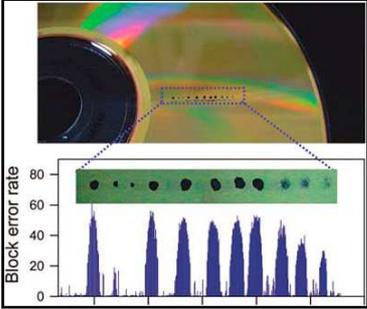




Research news

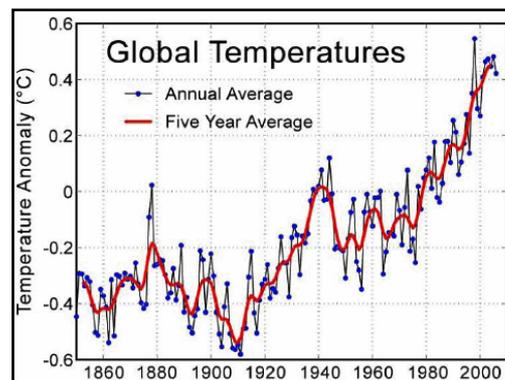
- Researchers in Spain have examined the absorption of young red wine by corks in bottled wine. The corks were ready-to-use natural cork stoppers and '1+1' cork stoppers. The latter consist of a very dense agglomerate cork body with natural cork disks on both ends. Stoppers were removed after 3, 6, 12 and 24 months of contact to determine the absorption of liquid and liquid progression along the lateral surface of the cork stopper. '1+1' cork stoppers absorbed less liquid than natural cork stoppers (30% less after 24 months). For natural cork, the lateral progression of the wine appeared to be complete from 3 months on at about 24mm, while for the '1+1', the linear progression took 12 months to reach a similar value. A scheme of the evolution of wine absorption with time was proposed, which differentiates liquid flow along the cork-glass interface, diffusion in cell walls and liquid flow through the cell lumens. www.inia.es/inia/contenidos/publicaciones/index.jsp?idcategoria=3053®ini=10
- Microarray technology is a powerful tool for the high throughput analysis of specific interactions between biological macromolecules (DNA, proteins, and carbohydrates). However, its applications are limited because of the expensive equipment required. Thus researchers have been investigating the development of inexpensive materials and tools for rapid biomolecular screening, especially the use of modified CD (compact disk) drives. Now a team of Canadian researchers have shown that it is possible to read biorecognition reactions on a CD disk by using the reading-error correction function embedded in standard audio CDs with no modification to either PC hardware or software. Three different types of biochemical recognition reactions (biotin–streptavidin binding, DNA hybridization, and protein–protein interaction) were performed directly on a compact disk in a line array format with the help of microfluidic channel plates. Being well-correlated with the optical darkness of the binding sites (after signal enhancement by gold nanoparticle-promoted autometallography), the reading error levels of pre-recorded audio files served as a quantitative measure of biochemical interaction. The novel readout protocol is about 1 order of magnitude more sensitive than fluorescence labelling/scanning and has the capability of examining multiplex microassays on the same disk.  <http://dx.doi.org/10.1021/ac8012434>
- *Brettanomyces bruxellensis* is considered a contaminant and spoilage yeast and is often referred to as brett. Its metabolic products can have major consequences for the organoleptic profile of wine. Some authorities consider brett to be responsible for 90% of the spoilage problems in premium red wines. Depending on growth conditions, this microorganism can produce volatile phenols such as 4-ethylgaiacol, 4-ethylcatechol and 4-ethylphenol. A concentration of 4-ethylphenol of more than 440 µg per litre in red wine can cause an unpleasant aroma, described as 'horse sweat', 'medicinal', 'stable', and 'spicy'. The use of yeast hulls (outer skin) presents an ecofriendly alternative to conventional physicochemical techniques used to decrease the volatile phenol content in wine. *S. cerevisiae* mutant strains with deletion of genes encoding specific proteins involved in cell-wall structure and composition were studied, and a major role for mannoproteins (which occur in the cell wall or hull) in 4-ethylphenol sorption was identified. The sorption capacity of 4-ethylphenol by yeasts was greatly influenced by the strain nature, methods, and medium used for biomass production and drying of the yeasts after harvesting. It was confirmed that 4-ethylphenol sorption occurs at the surface of the yeast wall and that not all mannoproteins are determinants of sorption; the sorption capacity of cells with deletion of the Gas1p-encoding gene was 75% lower than that of wild type. Physicochemical properties of the yeast cell surface were studied as these can determine cell-material adhesion. These properties were surface hydrophobicity, electron donor character, and zeta potential, and these were measured for each strain and for each method of biomass production. Significant differences of these properties were found in biomass of cells from the same strain cultured in different media or subjected to an industrial drying process. It was concluded that an approach based on the selection of strains and culture methods, together with careful assessment of the drying methods used, may be used to optimize the sorption of small molecules in wine. <http://dx.doi.org/10.1021/jf802170p>
- Oak barrel maturation enhances the organoleptic properties of wine and spirits through the extraction of various oak derived volatile compounds. The most important of these are the *cis*- and *trans*-isomers of 5-*n*-butyl-4-methyl-4,5-dihydro-2(3H)-furanone, more commonly known as oak lactone, which impart 'coconut', 'citrus' and 'vanilla' aroma characters. The *cis*-oak lactone is considered to be the more important isomer, since it has a lower detection threshold and is usually the more abundant. Some oak volatiles, including the oak lactones, are present as natural oak components, but are also released in significant quantities from glycoconjugated derivatives during the seasoning and toasting processes of cooperage. The β-D-glucopyranoside of 3-methyl-4-

