Winetech Scan

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

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Research News

- Cisgenesis is a term for a category of genetically engineered or modified (GM) plants. It applies to organisms which have been engineered using a process by which genes are artificially transferred between organisms that could otherwise be conventionally bred, i.e. genes are only transferred between closely related organisms. For the first time, a cisgenic approach has been used to obtain broad-spectrum fungal-disease resistance in a genetically engineered grapevine. A *V. vinifera* thaumatin-like protein (VVTL-1) was identified in Chardonnay grapes that significantly inhibited *Elsinoe ampelina* spore germination and hyphal growth. By inserting the relevant gene from the Chardonnay grape into Thompson Seedless grapes, the disease resistance of the Thompsons was dramatically enhanced. When grown under greenhouse conditions, the cisgenic Thompsons fended off powdery mildew disease seven to 10 days longer than unmodified counterparts. In the field, the grapes showed a 42% reduction in sour-bunch rot disease, compared with control grapes, and the incidence of black rot was reduced by about half. Shown right is the severity of powdery mildew (*Erysiphe necator*) on the leaf of a susceptible plant and on a resistant plant line after 10 days in a greenhouse. Grapevines are among the most heavily sprayed agricultural crops requiring an average of 12 sprays per season in some regions and engineered vines that slow fungal growth would not only improve crop productivity, but would also be beneficial in reducing the number of fungicide sprays. http://dx.doi.org/10.1007/s11627-011-9358-3

- To study the effect of oxygen on a French Sauvignon Blanc wine, the wine was bottled in 8 different ways. These were all the possible combinations of high (artificially induced) and low dissolved oxygen content, ground cork closures with high and low permeability to oxygen, and bottling under vacuum and with no vacuum. Poor bottling conditions (high dissolved oxygen content, corking with no vacuum and no inert gas) had significantly greater impact than cork permeability on total oxygen during the early months after bottling and hence on losses of free SO_2, and also on wine colour and sensorial properties. The wine with initially high dissolved O_2 content was more oxidised than that with low O_2 content. The wines bottled with corking without vacuum displayed lower free and total SO_2 concentrations and higher C* values (colour saturation) than the wines closed under vacuum. Whatever the date of analysis, the wines of the high O_2 content batch had lower free (and total) SO_2 contents and a more saturated yellow colour. Negative effects of high oxygen content were also noted during sensorial analysis undertaken after 18 months of storage. www.infowine.com/default.asp?scheda=10185

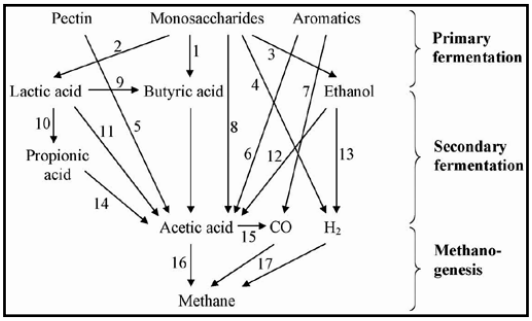
Local Research News

- Grapevine is threatened by 60 known viruses, reducing both crop yield and quality. A study investigated the applicability of a next-generation sequencer, the Illumina Genome Analyzer II, for metagenomic sequencing of grapevine viruses to provide the first complete viral profile, or virome, of a diseased vineyard. Leaf material was harvested in a leafroll-diseased vineyard. Approximately 837 megabases of metagenomic sequence data were obtained. The investigators were able to optimise the sequencing technique, including fragmentation, cDNA conversion, adapter ligation, cDNA amplification and sequence. Bioinformatic analyses determined the virus species present, the most prominent variants, and the relative abundances. Four grapevine infecting viruses, GLRaV-3, GRSPaV, GVA and also a virus not previously reported in South African vineyards, GVE, were identified. A complete sequence was generated for the South African strain, SA94, of GVE. At least three new viruses were detected and assigned to viral families. This technology could reduce the cost and time required for the unbiased virus identification of disease complexes. www.sawislibrary.co.za/dbtextimages/Winetech2010_05.pdf

- Acidity is the single most important factor that can influence the quality and stability of wine. In grape juice, the main acids are tartaric and malic acid. The acid composition of wine differs significantly from that of grapes because of various physicochemical and biochemical reactions, including those that lead to the formation of succinic acid. The importance of succinic acid's presence in wine has been overlooked. While it is a rather weak acid, succinic acid can still have a notable effect on the acidity of wine due to its influence on buffering capacity. A study examined factors influencing succinic acid production in wine. Due to the complexity of grape juice's chemical composition and the problems associated with sterilizing grape juice, fermentation experiments were conducted using a chemically defined grape juice-like medium. Succinic acid production by nine different industrial wine yeast strains was studied under various conditions. The amount of succinic acid produced during alcoholic fermentation was found to depend on the yeast strain, fermentation temperature and chemical composition of the synthetic grape juice. Succinic acid production was favoured by the metabolizable fraction of

yeast assimilable nitrogen (YAN) and moderate to high fermentation temperatures (20ºC to 28ºC). Even higher concentrations of succinic acid were produced when oxygen was made available to fermenting yeasts by aerating the fermenting grape juice. Fermentation temperatures below 18ºC, too much metabolizable nitrogen, very high concentrations of fermentable and a low concentration of various grape juice constituents decreased the amount of succinic acid produced. www.sawislibrary.co.za/dbtextimages/Winetech2010_16.pdf

