



Local Research News

Development of Integrated Snail Management Systems in Vineyards of the Western Cape

Three snail species occur as pests in South African vineyards. These are the brown garden snail, the white dune snail and the tower snail. Snails cause feeding damage to vines from early spring to midsummer. From mid-summer onwards snails seek shelter from dry, hot conditions among grape bunches and vine leaves. A study identified the brown garden and the white dune varieties as the major snail pests on grapevine at three locations in the Robertson area. Snail activity varied from site to site, but from middle to late winter snail activity decreased and almost ceased. During spring snail activity increased and snails quickly migrated into the vines where they stayed for almost the whole season. Feeding damage early in the season was minimal, but it increased as the season progressed. Both snail species showed a preference for Wild radish, Wild mustard, Narrow-leaved ribwort and Milk thistle as food sources, so these should be eliminated, whilst neither fed on triticale but only seemed to use it as a hibernation site. The presence of garden plants and water ways such as irrigation canals had no significant effect on snail activity in the vineyards. Two trials in the Robertson area showed that all the commercial snail baits tested were effective in controlling snails and preventing them from going into vines. The timing of bait application is crucial and must coincide with weed/cover crop control. The study makes a number of recommendations to ensure maximum efficacy of snail control. www.sawislibrary.co.za/dbtextimages/VermeulenAK1.pdf

The impact of alternative pruning methods on yields, and on grape and wine quality

A study has investigated the effect of hand, mechanical and minimal pruning on six cultivars in the Robertson region. The cultivars were Chardonnay, Chenin blanc, Colombar, Sauvignon blanc, Ruby Cabernet and Shiraz. Mechanical and minimal pruned vines from all six cultivars had much larger canopies than those of hand pruned vines. Hand pruned vines, however, had much denser canopies than the other two pruning treatments. The larger canopies and the larger number of shoots, leaves and bunches caused more stress and the stem water potential was lower than that of the hand pruned vines. Thus mechanical and minimal pruned vines require much more water, and irrigation scheduling needs to be adapted to meet the needs of these vines to optimally ripen their grapes.

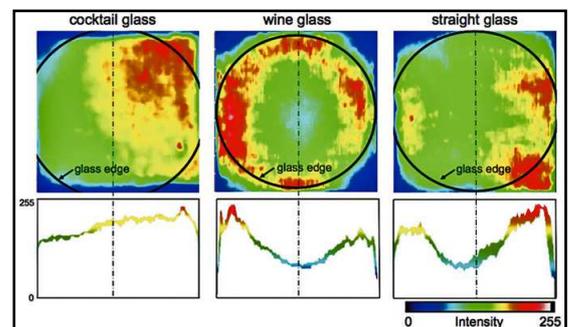
In the study period (2009 – 2014) the average number of main shoots per vine varied from 26, 67 and 120 for hand, mechanical and minimal pruning, respectively. The average number of bunches per vine were 37, 130 to 262, respectively, for hand, mechanical and minimal pruning. Average bunch mass varied from 205.1g, 146.1g to 78.2g, respectively, for hand, mechanical and minimal pruning. The average yields of all six cultivars were 15 t/ha, 30 t/ha and 35 t/ha, respectively, for hand, mechanical and minimal pruning. However, the yields of Chenin blanc, Colombar and Sauvignon blanc were more than double with mechanical and minimal pruning while that of the other cultivars increased less. Although hand pruning is still recommended for making high premium wines, mechanical pruning, and, in some seasons minimal pruning, produced comparable and even better quality wines than hand pruned vines. An important question is the productive lifespan of mechanical and minimal pruned vines. Mechanical pruners do not make a clean cut and sometimes the canes split, making bigger wounds for wood rot fungi to penetrate. After 16 years some of the vines have died as a result of die-back disease (*Eutypa lata*). <http://www.sawislibrary.co.za/dbtextimages/VanSchalkwykD11.pdf>

International Research News

A sniffer-camera for imaging of ethanol vaporization from wine

A two-dimensional imaging system (Sniffer-camera) for visualizing the concentration distribution of ethanol evaporating from wine in a wine glass has been developed. The system provided image information of ethanol vapour concentration using chemiluminescence (CL) from the reaction of the alcohol with an enzyme-immobilized mesh placed on top of a wine glass. The temporal changes in CL were detected using an electron multiplier-CCD camera and analysed.

As different glass shapes and temperatures can bring out completely different bouquets and finishes from the same wine, the researchers analysed different wines, in different glasses – including different shaped wine glasses, a cocktail (martini) glass and a straight glass – at different temperatures. At 13°C, the alcohol concentration in the centre of the wine glass was lower than that around the rim (ring phenomenon) – see centre image above. Wine served at a higher temperature, or from the martini or straight glass, did not exhibit a ring-shaped vapour pattern. It was concluded that the ring phenomenon allows enjoyment of the wine aroma from the centre of the glass without the interference of gaseous ethanol and thus the wine glass shape has a very specific and sophisticated functional design for tasting and enjoying wine. <http://dx.doi.org/10.1039/c4an02390k> and <http://dx.doi.org/10.1039/c5an90029h>



