



Local Research News

Ecophysiological characterization of viticultural terroirs

A terroir is an area of land that is characterised by a specific agricultural potential imparted by natural environmental features and is reflected in the characteristics of the final product. Three vineyard plots that were each representative of dominant terroir units were defined for Stellenbosch for Sauvignon Blanc and Cabernet Sauvignon using statistical decision trees (specifically the CART algorithm). The CART algorithm (Classification and Regression Trees) is a binary decision tree that is constructed by splitting a node into two child nodes repeatedly, beginning with the root node that contains the whole learning sample, and which can then be used for forecasting. The CART was built on analyses of ecophysiological parameters (viticultural, oenological and environmental data) at the representative plots.

Subsequently, the results from five seasons for Sauvignon Blanc and Cabernet Sauvignon vineyards from 60 plots were compared to predicted responses from the CART algorithm. CART for Sauvignon Blanc for date of flowering, date of harvest and wine pH could be validated, with the yield to pruning mass ratio and capacity being partially validated, while CART for Cabernet Sauvignon for must total titratable acidity, must pH, must maturity index, wine specific gravity, wine pH and wine total titratable acidity were validated. The CART rules were validated with respect to the pattern of high and low values rather than in terms of exact values. Some of the relationships could be validated on the new large dataset, but it was not possible to state with any certainty the reasons for a particular response. The ecophysiological parameters that were measured on the reference vineyards (grapevine water balance, canopy development, dynamics of berry ripening, organic acid ratios, etc.) should be analyzed in order to facilitate improved understanding of the grapevine - terroir interaction.

www.sawislibrary.co.za/dbtextimages/Carey.pdf

Agroclimatic analyses for viticultural terroir studies

The Winkler scale, sometimes known as the heat summation method, is a technique for classifying the climate of wine growing regions. Geographical areas are divided into five climate regions based on temperature. Region I is the coolest and Region V is the hottest (see http://en.wikipedia.org/wiki/Winkler_scale for more details). South African climatic data were analysed at three climatic scales (macro, meso and local scales) over a 6 year period (2005-2010) so as to highlight the cooler macro climatic conditions that South Africa experiences compared to those experienced by other wine regions at similar latitudes worldwide, as well as to describe the climatic potential of each wine region of South Africa. Climate change using long time series was investigated. The seasonal climatic variability within the Stellenbosch district was also investigated.

The 2008/2009 season was the coolest season (upper level of Region III) of the study period; the 2005/2006 season was the driest growing season of the study period; the 2004/2005 and 2009/2010 seasons had the warmest and the wettest growing seasons of the study period and the 2006/07 and 2007/08 seasons could be considered as representative of the average conditions over the study period. Winkler index values for sites and seasons showed that spatial variability in the Stellenbosch Wine of Origin District was greater than the temporal variability. www.sawislibrary.co.za/dbtextimages/Bonnardot.pdf

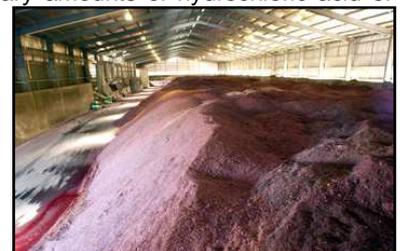
International Research News

Polyphenol extraction from grape wastes

Worldwide annual grape production is about 58 million metric tons, of which 71% is used in winemaking. Of this, some 10% to 25% (w/w) results in residues after processing. These residues are lees, marc (right below), seeds, stems and stalks and amount to between 4 and 10 million tons annually. While these wastes are difficult to manage due to their high biological oxygen demand, they are a rich source of polyphenols and thus can be used to produce new added value products such as anti-oxidants.

To investigate optimum conditions for polyphenol extraction, pressed marcs (from the vinification of Tempranillo red grapes), were treated with ethanol/water mixtures at different ratios as solvents with the necessary amounts of hydrochloric acid or potassium hydroxide to regulate the liquid pH. The phenolic content of the extracts was analyzed, namely: total polyphenol content, flavanols, phenolic acids and anthocyanins. The antioxidant activity of the extracts was also determined. An extraction time of two hours was found to be optimum, since longer times did not increase process yields. Best extraction yields were obtained for 75% ethanol solutions. Basic (high) pH led to better yields in extracting with a low percentage of ethanol, whereas acid pH presented better extraction yields in extracting with a high percentage of ethanol. Among all the polyphenols extracted, anthocyanins were the most abundant, representing over 40% of the total. In general, the best process conditions were 2 hours of extraction in a 75% ethanol liquid mixture at a pH of 2.

