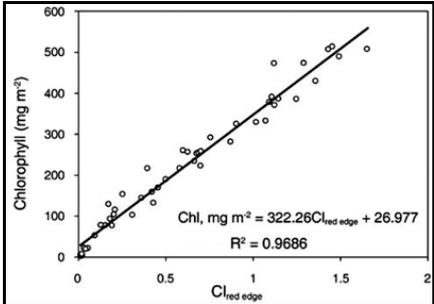


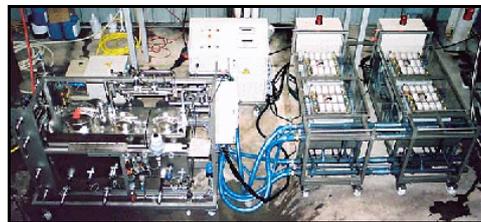


Research outputs

- A four-year long trial has been carried out in Italy in commercial vineyards to test the effect of manual leaf removal in the cluster zone at veraison on grape yield, berry composition, and stilbene concentration at harvest. Two *Vitis vinifera* L. red wine cultivars (Barbera and Croatina) and one white wine cultivar (Malvasia di Candia aromatica) were considered. The vines were Guyot trained, with 10 shoots per metre of row, and leaf removal accounted for approximately 22% of removed canopy surface. Grape yield was not affected by leaf removal. Grape sugars and acidity were affected by leaf removal differently depending on meteorological conditions and cultivar. Leaf removal increased trans-piceid concentration in Barbera and decreased trans-resveratrol and cis-piceid concentrations in Croatina and Malvasia di Candia aromatica grapes under cool meteorological conditions. (Piceid is a stilbenoid glucoside and a resveratrol derivative). Under warmer and drier climatic conditions, leaf removal had no effect on stilbene grape concentrations. www.ajevonline.org/cgi/content/abstract/59/3/292
- Leaf chlorophyll content (Chl) provides valuable information about the physiological status of plants, and there is a need for an accurate, efficient and practical method to estimate this biophysical parameter. Using sampled leaves from three field-grown grape cultivars (Edelweiss, Saint Croix, and DeChaunac), a good linear relationship was established between Chl content and the red-edge chlorophyll index, based on reflectances in the red-edge (710–720 nm) and near-infrared (755–765 nm) spectral ranges (see graph). The method was capable of accurately measuring grape leaf Chl over the wide range of the data set which varied from 3 to 506 mg per square metre. The approach has potential for developing simple hand-held field instrumentation for accurate non-destructive Chl estimation and in analyzing digital airborne or satellite imagery to assist in vineyard management decision making. www.ajevonline.org/cgi/content/abstract/59/3/299 .

- Regulated deficit irrigation (RDI) and crop-load adjustment are regarded as important viticultural practices for premium-quality wine production, although little is known about their interactive effects. A field trial was conducted with own-rooted Cabernet Sauvignon grapevines in the arid climate of Columbia Valley (Washington State) over a five-year period. The study tested the interaction of the extent and timing of relatively severe water deficit (thereby conserving water resources) and cluster thinning and their combined effects on canopy development, vine capacity, yield formation, fruit composition, and cold hardiness. The severity and timing of RDI had only minor effects on vegetative growth, yield formation, fruit composition (soluble solids, titratable acidity, pH, K⁺, colour), and cold hardiness. The more severe water-deficit treatments slowed berry growth while the treatments were being imposed, but final berry weights were similar in three of five years. Although cluster thinning reduced yields by 35% and crop loads by 32%, crop load had little or no influence on vegetative growth and cluster yield components and advanced fruit maturity at most by three to four days. The data suggest that considerable savings in water resources can be achieved without marked short- or longer-term effects (whether beneficial or detrimental) on deficit-irrigated, own-rooted Cabernet Sauvignon performance. Moreover, very few interactions were found between the irrigation and crop-load treatments, which implies that cluster thinning did not influence the vines' response to deficit irrigation. In the sunny climate of south-eastern Washington, temperature, rather than soil moisture or crop load, was the main factor accounting for seasonal fluctuations in fruit composition. Hence it is questionable whether the minor advancement of grape maturity justifies the loss of potential yield and the costs involved in crop adjustment of Cabernet Sauvignon, at least where the growing season is long enough to achieve adequate fruit maturity and climatic conditions and soil properties are conducive to using deficit irrigation. www.ajevonline.org/cgi/content/abstract/59/3/221
- Cold stabilization is the process used in winemaking to reduce the concentration of tartrate crystals (generally potassium bitartrate) in wine and thus to clarify it. The temperature of the wine is dropped close to freezing for 1-2 weeks, causing the crystals to separate out from the wine, which is then drained off. An alternative process gaining acceptance is electrodialysis (www.infowine.com/default.asp?scheda=1137&provenienza=42). It utilises an electric field to remove potassium, calcium and tartrate ions from the wine through ion-exchange membranes. Multiple electrodialysis cells are arranged into a electrodialysis stack, with alternating anion and cation exchange membranes. Advantages compared to cold stabilisation are: no filtration required resulting in retention of colour, no loss of aroma perception, no production of 'thinner' wine and savings on filter materials; savings on seeding

and other materials required for cold stabilisation; and energy savings as no refrigeration is required. The wines produced are always 'stable' whereas this is not always the case for cold stabilised wines. However, electro dialysis uses more water than does cold stabilisation. The method was introduced in Europe in 1997.

