



## Local Research News

### Effect of non-*Saccharomyces* yeast on malolactic fermentation

The successful induction and completion of malolactic fermentation (MLF) is an ongoing problem worldwide. The introduction of non-*Saccharomyces* yeasts in wine production constitutes yet another unknown factor for MLF, as the interaction between wild and industrial yeasts and lactic acid bacteria (LAB) has received little attention. The interaction between non-*Saccharomyces* yeasts and LAB, and subsequent effects on MLF and wine quality has been investigated for three non-*Saccharomyces* yeasts and two wine types. It was found that, depending on species and strain selection, non-*Saccharomyces* yeasts can have a positive effect on MLF and wine quality.

The non-*Saccharomyces* strains *Kloeckera apiculata*, *Schizosaccharomyces pombe* and *Torulaspora delbrueckii* were used in the production of Chenin blanc and Pinotage wines. Non-*Saccharomyces* fermented wines completed MLF faster than wines fermented with *Saccharomyces cerevisiae* only. Sensory data showed that Chenin blanc wines which had not undergone non-*Saccharomyces* MLF were preferred and scored higher for 'aroma intensity' and 'overall quality'. Pinotage wines which had not undergone non-*Saccharomyces* MLF scored higher for 'aroma intensity' and 'fruity aroma', but Pinotage wines having undergone non-*Saccharomyces* MLF had more 'body' and scored higher for 'overall quality'. Pinotage wines produced with non-*Saccharomyces* yeasts were considered to be better than wines produced with *Saccharomyces* yeast only. It was noted that non-*Saccharomyces* yeasts may increase the occurrence of spontaneous MLF, especially in sluggish fermentations of Chenin blanc. [www.sawislibrary.co.za/dbtextimages/DuPlessisHW1.pdf](http://www.sawislibrary.co.za/dbtextimages/DuPlessisHW1.pdf)

## International Research News

### *Saccharomyces cerevisiae* is a hybrid

Common baker's yeast (*Saccharomyces cerevisiae*), used in wine-making, was in 1996 the first non-bacterial organism to have its genome sequenced. It was found that the yeast seemed to have two very different versions of many of its genes and it was assumed that about 100 million years ago the entire genome had somehow been duplicated. Such whole genome duplications are now known to be surprisingly widespread and were important in the early evolution of vertebrates (our own genomes show two separate ancient whole genome duplication events). It is also a very common phenomenon in plants, especially cultivated ones. Now researchers have used advanced computational methods to study the origins of this whole genome duplication in yeast to gain a more thorough understanding of this phenomenon.

Unexpectedly, they have shown that the appearance of duplicated genes was not caused by a simple duplication of the whole genome but rather by a mating or hybridization event between two different species. So yeast is proposed to be an allopolyploid i.e. having a chromosome set composed of two or more chromosome sets derived more or less complete from different species. Their proposal, at odds with most widely accepted theory in the scientific community, provides new insight into this key process during genome evolution and the origins of species. <http://dx.doi.org/10.1371/journal.pbio.1002220>

### Unripe berries and petioles in Cabernet Sauvignon fermentations impact sensory and chemical profiles

The mechanical harvesting of vineyards is becoming common practice worldwide. A potential drawback of such harvesting is the consequent increase in the amount of matter other than grape (MOG) that may find its way into the must. Petioles, rachis and leaves are all MOG and while originating from vines, they are potential contaminants of primary ferments of red grape must. Petioles are the most common form of MOG, yet little is known of their chemical composition and their effect on the sensory and chemical properties of red wines.

A descriptive analysis panel examined Cabernet Sauvignon wines with various additions of MOG (green berries or petioles) from 0.5% upwards. The sensory analysis showed that the presence of 10% petioles in the must had a perceived impact, increasing floral aromas and reducing bitterness relative to a control, while wines made with petioles in the must were fuller bodied relative to wines made with green berries. These sensory results are related to increased terpene concentrations as petioles increase in concentration in the wines' must. Methoxypyrazines can also be detrimental contaminants to Cabernet Sauvignon wines. The predominant methoxypyrazine in the wines, 3-isobutyl-2-methoxypyrazine, increased in concentration with larger additions of pre-veraison green berries made to the must. Sensory analyses showed wines made with an addition of 0.5% of green berries and above during fermentation were associated with increased perceived acidity, and leafy and vegetal green aromas relative to some wines made with petioles. The results of this study provide winemakers with a better understanding of how grape harvesting choices may affect the perceived quality and chemical composition of their wines.

