Björkelund, C., Sundh, V., Bengtsson, C. A 32-year longitudinal study of alcohol consumption in Swedish women: reduced risk of myocardial infarction but increased risk of cancer. Scandinavian Journal of Primary Health Care 33(3), 153–162; 2015.

Abstract available online at http://doi.org/8sz

219.107

Pettigrew, S., Biagioni, N., Jones, S.C., Daube, M., Kirby, G., Stafford, J., Chikritzhs, T. Sales promotion strategies and youth drinking in Australia. Social Science & Medicine 141, 115–122; 2015.

Abstract available online at http://doi.org/8r7

219.108

Jones, S.B., Loehr, L., Avery, C.L., Gottesman, R.F., Wruck, L., Shahar, E., Rosamond, W.D. Midlife alcohol consumption and the risk of stroke in the atherosclerosis risk in communities study. Stroke 10.1161/STROKEAHA.115.010601, 1–9; 2015.

Abstract available online at http://doi.org/8rf

219.109

Shabanzadeh, D.M., Sørensen, L.T. Alcohol consumption increases post-operative infection but not mortality: a systematic review and meta-analysis. Surgical Infections 10.1089/sur.2015.009, 1–12; 2015.

Abstract available online at http://doi.org/8s6

Phenolic compounds

219.110

Granzotto, A., Zatta, P. Resveratrol and Alzheimer's disease: message in a bottle on red wine and cognition. Frontiers in Aging Neuroscience 6(95), 1–7; 2014.

Abstract available online at http://doi.org/7kx

219.111

Cuervo, A., De Los Reyes-Gavilán, C.G., Ruas-Madiedo, P., Lopez, P., Suarez, A., Gueimonde, M., González, S. Red wine consumption is associated with fecal microbiota and malondialdehyde in a human population. Journal of the American College of Nutrition 34(2), 135–141; 2015.

Abstract available online at http://doi.org/7kz

Public health policy

219.112

Coomber, K., Martino, F., Barbour, I.R., Mayshak, R., Miller, P.G. Do consumers 'get the facts'? A survey of alcohol warning label recognition in Australia. BMC Public Health 15(816), 1–9; 2015.

Background: There is limited research on awareness of alcohol warning labels and their effects. The current study examined the awareness of the Australian voluntary warning labels, the 'Get the facts' logo (a component of current warning labels) that directs consumers to an industry-designed informational website, and whether alcohol consumers visited this website. **Methods:** Participants aged 18–45 (unweighted n=561; mean age=33.6 years) completed an online survey assessing alcohol consumption patterns, awareness of the 'Get the facts' logo and warning labels, and use of the website. **Results:** No participants recalled the 'Get the facts' logo, and the recall rate of warning labels was 16% at best. A quarter of participants recognised the 'Get the facts' logo, and awareness of the warning labels ranged from 13.1–37.9%. Overall, only 7.3% of respondents had visited the website. Multivariable logistic regression models indicated that younger drinkers, increased frequency of binge drinking, consuming alcohol directly from the bottle or can, and support for warning labels were significantly, positively associated with awareness of the logo and warning labels. While an increased frequency of binge drinking, consuming alcohol directly from the container, support for warning labels, and recognition of the 'Get the facts' logo increased the odds of visiting the website. **Conclusions:** Within this sample, recall of the current, voluntary warning labels on Australian alcohol products was non-existent, overall awareness was low, and few people reported visiting the DrinkWise website. It appears that current warning labels fail to effectively transmit health messages to the general public.

Abstract online at http://doi.org/8r4

219.113

Brett, J., Lee, K., Gray, D., Wilson, S., Freeburn, B., Harrison, K., Conigrave, K. Mind the gap: what is the difference between alcohol treatment need and access for Aboriginal and Torres Strait Islander Australians? Drug and Alcohol Review 10.1111/dar.12313, 1–5; 2015.

