



Winetech Scan

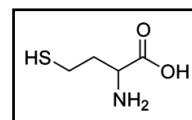
Wine Industry Network of Expertise and Technology
Netwerk van Kundigheid en Technologie vir die Wynbedryf

October 2009

- Readers may find the following glossaries related to winemaking, wine, wine tasting and viticulture useful:
http://en.wikipedia.org/wiki/Glossary_of_winemaking_terms http://en.wikipedia.org/wiki/Glossary_of_wine_terms
http://en.wikipedia.org/wiki/Wine_tasting_descriptors http://en.wikipedia.org/wiki/Glossary_of_viticultural_terms

Research News

- Wine authenticity is a challenging issue, especially in the context of the global wine market. In this highly competitive market, fair trade and fair prices are essential to maintain consumer confidence and a level playing field for honest wine producers. Recent developments have shown that authenticity control is improved by the application of multivariate statistical methods to a combination of composition and isotopic data. To improve authenticity control, a project funded by the European Commission, to establish a Wine Data Bank for analytical parameters for wines from Czech Republic, Hungary, Romania, South Africa and Australia, was initiated in 2002. Australian wines were dropped from the project after the first year due to budget constraints. In Part I of the project each country defined wine regions and identified grape varieties. A statistical sampling plan was developed for authentic samples taking these two variables into account. The authentic samples were grapes that had been harvested and converted to wine by a standard microvinification protocol. Each country provided 100 different samples per year, 50 commercial and 50 authentic samples. Three laboratories subjected the samples to isotopic analysis, inductively coupled plasma mass spectrometry (ICP-MS) and classical wine analysis, resulting in the determination, in the first year, of 104 parameters, including four stable isotope ratios, 34 inorganic parameters, 19 rare earth elements, 9 biogenic amines and 38 classical wine parameters. After due consideration, the number of parameters was reduced to 63 for the following years. The final chosen parameters, together with five calculated rare earth ratios comprised the following groups: classical parameters (16), macro elements (9), biogenic amines (3), trace elements (22), rare earth elements (4), stable isotopes (4) and rare earth ratios (5). Part II of the study reported on the descriptive and exploratory data analysis and discussed the univariate statistical results. South African authentic as well as commercial red and white wines were easily discriminated from the other countries by means of a single isotopic ratio such as Ethanol(D/H)₁, Ethanol(D/H)₂ or Wineδ¹⁸O. The separation of the European countries was more difficult, especially as the Hungarian and Czech wines showed an overlap. Multivariate techniques will be required for the differentiation of the European wines. However, it was possible to identify variables that might be important for the discrimination. Uranium and vanadium as well as the rare earths are most important for the separation of Hungarian and Romanian authentic white and red wines as well as for the separation of Czech and Romanian authentic white and red wines. These variables do not allow a discrimination of the commercial samples, which are more difficult to separate. Part III of the study, still to be published, will deal with multivariate discrimination and classification methods. Part I: <http://www.springerlink.com/content/100491/> Part II: <http://www.springerlink.com/content/jv004m04500q5584/>
- Homocysteine (HCy) (right) is a nonproteinogenic amino acid with important physiological functions. Elevations of plasma HCy (i.e. HCy in the blood) may be caused by one or more unhealthy lifestyle factors that influence vitamin status or metabolism, such as smoking, high alcohol consumption, low nutritional intake of vitamins, high coffee consumption and lack of physical exercise. A high level of plasma HCy is a powerful risk factor for cardiovascular disease and elevated levels of HCy have been linked to increased fractures in elderly persons. It appears that HCy degrades and inhibits the formation of the three main structural components of the artery, namely collagen, elastin and the proteoglycans. Up to now it was not known whether HCy is present in wine or spirits. Now a research group in Bulgaria have used their newly developed technique of determining plasma amniothiols - high performance liquid chromatography after precolumn derivatization with N-(2-acridonyl)maleimide - to examine the HCy content of 36 white and red Bulgarian wines. HCy was indeed found to be present, in the range of 0.09–0.64 mg/l for the white wines, and in the range of 0.10–1.37 mg/l for the red wines. The study noted that it is not clear whether the observed HCy concentrations could affect total plasma HCy and stated that it is important to investigate the possible impact of wine HCy content on plasma HCy levels. <http://dx.doi.org/10.1007/s00217-009-1162-5>
- Red European *Vitis vinifera* cultivars produce only the anthocyanin pigment compound oenin (malvidin 3-O-glucoside), whereas most other *Vitis* species and hybrids can produce the anthocyanin malvin (malvidin 3,5-di-O-glucoside) as well. Most of the wines produced from American species and cultivars *Vitis labrusca* have a strong, characteristic musty flavour and aroma, which is disagreeable to many wine consumers, and which has been attributed to malvin. Despite intensive grape breeding, this flavour still hampers production of European style wines from native American grapes. The production of malvin, which has been used to classify wines according to



