Winetech Scan

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Local Research News

A new species of leafminer on grapevine in the Western Cape

Since 2011 a grapevine leafminer has been observed in large numbers in table grape orchards and vineyards in the Paarl region of the Western Cape. It has now been confirmed to be a new species, closely related to *Holocacista salutans,* a leafminer widespread in southern Africa. The new leafminer is described as *Holocacista capensis*. It is a tiny moth with a wingspan of about 4 mm, with some silvery white spots on its wings. The eggs are inserted in the leaf, and the larva eats a tunnel inside the leaf, creating the so-called leafmine. The full-grown larva subsequently cuts out a shield from the leaf, leaving behind characteristic holes. The larva is able to move around in this shield and usually descends by a silken thread to attach itself to a trunk, trellis, leaf or even onto grapes. Although the effect of this new leafminer on the grape vine itself appears to be limited, collateral damage may be more serious, especially when larvae descend from the vine canopy to form a dense curtain of suspended larvae. http://dx.doi.org/10.3897/zookeys.507.9536

Generating a taxonomic database of fruit pests in the Western Cape

Insect pests and damage symptoms caused by pests are often not correctly identified. However, such correct identification is a critical aspect of Integrated Pest Management (IPM) in vine and other fruit production. Incorrect identification leads to incorrect treatment/management of a suspected pest problem. A project has built an active taxonomic database of pests occurring in deciduous wine grapes, fruit orchards and other fruit crops in the Western Cape. This database should lead to a better understanding and therefore better management of pest problems. 470 samples were submitted for identification and inclusion in the database, but only 171 were related to the fruit industries. The database is available upon request in CD format (MS Access database). As of January 2014, the pest identification service has been included in the Department of Plant Pathologies Disease Clinic at Stellenbosch University. www.sawislibrary.co.za/dbtextimages/Addisonp8.pdf

Determining reaction time of grapevine mealybug crawlers to systemically applied imidacloprid

Imidacloprid is currently the most widely used insecticide in the world. It is a systemic insecticide which acts as an insect neurotoxin and belongs to a class of chemicals which act on the central nervous system of insects and which chemicals have much lower toxicity to mammals. A research project investigated whether systemically applied imidacloprid either kills or stops grapevine mealybugs (*Planococcus ficus*) from feeding before they can transmit leafroll virus (GLRaV-3). Even under a stereo microscope it was not possible to determine whether a grapevine mealybug had stopped feeding, due to the positioning of the mealybug's mouthparts under the body and the insect's sensitivity to damage when manipulated under the microscope. Two bioassays were therefore conducted, and the results showed that systemically applied imidacloprid does not take effect rapidly enough to prevent grapevine mealybug nymphs from transmitting GLRaV-3. So virus-free grapevines treated with imidacloprid will not be protected from virus transmission if leafroll infected mealybugs should enter the vineyard. To maintain virus free grapevines in new plantings, leafroll-infected vines in nearby vineyards need to be removed as part of the leafroll control strategy. www.sawislibrary.co.za/dbtextimages/AllsoppE.pdf

International Research News

Flower debris removal delays grape bunch rot epidemic

Grape bunch rot caused by *Botrytis cinerea* is one of the major fungal diseases on grapevine worldwide. Field trials investigated the impact of removing flower debris, which usually remain partly attached to grape clusters after bloom, on the epidemic of grape bunch rot caused by *Botrytis cinerea.* The trials were conducted on the white cultivars Pinot gris and Riesling in the years 2011 to 2014. Grape clusters remained either untreated (control), flower debris was removed from the clusters (brush), clusters were treated with a botryticide (active ingredient fenhexamid) or clusters were brushed with a brush soaked in a botryticide suspension (botryticide-soaked brush) at growth stage BBCH 73, which is when the berries are the size of small seeds and bunches begin to hang. See https://en.wikipedia.org/wiki/BBCH-scale_(grape) for more on BBCH.

On average, bunch rot epidemics were significantly delayed compared to the untreated control by 3.7 (brush), 4.3 (botryticide) or 5.7 (botryticide-soaked brush) days, and no significant differences concerning the delay of the epidemic were observed between the three treatments. Consequently, flower debris removal might contribute to a reduction or partial replacement of pesticide use in viticulture and allow for a prolonged ripening period. However, efficient technical solutions to automatically remove flower debris need to be developed. http://dx.doi.org/10.5344/ajev.2015.15019

An evaluation of methods for measuring polyphenol concentration in white wine

Polyphenols are extremely important wine components. They impart bitterness by binding with different selectivities to a family of taste receptors. Polyphenols also react with oxygen to produce quinones and hydrogen peroxide, resulting in wine spoilage,

which is prevented by sulphite addition. Many assays have been developed to determine polyphenol concentrations in wine. A study has compared three methods: the Folin-Ciocalteu (F-C) assay; the Ferric ion Reducing Antioxidant Power (FRAP) assay; and a free radical scavenging power assay using the 2,2-diphenylpricryl-hydrazyl radical (DPPH•).