Abstract available online at http://doi.org/8mw

219.114

Botterman, S., De Cuyper, K., Tresignie, C. State of play in the use of alcoholic beverage labels to inform consumers about health aspects: action to prevent and reduce harm from alcohol. European Union Report 10.2772/12145, 1–105; 2014.

This study reports on an audit of 60 retailers across 15 European countries regarding the health-related messages that inform and educate the consumer on labels of alcoholic beverages. Overall, only one in five alcoholic beverages holds a health-related message on its label. A warning about drinking alcohol during pregnancy is the most popular message. It was found that messages are usually clearly visible, easy to understand and are placed on the back of beverage packaging. There is no clear pattern in terms of whether messages are presented as a logo or text, though warnings for pregnant women are mostly presented as logos. The size of a message relative to the label varies between package types, but most are very small. Market share analyses revealed sharp differences between countries in the labelling of the top selling beers and spirits. To conclude, only a minority of alcohol labels include health-related messages. When beverages do carry messages, there is wide divergence in their form and formatting. While there is a clear need for guidelines and standardisation, the first goal is to increase the prevalence of health-related messages on labels. The possible means to do this should therefore be explored; legal requirements for messages on alcoholic beverages are the ultimate means of doing this.

Full text available at http://doi.org/8s4

219.115

O'Brien, K.S., Carr, S., Ferris, J., Room, R., Miller, P., Livingston, M., Kypri, K., Lynott, D. Alcohol advertising in sport and non-sport TV in Australia, during children's viewing times. PLoS ONE 10(8), 1–9; 2015.

Estimate the amount of alcohol advertising in sport vs. non-sport programming in Australian free-to-air TV and identify children's viewing audience composition at different times of the day. Alcohol advertising and TV viewing audience data were purchased for free-to-air sport and non-sport TV in Australia for 2012. We counted alcohol advertisements in sport and non-sport TV in daytime (6am-8.29pm) and evening periods (8.30pm-11.59pm) and estimated viewing audiences for children and young adults (0–4 years, 5–13 years, 14–17 years, 18–29 years). During the daytime, most of the alcohol advertising (87%) was on sport TV. In the evening, most alcohol advertising

(86%) was in non-sport TV. There was little difference in the mean number of children (0–17 years) viewing TV in the evening (N = 273,989), compared with the daytime (N = 235,233). In programs containing alcohol advertising, sport TV had a greater mean number of alcohol adverts per hour (mean 1.74, SD = 1.1) than non-sport TV (mean 1.35, SD = .94). Alcohol advertising during the daytime, when large numbers of children are watching TV, is predominantly in free-to-air sport TV. By permitting day-time advertising in sport programs and in any programs from 8.30pm when many children are still watching TV, current regulations are not protecting children from exposure to alcohol advertising.

Abstract available online at http://doi.org/8r6

219.116

Anderson, P. U-turn our complacency in dealing with the potency of alcohol. Substance Use and Misuse 50(8–9), 1178–1181; 2015.

Abstract available online at http://bit.ly/1MuGMO1

Young adults and alcohol

219.117

Azar, D., White, V., Coomber, K., Faulkner, A., Livingston, M., Chikritzhs, T., Room, R., Wakefield, M. The association between alcohol outlet density and alcohol use among urban and regional Australian adolescents. Addiction 10.1111/add.13143, 1–8; 2015.

Abstract available online at http://doi.org/8mv

219.118

Chan, G.C.K., Kelly, A.B., Connor, J.P., Hall, W., Young, R.M., Toumbourou, J.W., Williams, J. Regional versus urban differences in teenage alcohol use: does parental disapproval account for these differences? Australian Journal of Rural Health 10.1111/ajr.12177, 1–6; 2015.

Abstract available online at http://doi.org/8rd

219.119

Bestman, A., Thomas, S.L., Randle, M., Thomas, S.D.M. Children's implicit recall of junk food, alcohol and gambling sponsorship in Australian sport. BMC Public Health 15(1022), 1–9; 2015.

