

From the Director's Desk

India is one of the richest and most diversified countries as far as biodiversity, natural products and resources are concerned. Dissemination of information on various topics related to these subjects has acquired unprecedented prominence in the last two decades as every field, be it science, technology or engineering, look to natural resources as a safe source, both environmentally as well as technologically.

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Gangan Prathap

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(A Quarterly Electronic Repository of Current Information on Natural Products and Resources)

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NATURAL PRODUCTS AND RESOURCES REPOSITORY (NPARR)

(A Quarterly Electronic Repository of Current Information on Natural Products and Resources)

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NATURAL PRODUCTS AND RESOURCES REPOSITORY (NPARR)

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

NPARR 3(3), 2012-0230, Production of caffeinated and decaffeinated green tea catechin powders from underutilised old tea leaves

Only the apical bud and the top four leaves are normally used to make high quality green teas, while the older lower leaves are cut and used for mulch. The aim was to determine whether the old fifth to tenth leaves could be used to make caffeinated and decaffeinated green tea catechin powders. The leaves were decaffeinated by blanching in water at 100°C for 10 min to remove 80% of the caffeine while retaining 85% of the catechins. The leaves were then extracted in water at 80°C and freeze drying gave 100% yields of extractable powder and catechins while spray drying gave 20–25% lower yields. Decaffeination and spray drying also increased the conversion of epistructured to non-epistructured catechins. Therefore, this study has shown that old green tea leaves, which are usually discarded, could be used as an underutilised source to make caffeinated and decaffeinated green tea catechin powders [Quan V. Vuong*, John B. Golding, Minh H. Nguyen and Paul D. Roach (School of Environmental and Life Sciences, University of Newcastle, Ourimbah, NSW 2258, Australia), *Journal of Food Engineering*, 2012, **110**(1), 1-8].

NPARR 3(3), 2012-0231, Estimation of theaflavin content in black tea using electronic tongue

Biochemical components like theaflavins (TF) play very important role in the quality of finished CTC (cut, torn and curled) variety of tea. TF are known to provide characteristic

astriogeneity to the taste of finished CTC tea. The quality indicators like brightness, briskness, strength, color and overall quality of tea liquor are also due to the amount of TF present. A positive correlation is normally observed between the amount of TF and the quality scores of finished tea. Biochemical tests that yield the percentage of TF are often time consuming, require meticulous effort of sample preparation, storage and measurement. This paper proposes an alternative approach of quality evaluation of CTC tea by predicting the amount of TF that may be present in a given tea sample, using a voltammetric electronic tongue [Arunangshu Ghosh*, Praia Tamuly, Nabarun Bhattacharyya, Bipan Tudu, Nagen Gogoi and Rajib Bandyopadhyay (Department of Instrumentation and Electronics Engineering, Jadavpur University, Kolkata 700 098, India), *Journal of Food Engineering*, 2012, **110**(1), 71-79]

NPARR 3(3), 2012-0232, Determination of catechins and flavonol glycosides in Chinese tea varieties

A standardized profiling method based on high performance liquid chromatography combined with ultraviolet (UV) and mass spectrometric detection (MS) was established to analyse the phenolic compounds of selected tea varieties used for manufacturing of green, black and oolong teas. The composition and content of 24 tea constituents were analysed, including catechins, flavonol and flavones glycosides, phenolic acids and purine alkaloids. Each tea variety had a unique chemical profile. The compositions of catechins were lower in the tea varieties for green tea manufacturing, while the content of myricetin glycosides was the lowest in the tea variety for oolong tea manufacturing. The content of individual phenolic compounds in the selected tea varieties is highly variable. However, the content of total catechins is proposed to be

helpful to classify tea according to the future application as non fermented green and fermented oolong or black tea [Chunyan Wu, Hairong Xu, Julien Héritier and Wilfried Andlauer* (University of Applied Sciences Valais, Institute of Life Technologies, Route du Rawyl 47, CH-1950 Sion, Switzerland), *Food Chemistry*, 2012, **132**(1), 144-149].

NPARR 3(3), 2012-0233, Green tea polyphenols benefits body composition and improves bone quality in long-term high-fat diet-induced obese rats

This study investigates the effects of green tea polyphenols (GTPs) on body composition and bone properties along with mechanisms in obese female rats. Thirty-six 3-month-old Sprague Dawley female rats were fed either a low-fat (LF) or a high-fat (HF) diet for 4 months. Animals in the LF diet group continued on an LF diet for additional 4 months, whereas those in the HF diet group were divided into 2 groups: with GTP (0.5%) or without in drinking water, in addition to an HF diet for another 4 months. Body composition, femur bone mass and strength, serum endocrine and proinflammatory cytokines, and liver glutathione peroxidase (GPX) protein expression were determined. We hypothesized that supplementation of GTP in drinking water would benefit body composition, enhance bone quality, and suppress obesity-related endocrines in HF diet-induced obese female rats and that such changes are related to an elevation of antioxidant capacity and a reduction of proinflammatory cytokine production. After 8 months, compared with the LF diet, the HF diet increased percentage of fat mass and serum insulin-like growth factor I and leptin levels; reduced percentage of fat-free mass, bone strength, and GPX protein expression; but had no effect on bone mineral density and serum adiponectin levels in the rats. Green tea polyphenol supplementation increased percentage of fat-free mass, bone mineral density and strength, and GPX protein expression and

decreased percentage of fat mass, serum insulin-like growth factor I, leptin, adiponectin, and proinflammatory cytokines in the obese rats. This study shows that GTP supplementation benefited body composition and bone properties in obese rats possibly through enhancing antioxidant capacity and suppressing inflammation [Chwan-Li Shen*, Jay J. Cao, Raul Y. Dagda, Samuel Chanjaplammoitil, Chuanwen Lu, Ming-Chien Chyu, Weimin Gao, Jia-Sheng Wang, and James K. Yeh (Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, TX 79430-8115, USA), *Nutrition Research*, 2012, **32**(6), 448-457].

NPARR 3(3), 2012-0234, Effect of roasting conditions and grinding on free radical contents of coffee beans stored in air

The influence of roasting and storage conditions on free radical contents of individual Arabica coffee beans was examined during storage of whole, half and ground beans in air over a 1-month period. Free radical contents increased with increasing roasting time (roasting degree), but the atmosphere (air vs. N₂) used in the roasting and cooling process had little effect. There was a progressive increase in free radical contents with storage time, but the rate was much lower in whole beans than with half and fully ground beans, for which the rate was similar. These results suggest that exposure to O₂, rather than physical grinding is the main mechanism for storage-related free radical generation, and strongly indicate that roasted coffee is best kept as whole beans in order to minimise changes during prolonged periods of aerobic storage. Furthermore, they demonstrate that EPR measurements can contribute to understanding the process and storage related changes in coffee [C. Yeretjian, E.C. Pascual and B.A. Goodman* (Guangxi Key Laboratory of Subtropical Bio-Resource Conservation and Utilization, Guangxi University, Nanning, 530004 Guangxi, PR China), *Food Chemistry*, 2012, **131**(3), 811-816].

NPARR 3(3), 2012-0235, Impact of exogenous tannin additions on wine chemistry and wine sensory character

Tannins are an important part of wine quality and are frequently added during winemaking. Tannin additives and their impact on wine are poorly documented. This work sought to characterize a range of enological tannins and their contribution to wine quality. Enological tannins were analysed for protein precipitable tannins and iron reactive phenolics. One tannin product was added to a Merlot wine during barrel ageing, at a range of concentrations from 60 to 300 mg/l. Condensed and hydrolysable tannins were added to Cabernet Sauvignon wine post-pressing at a recommended and excessive rate. Wines were analysed for anthocyanin, small and large polymeric pigment, precipitable tannin, iron reactive phenolics and sensory character. Enological tannins contained 12-48% tannin and recommended additions had little impact on wine tannin. High tannin additions were readily measured in the wines and were discriminated in sensory analysis with lower intensities of most parameters except brown colour, bitterness and earthy character. Recommended addition rates are too low to impact the measured tannin concentration of Merlot and Cabernet Sauvignon wines from Washington (USA). High enological tannin additions had a measureable impact on final wine had a negative impact on sensory character. Tannins are added to wines for a range of reasons and represent one of many input costs in an industry increasingly seeking efficiencies in response to global economic circumstances, over-supply and an ongoing price point squeeze. This research suggests many tannin additions may be unjustified and have limited or negative impacts on quality [James F. Harbertson*, Giuseppina P. Parpinello, Hildegard Heymann and Mark O. Downey (School of Food Science, Washington State University, Irrigated Agriculture Research and Extension Centre, 24106 N. Bunn Rd.,

Prosser, WA 99350-8694, USA), *Food Chemistry*, 2012, **131**(3), 999-1008].

NPARR 3(3), 2012-0236, Effect of soy milk powder addition on staling of soy bread

Effect of soy milk components (soluble fibre (SF), insoluble fibre (ISF), soy protein) on physicochemical properties (crust and crumb colour, water activity, total moisture content, “freezable” water (FW), “unfreezable” water (UFW), amylopectin recrystallisation (ARC), stiffness and firmness) of soy breads stored for 7 days was studied. By the end of storage ISF additions significantly increased ARC (from 0.01 to 0.57W/g), whereas SF additions (0.30W/g) retarded staling with respect to soy flour bread (0.39W/g). Principal Component Analysis (PCA) of all the different treatments and formulations indicated that SMP addition resulted in the lowest firmness and least amylopectin retrogradation at the end of storage, likely due to the synergistic effect of soluble fibre, partly denatured soy proteins and lipid content of this ingredient [D. Nilufer-Erdil, L. Serventi, D. Boyacioglu and Y. Vodovotz* (Department of Food Science and Technology, The Ohio State University, Parker Food Science and Technology Bldg., 2015 Fyffe Court, Columbus, OH 43210-1007, USA), *Food Chemistry*, 2012, **131**(4), 1132-1139].

NPARR 3(3), 2012-0237, Religiosin B, a milk-clotting serine protease from *Ficus religiosa*

A novel milk-clotting serine protease, named religiosin B, is purified from *Ficus religiosa*. The molecular mass of the protein is 63,000 with pI value of pH 7.6. The proteolytic activity of the enzyme is strongly inhibited by phenylmethanesulfonyl fluoride (PMSF) and chymostatin. Religiosin B acts optimally at pH 8.0-8.5 and temperature 55°C. The molar absorption coefficient of the enzyme is $149,725\text{M}^{-1}\text{cm}^{-1}$ with 23 tryptophan, 15 tyrosine and 7 cysteine residues per molecule of the

enzyme. The enzyme shows broad substrate specificity with natural as well as synthetic substrates. Religiosin B is highly stable against denaturants and metal ions as well as over a wide range of pH and temperature. The *de novo* sequencing confirms the novelty of the enzyme. In addition to its high milk-clotting ability, it could be used in the cheese industry, as well as other food and biotechnological industries [Moni Kumari, Anurag Sharma and M.V. Jagannadham* (Molecular Biology Unit, Institute of Medical Sciences, Banaras Hindu University, Varanasi 221005, India), *Food Chemistry*, 2012, **131**(4), 1295-1303].

