



Winetech Scan

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

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Research News

- A major concern when shipping wine is whether the condition in which it is received at its destination is the same as when it left the winery. For the first time a study has assessed sensory changes in wines under conditions that would potentially be experienced by wine in transit. Four whites and four reds were exposed to four different storage conditions to create 32 treatments. Riesling, Gewürztraminer, Sauvignon Blanc, and Chardonnay wines were from one producer and of the same vintage. One Merlot and three Cabernet Sauvignon wines were from different labels by the same producer. The four storage conditions were 20°C, 40°C, 20/40°C (reflecting the diurnal cycle in temperatures), and a sample that travelled in the trunk of a car for three weeks. Volatiles were analyzed using a HS-SPME-GC-MS analysis. The wines were evaluated using sensory descriptive analysis. Trained panellists, 11 for white wine and 13 for red wine, rated the wines on 14 and 23 attributes respectively. Both sensory and analytical results showed significant changes in the wines stored at the higher temperatures. Changes were noted for a number of compounds, including higher concentrations of vitispirane 1 and 2, p-cymene and the norisoprenoid TDN (1,1,6-trimethyl-1,2-dihydronaphthalene), as well as reduced concentrations in several esters and acetates, which are characteristic of aged wines. There was a significant impact of the constant 40°C heat treatment on the aromatic properties of all the wines. For the white wines there were increasing diesel, oxidized, and rubber aromas and decreasing citrus, floral, and tropical fruit aromas. The changes in the reds were significant, although less pronounced, with increased dried fruit and canned vegetable aromas. There was a lesser impact on the aroma and volatile composition of the wines by the 20°C/40°C cycled treatment, and the least impact was seen with the constant 20°C and car trunk treatments, which caused much the same changes. www.ajevonline.org.ez.sun.ac.za/cgi/content/abstract/61/3/337
- Superconductivity plays an important role in technologies relying on magnetic fields, e.g. magnetic resonance imaging (MRI), low-loss power cables and powerful superconducting electromagnets used in maglev trains. The search for ever-better superconducting materials is an ongoing one. Now Japanese researchers report they have discovered an amazing method to induce superconductivity in an Fe-Te-S compound. They immersed it in a variety of hot alcoholic beverages at 70°C for 24 hours. Red wine gave the best result, followed by white wine, beer, sake, whiskey, and shochu (a distilled beverage native to Japan). A pure water-ethanol mixture at various concentrations had little effect. These results suggest that components of the alcoholic beverages other than hydrous ethanol contribute to the evolution of superconductivity. <http://iopscience.iop.org/0953-2048/24/5/055008>
- Olfactory experts are rare, with only about 500 perfumers, known informally as 'noses', worldwide. A study has concluded that such world-class 'noses' in the perfume and wine business are not born with a specially enhanced sense of smell, but acquire it through years of professional sniffing. 28 volunteers, half of them student perfumers, and the other half scent-makers with five to 35 years experience had their brains scanned during two tests. They were asked to identify dozens of odours selected from a standard palate of 300 chemicals, and to imagine smells of chemicals after looking at their chemical names. Both groups scored well in the two tests though the experts were faster and more accurate. What surprised the researchers was that different parts of the brain lit up. For novices, activity was more concentrated in a region responsible for conscious perception. For the experts, neurons fired more vigorously an area involved in memory recall and mental imagery. The researchers feel that their findings demonstrate the extraordinary ability of the brain to adapt to environmental demands and to reorganise with experience, and showed that mental imaging of odours develops from daily practice and is not an innate skill. The results suggest that experts progressively develop more efficient strategies in their field of expertise, allowing them to liberate additional resources for other aspects of artistic performance such as the creation of new fragrances. <http://dx.doi.org/10.1002/hbm.21207> An earlier study involving 7 sommeliers and 7 so-called naïve drinkers found that the pattern of brain activations is substantially different in experienced sommeliers. In sommeliers brain areas which have been implicated in gustatory/olfactory integration in primates were activated, as were high-level cognitive processes such as working memory and selection of behavioural strategies. The naïve individuals activated brain areas implicated in emotional processing. <http://dx.doi.org/10.1016/j.neuroimage.2004.11.045>

