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International Research News

Wasps and yeast transmission

It is well known that natural fermentation can occur in ripe grapes, without artificial *Saccharomyces cerevisia* inoculation. However, as pristine fruits do not harbour *S. cerevisiae* cells, it was not known how yeast cells are preserved during the winter or in the absence of fermentable sources in natural environments, and subsequently reached the ripe fruit in the following summer and autumn. Now experimental evidence has been provided that that queens of social wasps (*Vespa crabro* (right) and *Polistes* spp.) can harbour yeast cells during winter hibernation and then transmit them to their progeny through regurgitation of the content of a small part of their digestive tract, the crop. When the wasps then bite into grapes on the vine they leave traces of *S. cerevisiae* behind on the grapes, which helps start the fermentation process.

DNA sequencing was used to analyse the genes of the yeast, tracing them back to the wasps' gut. Other insects and birds also carry the yeast, but wasps play a special role because only they harbour the yeast during winter. Thus wasps can maintain a potentially unending transmission of yeast strains through favourable and unfavourable seasons and also function as vectors to suitable targets such as ripe grapes.
www.pnas.org/content/early/2012/07/26/1208362109.full.pdf+html

The effects of UV radiation and the role of canopy leaves on berry biochemical composition in Sauvignon blanc

Vitis vinifera is increasingly grown in the high ultraviolet (UV) radiation regions of Australia, South America, South Africa and New Zealand. These high levels of UV radiation (UV-B: 280 nm–315 nm, UV-A: 315 nm–400 nm) are prevalent in many regions of the world as part of the normal climate, both because of physical aspects and geographical locations. For instance, New Zealand has 40% higher UV levels compared with the equivalent latitude in North America. A study investigated the effects of UV radiation and the role of canopy leaves on berry biochemical composition in *Vitis vinifera* var. Sauvignon Blanc grown in New Zealand. Leaves were removed from around the fruiting zones of vines and screens that altered UV radiation exposures were placed over the grape bunches. Samples taken throughout development were analysed for changes in total phenolic compounds (including flavonols), amino acids and methoxypyrazines.

Total phenolic compounds increased substantially in response to UV-B exposure and this was reflected in changes taking place within the skins of the berries. Flavonol levels were determined by UV-B radiation exposure and accumulated to maximum concentrations at veraison, subsequently declining to harvest. UV radiation did not have a significant effect on the majority of amino acids or methoxypyrazine concentrations. The most noticeable change in amino acid and methoxypyrazine accumulation was caused by the presence of leaves over the fruiting zone, and retaining these leaves maintained significantly higher concentrations in the berries at harvest. The findings are important for viticulturists to understand how management of the vine leaf canopy can determine the biochemical composition of the grapes and can thus ultimately affect wine quality.
http://dx.doi.org/10.1111/j.1755-0238.2012.00192.x

Alternatives to bentonite investigated

During white winemaking, it is essential to remove the heat-unstable grape proteins that could cause haze appearing during storage. The most effective tool for this is treatment with bentonite, a negatively charged adsorbent that at wine pH can bind the positively charged grape proteins and settle them to the bottom of tanks. However, bentonite has many undesired effects. A study has assessed whether the addition of carrageenan and pectin, two adsorbents currently not permitted as winemaking additives in Australia, could lower the content of heat-unstable proteins in a Chardonnay juice, thereby reducing the amount of bentonite required to attain heat stability. Carrageenan is a polysaccharide extracted from red seaweeds and pectin is an anionic heteropolysaccharide.

Preliminary results obtained in a small-scale experiment showed that carrageenan addition at several different levels efficiently removed proteins from several juices and wines, with reductions of up to 99% for certain treatments. For the juice studied in the large-scale experiment (20 litre batches), both pectin and carrageenan were demonstrated to be effective in removal of some proteins, with carrageenan being more efficient in terms of protein removal and wine stabilization. Despite being applied at a much lower dosage than pectin (0.25 g/L instead of 2 g/L), carrageenan had higher efficiency in stabilizing the wine samples, reducing bentonite requirements by up to 75% compared with the control. Some of the measured physicochemical parameters were altered by the treatments.

Pectin reduced the wine total acidity, mainly by removal of tartaric acid, and affected the metal ion content of the wine. Carrageenan caused frothing during fermentation, may have had some negative impact on the fermentation rate, reduced the level of ethanol in the wine, and, when added to juice post-racking, modified the sensorial profile of the wine. Despite the fact that adding carrageenan to juice post-racking maximized the wine stabilization, it affected the sensorial profile of the wine.