NPARR* 3(3), 2012-0238, *In Vitro* Activity of extract and fractions of natural cocoa powder on *Plasmodium falciparum

Several flavonoids isolated from certain plants have demonstrated antiplasmodial activity, after their initial indigenous use in malaria treatment. Cocoa has been found to be a rich food source of flavonoids in comparison with many common foods and beverages. The aim of this work was to investigate the *in vitro* activity of natural cocoa powder on the growth of *Plasmodium falciparum*. Prepared crude methanol extract was partitioned successively with petroleum ether, ethyl acetate, chloroform, and butanol. Total flavonoid concentration in the

crude methanol extract and fractions was measured by the AlCl_3 colorimetric assay. Direct inhibitory activity of the natural cocoa powder was assessed by culturing extract and fractions with *P. falciparum in vitro*. Greater antiplasmodial activity was observed in nonpolar solvent fractions (chloroform, ethyl acetate, and petroleum ether) compared with polar solvents. The chloroform fraction was most active, with mean \pm SEM 50% and 90% inhibition concentrations of 48.3 ± 0.9 and 417 ± 7.8 $\mu\text{g/mL}$, respectively. The study showed a weak association between total flavonoid concentration and antiplasmodial activity. Early trophozoite (ring-stage) synchronized cultures treated with the chloroform fraction of natural cocoa powder showed a decline in growth. Further reduction in parasitemia was also observed for other erythrocytic stages. These results suggest that natural cocoa powder has measurable direct *in vitro* inhibitory effect on *P. falciparum* and support the anecdotal reports of its ability to prevent malaria as a result of regular intake as a beverage [Seth K. Amponsah, Kwasi A. Bugyei, Dorcas Osei-Safo, F. Kwaku Addai, George Asare, Emmanuel Aheto Tsegah, Joseph Baah, Michael Ofori, and Ben A. Gyan* (Department of Immunology, Ncoguchi Memorial Institute for Medical Research, University of Ghana, P.O. Box LG 581, Legon, Ghana), *Journal of Medicinal Food*, 2012, **15**(5), 476-482]

COSMECEUTICALS

NPARR 3(3), 2012-0239, Inhibition of *Propionibacterium acnes* lipase by extracts of Indian medicinal plants

Lipases play an important role in pathogenesis of acne by hydrolysing sebum triglycerides and releasing irritating free fatty acids in the pilosebaceous follicles. Lipase is a strong chemotactic and proinflammatory antigen. Therefore, lipase has generated a high interest as a pharmacological target for antiacne drugs. The aim of this study was to identify inhibitory effects of plant extracts on the lipase activity of *Propionibacterium acnes*. Colorimetric microassay was used to determine lipase activity. Extracts from *Terminalia chebula* and *Embelia ribes* showed lower IC_{50} value ($1\mu\text{g mL}^{-1}$) for lipase inhibition as compared to *Vitex negundo* and *Picrorhiza kurroa* (19 and $47\mu\text{g mL}^{-1}$, respectively). The active component responsible for lipase inhibition was isolated. This study reports for the first time the novel antilipase activity of chebulagic acid (IC_{50} : $60\mu\text{mol L}^{-1}$) with minimum inhibitory concentration value of $12.5\mu\text{g mL}^{-1}$ against *P. acnes*. The inhibitory potential of plant extracts was further confirmed by plate assay. The organism was grown in the presence of subinhibitory concentrations of extracts from *P. kurroa*, *V. negundo*, *T. chebula*, *E. ribes* and antibiotics such as clindamycin and tetracycline. Extract from *T. chebula* showed significant inhibition of lipase activity and number of *P. acnes*. [V. Patil, A. Bandivadekar and D. Debjani* (Department of Biochemistry, The Institute of Science, Madam Cama Road, Mumbai 400032), *International Journal of Cosmetic Science*, 2012, **34**(3), 234-239]

NPARR 3(3), 2012-0240, Moisturizing effect of alcohol-based hand rub containing okra polysaccharide

A natural, moisturizing alcohol-based hand rub (ABHR) containing okra (*Abelmoschus esculentus*) polysaccharide was formulated to reduce the dryness caused by traditional hand-cleansing products. The ABHR developed also reduced infectious disease transmission. Preliminary evaluations of the stable natural hand hygiene preparations were conducted to determine preference and short-term moisturizing efficacy in volunteers. Formulations contained varying amounts of gelling agent (0.5% and 0.3% w/v). Accelerated stability testing using a centrifugation assay and six heating/cooling cycles of the ABHR bases were performed. Then, okra polysaccharide (5%, 7%, 10% and 15% w/w) was incorporated into the base, and stability tests were repeated. The moisturizing okra polysaccharide was compatible with the formulations at all concentrations. All of the formulated ABHRs were stable. Sensory evaluation was conducted in 36 volunteers. The two most preferred okra ABHRs were patch-tested in 12 volunteers; results indicated none of the preparations caused irritation. Efficacy of the most preferred moisturizing ABHR containing 0.3% gelling agent and 10% (w/v) okra extract was determined. Short-term moisturizing efficacy of a single application was examined in 20 volunteers. The okra ABHR hydrated skin significantly better than a control ABHR ($P<0.005$) at 30 min after application. Skin moisture was retained for 210 min of the observation period. Thus, the ABHR product containing moisturizing okra is safe, efficacious and possesses desirable properties. The formulation can be applied every 3 h for good hand hygiene with moisturizing efficacy [M. Kanlayavattanakul*, C. Rodchuea and N. Lourith (School of Cosmetic Science, Mae Fah Luang University, Chiang Rai 57100, Thailand), *International Journal of Cosmetic Science*, 2012, **34**(3), 280-283].

DYES (incl. Food colorants)

NPARR 3(3), 2012-0241, Production of a concentrated natural dye from Canadian Goldenrod (*Solidago canadensis*) extracts

The dyestuff content in plant sources is rather low, usually in the order of a few % of the mass of dry plant material. Introduction of plant dyes into technical scale textile dyeing operations thus requires handling, extraction and disposal of huge amounts of plant material. The precipitation of a solid, dyestuff-containing residue by addition of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ to the aqueous plant extract yields a highly concentrated plant dye. In this work Canadian Goldenrod (*Solidago canadensis*) was used as representative case to study production of a concentrated solid plant dye. An iron content of 5% w/w of the dry precipitate was analysed by photometry (1, 10-Phenanthrolinechloride). The content of total phenolics (TPH) calculated as gallic acid monohydrate equivalents according the Folin-Ciocalteu method, was determined with 45% w/w.

The dyestuff precipitate was tested in standard dyeing experiments. Shade and colour depth were found comparable to dyeings obtained with direct use of plant extracts. Use of a concentrated natural dye product offers new approaches with regard to standardisation of dyestuff quality, handling and applicable dyeing techniques. [Peter Leitner, Christa Fitz-Binder, Amalid Mahmud-Ali, Thomas Bechtold* (Research Institute of Textile Chemistry and Textile Physics of the University Innsbruck, Hoehsterstrasse 73, 6850 Dornbirn, Austria), *Dyes and Pigments*, 2012, **93**(1-3), 1416-1421].

NPARR 3(3), 2012-0242, Dyeing and anti-ultraviolet properties of anthocynins extracted from purple sweet potatoes for silk

Purple sweet potatoes were applied to extract anthocyanins for dyeing silk fabrics.

Dyeing and anti-ultraviolet properties of anthocyanins were investigated. The color yield, exhaustion behaviors, fastness properties and anti-ultraviolet properties of dyed silk fabrics were also discussed. The results showed that high color strength value (K/S value =3.01) was achieved at 50°C and pH 3. The washing and rubbing fastness properties were enhanced by mordant dyeing method using alum. The dyed silk samples displayed good anti-ultraviolet and the UV transmittance was decreased by 46% at 300nm and 58% at 360nm [Li Yuan Peng, Hai Yan Mao, Yu Fei Xiu, Kai Rui Zhang and Chao Xia Wang, *Advanced Materials Research*, 2012, **441**, 371-375].

NPARR 3(3), 2012-0243, Dyeing of silk with natural plant extract from *Rhizoma picrorhizae*

A new concept that uses natural plant extract from *Rhizoma Picrorhizae* (RP) as a natural dye in silk dyeing was proposed. The RP extract can be adsorbed by silk to provide yellow to brown color, depending on the RP concentration. The stabilities of RP solution against pH, heat, and ultraviolet light were investigated. Factors such as pH, temperature, dyeing time, RP concentration were studied in order to understand the dyeing properties of RP extract for silk fabric. After dyeing, some of the samples are mordanted with different mordants. It was founded that RP extract was stable at acidic conditions and stable to heat and ultraviolet light, and the interactions between silk and RP extract molecules were non-electrostatic interactions; and that RP extract showed good building-up properties on silk. Furthermore, the colors of the dyed fabric mordanted with different mordants as well as their depth were greatly dependent on the chemical nature of mordants. In conclusion, RP was a potential natural dye which can be applied to silk dyeing [Sha Sha Sun, Jie Jie Wang and Ren Cheng Tang, *Advanced Materials Research*, 2012, **441**, 155-159].

NPARR 3(3), 2012-0244, Assessment of colorimetric, antibacterial and antifungal properties of woollen yarn dyed with the extract of the leaves of henna (*Lawsonia inermis*)

The extract of leaves of henna was applied on woollen yarn to investigate the dyeing characteristics and antimicrobial efficacy against common human pathogens such as *Escherichia coli* MTCC 443, *Staphylococcus aureus* MTCC 902 and *Candida albicans* ATCC 90028. Bioactivity of henna dyed woollen yarn was compared with commercial antibacterial (Ampicillin) and antifungal (Fluconazole) agents. *Lawsonia inermis* dyed woollen yarn samples were found considerably active against tested microorganisms. Dyed wool yarns were tested for fastness toward light, washing and crocking (dry and wet). Fastness properties of dyed woollen yarn samples were found considerably good. Effect of eco-friendly metallic salt mordants on bioactivity and color characteristics of dyed woollen yarn samples were also investigated. The results proved that mordanted wool yarn showed increase in dye uptake resulting in high color strength and better fastness properties but considerable decrease in antimicrobial activity and slight decrease in the case of antifungal activity were observed with the application of mordants. [Mohd Yusuf, Aijaz Ahmad, Mohammad Shahid, Mohd Ibrahim Khan, Shafat Ahmad Khan, Nikhat Manzoor, Faqeer Mohammad* (Department of Chemistry, Jamia Millia Islamia (Central University), Jamia Nagar, New Delhi 110025, India), *Journal of Cleaner Production*, 2012, **27**, 42-50].

NPARR 3(3), 2012-0245, Aluminium based dye lakes from plant extracts for textile coloration

Production of concentrated natural dyes is a pre-requisite for a re-introduction of plant colorant based dyes into modern textile dyeing operations. Aluminium salts such as $Al_2(SO_4)_3 \cdot 14-15H_2O$ or $KAl(SO_4)_2 \cdot 12H_2O$ can be

used to precipitate extracted plant dyes from aqueous extracts at pH 5.0-5.5. Onion peel, Canadian Goldenrod and pomegranate peel were studied as representative sources for dye extraction. As an average 5% w/w of the extracted dry plant material could be collected as precipitate. After dissolving these residues in diluted oxalic acid, the quality of the dye lake was characterised by photometric analysis of the total phenol content in the dry using the Folin-Ciocalteu method, determination of the aluminium content and measurement of the absorbance at 400nm. Representative values of TPH in the dry solid dyestuff range from 20 to 40% and representative values for the aluminium content were determined with 3-5% w/w. Colour strength of the dissolved lakes was determined in dyeing experiments using different substrates and mordants followed by measurement of CIELab coordinates and K/S value according Kubelka-Munk function. Compared to the direct use of plant extracts the colour strength of the lakes is lower, however chroma of the dyeings is higher, as the lake formation also represents a dye purification step. [Amalid Mahmud-Ali, Christa Fitz-Binder, Thomas Bechtold* (Research Institute of Textile Chemistry and Textile Physics of the University Innsbruck, Hoehsterstrasse 73, 6850 Dornbirn, Austria), *Dyes and Pigments*, 2012, **94**(3), 533-540].

NPARR 3(3), 2012-0246, Dyeing silk with tea polyphenol

Tea polyphenol (TP) was used to dye silk by the post-mordanting method using three different metal salts as the mordant; ferrous sulfate, copper sulfate and potassium aluminum sulfate. The results were analyzed in terms of color strength (K/S value) and fastness characteristics as well as the influence of variables such as dyeing time, temperature and pH on the color depth of the dyed sample. A weak acid medium and a low dyeing temperature were found to be optimal for adsorption of TP when dyeing silk with TP. Comparing the color

shade of dyed silk obtained with different metal salts as the mordant showed that ferrous sulfate gave the highest K/S value followed by copper and then aluminum. During the soaping colorfastness test, a relatively large color change

was associated with increased color strength as well as non-staining of adjacent fibers [Hong Fei Qian, Ping Zhu, Gang Bai and Yan Chun Liu, *Journal Advanced Materials Research*, 2012, **441**, 83-87].

