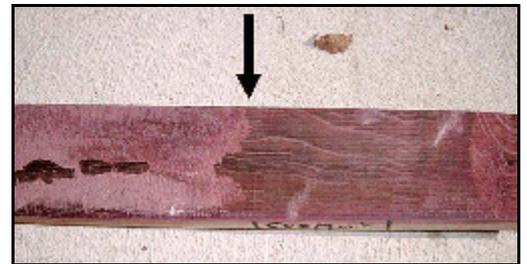




Research outputs

- Laccase in grape juice presents a major problem to winemakers, as it is responsible for the browning of white wines and discoloration of red wines. Laccase is an enzyme produced by *Botrytis cinerea*, a fungal pathogen that is the main cause of bunch rot. Laccase is difficult to eliminate from grape juice and is highly resistant to inactivation by heat treatment or by addition of SO₂. *Botrytis*-infected grapes are commonly regarded as undesirable for the production of table wines because it is assumed that laccase will be present. However, there is strong evidence that not all isolates secrete laccase to the same extent. To quantify the levels of *Botrytis* and laccase in winegrapes, the levels of rot in approximately 2 000 samples of winegrapes harvested in California in 2005 and 2006 were determined by hand sorting of berries and by quantitative immunoassays for *Botrytis* antigens in the expressed juice, including a new immunochromatographic assay (lateral flow device). There was poor correlation between hand-sort estimates of rot from machine-harvested grapes graded at the test stands at wineries with immunoassays for *Botrytis* antigens and tests for laccase activities in juice samples. A better correlation was found between laccase and levels of *Botrytis*-rot in juice samples from selected, carefully sorted hand-picked berries and immunoassays. The level and frequency of laccase in juice samples increased notably toward the end of the harvest season. The newly-developed *Botrytis*-lateral flow devices were easy to use and have the potential to be most useful for rapid (10 minute), semi-quantitative estimations of *Botrytis* levels at harvest. It was noted that grape berries with relatively low levels of *Botrytis* are unlikely to have significant levels of laccase in the expressed grape juice. Conversely, although high levels of laccase in grape juice are generally associated with significant levels of *Botrytis*, no evidence of a direct relationship was found.
www.ajevonline.org/cgi/content/abstract/59/1/47
- Methods that are currently employed by the wine industry to remove tartrates and solid residues, and to disinfect barrels are ineffective as evidenced by the rampant spread of the spoilage yeast *Brettanomyces/Dekkera* in wine-producing countries. The efficacy of high power ultrasound (HPU) as a method for inactivating viable *Brettanomyces/Dekkera* yeast cells in barrels compared with high pressure hot water (HPHW) and mains pressure hot water (MPHW) was investigated. A commercial static spray head was used to deliver HPHW (1000psi/60°C) or MPHW (70psi/60°C) through the bung-hole of a test barrel. For comparison, a prototype 4kw high power ultrasonic unit was used to introduce ultrasound into a test barrel filled with 60°C reverse osmosis water via the bung-hole or through an open head. A water temperature of 60°C is the most commonly used temperature in the wine industry. Infected new, one- and three-year-old staves were used to compare the three barrel sanitising techniques. All three techniques were effective in reducing the numbers of *Dekkera bruxellerisis* cells on the surface of the wood (up to a depth of 2mm), with HPU most effective. Tests on the subsurface (2mm-4mm) of the wood showed that high pressure or mains pressure hot water sprays to the interior of barrels do not completely inactivate the cells, whereas HPU yielded a much greater reduction in cell numbers. The study finds that the application of high power ultrasound for barrel disinfection has the potential to eliminate or at least drastically reduce wine spoilage by *Brettanomyces/Dekkera* and possibly other spoilage yeasts and bacteria, as well as providing other considerable cost savings. Shown on the right is a stave from a 7-year old *Brettanomyces/Dekkera* infected hogshead. The barrel had been cleaned with a high pressure cold and hot water cleaning system every year. The stave was covered with a hard tartrate deposit ranging in thickness from 1 to 3 mm. The part of the stave to the right of the arrow was treated with HPU for 5 minutes. Note the complete absence of tartrate deposits on the treated surface. 'Inactivation of *Brettanomyces/Dekkera* in wine barrels by high power ultrasound' by Yap et al, *The Australian and New Zealand Wine Industry Journal* 23(5) 2008 pp32-40, available at www.cavitus.com/cavitus/index.php?page=publications
- Probably the most useful yeast known is *Saccharomyces cerevisiae*, used since ancient times in baking and brewing. While most wine yeasts are *S. cerevisiae*, only a few members of this species can make wine. For the first time ever, the genome of a wine yeast, specifically AWRI1631, has been sequenced by researchers at the Australian Wine Research Institute (AWRI). The starting point was N96 from Anchor Yeast in Cape Town. To determine why so few strains of *S. cerevisiae* are able to make wine, the researchers compared their genetic blueprint of AWRI1631 with previously published genome sequences of two other, non-wine, strains of *S. cerevisiae*. The genetic code of the wine yeast has marked differences. There was extra DNA in the wine yeast,



enough to carry at least 27 genes not present in the two non-wine yeasts. These extra genes are thought to encode for proteins that are unique to ARWI1631. However, despite the large amount of data produced in the study, it is unclear which genomic variation is most important for the phenotypic divergence between wine yeasts and other *S. cerevisiae* strains. The breakthrough could pave the way for the development of improved wine yeasts, a key ingredient in winemaking. <http://dx.doi.org/10.1111/j.1567-1364.2008.00434.x>

