



Research News

Evaluation of Chemical and Natural Resistance Inducers against Downy Mildew in Grapevine

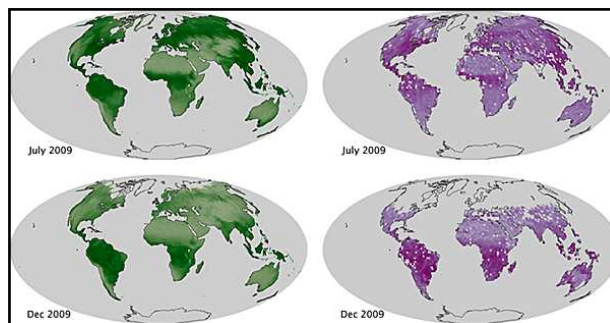
Vitis vinifera varieties are highly susceptible to downy mildew (*Plasmopara viticola*) infection and thus fungicides are required to sustain economic grape production. However, the use of pesticides, especially copper derivatives, is directly linked to ecological harm, and in addition, the increased use of pesticides has selected *P. viticola* isolates which are resistant, adding a further threat to grape production. An alternative protective strategy is the use of chemicals and 'resistance inducers' with the ability to stimulate the plant defence system. 53 substances, both chemical and natural resistance inducers, were evaluated for efficiency and mode of protective action against downy mildew. Only a few were able to reduce downy mildew to a negligible level, while the fungicide control treatments Frutogard (algae extract with phosphonates) and Cuprocin (combination of zinc and copper dithiocarbamates) completely eliminated the downy mildew. Foliar applications of potted vines with PEN (*Penicillium crysogenum*), LIN (linoleic acid), and the antagonistic yeast *Aureobasidium pullulans* resulted in unsatisfactory disease reduction of ~50%, both in the greenhouse and under field conditions. Only three resistance inducers provided a measure of protection. BABA (3-dl- β -aminobutyric acid), BTH (benzothiadiazole) and CanG (a water extract from *Solidago canadensis* or Canada goldenrod plant) reduced disease incidence to 10.4%, 15.8%, and 5.3%, respectively, in the greenhouse and to ~2% outdoors. The biocontrol agent Aureo (*Aureobasidium pullulans*) provided a very low level of protection. The study concluded that natural substances used to induce resistance cannot replace fungicides in viticulture, but may complement them synergistically when used in combination. www.ajevonline.org/cgi/content/abstract/62/2/184

A review of grape and wine tannin research

The review addresses the biosynthesis of tannins in grapes, the genetic and environmental factors that influence grape tannins, rapid methods for assessing tannin content in grapes and wine, the tannin content and composition in wine (especially the formation of polymeric pigments and other coloured compounds), the role of oxygen in tannin modification, the impact of exogenous tannins on colour stability and mouthfeel of wine and the links between tannin content and composition and sensory perception. www.gwrdc.com.au/site/page.cfm?u=12&t=content&cid=1524

First observations of global and seasonal terrestrial chlorophyll fluorescence from space

Researchers have produced the first satellite-derived global maps of land-plant fluorescence. Chloroplasts in plant leaves re-emit about two percent of incoming sunlight light at longer, redder wavelengths, and it is this radiation that the new method detects. The green maps depict satellite data of the Enhanced Vegetation Index (EVI) a well-established measure of greenness, for July and December 2009. The mauve maps show the new measurement of chlorophyll fluorescence for the same months, based on data from a Japanese satellite.



When EVI and NDVI (Normalized Difference Vegetation Index - not shown here) are used to observe vegetation, there can be a lag of days or even weeks between what happens on the ground and what satellites can detect. The chlorophyll fluorescence method offers a more direct view into the photosynthetic machinery of plants and might provide an opportunity to detect stress sooner, before outward signs of browning or yellowing become visible. The researchers expect that fluorescence measurements will complement EVI and NDVI, helping farmers and aid workers to respond to extreme weather events and potential crop failures and famines sooner. Fluorescence data could also lead to breakthroughs in understanding how carbon cycles through ecosystems. www.biogeosciences.net/8/637/2011/bg-8-637-2011.html

New Genome Sequences for the *Saccharomyces sensu stricto* yeasts

Saccharomyces sensu stricto is a species complex that includes most of the yeast strains relevant to the fermentation industry. Using massively parallel next-generation DNA sequencing, improved genome sequences of three yeasts of this species complex, viz. *S. bayanus* var. *uvarum*, *S. kudriavzevii*, and *S. mikatae*, have been achieved and compared to the genomes of *S. cerevisiae* and *S. paradoxus*. The new sequences have vastly greater long-range continuity and far fewer gaps than the previously available genome sequences. This new annotation of the nearly complete genomes for the five *Saccharomyces* species has approximately doubled the number of orthologous gene sets available for comparison. A novel gene with an as yet unknown biological function was discovered in the well-studied *S. cerevisiae* genome. The researchers generated genetically marked, stable haploid strains for all three of the *Saccharomyces* species. These nearly complete genome