ESSENTIAL OILS (incl. Flavour and Fragrance)

NPARR 3(3), 2012-0247, The anticarcinogenic potential of essential oil and aqueous infusion from caper (*Capparis spinosa* L.)

The present study assessed the influence of essential oil and aqueous infusion from wild-grown caper (*Capparis spinosa* L.) on cell growth, NF- κ B activation, apoptosis and cell cycle in the human colon carcinoma cell line, HT-29. Methyl isothiocyanate (92.06%), a degradation product of glucosinolate glucocapparin, was detected as major component of essential oil from caper leaves and flower buds. Aqueous infusion of caper showed an interesting and variegated compositional pattern containing several phenolic compounds, among which a flavonol glycoside, rutin (quercetin 3-*O*-rutinoside, 50.7%) and 5-caffeoyl-quinic acid (chlorogenic acid, 17.5%) were detected as dominant. Caper essential oil and aqueous infusion showed time- and dose-dependent high inhibitory effect on HT-29 cell proliferation. In addition, they induced the inhibition on nuclear factor κ B (NF- κ B) activity in a dose-dependent manner, while they did not show any effect on apoptosis in HT-29 cells. Flow cytometric analysis indicated that treatment with caper essential oil and aqueous infusion resulted in G₂/M cell cycle arrest in a dose-dependent manner. Presented results suggest that caper contains volatile and non-volatile compounds which potentially can play an important role in colon cancer prevention. [Tea Kulisic-Bilusic*, Ingrid Schmöller, Kerstin Schnäbele, Laura Siracusa and Giuseppe Ruberto (Faculty of Chemistry and Technology, University of Split, Teslina 10, 21000 Split, Croatia), *Food Chemistry*, 2012, **132**(1), 261-267].

NPARR 3(3), 2012-0248, Effect of fermentation time and drying temperature on volatile compounds in cocoa

The effects of fermentation time and drying temperature on the profile of volatile compounds were evaluated after 2, 4, 6, and 8 fermentation days followed by drying at 60, 70 and 80 °C. These treatments were compared with dry cocoa controls produced in a Samoa drier and by a sun-drying process. A total of 58 volatile compounds were identified by SPME-HS/GC-MS and classified as: esters (20), alcohols (12), acids (11), aldehydes and ketones (8), pyrazines (4) and other compounds (3). Six days of fermentation were enough to produce volatile compounds with flavour notes desirable in cocoa beans, as well as to avoid the production of compounds with off-flavour notes. Drying at 70 and 80 °C after six fermentation days presented a volatile profile similar to the one obtained by sun drying. However, drying at 70 °C represents a lower cost. Given the above results, in the present study the optimal conditions for fermentation and drying of cocoa beans were 6 days of fermentation, followed by drying at 70 °C [J. Rodriguez-Campos, H.B. Escalona-Buendía, S.M. Contreras-Ramos, I. Orozco-Avila, E. Jaramillo-Flores and E. Lugo-Cervantes* (Department of Food Science, National School of Biological Sciences National Polytechnic Institute (ENCB-IPN), Prolongación de Carpio y Plan de Ayala s/n, Col. Santo Tomas, Delegación Miguel Hidalgo, 11340 Mexico City, Mexico), *Food Chemistry*, 2012, **132**(1), 277-288].

NPARR 3(3), 2012-0249, A taste of sweet pepper: Volatile and non-volatile chemical composition of fresh sweet pepper (*Capsicum annuum*) in relation to sensory evaluation of taste

In this study volatile and non-volatile compounds, as well as some breeding parameters, were measured in mature fruits of elite sweet pepper (*Capsicum annuum*) lines and hybrids from a commercial breeding program, several cultivated genotypes and one gene bank accession. In addition, all genotypes were evaluated for taste by a trained descriptive

sensory expert panel. Metabolic contrasts between genotypes were caused by clusters of volatile and non-volatile compounds, which could be related to metabolic pathways and common biochemical precursors. Clusters of phenolic derivatives, higher alkanes, sesquiterpenes and lipid derived volatiles formed the major determinants of the genotypic differences. Flavour was described with the use of 14 taste attributes, of which the texture related attributes and the sweet-sour contrast were the most discriminatory factors. The attributes juiciness, toughness, crunchiness, stickiness, sweetness, aroma, sourness and fruity/apple taste could be significantly predicted with combined volatile and non-volatile data. Fructose and (E)-2-hexen-1-ol were highly correlated with aroma, fruity/apple taste and sweetness. New relations were found for fruity/apple taste and sweetness with the compounds p-menth-1-en-9-al, (E)- β -ocimene, (Z)-2-penten-1-ol and (E)-geranylacetone. Based on the overall biochemical and sensory results, the perspectives for flavour improvement by breeding are discussed [P.M. Eggink*, C. Maliepaard, Y. Tikunov, J.P.W. Haanstra, A.G. Bovy and R.G.F. Visser (Graduate School Experimental Plant Sciences, Wageningen, The Netherlands), *Food Chemistry*, 2012, **132**(1), 301-310].

NPARR 3(3), 2012-0250, Effect of cultural system and essential oil treatment on antioxidant capacity in raspberries

The effects of cultural system and essential oil treatment on antioxidant capacities in raspberries were evaluated. Raspberries were hand-harvested from organic and conventional farms in Maryland, USA, and were treated with essential oil including carvacrol, anethole, cinnamic acid, perillaldehyde, cinnamaldehyde, and linalool. Results from this study showed that raspberries grown from organic culture exhibited higher value of antioxidant capacities and individual flavonoids contents. Moreover, the

organic culture also enhanced the activities of antioxidant enzymes. In addition, essential oil treatments promoted the antioxidant enzymes activities and antioxidant capacities of raspberries, and the most effective compound was perillaldehyde. In conclusion, raspberries produced from organic culture contained significantly higher antioxidant capacities than those produce from conventional culture. Postharvest essential oil treatments have positive effect on enhancing antioxidant capacities in raspberries from both organic and conventional cultures [Peng Jin, Shiow Y. Wang, Haiyan Gao, Hangjun Chen Yonghua Zheng* and Chien Y. Wang (College of Food Science and Technology, Nanjing Agricultural University, Nanjing 210095, China), *Food Chemistry*, 2012, **132**(1), 399-405].

NPARR 3(3), 2012-0251, Stability of avocado oil during heating: comparative study to olive oil

The stability of the saponifiable and unsaponifiable fractions of avocado oil, under a drastic heating treatment, was studied and compared to that of olive oil. Avocado and olive oil were characterised and compared at time 0h and after different times of heating process (180°C). PUFA/SFA (0.61 at $t = 0$) and ω -6/ ω -3 (14.05 at $t = 0$) were higher in avocado oil than in olive oil during the whole experiment. Avocado oil was richer than olive oil in total phytosterols at time 0 h (339.64; 228.27mg/100g) and at 9 h (270.44; 210.30 mg/100g) of heating. TBARs were higher in olive oil after 3 h, reaching the maximum values in both oils at 6h of heating treatment. Vitamin E was higher in olive oil (35.52 vs. 24.5 mg/100g) and it disappeared earlier in avocado oil (at 4 vs. 5h). The stability of avocado oil was similar to that of olive oil [Izaskun Berasategi, Blanca Barriuso, Diana Ansorena* and Iciar Astiasarán (Faculty of Pharmacy, University of Navarra, Spain), *Food Chemistry*, 2012, **132**(1), 439-446].

NPARR 3(3), 2012-0252, Application of response surface methodology to optimise supercritical carbon dioxide extraction of essential oil from *Cyperus rotundus* Linn.

Supercritical fluid extraction with carbon dioxide (SC-CO₂ extraction) was performed to isolate essential oils from the rhizomes of *Cyperus rotundus* Linn. Effects of temperature, pressure, extraction time, and CO₂ flow rate on the yield of essential oils were investigated by response surface methodology (RSM). The oil yield was represented by a second-order polynomial model using central composite rotatable design (CCRD). The oil yield increased significantly with pressure ($p < 0.0001$) and CO₂ flow rate ($p < 0.01$). The maximum oil yield from the response surface equation was predicted to be 1.82% using an extraction temperature of 37.6°C, pressure of 294.4 bar, extraction time of 119.8 min, and CO₂ flow rate of 20.9L/h [Hongwu Wang*, Yanqing Liu, Shoulian Wei and Zijun Yan (School of Chemistry & Chemical Engineering, Zhaoqing University, Zhaoqing 526061, People's Republic of China), *Food Chemistry*, 2012, **132**(1), 582-587].

NPARR 3(3), 2012-0253, Chemical composition of leaf and root essential oils of *Boenninghausenia albiflora* Reichb. from northern India

The leaf and root essential oil composition of *Boenninghausenia albiflora* Reichb and Meissner (Family: Rutaceae), collected from Uttarakhand, India, was analysed by capillary gas chromatography and gas chromatography–mass spectrometry. The major constituents identified in the leaf essential oil were β -myrcene, (*Z*)- β -guaiene, (*Z*)- β -ocimene and β -caryophyllene, whereas bicyclegermacrene, α -terpinyl acetate, geijerene and β -copaene-4 α -ol were identified as the major constituents of the root essential oil. This is the first time that the chemical compositions of leaf and root essential oils of *B. albiflora* have been investigated in detail. The results show significant qualitative and quantitative variations in leaf and root oil composition [Rajendra C. Padalia*, Ram S. Verma, Amit Chauhan and Chandan S. Chanotiya (Central Institute of Medicinal and Aromatic Plants (CIMAP, CSIR), Research Centre, Pantnagar 263 149, Uttarakhand, India), *Natural Product Research* (Formerly *Natural Product Letters*), 2012, **26**(21), 2040-2044].

FEED/FODDER

NPARR 3(3), 2012-0254, Effects of the dietary incorporation of untreated and white-rot fungi (*Ganoderma resinaceum* Boud) pre-treated olive leaves on growing rabbits

The aim of this study was to evaluate the effects of the level of inclusion of olive leaves and its pre-treatment with *Ganoderma resinaceum* Boud on growth performance, nutrient digestibilities and caecal fermentation. A total of 48 rabbits were kept in individual cages and divided in 4 groups of 12 animals. Animals were fed *ad libitum* with one of four diets based on a basal feed for growing rabbits- Control diet (basal feed without olive leaves; OL0), basal diet with 50g/kg or 100g/kg of olive leaves (OL5 and OL10), and a basal diet with 50g/kg of *G. resinaceum* pre-treated olive leaves (OL5F).

The inclusion of olive leaves (OL0 vs. OL5 and OL10) had no effect on growth performance or feed intake. However lower feed intakes ($P=0.038$) were measured at 100g/kg of inclusion when compared to 50g/kg level of inclusion. Organic matter, neutral detergent fibre, crude fat and crude protein digestibilities were lower ($P<0.05$) for diets with the inclusion of olive leaves (OL0 vs. OL5 and OL10). Although the caecal volatile fatty acid (VFA) concentration was not affected by treatments there was an increase in caecum dry weight contents ($P=0.004$) in animals fed diets with olive leaves (OL0 vs. OL5 and OL10). Simple phenolics were completely removed by the pre-treatment with *G. resinaceum* and the concentration of flavonoids and iridoids were reduced by 85%. No effects of the pre-treatment with fungi (OL5F) were observed on the performance of growing rabbits compared to OL5 treatment. The pre-treatment with *G. resinaceum* increased ($P=0.02$) crude fat digestibility (0.829 vs. 0.886) and decreased ($P=0.006$) starch digestibility (0.987 vs. 0.973). Animals fed OL5F diet had lower caecum dry

weight contents (-21% ; $P=0.002$), higher caecal valeric acid concentration ($+50\%$; $P=0.046$) and a trend ($P=0.054$) for a higher caecal acetic acid concentration (increase of 12%), compared with OL5 treatment.

This study showed that increasing amounts of olive leaves in the diet decrease nutrient digestibility. However, fungal treatment of olive leaves seems to alleviate the effect of olive leaves inclusion [L. Ribeiro, V. Pinheiro, D. Outor-Monteiro, J. Mourão, R.M.F. Bezerra, A.A. Dias, R.N. Bennett, G. Marques, M.A.M. Rodrigues* (CECAV, Universidade de Trás-os-Montes e Alto Douro, Department of Animal Science, Apartado 1013, 5000-801 Vila Real, Portugal), *Animal Feed Science and Technology*, 2012, **173**(3-4), 244-251].

