Winetech Scan
Wine Industry Network of Expertise and Technology
Netwerk van Kundigheid en Technologie vir die Wynbedryf

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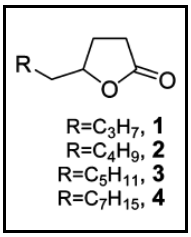
Research outputs

- A γ-lactones are generally pleasant odorants that contribute a variety of aromas and are common components of many fruits. Four γ-lactones have been reported in grapes and wine. These are γ-octalactone (1), γ-nonalactone (2), γ-decalactone (3) and γ-dodecalactone (4). A new method of assaying these γ-lactones in both white and red wines has been developed. Known as stable isotope dilution assay, it involves replacing hydrogen atoms in the γ-lactones with deuterium and then detecting the resulting compounds with a mass spectrometer. The method is highly accurate and reproducible. Using this method, 58 Australian white wines comprising Chardonnay, Riesling, Sauvignon Blanc, Semillon, Viognier and Botrytis style were analyzed and it was found that that γ-octalactone (1) was the most common lactone, being observed in 28 of the wines, followed by γ-nonalactone (2) in 23 wines. The Botrytis style white wines had the highest concentrations of (1) and (2). 120 Australian red wines covering the varieties Cabernet Sauvignon, Durif, Merlot, Pinot Noir and Shiraz were also studied and showed γ-octalactone (1) and γ-nonalactone (2) to be the most common lactones present, in 56 and 57 of the wines, respectively. γ-Decalactone (3) was observed in only a small number (13) of red wine samples and not at all in the white varieties. γ-Dodecalactone (4) was absent from all 178 samples studied. http://pubs.acs.org/doi/abs/10.1021/jf8026974



- Point quadrat analysis (PQA) has been used for decades to measure and compare microclimatic indicators of a canopy, including canopy consistency, leaf area density, cluster exposure, and leaf area source/sink balance. However, PQA is limited in spatial precision and the lack of calibration; while the measurement of photosynthetic photon flux (PPF) across an entire canopy typically requires rigorous sampling protocols. New methods for using the previously ignored spatial information collected from PQA data sets, and for simplifying whole-canopy PPF sampling protocols have been developed, resulting in a calibrated biomass and photon flux distribution model. New metrics include: occlusion layer number (OLN), which quantifies the shading contacts per insertion; cluster exposure layer (CEL) and leaf exposure layer (LEL), which quantify the shading layers between a contact and its nearest canopy boundary; canopy cluster symmetry (CCS), which measures the positional bias of clusters along the row; a canopy calibration coefficient (Ep1) which uses a single measurement at the centre of the canopy to calibrate the overall light distribution; cluster exposure flux availability (CEFA) and leaf exposure flux availability (LEFA), which use the canopy calibration to quantify sunlight available to each contact; cluster exposure flux symmetry (CEFS) and leaf exposure flux symmetry (LEFS), which measure the balance of sunlight exposure across the row; and trellis contact symmetry (TCS), which measures canopy consistency around the intended trellis centreline. These techniques were applied to a sample data set of control versus shoot-thinned vines, and demonstrated detailed quantitative descriptions of canopy biomass distribution, light environment, and the efficacy of the viticultural treatment. These new methods may serve to guide cultural practices and could be used to forecast relative fruit and wine quality from grapevine canopies midway through the growing season. www.ajevonline.org/cgi/content/abstract/59/4/425

- Enrichment of must prior to fermentation is one process that can be used to overcome reduced levels of sugars in a particular vintage. The enrichment is performed by adding sugar-containing products, such as sugar beet, sugar cane or grape musts. The classical methods of producing concentrated grape must are vacuum evaporation and reverse osmosis. These methods have various disadvantages, including the depletion of varietal aromas, the production of off-flavours in the grape must concentrate, high energy consumption and negative environmental impacts. A laboratory study investigated grape must concentration and fractionation by nanofiltration. Because of its versatility in preferential permeation mechanisms, nanofiltration displays a unique capability to fractionate sugar/acid aqueous solutions. Thus nanofiltration not only provides an alternative to the classical processes of concentrated must production, with lower energy consumption and less severe membrane fouling than reverse osmosis, but it also can adjust the level of specific components such as acids and salts. The study examined six different nanofilter membranes covering a wide range of hydraulic permeabilities, and their effect on grape must composition in terms of fluxes and rejection coefficients of organic acids and sugars. The results endorsed nanofiltration as potential process for the concentration and rectification of grape musts. www.ajevonline.org/cgi/content/abstract/59/4/446

- As copper accumulation in soil may promote phytotoxicity in grapevines, an investigation was carried out into potted vines (*Vitis vinifera* L. cv. Sangiovese) exposed to increasing concentrations of copper (Cu) in either clay loam soil or clay loam soil mixed with 85% sand. Soils were mixed at planting with Cu at the rates (mg Cu/kg) of 0 (control, native soil Cu only), 50, 100, 200, 400, 600, 800 and 1000, and non-bearing vines were grown in these for