Background: In Australia, sport is saturated by the promotion of junk food, alcohol and gambling products. This is particularly evident on player jerseys. The effect of this advertising on children,

who are exposed to these messages while watching sport, has not been thoroughly investigated. The aim of this research study was to investigate: (1) the extent to which children implicitly recalled shirt sponsors with the correct sporting team; (2) whether children associated some types of sponsors with certain sporting codes more than others; and (3) whether age of the children influenced the correct recall of sponsoring brands and teams. **Method:** This experimental study conducted in New South Wales, Australia used projective techniques to measure the implicit recall of team sponsorship relationships of 85 children aged 5–12 years. Participants were asked to arrange two sets of magnets – one which contained sporting teams and one which contained brand logos – in the manner deemed most appropriate by them. Children were not given any prompts relating to sporting sponsorship relationships. **Results:** Three quarters (77%) of the children were able to identify at least one correct shirt sponsor. Children associated alcohol and gambling brands more highly with the more popular sporting code, the National Rugby League compared to the Australian Football League sporting code. Results showed that age had an effect on number of shirt sponsors correctly recalled with 9–12 year olds being significantly more likely than 5–8 year olds to correctly identify team sponsors. **Conclusions:** Given children's ability to implicitly recall shirt sponsors in a sporting context, Australian sporting codes should examine their current sponsorship relationships to reduce the number of unhealthy commodity shirt sponsors. While there is some regulation that protects children from the marketing of unhealthy commodity products, these findings suggest that children are still exposed to and recall these sponsorship relationships. Results suggest that the promotion of unhealthy commodity products during sporting matches is contributing to increased awareness amongst children of unhealthy commodity brands. Further investigation is required to examine the extent and impact of marketing initiatives during televised sporting matches on children.

Abstract available online at http://doi.org/8st

219.120

Minaie, M.G., Hui, K.K., Leung, R.K., Toumbourou, J.W., King, R.M. Parenting style and behavior as longitudinal predictors of adolescent alcohol use. Journal of Studies on Alcohol and Drugs 76(5), 671–679; 2015.

Abstract available online at http://doi.org/8s2

AWRI publications

1734

Nordestgaard, S. The history of wine presses. Part 1: batch presses. Australian & New Zealand Grapegrower & Winemaker 619, 64–71; 2015.

In this article, Simon Nordestgaard, a senior engineer at The Australian Wine Research Institute, describes the types of batch processing mode pressing equipment that have been used in the wine industry since the late 19th century. A second article, to be published in the September issue, will cover continuous processing and provide some thoughts about the types of pressing technology that may be used in the future.

1735

Stockley, C. Ask the AWRI: Wine consumption and heart health. Australian & New Zealand Grapegrower & Winemaker 619, 72; 2015.

A large amount of research has been conducted on the effects of alcohol (and specifically wine) consumption on the risk of cardiovascular disease. This column provides responses to some of the more common questions in this area.

1736

Capone, D.L., Sefton, M.A., Jeffery, D.W., Francis, I.L. Terroir or terpenoid transformation: the origin of 1,8-cineole (eucalyptol) in wine. Current topics in flavor chemistry and biology: Proceedings of the 10th Wartburg Symposium on Flavor Chemistry and Biology, Eisenach, Germany, 16–19 April, 2013, 130–136; 2014.

Terpenoids belong to a group of compounds that display important sensory characteristics in plants, in eucalyptus trees there is one dominant terpenoid known as eucalyptol (1,8-cineole). This compound has been found in noteworthy concentrations in red wine and its aroma has been described as 'eucalypt', 'minty', 'fresh', and 'camphorous'. Using a SIDA-SPME-GC-MS method, the origin of this compound in wine was deduced. Data showed that precursor hydrolysis and translocation from the soil or grapevine leaves to the grapes was not the source of elevated 1,8-cineole concentrations in red wines and it was in fact the close proximity of vineyards to eucalyptus trees and winemaking conditions that had the major influence on its concentration in the finished wine. An additional outcome of this project revealed that the concentration of the terpenoid rotundone, which has been described as giving wine a 'peppery' aroma in red wine can be altered by the presence of grape vine leaves and stems in a ferment.

