# Winetech Scan

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

## Research outputs

- A geologist from Wales has explored the hypothesis that vineyard geology, i.e. the bedrock and overlying soils, is supposed to help explain the typicity of wine from a particular area. He notes that there has been little analysis of how this might come about. In his evaluation, he argues that geology does underpin some of the physical parameters that affect vine performance, but in an indirect way, and that the factors are commonly manipulated artificially. A direct geochemical influence on wine flavour is widely inferred but remains undemonstrated. He concludes that the popular model of nutrients being taken up by the vine and persisting to be tasted in the finished wine is untenable. The amounts that reach the fermenting must are minuscule, bear little relation to the substrate composition, and can be further complicated by contamination and fining. In the final wine these inorganic nutrients normally exist in concentrations far below human recognition thresholds and are 'swamped' by the organic secondary metabolites that do dominate wine flavour. He finds that being able to taste the vineyard geology in the wine (*a gout de terroir*) is a romantic notion which is wholly anecdotal and in any literal way is scientifically impossible. http://dx.doi.org/10.1080/09571260802163998

- Wine's high alcohol content and acidity eliminate most bacteria. Those that survive have the potential to spoil the wine so wine makers try to kill bacteria with heat, sulphur dioxide or ultraviolet light. Recently a team in Scotland used a sequence of up to 300 pulses of a strong electric field, each lasting 2 microseconds, to demonstrate that this technique can sterilise wine without spoiling its flavour. The intense electrostatic pulses rupture the bacteria's cell membranes. http://www.newscientist.com/article/mg17823922.800

- An 'electronic tongue' can be defined as an analytical instrument comprising an array of non-specific and poorly selective chemical sensors with cross-sensitivity to different compounds, and an appropriate chemometric tool for data processing. The sensor array produces a signal pattern that can be correlated to certain features or qualities of the sample, and most important is the analysis and/or pattern recognition of the data obtained from the sensor. Spanish and German researchers have constructed an integrated multisensor (long rectangle in picture) composed of six ion-sensitive field effect transistors selective to common ions and heavy metals combined with flow injection analysis. They applied this 'electronic tongue' with multivariate analysis to grape juice samples of four different grape varieties collected in 2005, to wine samples from the same grape juice samples, and to six different varietal wines from 2004 vintage. The results demonstrated that the multisensor is able to distinguish the grape juices samples according to the grape variety. The 2005 wines could be distinguished between themselves according to the grape variety, and the 2005 wines were successfully distinguished from the 2004 wines and each analysed sample was classified within the corresponding vintage group. Overall the obtained values for various constituents in the samples



were in good agreement with the data obtained with standard methods with a relative error below 10% for all the predictions, and below 2% for pH prediction. http://dx.doi.org/10.1039/b801228h

- The ability of an 'electronic nose' to classify cabernet sauvignon fruit based on maturity levels was investigated over two seasons. Maturity of samples collected 18, 19, and 20 weeks post-bloom was evaluated by measuring berry weight, pH, Brix, titratable acidity, total phenols, colour intensity, hue, total anthocyanins, and total and phenol-free glycosides. These were compared with analysis of headspace volatiles via a hand-held electronic nose. The electronic nose was able to determine differences among the three sample groups in both seasons. Electronic nose measurements were compared to chemical analyses of samples collected from east and west sides of north-south oriented vineyard rows. The electronic nose distinguished fruit from the two vine canopy sides. The study demonstrates the potential for the electronic nose as a rapid, non-destructive tool for evaluating grape maturity. http://dx.doi.org/10.1080/09571260802164061

- Researchers in Spain have investigated the influence on aroma compounds of adding oak chips to a wine aged either in stainless steel tanks or in used barrels, and compared the results for the same wine aged in new barrels. Three different sizes of oak chips were used; powder, shavings and cubes; and the amounts added were calculated to simulate the surface/volume of a barrel. The samples studied were wine in stainless steel tanks (1000L), control wine (no oak chips added), wine with powder, wine with shavings and wine with cubes, and wine
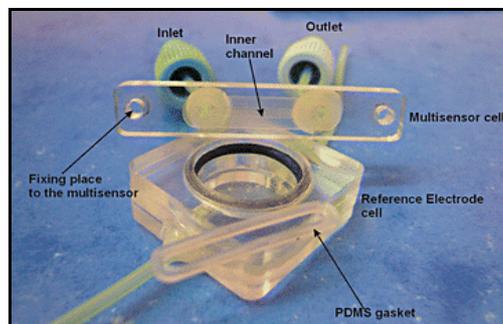
matured in new oak barrels (similar to the used barrels). The results showed that chips release aroma compounds into wine very rapidly, before stabilising, or even decreasing when the contact time exceeded 3 months. The wines in new barrels kept extracting aroma compounds for longer periods and higher concentrations were reached for most of the aroma compounds. Wines in used barrels and with chips added behaved in an intermediate manner, although the extraction did not last as long as in the case of new barrels. The effects were studied after 3, 6 and 9 months of wood contact time. Each wine was bottled and analysed 6 months later. Although overall quality was better in wines matured in new barrels, the use of oak chips could be considered a good choice for producing short-aged wines and for reusing used barrels. http://dx.doi.org/10.1111/j.1755-0238.2008.00008.x

