



Winetech Scan

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

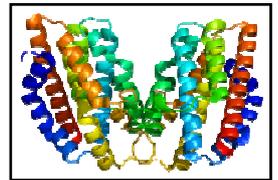
May 2010

Research News

- A gene of the common fungus *Trichoderma longibrachiatum* that is responsible for the production of 2,4,6-trichloroanisole (2,4,6-TCA) has been identified. 2,4,6-TCA is estimated to cost the wine industry \$10 billion in annual losses as it is able to confer a very unpleasant fungal aroma (musty/mouldy odour) to wine, even at concentrations as low as 2ng per litre. The encoded enzyme (CMT1) of the gene is responsible for the detoxification of chlorophenolic pesticides by O-methylation, which result in the formation of chloroanisoles. The gene (named *cmt1*) has been cloned and characterized from *T. longibrachiatum*. It is now hoped that fungi that do not have this gene and which can grow in cork can be isolated. Artificially inoculating cork with these could prevent the growth of *T. longibrachiatum*. <http://dx.doi.org/10.1016/j.fgb.2010.02.002>
- New Zealand receives about 45-50% higher levels of ultra-violet (UV) radiation compared with similar latitudes in the Northern hemisphere, and a study is underway there to investigate the effects of UV on Sauvignon Blanc grape chemistry under field conditions. Results so far show that UV causes accumulation of polyphenols (which absorb UV radiation and therefore protect the plant) in the grape skins, which may lead to changes in the properties of the wine, such as ageing and mouth feel. It appears that methoxypyrazines (compounds that impart the green/green capsicum aroma) are in high levels in the leaves, with implications for the leaf-berry relationship and canopy management. Leaf removal (a common practice to reduce disease pressure) altered the amino acid composition in the berries, while retaining the leaves increased the level of amino acids in the berries. A sensory evaluation of these wines revealed that aroma and flavour was impacted by the different experimental treatments, demonstrating the importance of managing the vine canopy in order to produce high quality grapes. www.voxo.co.nz/national/news-faculty-agriculture-and-life-sciences-lincoln-university/5/45754

Health Related Research

- Epidemiological and experimental reports have linked mild-to-moderate wine and/or grape consumption to a lowered incidence of cardiovascular, cerebrovascular, and peripheral vascular risk. The brain is particularly sensitive to free-radical damage because it has low levels of natural antioxidants. A study to test the hypothesis that resveratrol can provide resistance against free radicals and the cascade of events that leads to infarct brain damage after ischemia-reperfusion injury in the brain has found that resveratrol, a bioactive polyphenol in red wine, selectively induces heme oxygenase 1 (HO1) (above) in a dose- and time-dependent manner in cultured mouse cortical neuronal cells and provides neuroprotection from free-radical or excitotoxicity damage. HO1 is an enzyme that catalyzes the degradation of heme in response to stress such as oxidative stress. This neuroprotection was lost when cells were treated with a protein synthesis or heme oxygenase inhibitor, suggesting that HO1 induction is at least partially required for resveratrol's prophylactic properties. Furthermore, resveratrol pre-treatment protected mice subjected to an induced ischemic (restriction in blood supply) stroke. Mice in which HO1 was selectively deleted lost most, if not all, of the beneficial effects. Together, the data suggest a potential intracellular pathway by which resveratrol can provide cell/organ resistance against neuropathological conditions. <http://dx.doi.org/10.1016/j.expneurol.2010.03.032>
- For some time it has seemed that resveratrol, a compound present in red wine, could slow down ageing by activating enzymes called sirtuins, a class of proteins that are critical regulators of transcription, apoptosis, metabolism and aging. There are seven human sirtuins (SIRT1-7), and SIRT1 has been implicated as a key mediator of the pathways downstream of calorie restriction that have been shown to delay the onset and reduce the incidence of age-related diseases such as type 2 diabetes. Resveratrol has been widely referred to as a SIRT1 activator in the literature, with only a few questioning the original study. Now it has been found that resveratrol has little or no effect on SIRT1 activity. <http://dx.doi.org/10.1074/jbc.M109.088682>
- A meta-analysis of 111 067 persons with 2 155 non-fatal and fatal cases of cardiovascular diseases (strokes) has found that a high intake of flavonols was associated with a 20% lower risk of stroke incidence. Flavonols are a sub-class of flavonoids, and are found in tea, chocolate, red wine and certain vegetables and fruits. Up to 90% of the phenolic content of red wine comprises flavonoids. <http://jn.nutrition.org/cgi/content/abstract/140/3/600>



