



International Research News

14 new phenolic compounds previously unknown in wine and in grape seeds

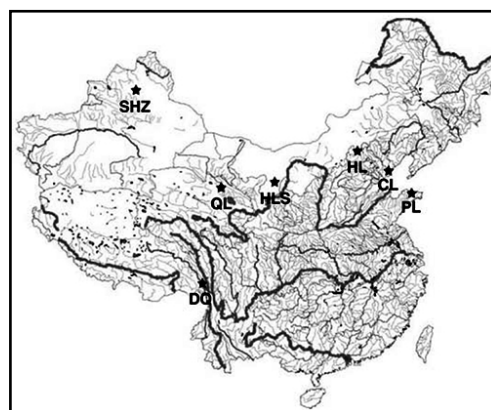
The partial identification of monomeric flavanol glycosylated compounds in Merlot red wine and grape seed extracts by targeted electrospray ionization quadrupole time of flight mass spectrometry (ESI-MS/MS) has been reported for the first time. The compounds are 14 different flavan-3-ol monoglycosides, having four aglycons (+)-catechin, (-)-epicatechin, (-)-epigallocatechin and epicatechin gallate monomeric units. These compounds were not detected in skins, and they originate only from grape seeds. In general, proanthocyanidins, also known as flavan-3-ols polymers or condensed tannins, are the main compounds that are responsible for the astringency, the bitterness, the structure and the aging of wines. These new findings could be used in the future to quantify the monoglycosylated compounds present in red wine and grape seeds to determine their influence on grape and wine quality. <http://dx.doi.org/10.1002/jms.3007>

Differences in Rioja wines by NMR spectroscopy

The characterization of food authenticity and traceability is aimed at protecting the consumer and producer from fraud. A study of the wines from the small Rioja district in central northern Spain investigated the use of proton nuclear magnetic resonance (^1H NMR) in distinguishing differences in the region's wine terroir. 111 samples were collected from three subareas of the Rioja (Rioja Alta, Rioja Baja, and Rioja Alavesa). The samples represented three vintages, nine winemaking cooperatives, and five different fermentation time points. The winemaking process from must, through alcoholic and malolactic fermentation, was followed by NMR metabolomics and chemometrics. Three different areas of the NMR spectra were analyzed separately, corresponding to organic acids (1.3-3.2 ppm), carbohydrates (3.2-5.5 ppm), aromatic compounds in must (5.5-10.0 ppm), and aromatic compounds in wine (6.4-10.0 ppm). The application of interval extended canonical variate analysis (iECVA) showed discriminative power between wineries which are geographically very close. Isopentanol and isobutanol compounds were found to be key biomarkers for the differentiation. <http://dx.doi.org/10.1021/jf204361d>

Differences in multi-element patterns of different wine-producing regions in China

China has a very scattered distribution of wine-producing regions with a distance of over 2 000 km from east to west and north to south. The eastern areas are characterized mainly by moderate rainfall and clay and sandy soil, while the western areas have a dry climate and gravelly soil. A study using inductively coupled plasma-mass spectrometry (ICP-MS) to analyze the levels of 44 elements in vineyard soils, ripened grapes, and young wines from seven wine-producing regions has been carried out. The regions, distributed in western, eastern, and south-western China, are (see map): Shihezi (SHZ), Xinjiang province; Qilian (QL), Gansu province; Helanshan (HLS), Ningxia region; Huailai (HL), Hebei province; Changli (CL), Hebei province; Penglai (PL), Shandong province; and Deqin (DQ), Yunnan province. In each region, three to eight vineyards were selected for grape and soil sampling. In addition to varied geological and climatic characteristics, there were differences in the grape varieties tested and viticulture practices.



Twenty-eight trace elements and 16 rare earth elements were analyzed. Analysis of variance showed that almost all elements in the grapes and wines and approximately half of the tested elements in the soils existed in statistically significant different amounts on a regional basis. Stepwise linear discriminant analysis revealed 22 parameters (Cr, Co, Ni, Ga, Se, Y, Zr, Nb, Mo, Pd, In, La, Pr, Sm, Eu, Gd, Tm, Yb, Au, Tl, Th, U) to evaluate soils with 93.5% accuracy, 17 parameters (Li, Co, Se, Sr, Zr, Mo, Pd, Cd, In, Ba, La, Ce, Pr, Eu, W, Pt, Au) to assess grapes with 96.5% accuracy, and 10 parameters (Sc, V, Cr, Ga, Se, Sr, Pd, Sn, Tl, U) to distinguish the origin of wines with 100% accuracy. Results indicate that mineral elements can be reliable descriptors for discrimination of regional origins of wines, grapes, and soils, despite the great distances among wine-producing regions and their variations in soil structure and climate. There were good correlations between grapes and soils and between wines and grapes. The differences in multi-elemental patterns of wines from different regions are due mainly to the differences in soil geochemistry, while the remaining variation could be attributed to differences in grape physiology relating to the elemental mobility of soil to plant root; grape selective absorption for soil elements; vine variety; and in vineyard management and winemaking practices. <http://dx.doi.org/10.5344/ajev.2012.11087>

