Winetech Scan
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## Research News

### Effect of headspace and closure type on a Riesling Wine

A Riesling wine was bottled with different headspace oxygen levels and sealed with either a coextruded closure or a screwcap. Using luminescence technology, dissolved oxygen and headspace oxygen, as well as oxygen ingress through the closure, were monitored during 24 months of bottle storage. Under typical winery conditions, headspace oxygen introduced at bottling was found to be a major component of oxygen in bottled wine. Headspace oxygen at bottling influenced loss of sulphur dioxide ($SO_2$), and was the main cause of $SO_2$ decline during the first four months after bottling. The loss of $SO_2$ was not correlated with the evolution of dissolved oxygen, but with the total amount of oxygen consumed by the wine. After 24 months in the bottle, colour differences among the diffent samples were generally minor. Conversely, differences in closure oxygen transfer rate were responsible for significant differences in the final concentration of the off-odour compound hydrogen sulphide, with screwcaps generally associated with higher levels of this compound. To a lesser extent, the amount of oxygen present in the headspace at bottling also had an effect on final hydrogen sulphide, with higher concentrations observed in wines bottled with lower headspace oxygen. www.ajevonline.org/content/62/3/261

### Ancient amphoras used for more than transporting wine

It has been assumed that Greeks used amphorae (right) to transport wine. Researchers have now established that these containers were used for other products as well. Nine containers from an ancient shipwreck period were tested. The DNA of grapes was found in five of the nine containers. Six of the jars also showed the DNA of olives, presumably from olive oil (which oil was possibly also used to preserve wine). DNA from ginger, walnut, juniper, legumes, mint, oregano and thyme was also found. The containers showed multiple DNA samples, suggesting that they were reused and contained different products each time. http://dx.doi.org/10.1016/j.jas.2011.09.025

### Climate change will affect plant and animal size

While a number of studies have found that global warming is causing earlier migration, breeding and flowering among species, little is known about how the changing climate might affect their size. A new study warns that climate change will have an effect on some species that had not been previously anticipated. Higher temperatures, a decrease in rainfall, and an increase in carbon dioxide levels will reduce the growth of a range of crops and protein sources. Many species already exhibit smaller sizes as a result of climate change and many others are likely to shrink in future, following fundamental ecological and metabolic rules. The degree to which organism size is affected by temperature or precipitation variability is likely to vary within and between taxa, which could disrupt ecosystem functioning. http://dx.doi.org/10.1038/nclimate1259

### The economic costs of excessive drinking in the US

A United States federal agency, The Centers for Disease Control, has calculated societal costs from binge and heavy drinking over and above the actual price of the drink, based on 2006 data. In the US excessive alcohol consumption causes premature death (79 000 deaths annually), increased disease and injury, property damage from motor vehicle crashes and fire, alcohol-related crime, and lost productivity. The estimated economic cost of excessive drinking was $224 billion in 2006 (72.2% from lost productivity, 11.0% from healthcare costs, 9.4% from criminal justice costs, and 7.5% from other effects) or approximately $1.90 per alcoholic drink. Binge drinking resulted in costs of $171 billion (76.4% of the total); underage drinking $27 billion; and drinking during pregnancy $5 billion. The cost of alcohol-attributable crime was $73 billion. On a per capita basis, the economic impact of excessive alcohol consumption in the US was $746 per person, most of which was attributable to binge drinking. http://dx.doi.org/10.1016/j.amepre.2011.06.045

## Local Research News

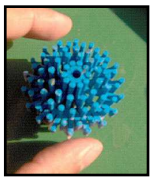
### Pro-active control of Petri Disease and Black foot Disease in newly established vineyards

Most nursery material received for planting contains a low percentage of pathogens that cause Petri disease (*Phaeomoniella chlamydospora*) (previously known as Black goo) and Black foot disease (*Cylindrocarpon* spp.) (right). These diseases are commonly known to affect young vines under stress conditions. Establishment of a new vineyard leads to stress on young vines and in combination with drought, poor nutrition and poor root development, these pathogens can multiply and colonise tissue. A project was carried out to determine whether various treatments during and after the establishment of young vines could limit further infections and improve the success of new plantings. In a newly established experimental vineyard 50% of the plants were immersed in hot water at 50ºC for 30 minutes (Hot Water Treatment or HWT). Petri disease was found in the graft unions, rootstocks, basal ends of rootstocks and roots of 28%, 31%, 72% and 28% of the 'control' plants, respectively. HWT reduced infection in the respective plant zones by 89%,

94%, 82% and 96%. HWT reduced Black foot disease in the same zones by 67%, 100%, 92% and 97%. The following treatments were applied to the vines during three growing seasons: *Trichoderma* (fungi which enhance plant and root growth and which attack other fungi); Aliette (aluminium salts of the diethyl ester of phosphorous acid); Brotomax (an organic nutrient preparation, containing nitrogen as urea, copper, manganese and zinc, formulated for plants stressed as a result of interrupted xylem conductivity); and compost tea treatment.

