Winetech Scan
Wine Industry Network of Expertise and Technology • Netwerk van Kundigheid en Tegnologie vir die Wynbedryf

New project 2017: Effect of HWT on fungal pathogens in vine nurseries

Researcher: Francois Halleen

The aim of the study will be to determine the effect of Hot Water Treatment (50°C for 45 min) on the occurrence of fungal pathogens associated with grapevine propagation material and nursery vines.

Grapevine pathogens, negatively affect nursery vines at various stages during the propagation process. Some species, infect nursery vines through infected nursery soils. Other species can already be in the propagation material as latent pathogens as a result of various factors. These infections can cause damage in the nursery since it adversely affects callusing and rooting, or it can cause problems at a later stage once planted in vineyards.

The objectives of this study will be to determine the effect of HWT (50°C for 45 min) on the:

- survival of fungal pathogens (*in vitro*);
- eradication of fungal pathogens inside propagation material;
- eradication of fungal pathogens inside dormant grafted vines.

The knowledge gained from this study can provide local grapevine nurseries, grape growers and the Plant Improvement Scheme with scientifically based proof of the efficacy of Hot water treatment (50°C for 45 min) towards the eradication of harmful fungal pathogens.

New project 2017: Is the poor detection of leafroll in SA rootstocks due to host resistance?

Researcher: Gerhard Pietersen

Grapevine leafroll associated virus 3 (GLRaV-3) does not produce symptoms and is generally considered to be poorly detected by ELISA and PCR in Vitis rootstocks.

In order to successfully control this virus in rootstocks within the Wine Grape Certification Scheme it is extremely important to ensure that rootstock material supplied to industry is free of this virus. It is therefore imperative to determine whether the poor detection of the virus in rootstocks is due to low levels of virus (tolerant host defence response), and in which rootstock cultivars this is found. It is also important to determine whether, in some instances, the virus is absent due to immunity by the host. Proving immunity to GLRaV-3 would allow these rootstocks to be used in industry without any need to test that they are GLRaV-3 free.

The objective of this project is to determine whether difficulties in detection of grapevine leafroll associated virus 3 (GLRaV-3) are due to tolerance or immunity of rootstock clones to this virus. This knowledge will allow the certification scheme to provide science-based recommendations regarding the testing of rootstock material for this important virus.

Final report: Interaction between wine yeast and MLF bacteria and the impact on wine aroma and flavour

Researchers: Maret du Toit, Florian Bauer and Debra Rossouw

Project aim: 1 - To study the impact of different combinations of inoculated yeast and MLF bacteria, as well as different inoculation regimes on the aroma profile of wine. 2 - To study the effect of different nitrogen sources on MLF and final wine aroma.

Project layout: Two different yeast strains were used in various combinations with selected *Oenococcus oeni* and *Lactobacillus plantarum* MLF starter cultures in co-inoculation and sequential inoculation. Inoculation regimes were also compared using different sources of nitrogen for the yeast and bacteria.

Results:

- Co-inoculation of bacteria and yeast in both synthetic and real must had no negative impacts on yeast performance.
- Co-inoculation MLF was quicker to finish than sequential inoculation.
- A combination of *L. plantarum* and *O. oeni* is successful in completing MLF, with no antagonistic interaction between the two bacterial species.
- *L. plantarum* is more successful as co-inoculated starter culture than as a sequential starter culture due to lower alcohol tolerance.
- Co-inoculated wines had higher ester content than sequential inoculated wines (synthetic and real).
- Both amino acid and ammonium additions resulted in higher ester formation.

Significance of the study: the study confirms the various advantageous and safety of co-inoculation of yeast and bacteria as well as the positive effects of yeast/bacterial nutrition on wine aroma.

