



Local Research News

The effect of antimicrobial peptides on the grapevine pathogen Aster Yellows Phytoplasma

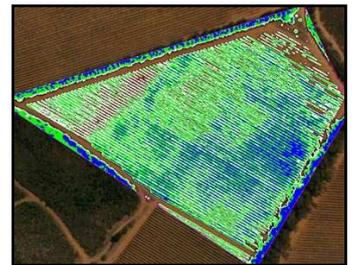
Phytoplasma are specialised bacteria (discovered in 1967) that are parasites of plant phloem tissue. Phytoplasmas cause symptoms that range from mild yellowing to the death of infected plants. Phytoplasmas require a vector to be transmitted from plant to plant, and this is usually a sap-sucking insects such as a leaf hopper. Aster Yellows (AY) phytoplasma is known to have caused disastrous effects in vineyards in European countries, resulting in significant reductions in fruit yield and wine quality. Antimicrobial peptides (AMPs) (also called host defence peptides) are small molecular weight proteins with broad spectrum antimicrobial activity against bacteria, viruses, and fungi. Phytoplasmas lack an outer membrane and cell wall, making this pathogen an ideal target for AMPs.

A study examined the efficacy of antimicrobial peptides (AMPs) against Aster Yellows (AY) phytoplasma, using a transient expression system. Three candidate AMPs (D4E1, VvAMP1 and SN1) were identified and D4E1 and VvAMP1 were tested for their efficacy to reduce bacterial titres of the two bacterial grapevine pathogens *Xylophilus ampelinus* and *Agrobacterium vitis*, *in vitro* (D4E1) and *in planta* (D4E1 and VvAMP1). In these experiments it was shown, using a semi-quantitative real-time PCR protocol, that the amount of bacteria (bacterial titres) were significantly reduced (by over 80%) in leaves of *Vitis vinifera* cv. Sultana when D4E1 was transiently expressed. No reduction in bacterial titre was observed when VvAMP1 was transiently expressed. <http://www.sawislibrary.co.za/dbtextimages/BurgerJ.pdf>

Remote sensing technology in terroir studies

The most important objective of terroir studies is to study conditions leading to the production of unique wines that portray a desired wine style within the specific terroir unit. The terroir/grapevine/wine interaction is difficult to study without prior knowledge of variability in grapevine performance within vineyards. A problem is that a vineyard may be considered as a unit with limited variability, which may lead to misinterpretations, especially of wine style results.

A project collected multispectral images, including digital elevation data, of 46 commercial vineyards in the Stellenbosch area. Clear links were shown between the measurement of dormant cane mass and image data, and other grapevine and grape composition measurements confirmed some results expected for higher vigour plots, including lower sugar levels (delayed ripening), higher acidity etc. A multispectral image of a Sauvignon blanc vineyard (left) shows vigour variability. The project showed the value of using digital multispectral imagery to delineate vigour areas within vineyards, as well as some consequences of vigour variability in vineyards. What was also highlighted in this study was the inadequacy of basing decisions on vineyard management on limited or misplaced point data or observations in vineyards. Variability mapping also offers the opportunity to place monitoring sites in areas more representative of the management unit (i.e. similar vigour area) within each block. <http://www.sawislibrary.co.za/dbtextimages/StreverA2.pdf>



International Research News

Within-vineyard variation in the 'pepper' compound rotundone

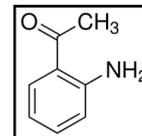
Previous studies have highlighted the importance of vineyard variability and the benefits that may accrue through its management. To investigate the variability of 'peppery' character in a vineyard in the Grampians region of Australia, fruit was sampled from 177 'target vines' immediately prior to harvest of a 6.1-ha block and analysed for its rotundone concentration. The resulting data were mapped and combined with other map layers describing variation in soils, topography and vine vigour. Berry rotundone concentration was found to be markedly variable spatially. The results further suggest that within-vineyard variation in berry rotundone concentration is associated with variation in soil properties and topography, with the influence of the latter on ambient temperature implicated as a likely key driver of rotundone variation. This is the first study of within-vineyard spatial variability in a grape-derived flavour compound. It highlights the potential opportunity to use selective harvesting and/or viticultural manipulation as a means of influencing wine style – in this case the 'pepperiness' of Shiraz.

Consistent with previous work on vineyard variability, this study suggests that within-vineyard variation in key elements of berry composition is associated with variation in the land underlying the vineyard. While this notion is consistent with the concept of *terroir*, it again raises questions about the scale at which *terroir* can be considered a useful construct given the traditional tendency for it to be considered in a regional sense. <http://dx.doi.org/10.1111/ajgw.12075>

Atypical aging of white wines – a review

Atypical aging is an off-flavour which can occur in white wines within a period of a few weeks to one year after the first addition of sulphur dioxide post fermentation. Its sensory characterization is varied and controversial, including a premature loss of

varietal aroma combined with an increase in off-flavours that comprise various attributes like mothballs, furniture varnish, acacia blossom, wet wool, and dirty dishrag. Most research agrees on 2-aminoacetophenone (AAP) (see right) and other less well identified compounds generated by degradation of indole-3-acetic acid (IAA) as the causal agents. This chemical pathway is controlled by the oxygen radical scavenging capacity of the wine which, in turn, is highly influenced by viticultural stress factors as the ultimate cause. These stress factors include drought, UV-B radiation, nutrient deficiencies, over-cropping, and premature. Skin contact and yeast strain have some impact as far as they affect the presence of oxygen radical scavengers such as polyphenols and yeast metabolic products. Atypical aging is distinct from premature oxidative aging with its own set of sensory and chemical descriptors.