The treatment effects were measured in August of each of the three years. Petri disease was by far the most frequently isolated pathogen from all the plant zones. HWT plus Brotomax, HWT plus Compost, and HWT plus *Trichoderma* treatments consistently reduced infections in all plant parts. Petri disease occurred most frequently in the graft unions. Aliette, HWT plus compost, Brotomax, HWT plus Aliette and HWT plus Brotomax treatments significantly reduced these infections. Black foot disease occurred most frequently in the roots, but none of the treatments reduced its incidence in any of the plant parts. None of the treatments affected any of the growth parameters evaluated, except the HWT plus *Trichoderma* treatment which significantly increased rootstock diameter. The project recommended that dormant nursery vines be Hot Water Treated before planting, and that this be supplemented with the additional treatments mentioned above during the growing season, especially during the first three seasons. www.sawislibrary.co.za/dbtextimages/Winetech2010_10.pdf

### Increased bioreactor surface area in winery or distillery effluent treatment



As a small-scale reactor with polyvinylchloride as the attachment material for biofilm formation within the bioreactor had showed promise in reducing Chemical Oxygen Demand (COD) and turbidity, two bioreactors were each constructed of four 1000 litre tanks that were all 75% filled with Bioballs (right). The Bioballs acted as the attachment material for biofilm formation. As aeration has been found to be a good option as pre-treatment of winery and distillery wastewater, one bioreactor contained a blower that allowed for additional air to be injected into the four tanks. However, aeration of up to 2 hours per day had only a minimal impact on wastewater output quality. The flow rate for both bioreactors was approximately 260 litres per day, giving a theoretical retention time (TRT) of 3 days per tank. With this TRT there was 77% COD removal efficiency over the sampling period. Turbidity was also improved. When operated at a 4-day TRT the COD removal did not exceed 18%. However, when the TRT was increased to 8 days, COD removal ranged between 30% and 58%. Turbidity removal increased from an average of 48% at 4-days TRT to 83% when the bioreactor operated at an 8-day TRT. When the bioreactor was operated at a TRT of 12-days, the average COD reduction was only 15.7% while the turbidity was on average reduced by 52%.

Microbial DNA fingerprinting showed that highly dynamic microbial populations existed within the different tanks of the two bioreactors. Additional aeration did not influence the microbial diversity index. Microbial diversity (the presence of different types of species) differed between all the tanks of the bioreactors. The bioreactor proved to be effective in turbidity removal but was less effective in removing COD. The system showed a reduced ability to remove COD when the influent COD was decreased. These results indicate that the bioreactor could be applied as a primary treatment system and not as a sole wastewater treatment system. Winery wastewater passing through this system will in most cases be suitable to pass through a secondary treatment system such as a constructed wetland, which has been found to be effective in removing COD from winery wastewater. www.sawislibrary.co.za/dbtextimages/Winetech2010_20.pdf

## Other News

### European Food Safety Authority concludes that wines treated with lysozyme may trigger adverse allergic reactions

In winemaking, lysozyme from hen's egg is used for the control of lactic acid bacteria, and it is considered essential for producing consistent and high quality wine. Lysozyme is an enzyme that damages bacterial cell walls. In response to an application to permanently exempt lysozyme from being mentioned on labelling, a panel concluded that wines treated with lysozyme may trigger adverse allergic reactions in susceptible individuals under the conditions of use proposed by the applicant, namely, in white wines with and without bentonite treatment, and in red wines without bentonite treatment. The application for labelling exemption in the EU was unsuccesful. http://dx.doi.org/10.2903/j.efsa.2011.2386

### A non-thermal process shows promise in replacing $SO_2$ treatment

‘PreserveWine’ is a promising non-thermal process for extending wine shelf life while avoiding the use of chemical preservatives (e.g. sulphur dioxide). The alternating-pressure technology injects an inert gas and subjects the wine to a pressure of 300 bar. The inert gas diffuses into the cells of the microorganisms in the liquid. The pressure is then rapidly released, causing the microbial cell walls to rupture, killing the microorganisms. The inert gas escapes from the wine. www.preservewine.fraunhofer.eu/index.html


### Keep a digital eye on your opened wine

‘Winery’ (right) is a digital bottle stopper with a sensor that goes into the opened bottleneck and keeps a tab on the wine. It can relay the temperature and the ‘expiry’ date of the wine via WiFi to a smartphone or PC. http://www.infowine.com/default.asp?scheda=10616