Local research news

- A project with the aim of developing grapevines with enhanced capabilities for growing under adverse conditions and producing stress-tolerant grapes with superior quality has targeted the carotenoid pathway of grapevine as a

central pathway that is linked to stress-tolerance (specifically light-stress), pigment development and the formation of the stress-hormone, abscisic acid. 27 full-length genes that are either directly or indirectly involved in carotenoid biosynthesis in *Vitis vinifera* have been isolated and characterised. Preliminary expression profiles of all 27 genes have been investigated in different grapevine organs using real-time polymerase chain reaction (RT-PCR), and the functionality of some of the genes has been confirmed in a preliminary heterologous bacterial system. A further three partial cDNA copies of genes that are in some way involved in carotenoid biosynthesis in *V. vinifera* have also been isolated, cloned, sequenced and analysed. All the genes isolated and characterised have been cloned into plant expression vectors. The results of this project are to be used to assist in the selection of potential genes for future grapevine transformations. www.sawislibrary.co.za/dbtextimages/VivierMA.pdf

- A project with the goal of developing fungal resistant grapevine and rootstock cultivars by genetically improving the grapevine's disease resistance has as its strategy the amplification of several of the natural defence mechanisms already present in the plants. These include the expression of various antifungal genes alone or in combination to up-regulate pre-existing defence strategies. The in-depth analysis of the role of polygalacturonase-inhibiting proteins (PGIPs) in plant defence, and specifically in interaction with *Botrytis cinerea*, was attempted. Functional analysis of the *Vitis vinifera* polygalacturonase-inhibiting protein encoding gene (*Vvpgip1*) revealed a much broader role for PGIP in plant defences than previously thought. The work shows that plants, over-expressing a *V. vinifera* *pgip*, and showing significant decreased susceptibility to *Botrytis* infection, show differential expression of a defence-related gene (*des1*), and the profile of its defence-related phytohormone content is altered at the level of the local response. These changes, together with the cell wall strengthening prior to infection that was previously shown, may all contribute to the observed decrease in disease susceptibility in *V. vinifera* PGIP plants. The interaction of PGIP with polygalacturonases (PGs) is much more complex than suggested by simple *in vitro* models. Conclusions obtained from these systems must be complemented by *in vivo* data. This study corroborates the role of PGIP in defence signalling and although the presence and role of elicitors have not been studied here, the downstream effects of the signalling were observed. The lipoxygenase pathway was affected, suggesting that this pathway may be regulated following *Botrytis* infection. The progress made with the analysis of resistance mechanisms is very important since it directs future strategies for antifungal approaches. www.sawislibrary.co.za/dbtextimages/VivierMA3.pdf

New Technology

- A prototype system called Tempwave which uses low-level microwave radiant heat to prevent freezing and frost damage to vineyards and orchards is being tested at a vineyard in Canada. The microwave energy is transmitted from 7.5 metre-tall towers, three of which are shown right. The frequency of the radiation is tuned specifically to water molecules, causing them to vibrate and heat up just enough to keep them from freezing. The energy is delivered directly to the crop without heating the intervening air. As temperatures drop to a critical point, the units automatically activate to prevent freeze damage. While preventing damage from frost is an important use for Tempwave, a major use may be in winter, when temperatures have dropped to the point where vines could suffer major damage. One purpose of the testing programme is to determine the low temperatures at which Tempwave will be effective. Other factors to be evaluated will be the health and vigour of the vine and bud hardiness. Human safety is ensured by compliance with legal limits on human exposure. The Tempwave tower will be comparable in price to a wind machine, but will be able to work under a broader range of conditions, has greater flexibility in covering up to an acre at a time, and without noise being a factor. www.winesandvines.com/template.cfm?section=news&content=73695



- In a demonstration project in Tunisia, solar energy is being used to keep fermenting wine cool. The technology is also being applied at a dairy in Morocco. Concentrating collectors which direct sunlight onto an absorber by means of a reflector (right) convert the solar radiation into hot water at 200°C. The extreme water temperature is necessary in order to drive the absorption refrigeration machine in the high external (air) temperatures that prevail. The absorption refrigeration machine produces a temperature of 0°C, cooling a water-glycol solution. The water-glycol solution is pumped through coiled pipes in the wine tanks, or in the case of milk, through a heat exchanger. The method is intended for countries which have many days of sunshine and where there are no conventional means of refrigeration owing to a lack of water and non-existent or unreliable energy sources. It is environmentally friendly and reduces the use of expensive electricity for conventional refrigerators to a minimum. The project is organised by MEDISCO (MEDiterranean food and agro Industry applications of Solar COoling technologies), a consortium of universities, energy agencies and European industry. www.physorg.com/news192122852.html



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