## Local research results

- To assist producers, processors and policy makers in dealing with uncertainty regarding the future of the wine industry with respect to changes in import tariffs, exchange rates, taxes, prices and other exogenous factors, a computer model has been developed that is housed in the Bureau for Food and Agricultural Policy at the Department of Agriculture, Western Cape, and the Universities of Pretoria and Stellenbosch. There is a sector model and a farm level model and these are linked via price indexes for the various wine grape varieties for each VINPRO region. Users can obtain answers to 'what if' questions to assess the impact of changes in world markets, exchange rates, economic growth, population growth or policies. These can be assessed at the industry level, and on the likelihood of financial survivability at the farm level. Supply of wine grapes is modelled for the main varieties as well as per region. Supply of wine is disaggregated into drinking wine, distilled wine, rebate wine and fruit juice. Demand is broken down into domestic demand and export demand. Exports are modelled for the nine main export destinations of South Africa. The farm level model simulates a representative farm business in each of the ten VINPRO regions. The land utilization and capital structure, as well as each separate enterprise for a representative farm serve as input, together with the wine grape enterprise sheet that can accommodate up to 12 wine grape varieties with three blocks per variety, each for a variable age of the specific vineyard. Provision is also made for the option to utilize own or bought wine grapes in an on-farm cellar. The following performance indicators serve as model output for each year over the planning horizon: farm gross margin, net cash farm income, net farm income, return to family living, ending cash surplus/deficit, net worth, real net worth, debt to assets ratio and operating cost to income ratio. http://www.sawislibrary.co.za/dbtextimages/FinalReport146.pdf

## Closures

- The WAK screwcap from the Guala Closures Group is now available in South Africa. Created specifically for high and mid-end 750ml wine bottles with a standard BVS neck finish (the most common type on the market). Unlike other screwcaps, the WAK closure's thread is not visible externally because it is inserted into a long, specially-formed aluminium shell. It is internally threaded by use of a pre-formed insert. The WAK cap appears smooth on the outside, combining a traditional look with the benefits of a screwcap. It is claimed that insert offers added protection to the seal making it almost impossible to damage. Application is by means of a single capping head that applies the screwcap to a predetermined torque and then crimps the centre of the cap. Wine screwcaps represents over 10% of the Guala Closures Group business, with ten plants across eight countries dedicated to aluminium wine closure production. http://www.packagingeurope.com/NewsDetails.aspx?nNewsID=23205

- There have been a number of studies evaluating oxygen ingress for different wine stoppers. Now a study has examined the impact of the stopper type on oxygen ingress into headspace during the bottling process. Eight different stoppers were used: three natural corks that varied in length, being 38, 45 and 49mm long; two technical stoppers; two synthetic stoppers, one extruded and the other moulded; and a metal screw cap with a multilayered liner. It was found that stopper type significantly affected oxygen introduced into the headspace. Bottles sealed with natural cork had the lowest headspace oxygen concentration (1.31–2.12 mg/L) despite these stoppers having a lower height (38 mm) than the others tested. Non-cork stoppers were associated with higher oxygen concentrations, probably because they generated higher overpressure. Bottles sealed with screw cap and synthetic stoppers had the highest oxygen concentration (3.29–3.82 mg/L) and, in the case of screw caps, this was probably a result of greater headspace volume. Headspace oxygen concentration for the synthetic stoppers and the screw cap was approximately equivalent to the oxygen entrance through natural cork during the first 8–10 months of ageing. This may be critical for wines that are particularly susceptible to oxidation, such as white and rose wines. It can be concluded that the stopper used during bottling has a major effect on the oxygen concentration of the headspace, especially if the bottling machine is not equipped with an efficient vacuum and/or inert gas system. Thus the selection of stopper type should be considered not just for its oxygen permeability, but also its effects on the amount of headspace oxygen generated during bottling. http://dx.doi.org/10.1111/j.1755-0238.2008.00013.x

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