Winetech Scan
Wine Industry Network of Expertise and Technology
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Reviews

- ***Botrytis cinerea***, which is the cause of botrytis bunch rot, is an important disease of grapevines worldwide, with canopy management and the heavy dependance on the prophylactic use of synthetic fungicides being the most common control methods. Fungicide resistance, and market and regulatory pressures regarding residues and concerns of environmental and human health are increasing, so new management techniques will need to be adopted. All the alternative products and techniques discussed in this review have a role to play, with the exception of essential oils because of taint issues, and plant hormones which are too sensitive for commercial application in their current state. Biofungicides have been shown to be compatible with other products, to be stable on the shelf and in the field, and to operate through a variety of mechanisms. However, a limited range of these products is available because of the excessive cost of commercialisation, production challenges and regulatory issues. Mineral oils have been shown to be effective by themselves, and can be complemented by other products and have excellent sticking properties. They do, however, have the potential to disturb plant function, affect grape quality and potentially leave residues, and so need to be used in moderation. Plant defence stimulants have been shown to be very effective at suppressing *B. cinerea* and other plant pathogens, both by themselves and in conjunction with other products, including essential oils, BCAs (biological control agents) and synthetic fungicides. These products can cause subtle changes in vine physiology and can alter grape juice components, such as resveratrol levels, which need to be managed by the viticulturalist. The use of mulches and cover crops can effectively suppresses *B. cinerea* through induced vine disease resistance, canopy density reductions and biological control. They are compatible with all other techniques that do not disturb soil biology, but may be unsuitable in areas where voles and other rodents cause vine damage, or where vines are at high risk of frost damage. Techniques such as pruning, leaf clipping and leaf plucking, are well established and are effective at reducing *B. cinerea* infection. Extensive tables on synthetic fungicides, biofungicides, essential oils and plant extracts effective against *B. cinerea* are included. http://dx.doi.org/10.1111/j.1755-0238.2009.0067.x

- In a paper which is an extract from *'Technical Notes of Code of Best Practice for Organic Winemaking, produced under the EU FP6 project ORWINE'*, the management of sulphur dioxide in low input winemaking is briefly reviewed. Sulphites are nowadays considered as fundamental additives in various stages of wine production for their antimicrobial, antioxidant and anti-oxidasic activity. There are alternative practices and additives which can be used in reducing the use of sulphites in wine-making, but the complete elimination of sulphites is, at the moment, still not possible. Based on EC Regulation 1991/2004, sulphites must be declared on the label if their overall content in wine is higher than 10 mg/L. This represents a challenge to wine producers and is an important issue, particularly for the 'organic sector'. Some questions related to the use of sulphites in oenology are still undecided. One is: 'By how much is it possible to reduce sulphur dioxide (SO_2) levels without risking taste and quality degradation, or increasing microbial contamination or oxidation during vinification or storage?' Some of the methods for reducing SO_2 levels follow. If no SO_2 is to be used before alcoholic fermentation, a very early inoculation of the selected starter culture is strongly recommended, as is the control of yeast assimilable nitrogen. The recently introduced practice of yeast–lactic bacteria co-inoculation permits an effective and simultaneous management of both alcoholic and malolactic fermentation. An alternative to sulphites is lysozyme (a family of enzymes which damage bacterial cell walls - 500 mg/L of this egg derived protein having the same effect on lactic bacteria as 40 mg/L of SO_2). However, the use of lysozyme should be carefully considered as its protein nature may cause an interaction with phenolic compounds with the consequent loss in colour of red wines. It may cause protein instability in white wines, and it can be an allergen in white wines. Hyper-oxygenation, a massive addition of oxygen or air with the purpose of completely oxidising all the unstable substances, is another alternative, as is hyper-reduction with ascorbic acid or other antioxidants to protect the must from oxidative reactions. Conservation under inert gases such as nitrogen or argon can be useful in the management of the wine level inside steel tanks. These gases (as opposed to others such as carbon dioxide) show a low solubility in the wine itself and are able to significantly reduce the concentration of oxygen in the headspace, minimising the risk of oxidation. www.infowine.com/default.asp?scheda=8799

- Monitoring microbes effectively and efficiently during the winemaking process requires coordinating several different techniques. These techniques and the microbes likely to be encountered are the subjects of two excellent reviews; 'Monitoring microbes during fermentation' www.practicalwinery.com/sepoct09/microbes1.htm and 'Monitoring microbes during cellaring / bottling'. www.practicalwinery.com/JanFeb10/microbes1.htm