their varietal origin, had been attributed to a particular single gene mutation inherited by the European plants. It has now been shown, by isolating and cloning DNA sequences of interest, rewriting specific parts of the genetic code (site-directed mutagenesis), and determining the 3-dimensional structure of proteins expressed, that the difference stems not from a single gene mutation, but from a double mutation. The chromosome bearing the double-mutated gene (5GT) is colocated with the gene AMAT responsible for the production of methyl anthranilate, implicated in the poor, 'musty' aroma of the North American varieties. Colocalization of the two genes explains the observed correlation between the ability to form the negative flavour and the presence of malvin. This study may have a significant impact on the classification of *Vitis* varieties and the evaluation of products derived thereof, with the possibility of eliminating the negative flavour from North American varieties. This result contributes to the ongoing change in grapevine breeding, which is moving from empirical crossings to the sophisticated planning of a desired genotype. <http://dx.doi.org/10.1021/jf900146a>

- A study of the aerosols emanating from champagne notes that a total of 5 litres of CO₂ escape from a typical 0.75 litre champagne bottle once it has been opened. As bubbles are typically 0.5 mm in diameter, this means that some 100 million bubbles with an effective exchange surface of 80 square metres are released from each bottle. The bubbles nucleated on the glass wall drag champagne surfactants along their way through the liquid bulk and the bubbles bursting at the champagne surface radiate hundreds of tiny liquid jets every second, which quickly break up into a multitude of tiny droplets as shown by use of high-speed photography (right), and laser tomography techniques. The droplets are in the form of very characteristic and refreshing aerosols. The study investigated the chemical complexity and diversity of these through ultrahigh-resolution mass spectrometry in the mass range 150–1 000. The study was able to discriminate hundreds of chemical components that are preferentially partitioned in champagne aerosols rather than in the champagne bulk, and proposed structural assignments for tens of them. Based on accurate exact mass analysis and database search, these latter were unambiguously discriminated and assigned to compounds showing organoleptic activity or being aroma precursors. Some of these were a nearly complete series of saturated fatty acid structures ranging from the C10 (decanoic) to the C24 (tetracosanoic), alternatively these could be structural isomers, namely ethyl esters, well-known to contribute to the aroma of wine. The mono unsaturated fatty acids myristoleic acid, palmitoleic acid and oleic acid were present in the aerosol as was the polyunsaturated fatty acid linoleic acid. These unsaturated fatty acids constitute the main lipid fraction of grapes, and are also precursors of C6 compounds responsible for herbaceous aromas. Another important family of odorant compounds, namely norisoprenoids, was also identified. The results support the idea that rising and collapsing bubbles act as a continuous 'conveyor belt', preferentially partitioning aromas from the liquid into champagne aerosols. www.pnas.org/cgi/doi/10.1073/pnas.0906483106



- High ethanol and low pH (acid) are stress factors that influence the survival of LAB (lactic acid bacteria), and the progress of MLF (malolactic fermentation). A study of the microvinification of simultaneous and sequential AF/MLF (AF alcoholic fermentation) to evaluate MLF in high-alcohol wines such as Amarone, an Italian wine made from dried grapes, conducted both simultaneous and sequential AF/MLF with direct inoculation of bacteria, which resulted in successful MLF in wines containing approximately 16% alcohol. At higher ethanol levels, stuck MLF occurred because of growth inhibition. To overcome this, the performance of bacteria was tested in wine containing approximately 17% ethanol using a starter preparation consisting of cells acclimatised in a wine-water solution for 24 and 48 hours. Total malic acid depletion (i.e. successful MLF) was recorded when the bacterial cells that had been acclimatised for 48 hours were inoculated simultaneously with yeast to conduct AF. This then seems to be a valid strategy to obtain complete MLF in high-alcohol wines. www.sasev.org/journal/sajev-articles/volume-30-1/Bacterial%20Inoculation%20-%20High-alcohol%20Wines.pdf

Local research results

- A project which investigated the role that oxygen plays in the making of South African wines, both white and red, developed a novel LC-MSMS method (liquid chromatography-tandem mass spectrometry) for the determination of glutathione, and made a number of findings. When the oxygen content is controlled (limited) in white wine production, glutathione, a potent anti-oxidant, is retained, as are phenolic compounds. However, conditions that are too reductive can lead to the formation of sulphur aroma compounds even if diammonium phosphate is added. Addition of oxygen before malolactic fermentation can positively influence the colour and colour composition of red wines if applied correctly, but sufficient tannins from skins at a normal seed to skin ratio are required to stabilize the colour. The addition of more seed, which also leads to a more astringent wine, does not necessarily further enhance the colour. It was shown that Fourier transform infra-red spectroscopy (FTIR) or an electronic tongue can be used to monitor the progression of oxidation in red wines. This was done for four different Pinotage wines which were exposed to oxygen (air) for periods ranging from a few days to several weeks. www.sawislibrary.co.za/dbtextimages/DuToitWJ2.pdf

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