BEVERAGES (incl. Juices, Tea /Coffee, Yoghurt and other natural soft drinks)

NPARR 2(2), 2011-0133, Tea prepared from Anastatica hirerochuntica seeds contains a diversity of antioxidant flavonoids, chlorogenic acids and phenolic compounds

HPLC–PDA–MS² was used to identify phenolic and polyphenolic compounds in an herbal tea made from seeds of Anastatica hirerochuntica, a plant found in the Sahara–Arabian deserts and used to treat a variety of ailments. Twenty compounds comprising a series of flavone C- and O-linked glycosides, phenolic acids, chlorogenic acids and flavonols were identified or partially identified on the basis of co-chromatography with reference compounds and MS² and MS³ fragmentation patterns. The flavones were the principal components, occurring as luteolin, apigenin and diosmetin conjugates. The antioxidant potential of individual compounds in Anastatica was assessed using HPLC with an on-line ABTS+ detection system. This revealed that 14 compounds exhibited antioxidant activity. The highest contribution to the antioxidant capacity of the tea, 56%, came from 3,4-dihydroxybenzoic acid and caffeoyl- and dicaffeoylquinic acids while 6-C-glucosides of luteolin and apigenin contributed 41% [Noura AlGamdi, William Mullen and Alan Crozier* (College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow G12 8QQ, UK), Phytochemistry, 2011, 72(2-3 248-254).

NPARR 2(2), 2011-0134, Impact of apple processing modes on extracted juice quality: Pressing assisted by pulsed electric fields

The purpose of this study was to compare the effects of pulsed electric field (PEF) on apple juice characteristics (turbidity, polyphenolic content and antioxidant capacities). The pressing was used as a standard method for juice extraction. Experiments were carried out at a constant pressure (P=3bar) using a laboratory press cell. Two different methods for PEF application at 400V/cm were investigated (PEF treatment of whole samples before cutting and PEF treatment of apple slices after cutting). PEF treatment resulted in increase of the juice yield from 44g/100g apple (untreated samples) to 58g/100g apple (treatment of whole apples) and 64g/100g apple (treatment of slices) after 30 min of pressing. The analysis of pH and conductivity showed no significant difference between untreated and PEF-treated samples. However, the total soluble matter content of juice increased after PEF treatment. The obtained turbidity and transmittance data evidence a noticeable improvement of juice clarity for PEF-treated samples. The PEF pre-treatment was accompanied by an increase of the content of polyphenols and intensification of the antioxidant capacities of juice. Most of these effects (juice clarity and content of antioxidants) were more pronounced for the whole treated apples as compared to untreated apples and PEF-treated apple slices. The evolution of apple browning before and after PEF treatment was more pronounced for whole samples. PEF treatment accelerates browning. The obtained data can contribute to the determination of an optimum time for PEF application. The results evidence that PEF-enhanced expression is promising for production of higher quality juices. PEF treatment of whole apples reduces the energy consumption and is advantageous for industrial applications as compared to the treatment of apple slices. PEF combined with pressing can become a good alternative to traditional process [Nabil Grimi*, Fatine Mamouni, Nikolaï Lebovka, Eugène Vorobiev and Jean Vaxelaire (Université de Technologie de Compiègne, Département de Génie Chimique, Unité Transformations Intégrées de la Matière Renouvelable, Centre de Recherche de Royallieu, B.P. 20529-60205, Compiègne Cedex, France), Journal of Food Engineering, 2011, 103(1), 52-61].

NPARR 2(2), 2011-0135, How trigeminal, taste and aroma perceptions are affected in mint-flavored carbonated beverages

The integration of olfactory, taste and trigeminal perceptions must be taken into account to better understand the perception of beverages. To do this,
seven beverages were formulated to investigate the role of ingredients on trigeminal perception. All mutual interactions between olfactory, gustatory and trigeminal perceptions were studied. Instrumental measurements and sensory evaluation were used to elucidate both physicochemical and sensory interactions. Sensory profiling was conducted according to monadic product presentation, and in vivo aroma release was assessed in the nasal cavities of subjects during beverage consumption.