NPARR 3(3), 2012-0255, The effect of feeding lentil on growth performance and diet nutrient digestibility in starter pigs

The effects of substitution of soybean meal with increasing levels of green lentil (*Lens culinaris*) were evaluated in 240 starter pigs from 9 to 20 kg. Five pelleted wheat-based diets containing 0, 75, 150, 225, or 300g lentil/kg were formulated to contain 9.76 MJ net energy (NE)/kg and 1.20 g standardised ileal digestible lysine (Lys)/MJ NE and were fed for 3 weeks starting 2 weeks after weaning at 19 days of age. Lentil was added by replacing soybean meal and wheat and the diets were balanced for NE using canola oil and for amino acids using crystalline Lys, threonine, methionine and tryptophan. Increasing dietary inclusion of lentil linearly decreased ($P<0.001$) the diet apparent total tract digestibility coefficient for crude protein from 0.821 to 0.798 and digestible energy value from 14.4 to 14.0 MJ/kg. For the entire trial (day 0-21), increasing dietary inclusion of lentil linearly decreased ($P<0.05$) average daily gain (ADG) and quadratically reduced ($P<0.01$) feed efficiency (G: F). Specifically, pigs fed 75-225g lentil/kg had a similar ADG and G:F than pigs

fed 0g lentil/kg, whilst the inclusion of 300g lentil/kg reduced ($P<0.01$) both ADG and G:F by 10%. Differences in feed intake were not observed ($P>0.05$). In conclusion, inclusion of green lentil should not exceed 225 g/kg in diets for nursery pigs to maintain similar performance as pigs fed a diet with soybean meal as the main supplemental protein feedstuff [J.L. Landero, E. Beltranena and R.T. Zijlstra* (Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Alberta T6G 2P5, Canada), *Animal Feed Science and Technology*, 2012, **174**(1-2), 108-112].

NPARR 3(3), 2012-0256, Effects of energy level and *Leucaena leucocephala* leaf meal as a protein source on rumen fermentation efficiency and digestibility in swamp buffalo

Four Thai- rumen fistulated male swamp buffaloes (*Bubalus bubalis*), about 3 years old with 360 ± 18 kg liveweight, were randomly assigned according to a 2×2 factorial arrangement in a 4×4 Latin square design to receive four dietary treatments. The treatments were as follows: a cassava based supplement (CS) at 1g/kg BW and *Leucaena leucocephala* leaf meal (LLM) at 300g/d (T1); CS at 2g/kg BW with LLM at 300g/d (T2); CS at 1g/kg BW and heat treated LLM (HLLM) at 300g/d (T3); and CS at 2g/kg BW and HLLM at 300g/d. During the experiment, urea-calcium hydroxide treated rice straw was given on *ad libitum* basis. The results revealed an increase in roughage and total dry matter (DM) intake ($P<0.05$) by CS at 2g/kg BW (T2 and T4) as compared with CS at 1g/kg BW (T1 and T3). Digestion coefficients of DM, organic matter (OM), and crude protein (CP) were increased by CS at 2g/kg BW, while neutral

detergent fiber (aNDF) and acid detergent fiber (ADF) were similar among treatments. However, there was no effect of neither energy level nor HLLM on ruminal pH and temperature ($P>0.05$). Concentration of ruminal ammonia nitrogen ($\text{NH}_3\text{-N}$) was decreased by HLLM as compared with LLM ($P<0.05$), while blood urea-nitrogen was not altered. There was an increase ($P<0.05$) in total volatile fatty acid (TVFA), acetic acid (C2), propionic acid (C3), and butyric acid (C4) concentrations and the highest were found in CS at 2g/kg BW with HLLM (T4), while the lowest was in T1 and T3. However, no changes in C2-C3 ratio were found in this study. Total bacterial direct counts were found different ($P<0.05$), whereas fungal zoospores and protozoal populations were similar among treatments. Nevertheless, viable bacterial counts were found affected by both concentrate level and HLLM. The treatments with HLLM were lower than those in LLM and CS at 2g/kg BW were higher than those supplemented at CS at 1g/kg BW ($P<0.05$). In addition, efficiency of rumen microbial CP synthesis tended to be higher in treatment with higher level of energy and HLLM. Based on this study, it could be concluded that LLM could be used as a protein source, while the combination of HLLM and CS at 2g/kg BW could enhance the voluntary feed intake, nutrient digestibility and rumen fermentation in swamp buffalo fed on treated rice straw (urea-calcium hydroxide treatment) [S. Kang, M. Wanapat*, P. Pakdee, R. Pilajun and A. Cherdthong (Tropical Feed Resources Research and Development Center (TROFREC), Department of Animal Science, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand), *Animal Feed Science and Technology*, 2012, **174**(3-4), 131-139].

FIBRES (incl. Textile and other utility fibres)

NPARR 3(3), 2012-0257, Influence of fibre treatments on mechanical properties of short *Sansevieria cylindrica*/polyester composites

In the present study, to improve the interfacial bond between *Sansevieria cylindrica* fibres (SCFs) and polyester matrix, chemical surface treatments have been performed on the fibres. Treatments including alkali, benzoyl peroxide, potassium permanganate and stearic acid were carried out to modify the fibre surface. Raw and each type of treated SCF samples were utilised separately for fabricating the composites. The mechanical properties of composites prepared from the chemically treated SCFs are found to be much better than those of the untreated ones. Potassium-permanganate-treated *S. cylindrica* fibre/polyester (PSCFP) composites showed optimum mechanical properties among the treated *S. cylindrica* fibre/polyester (SCFP) composites. The surface morphologies of fracture surfaces of composites were recorded using scanning electron microscopy (SEM). The SEM micrographs reveal that interfacial bonding between potassium-permanganate-treated SCF (PSCF) and polyester matrix has significantly improved, suggesting that better dispersion of PSCF into the matrix has occurred upon potassium permanganate treatment of SCF [V.S. Sreenivasan*, D. Ravindran, V. Manikandan and R. Narayanasamy (Department of Mechanical Engineering, Dr. Sivanthi Aditanar College of Engineering, Tiruchendur 628 215, Tamil Nadu, India), *Materials & Design*, 2012, **37**, 111-121].

NPARR 3(3), 2012-0258, Characterisation of agricultural residues used as a source of fibres for fibre-cement production

Nowadays, certain components of non-wood annual plants such as corn stalk and industrial hemp core are considered waste

materials or used in low value applications; both by-products have a very low cost. On the other hand, given the large quantities of these materials generated worldwide and their renewable character, it is reasonable to explore new routes for their exploitation. The aim of this paper is to study the potential of both corn stalk (*Zea mays* L.) and industrial hemp core (*Cannabis sativa* L.) fibres as a renewable source of cellulose fibres in the production of fibre-cement. For each source of fibres, a number of chemical cooking treatments were studied. The morphological properties of the fibres were determined using a scanning electron microscope and a fibre and pulp morphological analyser. Pulp refining was carried out in a PFI mill to improve the characteristics of the fibres. In the case of corn fibres, different degrees of refining were applied. The fibre flocculation process was investigated using several polyacrylamides. The process was studied by monitoring the chord size distribution in real time by means of a focused beam reflectance measurement probe.

The results indicated that both pulps can be used for the production of fibre-cement, having the two types of pulp morphological similarities with the pine fibres currently used. Through the flocculation process it was concluded the floc size depends on the length of the fibres [Rocío Jarabo, M Concepción Monte*, Angeles Blanco, Carlos Negro and Julio Tijero (Chemical Engineering Department, Faculty of Chemistry, University Complutense of Madrid, 28040 Madrid, Spain), *Industrial Crops and Products*, 2012, **36**(1), 14-21].

NPARR 3(3), 2012-0259, Effects of the integration of Sunn hemp and soil solarization on plant-parasitic and free-living nematodes

Sunn hemp (SH), *Crotalaria juncea*, is known to suppress *Rotylenchulus reniformis* and weeds while enhancing free-living nematodes involved in nutrient cycling. Field trials were conducted in 2009 (Trial I) and 2010 (Trial II) to

examine if SH cover cropping could suppress *R. reniformis* and weeds while enhancing free-living nematodes if integrated with soil solarization (SOL). Cover cropping of SH, soil solarization, and SH followed by SOL (SHSOL) were compared to weedy fallow control (C). *Rotylenchulus reniformis* population was suppressed by SHSOL at the end of cover cropping or solarization period (Pi) in Trial I, but not in Trial II. However, SOL and SHSOL did not suppress *R. reniformis* compared to SH in either trial. SH enhanced abundance of bacterivores and suppressed the % herbivores only at Pi in Trial II. At termination of the experiment, SH resulted in a higher enrichment index indicating greater soil nutrient availability, and a higher structure index indicating a less disturbed nematode community compared to C. SOL suppressed bacterivores and fungivores only in Trial II but not in Trial I. On the other hand, SHSOL enhanced bacterivores and fungivores only at Pi in Trial I. Weeds were suppressed by SH, SOL and SHSOL throughout the experiment. SHSOL suppressed *R. reniformis* and enhanced free-living nematodes better than SOL, and

suppressed weeds better than SH [Sharadchandra P. Marahatta*, Koon-Hui Wang, Brent S. Sipes, and Cerruti R. R. Hooks (Science and Math Division, Kauai Community College, 3-1901 Kaunali Highway, Lihue, HI 96766-9500), *Journal of Nematology*, 2012, **44**(1), 72-79].

NPARR 3(3), 2012-0260, Nettle Fibre: Its Prospects, Uses and Problems in Historical Perspective

The stinging nettle plant (*Urtica dioica* L.) is perhaps best known as an abundant and perennial weed, but throughout history it has been used as a source of fibre in many parts of the world. This paper explores the potential uses of nettle fibre within a historical context and describes efforts made by the German and UK governments to cultivate and process the fibre for special war purposes during World War I and II. There has recently been a revival of interest in this fascinating fibre, and recent attempts to commercialise production are discussed [Harwood, Jane and Edom, Gillian, *Textile History*, 2012, **43**(1), 107-119].

FOOD (incl. Dairy, Fishery, Poultry and other Plant and Animal products)

NPARR 3(3), 2012-0261, Development of functional biscuit from soy flour & rice bran

The research intended to explore the possibility of fortifying the soy flour and rice bran to formulate the functional biscuit which have the ability to improve the quality of food products due to various functional properties. Supplementation of wheat flour with soya and rice bran was tried at 10 %, 15%, 20%, 25% level each. Prepared biscuit is subjected to physical, Sensory and nutritional analysis to evaluate the suitability of biscuit for consumption. The width of biscuit decreases from 44 to 36.2 with increasing in the level of substitution of composite flour of rice bran and soya. Similar trend shown by spread ratio. However, biscuit thickness increases from 9.2 to 10.6 with increasing level of substitution. Nine-Point Hedonic Score System was used for sensory evaluation of prepared biscuit which is generally decreases with increasing the level of substitution. From overall acceptability rating, 15% soy flour +15% rice bran incorporated biscuit obtained the highest rating compare to other treatments. At $p \leq 0.05$, there were no significant difference between the control treatment and best rated supplemented biscuit (70:15:15) in general preference of sensory rating. Nutritional evaluation of best rated supplemented biscuit were protein (15.7%), fat (19.5%), fiber (2.2%), and moisture (3.6%). Thus supplementation of soy flour and rice bran at 15% level each, would improve the nutritional quality without adversely affecting the sensory parameters [Neha Mishra* and Ramesh Chandra (Department of Food Science & Technology 2 Warner School of Food & Dairy Technology Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad), *International Journal of Agricultural and Food Science* 2012, **2**(1), 14-20].

