



Winetech Scan

Wine Industry Network of Expertise and Technology
Netwerk van Kundigheid en Technologie vir die Wynbedryf

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Research news

- The American Society for Enology and Viticulture evaluates all research articles published in its Journal for Enology and Viticulture (AJEV) for the prior year and selects one paper in enology and one in viticulture that is deemed outstanding in its content and a substantial contribution to its field. For 2009 the two papers selected are summarised in the next two paragraphs. <http://asev.org/2009/04/16/2009-best-paper-awards-announced/>
- The transport of sugars across the plasma membrane is the critical step in the utilization of glucose and fructose by yeast during wine fermentation. The yeast *Saccharomyces cerevisiae* possesses a large family of hexose (monosaccharides with six carbon atoms) transporter genes, termed 'HXT'. During fermentation, *S. cerevisiae* faces highly changing environmental conditions as the sugar concentration decreases over a thousand-fold range while the ethanol content increases significantly. Nitrogen starvation and ethanol are two particular stresses that can have negative effects on the activity of membrane proteins. The major transporter genes, *HXT1* through *HXT7*, were sequenced from a number of yeast strains and compared to the sequences in the *Saccharomyces* Genome Database. Base pair changes leading to differences in amino acid sequence were found for all seven transporters. Transporter protein levels were analyzed in a wine yeast strain. *HXT5*, not shown to be expressed in previous studies, was expressed during fermentation. Expression of *HXT4*, a prominently expressed transporter in laboratory media, was not detected. A strain lacking *HXT3* had no apparent difficulty in completing a fermentation with final ethanol concentrations above 13%, but was unable to complete the fermentation in media containing 5% exogenous ethanol. This suggests that correct expression of *HXT3* may play a role in ethanol tolerance. This information has the potential to be turned into a diagnostic tool for such important problems as stuck and sluggish fermentations at wineries. www.ajevonline.org/cgi/content/abstract/59/3/265
- To study the effect of temperature and solar radiation on phenolic profiles (anthocyanins and flavonol-glycosides) and on total concentrations of skin anthocyanin (TSA) in Merlot grape clusters at commercial maturity, a forced convection system was utilised. Ten combinations of temperature and solar radiation exposure were used to produce a dynamic range of berry temperatures under field conditions in both sun-exposed and shaded fruit between veraison and harvest. Exposure to high temperature extremes for relatively short periods appeared to alter the partitioning of anthocyanins between acylated and nonacylated forms and between dihydroxylated and trihydroxylated branches of the anthocyanin biosynthetic pathway, with the flavonol-glycoside, quercetin 3-glucoside, increasing in concentration with exposure to solar radiation. Low incident solar radiation alone appeared not to compromise total anthocyanin accumulation; rather, a combination of low light and high berry temperatures decreased TSA. Regardless of exposure to solar radiation, higher berry temperatures led to a higher concentration and a higher proportion of TSA comprising malvidin-based anthocyanins, driven primarily by increases in the acylated derivatives. Under shade alone and under high temperature extremes in sunlit and shaded fruit, acylated anthocyanins represented a larger proportion of TSA than did nonacylated anthocyanins. At berry temperatures equivalent to those of shaded fruit, exposure to solar radiation decreased the proportion of TSA comprised of acylated forms of the five base anthocyanins, and increased the proportion of TSA comprised of dihydroxylated anthocyanins. Temperature is a strong environmental determinant of anthocyanin profile in the berry skins, above a potentially low threshold of exposure to solar radiation. The combined effect of solar radiation and berry temperature on anthocyanin composition is more complex than previously reported and is synergistic at moderate berry temperatures and potentially antagonistic at high temperature extremes. www.ajevonline.org/cgi/content/abstract/59/3/235
- Extremely sensitive chemical analyses involving advanced gas chromatography, mass spectrometry and instrumental neutron activation analysis have been applied to a 5 000 year-old shard of a wine jar (right) that was buried with one of ancient Egypt's first rulers, Scorpion I, in 3150 BC. Eight terpenoid compounds were found in the shard: linalool, camphor, borneol, L-menthol, alpha-terpineol, carvone, thymol, and geranyl acetone. Their presence is attributed to three herbs being dissolved in the wine the jar contained. They are savory (*Satureja*), *Artemisia seibeni* (a wormwood), and blue tansy (*Tanacetum annuum*). The same terpenoid compounds, except for geranyl acetone, occur in an additional 7 herbal genera, including balm (*Melissa*), senna (*Cassia*), coriander (*Coriandrum*), germander (*Teucrium*), mint (*Mentha*), sage (*Salvia*), and thyme (*Thymus/ Thymbra*), and so these herbs could also have been present in the wine. Previously the earliest documented use by ancient Egyptians of herbal remedies in alcoholic beverages was 1850 BC, ambiguously mentioned in medical papyri of that time. www.pnas.org/cgi/doi/10.1073/pnas.0811578106