Hence, carrageenan addition to juice pre-racking may represent the best solution because protein removal is still reasonable, and wine quality is less affected. Because carrageenan showed more potential than pectin, future studies should focus on optimizing its use. http://dx.doi.org/10.1111/j.1755-0238.2012.00187.x

How alcohol may cause cancer in some people

A study has provided evidence that acetaldehyde formed after alcohol consumption damages DNA dramatically. When the body metabolizes alcohol, acetaldehyde is formed. The acetaldehyde attaches to DNA, forming adducts and interfering with DNA activity in a way that is linked to an increased risk of cancer. 10 volunteers were given increasing doses of vodka once a week for three weeks. It was found that levels of DNA adducts increased up to 100 times in participants' oral cells within hours after each dose. These levels dropped about 24 hours later. Most people, however, who drink socially do not develop cancer because they have an enzyme known as alcohol dehydrogenase, which converts acetaldehyde to a harmless substance known as acetate. But certain people are not able to convert acetaldehyde to acetate because they have a variant of the alcohol dehydrogenase gene. As a result, they are more likely to develop esophageal cancer from drinking alcohol. This group includes 30% of people of Asian descent. www.nlm.nih.gov/medlineplus/news/fullstory_128504.html

Electricity from wastewater

A microbial fuel cell is a device that converts chemical energy to electrical energy by the catalytic reaction of microorganisms and typically consists of anode and cathode compartments separated by a cation specific membrane. In the anode compartment, fuel is oxidized by microorganisms, generating electrons and protons. Electrons are transferred to the cathode compartment through an external electric circuit, while protons are transferred to the cathode compartment through the membrane. Electrons and protons are consumed in the cathode compartment, combining with oxygen to form water. Engineers at Oregon State University have made a breakthrough in the performance of microbial fuel cells that can produce electricity directly from wastewater, which can be sewage, grass straw, animal waste, and by-products from the wine, beer or dairy industries.

With new concepts – reduced anode-cathode spacing, evolved microbes and new separator materials – the technology can now produce more than two kilowatts per cubic meter of liquid reactor volume. This power density far exceeds (by up to 50 times) anything previously done with microbial fuel cells. The system also works better than an alternative approach to creating electricity from wastewater, based on anaerobic digestion that produces methane. It treats the wastewater more effectively, and doesn't have any of the environmental drawbacks of that technology, such as production of unwanted hydrogen sulphide or possible release of methane, a potent greenhouse gas. The system has now been proven at a substantial scale in the laboratory, and the next step would be a pilot study. http://dx.doi.org/10.1039/c2ee21964f

Local Research News

Leafroll in replanted vineyards

A study has been carried out to investigate the possibility that grapevine leafroll spreads between two successive (old removed and newly established) vineyard blocks on the same site. It was also planned to evaluate the potential of control methods such as different length fallow periods between vineyards, systemic insecticide treatment of the vines being replaced and herbicide treatment of the old vineyard, to prevent the perpetuation of grapevine leafroll infection from a preceding vineyard. It was confirmed that and old infected vineyard can serve as the source for spread of leafroll to a new vineyard on that site. However, the number of vines in the new vineyard correlating with a specific treatment in the previous vineyard were too low currently to make any inferences regarding which treatments are most effective, and the situation requires monitoring over a number of further seasons. www.sawislibrary.co.za/dbtextimages/PietersenG2.pdf

Other News

Wine drinkers in the US

A telephone Gallup poll of 1 014 adults in the US has concluded that 39% of US drinkers most often drink beer, compared to 35% that drink wine and 22% that prefer liquor. More than half of US women (52%) prefer wine, compared to 20% of men. In the group of those over 50 years of age, 59% of women said wine was their drink of choice, and for men it was 28%. Overall, the poll found that beer is the preferred beverage for those between the ages of 18 and 54, while adults aged 55 and older opt for wine. Wine drinkers are mostly based on the East Coast while beer aficionados live in the Midwest. http://medicalxpress.com/news/2012-08-men-beer-women-wine.html

Vine and Wine book awards

Each year, the International Organisation of Vine and Wine (OIV) presents awards (award logo on right) to the best books published in the past two years, and which books have been submitted by the authors or publishers. These awards are presented in one of 10 categories relating to the Vine and Wine sector. 10 works were presented with awards in 2012, and 10 others received special mentions. The details of the award winning books may be seen at www.oiv.int/oiv/info/enprixOIV?lang=en