NPARR 3(3), 2012-0262, Nutritional and functional properties of *Vicia faba* protein isolates and related fractions

The goal of this research was the characterisation of *Vicia faba* (broadbean) protein isolates and related fractions in order to determine whether this grain legume could be used for production of high quality protein products and other fractions rich in functional components. Alkaline extraction of the defatted seed flour, followed by precipitation at the isoelectric pH, yielded a 92% protein isolate with a high oil absorption capacity. The contents of the favism-inducing glycosides, vicine and convicine, in the isolate were reduced by more than 99% as compared to the original flour, although the amino acid composition was similar to that of the flour. Some of the by-products of protein isolate production may also be of interest from a nutritional and functional point of view. Thus, the oil resulting from hexane extraction of the flour is rich in unsaturated fatty acids, and polyphenols (resulting from extraction of the defatted flour with acetone) showed a high ABTS radical-scavenging activity. In addition, the solid residue (resulting from protein solubilisation) was high in fibre and showed good water absorption. These results show good nutritional and functional properties in *V. faba* protein isolates and related fractions, which may favour the revalorisation of this traditional bean crop [Javier Vioque*, Manuel Alaiz and Julio Girón-Calle (Instituto de la Grasa (C.S.I.C.), Avda. Padre García Tejero 4, 41012 Sevilla, Spain), *Food Chemistry*, 2012, **132**(1), 67-72].

NPARR 3(3), 2012-0263, Antioxidant activity of barley as affected by extrusion cooking

Grit from different hulled barley cultivars was subjected to extrusion cooking and the effect of extrusion moisture and temperature on the antioxidant properties was studied. A significant decrease in the total phenolic content (TPC) and total flavonoid content (TFC) was observed upon

extrusion and a further decrease of 8-29% in TPC and 13-27% in TFC was observed when both the feed moisture and extrusion temperature were increased. The antioxidant activity (AOA) increased significantly upon extrusion and this increase was the highest (36-69%) at 150 °C and 20% feed moisture. The increase in feed moisture and temperature significantly increased the metal chelating activity. The reducing power decreased significantly upon extrusion as compared to their corresponding control samples. Extrusion led to a greater increase in non-enzymatic browning (NEB) index however, increasing the moisture content of feed decreased the NEB index by 3-29% (at 180°C) and 1-17% (150°C), while increasing the temperature increased the NEB significantly [Paras Sharma, Hardeep Singh Gujral* and Baljeet Singh (Department of Food Science and Technology, Guru Nanak Dev University, Amritsar 143005, India), *Food Chemistry*, 2012, **131**(4), 1406-1413].

NPARR 3(3), 2012-0264, Development and characterization of a novel biodegradable edible film obtained from psyllium seed (*Plantago ovata* Forsk)

In this study, the physical, thermal and mechanical properties of a novel edible film based on psyllium hydrocolloid (PH) were investigated. PH films were prepared by incorporation of three levels of glycerol (15%, 25%, and 35% w/w). As glycerol concentration increased, water vapor permeability (WVP), percent of elongation (E %) and water solubility of PH films increased whilst, tensile strength (TS), surface hydrophobicity and glass transition point (T_g) decreased significantly. At the level of 15% (W/W) of glycerol, PH films showed the lowest WVP values ($1.16 \times 10^{-10} \text{ g H}_2\text{O m}^{-2} \text{ s}^{-1} \text{ MPa}^{-1}$), E % (24.57%) and water solubility (47.69%) and the highest values for TS (14.31 MPa), water contact angle (84.47) and T_g (175.2°C). By increasing glycerol concentration, PH films became slightly greenish and yellowish

in color but still transparent in appearance. This study revealed that the psyllium hydrocolloid had a good potential to be used in producing edible films with interesting specifications [Reza Ahmadi, Ahmad Kalbasi-Ashtari*, Abdulasoul Oromiehie, Mohammad-Saeed Yarmand and Forough Jahandideh (Department of Food Science, Engineering and Technology, Faculty of Agricultural Engineering and Technology, Campus of Agriculture and Natural Resources, University of Tehran, P.O. Box 4111, Karaj 31587-77871, Iran), *Journal of Food Engineering*, 2012, **109**(4), 745-751].

NPARR 3(3), 2012-0265, Effect of high pressure on fresh cheese shelf-life

The effect of high pressure (HP; 300 and 400 MPa for 5min at 6 °C) on physico-chemical, microbial, color, texture and sensorial characteristics of starter-free fresh cheeses stored at 4 and 8 °C was studied. Physico-chemical parameters considered were total solids, fat, total protein, pH, whey loss and water activity. The microbiological quality was studied, on cheeses stored at 4 and 8°C, by enumerating aerobic mesophilic bacteria, lactococci, psychrotrophic bacteria, *Enterobacteriaceae*, *Escherichia coli*, molds and yeasts. Cheeses treated at 300 and 400MPa, stored at 4°C, presented a shelf-life of 14 and 21days, respectively, compared to untreated control cheese, which presented a shelf life of 7days. On the other hand, HP treatments modified the texture (more firm) and color (more yellow) compared to control cheeses. These changes were detected by instrumental and sensory analysis [K. Evert-Arriagada, M.M. Hernández-Herrero, B. Juan, B. Guamis and A.J. Trujillo* (Centre Especial de Recerca Planta de Tecnologia dels Aliments (CERPTA), XaRTA, TECNIO, MALTA Consolider, Departament de Ciència Animal i dels Aliments, Facultat de Veterinària, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain), *Journal of Food Engineering*, 2012, **110**(2), 248-253].

NPARR 3(3), 2012-0266, Characterization of stipe and cap powders of mushroom (*Lentinus edodes*) prepared by different grinding methods

The effects of micronization methods, mechanical and jet millings, on the physico-chemical properties of mushroom (*Lentinus edodes*) powder were investigated in contrast to shear pulverization. The powders of dried mushroom cap and stipe were prepared to obtain six powders. Compared to shear pulverization, mechanical and jet millings effectively reduced particle size and brought about a narrow and uniform particle size distribution. With the same material, powders from mechanical and jet millings had higher values in soluble dietary fiber content, surface area, bulk density, water soluble index and nutrient substance solubility, but lower values in the angles of repose and slide, water holding and swelling capacities than shear pulverized powder. These indexes were tightly dependent on particle size with absolute coefficients beyond 0.8330. With the same grinding method, cap powders possessed higher values in water soluble index, swelling capacity, bulk density, protein and soluble dietary fiber than stipe powders [Zipei Zhang, Huige Song, Zhen Peng, Qingnan Luo, Jian Ming and Guahua Zhao*(College of Food Science, Southwest University, Tiansheng Road 1, Chongqing 400715, PR China), *Journal of Food Engineering*, 2012, **109**(3), 406-413].

NPARR 3(3), 2012-0267, Effect of an organic and conventional rearing system on the mineral content of hen eggs

In this study, the effect on mineral content of eggs from organic and conventional-housing systems was investigated. For this, random samples of 12 eggs were collected in both housing systems. Egg shells and edible portions were analysed for ash, Ca, P, Mg, Fe, Zn and Cu contents. The P and Zn contents of the edible egg

portion were lower in the organic eggs than in conventional eggs. Mg content of the eggshell was higher in organic eggs while Zn content showed a marked decrease. As far as Ca, Fe and Cu values were concerned, these did not differ between the eggs from organic and conventional systems. The results showed considerable differences in mineral content between the eggs from the hens reared in organic and conventional systems [K. Küçükyılmaz*, M. Bozkurt, Ç. Yamaner, M. Çınar, A.U. Çatlı and R. Konak (Erbeyli Poultry Research Institute, 09600 İncirliova/Aydın, Turkey), *Food Chemistry*, 2012, **132** (2), 989-992].

NPARR 3(3), 2012-0268, Effects of toasting on the carbohydrate profile and antioxidant properties of chickpea (*Cicer arietinum* L.) flour added to durum wheat pasta

The effects of the toasting process on the carbohydrate profile and antioxidant properties of chickpea flour were studied, along with the cooking behaviour, and antioxidant and nutritional properties of pasta enriched with the chickpea flour. The toasting process increased the resistant starch, insoluble dietary fibre and antioxidant properties of the flour. Addition of chickpea flour (raw and toasted) to durum wheat semolina changed the carbohydrate profile in the uncooked and cooked enriched pasta, especially with the toasted chickpea, and worsened the overall quality of the pasta. The increase in total phenolic content and total free phenolic acid content in the uncooked pasta was due to positive effects of addition of the chickpea flours, while the increase in the bound phenolics fraction in the cooked pasta was from the durum wheat, which was crucial for its high concentrations of ferulic acid. The increase in the free fraction of the Trolox equivalent antioxidant capacity in cooked pasta was consistent with the addition of chickpea [Clara Fares* and Valeria Menga (CRA, Centre for Cereal Research, S.S. 16, Km 675, 71100 Foggia, Italy), *Food Chemistry*, 2012, **131**(4), 1140-1148].

FRUITS

NPARR 3(3), 2012-0269 Inhibition of pericarp browning and shelf life extension of litchi by combination dip treatment and radiation processing

Litchi, being a highly juicy and nutritious fruit, has very short life at ambient temperature, mainly due to microbial spoilage. The fruit soon loses its appeal because of pericarp browning due to anthocyanin degradation and enzymatic oxidation of phenolics. A sequential dip treatment, including sodium hypochlorite (0.2%, 4 min, 52°C), potassium metabisulfite (3%, 30min, 26°C), and hydrochloric acid (0.25N) containing ascorbic acid (2%, 10min, 26°C), followed by gamma irradiation, helped in overcoming this problem confronting trade. Dip treatment reduced polyphenol oxidase activity by ~85%, retained major anthocyanins, cyanidin-3-*O*-rutinoside and cyanidin-3-*O*-glucoside by 82% and 97%, respectively, and reduced microbial load to below detectable limits. Shelf life of processed 'Shahi' and 'China' varieties, at 4°C, was found to be 45 and 30 days, respectively, whereas, unprocessed fruits spoiled within 15days. Processing helped in maintaining overall quality attributes and can expand market access of the fruit in non-producing regions [Sanjeev Kumar, B.B. Mishra, Sudhanshu Saxena, Nilantana Bandyopadhyay, Varsha More, Surbhi Wadhawan, Sachin N. Hajare, Satyendra Gautam and Arun Sharma* (Food Technology Division, Bhabha Atomic Research Centre, Mumbai 400 085, India), *Food Chemistry*, 2012, **131**(4), 1223-1232].

NPARR 3(3), 2012-0270, Modified atmosphere packaging and active packaging of banana (*Musa spp.*): A review on control of ripening and extension of shelf life

Banana is one of the most important fruit crops in the world and is considered by millions

of people as their main energy source. Post harvest shelf life extension has been a problem for years due to its climacteric respiration pattern and sensitivity to low temperature. Extensive research has been done in this area for many decades. Among various existing technologies, Modified Atmosphere Packaging (MAP) which extends shelf life of fresh fruits and vegetables by reducing their respiration rate is gaining popularity. Active packaging is a kind of MAP where different scrubbing/releasing materials are used. This review summarises important aspects behind the ripening physiology of banana, controlling factors and recent advance technologies of MAP and active packaging [Sen C*, Mishra H N and Srivastav P P (Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur, Kharagpur-721302, West Bengal, India), *Journal of Stored Products and Postharvest Research*, 2012, **3**(9), 122-132].

NPARR 3(3), 2012-0271, Polyphenolic composition and content in the ripe berries of wild *Vitis* species

To explore wild genetic resources for improving fruit and processing quality of cultivated grape cultivars, the polyphenolic composition and content in the ripe berries of 147 grape accessions from 16 *Vitis* species for two consecutive years were characterised. A total of 48 polyphenolic compounds, including 28 anthocyanins, 6 flavonols, 6 flavanols, 6 hydroxycinnamic derivatives, and 2 hydroxybenzoic acids, were identified via HPLC-MS and quantified by HPLC-DAD. These wild grape species had unique presence of abundant di-glucoside derivatives of anthocyanins. In addition, anthocyanins in most wild species were predominantly nonacylated. The mean contents for anthocyanins, flavanols, flavonols, hydroxycinnamic derivatives, and hydroxybenzoic acids were 9.610, 0.769, 0.093, 0.441 and 0.027mgg⁻¹ FW, respectively. They were about 2 to 10 folds higher than their

respective counterparts in the most widely cultivated grape species *Vitis vinifera*. As expected, most of these groups of compounds were correlated negatively with berry weight, but positively with the content of total soluble solids

[Zhenchang Liang, Yingzhen Yang, Lailiang Cheng*, and Gan-Yuan Zhong (Department of Horticulture, Cornell University, Ithaca, NY 14853, USA), *Food Chemistry*, 2012, **132**(2), 730-738].