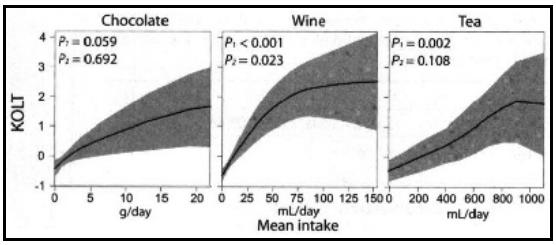
two seasons. Reduction of root growth was observed after addition of ≥400 mg Cu/kg to both soils; reduction of shoot growth, leaf number and chlorosis of leaf edges were detected only in sand enriched soil. It was concluded that vines grown in clay loam soil can tolerate a high (more than 10-fold higher than natural concentration) amount of new added Cu with no reduction in shoot growth. On the other hand, in sand-enriched soils, which have a low nutritional status, Cu toxicity threshold can be established at 200 mg/kg, above which a reduction of shoot growth and leaf chlorosis appears after 2 years of Cu exposure. Considering the difficulties of Cu soil decontamination, attention must be paid to Cu management in soils of a very light texture. Along with a reduction of Cu inputs, the introduction of varieties tolerant to potential diseases and proper cultivation rotation that includes vegetable crops are recommended. http://dx.doi.org/10.1111/j.1755-0238.2008.00040.x

Local research results

- *Vitis vinifera* L. cv. Crimson Seedless is a late ripening, red seedless cultivar which can be highly profitable as it fills a niche gap. However, a concern in its commercial production is that it has been observed to lack adequate size and colour required for export, and that practices which improve size, such as girdling (ring-barking) and gibberellic acid application, reduce the colour even more. A study at Paarl and De Doorns showed that application of the plant growth regulator Ethephon stimulated anthocyanin accumulation (thereby improving colour) without effect on bunch or berry size. The study concluded that growth regulators, such as Ethephon and potentially ABA (Abscisic acid) can be used for the commercial enhancement of skin colour properties. The toxicity of ethephon is very low, and should cause no concern to environmental groups. www.sasev.org/journal/sajev-articles/volume-29-1/Human%20and%20Bindon%20vol%2029%20pages%2050%20to%2058.pdf

Health effects

- The role of micronutrients in age-related cognitive decline is being increasingly studied. Such micronutrients include polyphenols. The largest subclass of dietary polyphenols is flavonoids, and it is believed that the elderly who consume lots of flavonoids have a lower incidence of dementia. Now 2 031 Norwegians between the ages of 70 and 74 years of age, 55% of whom were women, have undergone cognitive testing to examine the relation between the intake of 3 common foodstuffs that contain flavonoids (chocolate, wine, and tea - including herbal teas) and cognitive performance using 6 tests. Participants who had habitually consumed chocolate, wine or tea had significantly better mean test scores and lower prevalence of poor cognitive performance than those who did not. The effect was most pronounced for wine and modestly weaker for chocolate intake, with maximum effect at intakes 75 to 100 mL/day for wine and 10 grams/day for chocolate. The effect of tea on cognitive performance was approximately linear. The sharpest dose-response effect of tea on cognitive performance was up to ~200 mL/d, after which it reached to plateau or tended to be linear. Overall results for one of the 6 tests are shown in the adjacent figure. Herbal tea was less effective than ordinary tea at improving cognitive performance. The associations were dose dependent and were also additive in the sense that the risk of poor cognition was lower if more than one type of the 3 foods had been consumed over the previous year. The reduction in risk of poor test performance for those who consumed all 3 flavonoid-rich foods ranged from 64% to 74% compared with those who did not report consuming any. http://jn.nutrition.org/cgi/content/abstract/139/1/120



- The effects of alcohol and smoking on incidences of liver cirrhosis and gallbladder disease were examined in a prospective cohort study of 1.3 million United Kingdom women (mean age = 56 years) recruited during 1996–2001. After a mean follow-up period of 6.1 years, incidence rates of cirrhosis and gallbladder disease were 1.3 per 1 000 and 15 per 1 000 respectively. It was found that cirrhosis risk increased with increasing alcohol consumption, while the risk of gallbladder disease decreased. Comparing women who drank ≥15 units/week with those who drank 1–2 units/week, the relative risk was 4.32 for cirrhosis and 0.59 for gallbladder disease. Increasing numbers of cigarettes smoked daily increased the risk of both conditions. http://dx.doi.org/10.1093/aje/kwn280

- Alcohol consumption is a major risk factor for head and neck cancer (cancers of the oral cavity, pharynx and larynx). A very large meta-study pooled data from 15 studies of head and neck cancer (9 107 cases, 14 219 controls) to investigate the independent associations of such cancers with consumption of beer, wine, and liquor. It was found that for beer and liquor the relative risks of head and neck cancer are comparable and that the dose-response relation was generally increasing and linear. No such trend was observed for wine. At moderate levels of consumption, the odds ratio estimates for wine were much weaker than the corresponding estimates for beer or liquor. At high consumption levels (>30 standard drinks per week), the odds ratio estimate for wine was generally comparable to those of the other beverage types. It was noted that the result for wine may be confounded by diet and other lifestyle factors. http://dx.doi.org/10.1093/aje/kwn306