<http://dx.doi.org/10.5344/ajev.2015.15016>



## Rapid assessment of grey mould (*Botrytis cinerea*) infection using a simple biosensor system

*Botrytis cinerea* is responsible for the grey mould disease, which causes considerable economic losses for winemakers. The extent of the disease in wine grapes is usually visually estimated, which method is prone to assessor bias. Now a rapid and simple method using enzymatic carbon screen printed amperometric biosensors with flow injection analysis has been developed to measure gluconic acid and glycerol content in wine grapes with different degrees of *B. cinerea* infection. The lowest concentrations measurable by this method were 3 mg/L for gluconic acid (corresponding to an infection degree lower than 1%) and 35 mg/L for glycerol. The relationship between the concentrations of gluconic acid and glycerol and *B. cinerea* degree of infection in grapes was a highly correlated linear one ( $r^2 = 0.98$ ). The measurement took 30 seconds to 2 minutes. Thus this new method is more precise and gives a faster response than other methods that currently exist for determining the percentage of infection of grape berries by *B. cinerea*. <http://dx.doi.org/10.5344/ajev.2015.15029>

## Autolysis of wine yeasts induced by high pressure homogenization (HPH)

*Saccharomyces bayanus* is a yeast used in winemaking and cider fermentation. High pressure homogenization (HPH) was tested for inducing autolysis (the destruction of a cell through the action of its own enzymes) for winemaking in a commercial strain of *S. bayanus*. The effects on cell viability, the release of soluble proteins, glucidic colloids and amino acids in wine-like medium and the volatile composition of the autolysates was investigated in detail after processing, and compared to the results of thermolysis (thermal decomposition). It appears that HPH is a promising technique for inducing autolysis of wine yeasts. One pass at a pressure of 150 MPa was found to be the best operating condition. Soluble colloids, proteins and free amino acids were similar after HPH and thermolysis, but the former gave a more interesting volatile composition after processing, with higher concentrations of ethyl esters (fruity odours) and lower fatty acids (potential off-flavours). This might indicate different winemaking uses for HPH, such as the production of yeast derivatives for wine ageing. In the conditions tested, HPH did not completely deactivate the yeast cells and the treatment needs to be optimized before being used in actual winemaking. <http://dx.doi.org/10.1016/j.foodchem.2015.03.129>

## Pierce's Disease combatted by virus cocktail

Pierce's Disease (PD) is a deadly disease of grapevines and other plants such as oaks, peaches, almonds, coffee and citrus. It is caused by the bacterium *Xylella fastidiosa* (Xf), which is spread by xylem feeding leafhoppers known as sharpshooters. Pierce's Disease is prevalent in the USA and in Central and South America. The bacterium creates a biofilm which blocks the water-conducting xylem. Symptoms include chlorosis and scorching of leaves, and entire vines will die after 1-5 years. There are presently no effective control methods to prevent or treat PD. Bacteriophages, or phages, are viruses that attack bacteria. Researchers selected four such phages that had the potential to attack the Xf bacteria causing PD and used a mixture of these to treat vines. Xf levels in grapevines were significantly reduced in therapeutically or prophylactically treated grapevines. PD symptoms ceased to progress one week after therapeutic treatment and symptoms were not observed in prophylactically treated grapevines. The results indicate that phages have great potential for biocontrol of PD and other economically important diseases caused by Xf. <http://dx.doi.org/10.1371/journal.pone.0128902>

## Comparing Wild American Grapes with *Vitis vinifera* – towards hybrid grapes

Due to vegetative propagation and the consequent lack of evolution, *V. vinifera* is generally susceptible to many pests, and its cultivation requires grafting onto rootstocks resistant to Phylloxera. It also needs frequent treatments with large amounts of pesticides which are effective against fungal pathogens. The resulting problems of pesticide pollution and pesticide-resistant pathogens have stimulated research into hybrid varieties.

A study has analysed 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 between *Vitis vinifera* and the wild varieties. It was found that, compared to the high concentrations in the *vinifera* varieties in the study, the American grapes had very low levels of metabolites such as procyanidins that are considered crucial to the body and healthfulness of fine wine. They were also missing several compounds common in *vinifera* grapes that lead to appealing aromatic notes, such as pleasing aroma precursors (terpenoids, glycosides). But the American species were high in polyphenolic stillbenoids that are anti-fungal. An accumulation of hydrolysable tannins and their precursors were found in the skin of the wild American grapes. Such chemical profiling studies will help inform future breeding studies in designing better grape varieties. <http://dx.doi.org/10.1021/acs.jafc.5b01999>

## Other News

### App counts inflorescence flowers

Scientists in Spain have developed a free Android app that enables growers to quickly ascertain the flower numbers of an inflorescence. The app is called vitisFlower, and by counting unopened flowers it provides information that can assist in early season yield estimations. It is available at: <https://play.google.com/store/apps/details?id=com.ur.android.grapegenius&hl=en>



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