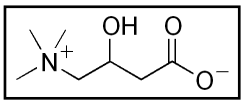
Research News

- Virtually all commercial yeast strains used for winemaking in India are imported. In view of this, a study was undertaken to evaluate the bioefficacy of local (Indian) wine yeasts during the initial fermentation of Cabernet Sauvignon wines. The must was inoculated with three imported commercial (KIV 1116, EC 1118 and Premier Cuvee) and three local (RS1, RS2 and RS3) yeast strains. The physicochemical parameters of wines made with these two groups of yeast strains showed significant differences during fermentation. The pH values ranged from 3.40 to 3.55, which fell in the agreeable limit. Alcohol content ranged from 10.32% in the wine with maximum reducing sugars (RS3) to 11.06% (EC 1118). The anthocyanin content differed significantly among all the yeast strains, with the maximum in wine prepared from RS1 (15.70 g/l). Maximum colour intensity (14.66) was observed in the RS2 yeast strain. The wines made from locally identified yeast strains contained more antioxidant reducing power than the commercially available yeast strains. It was concluded that the locally identified yeast strains were equally as good in terms of the quality parameters of Cabernet Sauvignon wines, and in some cases, these strains were found to be better than commercially available yeasts. www.sasev.org/journal/sajev-articles/volume-30-2/Comparison%20of%20commercial%20and%20locally%20Yeast%20strains%20Cab%20Sauvignon%20pp%20148-150.pdf/view

- In an earlier study of the micro-oxygenation of wine, it was found that there was an unexpected decrease of oxygen transfer when dissolved carbon dioxide was present in the liquid phase. Now a model, restricted to liquid-side limiting mass transfer, which is always the case for poorly soluble gases, has been developed which explains this phenomenon. The swarm of micro-bubbles is considered as a succession of isolated bubbles rising without interaction, and simple-to-use expressions for the oxygen transfer yield have been established. The oxygen transfer yield does not involve the partial pressure of oxygen in the bubbles, but depends only on the ratio 'column height' to 'diffuser pore diameter', i.e. it increases with increasing liquid column height, and increases as the bubbles get smaller. http://dx.doi.org/10.1016/j.ces.2009.01.012

Local research results

- A project to increase the concentrations of two compounds (resveratrol and carnitine) in wine that have been shown to directly and positively impact on human health, and to decrease the production of compounds (biogenic amines) that have a negative impact, has been carried out. Resveratrol is a well-studied antioxidant associated with many of the beneficial effects of moderate wine consumption. An increase in the concentration of resveratrol in wine was achieved by two methods. The first focused on the production of enzymes via cloning that would help release the resveratrol bound to grape polymers during fermentation, while the second approach focused on the establishment of a resveratrol biosynthesis pathway in yeast. Both approaches now form part of the pre-commercialisation pipeline within SunBio, a commercial entity which actively markets the technologies developed at the Institute for Wine Biotechnology at Stellenbosch University. Carnitine (right) is a quaternary ammonium compound biosynthesized from the amino acids lysine and methionine. In living cells, it is required for the transport of fatty acids from the cytosol into the mitochondria during the breakdown of lipids (or fats) for the generation of metabolic energy. Some of the positive effects of carnitine are that it is a significant antioxidant, it can increase bone mass, it is used to treat heart-related conditions, and it has positive effects on diabetes. It is also sold as a nutritional supplement. Yeast (*S. cerevisiae)* can not produce carnitine. The production of carnitine required the cloning of five genes that encode all enzymes of the biosynthesis pathway from a carnitine-producing fungus, *Neurospora crassa*. These genes have been co-expressed in a single yeast strain, and the project has also entered the SunBio development and commercialisation pipeline. It was found that the co-inoculation of malolactic starter cultures together with alcoholic fermentation could reduce the incidence of biogenic amines in wine compared to conventional inoculation protocols. The frequency of the occurrence of these amines in wines aged for a short period was generally higher in the presence of fermentation lees than in its absence. The levels of the undesirable biogenic amines tyramine, putrescine, cadaverine and histamine were determined in South African wines. It appears that wines that support the growth of lactic acid bacteria, or are more susceptible to malolactic fermentation have higher levels of biogenic amines. The three genes responsible for amine production were isolated from strains and sequenced. It was shown that biogenic amine production by lactic acid bacteria could be influenced by the presence of precursor amino acids in the grape must or wine, the time of contact between juice or wine and grape skins, the time of contact between wine and yeast lees, the presence of microbial nutrients, wine pH, sulphite and ethanol levels, the phenolic composition of the wine and the number of decarboxylase positive lactic acid bacteria present in the wine. Analytical methods to determine biogenic amines were developed. www.sawislibrary.co.za/dbtextimages/BauerFF2.pdf



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