



Local Research News

The simultaneous detection of viruses associated with leafroll and rugose wood diseases

Grapevine is host to about 60 different viruses. The viruses of the *Closteroviridae* and *Betaflexiviridae* families are the ones of most concern to grapevine industries world-wide as they include viruses associated with leafroll (LR) and rugose wood (RW), also known as corky bark disease (see picture). These diseases decrease productivity and longevity of vineyards and negatively affect the quality of produced wines. At present the South African grapevine industry is using the ELISA assay for the detection of viruses. While easy to use, it has limited sensitivity, it detects only three out of more than 10 viruses of the *Closteroviridae* family associated LR, and it does not detect viruses of the *Betaflexiviridae* family associated with RW.



The reliability of a reverse transcription (RT) nested polymerase chain reaction (PCR) technique designed for the simultaneous detection of viruses associated with both LR and RW was investigated. Eight different varieties of multiply virus-infected grapevines were tested. It was found that the technique has the capability to efficiently and specifically amplify all known and as yet unknown viruses associated with these two economically important diseases. The technique was applied to the comparative analysis of viruses of Shiraz grapevines with various Shiraz diseases. The study led to the discovery of a new, highly divergent variant of Grapevine leafroll-associated virus 3 (GLRaV-3), and a new genetic variant of Grapevine virus A. Also, a broad spectrum two-step RT-PCR technique based on a single primer with random hexanucleotide sequence was investigated. This latter technique is potentially able to amplify all grapevine infecting viruses. www.sawislibrary.co.za/dbtextimages/GoszczynskiDE1.pdf

International Research News

Effect of bentonite properties on wine proteins, polyphenols, and metals under different pH conditions

Despite the importance of evaluating elemental exchanges between bentonite and wine for health-safety and stability purposes, only a few studies have investigated the effect of bentonite on wine. A study has now assessed the proteins, polyphenols, metals and haze forming tendency when heating Erbaluce white wine samples before and after a fining treatment with four different activated sodium bentonites in a typical wine pH-range (3.00 to 3.60). The fining performances of the different bentonites were more marked at higher wine pHs than at lower, more acidic values. Low molecular mass proteins were removed at a high efficiency by all of the bentonites, regardless of pH. High and medium molecular weight proteins were generally less likely to be removed according to the clay characteristics and pH. Vacuolar invertase and some of the thaumatin-like proteins were the fractions more affected by the bentonites having a natural pH lower than 10, thus inducing an increased thermal stability of the wine. The bentonite clay with the lowest calcium content was the least effective in removing certain proteins. The extent of polyphenol removal was strongly correlated to the amount of proteins removed. Acidic pHs resulted in smaller releases of Na and smaller K removal from wine, while more basic pHs showed the largest replacement of K with Na in wine. This finding could help reduce the risk of tartrate precipitation. <http://dx.doi.org/10.5344/ajev.2015.15009>

Interaction of grape skin, seed, and pulp tissues on tannin and anthocyanin extraction in Pinot noir Wines

Making wine from Pinot noir grapes has long been a challenge due to the delicate flavour, light colour and sometimes poor ageing potential of the wine. Maceration techniques that promote greater release of tannin and pigment from the pomace have traditionally been used to make such wines. The effect of each berry tissue component (skin, seed, and pulp) in determining the phenolic profile of the wine was investigated. Skin, seed, and pulp were isolated from Pinot noir grapes to determine the tannin content of each component. The role and effect of each berry component was investigated by omitting or doubling each berry tissue in the must and fermenting these using submerged cap micro-vinification.

It was found that the delay in the formation of pigmented tannin from seed derived tannin coincided with a later release of the seed tannin into the wine matrix, while the presence of either skin or seed tannin in excess promoted the release of colour pigment from the skin. Pulp components appeared to reduce the concentration of seed tannins, but had far less effect on skin tannins. The study shows that it is important to consider the nature and source of the tannins extracted by maceration. The results also show that both tannin concentration and tannin subunit composition have roles in the formation of stable, non-bleachable colour in Pinot noir. <http://dx.doi.org/10.5344/ajev.2015.15022>

Reflectance spectroscopy for non-destructive analysis of red winegrapes

One of the most challenging tasks for a vineyard manager in wine grape production is the correct assessment of the readiness of fruit for harvest. For late-maturing red wine grape cultivars in particular, there is an ongoing conflict between a desire for longer hang times to promote ripeness and the fear of inclement weather and consequent fruit breakdown. Indicators of

maturity for red wine grapes typically measured in the laboratory are soluble solids content (SSC), Brix, pH, titratable acidity (TA), total phenols and total anthocyanins. Systematically running lab evaluation on all of the samples collected during pre-harvest scouting would be prohibitively expensive and time consuming. A novel non-destructive method of grape berry analysis is presented that uses reflected light to predict berry composition. The visible–near infra-red (VIS-NIR) reflectance spectrum of three different red wine berries was collected using a portable diode array spectrometer (350 to 850 nm) over two growing seasons. Chemical analyses for soluble solids content (Brix), pH, titratable acidity (TA), total phenols, and total anthocyanins were carried out for all samples and a mathematical model was constructed relating the VIS-NIR spectrum to the chemical analyses results. The model showed acceptable performance for the prediction of Brix and pH from the spectral reflectance characteristic of a composite grape berry sample in the VIS-NIR range, but not for the other indicators measured. Nevertheless, this preliminary study demonstrates the potential of VIS-NIR reflectance spectroscopy for the rapid determination of the maturity of composite grape berry samples. <http://dx.doi.org/10.5344/ajev.2015.15035>