Diffusion of oxygen through cork

The kinetics of oxygen transfer through cork at 25°C has been studied using a manometric device in which two gas compartments were separated by a 3 mm thick cork wafer. The first compartment contained oxygen, and the other was kept under dynamic vacuum. The pressure decrease in the first compartment was recorded as a function of time. The thin cork

wafer was used as using a standard cork of 48 mm would have required months for each observation. Statistical analysis of the results and comparison with data from other studies gave an effective diffusion coefficient for the thin cork wafers of $1.1 \times 10^{-9} \text{ m}^2 \text{ s}^{-1}$. Extrapolation to a 48 mm cork wafer resulted in a value of $1.6 \times 10^{-9} \text{ m}^2 \text{ s}^{-1}$. The results showed that it is possible to obtain the effective diffusion coefficient of oxygen through cork from shorter time (a few days) measurements performed on a thin cork wafer, rather than the months required for full cork stopper. It was concluded that, for the whole cork stopper, Fick's diffusion (mass transfer through cork cell walls) is obviously the limiting step, whereas for smaller thicknesses the regime of transport is governed by Darcy and Knudsen diffusion. <http://dx.doi.org/10.1021/jf204655c>

Screw caps versus corks

The University of California at Davis is conducting a study that could help end the debate as to whether screw cap closures are as effective as natural corks when it comes to aging wine. The goal is to provide direction for the industry so vintners can make informed decisions about stoppers. The two-year study will analyze wines under three different types of closures: screw caps, synthetic corks and natural corks. The test group, which consists of 200 bottles of Cade Sauvignon Blanc 2011, will be monitored every few months using a spectrometer to detect changes in colour. The wines will also be chemically analyzed using oxygen sensors placed inside the bottles. The sensors allow the university to measure how a wine is aging with the three different types of closures without opening it. The wines that show differences will be opened at the end of the study and tasted to determine if the quality has been compromised. A CT scanner was used to measure the permeability of the natural and synthetic corks to eliminate potential flaws, and the best corks (the least permeable), were chosen for the study. When oxygen interacts with a wine it causes it to oxidize, changing its colour and taste. Corks and screw caps limit the amount of air a wine is exposed to, potentially preventing it from aging prematurely. www.winespectator.com/webfeature/show/id/46971

Local Research News

Control of leafroll

Leafroll is the most significant virus disease found in vineyards all over the world. Leafroll causes a degeneration of phloem tissue in young shoots, leaves, petioles and rachis. A project has annually monitored the spatial progression of grapevine leafroll in the vineyards of a single wine estate in which control strategies for the known dispersal mechanisms of the virus are being applied. The study is a continuation of work started in 2003. Control of leafroll on the estate has been remarkable, with only 50 leafroll infected vines recorded in autumn 2011 amongst 210 000 vines monitored in 63 vineyards of primarily red-berried cultivars. No unusual or novel leafroll spread patterns were observed during the study, although an increase in leafroll numbers in a number of adjoining vineyards in 2006 and 2007 was possibly due to wind dispersal of viruliferous mealybugs.

The majority of vineyards (39 out of 63) did not have a single leafroll infected vine by the end of 2011. Clearly leafroll control on newly planted or low incidence vineyards is very feasible and should be conducted industry-wide on all such vineyards. Where such intervention fails to reduce leafroll incidence due to persistent primary spread from an adjacent vineyard, mealybug control in the surrounding vineyards should also be employed. Rehabilitation of vineyards with leafroll incidences as high as 15-20% can be considered if such vineyards do not display significant secondary spread, as the number of vines that need to be removed will not be significantly more than those observed initially. If secondary spread has already occurred, an initially unknown number of vines will have to be removed in a vineyard in order to eradicate the disease. www.sawislibrary.co.za/dbtextimages/PietersenG1.pdf

Other News

Stopper selector and non-invasive oxygen measurement

A free software tool that uses a scientific model to recommend a closure tailored for a specific wine is available. The NomaSelector guides winemakers through a structured questionnaire on the grape variety and winemaking practices used, as well as the intended shelf life, storage and distribution for a wine. Using the data submitted, the model uses an algorithm to determine the best Nomacorc closure for a wine. The model was developed using conclusions from Nomacorc's oxygen management research programs at academic wine institutes around the world. The consortium studied the impact of oxygen ingress through the closure on the development of wines and unravelled the complex role different winemaking practices and oxygen exposure regimes play in the optimal sensory expression of different varietals. www.decanter.com/news/wine-news/529437/new-nomacorc-system-tailors-cork-to-wine

The company also offers two systems for the rapid measurement of the total oxygen contents in wine. They provide a direct, highly accurate, portable, non-destructive non-invasive and easy reading of the dissolved oxygen concentration in the wine and the amount of gaseous oxygen in e.g. the headspace of a bottle. The method is based on state-of-the-art luminescence technology which allows for a precise and non-destructive quantification of the oxygen value. The technique also allows in line measures of high or trace amounts of oxygen at virtually all steps of the winemaking process.

www.nomacorc.com/wine-oxygen-analyzers.php



Winetech Scan is available on the Winetech website www.winetech.co.za
To subscribe please email Gerard Martin: marting@winetech.co.za