The study concluded that the FRAP assay with SO_2 removal, backed up by a UV357 spectrum, should be adequate for the rapid determination of the concentration of the most readily oxidized polyphenols in white wine. After SO_2 removal the three methods ranked wines similarly with respect to polyphenol concentration but, as is already well known, the F-C assay is much less selective. The FRAP reagent is more stable than DPPH• and gives clearer results with flavanols, as represented by (+)-catechin, at short reaction times. It is also conducted in water buffered at wine pH and so protected from alterations in acidity. The DPPH• assay is greatly affected by solvent impurities and changes in hydrogen ion concentration. It offers no advantage over the FRAP assay and overall is less robust. http://dx.doi.org/10.5344/ajev.2015.15025

The effects of cap and fermentation temperature on phenolic extraction in Cabernet Sauvignon

The cap is the solid mass of grape skins, stems, and pips that floats to the top of the fermenting vessel during fermentation. The effects of fermentation temperature on the extraction of phenolics during the fermentation of red wines have been well researched and documented, with extraction generally being shown to increase with increased temperatures. A fundamental gap in this knowledge has been how the temperature gradient that naturally develops between the cap and the must affects the extraction of the phenolics.

Fermentations were performed in which the cap and must were either maintained at the same temperature or a constant thermal gradient was maintained between the two during the period of active fermentation. These experiments showed that cap and must temperature have noticeable effects on phenolic extraction depending on where the phenolics originate. For skin phenolics, temperature affected primarily the rate of extraction but not the final concentration, with increasing temperatures favouring faster extraction. For seed phenolics increases in fermentation temperature increased both the rate of extraction and also the final concentration. Must temperature, rather than cap temperature, appeared to be more important in driving extraction. http://dx.doi.org/10.5344/ajev.2015.14129

Grapevine anatomy as a possible determinant of water stress reaction

Plants vary in their stomatal sensitivity in response to water stress. Some plants, termed isohydric, keep their water potential constant by rapid stomatal closure. In contrast, anisohydric plants close their stomata only when the plant water potential decreases dramatically. The distinctions between isohydric and anisohydric strategies among different cultivars of the same species are often unclear. A study compared these strategies using two wine grape cultivars, Grenache, which is known to be near-isohydric, and the anisohydric cultivar Shiraz.

The plants were exposed to a prolonged period of water deficit, and their physiological responses were recorded. When water potential was measured in the stem tissue of the two cultivars at mid-day, and in leaf tissue at pre-dawn, a consistently lower value of stomatal conductance was found in the Grenache plants. The Shiraz plants exhibited a more vigorous response to water deficit, demonstrating vegetative growth and lower defoliation compared to the Grenache plants. An analysis of the anatomical architecture of the two cultivars revealed that Grenache plants have a larger xylem vessel diameter, higher hydraulic conductivity and a higher density of stomata than the Shiraz plants. The results suggest that isohydric and anisohydric strategies may not be a result of distinct mechanisms, but rather of a well-defined time-regulated response. Plants defined as isohydric may be in greater danger of developing a possibly fatal xylem embolism (the formation of bubbles or voids), compared to anisohydric plants, and therefore their response to water deficit must be rapid. This accelerated response results in avoiding the drought stress, but lowers the plant's ability to survive the moderate stress of prolonged drought. However, this is their only option to minimize the risk of xylem embolism. http://dx.doi.org/10.5344/ajev.2015.14090

Other News

A new approach to detecting Phylloxera

The Phylloxera and Grape Industry Board of Southern Australia and research partners are making great strides in developing sampling strategies for sensitive, accurate and cost-effective detection of Phylloxera that can be used in any vineyard. Up to now the technology used for identifying Phylloxera has been essentially a shovel and a magnifying glass approach, based largely on sites of low vigour. A quantitative DNA-based assay for the specific detection of Phylloxera was developed some years ago, however, work to determine its applicability for Phylloxera management was not explored further at that time.

The current four-year project was set up in early 2013 to leverage this earlier work and to develop a vineyard sampling protocol to collect soil samples that could be analysed through the DNA assay. In its third year, over 500 soil samples have been collected using a simple corer from trial sites in Australia and the samples are being analysed. In 2016, the last year of the project, the focus will be on ensuring adoption by the sector. The potential is enormous, not just to find where Phylloxera is, but to keep checking that areas declared Phylloxera-free remain so. It is envisaged that eventually vineyard operators will be equipped not just to take soil samples, but to do the testing themselves. http://research.agwa.net.au/a-new-approach-to-detecting-phylloxera/