Winetech Scan

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Local Research News

An investigation into the use of worms for the control of grapevine mealybug

A study has investigated the control of the vine mealybug (right) in South African vineyards by using entomopathogenic nematodes (EPNs) as a biological control agent. EPNs are a group of nematodes (thread worms) that cause death to insects. The vine mealybug (*Planococcus ficus*) characteristically causes more damage to grapes than other mealybug species. Mealybug infestations contaminate grapes with their waxy secretions, egg-sacs and honeydew production, on which sooty mould grows, all of which result in the fruit being unmarketable or unusable. The mealybugs are also vectors for various plant viruses. Chemical insecticides are the most common method of mealybug control in South Africa. These chemicals are not very effective and also have negative environmental effects.

Six indigenous species of EPN were studied, as well as two produced in Germany which are commercially available in South Africa. The mealybugs were highly susceptible to two indigenous species of EPN, *Heterorhabditis zealandica* and *Steinernema yirgalemense,* which were responsible for 96% and 65% of mealybug mortalities respectively. One of the German products, *Heterorhabditis bacteriophora*, was more effective than the two indigenous EPNs. The study found that the local EPN *S. yirgalemense* has great potential as a biopesticide for controlling vine mealybugs in the soil of South African grape vineyards. Soil application of *S. yirgalemense* in the field produced exceptionally good results, while laboratory tests indicated the potential for further aerial field application trials on grapevines. It was shown that *S. yirgalemense* actively seeks out its mealybug hosts and that volatile cues produced by damaged grape vine roots are more attractive to the EPN than cues produced by the insect itself. The study also established the fact that the two German EPN species can be applied in combination with the insecticide imidacloprid, in an integrated pest management scheme, thus providing the grape grower with excellent control against the vine mealybug. www.sawislibrary.co.za/dbtextimages/MalanAP.pdf

Identification of the insect vectors of Asters Yellows in the Olifants and Breede River areas

Aster yellows is a chronic, systemic plant disease caused by a bacterium-like organism called a phytoplasma. Phytoplasmas cause a wide variety of symptoms that range from mild yellowing to the death of infected plants. They require a vector for transmission and this normally takes the form of minute sap-sucking insects such as leaf hoppers (left), in which they are also able to survive and replicate. Leafhopper is a common name applied to any species from the family *Cicadellidae*. Aster Yellows phytoplasma was first found in vineyards in South Africa in 2006.

A survey was undertaken to determine which species of leafhopper occurred in these infected vineyards and whether Aster Yellows was present in the digestive system of the different species in order to identify potential vectors. Over four seasons a total of 26 species of 24 genera and 5 families were identified in vineyards. Four genera were found to be infected with Aster Yellows. Most of the positive identifications were found with *Mgenia fuscuvaria*, and this species was positively identified as a vector of Aster Yellows. The seasonal occurrence of leafhoppers and especially that of *Mgenia* was determined on a monthly basis over two consecutive seasons in the infected areas. Marked differences occurred in the different areas in the buildup of the populations during each season. This information can be used to determine the best time for applications of chemical control measures. A survey was also conducted over three seasons to determine the presence of leafhoppers and especially *Mgenia* in the main viticultural regions of South Africa. Eleven regions, 59 areas and 149 farms were included in the survey. *Mgenia* was present in 6 regions, 22 areas and on 43% of the farms investigated in the Western Cape. *Mgenia* was also present in high numbers at 4 main nursery farms near Wellington. *Mgenia* was not found in the Northern Cape. The widespread occurrence of the vector *Mgenia* poses a great risk for the spread of Aster Yellows in all areas in the Western Cape. www.sawislibrary.co.za/dbtextimages/deKlerkA.pdf

International Research News

The effects on grapes of supplementing sunlight with artificial light

While exposure to sunlight can have a strong effect on grape quality and commercial value, the mechanisms of light action are not well understood. The role of fruit-localized photoreceptors in the control of berry quality traits was evaluated under field conditions in a commercial vineyard in Mendoza, Argentina. It was found that clusters were shaded by leaves during most of the photoperiod. Researchers used three light supplementation treatments to stimulate fruit photoreceptors. Supplementation of the fruit light environment from 20 days before veraison until technological harvest showed that red (wavelength of 660 nm) and blue (470 nm) light strongly increased total phenolic compound levels at harvest in the berry skins without affecting sugar content, acidity or berry size. Far-red (730 nm) and green (560 nm) light supplementation had relatively small effects. The stimulation of berry phytochromes and cryptochromes favoured accumulation of flavonoid and non-flavonoid compounds, including anthocyanins, flavonols, flavanols, phenolic acids and stilbenes. It was found that fruit photoreceptors are not

saturated even in areas of high solar radiation and under vine training systems that are considered to result in a relatively high exposure of fruits to solar radiation. Thus, manipulation of the light environment or the light sensitivity of fruits could have significant effects on critical grape quality traits and are potential tools for increasing the concentration of health-promoting compounds, such as resveratrol, anthocyanins, flavanols and flavonols. http://dx.doi.org/10.1016/j.phytochem.2014.11.018

Changes in ethanol concentration influence red wine astringency

Astringency (dry, puckering mouthfeel) mostly involves wine tannins binding to proteins in saliva. Lower alcohol red wines are perceived as more astringent than higher alcohol wines even when they have the same amount of tannin. Now research has shown that this may be because alcohol can prevent wine tannins from binding strongly to saliva proteins. Wine tannins are complex molecules that have both hydrophilic (water-loving) and hydrophobic (water-fearing) parts, both of which can stick to proteins.