FUEL (incl. Biogas, Biodiesel, Biomass energy, Ethanol etc.)

NPARR 3(3), 2012-0272, Efficacy of gossypol as an antioxidant additive in biodiesel

The efficacy of gossypol as an antioxidant additive in fatty acid methyl esters (FAMEs) prepared from soybean oil (SME), waste cooking oil (WCME) and technical grade methyl oleate (MO) was investigated. Gossypol is a naturally occurring polyphenolic aldehyde with antioxidant properties isolated from cottonseed that is toxic to humans and animals. At treatment levels of 250 and 500 ppm, gossypol exhibited statistically significant improvements in the induction periods (IPs; EN 14112) of SME, WCME and MO. Efficacy was most pronounced in SME, which was due to its higher concentration of endogenous tocopherols (757 ppm) versus WCME (60 ppm) and MO (0 ppm). A comparison of antioxidant efficacy was made with butylated hydroxytoluene (BHT) and γ -tocopherol. For FAMEs with low concentrations of endogenous tocopherols (WCME and MO), γ -tocopherol exhibited the greatest efficacy, although treatments employing BHT and gossypol also yielded statistically significant improvements to oxidative stability. In summary, gossypol was effective as an exogenous antioxidant for FAMEs investigated herein. In particular, FAMEs containing a comparatively high percentage of endogenous tocopherols were especially suited to gossypol as an antioxidant additive [Bryan R. Moser* (Bio-Oils Research Unit, National Center for Agricultural Utilization Research, Agricultural Research Service, United States Department of Agriculture, 1815 N. University St., Peoria, IL 61604, USA), *Renewable Energy*, 2012, **40**(1), 65-70].

NPARR 3(3), 2012-0273, Potential of five plants growing on unproductive agricultural lands as biodiesel resources

Fossil fuels are being heavily depleted due to increasing anthropogenic activities

worldwide, and burning them contributes to global climate warming and air pollution. Vegetable oils are one of the main feedstocks for biodiesel: they are non-toxic and environmentally friendly. Rising global population, decreasing arable lands and a decline in crop yields from desertification and salinization demands that biodiesel feedstock be grown on unproductive agricultural lands. To estimate whether five plants growing on such land in China could be used as energy plants, we determined their seed oil content (SOC) and relative fatty acid content, and estimated the cetane number (CN) of the biodiesel produced from these plant oils by a fitted regression between different C18 fatty acids and CN. Results showed that four plants can be developed as energy plants, including *Datura candida* (SOC=22.9%, CN=0.8), *Xanthium sibiricum* (SOC=41.9%, CN=46.5), *Kosteletzkya pentacarpos* (SOC=18.6%, CN=45.9) and *Hibiscus trionum* (SOC=17.5%, CN=46.9). The fifth plant, *Rhus typhina*, was not adapted as an energy plant because of its low SOC, 9.7%. Our data provide a scientific basis for growing energy plants in unproductive agricultural lands as biodiesel resources [Cheng-Jiang Ruan*, Wei-He Xing and Jaime A. Teixeira da Silva (Key Laboratory of Biotechnology & Resources Utilization, Dalian Nationalities University, Dalian 116600, China), *Renewable Energy*, 2012, **41**, 191-199].

NPARR 3(3), 2012-0274, Production potential of biogas in sugar and ethanol plants for use in urban buses in Brazil

Brazil is one of the major producers of ethanol and sugar in the world. Ethanol has been used as a renewable fuel in passenger vehicles, decreasing the levels of pollution in big cities like São Paulo and Rio de Janeiro. On the other hand, sugarcane ethanol plants produce a waste of vinasse, which is used as organic fertilizer in cane plantations which causes soil and water contamination. The anaerobic digestion treatment

can be used to reduce the pollution vinasse and, concomitantly, to increase the production of biogas. This essay intended to reflect/discuss about the potential of biogas production from the anaerobic digestion of vinasse in Brazil, and the availability of its use in urban buses as gas fuel. Brazilian urban buses are using natural gas as fuel in big cities like Rio de Janeiro, but diesel prevails in most of the cities, and biogas can be important to reduce the dependence of a nonrenewable fuel in the country. The national potential for biogas production from vinasse

could replace 50% of the urban bus fleet in Brazil. A big ethanol production plant has autonomy to supply 788 buses per day [Samuel Nelson Melegari de Souza*, Augustinho Borsoi, Reginaldo Ferreira Santos, Deonir Secco, Elisandro Pires Frigo and Marcelo José da Silva (State University of West of Paraná - Graduate Program, Master Energy in Agriculture. Rua Universitária, 2069, CEP 85.819- 130, Bairro Faculdade, Cascavel, PR, Brazil), *Journal of Food, Agriculture & Environment*, 2012, **10**(1), 908-910].

GUM/RUBBER (incl. Latex, Resin, Pectin, Tannin, Mucilage, Starch, Cellulose, etc.)

NPARR 3(3), 2012-0275, Short term effects of latex tapping on micro-changes of trunk girth in *Hevea Brasiliensis*

Latex tapping has a well-known negative effect on the long term radial growth of rubber trees (*Hevea Brasiliensis*). The additional carbon sink induced by latex yield is considered as the main cause. However the potential contribution of a tapping induced water stress has received little attention. In Northeast Thailand, we applied an exploring approach comparing the diel cycle of girth change between days of rest and days with tapping in conditions of relatively stable evaporative demand and soil water availability. Trees were tapped at dark in the early morning for two consecutive days and rested for one day. Five standard trees were equipped with high accuracy girth bands above the tapping panel. The sampling included one tree with additional measurements, one below the tapping cut and the other at the trunk bottom. Data were recorded at 30 min interval over 14 days at the onset of the dry season in November. Results demonstrated a significant short-term shrinkage within two hours after tapping. However, the nighttime expansion maximum diurnal shrinkage and midnight recovery were not significantly influenced by the tapping cycle. As a result the daily growth was not negatively impacted on tapping days. Finally, in conditions of low average growth, our results refute the hypothesis of a negative impact of tapping on radial growth at a daily scale through a simple dehydration. A substantial loss of turgor was confirmed but trees seem to quickly react and smooth the consequences on nighttime recovery and diurnal shrinkage [Junya Junjittakarn, Viriya Limpinuntana*, Krirk Pannengpetch, Supat Isarangkool Na Ayutthaya, Alain Rocheteau, Herve Cochard and Frederic C. Do (1Department of Plant Science and

Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Khon Kaen, 40002, Thailand), *AJCS*, 2012, **6**(1), 65-72].

NPARR 3(3), 2012-0276, Anti-proliferation effect of *Hevea brasiliensis* latex B-serum on human breast epithelial cells

The rubber tree (*Hevea brasiliensis*) extracts are becoming increasingly visible in pharmaceutical and therapeutical research. The present study is aimed at examining the specific anti-proliferation property of *H. brasiliensis* latex B-serum sub-fractions against human breast cancer epithelial cell lines MCF-7 and MDA-MB231. The results showed that the latex whole B-serum and DBP sub-fraction exerted a specific anti-proliferation activity against cancer origin cells MDA-MB231 but had little effect on non-cancer-origin cells. On the other hand, the anti-proliferative activity was diminished in the pre-heated B-serum fractions. With the low toxicity that the B-serum demonstrated previously in Brine Shrimp Lethality Test (BSLT), the present results suggest the potential use of the B-serum subfractions in cancer treatment [Yang Kok Lee, Lam Kit Lay, Mansor Sharif Mahsufi, Teoh Siang Guan, Sunderasan Elumalai and Ong Ming Thong^{2*}(Institute for Research in Molecular Medicine (INFORMM), Universiti Sains Malaysia, 11800 Minden, Pulau Pinang, Malaysia), *Pakistan Journal of Pharmaceutical Sciences*, 2012, **25**(3), 645-650].

NPARR 3(3), 2012-0277, Formulations of natural rubber latex as film former for pharmaceutical coating

Natural rubber latex (NRL) from *Hevea brasiliensis* consists of poly-*cis*-1,4-isoprene polymer displaying excellent physical properties such as high elasticity, high tensile strength, and ease of film-forming. However, the film casted from NRL is soft and sticky. The aim of this research was to apply the NRL as polymeric

material for tablet coating. NRL, triethyl citrate (TEC) and titanium dioxide (TiO₂) were used as polymer, plasticizer and antiadherent, respectively. Mechanical properties of the casted films were characterized. It was found that TEC and TiO₂ affected the properties of the films. The results showed good compatibility which confirmed by Fourier transforms infrared (FTIR) spectroscopy. These results confirmed that NRL was possible to use as film former for pharmaceutical coating applications [K. Panrat^a, P. Boonme^a, W. Taweeprada^b, and W. Pichayakorn* (Department of Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Songkhla 90112, Thailand), *Procedia Chemistry*, 2012, 4, 322-327].

NPARR 3(3), 2012-0278, Isolation, characterization and study of disintegration properties of mucilage from *Urginea indica*, Liliaceae Indian squill (*Urginea indica*) is used as a cardiogenic, hair tonic and as a remedy for cancer. It has high content of mucilage which may be of pharmaceutical significance. There are many plant sourced drugs which also act as pharmaceutical adjuvants. This study was undertaken to isolate the mucilage as well as to characterize and to investigate the properties of mucilage of *Urginea indica* in various concentrations as disintegrant for tablet formulation containing tramadol hydrochloride as active ingredient. The mucilage from bulbs of *Urginea indica* was separated by an acetone precipitation method. The separated mucilage was evaluated for physicochemical characteristics such as color, solubility, swelling index, compressibility index etc. Tablets of tramadol hydrochloride were prepared by direct compression using directly compressible Avicel 102 as diluents along with different proportions of mucilage of plant *Urginea indica* as a disintegrant. These tablets were compared with the standard disintegrant, starch. The percentage yield of the mucilage of *Urginea indica* was 4%.

The physicochemical parameters showed the results indicating the suitability of mucilage to be used as tablet excipient. The dissolution profile was significantly affected by the choice of the disintegrant. All formulations containing *Urginea indica* mucilage as disintegrant showed more than 90% drug release at 10 min whilst formulations containing starch as disintegrant showed significantly less release in this time period. Thus, this mucilage could be used as a very good natural disintegrant in comparison to costly synthetic disintegrant. A concentration of 7.5% mucilage gave the least disintegration time (20 second) compared to the starch [Sunetra Patwardhan*, Dhairya Maheshwari, Neelam Upadhyay, Kaumudee Bodas, Arati Ranade and Shilpa Shrotriya, *Inventi Impact: Novel Excipients*, 2012, 2(2), 61-69].

NPARR 3(3), 2012-0279, Isolation and characterization of jackfruit mucilage and its comparative evaluation as a mucoadhesive and controlled release component in buccal tablets

The purpose of the present research work was to extract jackfruit mucilage, use it as a mucoadhesive agent, and to develop extended release buccoadhesive tablets with an intention to avoid hepatic first-pass metabolism, by enhancing residence time in the buccal cavity. The mucilage was isolated from the jackfruit pulp by the aqueous extraction method and characterized for various physicochemical parameters as well as for its adhesive properties. Three batches of tablets were prepared (wet granulation method) and evaluated containing three mucoadhesive components: Methocel K4M, Carbopol 974P, and isolated jackfruit mucilage using chlorpheniramine maleate (CPM) as a model drug and changing the proportion of the mucoadhesive component (1:2:3), resulting in nine different formulations. The results of the study indicate that the isolated mucilage had good physicochemical and morphological

characteristics, granules and tablets conformed to the Pharmacopoeial specifications, and in vitro release studies showed the sustained action of drug with increasing concentration of the isolated natural mucoadhesive agent in the formulations. Permeability studies indicated that changing the mucoadhesive component, permeability behavior was not statistically different ($P > 0.05$). FTIR and UV spectroscopy studies between mucilage and CPM suggested the absence of a chemical interaction between CPM and jackfruit mucilage.