- Most studies of the use of wetlands for the treatment of agroindustrial wastes are carried out on artificial or constructed wetlands. A study investigated the microbes in a natural wetland near Stellenbosch fed by a continuous stream that rises from a nearby spring. The wetland is overgrown by a variety of plants and is accessible to farm animals. The effluents of the adjacent small winery have been discharged into the stream for decades, and a preliminary analysis indicated that the wetland exhibits a high bioremediation efficiency, purifying the effluents to less than 10 mg per litre of COD (chemical oxygen demand). Wetlands are environments in which most organic matter is decomposed anaerobically, with the mineralisation of organic polymers to methane and carbon dioxide. COD provides a measure the amount of organic compounds in water, and is thus a useful measure of water quality. Molecular phylogenetic methods (denaturing gradient gel electrophoresis (DGGE) profiles) were used to monitor seasonal changes in the composition of the microbial 'community' in the wetland system. Most prominent within the wide spectrum of microorganisms participating in this process were the acetogenic and/or hydrogen-producing bacteria and the methanogenic Archaea. Surface wetland soil samples collected over a 12 month period indicated that major qualitative and quantitative changes occurred in the structure of the bacterial, total archaeal and methanogenic communities over this period. But no significant differences were detected in samples recovered over the same period at a depth of 25cm. The comparison of the two distinct seasonal clustering of microorganisms with the chemical characterisation of the effluents supports a correlation between the release of winery wastes and the 'community' structure at the wetland surface. The findings suggest that even after a very long adaptation period, recurrent changes in the physicochemical conditions at the wetland surface prevent the formation of a stable microbial community. The analysis of the temporal intensity variations of specific DGGE bands was used to identify taxa potentially involved in the degradation of winery waste compounds. The identified microbial taxa were then assigned to the different metabolic conversions in a diagram that visualises the functional potential of the wetland (shown right above, where the numbers represent different microbial genera). http://dx.doi.org/10.1080/0035919X.2011.572428



Other News

- Polymerase chain reaction (PCR) based tests are excellent for diagnosing plant diseases. But PCR's ability to obtain a genetic fingerprint that conclusively identifies the pathogen relies on there being a minimum number of target cells to be detected. This diagnostic shortcoming can be especially costly when asymptomatic seeds or plants intended for commercial sale are incorrectly certified as pathogen free. A patented procedure, Bio-PCR, now resolves this problem. The technique increases numbers of the target organism in a sample by using growth-promoting agar or liquid media before PCR. In 4 to 72 hours, depending on the pathogen, the target cells make many thousands of copies, enabling detection by direct PCR. The procedure only needs to grow pinpoint-size colonies for PCR. These small colonies are washed from the agar-media plates and used directly for PCR. This eliminates the need for chemicals such as phenol, which is used in conventional PCR. Besides increasing sensitivity by 100- to 1 000-fold over conventional PCR methods, the enrichment technique stops inhibitors from interfering with the action of a key enzyme, Taq polymerase, in the PCR process. These inhibitors can come from plant extracts and even bacterial cells. Even detection of the extremely slow-growing *Xylella fastidiosa* (Pierce's disease of grapes and leaf scorch of shade trees) is improved by Bio-PCR. Indeed, in studies with *X. fastidiosa*, Bio-PCR detected the bacterium in 90% of infected grape samples, whereas conventional PCR detected just 13%. www.ars.usda.gov/is/AR/archive/apr11/plant0411.htm

- In a survey at the Edinburgh Science Festival, 578 people sampled a variety of red and white wines ranging in price from £3.49 to £29.99 a bottle. Only 53% were able to distinguish between the cheap and expensive white wines, and only 47% correctly identified the price category of the reds. The survey claimed that most people can't tell the difference between cheap plonk and fine wine. The wine industry attacked the tasting as flawed. One criticism was that the wines were inappropriately served in thimble-sized glasses.
www.thedrinksbusiness.com/index.php?option=com_content&task=view&id=12634 and
www.edinburghguide.com/news/edinburghinternationalsciencefestival/7952-expensivewinesdontwinoutinmasstastetest.

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To subscribe please email Gerard Martin: marting@winetech.co.za