



Research news

- Inflorescences of grapevine are composed of tiny green flowers that produce an abundance of sesquiterpenoid volatiles. These volatiles are important information molecules that enable pollinators to locate flowers and which may protect reproductive tissues against pathogens or herbivores. It has been established that the male flower parts of grapevines are responsible for the sesquiterpenoid floral scent formation. The study found that such volatiles in *V. vinifera* L. cv. Cabernet Sauvignon are emitted with a light-dependent diurnal pattern early in the morning at prebloom (picture left) and bloom (right). The release of volatiles between 0600 and 1100 hours remained elevated over a period of 3–5 days while individual flowers of a given cluster continued to open. The largest amount of volatiles was released between 0600 and 0800 hours. During the time of maximum volatile release, sesquiterpenes composed up to 86% of total emissions, whereas aliphatic compounds composed up to 16% of total emissions. It was found that the biosynthesis of the sesquiterpene volatile is localized to anthers and, more specifically, within the developing pollen grains. The biosynthesis of terpene volatiles within the male flower parts (anthers and pollen grains) before bloom presents a substantially different biological system of floral scent formation than those described from species studied previously, in which floral scent biosynthesis occurs during the blooming process and has been attributed to other flower tissues but not the male flower parts. www.pnas.org/content/106/17/7245

- Researchers in Spain have compared ten different sorbents in solid-phase extraction (SPE) cartridges with the C18 (commercial name) sorbent commonly used for the isolation of most of the phenolic compounds present in wines in low concentration. SPE is rapid, economical, sensitive and can now also be automated, reducing processing time. The use of C18 cartridges has disadvantages, such as low recoveries, the need to take care not to dry the cartridge after conditioning because of possible low repeatability, and low detection of some phenolic compounds (such as hydroxycinnamic acids and their derivatives). Of the ten sorbents evaluated, the HLB (commercial name) with *N*-vinylpyrrolidone-divinylbenzene copolymer as a sorbent was found to be a good alternative to replace C18 cartridges. The advantages of the proposed SPE method with the HLB cartridge are that interferences can be eliminated with water without losing the compounds of great interest; the method has a higher sensitivity for the compounds detected only slightly with the C18 cartridges; it has very good repeatability, reproducibility, and high percentages of recovery; it has a higher loading capacity than silica-based C18 cartridges due to the larger surface area of this type of sorbent; and the method is not adversely affected by drying, being more reproducible. The SPE HLB method allows quantification of at least 33 individual phenolic compounds, and is a rapid technique as only organic fractions have to be concentrated. <http://pubs.acs.org/doi/abs/10.1021/jf802100j>
- The anthocyanin (Anth) content in leaves provides valuable information about the physiological status of plants. Reflectance measurement can quickly and non-destructively assess leaf Anth content in situ. A study has established relationships between Anth content and four vegetation indices: NIR (near-infrared)/green, red/green, anthocyanin reflectance index (ARI, based on reflectances in bands within the green and the red-edge regions), and a modified anthocyanin reflectance index (MARI, based on reflectances in green, red edge, and NIR). The accuracy of the relationship for forecasting Anth content was evaluated using an independent data set containing sampled leaves from two field-grown grape cultivars (Saint Croix and Saint Pepin), with differences in pigment composition, leaf thickness, age, and pubescence. Although the Anth content in the validation data set was widely variable, from 3 to 45 nmol cm⁻², the ARI and MARI algorithms were capable of accurately predicting Anth content in grapevine leaves with a root mean square error below 3 nmol cm⁻² and 2.3 nmol cm⁻², respectively. Such an approach has potential for developing simple hand-held field instrumentation for accurate non-destructive Anth estimation and for analyzing digital airborne or satellite imagery. www.ajevonline.org/cgi/content/abstract/60/1/87
- Hydroxycinnamates are the major phenols in grape juice and the major class of phenolics in white wine. They are the first to be oxidized and subsequently initiate browning, a problem in white wines. While they appear to have no perceptible bitterness or astringency at the levels found in wine, some of their derivatives (e.g. volatile phenols) greatly influence the aroma of wine. The most important are 4-vinylphenol and 4-ethylphenol, responsible for characteristics of some wines such as 'traminer'. Above certain levels, these compounds negatively affect wine quality, imparting animal, leather, and 'horse sweat' odours. The potential to produce such volatile phenols from hydroxycinnamic acids was investigated for lactic acid bacteria (LAB). A polymerase chain reaction (PCR) assay was developed for the detection of the LAB. The PCR assay amplifies a DNA fragment from phenolic acid decarboxylase (*pdc* gene). The PCR method was applied to 85 strains belonging to the 6 main wine LAB species.

