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Local Research News

Grapevine water status differences as a result of different irrigation strategies

Irrigation treatments were applied at two sites. The Wellington Merlot site consisted of five irrigation treatments: rain-fed, two applications per season on the vine row, four applications per season on the vine row, four applications per season between the vine row, and partial root-zone drying. At the Merlot vineyard in Stellenbosch two irrigation regimes (rain-fed and irrigated) were applied. Carbon isotope discrimination, photosynthesis measurements and infrared thermometry were evaluated as monitors of grapevine water status differences induced by these different irrigation strategies.

Results showed that stem water potential correlated best with most of the techniques. Pre-dawn and midday leaf water potentials did not correlate well with measures of leaf temperature, carbon discrimination, or photosynthesis, but these measurements were useful in quantifying the irrigation regime applied. It was found that partial root zone drying vines exhibited the least water deficits during the season, followed by a 4x irrigation treatment, compared to the rain-fed treatment. This could also be seen from increased vine vigour at these plots. The partial root zone drying experiment indicated a significant increase in water use efficiency without any indication of increased water stress, compared to irrigation treatments that delivered the same amount of water. No significant differences were found in berry characteristics. Carbon isotope discrimination analyses showed close relationships with both stem water potential and stomatal conductance. A very good distinction between irrigation strategies was shown in the seasonal evolution of carbon discrimination, indicating the potential usefulness of this measuring technique. www.sawislibrary.co.za/dbtextimages/StreverA4.pdf

Evaluation of soil preparation practices

Because of the negative effects of high soil bulk density on the growth and producing capacity of a vine, a study was conducted in some vineyards in the Western Cape to investigate the effect of soil preparation on selected soil physical properties. Soil preparation is applied to remove root limiting layers in the subsoil and to create a larger soil volume for root growth, but can destroy the macropore structure (cavities that are larger than 75 µm) and has a high cost. The main finding was that soil preparation had positive effects and these were still clear after 25 years, with various parameters relating to soil density considerably lower than those of undisturbed soil. Measurement of vine root distribution showed that root distribution had increased with increasing depth of original tillage. It was also clear that the longer the time after tillage the smaller was the difference between the tillage treatments and the undisturbed soils. Recompaction did occur and therefore soil preparation might be required again before new vines are planted. www.sawislibrary.co.za/dbtextimages/HoffmanJE.pdf

International Research News

Elicitors as alternative strategy to pesticides – a review

The use of pesticides is well proven and relatively inexpensive compared to the study of and use in the vineyard of new substances, but the need to reduce the use of classic chemical inputs for protection against diseases in vineyard is becoming a necessity. One of the most promising strategies is the use of elicitors which elicit specific plant defences and also help the plant to develop resistance to subsequent attacks by pathogens. They can have various origins, including purified molecules or crude natural extracts from plants, microorganisms, decoctions or teas (nettle, horsetail, etc.) or minerals (clays, calcium, etc.). For crude extracts, the effective substances against the pathogen are not always known and there is little knowledge on their mode of action. Plant hormones such as salicylic acid, jasmonic acid and hormone derivatives are also sometime described as elicitors.

The review provides an overview of these molecules and highlights their potential efficacy. The review also highlights the difficulty of transferring findings about elicitors from controlled laboratory conditions to the vineyard, and discusses ways to determine their practical and effective use in viticulture and to proposes ideas for improving their efficacy in non-controlled conditions. The review concludes that while elicitors have good potential, they are not the 'miracle' solution for protection against diseases in grapevine and they need to be integrated into pest management practices. But the increased sensitivity of consumers to organic farming may make the use of elicitors a necessity in future. http://dx.doi.org/10.1007/s11356-013-1841-4

The economic benefits of virus-screening

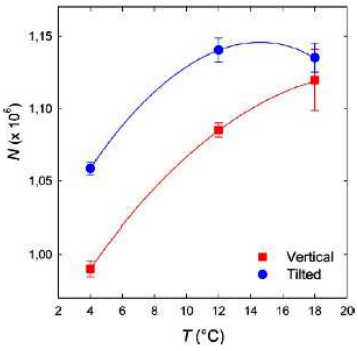
Viruses and related pathogens have no cure and impose high costs on nurseries and crop producers. These diseases are typically spread through infected planting stock and plant propagation material. However, virus spread can be minimized if clean stock is used. A study presents the costs and benefits of a virus screening program for Grapevine Leafroll associated Virus-3 (GLRaV-3) in the North Coast region of California. The study found that even if growers have to pay a premium per GLRaV-3-screened vine, they would reap a very large benefit, over 100 times the cost, from doing so at current costs. Economic benefits from the testing and cleaning programme were found to be in excess of $50 million per year for the region.