Final report

Final report: Balancing the major products of fermentative metabolism to reduce ethanol and volatile acidity production

Researchers: Florian Bauer and Debra Rossouw

Project aim: 1 – evaluate ethanol production by commonly used commercial yeast strains under various winemaking conditions. 2 – genetic engineering of *S. cerevisiae* to produce lower alcohol wines without elevated volatile acidity. 3. Explore non-*Saccharomyces* yeasts for lower alcohol production

Project layout:

1 – 15 different *S. cerevisiae* commercial strains were evaluated under different pH, temperature and nitrogen conditions in synthetic must. Four strains were compared in real must.

2 –TPS1 gene responsible for trehalose production was overexpressed in VIN 13.

3 – 91 Non-Sacch yeasts were evaluated in synthetic must, 21 with lower alcohol were evaluated in co-inoculation with *S. cerevisiae*. 4 were evaluated in real must.

Results:

- No significant differences in ethanol production were obtained among commercial strains.
- Strains showed contradictory results in chemical parameter changes. There were no apparent conserved trends between treatments or strains.
- The GM VIN 13 strain successfully produced more trehalose and less ethanol with no negative off-flavour production.
- Two strains produced up to 0.8% less alcohol in Pinotage must and up to 1.3% less alcohol in S. blanc must.

Significance of the study: Co-inoculation of selected non-Sacch and *S. cerevisiae* strains can provide a solution to producing lower alcohol wines. A low alcohol GM yeast producing no off-flavours also exists for when/if the technology will be accepted in winemaking.

Final report

Latest South African research

Effect of irrigation with diluted winery wastewater on phosphorous in soils

Researchers: A.R. Mulidzi, C.E. Clark and P.A. Myburgh

The wine industry needs solutions for wastewater treatment, as environmental legislation for its disposal is increasingly being enforced due to non-compliance. The feasibility of re-using diluted winery wastewater was assessed in a pot experiment under a rain shelter over four simulated irrigation seasons. Four soils varying in parent material and clay content were irrigated with wastewater diluted to 3 000 mg/L COD (chemical oxygen demand), whereas the control received municipal water. Soils included in the trail were aeolic sand from Lutzville, alluvial sand from Rawsonville, granite-derived soil from Stellenbosch and shale-derived soil from Stellenbosch.

Irrigation with diluted winery wastewater increased the $pH_{(KCl)}$ in the shale- and granite-derived soils into the optimum range for P availability. Although pH in the aeolic sand was initially above the optimum range, relatively high Na^+ levels also caused available P to increase as the $pH_{(KCl)}$ increased. The $pH_{(KCl)}$ in the alluvial sand increased beyond the optimum range, thereby causing a reduction in the available P. This indicates that irrigation with diluted winery wastewater may only enhance P absorption if the pH shift is towards the optimum. It must be noted that the results represent a worst-case scenario, *i.e.* in the absence of rainfall or crops. Read more

Effect of the addition of glutathione or glutathione enriched dry yeast preparations to S. blanc must

Researchers: M. Gabrielli, J.L. Aleixandre-Tudo, P.A. Kilmartin, N. Sieczkowski and W. du Toit

Researchers investigated the effects of the addition of pure glutathione (GSH) and/or an inactivated dry yeast preparation (DYP) enriched with glutathione on the aromatic expression of Sauvignon blanc wine. Four different treatments were compared with a control that received no glutathione or DYP. They were:

- 5.5 mg/l GSH
- 40 g/hl DYP
- 80 mg/l GSH
- 40 g/hl DYP + 80 mg/l GSH

Three months after bottling the wines were chemically and sensorially (descriptive analysis) analysed. The addition of the pure GSH only attributed to small changes in the chemical and aromatic profile of the wines compared to the control. The most noticeable change in wine aroma was from the addition of DYP during fermentation, with the latter wines displaying riper tropical fruit aromas. The DYP only release small amounts of GSH during fermentation and the release of compounds other than GSH is therefore proposed responsible for the changes observed.

Winemakers are encouraged to experiment with these types of products on their white wines as it can possibly extend the shelf life of their wines.

Read more