Local Research News

- Most irrigation research on wine grapevines has been carried out in micro-sprinkler irrigated vineyards. A project which examined the scheduling low or high frequency drip irrigation in vineyards, and in particular the effects of deficit irrigation has been carried out. The primary objectives were to determine the effects of different regulated deficit irrigation strategies on root distribution and density, cane mass, evapotranspiration, and wine quality. The

vineyards concerned were Shiraz in the Breede River valley near Robertson and Merlot in the Coastal region near Wellington. The findings for Shiraz included that different irrigation strategies did not have a significant effect on root distribution and density, that water stress in Shiraz grapevines was increased by deficit irrigation, and that shoot growth of grapevines exposed to water deficits in the pre-veraison period stopped before mid December. Shoots of grapevines that were irrigated more frequently from veraison until harvest showed re-growth during berry ripening. Water deficits had a negative effect on berry mass, bunch size and yield. Higher water stress in grapevines, particularly during ripening, had a positive effect on wine colour as well as berry and spicy characters, and eventually on overall wine quality. For the Merlot, although low frequency irrigation increased yields compared to non-irrigated conditions, it had no negative effects on sensorial wine quality characteristics. Non-irrigated grapevines produced the smallest berries, but did not necessarily produce wines superior in colour, berry aroma or overall quality. Some irrigation strategies reduced wine quality, particularly when irrigation was applied at a high frequency, i.e. twice a week. www.sawislibrary.co.za/dbtextimages/Winetech2010_06.pdf

- Leafroll is one of the most significant virus diseases of grapevines. It causes large yield losses (up to 50%) and delays fruit ripening. Among the ten viruses associated with leafroll disease, Grapevine Leafroll- associated Virus type 3 (GLRaV-3) is the main causative agent in South Africa. There has been only one previous report of the complete nucleotide sequence of GLRaV-3 (isolate NY-1, AF037268). Now the complete sequence of the South African GLRaV-3, isolate GP18 (EU259806), has been carried out, with the aim of addressing the lack of knowledge that exists regarding the replication strategy of GLRaV-3. Very little is known about the role of GLRaV-3 sub genomic RNAs other than that they form part of virus replication and viral gene regulation. A particular sub genomic RNA, the five prime untranslated region (5' UTR), was found to be a long 737 nucleotides compared to the 158 nucleotides in the earlier NY-1 sequence. The 5' UTR, also known as the leader sequence, is a particular section of messenger RNA and the DNA that codes for it. Some viruses and cellular genes have unusual long structured 5' UTRs which may have roles in controlling gene expression by way of attenuation. This extended UTR was found in all other South African isolates of GLRaV-3 that were tested. The construction of a GLRaV-3 mini-replicon, analogous to RNA1 of *Lettuce infectious yellows virus*, for the evaluation of possible sub genomic promoters was carried out. The evaluation is ongoing. www.sawislibrary.co.za/dbtextimages/Winetech2010_04.pdf

Other News

- A technological breakthrough has resulted in an inexpensive benchtop machine that sequences DNA directly using semiconductor technology, and which could help make small-scale gene sequencing affordable to labs around the world. The Ion Torrent Personal Genome Machine (Ion PGM) utilizes a disposable integrated circuit chip costing \$250 that enables chemical signals to be directly translated into digital information for the first time. Most current sequencing technologies label nucleotides with dyes, which must then be optically read as sequences. The Ion PGM utilizes a massively parallel array of semiconductor sensors to perform direct real-time measurement of the hydrogen ions produced during DNA replication. A high-density array of wells on the chip provides millions of individual reactors while integrated fluidics allow reagents to flow over the sensor array. This unique combination of fluidics, micromachining, and semiconductor technology enables the direct translation of genetic information (DNA) to digital information (DNA sequence). Most sequencing machines available today take a week to process DNA samples, whereas the Ion PGM can do runs in about 2 hours. www.nature.com/news/2010/101214/full/news.2010.674.html and www.iontorrent.com/technology-scalability-simplicity-speed/
- The Russian-English Agricultural Atlas is the world's most comprehensive source of information on the geographic distribution of plant-based agriculture in Russia and neighbouring countries. The Atlas contains 1 500 maps that illustrate the distribution of 100 crops including the grapevine, 560 wild crop relatives, 640 diseases, pests and weeds, and 200 environmental parameters. Additionally, the Atlas provides detailed biological descriptions, illustrations, metadata and reference lists. Individual maps can be downloaded and viewed using free GIS software. A leader of the project said that the ability to layer information from such a comprehensive atlas enables researchers to answer a huge array of agricultural questions. As an example, AgroAtlas can be used to show where in Crimea, a major wine-producing region, US wine grapes can be successfully grown. www.agroatlas.ru and www.ars.usda.gov/is/AR/archive/mar11/atlas0311.htm
- Wine makers are going to extreme lengths to ensure the authenticity of their wines. A top wine estate in France not only etches the year and the specific winemaker's name into the glass of each bottle by laser (which also aids in the tracking of the wine in winery), but also uses a capsule which contains a trace mineral which can be detected with a special reader. And then the capsule is sealed with a 'prooftag' which contains a code of small bubbles unique to each bottle. See video at http://news.bbc.co.uk/2/hi/programmes/click_online/9407809.stm and for more details of the 'prooftag' see www.prooftag.com.



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