

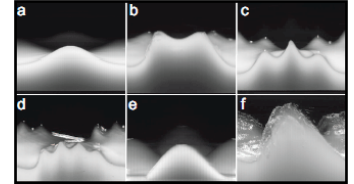


International Research News

The hydrodynamics of wine swirling

In wine tasting, swirling of the glass is necessary to release the bouquet and is usually obtained by a gentle circular (orbital) movement. The wave generated by this movement propagates along the glass wall and enhances oxygenation and mixing. Recently, similar orbital shaking has been applied to large scale bioreactors for the cultivation of cells expressing recombinant proteins (e.g. antibodies), and thus the physics of the process is of significant interest.

A study observed a large variety of wave shapes in the swirled glass (see right), the most simple being a wave with one crest and one trough. More complex shapes, featuring multiple crests and troughs were also observed. Under certain conditions the wave could 'dry' a portion of the vessel bottom, or break. Subsequent mathematical analysis found that there are three dimensionless parameters governing the shape of the free surface. Each combination of the free parameter has a peculiar balance of forces, generating a particular wave shape. A video of the various waves obtained may be downloaded at <http://arxiv.org/abs/1110.3369>



Proto-quercitol an excellent indicator of genuine oak

The use of chips, staves, or pieces of wood as alternatives to oak barrels for aging wine is gaining in popularity among winemakers. With this technique, it is possible to both speed up the maturation process and to cut down production costs. The International Organization of Vine and Wine and the European Union have approved the use of this accelerated maturation practice. However, only the use of oak chips or pieces of oak wood from the genus *Quercus* (Oak) is allowed by the legislation. Nevertheless, sometimes the nature of chips or pieces of wood sold to wineries is inadequately defined. Thus it is important to develop analytical methods to guarantee the authenticity of pieces or chips of wood sold as oak.

A gas chromatography-mass spectrometry study analyzed the cyclic polyalcohol composition of natural wood samples. 80 samples in total of 8 deciduous species were analysed. There were four species of oak wood (three species from Spain and one from the US). The other four were chestnut, cherry, common alder (a wood used for smoking foods) and birch. Each species showed a different and specific cyclic polyalcohol profile. Oak wood samples were characterized by richness in deoxyinositols, especially of proto-quercitol, which latter was not detected in the non-oak samples. The non-oak species showed a very low content of cyclic polyalcohols. Thus analysis of cyclic polyalcohols is able to characterize and differentiate woods of different botanical origin and to guarantee the authenticity of oak chips. <http://dx.doi.org/10.1021/jf104737n>

Towards improved forecasts of grape ripeness

Improved forecasts of grape ripeness time would allow for better allocation of key resources in vineyards and wineries such as labour, time, machinery, transport, analytical services, chemicals and storage. At present the forecast is carried out by measuring of total soluble solids (TSS) and then projecting with the assumption that TSS will increase at 1°Bé/week (Bé is Baume, a measure of liquid density, in this case yield concentration of TSS). A study in Australia examined the effect of using variety- and location-specific chronological rates between 0.8 and 1.2°Bé/week as well as variety- and location-specific degree-days (the temperature (>10°C) accumulated over time). The actual TSS of Chardonnay, Shiraz and Cabernet Sauvignon was measured in commercial vineyards in Coonawarra, Barossa Valley and Riverland during ripening.

It was found that the default rate of 1°Bé/week is justified when no additional information is available. Locally calibrated rates from the data obtained, in the range from 0.8 to 1.2°Bé/week, significantly improved ripening predictions for major grapevine varieties in a wide range of environments. In only one of the nine cases studied (Cabernet Sauvignon in Coonawarra) did the inclusion of degree-day parameters provide a better forecast. <http://dx.doi.org/10.1111/j.1755-0238.2011.00169.x>

A review of molecular techniques detection and identification of microorganisms in wine

A review of molecular techniques for the detection and identification of microorganisms in wine notes that the microbial ecology of wine is complex, with microbes playing both positive and negative roles. Thus the microbial ecology of wine has been well studied, and for such studies, traditional indirect methods, such as plating, have largely been replaced by a number of molecular methods. These methods are typically either indirect methods used for identification of cultured organisms, or direct methods used to profile whole populations or to identify specific microbes in a mixed population. These molecular methods offer a number of advantages over traditional methods, including speed and precision. The review examines both direct and indirect molecular methods, provides examples of their impact on the study of the microbial ecology of wine, and also discusses their strengths and limitations.