The degradation reaction of IAA is induced by oxygen radicals resulting from aerobic oxidation of sulphites added post fermentation. The formation of AAP requires only a brief exposure to trace concentrations of dissolved oxygen, and minimizing oxygen uptake during cellar operations cannot impede the reaction. However, ascorbic acid has proven to effectively scavenge oxygen radicals and is the only technical means to prevent atypical aging in wines prone to its development. <http://dx.doi.org/10.5344/ajev.2014.14014>

A biocontrol agent against *Botrytis cinerea*

The microflora of Nosiola grapes involved in the production of a traditional Italian straw wine was evaluated as a biocontrol agent against *Botrytis cinerea*, one of the main diseases affecting fruit and grapes. The microbiota were identified using plate counts and genotypic characterisation, allowing identification of yeasts belonging to the *Hanseniaspora*, *Metschnikowia*, *Cryptococcus* and *Issatchenkia* genera and of the bacteria (*Bacillus*, *Microbacterium*, *Acetobacter* and *Gluconobacter spp.*). Isolates were able to halt the growth of *B. cinerea* in antagonistic cultures grown in Petri plates, using both synthetic growth and grape juice media. It was demonstrated that these microorganisms did not represent a risk for wine production due to their low resistance to ethanol, low pH and the absence of off-flavours. The biocontrol agents disappear during winemaking and there is no negative impact on the quality of the wine. The use of these yeast strains in the orchards or vineyards particularly in the last ripening stages, could contribute to a reduction in botrytis related damages when other common fungicide treatments can no longer be used. <http://dx.doi.org/10.1007/s00217-014-2195-y>

The use of inactive wine yeasts rich in glutathione for reducing oxidation in wine

The addition of glutathione (GSH) (γ -L-glutamyl-L-cysteinylglycine), a tripeptide of known antioxidant properties, is of interest since it has been shown that it prevents the enzymatic browning of white wines, and also preserves varietal aroma compounds, reducing the occurrence of aged off-flavour compounds. However, the use of this compound during winemaking is as yet not permitted. However, the addition Inactive Dry Yeast (IDY) which can include GSH is allowed. And this addition could prove to be a more sustainable alternative than the traditional usage of sulphites to preserve the aroma of young wines during their storage.

The effect of the addition of a commercial enriched glutathione inactive dry yeast (GSH-IDY) preparation on the volatile and sensory properties of industrially manufactured rosé Grenache wines was evaluated during their shelf-life. It had an impact on the volatile profile of these wines during aging that could be responsible for sensory differences in the later stages of wine shelf-life (above 9 months). In general, wines supplemented with a glutathione enriched IDY preparation were more intense in typical fruity attributes of young rosé wines (banana, strawberry), which could be related, at least in part, by the protection of some aroma compounds against oxidation, likely in the first steps during winemaking. However, the changes in the sensory profile could also be related to other effects linked to the addition of IDYs into wines. There was no significant difference in consumer preference for the GSH-IDY and non-GSH-IDY wines. <http://dx.doi.org/10.1080/10942912.2012.685682>

Other news

Manganese in wine

The Chinese government recently enforced mandatory upper limits on copper (1 mg/L), iron (8 mg/L) and manganese (2 mg/L) in wine. The Australian Wine Research Institute (AWRI) has subsequently analysed the manganese levels of more than 800 wines. The distribution of results was consistent for all wines irrespective of origin. This suggests that manganese levels in wine are common worldwide. A significant number of wines exceeded the manganese 2 mg/L limit, with higher manganese levels seen in red wines than in white wines. This may be due to the extraction process during the fermentation of red wine releasing more manganese from the grape skins and flesh. No significant differences were seen among varieties of red and white grapes; however, there does appear to be a vintage-to-vintage variation, with the median values for the 2011 season being significantly lower than those for 2009 and 2013. The median values for 2010 and 2012 fell between these two groups.

Manganese occurs naturally in soils and grapes; however a study had found that certain manganese-based fungicide treatments could significantly increase the concentration of manganese in wine. The AWRI has analysed wines which exceeded the limit which have not received any such fungicide treatments. The AWRI has also tested a number of wine fining treatments for their effects on manganese concentration. To date, none tested has shown a satisfactory impact on reducing the manganese concentration of wine. The AWRI recommends that all wines destined for export to China should be tested for copper, iron and manganese. http://www.awri.com.au/information_services/enews/2014/05/12/enews-may-2014/#title1

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