Microencapsulation of polyphenols from grape wastes

Wine production wastes are a source of many by-products of high added-value, and may become a promising and economically profitable source of polyphenols. Unfortunately, polyphenols have a poor long-term stability, as they are affected by pH variation, the presence of metal ions, light, temperature, oxygen, and enzymatic activities.

A study encapsulated wine wastes extracts through vibration nozzle microencapsulation with two different types of nozzles, using sodium alginate as polymer and calcium chloride as hardening reagent. Long-term stability of the microbeads was studied for 6 months taking into account different storage conditions: at 4°C and room temperature, in darkness and in presence of light, and the addition of chitosan to the gelling bath. Encapsulation efficiencies in calcium alginate microbeads were found to be independent to the extract concentration in the studied range but higher efficiencies were rendered by the larger nozzle. Assays showed that all encapsulated systems were much more stable than the free extract at all conditions, with half-life between 72 and 857 days, the latter in darkness at 4°C. Lower degradation rates were obtained when chitosan was added to the gelling bath. These results should be helpful for the future commercial-scale processing of wine wastes. <http://dx.doi.org/10.1016/j.foodchem.2015.05.117>

Designing *Saccharomyces* interspecific hybrids for sweet dessert wines

Winemakers endeavouring to produce sweet dessert wines face challenges in fermenting high-sugar juices, which can lead to elevated volatile acidity levels and extended fermentation times. To deal with this problem, researchers have used natural yeast breeding techniques to generate *Saccharomyces* spp. interspecific hybrids as a non-genetically modified (GM) strategy to introduce targeted improvements in important, wine-relevant traits. The hybrids were generated by mating a robust wine strain of *Saccharomyces cerevisiae* with a wine isolate of *Saccharomyces bayanus*, a species previously reported to produce wines with low concentrations of acetic acid. Two hybrids generated from the cross (AWRI 1571 and AWRI 1572) showed robust fermentation properties in high-sugar grape juice and produced botrytised Riesling wines with much lower concentrations of acetic acid relative to the industrial wine yeast parent. The hybrids also displayed suitability for icewine production when bench-marked against an industry standard icewine yeast, by delivering icewines with lower levels of acetic acid. Additionally, the hybrid yeast produced wines with novel aroma and flavour profiles and also established that the choice of yeast strain impacts on wine colour. <http://dx.doi.org/10.1007/s00253-015-6737-4>

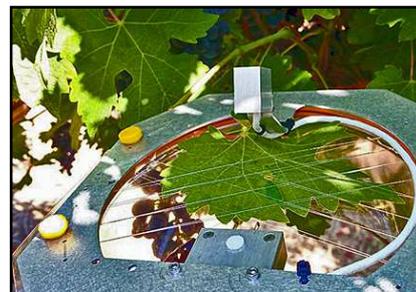
Biodiversity of indigenous *Saccharomyces cerevisiae*: a distinctive resource for wineries?

Indigenous *Saccharomyces cerevisiae* strains, occurring in spontaneous wine fermentations, usually display a high genetic polymorphism which can significantly affect sensorial wine qualities. Surveys of the genotypic diversity were carried out in 7 Italian wineries in the course of alcoholic fermentations of musts from different grape varieties during various vintages. It was found that, independently of the grape variety, a few dominant and recurrent *S. cerevisiae* strains became the resident microbiota of a given winery. The occurrence of specific *S. cerevisiae* strains in each winery shows the role of these microorganisms in determining terroir-associated wine characteristics and they can be seen as a resource contributing to the preservation of the typicality of wines. www.infowine.com/default.asp?scheda=14711

Other News

Real-time plant-stress data for vineyard irrigation optimisation

LeafMon (right) is a suite of sensors that attaches to a single, shaded leaf and measures leaf temperature, light, wind speed, relative humidity and air temperature, all of which affect a plant's water needs. LeafMon delivers this data wirelessly to a computer or mobile device, thus enabling growers to customize irrigation accordingly. <http://phys.org/news/2015-09-california-growers-optimize.html>



A history of batch press technologies

An article describes the types of batch processing mode pressing equipment that have been used in the wine industry since the late 19th century. It can be downloaded from www.awri.com.au/wp-content/uploads/2015/09/Nordestgaard2015-Part1.pdf

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