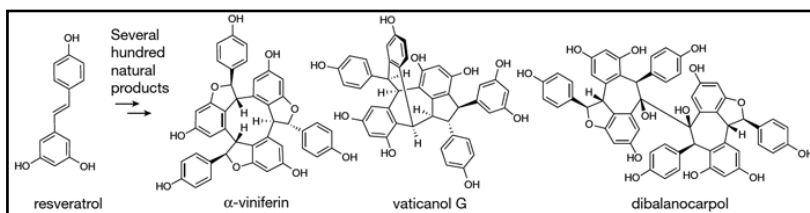
sequences and the collection of genetically marked strains provide a valuable toolset for comparative studies of gene function, metabolism, and evolution, and render *Saccharomyces sensu stricto* the most experimentally tractable model genus. These resources are freely available at www.SaccharomycesSensuStricto.org This study was published in the first issue of the new open access journal *G3: Genes | Genomes | Genetics*. www.g3journal.org/content/1/1/11

Closures and cork taint (TCA)

2,4,6-Trichloroanisole (TCA) is responsible for cork taint in wines. A study examined the sealing effectiveness of different closures on the permeation of deuterium-labelled TCA when bottled wine was stored in a TCA contaminated environment. During 24 months of storage, high concentrations of TCA were retained in the outer portions of natural and microagglomerate corks, showing that these stoppers were effective barriers to the transmission of TCA contaminants. However, the TCA penetrated synthetic closures and contaminated the wine. www.ajeonline.org/cgi/content/abstract/62/2/245

A new strategy for synthesizing resveratrol oligomers

Many polyphenols are oligomers (a molecule that consists of a few monomer units, of which monomer resveratrol is a well-known example). Several hundred resveratrol oligomers occur naturally. Because many polyphenols are antioxidants, they are acclaimed as natural health-protecting agents, although the benefits to humans have yet to be proven. Nevertheless, some polyphenols have biological activities that make them potentially useful leads in the search for drugs against illnesses such as heart disease, cancer and Alzheimer's disease. However, research has been thwarted because the most complex polyphenols are available from natural sources only in extremely limited quantities. For example, only 10 mg of the resveratrol oligomer carasiphenol C was obtained from 70 kg of plant material.



The structural complexity of resveratrol oligomers makes their chemical synthesis a daunting challenge. Now a team has demonstrated, for the first time, that the controlled synthesis of higher-order resveratrol oligomers (and potentially the entire class) can be achieved. The clever synthetic strategy has enabled them to prepare a series of resveratrol trimers and tetramers — the highest-order resveratrol oligomers prepared to date. This means that the structural diversity of resveratrol oligomers (include those that do not occur in nature) that can now be prepared controllably is truly remarkable, far surpassing what can be achieved using biosynthetic or biomimetic approaches starting from resveratrol itself. Thus it will be possible to optimize biological activity and alter physicochemical properties by making analogues otherwise inaccessible from resveratrol alone. www.nature.com/nature/journal/v474/n7352/full/nature10197.html

Local Research News

Factors associated with award-winning Pinotage wines in South Africa

Exceptional wines stem from fortuitous combinations of environmental and management factors. As yet, such factors have been neither identified nor quantified. 320 questionnaires were sent to the winners and finalists of the ABSA top 10 winning wines for the period 1997 to 2009 with the objective of identifying and quantifying those factors which are linked with award-winning Pinotage wines in South Africa. Information was requested about the wines, block statistics, soil etc., and many of the cellars were personally visited to obtain the necessary information. The data received was compiled into a database, however, the level of feedback was poor. There was, however, a clear indication that the hypothesis that Pinotage established on a specific soil regularly produced winning wines was not true. In some cases the winning wine's grapes came from more than one block and even from different farms. www.sawislibrary.co.za/dbtextimages/Winetech2010_00.pdf

The impact of shorter retention time on wastewater treatment by constructed wetlands

The wine industry produces large quantities of wastewater during grape harvesting, pressing and first fermentation phases of wine processing. Wetlands are naturally among the most biological active ecosystems on earth and are among the least expensive wastewater treatment systems. Research trials on the use of a constructed wetland to treat winery and distillery wastewater have been conducted in Goudini in the Western Cape over a number of years, and have shown that a constructed wetland with 14 days retention time achieves an overall average Chemical Oxygen Demand (COD) removal of more than 80%.

A follow-up project evaluated the impact of a shorter retention time (7 days) on the performance the same constructed wetland. There was an overall average COD removal of more than 50%. It was thus concluded that winery and distillery effluent with a maximum COD value of 15 000 mg/l can be treated effectively by constructed wetlands to an acceptable water quality depending on the retention time, which can be chosen by the user, depending the water quality to be treated. It is noted that constructed wetlands are a secondary treatment system, and a primary system or prefiltration is essential for solids removal before wastewater is applied to the wetland. www.sawislibrary.co.za/dbtextimages/Winetech2010_21.pdf

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