Closures

- Duval-Leroy, one of the larger Champagne houses which produced more than 6 million of the 320 million bottles of Champagne made in 2008, is to start selling bottles with aluminium tops later this year. This will be the first time in Champagne's 350-year history that cork has not been used as a closure. It has been thought impossible to develop a metal top that would be strong enough to withstand the pressure that builds up inside a Champagne bottle. The force reaches 6 atmospheres under normal conditions - three times the pressure inside a car tyre and enough to send a cork flying out at a speed of 40 kilometres per hour. Alcan Packaging has come up with a design it describes as revolutionary, but has refused to divulge more details until it is officially launched next month (May). The device will appear on a limited number of bottles of Duval-Leroy's clos des Bouveries range to test market reaction. A spokesperson for Alcan insisted vinophiles would be impressed, saying, 'it will still make a pop sound, for sure. And it will be easy to open'. Analysts feel that consumers would not embrace the new technology. www.telegraph.co.uk/foodanddrink/foodanddrinknews/5166156/Champagne-cork-to-be-replaced-by-metal-top.html

Health

- In humans, fetal ethanol exposure is highly predictive of adolescent ethanol avidity and abuse. Little is known about how fetal exposure produces these effects. A study involving rats found that fetal ethanol exposure increased the taste-mediated acceptability of both ethanol and quinine hydrochloride (bitter), but not sucrose (sweet). Importantly, a significant proportion of the increased ethanol acceptability was attributed directly to the diminished aversion to ethanol's quinine-like taste quality. Fetal ethanol exposure also enhanced the rats' later ethanol intake and the behavioural response to ethanol odour, with the elevated intake causally linked to the enhanced odour response. www.pnas.org/cgi/doi/10.1073/pnas.0809804106
- Red wine can cause teeth to stain. Now a study by New York University dental researchers has found that drinking white wine can also increase the potential for teeth to take on dark stains. The researchers compared two sets of six cow teeth, whose surface closely resembles that of human teeth, and used a spectrophotometer to evaluate staining levels. To simulate the effect of sipping white wine with dinner, the teeth were dipped in white wine for one hour, and then immersed in black tea. The teeth had significantly darker stains than teeth immersed for one hour in water before exposure to the tea. Lead researcher Dr. Mark Wolff said, 'The acids in wine create rough spots and grooves that enable chemicals in other beverages that cause staining, such as coffee and tea, to penetrate deeper into the tooth'. When the researchers repeated the experiment with red wine, the resulting stains were significantly darker than those in the white wine group, because red wine, unlike white, contains a highly-pigmented substance known as chromogen (a precursor of a biochemical pigment). Dr. Wolff advised that the best way to prevent staining caused by wine, as well as other beverages, was to use a toothpaste containing a whitening agent. www.physorg.com/news157816969.html
- A study of bone mineral density (BMD) in 1182 men, 1289 post-menopausal and 248 pre-menopausal women found that moderate intake of alcohol (wine, beer or liquor) had beneficial effects on bone in some cases. Compared with nondrinkers, hip BMD was greater (good) (3.4–4.5%) in men consuming 1–2 drinks/day, whereas hip and spine BMD were significantly greater (5.0–8.3%) in post-menopausal women consuming >2 drinks/day. Intake of >2 drinks/day in men was associated with significantly lower (bad) (3.0–5.2%) hip and spine BMD. Associations between alcohol intake and BMD were not significant for pre-menopausal women. A tendency toward stronger associations between BMD and beer or wine, relative to liquor, suggested that constituents other than ethanol may contribute to bone health. Silicon appears to mediate the association of beer, but not that of wine or liquor, with BMD. www.ajcn.org/cgi/content/abstract/89/4/1188
- A study performed on laboratory rats suggests grapes may reduce heart health risks beyond the simple blood pressure-lowering impact that can come from a diet rich in fruit and vegetables. The rats were from a research breed that develops high blood pressure when fed a salty diet. Regular table grapes (a blend of green, red, and black grapes) were mixed into the rat diet in a powdered form, as part of either a high- or low-salt diet. Comparisons were made between rats consuming the grape powder and rats that received a mild dose of a common blood pressure drug, hydrazine. After 18 weeks, the rats that received the grape-enriched diet powder had lower blood pressure, better heart function, and fewer signs of heart muscle damage than the rats that ate the same salty diet but didn't receive grapes. Rats that received the blood pressure medicine, along with a salty diet also had lower blood pressure, but their hearts were not protected from damage as they were in the grape-fed group. Heart cells, like other cells in the body, make an antioxidant protein called glutathione, which defends against damaging oxidative stress. High blood pressure causes oxidative stress in the heart and lowers the amount of protective glutathione. However, intake of grapes actually turned on glutathione-regulating genes in the heart and significantly elevated glutathione levels, possibly explaining why the hearts of the grape-fed rats functioned better and had less damage. Whether the same effect occurs in humans remains to be seen. www.physorg.com/news159644910.html

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