Lactobacillus plantarum, *Lactobacillus brevis*, and *Pediococcus pentosaceus* strains produced a positive response in assay, whereas *Oenococcus oeni*, *Lactobacillus hilgardii*, and *Leuconostoc mesenteroides* strains did not. Thus LAB strains that give a positive *pdC* PCR response produce volatile phenols, whereas strains with no response do not produce volatile phenols. This method could be useful for a preliminary identification of LAB strains able to produce volatile phenols in wine. <http://pubs.acs.org/doi/abs/10.1021/jf803016p>

- The demand for more hygienic production practices has made the use of stainless steel vats more widespread for the making of wines. In a study of the formation of volatile compounds in Chardonnay wines, and the determination of the amine content of the wine over time, it was found that the aroma of cask-fermented Chardonnays is less pronounced than in those that have been fermented in stainless steel vats and then transferred to barrels for ageing. The olfactory impact of certain volatile substances extracted from the wood is limited by the action of yeasts during fermentation. Oak cask-fermented wines have, in general, a greater concentration of superior alcohols and esters of medium-sized chains of fatty acids. The presence of biogenic amines, especially histamine and tiramine, in wine has received attention because they may have unpleasant and negative effects on human health. Chardonnay wines subjected to weekly agitation during ageing in the barrel had greater histamine and tiramine content than wines aged in an undisturbed manner. After bottling the total concentration of the wine amines increases, this increase being mainly observed during the first 45 days. The temperature at which the bottled Chardonnay was stored did not have an influence on the concentration of these substances in the wine. www.basqueresearch.com/berria_irakurri.asp?Berri_Kod=2194&hizk=
- The aromas of 30 French Provence rosé wines were subject to in-depth gas chromatography and sensory analyses. De-aromatization and reconstitution of flavour revealed the preponderant character of ethyl esters and higher alcohol acetates, which are simple to determine and are at the origin of the fruity and amylic notes of rosé wines. The following key compounds of rosé wine flavour were identified: two volatile thiols (3-mercaptohexanol and 3-mercaptohexyl acetate), two furanic compounds (furanol and homofuranol), and one C13 norisoprenoid (β -damascenone). These compounds are now used as qualitative indicators in evaluation protocols for the exploitation of vines or for rosé winemaking techniques at the French Research and Experimentation Centre on Rosé Wine. www.ajevonline.org/cgi/content/abstract/60/1/116
- A study of climate parameters from 1952 to 2006 important to winegrape production in the Alt Penedès, Priorat, and Segrià regions of NE Spain, which produce some of the world's most coveted wines, has found an overall growing season warming over the period of 1.0 to 2.2°C, with significant increases in heat accumulation indices that are driven mostly by increases in maximum temperatures. Changes in many temperature parameters show moderate to strong relationships with vine and wine parameters such as higher wine quality with higher ripening diurnal temperature ranges, and reduced production. It was estimated that each 1°C increase of growing season warming increases water demands in the region by 6 to 14%. These observations, combined with climate projections, indicate potential disruption of climate–variety balance, increasing water stress, and challenges in the on-going production of quality wines. www.int-res.com/abstracts/cr/v38/n1/p1-15/

Health

- A study in the North-Eastern United States involving 6 327 women with breast cancer and 7 558 women who did not have a cancer diagnosis, in the age range 20 to 69, has found that breast cancer risk rose with the amount of alcohol consumed, no matter whether it was wine, beer or liquor. The heaviest drinkers, those women who reported having 14 or more drinks a week were 24 percent more likely to develop breast cancer than non-drinkers. The researchers found no difference between red or white wine in relation to breast-cancer risk. Neither appeared to have any benefits. They concluded that, 'If a woman drinks, she should do so in moderation - no more than one drink a day. And if a woman chooses red wine, she should do so because she likes the taste, not because she thinks it may reduce her risk of breast cancer.' www.aacr.org/home/public--media/aacr-in-the-news.aspx?d=1265 and <http://cebp.aacrjournals.org/cgi/content/citation/18/3/1007> See also *Winetech Scan* 2008 October, first article.
- A study of 953 men and women in Northern California has found that people who drink one or more glasses of red or white wine a day had a 56 percent reduced risk of having Barrett's Oesophagus (or Syndrome). Barrett's Oesophagus is a precursor to oesophageal cancer. There are no symptoms or warning signs of Barrett's Oesophagus, and currently there is no treatment. The protective effect of wine was greatest with just one or two glasses a day, and did not increase with higher consumption. There was no reduction of Barrett's Oesophagus risk among people who drank beer or liquor. Researchers are not certain why wine reduces the risk of Barrett's Oesophagus and oesophageal cancer. It could be that the wine's antioxidants neutralize the oxidative damage caused by gastro-oesophageal reflux disease, or that wine drinkers typically consume food with their wine rather than drinking straight liquor without food, thereby reducing the potentially damaging effect of alcohol on oesophageal tissue, or the possibility that wine drinking is a proxy for other 'health-seeking' behaviour'. <http://dx.doi.org/10.1053/j.gastro.2008.11.042>

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