



## New project 2017: Pilot-scale treatment of winery wastewater

*Researcher: G.O. Sigge*

Several biological winery wastewater treatment methods have been proposed, including chemical, physico-chemical, aerobic and anaerobic methods. Anaerobic digestion (AD) has been shown to be a viable option for many food and beverage processing wastewaters, including winery wastewater. A few AD processes have been successfully applied in the wine industry, but very little literature is available on the anaerobic sequencing batch reactor technology, even though it has the potential to suit winery wastewater's seasonal production. This technology was investigated in a recent Winetech project. The use of the novel AnSBR to treat a synthetic winery wastewater substrate over a range of 1 000 – 7 000 mg/l was found to be feasible. It was recommended that the AnSBR process be up-scaled into a pilot scale set-up to optimise the operational parameters before up scaling the process to an industrial scale. This should be done to determine the feasibility, optimum operational parameters and the cost of the process on a larger scale.

Therefore, the objective of this study is to investigate the on-site AnSBR treatment of winery wastewater at pilot-scale, using actual winery wastewater. Optimisation and validation should be done by making use of a similar central composite design as used in the laboratory-scale study.

## New project 2017: Small winery treatment of winery wastewater

*Researcher: PJ Welz*

Most small wineries in the Western Cape dispose of cellar effluent by means of irrigation to pasture. This poses a potential environmental threat because the effluent can negatively affect soil structure and can enter the already degraded aquatic environment via groundwater and surface run-off. The wastewater should therefore be treated before disposal. Sophisticated wastewater treatment systems require skilled labour and significant finances. There is a need to find simple, cost effective wastewater treatment systems for use in small wineries in South Africa. Research conducted over the past seven years has identified that biological sand filters (BSF) are promising candidates.

A pilot system has been in operation at a small winery in Stellenbosch for over one year and has achieved excellent results in terms of COD removal, pH neutralisation and SAR reduction via calcite dissolution. The aim of this study is to:

- Establish the long-term effectiveness of the systems;
- Ascertain whether the use of a rudimentary upstream anaerobic digester would increase the efficiency of the system;
- Determine at what stage (if ever) the sand would need to be changed.

## New project 2017: Investigating the spread of natural vitiviruses

Researcher: G Pietersen

During surveys of South African wine grape vineyards, various members of the vitivirus group were detected. The vitiviruses detected were very commonly observed in mixed infections with grapevine leafroll associated virus. In instances where the vitivirus vectors are known, they share the same general vector group (mealybugs and soft scale species) as the ampeloviruses (including leafroll). For a number of years, it was believed that vitivirus spread is co-dependant on leafroll. This means that vitiviruses require leafroll for co-transmission by their common mealybug vector. The implication of a co-dependence of vitiviruses on leafroll would be that if mealybug numbers and dispersal was managed and leafroll infected plants are rogued, that vitiviruses would similarly be controlled. Recently however, evidence has been obtained of the leafroll independent transmission of vitiviruses. This implies that vitiviruses could be transmitted to grapevines without the presence of leafroll. The aim of this study is to determine whether:

- Vitivirus natural spread occurs independently of, and at different spatial rates than leafroll;
- Mild virus-like symptoms observed in leafroll eradicated vineyards are due to vitiviruses;
- It is necessary, within the South African certification scheme to further test for vitiviruses in mother-blocks where leafroll is eliminated.

## New project 2017: Effect of Hot Water Treatment on root-knot nematodes in rooted grapevine nursery stock

Researchers: Rolene Carstens / Dr N. Stokwe

Root-knot nematodes (*Meloidogyne javanica*) feed on roots of grapevines, thereby restricting their ability to absorb water and nutrients, resulting in low vigour and much reduced yield. Although vine nurseries use soil fumigation and chemical control throughout the year, nematodes are not necessarily entirely eradicated from the soil. Currently, the Plant Improvement Scheme requires plant material to be visually free of root-knot nematode infestation. The Standard Operating Procedure for Grapevines states that hot water treatment for eradication of root-knot nematodes in rooted grapevine material has not yet been approved. Currently, nursery vines receive hot water treatment (HWT) of 50°C for 45 min to control various pathogens, crown gall and the phytoplasma disease, aster yellows.

The objective of this study is to test whether HWT at 50°C for 45 min effectively eliminates root-knot nematodes and eggs from rooted nursery material. Knowledge generated through this project will:

- Enable the Vine Improvement Association to update and revise regulations and standard industry procedures pertaining to the provision of root-knot free planting material to growers;
- Save costs for nematode control in established vineyards and prolong the productive lifespan of vineyards if root-knot nematode free planting material is supplied;
- Simplify and streamline nursery procedures if a single HWT at 50°C for 45 min can be implemented to eradicate all pests and pathogens in grapevine nursery stock.

# Latest international research

## Grape seed extract: the first protein based fining agent endogenous to grapes

*Researchers: D. Gazzola, S. Vincenzi, M. Marangon, G. Pasini and A. Curioni*

Italian and English researchers investigated grape seed extract as a potential fining agent in wine. The experiment was done on a very small scale (500 ml) but interesting results were found that could pave the way for further investigation. Since 2012 EU legislation requires that all wines containing allergenic fining agents above 0.25 mg/l in the finished wine must be labelled as containing allergens. As a result winemakers using fining agents such as egg white and casein must have their wines tested for allergenic residues. The alternative is to use plant proteins such as pea and potato protein for wine fining. These proteins, although legally permitted, are still foreign to wine and subjected to legal restrictions. Using proteins from yeast or grapes itself, sidesteps the “foreign” concept and various studies have focused on using yeasts or their derivatives as processing aids.

In this study grape seed extract (GSE) containing protein, polysaccharides and phenolic compounds was compared with PVPP, casein, pea protein, potato protein, gelatine, egg white and casein. The GSE was effective in decreasing only white wine turbidity but improved the sensory properties of the rosé and the red wine by reducing astringency. Since GSE only contain about 25% protein it will be interesting to see in future research how a purified GSE protein fraction will compare to traditional fining agents. [Read more](#)

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## Aroma precursors in grapes and wine: Flavour release during wine production and consumption

*Researchers: Mango Parker, Dimitra L. Capone, I. Leigh Francis and Markus J. Herderich*

This review article describes:

- The structural diversity of aroma precursors in grapes and wine;
- Aroma precursors from oak;
- Precursors from off-flavours and taints;
- Enzymatic and non-enzymatic release of wine volatiles.

The review shifts the focus from identifying aroma precursors in grapes to understanding aroma precursors present in bottled wine.

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