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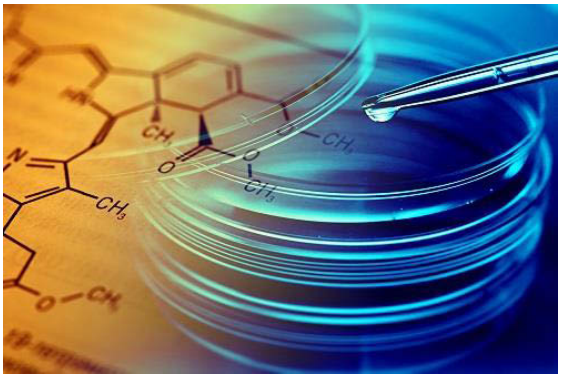
New Projects

The impact of nutrients on aroma production by *S. cerevisiae*, non-*Saccharomyces* yeasts and lactic acid bacteria in mixed fermentations

Researchers: Drs D Rossouw, H Musarurwa, N Jolly, B Divol and Prof F Bauer

If optimal fermentation supplements are to be formulated, a deeper knowledge is required regarding the impact of specific nutrients (i.e. amino acids) on the aroma compounds produced by *S. cerevisiae*, non-*Saccharomyces* yeasts and LAB. In light of the growing trend towards inoculation of mixed species starter cultures the impact of nutrients on microbial interactions and aroma outcomes in co-inoculated (*S. cerevisiae*, non-*Saccharomyces* and LAB) fermentations also need to be evaluated comprehensively. The present application proposes to investigate aromatic outcomes in complex environments and in particular to multispecies and mixed fermentations supplemented with different nutrients. Such an approach will yield data that are of direct relevance to practical wine making, and will lead to the development of better microbiological tools, an aroma prediction model and practical strategies to achieve desired outcomes.



Exploring and exploiting the unique South African vineyard microbial diversity for sustainable oenology

Researchers: Drs E. Setati, B Divol and Prof F Bauer

It is generally accepted that wine character frequently reflects a geographical origin, an idea which is encapsulated in the concept of *terroir*. *Terroir* is thought to broadly reflect the interaction of *Vitis vinifera* plants with the local soils, geography, farming practices and climate. The contribution of the microbial communities to this concept has largely been ignored, although it is well known that wine fermentations, whether spontaneous or inoculated, are indeed characterized by multispecies participation, with the early stages of the spontaneous fermentation mainly driven by a complex community of non-

Saccharomyces yeasts. This diversity remains poorly characterised and explored, but clearly represents an unused and potentially critical tool to achieve unique or specific wine styles. In order to strategically exploit this diversity a more comprehensive characterization of vineyard and cellar-associated microbiota is required. Essential areas to consider include the fermentation and aroma potential of these communities, as well as of ways to control population dynamics throughout fermentation. Therefore, the current project seeks to (i) perform an in-depth inventory of South African vineyard microbiota (ii) develop methods to rapidly assess the microbial community present in individual grape juices after pressing; (iii) screen yeast isolates and consortia for properties of oenological interest; (iv) evaluate the influence of winemaking practices on microbial population changes during fermentation.

Latest publications

Manipulation of ripening via antitranspirants in Barbera

Researchers: M. Gatti *et al*. (2016) Image: www.lodiwine.com

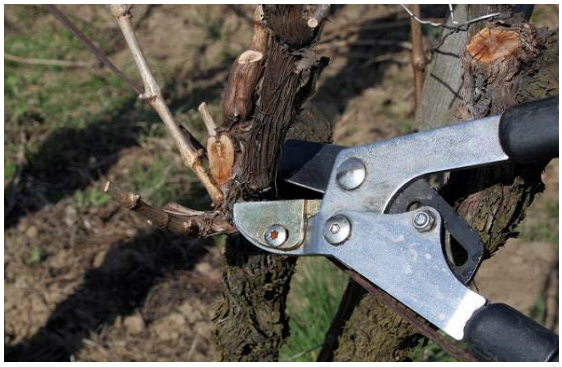
An antitranspirant emulsion was applied in 2013 and in 2014 on field-grown Barbera vines at pre-flowering (PF), pre-veraison (PV) and at both dates (PFPV), and compared with the unsprayed control. Post-treatment assessment included seasonal gas exchange, yield components, growth of berry organs and must composition. Although all treatments were effective in reducing gas exchange by as much as 46% compared with that of the control, berry growth was not affected. Conversely, whereas PF slightly modified the ripening pattern, PV and PFPV markedly delayed accumulation of sugar in the warm 2013 season (−2.4 and −3.7° Brix, respectively, vs control) without detriment to colour development because the onset of anthocyanins occurred at lower TSS. In the cooler, wet 2014 season, PV and PFPV were again able to delay sugar accumulation without affecting colour development. Read more

Impact of leaf removal, applied before and after flowering on anthocyanin, tannin and methoxypyrazine concentrations in Merlot grapes and wines

Researchers: P. Sivilotti *et al.* (2016) Image: www.vinepair.com

The development and accumulation of secondary metabolites in grapes determine wine colour, taste, and aroma. This study aimed to investigate the effect of leaf removal before flowering, a practice recently introduced to reduce cluster compactness and *Botrytis* rot, on anthocyanin, tannin, and methoxypyrazine concentrations in 'Merlot'

grapes and wines. Leaf removal before flowering was compared with leaf removal after flowering and an untreated control. No effects on tannin and anthocyanin concentrations in grapes were observed. Both treatments reduced levels of 3-isobutyl-2-methoxypyrazine (IBMP) in the grapes and the derived wines, although the after-flowering treatment did so to a greater degree in the fruit specifically. Leaf removal before flowering can be used to reduce cluster compactness, *Botrytis* rot, and grape and wine IBMP concentration and to improve wine color intensity but at the expense of cluster weight and vine yield. Leaf removal after flowering accomplishes essentially the same results without loss of yield. Read more



Optimisation of time of application of *Trichoderma* biocontrol agents for protection of grapevine pruning wounds

Researchers: C. Mutawila, F. Halleen and L. Mostert (2016)

In this Winetech funded study cultivars Chenin blanc and Cabernet Sauvignon were pruned early and late in the winter season, respectively, corresponding to the break from the winter dormancy period and the normal pruning time for these cultivars. After pruning, the wounds were treated immediately, 6, 24, 48 or 96 h after pruning with either *T. atroviride* or *T. harzianum*. Colonisation of grapevine pruning wounds by the *Trichoderma* spp. was dependent on the physiological state of the vines as well as the weather conditions at pruning. In dormant vines, colonisation remained high from immediate application up to 48 h after pruning. In vines at break of dormancy, colonisation was highest at 6 and 24 h after application. Natural wound infection was higher in wounds pruned in late winter compared with that in early winter. Read more

A condenser to recover organic volatile compounds during vinification

Researchers: L. Guerrini *et al.* (2016)

The escape of carbon dioxide during grape must fermentation leads to the loss of volatile compounds, which ultimately affects the wine's aroma. An innovative condensation device was designed to trap organic volatile compounds that would otherwise be lost. Trials were performed using Sangiovese and Shiraz grapes and involved continuous condensation of vapour (condensed fractions, CFs) that escaped from fermentation tanks. Ethanol content and volatile compound composition of CFs were measured daily since 48 hr after the fermentation began. Predominent compounds measured were alcohols and esters and the CF profile also changed over time. When the CF's were added back to the wines for sensory evaluation, panelists correctly ordered the wines in terms of aroma intensity. Read more

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