Clonal polymorphism of berry colour in the Pinot family

The stocks used in viticulture are obtained by grafting, thus, for any given variety, all stocks are identical. However, spontaneous events in the genomes of some vines lead to differences between individual plants. Researchers have now elucidated the molecular mechanisms that underpin the change of Pinot berry colour. They examined a collection of 33 clones of Pinot noir, Pinot gris and Pinot blanc, and found that large-scale exchanges between homologous chromosomes, sometimes associated with deletions, selectively shut down the genes that induce the biosynthesis of anthocyanins. These somatic mutations, which occur in a cell, propagate to form a distinct cell layer, leading to chimeric plants (chimeric is a single organism composed of genetically distinct cells). This then is how chimeric Pinot gris arises from Pinot noir: a Pinot noir skin surrounds internal cells that have mutated to Pinot blanc. Subsequently, Pinot blanc can emerge from Pinot gris as a result of cellular rearrangements that spread the mutations throughout the plant. <http://dx.doi.org/10.1371/journal.pgen.1005081>

Measurement of sulphur dioxide (SO₂) in wine without disruption of SO₂ equilibrium

Standard approaches to SO₂ measurement in wine overestimate free and molecular SO₂ due to dissociation of weakly bound bisulfite adducts. A study found this to be particularly so in red wines where discrepancies up to 5-fold were noted, and overestimation was also a minor issue in white and blush wines. A new method, the headspace gas detection tube (HS-GDT) for the measurement of molecular and free sulphur dioxide (SO₂) in wine was developed. It is a simple and low cost procedure using commercial industrial safety colorimetric tubes. A syringe is used to sample a wine and to create a closed headspace in the syringe, which gaseous headspace is expelled through the GDT after equilibrium is obtained. The vapour-phase concentration of SO₂ is determined from the GDT manufacturer's printed markings, and then related to the molecular SO₂ concentration based on Henry's law coefficients or better, by calibration curves. The method determines molecular and free SO₂ concentrations typically found in wines without perturbing the equilibria of free and bound SO₂ forms. Thus, the HS-GDT method may be of use to researchers interested in determining the mechanisms of wine oxidation or establishing microbial tolerance to SO₂. Because of the low requirements for consumables and fast analysis time (about 5 minutes), HS-GDT could also be adopted for use by winemakers. <http://dx.doi.org/10.5344/ajev.2015.14125>

Metabolomic measurements in a Chardonnay wine fermentation

The transformation of grape juice to wine is a complex metabolic relationship between two species, *Vitis vinifera* and *Saccharomyces cerevisiae*. The final molecular composition developed from this grape/yeast relationship contributes to the flavour, aroma and mouthfeel of the wine. A study has examined this complex relationship by identifying the exo- and endo-metabolome (the collection of metabolites present extra- and intra-cellularly, respectively) at three time points (Day 4, 9 and 15) of a Chardonnay wine fermentation. The three time points represented three phases in yeast growth: early stationary, late stationary and death. The researchers identified and tracked 227 metabolites in the exometabolome and 404 metabolites in the endometabolome, each of which was grouped into metabolic pathways or families. Considerable metabolic variation was seen at each stage of fermentation, illuminating metabolic patterns that suggest the regulation of metabolic pathways is coupled to fermentation progress. Substantial differences were found among time points in the utilization and production of the metabolites. Distribution of carbon and nitrogen changed dramatically over the course of fermentation as the cells adapted to the transition from grape juice to wine. <http://dx.doi.org/10.5344/ajev.2015.14062>

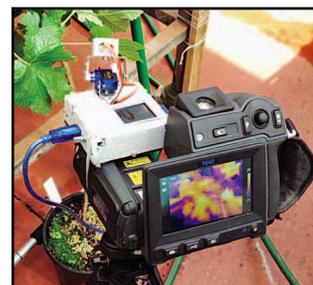
Effect of various treatments and filtration methods on eliminating casein fining agent residues of wine

Casein and potassium caseinate are the main oenological fining agents derived from milk which are applied in the wine industry. Such milk-derived fining materials have the possibility of triggering allergic reactions. A fining trial has been conducted to study the influence of various filtration methods, as well as other treatments, and their efficiency in reducing these possible allergens, even in a worst case scenario. The method of detection used was ELISA (enzyme-linked immunosorbent assay), and in vivo tests were also conducted. Casein was removed from both red and white wines to undetectable levels by all methods of filtration used in the study. Other methods evaluated in the study were just as efficient, apart from flash-pasteurization or silica sol when an exaggerated dosage was applied for a worst case scenario. However, an additional sterile filtration after flash-pasteurization or silica sol fining decreased casein proteins to undetectable levels as well. <http://dx.doi.org/10.5344/ajev.2015.14122>

Other News

Scientists show 'vineyard of the future'

In the future viticulturalists could do much of their work remotely, thanks to three new pieces of technology demonstrated by a team at the University of Adelaide. A smartphone app can measure canopy growth and is soon to be made generally available. A low cost camera system (right) uses near-infrared spectroscopy to see how much water stress a vine is under. Grape quality can be measured by a machine that attaches via electrodes to the berry and uses impedance spectroscopy. In the future the viticulturist could monitor the vineyard and make vineyard management decisions, possibly carried out robotically, without ever visiting the actual vineyard. www.thedrinksbusiness.com/2015/04/scientists-show-vineyard-of-the-future/



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