1737

Smith, P. Assessment of relationships between grape chemical composition and grape allocation grade for Cabernet Sauvignon, Shiraz and Chardonnay. Australian & New Zealand Grapegrower & Winemaker 620, 30–32; 2015.

Internationally, there are examples of objective winegrape quality assessments being carried out by chemical measurement and accurate analysis of aroma, tannin and colour compounds. But in Australia winegrapes are generally assessed far more subjectively. In this article, Paul Smith, The Australian Wine Research Institute's research manager for chemistry, looks at a recent project between a large Australian wine company and a leading viticulture management business. This article focuses on work investigating whether current fruit grading allocations can be predicted using chemical measurements, with data from Cabernet Sauvignon, Shiraz and Chardonnay grape lots from the 2014 vintage.

1738

Hill, M., Cowey, G. The adoption of innovations by Australian grapegrowers and winemakers. Australian & New Zealand Grapegrower & Winemaker 620, 70–72; 2015.

The authors led a project which found grapegrowers and winemakers facing decisions on innovative technology, equipment or products are likely to seek multiple sources of information and value demonstrations and trials. This article was first published in *Technical Review 217* (August 2015).

1739

Nordestgaard, S. The history of wine presses. Part 2: continuous presses…And what next? Australian & New Zealand Grapegrower & Winemaker 620, 73–79; 2015.

In this article, Simon Nordestgaard, a senior engineer at The Australian Wine Research Institute, describes the different styles of continuous press that have been used and provides some thoughts about the types of pressing technology that may be used in the future. This article is a continuation of an article published last issue on the types of pressing equipment that have been employed since the late 19th century. The first article focused on batch processing mode equipment, while this article focuses on continuous processing mode equipment. Continuous presses have generally been associated with higher throughputs but lower quality wine production. This article again focuses on the pressing of grapes for white wine production, although most of the equipment to be discussed has also been used for pressing fermented red grapes.

1740

Cowey, G. Ask the AWRI: DIY haze and deposit identification. Australian & New Zealand Grapegrower & Winemaker 620, 87; 2015.

A high proportion of questions answered and investigations conducted by the AWRI helpdesk are related to hazes and deposits in wine. While the helpdesk is well equipped to identify both common and unusual hazes and deposits, there are some steps that can be taken in the winery lab or kitchen to achieve a quick DIY identification.

1741

Francis, I.L., Williamson, P.O. Application of consumer sensory science in wine research. Australian Journal of Grape and Wine Research 10.1111/ajgw.12169, 1–14; 2015.

The sensory properties of wines are a major element that will determine success with consumers. It has been only in recent times that the wine industry and research community have started to apply the principles of sensory evaluation to quantify consumer preferences. This review provides an overview of current knowledge of the sensory attributes that have been found to be important to consumer preference and liking, including taints and off-flavours. The evidence for subgroups of consumers with different preference is considered, and the links between liking responses and demographic or psychologically based measures are outlined. The relationship between quality judgements of experts and liking of consumers has been established in several studies, and it has been repeatedly shown that generally there is no relationship between the two measures. Finally, the limitations in methodology for characterising consumer perceptions and hedonic response, the value of blind versus informed evaluations, and the linkages between consumer sensory-based testing and marketing research are explored.

Abstract available online at http://doi.org/822

1742

Stockley, C.S., Johnson, D.L. Adverse food reactions from consuming wine. Australian Journal of Grape and Wine Research 10.1111/ajgw.12171, 1–14; 2015.

