Winetech Scan

Wine Industry Network of Expertise and Technology
Netwerk van Kundigheid en Technologie vir die Wynbedryf

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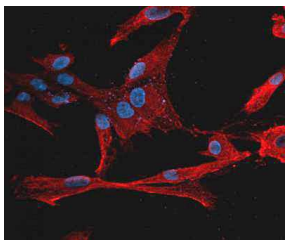
Research News

- Grapevine stilbenes include many compounds such as *trans*- and *cis*-resveratrol, their glucosides known as piceids, viniferins (resveratrol dimers and trimers) and piceatannol. Epidemiological studies have shown that individuals who regularly consume moderate amounts of wine are less affected by acute coronary events than abstainers. This health protection is related to the presence of functional phytochemicals in grapes and wine and, in this context, stilbenes in general, and *trans*-resveratrol in particular, have been reported to be responsible for various beneficial effects. The stilbenes found in wine occur mainly in the skin of grape berries, and they pass from grape to wine during alcoholic fermentation. As bioactive products enriched in stilbenes are considered of potential future interest, a study investigated the postharvest induction of stilbene biosynthesis in grapes by ultraviolet C (UV-C) treatment. 12 different grape varieties from both the 2007 and 2008 vintages in Southern Spain were studied. The varieties comprised Merlot, Syrah, two national varieties, 3 local varieties, 2 Hybrid Direct Producers (HDP) and 3 varieties of the *Vitis vinifera sylvestris* species. Two of the twelve produce white grapes and the rest red grapes. Batches of 5kg of healthy grape clusters of each variety were selected and manually harvested. On the same day these grape clusters were then irradiated by being passed under UV-C lamps with a theoretical power of 510W at 42 cm for 60 seconds. In all 24 cases (12 varieties and 2 vintages) the total stilbene concentration increased, peaking at about 6 days after irradiation. In a number of cases the increase was quite significant ranging from 4-fold to 29-fold. The content of *trans*-resveratrol in grapes is rather low, ranging from trace to 6.67 mg per kg, depending on the variety. In this study the highest concentration was 3.56, which after irradiation increased to a maximum of 19.56. For the 2008 Syrah the total stilbenes increased after irradiation from 4 to 25 mg per kg, and in the statistical analysis, this variety stood out from the other varieties tested. In the 2008 vintage, varieties belonging to the *sylvestris* group and Merlot also presented high stilbene production. However, the expected increase of stilbene concentration in the HDPs was not obtained. The industrial relevance of this study is that a most suitable raw material and process for preparing bioactive stilbene-enriched products, such as nutraceutics and wines, has been established. http://dx.doi.org/10.1016/j.ifset.2009.10.005

- A discovery which may in due course be of interest to the wine industry is that of taste receptors in the human lung. The researchers said that the detection of functioning taste receptors on smooth muscle of the bronchus in the lungs was so unexpected that they were at first quite sceptical. The tongue's receptors are clustered in taste buds, which send signals to the brain. The taste receptors in the lung are not clustered in buds and do not send signals to the brain, yet they respond to substances that have a bitter taste. There are thousands of compounds that activate the body's bitter taste receptors. The researchers tested a few standard bitter substances known to activate these receptors. The bitter compounds all opened the airway more profoundly than any known drug available for the treatment of asthma or chronic obstructive pulmonary disease. The discovery could thus have significant implications for new therapies for these diseases. http://dx.doi.org/10.1038/nm.2237



Microscope view of lung taste receptors. Red bands are receptors, blue dots are nuclei.
Credit: University of Maryland

- Removing carbon dioxide from the atmosphere is a hot topic in climate change research. By genetically engineering yeast, researchers have created a process that can convert carbon dioxide into carbonates that could be used as building materials. The process is based on the mechanism whereby abalone produces its exceptionally strong shells made of calcium carbonate. The yeast was modified to express genes found in the abalone. Those genes code for enzymes and other proteins that help move carbon dioxide through the mineralization process. The process produces about two kilograms of carbonate for every kilogram of carbon dioxide captured, a higher rate than commercial chemical processes, and requires no heating or cooling, and uses no toxic chemicals. The researchers plan to industrialise the process. http://web.mit.edu/newsoffice/2010/belcher-carbon-0922.html

