



Local Research News

Identifying terroirs for Chardonnay and Shiraz in the Robertson Valley

Natural terroir units (NTU) are defined as the grouping of land surfaces with homogeneous patterns in topography, climate, geology and soil. A project delimited 170 natural terroir units for Chardonnay and Shiraz in a selected sub-region of the Robertson valley. Based on results obtained from surveys and field studies, the criteria for optimal performance of Chardonnay and Shiraz were determined, and of the 170, thirty-nine natural terroir units representing these criteria were identified as potential vineyards. Thirty had the potential for Shiraz (totalling 25438ha) and nine (totalling 6819ha) for Chardonnay. www.sawislibrary.co.za/dbtextimages/Carey1.pdf

A large-scale detection method for grapevine leafroll associated virus 3

Grapevine leafroll disease is one of the most significant grapevine viral diseases affecting grapevines worldwide. Significant economic losses are consistently reported over the lifespan of a vineyard if intervention strategies are not implemented. Detection of the virus grapevine GLRaV-3, which is the major cause of grapevine leafroll disease in South Africa, is currently very expensive and impractical as it must be carried out annually with laboratory tests using ELISA and must be conducted on a massive scale to identify individual infected vines. ELISA (enzyme-linked immunosorbent assay) is a test that uses antibodies and colour change to identify a substance. Infected Cabernet Franc (left) and Chardonnay (right) leaves are shown.



A project was carried out to develop a technique for detecting GLRaV-3 that is extremely sensitive, and cheap and simple to perform. Two techniques showed potential, namely; Loop-mediated isothermal amplification (LAMP) and cycleave isothermal and chimeric primer-initiated amplification (Cycleave ICAN). While the ICAN method that was developed was capable of detecting GLRaV-3, initial tests suggested that it was not very sensitive, and too complicated for on-site use at the vineyard. A single-tube one-step reverse transcription RT-LAMP assay combined with a simple RNA extraction protocol was developed for the rapid and easy detection of GLRaV-3 at the wine estate. Under isothermal conditions at 60°C the target viral gene could be amplified in under two hours and positive results could be easily seen by examining an indicator colour change from violet to sky blue. RT-LAMP may also be a viable alternative for testing grapevine rootstocks for GLRaV-3 infection. www.sawislibrary.co.za/dbtextimages/PietersenG3.pdf

International Research News

First synthetic chromosome ever is that of the yeast *Saccharomyces cerevisiae*

The yeast *S. cerevisiae* has 16 chromosomes (humans have 23). Now one of these, the third smallest, has been redesigned and synthetically constructed by an academic team made up mostly of undergraduate students. The chromosome is fully functional, and the achievement is the next step towards synthetic life. The team reported the synthesis of a functional 272 871 base pair designer eukaryotic chromosome, synIII, which is based on the 316 617 base pair native *Saccharomyces cerevisiae* chromosome III. All this was done, as the paper puts it, 'in silico', in other words, on a computer before the chromosome was made. They spent more than a year of the seven year-long project deciding what DNA they should remove to make the new chromosome more stable and what DNA to add to be able to mutate it at will. The next step is to make more yeast chromosomes - eventually creating a completely synthetic genome. This is the goal of the Synthetic Yeast Genome Project. <http://dx.doi.org/10.1126/science.1249252>

Does frequency of irrigation affect fungal colonies?

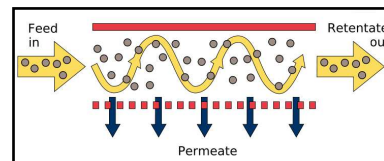
The importance of arbuscular mycorrhizal (AM) fungal communities in natural and agricultural ecosystems is well established. These fungal symbionts associate with the roots of most plant species and are linked to increases in plant nutrient acquisition, soil aggregation, water uptake, and plant productivity. Grapevines should be highly responsive to AM fungi, since plants growing under stressful conditions, such as those imposed in vineyards to reduce vigour, experience major benefits from AM fungi. Grapevines are known to form associations with mycorrhizas, which influence vine physiology in different ways. It is therefore important to understand how management practices such as irrigation regimes may affect AM communities.