In the community, wine is sometimes considered responsible for adverse reactions. Commonly reported reactions to wine include skin flushing, itching and nasal congestion. A review of the literature was undertaken to identify adverse food reactions from wine, including those related to residues from egg, fish, milk, or nut processing aids and additives used in winemaking. Relatively limited literature was found reporting true allergic reactions following the ingestion of wine. This paper also examines what is known about the potential of egg, fish, milk, nut and other food proteins used in wine production to cause an allergic reaction to wine. It can be cautiously concluded that

wine made with traditional proteinaceous processing aids, according to good manufacturing practice, poses little risk to the health of adult consumers with food allergies.

Abstract available online at http://doi.org/823

1743

Longbottom, M. ASVO Mildura seminar – was it the best yet? Wine and Viticulture Journal 30(5), 15; 2015.

Feedback is continuing to roll in off the back of the recent ASVO Mildura seminar and all of it positive. It's even been cited as the best ASVO seminar in a long time with plenty of information to take back to businesses and apply straight away. While the highlights were the presentations by our international guests, Drs Kendra Baumgartner and Vaughn Bell, the locals followed close behind. Both Baumgartner and Bell, while speaking on different pathogens – trunk diseases and viruses – they provided similar take home messages: minimise the economic impact by identifying and acknowledging the problem early and remediate it immediately.

1744

Reschke, S., Tran, T., Bekker, M., Wilkes, E., Johnson, D. Using copper more effectively in winemaking. Wine and Viticulture Journal 30(5), 35–39; 2015.

The salient points in this article about copper are:

- Copper sulfate is commonly used to treat 'reductive' aromas in winemaking
- Additions are often made to finished wine shortly before packaging, which can leave residual copper in packaged wine
- Metal ions in wine can cause oxidation, reduction and haze issues
- Recent experiments investigated the impact of copper additions made at different times on fermentation performance, sulfide concentration and residual copper levels
- Copper additions up to 20 mg/L added at the start of fermentation had no impact on fermentation kinetics
- Copper additions made at 0°Brix (towards the end of active ferment) did not affect fermentation performance
- In general, earlier additions resulted in lower residual copper levels
- Additions of 5 mg/L at 0°Brix appear to be effective at removing reductive aromas without leaving copper in the final wine
- Further work is needed to focus on the sensory impacts of copper addition levels and timing

1745

Powell, K., Krstic, M. Rootstock tolerance and resistance to different genetic strains of phylloxera. Wine and Viticulture Journal 30(5), 48–51; 2015.

Studies conducted between 2006 and 2012 examined phylloxera survival characteristics on commonly planted American rootstock species used in Australia. Although there are still gaps in the data, the results boost our knowledge base and assist growers when making decisions about which rootstock to plant.

1746

Dry, P. Lagrein. Wine and Viticulture Journal 30(5), 61; 2015.

Lagrein (lah-grain) is an old variety that has been known in Trentino, in North-East Italy, since the 16th century. It is now mainly grown in Alto Adige and Trentino where varietal wines are permitted in local DOCs.

1747

Giaccio, J., Curtin, C.D., Sefton, M.A., Taylor, D.K. Relationship between menthiafolic acid and wine lactone in wine. Journal of Agricultural and Food Chemistry 63(37), 8241–8246; 2015.

Menthiafolic acid (6-hydroxy-2,6-dimethylocta-2,7-dienoic acid, 2a) was quantified by GC-MS in 28 white wines, 4 Shiraz wines, and for the first time in 6 white grape juice samples. Menthiafolic acid was detected in all but one of the wine samples at concentrations ranging from 26 to 342 µg/L and in the juice samples from 16 to 236 µg/L. Various model fermentation experiments showed that some menthiafolic acid in wine could be generated from the grape-derived menthiafolic acid glucose ester (2b) during alcoholic and malolactic fermentation. Samples containing high concentrations of menthiafolic acid were also analyzed by enantioselective GC-MS and were shown to contain this compound in predominantly the (*S*)- configuration. Enantioselective analysis of wine lactone (1) in one of these samples, a four-year-old Chardonnay wine showed, for the first time, the presence of the 3*R*,3a*R*,7a*S* isomer of wine lactone (1b), which is the enantiomer of the form previously reported as the sole isomer present in young wine samples. The weakly odorous 3*R*,3a*R*,7a*S* 1b form comprised 69% of the total wine lactone in the sample. On the basis of the enantioselectivity of the hydrolytic conversion of menthiafolic acid to wine lactone at pH 3.0 determined previously and the relative proportions of (*R*)- and (*S*)-menthiafolic acid in the Chardonnay wine, the predicted ratio of wine lactone enantiomers that would be formed from hydrolysis at ambient temperature of the menthiafolic acid present in this wine was close to the ratio measured, which was consistent with menthiafolic acid being the major or sole precursor to wine lactone in this sample.