This study further revealed the influence of trigeminal perception on taste and aroma in complex beverages. The addition of CO₂ in beverages induced a decrease in sweetness perception, an increase in sourness perception and an enhancement of aroma perception. Physicochemical and/or physical mechanisms (pH, aroma stripping effect) were assumed to be at the origin of these gustatory and olfactory interactions. Furthermore, the addition of mint flavoring enhanced tingling and freshness perceptions, highlighting perceptual interactions. The presence of sugar was shown to decrease the freshness perception but not the tingling perception [A. Saint-Eve*, I. Déléris, G. Feron, D. Ibarra, E. Guichard and I. Souchon (AgroParisTech, UMR 782 GMPA, 78850 Thiverval-Grignon, France), *Food Quality and Preference, 2010, 21(8), 1026-1033].

NPARR 2(2), 2011-0136, *Fingerprint of volatile flavour constituents and antioxidant activities of teas from Thailand*

The volatile flavour components of different teas growing in Thailand were extracted using the simultaneous distillation and extraction (SDE) technique. These volatiles were investigated by GC–MS. At least 54 components representing 76.51–83.32% of all samples were identified. Hotrienol, geraniol and linalool were found to be the major components in Green Oolong tea. Green Assam tea contained linalool, geraniol and α-terpineol as the key flavour constituents. Chin Shin Oolong tea was dominated by linalool, indole and cis-jasmone whilst the major flavour volatiles of Chin Hsuan Oolong tea were trans-nerolidol, cis-jasmone and geraniol. Indole, geraniol and cis-jasmone were detected as the main constituents in Four Season tea. Change of quality and quantity of volatile flavour components was related to fermentation methods that increased volatiles were illustrated by the semi-fermented tea processing method. Green Assam tea infusion extract was evaluated to have the strongest antioxidant activities with the highest amount of phenol content followed by Four Season tea, Chin Shin Oolong tea, Chin Hsuan Oolong tea and Green Oolong tea, respectively [Patcharee Pripdeevech* and Theeraphan Machan, (Program of Applied Chemistry, School of Science, Mae Fah Luang University, Chiang Rai 57100, Thailand), *Food Chemistry*, 2011, 125(2), 797-802].


Recent interest into the possible benefits of l-theanine found in tea has raised the issue that there are few data available on amounts of l-theanine contained in cups of commercially-available teas, prepared by a standard method. HPLC along with a standard method of preparing tea was employed here to determine amounts of l-theanine in cups of tea and the effects that various preparation factors have on amounts of l-theanine extracted. Brewing time was found to be a major determinant of the amount of l-theanine extracted, while the addition of small amounts of milk and sugar made no significant difference. High levels of milk resulted in a marked lowering of the level of detectable l-theanine. Contrary to previous research, a standard (200 ml) cup of black tea was found to contain the most l-theanine (24.2±5.7mg) while a cup of green tea contained the least (7.9±3.8 mg) [Emma K. Keenan*, Mike D.A. Finnie, Paul S. Jones, Peter J. Rogers and Caroline M. Priestley (Department of Experimental Psychology, University of Bristol, 12A Priory Road, Bristol BS8 1TU, UK), *Food Chemistry*, 2011, 125(2), 588-594].

NPARR 2(2), 2011-0138, *Clarifying agents effect on the nitrogen composition in must and wine during fermentation*

The effect of static sedimentation with and without clarifying agents (silica sol and gelatine) upon the nitrogenous fraction of musts and wines was studied. Four vinifications were carried out using a *Vitis vinifera* cv. Cayetana white grape must. Static sedimentation reduced less than other techniques the
assimilable nitrogen (FAN), however the employment of fining agents promoted a net decrease. The changes in the amino acids during fermentation were similar in all the experiments carried out. In general, during the first days there was a fast decrease followed by a slight increment and then stabilisation. This decrease fitted, in most of the cases, with first order kinetics. For most of the amino acids, the percent consumption was higher in the must settled with clarifying agents. The clarifying agent’s addition did not have the same effect on the amino acid concentration in the final wines [E. Valdés*, M. Vilanova, E. Sabio and M.J. Benalte (Instituto Tecnológico Agroalimentario (INTAEX), Carretera San Vicente, s/n, 06071 Badajoz, Spain), Food Chemistry, 2011, 125(2), 430-437].