The binding strength between a model salivary protein, poly(L-proline) and a range of wine tannins (tannin fractions from a 3- and a 7-year old Cabernet Sauvignon wine) across different ethanol concentrations (5, 10, 15, and 40% v/v) was measured. The tannin−model saliva interactions were strongest at 5% ethanol and weakest at 40% ethanol. In the normal wine alcohol range, tannins in lower alcohol (10%) wines grip more tightly to salivary proteins than those in higher alcohol (15%) wines. In higher alcohol wines the alcohol can prevent the hydrophobic parts of the tannin from sticking to proteins, leaving only the hydrophilic parts to stick to the saliva. In low alcohol wines, both parts of the tannins can stick to proteins, enabling the tannins to bind more tightly for a more astringent taste. http://dx.doi.org/10.1021/acs.jafc.5b00758

Elemental profiling of Malbec wines

The red wine grape variety Malbec is the most extensively planted grape variety in Argentina, predominantly in the Mendoza region. Malbec demand in the United States is increasing and since the US produces so little Malbec and with imports likely to continue increasing rapidly, concerns relating to the validation of the geographical origin of this wine have arisen. Microwave Plasma-Atomic Emission Spectrometry (MP-AES) was used for elemental analysis of Malbec wines from Argentina and the US. Using just 6 elements (Sr, Rb, Ca, K, Na and Mg), Malbec wines from Mendoza and California were compared. The Malbec wines from the two countries were clearly separated based on their elemental profiles. MP-AES offers a number of advantages for the analysis compared to other atomic spectroscopy instruments. MP-AES uses a nitrogen-based plasma that can be generated from air, it is a safe and cost effective technique as flammable or expensive gases are not required for its operation. It also provides faster multi-elemental analysis results than flame atomic absorption spectroscopy (FAAS) or graphite furnace atomic absorption spectrometry (GFAAS). It was noted that a classification model with more than 6 elements would be required to distinguish between sub-regions. http://dx.doi.org/10.5344/ajev.2015.14120

Individual Differences in Marketing Placebo Effects

When consumers taste cheap wine and rate it highly because they believe it is expensive, is it because prejudice has blinded them to the actual taste, or has prejudice actually changed their brain function, causing them to experience the cheap wine in the same physical way as the expensive wine? Almost no research has examined individual differences in marketing placebo effects, but now a study has examined three moderators of the effect marketing-based expectancies have on the behavioural and neural measures of the consumption experience. Participants were told they would consume five wines ($90, $45, $35, $10, $5) while their brains were scanned using an MRI. In reality, subjects consumed only three different wines with two different prices. Participants showed significant effects of price and taste prejudices, both in how they rated the taste as well as in their measurable brain activity. The MRI readings related in part to specific areas of the brain that differ from person to person. These differences are also associated with known differences in personality traits. It was found that people who were strong reward-seekers or who were low in physical self-awareness were also more susceptible to having their experience shaped by prejudices about the product. Understanding the underlying mechanisms of marketing placebo effect provides marketers with powerful tools as marketing actions can change the very biological processes underlying a purchasing decision, making the effect very powerful. www.sciencedaily.com/releases/2015/04/150429104809.htm

Invasive weed's resistance to well-known herbicide comes from an increase in gene copies

Bromus diandrus (right) is a species of grass known by the common names great brome and ripgut brome. It is considered a significant and noxious weed in many areas. The weed killer glyphosate is the most widely used and versatile herbicide in the world and resistance to glyphosate has been found in recent years in two different populations of great brome. Researchers have now identified the mechanism behind the resistance. Both populations showed the same mechanism of resistance, namely gene amplification. In gene amplification, the resistant plant produces numbers of copies of the gene responsible for the enzyme EPSPS which is targeted by glyphosate. More enzyme production overcomes the herbicide action. The study notes that it is yet another way that plants are developing resistance to herbicides as until now there have been just three key mechanisms for resistance. Unfortunately it means that there will be even more cases of plants developing resistance to herbicides. It reinforces the need to not overuse glyphosate; to employ good practice of diverse weed management including crop rotations, fallow periods, interspersing with grazing cycles and other control mechanisms. http://dx.doi.org/10.1002/ps.4019