Abstract also available online at http://doi.org/8s9

1748

Bachhuka, A., Christo, S.N., Cavallaro, A., Diener, K.R., Mierczynska, A., Smith, L.E., Marian, R., Manavis, J., Hayball, J.D., Vasilev, K. Hybrid core/shell microparticles and their use for understanding biological processes. Journal of Colloid and Interface Science 457, 9–17; 2015.

Hybrid micro and nanoparticles have become a topic of intense research in recent years. This is due to the special properties of these materials that open new avenues in advanced applications. Herein, we report a novel method for the generation of hybrid particles utilising plasma polymerization. Poly (methyl methacrylate) (PMMA) beads were first coated with a thin allylamine based plasma polymer layer. Gold nanoparticles of engineered size and surface structure were then attached in a controlled manner to the plasma polymer coated beads. To generate uniform chemistry on the outermost surface and to preserve the nanotopography, we deposited a 5–10 nm thin layer of Acpp. We demonstrated that these particles can be utilized in *in vivo* models to interrogate important biological phenomena. Specifically, we used them in mice to study the inflammatory and foreign body responses to surface nanotopography. The data strongly indicates that surface nanotopography and chemistry can modulate collagen production and the number of adhering immune cells. The method for generating hybrid particles reported here is solvent free and can open new opportunities in fields such as tissue engineering, drug delivery, biosensors, and regenerative medicine.

Abstract also available online at http://doi.org/8tb

1749

Clark, A.C., Wilkes, E.N., Scollary, G.R. Chemistry of copper in white wine: a review. Australian Journal of Grape and Wine Research 21(3), 339–350; 2015.

Copper is one element in wine that has considerable notoriety. While current winemaking practice tends to minimise the amount of copper that results from vineyard and winery sources, the addition of copper(II), either as its sulfate or citrate, to remove sulfidic off-odours may result in an elevated concentration in the finished (bottled) wine. Residual copper in white wine has been linked to oxidative and reductive spoilage processes, although the mechanisms are at times speculative. The presence of copper has been implicated in haze formation (copper casse) and linked to protein instability. More recent concerns include the coexistence of residual copper and hydrogen sulfide in wine stored under low oxygen conditions.

The chemistry of copper is important in both white and red wine. While there are some overlapping issues, especially with respect to sulfidic off-odours, both white and red wine display their own unique chemistry. Thus, this review describes the state of knowledge of copper in white wine, differentiating between evidence-based claims and speculation. It also identifies areas of research that will provide a much clearer understanding of the role of copper in wine spoilage.

Abstract available online at http://doi.org/824

1750

Sternes, P.R., Moyle, R.L. Deep sequencing reveals divergent expression patterns within the small RNA transcriptomes of cultured and vegetative tissues of sugarcane. Plant Molecular Biology Reporter 33(4), 931–951; 2015.