The developed mucoadhesive tablets for buccal administration containing natural mucilage (MF3) have a potential for the sustained action of drug release. Thus, mucoadhesive tablets for controlled release were successfully developed using natural jackfruit mucilage [Vidya Sabale*, Vandana Patel and Archana Paranjape (Baroda College of Pharmacy, At and P. O. Limda, Ta. Waghodia, Dist Vadodara-391 760, Gujarat India), *International J Pharma Investig*, 2012, **2**, 61-69].

INSECTICIDES (incl. Fungicides, Herbicides, Nematicides, Larvicides, etc.)

NPARR 3(3), 2012-0280, Fumigant toxicity and oviposition deterrence of the essential oil from cardamom, *Elettaria cardamomum*, against three stored—product insects

Use of insecticides can have disruptive effects on the environment. Replacing the chemical compounds in these insecticides with plant materials, however, can be a safe method with low environmental risk. In the current study, chemical composition and insecticidal activities of the essential oil from cardamom, *Elettaria cardamomum* L. (Maton) (Zingiberales: Zingiberaceae) on the adults of three stored product pests was investigated. Results indicated that essential oil of *E. cardamomum* toxic to the bruchid beetle, *Callosobruchus maculatus* Fabricius (Coleoptera: Bruchidae), the red flour beetle, *Tribolium castaneum* Herbst (Coleoptera: Tenebrionidae), and the flour moth, *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae). Adults of *E. kuehniella* were more sensitive than the Coleoptera. Also, the highest mortality of these insects was seen after 12 hours. Results of the LT50 tests showed that the lethal time of mortality occurred between 10–20 hours in various test concentrations. Essential oil of *E. cardamomum* had a good efficacy on oviposition deterrence of *C. maculatus* females, too. The chemical constituents of the essential oils were analyzed by gas chromatography—mass spectrometry. The major constituents of cardamom were identified as 1, 8-cineol, α -terpinyl acetate, terpinene and fenchyl alcohol. These results suggest that essential oil of *E. cardamomum* is a good choice for control of stored product pests [Habib Abbasipour, Mohammad Mahmoudvand, Fahimeh Rastegar and Mohammad Hossein Hosseinpour (Department of Plant Protection, Faculty of Agricultural Sciences, Shahed University,

Tehran, Iran), *Journal of Insect Science*, 2011, **11**(165), 1-10].

NPARR 3(3), 2012-0281, Insecticidal activity of *Tagetes erecta* extracts on *Spodoptera frugiperda* (Lepidoptera: Noctuidae)

The bioinsecticidal activity of organic extracts of *Tagetes erecta* L. (Asteraceae) was evaluated on neonate larvae of *Spodoptera frugiperda* J. E. Smith (Lepidoptera: Noctuidae) a major maize pest in the world. The acetone leaf extract (500 ppm) of *T. erecta* induced an antifeedant effect, causing a 50% reduction of larval weight in comparison with the control. Larval weights were drastically reduced at 7 d, but even more so at 14 d, when *T. erecta* extracts also caused substantial mortality. Three leaf extracts of *T. erecta* caused high larval mortality, with hexane (48%), acetone (60%) and ethanol (72%). Further *T. erecta* leaf extracts caused pupal mortalities of 40–80%. The use of such plant extracts can be proposed as bioinsecticides to control *S. frugiperda*, in a more environment-friendly manner [David Osvaldo Salinas-Sánchez, Lucila Aldana-Llanos*, Ma. Elena Valdés-Estrada, Mirna Gutiérrez-Ochoa, Guadalupe Valladares-Cisneros and Evelyn Rodríguez-Flores (Laboratorio de Entomología del Centro de Desarrollo de Productos Bióticos del Instituto Politécnico Nacional. Carretera Yautepec-Jojutla Km. 6, AP 24, 62731 San Isidro, Yautepec, Morelos, México), *Florida Entomologist*, 2012, **95**(2), 428-432].

NPARR 3(3), 2012-0282, Identification of volatile compounds released by leaves of the invasive plant Croftonweed (*Ageratina adenophora*, Compositae), and their inhibition of rice seedling growth

Several volatile allelochemicals were identified and characterized from fresh leaf tissues of the invasive croftonweed. A simple bioassay was used to demonstrate the release of

volatile allelochemicals from leaf tissues. The bioassays revealed that foliar volatile components of croftonweed exhibited significant effects on the seedling growth of upland rice. Peroxidase (POD) activity, superoxide dismutase (SOD) activity, and root oxidizability rose as the concentration of volatiles increased. Activity for both POD and SOD significantly increased with exposure to 15 g and 20 g of croftonweed leaf tissue for 5 d. Root activity was significant at 10 g compared to the control. The volatile components also stimulated the development of the aerenchyma tissue and inhibited lateral root formation. Leaf volatiles of croftonweed were identified by gas chromatography coupled with mass spectrometry (GC-MS). Some of the compounds identified included α -phellandrene, camphene, ρ -cymene, 2-carene, α -pinene, limonene, and (z)-3-hexen-1-ol. Bioassays showed that four of these compounds could account for the observed phytotoxicity imparted by total leaf volatiles. Limonene, 2-carene, α -pinene and camphene had no phytotoxic effect on shoot elongation. Phellandrene did cause inhibition in shoot growth at all concentrations. Both (z)-3-hexene-1-ol and ρ -cymene inhibited both shoot elongation and root elongation, but the effects of the two compounds on root length were more significant than on the shoot length [Fengjuan Zhang, Jianying Guo, Fengxin Chen, Wanxue Liu, and Fanghao Wan* (College of Life Science, Hebei University, Baoding, Hebei, 071002, China), *Weed Science*, 2012, **60**(2), 205-2112].

NPARR 3(3), 2012-0283, **Tabanone, a New Phytotoxic Constituent of Cogongrass (*Imperata cylindrica*)**

Cogongrass is a troublesome, invasive weedy species with reported allelopathic properties. The phytotoxicity of different constituents isolated from roots and aerial parts of this species was evaluated on garden lettuce and creeping bentgrass. No significant phytotoxic

activity was detected in the methylene chloride, methanol, or water extracts when tested at 1.0 mg ml^{-1} . However, the total essential oil extract of cogongrass aerial parts was active. Bioactivity-guided fractionation of this extract using silica gel column chromatography led to the identification of megastigmatrienone, 4-(2-butenylidene)-3,5,5-trimethyl-2-cyclohexen-1-one (also called *tabanone*), as a mixture of four stereoisomers responsible for most of the activity. Tabanone inhibited growth of frond area of lesser duckweed, root growth of garden onion, and fresh weight gain of garden lettuce with 50% inhibition values of 0.094, 3.6, and 6.5 mM, respectively. The target site of tabanone is not known, but its mode of action results in rapid loss of membrane integrity and subsequent reduction in the rate of photosynthetic electron flow [Antonio L. Cerdeira, Charles L. Cantrell, Franck E. Dayan, John D. Byrd, and Stephen O. Duke* (Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762), *Weed Science*, 2012, **60**(2), 212-218].

NPARR 3(3), 2012-0284 **The use of clarified butter sediment waste from dairy industries for the production of mosquitocidal bacteria**

Dairy industries worldwide discard ghee sediment waste and clarified butter sediment waste (CBSW) in bulk every day. The aim of the present study was to explore the possibility of utilising the CBSW to prepare culture media so as to produce mosquitocidal bacteria. The bacteria achieved complete degradation of CBSW for its toxin synthesis. The bacterial growth, biomass, toxin production and larvicidal activity against mosquito vectors were comparable with those using conventional culture medium (NYSM) as a control. We obtained a cell mass yield of 9.7 g/L and larvicidal activity (LC_{50} and LC_{90}) of 0.0036 mg/L and 0.01 mg/L against *Culex quinquefasciatus* using bacteria grown in CBSW. Cost-effective analysis indicated that CBSW is highly economical [Subbiah Poopathi*

and Suresh Abidha (Unit of Microbiology and Immunology, Vector Control Research Centre (Indian Council of Medical Research), Medical complex, Indira Nagar, Pondicherry 60 5006, India), *International Journal of Dairy Technology*, 2012, **65**(1), 152-157].

MANURE/FERTILIZERS

NPARR 3(3), 2012-0285 Effect of bio-organic and inorganic nutrient sources to improve leaf nutrient status in apricot

The present study was carried out on 20-year-old 'New Castle' apricot (*Prunus armeniaca* L.) trees grown in Shiwalik hill range of north-western Himalayan region of India. The conjoint efficacy of bio-organics used along with chemical fertilizers for improving leaf nutrient content. Bio-organic nutrient sources namely, vermicompost (VC), bio-fertilizer (BF), cow urine (CU) and two levels of NPK fertilizers, *i.e.* 75 and 50% of recommended dose were evaluated in 13 different treatment combinations. The conjoint treatment application of bio-fertilizer- 60 g tree⁻¹, vermicompost- 30 kg tree⁻¹, cow urine -12.5% as foliar application and 50% NPK significantly improved total N, P, K, Ca, Mg, Fe, Cu, Zn and Mn contents of leaf and was significantly increased by 30.4, 109.5, 31.6, 33.5, 65.7, 34.6, 71.9, 47.5 and 31.3%, respectively over control (traditional orchard practice). The study inferred a saving of 50% of NPK fertilizers over the traditional orchard practice being followed in the region [Singh VJ, Sharma Som Dev, Kumar Pramod* and Bhardwaj Satish Kumar (Regional Horticultural Research Station, Dr YS Parmar University of Horticulture & Forestry, Sharbo (Reckong Peo), District Kinnaur, Himachal Pradesh 172 107), *Indian Journal of Horticulture*, 2012, **69**(1), 45-49].

NPARR 3(3), 2012-02867, Effect of post flowering foliar sprays of nutrients for accelerating harvesting of kokum (*Garcinia indica* Choisy)

An investigation was undertaken to find out the effect of post flowering foliar nutrient sprays on harvesting, yield and fruit quality of *kokum*. The treatments consisted of various concentrations and combinations of urea (1.0%),

potassium nitrate (3.0%), monopotassium phosphate (0.5%) and 19 N: 19 P: 19 K (1.0%). All foliar sprays improved yield and quality of *kokum* fruits. The treatment T₄ (3.0% KNO₃ at fruit set and 20 days after fruit set) was the best, which hastened harvesting by 34 days, improved the yield, resulted in maximum harvest before rains, improved acidity, TSS, reducing, non reducing and total sugars and also had the highest B: C ratio. All urea treatments delayed harvesting [Haldankar P.M., Somavanshi A.V., Rangwala A.D., Khandekar R.G. and Burondkar M.M. (Department of Horticulture, College of Agriculture, Dapoli, Ratnagiri-415 712, Maharashtra), *Indian Journal of Horticulture*, 2012, **69**(1), 55-59].

NPARR 3(3), 2012-0287, Comparison of nutritional quality of organically versus conventionally grown tomato

Tomato crop was grown using organic manures and chemical fertilizers and the effect of organic farming on nutritional profile, quality characteristics, toxic parameters were studied. The experiment was laid out in a randomized block design with fifteen treatments consisting of four organic manure treatments of vermicompost (VC), poultry manure (PM), farm yard manure (FYM), cow dung (CD) and recommended dose of chemical fertilizers, *i.e.*, conventional farming as control. Organically and conventionally grown tomato were analysed for their nutrient composition. Application of organic manures was found to be significantly influence the nutrient content (micro nutrients, TSS, lycopene etc.) compared to conventional fertilizers application [Shankar K. Sreedevi*, Sumathi S., Shankar M. and Reddy N.N. (Division of Crop Science, Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad-500 059, Andhra Pradesh), *Indian Journal of Horticulture*, 2012, **69**(1), 86- 90].