The effects of irrigating daily or every three days on arbuscular mycorrhizal (AM) fungal communities associated with grapevine roots were determined in vineyard blocks of Merlot and Syrah. The irrigation experiment incorporated two frequencies of drip irrigation, either 5.33 L/vine daily or 16 L/vine every third day, starting at the beginning of July and running until harvest in October. After four growing seasons, root samples were analyzed for changes in AM fungal colonization, species richness, and community composition. AM fungal colonization was higher in response to irrigating every three days compared with daily irrigation, indicating a treatment effect on the physiology of the fungal communities. However, no

difference in AM fungal community composition was found in response to irrigation frequency. Species richness, identity and dispersion were consistent across the two treatments. It was concluded that environmental factors other than irrigation frequency influence the fungal community structure in vineyards. <http://dx.doi.org/10.5344/ajev.2014.13101>

Sensory and chemical effects of cross-flow filtration on wine

Cross-flow filtration differs from conventional (i.e. dead-end or normal-flow) filtration in that the feed stream is tangential to the filtration membrane (see diagram). With crossflow filtration the tangential motion of the bulk of the fluid across the membrane causes trapped particles on the filter surface to be rubbed off. This means that a crossflow filter can operate continuously at relatively high solids loads without 'blinding' (clogging). Cross-flow filtration is an increasingly common post-fermentation process in the wine industry.



A study investigated the impact of cross-flow filtration on the sensory or chemical properties of white and red wine. A California white wine blend and a California red wine blend were filtered using a Bucher Vaslin cross-flow unit with a nominal 0.22 micron polyethersulfone membrane. The unfiltered control was sent directly to the bottling line without filtration. Panellists found minimal sensory differences between the filtered and unfiltered white wines. Some sensory differences were found between filtered and unfiltered red wines, and the sensory profile of the unfiltered red wine changed after two months post-filtration. Cross-flow filtration clearly stabilized the sensory profile of wines in this study. For both red and white wines there were significant changes in colour and phenolic profile with filtration. However, it seems that, especially for red wines, the changes in phenolic compound concentration were not large enough to be detected sensorially and may just be associated with a transient adsorption onto the filtration membrane. <http://dx.doi.org/10.5344/ajev.2014.13090>

Partial mapping of the proteome of the bacterium *Oenococcus oeni*

A proteome is the entire set of proteins expressed by an organism. Researchers have partially mapped the proteome of the bacterium *Oenococcus oeni*. It is the bacterium responsible for malolactic acid fermentation or de-acidification following fermentation of most red wines and some white and sparkling wines. A better understanding of the molecular mechanisms related to the stress adaptation and technical performance of *O. oeni* is crucial for the characterization and selection of strains for industrial purposes. The researchers standardized a method to extract proteins from *O. oeni* ATCC BAA-1163 and characterized its membrane and cytosolic proteome. They identified 152 unique proteins, which they estimate is about 10% of the total proteome. A wide variety of metabolic enzymes, including many involved in the synthesis and catabolism of various carbohydrates, amino acids and amines, were detected. These metabolic pathways can lead to changes in levels of nutty and buttery flavours in wine. <http://dx.doi.org/10.1098/rsob.130154>

Other news

UK opens its first wine research centre

The UK Wine Research Centre, at Plumpton College in East Sussex, the country's first, was opened in March. It is sponsored by more than fifty English wine producers and incorporates the Rathfinny Research Winery and the Jack Ward Laboratory. From September, it will also provide the facilities to support the UK's first MSc course in Viticulture and Oenology. The course will deal with all aspects of grapegrowing and winemaking, but as England now has a highly innovative and successful wine industry, the course will focus on cool climate issues, including terroir, climate change and the production of sparkling wine.

Internet bosses put hold on allocation of .wine and .vin domain names

The Internet Corporation for Assigned Names and Numbers (ICANN) has put a hold on the process of issuing .WINE and .VIN Internet domain names till early June. The hold was implemented to provide additional time for impacted parties to negotiate. Wine industry groups are keen on defending appellations with valuable reputations e.g. Bordeaux or Napa. Wine makers also fear having to pay to register their names at websites in the new online terrain solely to stop online addresses from being used by imposters or in other harmful ways. <http://phys.org/news/2014-04-internet-lords-wine-bottled.html>

Measuring phenolics and tannins

The Australian Wine Research Institute (AWRI) has recently add two new titles to its collection of factsheets. They are: 'Measuring grape colour, phenolics and tannins using different analytical methods' and 'Measuring wine tannins using different analytical methods'. The AWRI factsheets can be downloaded from www.awri.com.au/information_services/fact_sheets/

Best AJEV papers for 2013

Each year, the American Society for Enology and Viticulture Best Paper Committee selects from the American Journal of Enology and Viticulture for the prior year two papers are deemed outstanding. The best papers for 2013 are 'Postveraison Application of Antitranspirant Di-1-p-Menthene to Control Sugar Accumulation in Sangiovese Grapevines' (Pallioti *et al*) <http://ajevonline.org/content/64/3/378.full> and 'Sensory Impact of Extended Maceration and Regulated Deficit Irrigation on Washington State Cabernet Sauvignon Wines' (Casassa *et al*) <http://ajevonline.org/content/64/4/505.full>

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