This means that there are potential benefits to be obtained from removing and replacing diseased vines, rather than leaving them in the vineyard where they can spread the disease. It was also found that there are significant costs associated with disease entering from infected vines in neighbouring properties. http://dx.doi.org/10.5344/ajev.2014.14055

Factors affecting the sensory profiles of traditional method 'sparkling' wine

The sensory effects of glassware with three nucleation point treatments, as well as the impact of time on the sensory profiles of eight Californian blanc de blanc traditional method wines were assessed. Air dried, etched and towel dried glassware showed no significant difference in overall aroma and flavour intensity showing that the different nucleation points applied to glassware by paper towel drying or etching did not significantly affect the perception of sparkling wines. There was a significantly greater sensory difference in all wines assessed at five minutes after pouring when compared to the sensory characteristics of the wines tasted one minute after pouring. This difference was characterized by fewer and smaller bubbles after five minutes, and indicated that the sensory influence of carbon dioxide had diminished after five minutes, allowing the sensory influence of the wine to come to the fore. http://dx.doi.org/10.5344/ajev.2014.14091

How many bubbles?



A rough estimate based on the volume of carbon dioxide (CO_2) dissolved in a bottle of champagne concludes that about 15 million bubbles should be able to form in a typical flute. This is the number often given in wine blogs and magazines. A theoretical study finds that this rough estimate is far from correct because, all of the dissolved CO_2 which escapes from the glass does not form bubbles, and the size of bubbles continuously decreases as time proceeds. Based on theoretical models combining ascending bubble dynamics and mass transfer equations, a theoretical relationship was derived which provides the number of bubbles likely to form per glass, depending on various parameters of both the wine and the glass itself. If 100 ml of champagne is poured straight down the middle of a vertically oriented flute, about one million bubbles are likely to nucleate. If the champagne is served more gently on the wall of a tilted flute, dissolved CO_2 is better preserved, and therefore several tens of thousands of bubbles should additionally form. The number of bubbles (N) likely to form was found to increase with the champagne temperature. See graph right. http://dx.doi.org/10.1021/jp500295e

A device for fully automated water-deficit experiments with potted grapevines

A new system designed to perform automated, unattended water-deficit experiments on potted plants has been successfully tested. Besides exempting operators from the laborious and time-consuming manual supply of irrigation volumes, the system offers such advantages as the ability to calibrate water supply on actual water use concurrently measured via a vine-enclosure system as well as differentiating the water supply according to plant size and, hence, to the transpiring potential of each vine. The core of the system is the cylinder tank which is programmed to deliver water to the vine based on real-time measurements of vine transpiration. The very close linear relationships found between vine transpiration and water supply over a 40 day trial confirmed the system's reliability in accurately feeding the vines with a water supply that closely tracks the measured transpiration. http://dx.doi.org/10.5344/ajev.2014.14109

Characterization of canopy parameters by UAV remote sensing and photogrammetry techniques

Using high resolution images from UAVs (unmanned aerial vehicles) means that accurate, high spatial and temporal resolution geo-referenced imagery can be delivered in near-real time, which offers farmers new possibilities for controlling grapevine vigour and growth patterns. Leaf area index, green canopy cover, and canopy volume (LAI, GCC and V) are indicators of grape vigour, quality and yield. Thus, analysing these parameters throughout the growing season contributes to optimizing site-specific management. Direct measurements of LAI are destructive and tedious and cannot be repeated for the same vine.

A study in Spain using a UAV was carried out over three seasons The growth parameters, LAI, GCC and V, of irrigated and rain-fed Cencibel and Airén vineyards under semiarid conditions were characterised from the aerial image. The measurements showed good results under non-extreme conditions and natural canopy growth. However, to apply this method in other areas, GCC, LAI and V relationships must be calibrated for other vine training systems and rainfall regimes. http://dx.doi.org/10.5344/ajev.2014.14070

Haze-preventing enzymes approved for use in Australia and New Zealand

The enzymes Aspergillopepsin 1 and 2 can now be used in wine made and sold in Australia and New Zealand. This approval provides the Australian wine industry with an alternative to bentonite for removing haze-forming proteins from white, rosé and sparkling wines. The use of bentonite results in significant wine losses, estimated globally at $1 billion dollars every year. After the enzymes are added to grape juice prior to fermentation, the juice is heated for one minute which unfolds the heat-unstable proteins, making them susceptible to enzyme attack. The juice is then cooled before being fermented. The combined cost of the enzymes and the juice heating step is generally considerably lower than the cost of the batch bentonite treatment. Extensive sensory testing has shown no negative impacts from this treatment compared to using bentonite. www.awri.com.au/information_services/enews/2015/01/19/enews-january-2015/#title3