- A meta-analysis of published values of heavy metal ions in wines and the subsequent calculation of target hazard quotients (THQ) has claimed that there is a possible significant long-term health risk in consuming wines from some countries. The analysis of more than 100 red and white wines from 16 countries, (Argentina, Austria, Brazil, the Czech Republic, France, Germany, Greece, Hungary, Italy, Jordan, Macedonia, Portugal, Serbia, Slovakia and Spain) found that in thirteen of the countries the wines contain significant traces of vanadium, copper and manganese, the levels of which exceed the health standards imposed by the Environmental Protection Agency of the US as measured by THQ. A THQ greater than 1 poses a permanent threat to health over a lifetime, and some of the wines in the study had a THQ of 300. Hungary and Slovakia were the worst, followed by France, Austria, Spain, Germany, and Portugal. Argentinean, Brazilian and Italian wines didn't contain traces of the hazardous materials. The study also questioned whether the hazardous levels of metal ions, which can be pro-oxidants, counters the alleged beneficial qualities of anti-oxidants in red wine. The study did not specify any of the wines that were included. www.journal.chemistrycentral.com/content/2/1/22
- To assess the effect of stainless-steel vats on red muscadine (*Vitis rotundifolia* cv. Noble), grapes were fermented in glass carboys and stainless-steel vats of similar size for 18 months. Wine samples were analyzed every two weeks. Results showed that oxygen levels in wine from stainless-steel vats were continuously higher than in wine from glass carboys. A higher colour hue started after three months of fermentation in stainless-steel vats and this trend continued for the 18 months storage time. Total phenol values were not significantly different. Titratable acidity values were lower in wine from the stainless-steel vats. It was concluded that stainless-steel vats introduced a micro amount of oxygen into wine, thus allowing micro-oxygenation to occur, and thus enhancing the stability of the muscadine wine. In 'Abstracts from Presentations at the ASEV 59th Annual Meeting 17–20 June 2008, Portland p335A' in www.ajevonline.org/cgi/content/abstract/59/3/330A

Local research results

- An investigation into the activity of soil organisms in a vineyard soil at Simondium in the Western Cape has found that the activity was affected by different management practices. It is generally accepted that greater activity is associated with higher soil fertility. The influences of organic and conventional treatments were compared in two vineyard blocks. Experimental plots received either full chemical weed control or 'organic' treatment, as recommended by the Organic Standards of the British Soil Association. The pest and disease control practices followed in the conventionally treated vineyard block included the use of various pesticides. A comparison of feeding activity and moisture content indicated that the activity was substantially higher in the organically treated plots compared to the conventionally treated ones, while the soil moisture contents were very similar. This indicated that the organic treatment favoured soil biological activity. *African Zoology*, 43 (1) April 2008 pp 66-74.

Technological Developments

- The count of grape clusters per vine or per vineyard block is essential for forecasting, adjusting or evaluating crop yields. However, present counting methods are generally regarded being inefficient and are often inaccurate. Prototype datalogging harvest snips were developed that automatically recorded each open/close cycle of the snips, and hence the number of clusters harvested by an individual using the snips. A standard pair of harvest snips had a magnetically activated reed switch and miniature datalogger attached to one handle, and a magnet attached to the opposite handle; each open/close cycle of the snips was recorded as a unique time event on the datalogger. Ten such identical devices were successfully tested in three large winegrape field trials in 2007. The numbers of clusters harvested were acquired with very little additional effort beyond tabulating the output of the dataloggers later that same day. In 'Abstracts from Presentations at the ASEV 59th Annual Meeting 17–20 June 2008, Portland p338A' in www.ajevonline.org/cgi/content/abstract/59/3/330A

- European packaging manufacturer Smurfit Kappa has created a new corrugated mail order pack for wine bottles, specially designed to withstand the harsh postal distribution environment and also intended to replace environmentally unfriendly and expensive polystyrene. The cardboard 'Protektapak' box has a 100% guarantee is robust enough to protect bottle contents even when dropped from a height of 5 metres. It is simple to pack and simple to post. It can be modified to accommodate other fragile objects that need to be protected in the post.



<http://corrugated.smurfitkappa.co.uk/DropdownMenu/Newsroom/Press+releases/New+Corrugated+Mail+Order+Pack.htm>

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