



## Local Research News

### Berry tannin structure and evolution in Cabernet Sauvignon

Cabernet Sauvignon grape tannin and phenolic structure and their modification during the green berry growth and ripening stages were monitored over two seasons. Four treatments, which included shade, leaf removal and protection against ultraviolet light, were applied. Berry development was not influenced by the treatments. Compositional differences in tannins were observed during berry development. Flavonoid concentration was the highest in the light exposed treatment supporting its photo-protective role within the berry. Anthocyanin concentrations did not differ significantly in the first season, but differences between treatments were observed in season two. This could be ascribed to berry temperatures exceeding 30°C in the 2010/2011 season compared to the 2011/2012, confirming that the grape berry has a critical metabolism of 30°C. The study provides a better understanding of the flavonoid composition of grapes during berry development, and the mouth feel properties of the resulting wine. This may assist wine producers in understanding how to manage and manipulate flavonoid composition of berries for specific wine styles. [www.sawislibrary.co.za/dbtextimages/BlancquaertE.pdf](http://www.sawislibrary.co.za/dbtextimages/BlancquaertE.pdf)

### Analysis, identification and improved release of mannoproteins

Mannoproteins are structural proteins found in the yeast cell wall which contain mannose (a sugar). The release of mannoproteins by yeast during fermentation has a significant influence on the organoleptic quality of wine, in particular the mouth feel. Mannoproteins can also protect wines against haze formation and pinking (the salmon-red blush colour that may appear in white wines), defects that lead to significant economic losses. However, most yeast strains appear to be unable to release significant levels of such proteins. A study developed methods based on protein estimation and carbohydrate content to accurately determine the mannoprotein content of yeast strains. An infrared spectral database was evaluated and compared to reference protocols. These methods offered a means to determine relative mannoprotein to glucan ratios in yeast preparations but absolute quantitative results were not possible. The mechanism(s) responsible for haze protection identified in 16 yeast strains seems to be linked to a high chitinase content in must/wine solutions. A *Saccharomyces paradoxus* strain with high chitinase content was identified and patented. [www.sawislibrary.co.za/dbtextimages/BauerFF10.pdf](http://www.sawislibrary.co.za/dbtextimages/BauerFF10.pdf)

## International Research News

### The origin of pinking in Siria wine

Pinking is the undesirable salmon-red blush colour that may appear in white wines produced exclusively from white grape varieties. The isolation of pinking compounds from white wines made from the Síria (also known as Codega or Roupeiro) grape and their subsequent analysis showed that pinking was caused by anthocyanins, mainly malvidin-3-O-glucoside. The anthocyanins were located both in the pulp and in the skin. Wine pinking severity was negatively related to the increase of the average temperature in the final 10 days grape maturation. The minimum amount of anthocyanins required to show the pink colour in the wine was 0.3 mg/L. The appearance of pinking in white wines after bottling is due to the lowering of free sulphur dioxide, which leads to an increase of the relative amount of the anthocyanins in red flavylum form, and their polymerization, resulting in the formation of coloured compounds resistant to pH changes and sulphur dioxide bleaching. <http://dx.doi.org/10.1021/jf500825h>

### Continuous measurement of wine evolution

An in-situ and on-line electronic nose has been installed in a wine cellar for the continuous measurement of wine evolution. The system (see right) is based on an array of thin film sensors and a modified headspace sampling method that extracts the aroma directly from the tanks where wine is stored and automatically carries the volatile compounds to the sensor cell. The advantages of this system are the in situ and on-line possibility of making continuous analysis without the need to take samples of wine. Results based on Malvar and Grenache wine show that the system is capable of detecting the wine evolution for 9 months and that it can also detect wine spoilage, thus allowing early remedial action to correct the situation before the fault becomes serious or irreversible. A correlation of the sensor with GC-MS analysis of the wine was used to make quite accurate estimates of several volatile organic compounds (VOCs) showing there was no need to sample the wine on a regular basis. <http://dx.doi.org/10.5344/ajev.2014.14103>



### Glycosidically bound volatile aroma compounds in grapes and wine

A new review of glycosides in grapes and in wine is available. Volatile aroma compounds in plants are typically found both as 'free' and 'bound' to a sugar. When bound, these compounds are not odour active; however, upon hydrolysis of the glycoside,

these compounds may then be volatilized. In grapes and wine, a large proportion of volatile aroma compounds are found in the bound form. The review focuses on identified glycoside structures, their biosynthesis, their potential roles in the plant, and methods for their analysis. Studies of these compounds and their concentration changes during the winemaking process are discussed. The review is not intended to be exhaustive, but rather to inform the reader on progress made in the field of volatile aroma glycosides in grape and wine research, and to draw attention to areas where further studies may prove useful. Many past reviews are noted and recommended. <http://dx.doi.org/10.5344/ajev.2014.14104>