- The 1 100 wineries in California use 100 gigawatt-hours (GWh) of electricity annually in the energy-intensive refrigeration cold stabilisation process, about 25% of their total electricity consumption. Two recent studies at California wineries examined the most energy-efficient methods to stabilize wines. The energy efficiency of the cold stabilization process varied greatly depending on a number of factors, including tank insulation, wine type, seeding, and duration of stabilization. Despite using more water, the electro dialysis process was dramatically more energy efficient than cold stabilization, using 2.1 watt-hours (Wh) per litre to stabilize the wine versus 317Wh per litre for the cold stabilization process in uninsulated tanks without seeding, and 5.8Wh per litre in insulated tanks with seeding. The amount of extra water required for electro dialysis amounted to 140 litres per 1 000 litres of wine. Electro dialysis stabilisation took just over one day, while the cold stabilization system that included seeding and tank insulation required five days. The unenhanced cold stabilization process required 46 days. Electro dialysis was shown to maintain wine quality and to reduce wine loss. www.practicalwinery.com/sep0ct08/page1.htm The STARS ED-1600 electro dialysis unit with a nominal flow rate of 6 000 litres per hour used in the studies is shown on the right.



Local research results

- The latest national survey of R&D activities has found that South Africa spent R16.5 billion, or 0.95% of its gross domestic product (GDP) on research and development (R&D) in 2006/7. This is up from 2005/06, when a R&D expenditure of R14.1 billion, or 0.92% of GDP was recorded. Most South African R&D is performed in the engineering sciences (20.9% of total R&D), followed by the natural sciences (20.3%) and the medical and health sciences (15.1%). The survey recorded a total of 30 986 full time equivalent (FTE) R&D personnel, comprising researchers, technicians and other support staff. Women researchers comprised 39.7% of the total researchers compared to 12.4% in Japan, but below developing countries leader, Argentina, where 50.5% of women are researchers. The goal is to reach a R&D spend of 1% of GDP on R&D by 2008/09. www.dst.gov.za/media-room/press-releases-1/sa-showing-ability-to-participate-in-knowledge-economy/
- A 6-year long study to evaluate constructed wetlands as a secondary treatment for disposal as a cost-effective solution to comply with national and international requirements comprised 6 small wetlands (6 metres long, 2.4 metres wide and 1.2 metres deep) and two big wetlands (45 metres long, 4 metres wide and 1.2 metres deep). Three of the small wetlands were constructed at a winery, and the rest at a distillery. The small wetlands at each site had retention times of 4.5 days, 9 days and 18 days. The two larger wetlands had a retention time of 14 days, one being filled with soil and the other with dolomitic gravel. The results showed that constructed wetland as a secondary treatment system is effective in terms of Chemical Oxygen Demand (COD) removal from winery and distillery wastewater, with an overall average COD removal of 80% throughout the year. It was found that winery and distillery effluent with a maximum COD value of 15 000 mg/l can be treated effectively by constructed wetlands, and that the longer the effluent remains in the wetland, the better the performance of microorganisms. Gravel substrate was found to be more suitable than soil as a medium for constructed wetlands. It was concluded that constructed wetlands as a secondary treatment system (with prefilter being essential for solids removal before wastewater is applied to the wetland) can be implemented in the wine industry as a secondary treatment for wastewater. A further advantage is that constructed wetlands do not require intensive management. www.sawislibrary.co.za/dbtextimages/FinalReport140.pdf

Application of technology

- The Antique Wine Company in London, one of Britain's top rare wine merchants, has teamed up with the Centre for Nuclear Studies at the National Centre for Scientific Research in Bordeaux to develop a non-destructive tool for checking the authenticity of rare vintage wines. The Antique Wine Company sells wine ranging in price from \$2 000 to \$100 000 a bottle. It is not the wine itself that is tested, but the chemical composition of the glass of the bottle. This involves sputtering of the surface of the glass with a focused primary ion beam and collecting and analyzing ejected secondary ions with a mass spectrometer to determine the composition of the surface. As the composition of glass used to make bottles has changed over time and was different from place to place, the results are compared with those in a database of authentic bottles from the chateaux in question. While the new test can verify the age and origin of the bottle, it cannot guarantee the quality of the wine. www.physorg.com/news13959977.html

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