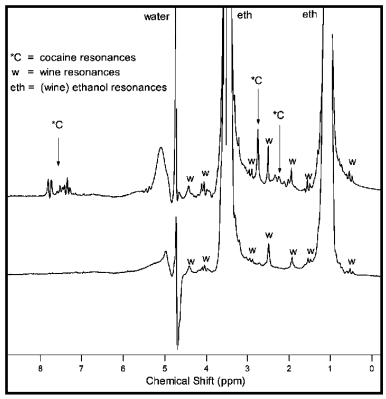
- A survey of relevant data in New Zealand has found that alcohol has become cheaper than bottled water, with researchers warning of major implications for public health. Alcohol is now probably the cheapest recreational drug in New Zealand and has become increasingly affordable, while the same time concern about the so-called binge drinking culture has grown. Wine costs as little as 62 NZ cents per standard drink (100ml), compared to 67 cents for 250ml of bottled water and 43 cents for a glass (250ml) of milk. The minutes that an average worker needed to work to earn enough to pay for sufficient alcohol to reach the legal lower limit for intoxicated driving were calculated to be: for beer, 17 minutes; for whiskey 13 minutes; and for wine 7 minutes. The researchers argue that the NZ government should adopt policies that would help to curb alcohol consumption. A copy of the

article, 'Very cheap drinking in New Zealand', which appears in the New Zealand Medical Journal, may be obtained from Prof N Wilson nick.wilson@otago.ac.nz

Local research news

- It is not known at what level of infestation ants pose a threat to the biological control of vine mealybug in South African vineyards. A project to correlate ant infestation with vine mealybug infestation and mealybug parasitism in three main vine-growing areas of the Western Cape was carried out, with the ultimate objective of ascertaining an action threshold, which would enable producers to decide when to implement chemical control against ants. It was found that, using the presence-absence cluster sampling system, monitoring for ants in vineyards every second week during the growing season was sufficient. Monitoring for ants on more than 20 plots/ha of 5 vines each is not only time-consuming but unnecessary as the results are not significantly affected with increased sampling. The decision whether or not to intervene against ants can be made using results from any of the vine sections, but the study recommended that the stem is best for monitoring ant activity. It was found that there is a 95% chance of correctly initiating ant control measures when 20% of the stems are infested with ants. Thus routine monitoring as described reduces unnecessary expenditure on pesticides, benefits the environment and improves biological control. www.sawislibrary.co.za/dbtextimages/AddisonP3.pdf

Technological Developments



- Recently the smuggling of cocaine dissolved in wine in bottles has been reported. A study investigated whether such cocaine in intact (unopened) wine bottles can be detected by protonmagnetic resonance spectroscopy (^{1}HMRS), using a standard 3 Tesla clinical magnetic resonance scanner. The aromatic protons of cocaine displayed resonance peaks in the 7–8 ppm region of the spectrum, where no overlapping resonances of wine were present. Additional cocaine resonances were detected in the 2–3 ppm region of the spectrum, between the resonances of ethanol and other wine constituents (all resonances marked *C in the graph right). Detection of cocaine in wine (at 5 mM, i.e. 1.5 g/L) was feasible in a scan time of 1 minute. This is well below the actual cocaine concentration of approximately 400 mM which has been found in smuggled wine bottles. It was noted that spectral quality, and thus the detection limit, can be degraded by the presence of metal. For instance, wine bottles might be surrounded by a metallic net, or might have metal caps, or the wine might be stored in aluminium-coated containers. Nevertheless, ^{1}H MRS is an excellent technique for examining this type of suspicious cargo, as it allows for a non-destructive and rapid content characterization. http://dx.doi.org/10.1002/dta.179

- Raman spectroscopy has recently been shown capable of detecting smuggled cocaine dissolved in alcohol without removing specimens from their glass containers. Several common containers used in smuggling were analyzed with varying concentrations of cocaine in ethanol solutions. The presence of cocaine was detectable down to about 6% *w/v* in most containers. Green glass presented a problem at 785 nm due to fluorescence, but by switching to 1064 nm this was overcome. The method was successfully applied to cocaine dissolved in a selection of commercial dark and white rums in bottles. http://dx.doi.org/10.1002/dta.169

- The latest airport security technology being developed at Los Alamos National Laboratory could open the door for airline passengers to bring their soft drinks, full-size shampoo bottles and other liquids on board again. The device uses magnetic resonance to read the liquids' molecular makeup, even when the substances are in metal containers. Within 15 seconds, a light flashes red if the passenger is carrying liquid explosives, or green when the liquids are harmless. The device is so sensitive it can tell the difference between red and white wine, and between different types of soda. www.physorg.com/news/2010-10-scanner-aims-liquids-planes-safer.html

- A novel technology that uses air instead of water and cleaning agents to clean process pipe work is being introduced in the United Kingdom. The Whirlwind System clears, cleans and dries the inside of pipes in factories using minimal water and no chemicals, and could deliver a payback in 9 to 12 months, by reducing water and cleaning bills, effluent charges, and energy bills as hot water is not required. It also increases product recovery from pipes. The system, which is particularly well-suited for wines, whisky and spirits, soft drinks and juices, can clean pumps, valves, filters and heat exchangers used for both heating and cooling. A laminar air stream is blown through the product remaining in the processing pipework, recovering 60 – 80%. A whirlwind is then generated within the airstream, and together with a small amount of water or cleaning agent (2-10 litres/min) clears the remaining product. By warming the whirlwind airflow any traces of water droplets on the inner surface of the pipework can be completely removed and the 100% clean surfaces are dried and ready for production to restart in a short period of time. www.aeolustech.co.uk