



Local Research News

The impact of wastewater irrigation by wineries on soils, crop growth and product quality

Wineries produce large volumes of low quality wastewater, particularly during the harvest period. Using this wastewater in a sustainable way for the beneficial irrigation of agricultural crops such as vineyards is not a straightforward matter. Started in 2008, a six year-long project was a multidisciplinary study which evaluated the management and impact of the quality of augmented winery wastewater on soils, vineyard performance and wine quality. The detailed project report makes a number of observations and recommendations regarding the quality parameters of the waste water, its effect on grape quality, the method and frequency of irrigation, and the use of interception crops. Right: sedimentation pond used to remove substances such as tartaric acid from winery wastewater. www.sawislibrary.co.za/dbtextimages/MyburghPA9.pdf



Ring nematodes and soil factors

Plant parasitic nematodes are microscopic, unsegmented roundworms that feed on plant roots by puncturing and sucking the cell contents with a needlelike mouthpart called a stylet and are thus undesirable in vineyards and orchards. They live in soil and within or on plant tissues. A project investigated whether soil factors such as soil texture and pH have any effect on ring nematode (*Criconemoides xenoplax*) (RN); whether the vertical distribution of RN in soil for different crops varied; and whether RN populations exhibit seasonal fluctuations.

It was found, by sampling all the major fruit and vine areas of the Western Cape and the Lower Orange River, that five different soil fractions, namely coarse sand, medium sand, fine sand, loam, and clay had no effect on RN numbers and that high RN numbers occurred in all five types of soil. Soil pH with values ranging between 4.5 – 7.0 had no effect on RN numbers. Although almost 50% of the RN population present in a plant's root zone occurs in the top 40cm of soil, damaging high levels can occur to at least 1 m deep, posing a serious problem for effective nematode control. These high nematode numbers below the zone that can be effectively fumigated provide a source for re-infecting replanted vineyards and orchards. No seasonal fluctuations were noted, and thus soil samples for RN diagnostic analysis can be taken at any time of the year. www.sawislibrary.co.za/dbtextimages/HugoHJ1.pdf

International Research News

Oak barrels or oak chips?

A study examined the knowledge and attitudes of 1015 Australian wine consumers toward the use of oak in winemaking. The 847 consumers who indicated a liking of oak-aged wines were segmented into four groups according to their knowledge of the role of oak and the use of oak alternatives (such as oak chips) in wine production.

The largest group (n=461) indicated they 'don't care how it's made as long as it tastes good', and did not have strong opinions concerning oak quality or the use of oak alternatives. A second group (n=133) did not have an opinion regarding the use of oak alternatives, but they did agree that oak has an impact on the taste and quality of wine. The third group (n=141) had no opinion that oak influences the taste or quality of wine, but they did have a moderately strong negative opinion regarding the use of oak alternatives. The last group (n = 112) considered themselves more knowledgeable about wine than the other groups. They had strong opinions regarding the impact of oak on wine quality and strong negative views on the use of oak alternatives for wine maturation. Winemakers can therefore justify the use of oak alternatives to achieve oak-aged wines at lower price points, and can better tailor their wines to the specific needs and expectations of consumers within different segments of the market. <http://dx.doi.org/10.2147/IJWR.S70458>

Effect of training systems on fatty acids and their derived volatiles

Fatty acid-derived volatile compounds mainly comprise C₆ and C₉ aldehydes, alcohols and esters. The C₆ compounds are normally the most abundant volatiles in grape berries, which are classified as 'Green Leaf Volatiles' (GLVs) due to their characteristic 'green' and fresh odour. A study in the northwest of China has evaluated the influence of different training systems including Modified Vertical Shoot Positioned, (M-VSP); Fan training system with two trunks (F-TT); Fan training system with multiple trunks (F-MT) on these volatiles and the long-chain fatty acids (>C₁₂) of Cabernet Sauvignon grape berries and wines. The expression profiles of genes from the associated metabolic pathway were also analysed.

F-MT training resulted in lower vine vigour, higher yield, higher content of unsaturated fatty acids in grapes and lower C₆ esters in wines in comparison with M-VSP and F-TT. M-VSP and F-TT enhanced C₆ volatiles and reduced C₉ compounds in grape berries. M-VSP and F-TT vines produced superior grapes and wines considering fatty acid derived volatiles. The

concentrations of C₆ volatiles were positively correlated with the expression of the genes VVLOXA and VvHPL1. <http://dx.doi.org/10.1016/j.foodchem.2015.02.082>

Nanotechnology protects vines

Symptoms of the fungal disease Esca, or vine decline, include reduced yields, stunted growth and even the sudden death of vines. Esca is prevalent throughout the world and poses a significant threat to the wine industry with some countries having lost 40% of their grape harvest to the fungus. No fungicide treatment is available as the previously used; sodium arsenite is now banned for health reasons in Europe. Pruning makes vines particularly vulnerable. The cuts are an easy entrance for fungi and can be sealed with wax or tar, but this hinders healing and can contaminate the soil. The Esca causing fungi are 20 to 50 microns (µm) in size.