Deep sequencing has advanced the discovery and analysis of the small RNA component of transcriptomes and has revealed developmentally-regulated populations of small RNAs consistent with key roles in plant development. To study small RNA transcriptome complexity and explore their roles in sugarcane development, we obtained almost 50 million small RNA reads from suspension cells, embryogenic calli, leaf, apex and a developmental series of stem internodes. The complexity of the small RNA component of the transcriptome varied between tissues. The undifferentiated and young tissue type libraries had lower redundancy levels than libraries generated from maturing and mature tissues. The ratio of 21:24 NT small RNAs also varied widely between different tissue types, as did the proportion of abundant small RNAs derived from each putative origin of small RNA biogenesis. Cluster analysis indicates many abundant small RNAs display developmental expression patterns. There was substantial variation in isomiR composition, abundance and expression patterns within sugarcane microRNA (miRNA) families. Two hundred and fifty-six isomiRs from 36 miRNA families were identified by homology to known miRNA families from a range of plant species. Many isomiRs and miRNA families appear to be developmentally regulated, including a subset of miRNAs that are progressively upregulated during stem internode maturation. Transcribed sequences putatively targeted by abundant sugarcane small RNAs were predicted and miRNA directed cleavage of 18 predicted sugarcane targets were validated by 5′ RACE.

Abstract also available online at http://doi.org/8s7

1751

Moyle, R.L., Sternes, P.R., Birch, R.G. Incorporating target sequences of developmentally regulated small RNAs into transgenes to enhance tissue specificity of expression in plants. Plant Molecular Biology Reporter 33(3), 505–511; 2015.

Many applications of plant genetic engineering require tight control of transgene expression to a particular organ, tissue or developmental stage, particularly when off-target expression causes deleterious effects. Most studies have relied on tissue-specific and developmentally regulated promoters to confer the desired transgene expression pattern via transcriptional control. However, the process to identify promoters conferring required expression patterns is slow and expensive, with no certainty of success. Therefore, we investigated the practicality of post-transcriptional control of transgene expression patterns in plants, triggered by binding of endogenous small RNA sequences. Target sequences of several small RNAs, inserted 3′ of a luciferase reporter, altered transgene expression in patterns consistent with developmental abundance of the corresponding small RNAs in sugarcane. Incorporating the target sequences of miR167 or a leaf-specific small RNA selectively reduced reporter expression in leaves by more than 90% on average, whereas incorporating the miR160–3p target sequence selectively reduced reporter expression in roots by 75% on average across immature transgenic lines. We anticipate that the strategy should be broadly applicable in plants.

Abstract also available online at http://doi.org/8s8

1752

Stockley, C.S. The relationship between alcohol, wine and cardiovascular diseases – a review. Nutrition and Aging 10.3233/NUA-150052, 1–35; 2015.

Summary of the literature on the potential effects of wine on cardiovascular health.

Abstract available online at http://bit.ly/1ll3LiD

AWRI events calendar

For details see http://www.awri.com.au/industry_support/courses-seminars-workshops/events/

December 2015

3 December — Using in-line sensors to monitor sugar levels during fermentation (Webinar)

8 December — Insights into managing risks associated with drought, fire and smoke winegrowers' seminar, Avoca Information Centre Meeting Rooms, Avoca VIC

8 December — Opportunities in a new climate Mildura workshop, DEDJTR, Irymple VIC

8 December — Recent advances in destemming and sorting technology (Webinar)

10 December — Opportunities in a new climate Barossa Valley workshop, St Hallett Winery, Tanunda SA

10 December — Winery wastewater treatment: cleaning water with happy microbes (Webinar)

January 2016

21 January — Why doesn't 14°Bé give 14% alcohol? (Webinar)

April 2016

14 April — Cover crop update (Webinar)

28 April — Measuring and managing oxygen during winemaking (Webinar)

May 2016

5 May — Redirecting rain to manage soil salinity (Webinar)

12 May — The influence of different closure technologies and oxygen management techniques on wine shelf life (Webinar)

*** Details subject to change without notice.** Please visit the AWRI website to view the most up to date copy of this calendar at http://www.awri.com.au/industry_support/courses-seminars-workshops/events/. All information was accurate at time of compilation.

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