It concludes by stating that a number of advances in molecular detection techniques hold promise for applications in the identification of wine-related microbial communities. Microarrays, for example, could be applied to oenological studies to provide simultaneous detection of multiple microorganisms. However, microarrays, even for the detection of multiple

organisms, rely on existing knowledge about an organism, making it difficult to use when working with a new sequence. Another emerging method, which would overcome this deficiency, is known as deep sequencing or pyrosequencing. It is thought this method will also identify organisms present at lower levels in an environment when compared to traditional methods, thus giving a more complete picture of the ecology of any niche. The method compares well with microarrays and little previous sequence knowledge is needed, only the rDNA sequence. <http://dx.doi.org/10.1007/s10295-011-1020-x>

Other News

Carry wine bottles on board again soon

A bottle scanner based on Raman Spectroscopy has received European approval, which should enable aircraft passengers to carry liquid items larger than 100ml on board from April 2013. The current ban on items over 100ml in hand baggage can only be lifted when airports are able to effectively screen quickly, and without opening the containers. The INSIGHT100 screens individual bottles in less than 5 seconds and is capable of identifying explosives unambiguously inside opaque bottles such as coloured plastic shampoo containers, or green glass wine bottles. The system is currently in trials at several major European airports. Recently, the European Commission agreed to relax the limit on liquids by introducing new screening measures from April 2013. In just over a year from now, passengers will again be allowed to carry on that expensive bottle of champagne as a gift for friends, provided the bottle is screened. www.coballight.com/news/2012/insight100-attains-ecac-standard-bottle-screening



Researchers to sequence Chardonnay genome

The University of British Columbia's Wine Research Centre has launched an international collaboration with the Australian Wine Research Institute to sequence the Chardonnay grape genome. Chardonnay is the world's most planted grape variety, however, not many wineries know the type they have planted. The researchers will examine 15 different varieties of the Chardonnay grape, looking at their distinct properties such as early or late ripening, loose or small bunch sizes and seedless or large berries, with the goal of helping wineries so they can plant the most appropriate type for their climate, leading to improved quality of wine. www.physorg.com/news/2012-01-ubc-sequence-chardonnay-genome.html

Red wine health benefits researcher found to have falsified data

Dr. Dipak Das, a University of Connecticut researcher known for his work on red wine's benefits, particularly resveratrol, to cardiovascular health, has been found, in 145 instances over seven years, to have fabricated, falsified and manipulated data. As yet it is not known whether the irregularities in Das' research were significant enough to alter the conclusions. However, Dr. Nir Barzilai, whose research team conducts resveratrol research at the Albert Einstein College of Medicine in New York, said that Das was not a major figure in the field, and that the allegations will not make a material difference to resveratrol research, which is being conducted extensively around the world with encouraging results from many labs. <http://medicalxpress.com/news/2012-01-red-wine-accused-falsifying.html>

A closing Y-shaped training system for grapevines

Total leaf area and its distribution inside the canopy are known to influence photosynthesis capacity as well as grape quality. A five-year study has been carried out to evaluate the effectiveness of a closing Y-shaped training grapevine system called 'SAYM'. The SAYM was applied on eight rows of 80 vines in an experimental Sangiovese vineyard and compared to vertically shoot-positioned trellis type during the 2004–2008 seasons. In 2003, the eight hedgerows spaced at 3.5m were modified into the SAYM by mounting onto each stake of all hedgerows, a 1.1 m, V-shaped galvanised iron frame with an overall aperture angle of 50°, thereby increasing the surface area of the canopy and its exposure to sunlight.

This structure remained open from bud-burst was closed just before harvest, by using an appropriate device (below). When closed into the vertical position, the system allowed traditional mechanical harvesters and later pre-pruning machines to be used. In comparison to vertically shoot-positioned trellis vines, the SAYM was able to reduce the incidence of botrytis rot and improve grape and wine quality (alcohol, anthocyanins, phenolics, tannins and colour intensity), while maintaining an adequate yield and without significantly impacting work in the vineyard.



The reduction of production costs associated with the use of mechanical harvesters and pruners was noted. <http://dx.doi.org/10.1111/j.1755-0238.2011.00171.x>

Managing grapevines during heatwaves

The Grape and Wine Research and Development Corporation (GWRDC) Innovators Network is a network of people actively engaged in winegrape production in the Australian wine sector who want to keep up to date with the latest information and tools. Membership is free. A downloadable 9 page fact sheet 'Managing Grapevines During Heatwaves' has very recently been made available at www.gwrdc.com.au/site/page.cfm?u=12&t=content&cid=2600 It contains important information on monitoring weather patterns and practical management strategies for managing vines through heatwave conditions.

Winetech Scan is available on the Winetech website www.winetech.co.za

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