<http://dx.doi.org/10.4236/as.2013.49B010>



Ergosterol as an indicator for grape rot and fungal biomass in grapes

Apart from the desirable 'noble rot', infection by grape rot destroys fruit flavours typical of the grape variety, leading to off-flavours, off-odour, bitterness and colour loss in wine. The formation of mycotoxins, in particular ochratoxin A, associated with fungal infestation, affects the food safety of the products. The usual visual examination for rot is subjective, and is not suitable when grapes are mechanically harvested. Other methods, such as the analysis of metabolites of moulds and the determination of related enzyme activities, require tedious sample preparation and mostly lack selectivity and sensitivity.

Ergosterol is a sterol found only in fungi. It is a component of yeast and fungal cell membranes, serving the same function cholesterol serves in animal cells. Thus a study has proposed ergosterol as a specific and quantitative marker for the fungal infection of grapes. The study showed that mould strains relevant to grape rot contained considerable amounts of ergosterol. In grapes infected with several pure mould strains and in naturally contaminated grapes, ergosterol was unambiguously detected and quantified. By contrast, only traces were found in sound grapes. Ergosterol levels were highly correlated with the degree of fungal decay in blended samples of mashes made from sound and rotten berries. An analytical HPLC-method for the quantitative determination of ergosterol was developed allowing a simple and objective evaluation of the phytosanitary status of grapes. <http://dx.doi.org/10.1016/j.foodcont.2013.09.012>

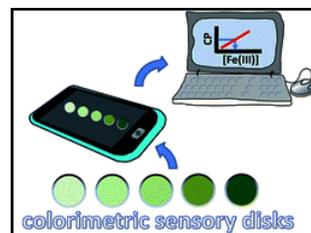
Foamability of Prosecco wine

Prosecco is an Italian sparkling white wine normally made from Glera grapes. So as to investigate its foamability, five macromolecular fractions differing in molecular weight (MW) and composition were separated from a Prosecco wine by ultrafiltration and Size Exclusion Chromatography (SEC) before and after 1 and 18 months of wine ageing on yeast lees. The fractions, combined or alone, were back-added to the ultrafiltered wine in order to assess their contribution to wine foamability.

The results indicated that the highest MW fraction, containing the wine glycoconpounds and comprising the yeast mannoproteins, gave the highest foamability, whereas the wine proteins derived from the grape berry did not foam. However, the combination of all the fractions gave a foamability higher than that provided by the glycoconpounds, indicating a cooperative effect between these latter and the proteins of grape origin. This result indicates a molecular interaction leading to the formation of macromolecular complexes able to interact with the gas-wine interface. As these effects are likely to be present in sparkling wines deriving from other grape varieties, the content of both glycoconpounds and grape proteins, as affected by the winemaking technique used, should be carefully considered for their impact on wine foaming properties. <http://dx.doi.org/10.1016/j.foodhyd.2012.09.016>

Chelators inhibit oxidation

Researchers in Spain have developed a smart material which changes colour based on the amount of iron in a fluid, whether it be wine, water or blood serum. If the smart material is then photographed with a digital camera such as on Smartphones/tablets, analysis of the colour of the photograph yields the concentration of Fe⁺⁺⁺ without the need for chemical analysis. A proven iron organic chelator was transformed into an acrylic monomer and further copolymerized with hydrophilic co-monomers to render a polymer membrane. The film-like membrane generated was cut into small-diameter sensory discs. Upon immersion of the sensory discs in wine, blood serum or water, a colour development was rapidly observed which could be easily correlated with the iron concentration of the samples. RGB digital parameters obtained from photographs of the sensors were processed statistically and used to elaborate titration curves and quantify iron concentrations. The response time of the sensory films was short, 15 minutes, and the concentrations measured in water ranged from 56 ppb to 56 ppm which range includes the typical iron content of wines (1 to 10 ppm). <http://dx.doi.org/10.1039/C3TA12703F>



Other news

Mobile device wine app

Winetech Scan recently tried out the free *Vivino* app on a Smartphone/tablet. The app helps you to remember your favourite wines, to learn more about wine, and which one to choose for next occasion. All that is required is to snap a photo of any wine label, and it should be automatically recognized from a database of more than 2 million wines. If the app doesn't match it immediately, then the *Vivino* team will do it 'manually'. *Winetech Scan* tried the app on six different South African wines, and four were recognised within 15 seconds, and the other two were manually recognised in less than an hour. For each wine, *Vivino* provided the winery, ratings, grape type, food pairing, serving tips and more. Tasting notes may be recorded, and the wine information can be exchanged with friends. www.vivino.com

Which winegrape varieties are grown where?

The *Database of Regional, National and Global Winegrape Bearing Areas by Variety, 2000 and 2010* is a new and unique compendium of data on winegrape bearing areas by variety and region for 44 countries for the years 2000 and 2010. The e-book version may be downloaded free of charge from the University of Adelaide Press, where a hard copy also may be ordered. www.adelaide.edu.au/wine-econ/databases/winegrapes/

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

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