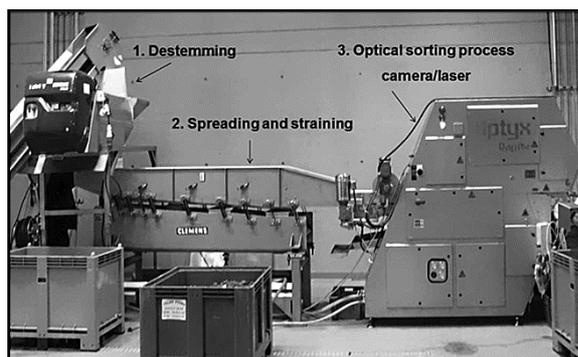
So a team has developed a nanofibre patch which has a pore size of about 3–5µm, so the fungi are blocked by the patch. The nanofibres are made from a half-and-half blend of a biodegradable synthetic polymer and soy protein, an abundant waste product. A non-toxic adhesive is either included in the blend, or applied afterwards, and the nanofibres are supported by an outer pad of porous rayon fibre. Biodegradation of the patch occurs over several months which is long enough for healing of the wound to take place beneath the breathable membrane. Adhesion of the patch is not affected by rain, extreme temperatures, uneven wood and high winds. The patches are being tested for their effectiveness against Esca under field conditions. <http://dx.doi.org/10.1039/C4TB01887G>

Bunch compactness assessment using image analysis

Bunch compactness is a key feature determining grape and wine composition because tight bunches do not ripen evenly and are prone to a greater incidence of fungal disease. Up to now, assessment of bunch compactness has required visual inspection by trained evaluators, and the results are, to some extent, subjective. Ninety bunches of nine different red cultivars were photographed with a colour camera from 4 sides, and their bunch compactness was also determined by visual inspection. A predictive partial least squares (PLS) model was developed in order to estimate bunch compactness from the morphological features extracted by automated image analysis. The model showed a capability of 85.3% for correctly predicting the rating of bunch compactness. The most discriminant variables of the model were highly correlated with the tightness of the berries in the bunch (proportion of visibility of berries, rachis (stems) and holes) and with the shape of the bunch (roundness, compactness shape factor and aspect ratio). This new method could be applied to the classification of table grapes, and at wineries for the assessment and sorting of wine grapes on arrival. <http://dx.doi.org/10.1111/ajgw.12118>

Automated optical sorting of rotten grapes

An automated optical grape sorter (Optyx 3375) with an integrated high-speed camera system (up to 4000 pictures per second) and an infrared laser (765 nm) was used for the detection and sorting of damaged berries and particles to ensure and improve the wine quality. Prior to sorting, the machine was trained with healthy and rotten berries. A computer compared the data from the camera and the laser detection with the given data and sorted the grapes by blowing out 'bad' (e.g. rotten) berries by air pressure in flight. Each sorting trial was performed with the optimal calibration depending on the grape variety and type of rot. With white grape varieties, especially 'Riesling', selection success rates at an average of 98% were possible. In contrast, with red grape varieties selection success rates at an average of only 72% were achieved. The performance of the optical grape sorter allowed the sorting of a large amount of grapes, that is, from a whole vineyard. <http://dx.doi.org/10.1080/09571264.2014.993950>



Other News

Can trees near vineyards influence wine flavour?

Previous work at the AWRI (Australian Wine Research Institute) has shown that eucalyptol from eucalyptus trees can be transferred through the air and absorbed onto grape skins or leaves, thus influencing wine flavour. Now a new study is being undertaken in vineyards near conifer (pine) plantings, to see if volatile compounds from the trees can be detected both in the air and on grape leaves or berries. The idea of distinctive regional flavour characters stemming partly from indigenous flora is a fascinating topic to consider. www.awri.com.au/information_services/enews/2015/03/12/march-2015/#title2

2015 ASEV Best Paper Awards

Each year, the American Society for Enology and Viticulture (ASEV) selects from its journal (AJEV) one paper in the field of enology and one in the field of viticulture that is deemed outstanding in its content and a substantial contribution to the field. The papers for 2015 are 'Persistence of Elemental Sulfur Spray Residue on Grapes during Ripening and Vinification' by Kwasniewski et al, and 'In-Line Measurement of Color and Total Phenolics during Red Wine Fermentations Using a Light-Emitting Diode Sensor' by Shrake et al. Summaries of the papers appeared in *Winetech Scan* in August and October 2014.

Winetech Scan is available on the Winetech website www.winetech.co.za

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