### **Improvement of BSA tannin precipitation assay**

Analysis of protein precipitable wine tannins has become more commonplace due to the simplicity of the methodology and strong correlations with the sensory perception of astringency. The original Hagerman and Butler method used 5% w/v sodium dodecyl sulfate (SDS) and an alkaline buffer (triethanolamine, TEA at pH 9.4) to dissolve the tannin-protein precipitate and to support the colorimetric reaction with ferric chloride. Now it has been found that pairing urea with TEA instead of SDS allows lower pH buffer formulations. Using urea TEA at pH 7 and 8 significantly lowered background absorbance and resulted in significantly less background drift over time as well as a significantly greater amount of tannin recovered, likely the result of less oxidative destruction of the tannins. It was found that utilizing TEA-urea buffers at pH 7 or 8 would be comparable to results obtained at pH 9.4 with the TEA-SDS buffer. <http://dx.doi.org/10.5344/ajev.2014.14082>

### **Weed management strategies**

Weeds reduce vineyard productivity by competing with grapevines for water and nutrients. To manage weeds, growers commonly apply herbicides and/or cultivate, both of which compromise soil quality. A study evaluated four weed management strategies in a Midwestern (USA) vineyard. Data were collected from an established vineyard in Iowa planted with Maréchal Foch grapevines (interspecific hybrid). Treatments were established in a randomized complete block design. Treatments were replicated four times and included: (1) cultivation, (2) herbicide application, (3) straw mulch, and (4) a living mulch of creeping red fescue. Weed control, grapevine productivity, fruit quality, and soil quality were measured from 2004 to 2010. Straw and living mulches provided significantly greater weed control than cultivation and herbicides. Grapevine yield was unaffected by the treatments. <http://dx.doi.org/10.5344/ajev.2014.14064>

### **Pinot Noir and ancient viruses**

Viruses dating back 30-million years have been found in Pinot Noir DNA. The study suggests that viruses play a vital evolutionary role in plants because plants are anchored to the ground. Thus they are obliged to adapt to environmental pressures, such as drought or grazing, using novel strategies. Plants cope with such threats by acquiring new biochemical pathways or growth habits and by pulling new genetic material from the environment, such as from viruses that infect the plant, the plant's evolution can be sped up considerably. <http://phys.org/news/2014-11-wine-debt-ancient-viruses.html>

### **Guidelines for the management of winery wastewater**

A dramatic increase in wine production worldwide has led to a corresponding increase in winery wastewater production. Sustainable management of winery wastewater has thus become a priority in addressing environmental concerns. An investigation into treatment options has concluded that the end use of the wastewater is the most important factor. The best choice of management of the wastewater prior to disposal depends on critical issues such as chemical oxygen demand (COD), quality of the winery wastewater (including pH, Na, K levels) and relevant regulations. If wastewater could be rapidly used for irrigation, only minimal treatment may be required, which could be filtration, pH adjustment and possibly adding water to dilute the salt load. However if it is necessary to store the wastewater near an urban area, it may be necessary to reduce biochemical oxygen demand (BOD) and/or COD in order to control odour. Guideline values for key indicators of recycled winery wastewater quality for on-site and off-site disposal were developed during this investigation that focus on the balance between adequate treatment with its associated costs and rapid disposal through irrigation with its inherent risk of odour production. The investigation also notes that the disposal of winery wastewater (whether treated or not) often poses a threat to soil structure. The detailed report is available for download at [http://research.agwa.net.au/completed\\_projects/sustainable-recycled-winery-water-irrigation-based-on-treatment-fit-for-purpose-approach/](http://research.agwa.net.au/completed_projects/sustainable-recycled-winery-water-irrigation-based-on-treatment-fit-for-purpose-approach/)

## **Other news**

### **New strategies to reduce use of plant protection products in winemaking**

The Basque Institute for Agricultural Research and Development (NEIKER) has embarked on a 3-year-long project, known as FITOVID, to reduce the use of plant protection products in viticulture. The aim is to show that it is possible to reduce the frequency and intensity of applications of plant protection treatment for fungal diseases such as mildew. The researchers will take two broad approaches. They plan to determine the minimum amount necessary of the various fungicides and chemicals so as to minimize pollution, waste and costs. They will also investigate the use of new technologies for the very early detection and location of the fungus. This early detection will allow precise application of the plant protection products, thus minimising use. The project will also investigate alternatives to conventional chemical pesticides. [http://www.basqueresearch.com/berria\\_irakurri.asp?hizk=I&Berri\\_Kod=5311](http://www.basqueresearch.com/berria_irakurri.asp?hizk=I&Berri_Kod=5311)

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