NPARR 2(2), 2011-0139, Variation in antioxidant potential and total polyphenol content of fresh and fully-fermented Sri Lankan tea

Tea polyphenols possess antioxidant properties and have been shown to have a protective effect against several degenerative diseases. The study aimed to determine the amounts of polyphenols and antioxidant properties for teas grown in Sri Lanka, over a period of 10 months. Water extracts of freeze-dried fresh (unfermented) and fully-fermented tea leaves were made for a structured set of samples (fermented and unfermented teas from six plantations; teas representing two harvesting seasons from four plantations) collected from the main tea growing regions in Sri Lanka. Total phenolic content (TPC), the ferric reducing antioxidant power (FRAP) and the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging activity were determined for each sample. The results highlight significant ($P<0.05$) variations in antioxidant activity across the six plantations. FRAP and DPPH for both fermented and unfermented teas from the four highland plantations showed a significant ($P<0.05$) interaction between season and plantation. A similar interaction between season and plantation was observed for total phenolics in unfermented teas from the four highland plantations. The variability of the total phenolics for fermented teas, however, was independent of seasonal variations. A significant correlation ($r=0.5$, $P<0.05$) was observed between FRAP and total phenolics [S. Jayasekera, A.L. Molan, M. Garg and P.J. Moughan*(Riddet Institute, Massey University, Palmerston North, New Zealand), Food Chemistry, 2011, 125(2), 536-541].

NPARR 2(2), 2011-0140, Antioxidant compounds from a South Asian beverage and medicinal plant, Cassia auriculata

Cassia auriculata (Caesalpiniaceae) is a common South Asian beverage and medicinal plant widely used in tradition medicine for treating diabetes and various other disease conditions. The alcoholic extract of the aerial part of C. auriculata displayed potent antioxidant activity when assessed by DPPH radical scavenging, lipid peroxidation and reducing power analysis. Fractionation of the crude extract using solvents of ascending polarity showed that the ethyl acetate fraction is the most active followed by the chloroform fraction while the petroleum ether, n-butanol and water fractions were less active than the crude extract. Further activity-guided fractionation studies on the active fractions resulted in the isolation of the major antioxidant constituent kaempferol-3-O-rutinoside together with kaempferol, quercetin and luteolin. The identity of the compounds was established based on extensive spectroscopic studies including 2D NMR [Malindra Juan-Badaturuge, Solomon Habtemariam* and Michael J.K. Thomas (Pharmacognosy Research Laboratories, Medway School of Science, The University of Greenwich, Central Avenue, Chatham-Maritime, Kent ME4 4TB, UK), Food Chemistry, 2011, 125(1), 221-225].

NPARR 2(2), 2011-0141, Effect of enzymatic debittering on antioxidant capacity and protective role against oxidative stress of grapefruit juice in comparison with adsorption on exchange resin

Antioxidant capacity, radical scavenging activity, as well as protective effect on lipoperoxidation, glutathione oxidation and DNA damage, were evaluated in grapefruit juice subjected to bitterness removal by naringinase or by physical adsorption with Amberlite®IRA-400. The results showed a reduction in naringin content for the naringinase-treated juice (N-PJ) and those processed with the exchange resin (R-PJ), which made both juices acceptable to consumers. Total antioxidant capacity, measured by ABTS and FRAP assays, was lower in R-PJ samples. The highest superoxide and hydroxyl radical scavenger activity was observed in
N-PJ. With regard to inhibitory effect of juice samples on lipoperoxidation, N-PJ also provided the greatest effectiveness. In addition, R-PJ showed the lowest levels of GSH. The results showed a protective effect on DNA oxidative damage for all juice samples tested. In summary, enzymatic technology was more effective than physical adsorption in preserving the antioxidant and biomolecule protection capacity of fresh grapefruit juice [M. Cavia-Saiz, P. Muñiz, N. Ortega and M.D. Busto* (Department of Biotechnology and Food Science, Area of Biochemistry and Molecular Biology, University of Burgos, Plaza Misael Bahuelos, s/n, E-09001 Burgos, Spain), Food Chemistry, 2011, 125(1), 158-163].

NPARR 2(2), 2011-0142, Antiglycative and antioxidative properties of coffee fractions

In this work the inhibitory activity of coffee low molecular weight compound (LMWC) and high molecular weight compound (HMWC) fractions against in vitro advanced glycation end-products (AGEs) formation was investigated. The HMWC fraction was characterised for its content in total phenolic groups, proteins and carbohydrates. The chlorogenic acids of LMWC fraction were identified by liquid chromatography coupled with tandem mass spectrometry. HMWC inhibited bovine serum albumin glycation by acting as radical scavenger and Fe-chelator in the post-Amadori phase of the reaction and by inhibiting dicarbonyl reactive compounds production during glucose autoxidation. LMWC fraction was able to inhibit protein glycation and dicarbonyl reactive compounds formation more than HMWC fraction. Chlorogenic acids are the main compounds responsible for the antiglycative activity of LMWC fraction.