hydroxyoctanoic acid (glucoside), exists in oak wood and is a potential precursor to *cis*-oak lactone. Now, for the first time, a method for the quantification of the glucoside in extracts of oak wood using liquid chromatography–tandem mass spectrometry has been developed. Analysis of extracts of both American and French oak woods using the new technique found that the concentration of the glucoside varied widely from less than 0.1 up to approximately 50 µg per gram of oak wood. Up to now it has been difficult to control the levels of the oak lactones in wine or spirits aged in contact with oak wood. This new method affords a tool for measuring the potential oak lactone level in oak wood, and could be used to more accurately estimate the duration of oak contact or cooperage treatments required to produce desired levels of oak flavour from oak maturation. <http://dx.doi.org/10.1016/j.chroma.2008.10.109>

- To better understand at the whole genome level the evolutionary processes acting within yeast populations and species that lead to adaptation to different environments, phenotypic differences and reproductive isolation, one- to fourfold or more coverage of the genome sequences of over seventy isolates of the baker's yeast *S. cerevisiae* and its closest relative, *Saccharomyces paradoxus* were carried out. Variation in gene content, single nucleotide polymorphisms, nucleotide insertions and deletions, copy numbers and transposable elements were all examined. It was found that phenotypic variation broadly correlates with global genomewide phylogenetic relationships. *S. paradoxus* populations are well delineated along geographic boundaries, whereas the variation among worldwide *S. cerevisiae* isolates shows less differentiation and is comparable to a single *S. paradoxus* population. Rather than one or two domestication events leading to the extant baker's yeasts, the population structure of *S. cerevisiae* consists of a few well-defined, geographically isolated lineages and many different mosaics of these lineages, supporting the idea that human influence provided the opportunity for cross-breeding and production of new combinations of pre-existing variations. The survey will allow future rapid fine mapping of the genetic determinants. The sequence data obtained have many other applications, and have already been used for global and gene-specific studies. <http://dx.doi.org/10.1038/nature07743>
- The Amorim Academy supports research for wine development and conservation. Scientists who have conducted research in oenology, and economists, jurists and sociologists who have published works on wine quality, may participate in its 2009 competition. There are 3 prizes of 5 000, 3 000 and 3 000 Euros. The deadline for submissions is May 16. Details are available at www.academie-amorim.com/?Version=EN

Environmental Issues

- Climate change and associated environmental and economic implications are becoming an accepted part of economic and business planning. Consumers (including those in export markets) place trust in and support entities that actively address environmental issues, particularly climate change. The agricultural sector contributes significantly to greenhouse gas emissions though the use of agrochemicals, liquid fuels, and land-use change. To preserve SA's competitive position in global fruit and wine export markets it is therefore crucial to develop a comprehensive, industry-scale response to climate change. This has been launched by local industry stakeholders, together with ConMark, in the form of the *South African Fruit and Wine Climate Change Program*, available at www.winetech.co.za/overview-articles.php The programme is being implemented in three stages which will result in a comprehensive climate change response for the industry. The stages are: an audit of current greenhouse gas emissions throughout the supply chain; the development of a comprehensive strategy to identify reduction opportunities and establish realistic goals and targets; and an implementation plan, which will provide a pathway to achieving the goals and targets. It will include a description of opportunities, the process required to realise such opportunities, potential costs, and how to communicate climate change initiatives to stakeholders. The project is being directed by a ten person steering committee, drawn from industry stakeholders, funders and expert advisors.
- The Amethyst project www.infowine.com/default.asp?scheda=7914 has developed a benchmarking and self-assessment tool for small and mid-scale wineries in the European Union. The tool gives an insight into the relative energy and water efficiency of the winery and the potential for improvement. It is estimated that savings of more than 20% can be obtained in a cost-effective way, resulting in reductions in peak electricity use and CO₂ emissions, and an improvement to the 'bottom line' of wineries. Conclusions of the project included the finding that there is a need for benchmarking information in all countries, that the main issue in energy and water optimization is often not money but perceived image, and that big wineries generally had much better results than small ones. Consultants will be needed to help disseminate the tool among wineries. The Excel-based tool may be downloaded from www.amethyst-project.eu



Winetech Scan is available on the Winetech website www.winetech.co.za

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