This study clearly shows that coffee contains molecules with in vitro antiglycative activity, in particular chlorogenic acids, are of particular interest for their known bioavailability in vivo [E. Verzelloni*, D. Tagliazucchi, D. Del Rio, L. Calani and A. Conte (Department of Agricultural and Food Sciences, University of Modena and Reggio Emilia, Via Amendola 2, 42100 Reggio Emilia, Italy), Food Chemistry, 2011, 124(4), 1430-1435].

NPARR 2(2), 2011-0143, Green tea aqueous extract reduces visceral fat and decreases protein availability in rats fed with a high-fat diet

Green tea is associated with beneficial health effects mainly because of its body fat-reducing and hypocholesterolemic activities, but an effective dose without pronounced influence on protein availability is unknown. The objective of this study was to examine the hypothesis that green tea aqueous extract (GTAE) depending on dose improves cardiovascular risk indicators such as body weight, visceral fat content, and atherogenic index of plasma and does not have unfavorable effect on protein availability in rats fed with a high-fat diet. The rats fed with a high-fat diet enriched with 1.1 and 2.0% GTAE for 8 weeks had significantly (P < .05) lower atherogenic index (in both groups, about 14.3%). Only administration of 2.0% GTAE significantly (P < .05) decreased body weight gain (5.6%) and prevented visceral fat accumulation (17.8%) in rats. However, considerably (P < .05), reduction in the digestion of protein (but not fat) was observed in both GTAE groups (1.1% GTAE: 82.6% ± 1.8%; 2.0% GTAE: 84.3% ± 0.8%) when compared to the control (93.3% ± 1.5%). It was concluded that GTAE may have preventive effects on the accumulation of visceral fat but only in higher doses. Although both doses improved cardiovascular risk indicators, they, in addition, significantly inhibited protein digestion [Joanna Bajerska*, Małgorzata Wozniewicz, Jan Jeszka, Slawomira Drzymala-Czyz and Jaroslaw Walkowiak (Department of Human Nutrition and Hygiene, Poznan University of Life Sciences, 60-624 Poznan, Poland), Nutrition Research, 2011, 31(2), 157-164].

NPARR 2(2), 2011-0144, Influence of barley variety, timing of nitrogen fertilizations and sunn pest infestation on malting and brewing

This paper presents a multivariate approach to investigate the influence of barley variety, timing of nitrogen fertilisation and sunn pest infestation on malting and brewing. Four spring and two winter barley varieties were grown in one location in southern Europe. Moreover, one of the spring varieties was infested with sunn pest, in order to study the effects of this pest on malting quality, and subjected to different nitrogen fertilisation timing regimes. The samples were micromalted, mashed, brewed and analysed.
The data showed that even though the two winter barleys seemed to be the best regarding their physical appearance (sieving fraction I + II > 82%), this superiority was not confirmed in the malt samples, which showed low values of Hartong extract (27.1%) and high values of pH (6.07–6.11) and β-glucan content (12.5–13.2 g kg\(^{-1}\)), resulting in low-quality beers. The barley sample subjected to postponed fertilisation had a total nitrogen content (19.5 g kg\(^{-1}\) dry matter) exceeding the specification for malting barley and gave a beer with a low content of free amino nitrogen (47 mg L\(^{-1}\)) and high values of viscosity (1.99 cP) and β-glucan content (533 mg L\(^{-1}\)). The beer obtained from the barley sample subjected to pest attack had good quality parameters.

All spring barleys gave well-modified malts and consequently beers of higher quality than the winter barleys. Moreover, postponed fertilisation was negatively related to the quality of the final beer, and sunn pest infestation did not induce important economic losses in the beer production chain. Copyright © 2010 Society of Chemical Industry [Ombretta Marconi*, Valeria Sileoni, Michele Sensidoni, José Manuel Amigo Rubio, Giuseppe Perretti and Paolo Fantozzi ((Department of Economic and Food Science, University of Perugia, Via San Costanzo, I-06126 Perugia, Italy), Journal of the Science of Food and Agriculture, 2011, 91(5), 820-830].