NPARR 3(3), 2012-0288, Growth, yield and quality of fenugreek (*Trigonella foenum-*

***graecum* L.) as influenced by nitrogen, phosphorus and bio-fertilizers**

A field experiment was conducted at Sardarkrushinagar (Gujarat) during 2006–07 and 2007–08 to study response of nitrogen, phosphorus and bio-fertilizers on fenugreek with 16 treatment combinations in factorial RBD with three replications. The soil of the experimental field was low in organic carbon, available nitrogen, medium in phosphorus and good in respect to available potassium. Application of 20 kg N and 40 kg P₂O₅/ha gave significantly higher plant height at all the growth stages, and seed, straw and biological yields as well as protein content in seed and straw over 10 kg N and 20 kg P₂O₅/ha, respectively. Combined inoculation of

seed with *Rhizobium* and PSB and their sole application significantly gave higher plant height over control at all the growth stages but significantly the highest seed, straw and biological yield as well as protein content in seed and straw was recorded with combined inoculation of seed with *Rhizobium* and PSB, which was higher over their individual application and control. Sole application of both *Rhizobium* and PSB was found at par in respect to seed, straw and biological yield. Harvest index was not significantly influenced with N, P and bio-fertilizer levels [Mehta R.S., Anwer M.M., Aishwath O.P. and Meena R.S.(National Research Center on Seed Spices, Tabiji, Ajmer 305206, Rajasthan), *Indian Journal of Horticulture*, 2012, **69** (1), 94-97].

OILS/FATS (incl. Edible oils, Butter)

NPARR 3(3), 2012-0289, Enrichment of edible oil with sea buckthorn by-products using ultrasound-assisted extraction

Sea buckthorn (SBT) pomace, a by-product of juice production, has been studied as a potential carotenoids source because such compounds are of great interest in the food industry. Ultrasound-assisted extraction (UAE) has been used to improve the direct enrichment of edible oils (sunflower, rape seed, olive, and soya) with SBT carotenoids. These oils do not naturally contain carotenoids. After a preliminary study, a RSM has been used to maximize total carotenoid content of extracts and the influence of process variables on the UAE has been investigated. The results provided by the statistical analysis revealed that the optimized conditions were: sonication power of 0.67 W/g oil and a temperature of 35°C. The optimization parameters of this “green” process provide a greatly improved enrichment of the edible oil in terms of quantity and process time from 33.83 mg/L extract in 90 min obtained by conventional extraction to 51.64 mg/L extract in only 20 min by UAE. Ultrasound-assisted carotenoids extraction from SBT by-products appears to be a simple, rapid, and sustainable alternative to conventional procedures. Improving the value of low quality edibles is important for the food, cosmetic, or nutraceutical industry. It is done by adding ingredients such as carotenoids which are extracted by hexane or other solvents. In this study we show an innovative application of a direct extraction by maceration of by-products in edible oil without solvent and eliminating evaporation and extraction unit operations. Using ultrasound, full extractions can now be completed in minutes with high reproducibility, reducing the consumption of solvent, simplifying manipulation and work-up, giving higher purity of the final product, eliminating post-treatment of

waste water, and consuming only a fraction of the fossil energy normally needed for a conventional extraction method such as Soxhlet extraction, maceration, or steam distillation [Farid Chemat*, Sandrine Périno-Issartier, Lynda Loucif, Mohamed Elmaataoui and Timothy J. Mason (Université d'Avignon et des Pays de Vaucluse, INRA, UMR 408, UMR 406, 84000 Avignon, France), *European Journal of Lipid Science and Technology*, 2012, **114** (4), 453-460].

NPARR 3(3), 2012-0290, Loss of vitamin A in fortified edible oils and ghee during cooking in asian traditional style

Vitamin 'A' is essential for normal growth and its deficiency causes night blindness, affects the regulatory function of skin and reduces the general resistance of organism to infection. This deficiency does not occur by using balanced diet or by fortification of staple food with appropriate amount of Vitamin 'A'. In Pakistan vitamin 'A' fortification is done in vegetable ghee/cooking oil. It is generally assumed that fortified amount of vitamin 'A' is fully destroyed when the food is cooked at high temperature. The present study was focused to examine the effect of Pakistani traditional cooking style on the degree of destruction of vitamin 'A' mandatory fortified in the vegetable ghee/ cooking oils. The study indicates that there are some losses of Vitamin A of the fortified oils during cooking. However in case of deep fat frying destruction of added vitamin 'A' is more pronounced. The loss of vitamin 'A' was less than 50%, when the food was cooked in Pakistani style in case of all the cooking oils/ vegetable ghee. In prolonged frying conditions substantial amount of vitamin 'A' (45%) remains in the oil. Any how, this retention of vitamin 'A' is sufficient to meet the body requirements when oils/ghee was fortified according to the prescribed Pakistan Pure Food Rules 1965 i.e. 33,000 IU per Kg [Hifza Akhtar*, Lubna Tahir, Shahid Mahmud, Shahnaz Hamid (Pakistan Council of Scientific and Industrial

Research, PCSIR Labs Complex Ferozpur Road, Lahore, Pakistan), *Bangladesh Journal of Scientific and Industrial Research*, 2012, **47**(2) (2012), 243-248].

NPARR 3(3), 2012-0291, Eri silkworm: a source of edible oil with a high content of α -linolenic acid and of significant nutritional value

The study was undertaken to provide value addition to spent eri silkworm as an alternative source of edible oil for the food and feed industry by carrying out a short-term nutritional and toxicological evaluation of eri silkworm pupae oil using Wistar NIN rats. Growth performance of rats fed either sunflower oil (Control) or eri silkworm pupae oil (Experimental) was comparable. Histopathological examination of the various tissues showed no signs of toxicity even after feeding the eri silkworm oil for 18 weeks. Serum cholesterol and triglyceride was significantly reduced ($P < 0.05$) while high-density lipoprotein cholesterol was significantly increased ($P < 0.05$) which is attributed to the high α -linolenic acid content of eri silkworm oil. The study showed that eri silkworm pupae oil is safe and nutritionally equivalent to commonly used vegetable oils. Eri silkworm pupae can be harvested to provide cost effective alternative edible oil that can be used to nutritional advantage in the food and feed industry. Therefore eri silkworm and its host plants offer an excellent example of multiple product crops and of sustainable agricultural practice with excellent opportunity for economic and nutritional benefits [Thingnganing Longvah*, Korra Manghtya and Syed S Y H Qadri (National Institute of Nutrition, Jamai Osmania PO, Hyderabad-500 007, AP, India), *Journal of the Science of Food and Agriculture*, 2012, **92**(9), 1988-1993].

NPARR 3(3), 2012-0292, Edible oils for liver protection: hepatoprotective potentiality of

***Moringa oleifera* seed oil against chemical-induced hepatitis in rats**

In the present study, *in vitro* antioxidant, antioxidative stress and hepatoprotective activity of *Moringa oleifera* Lam. seed oil (Ben oil; BO) was evaluated against carbon tetrachloride (CCl₄) induced lipid peroxidation and hepatic damage in rats. The oil at 0.2 and 0.4 mL/rat was administered orally for 21 consecutive days. The substantially elevated serum enzymatic (GOT, GPT, ALP, GGT) and bilirubin levels were significantly restored towards normalization by the oil. There was a significant elevation in the level of malondialdehyde (MDA), non-protein sulfhydryl (NP-SH), and total protein (TP) contents in the liver tissue. The results obtained indicated that BO possesses potent hepatoprotective action against CCl₄-induced hepatic damage by lowering liver marker enzymes, MDA concentration, and elevating NP-SH and TP levels in liver tissue. The biochemical observations were supplemented with histopathological examination of rat liver. The results of this study showed that treatment with Ben oil or silymarin (as a reference) appears to enhance the recovery from hepatic damage induced by CCl₄. The pentobarbital induced narcolepsy prolongation in mice was retarded by the Ben oil. Acute toxicity test in mice showed no morbidity or mortality. *In vitro* DPPH radical scavenging and β -carotene-linolic acid assay tests of the BO exhibited a moderate antioxidant activity in both tests used. The possible mechanism(s) of the liver protective activity of Ben oil activity may be due to free radical scavenging potential caused by the presence of antioxidant component(s) in the oil. Consequently, BO can be used as a therapeutic regime in treatment of some hepatic disorders [Mansour S. Al-Said, Ramzi A. Mothana*, Mohammed A. Al-Yahya, Ali S. Al-Blowi, Mohammed Al-Sohaibani, Atallah F. Ahmed, Syed Rafatullah (Medicinal, Aromatic and Poisonous Plants Research Center (MAPPRC),

College of Pharmacy, King Saud Univ., P.O. Box 2457, Riyadh 11451, Saudi Arabia), *Journal of Food Science*, 2012, **77**(7), T124-T130].

NPARR 3(3), 2012-0293, Effect of feeding fresh forage and marine algae on the fatty acid composition and oxidation of milk and butter

This study evaluated the effects of feeding fresh forage either as pasture plus a concentrate (PAS) or as a silage-based total mixed ration (TMR), combined with either a ruminally inert lipid supplement high in saturated fatty acids (\ominus) or a ruminally protected microalgae containing 22g of docosahexaenoic acid (DHA)/100g of fatty acids (\oplus) on the fatty acid (FA) composition and oxidation of milk and butter. For the 8 mid-lactation Holstein cows in this study, milk yield was not significantly affected by treatment, averaging 32.3 ± 1.28 kg/d. Milk fat content was higher for PAS \ominus , averaging 5.05 compared with $4.10 \pm 0.17\%$ for the mean of other treatments, and was significantly depressed with microalgae supplementation (3.97 vs. $4.69 \pm 0.17\%$). The saturated fatty acid level in the milk of cows fed TMR \ominus was significantly higher than that of the other treatments (66.9 vs. 61.2g/100g of FA). The level of monounsaturated FA was lowered by

feeding TMR \ominus (27.4 vs. 32.0g/100g of FA), whereas levels of polyunsaturated FA were elevated by feeding PAS \oplus compared with the mean of the other treatments (6.54 vs. 5.07g/100g of FA). Feeding the rumen-protected microalgae increased the DHA content of milk more than 4-fold (0.06 to 0.26g/100g of FA) with the PAS treatment. The conjugated linoleic acid content of milk was highest for PAS \oplus compared with the other treatments (4.18 vs. 3.41g/100g of FA). In general, the fatty acid composition of butter followed that of milk. Overall, feeding the TMR supplemented with the rumen-protected microalgae increased the levels of volatile products of oxidation in milk and butter. No effect of forage type or microalgae supplementation was observed on the oxidative stability or antioxidant capacity of milk, although the oxidative stability of butter exposed to UV was reduced with microalgae supplementation, particularly with TMR, as assessed by using the ferric reducing ability of plasma assay [K.E. Glover, S. Budge, M. Rose, H.P.V. Rupasinghe, L. MacLaren, J. Green-Johnson and A.H. Fredeen* (Department of Plant and Animal Sciences, Nova Scotia Agricultural College, Truro, Nova Scotia, Canada, B2N 5E3), *Journal of Dairy Science*, 2012, **95**(6), 2797-2809].

PHYTOCHEMICALS

NPARR 3(3), 2012-0294, Anti-atherogenic and anti-angiogenic activities of polyphenols from propolis

Propolis is a polyphenol-rich resinous substance extensively used to improve health and prevent diseases. The effects of polyphenols from different sources of propolis on atherosclerotic lesions and inflammatory and angiogenic factors were investigated in LDL receptor gene (LDLR^{-/-}) knockout mice. The animals received a cholesterol-enriched diet to induce the initial atherosclerotic lesions (IALs) or advanced atherosclerotic lesions (AALs). The IAL or AAL animals were divided into three groups, each receiving polyphenols from either the green, red or brown propolis (250 mg/kg per day) by gavage. After 4 weeks of polyphenol treatment, the animals were sacrificed and their blood was collected for lipid profile analysis. The atheromatous lesions at the aortic root were also analyzed for gene expression of inflammatory and angiogenic factors by quantitative real-time polymerase chain reaction and immunohistochemistry. All three polyphenol extracts improved the lipid profile and decreased the atherosclerotic lesion area in IAL animals. However, only polyphenols from the red propolis induced favorable changes in the lipid profiles and reduced the lesion areas in AAL mice. In IAL groups, VCAM, MCP-1, FGF, PDGF, VEGF, PECAM and MMP-9 gene expression was down-regulated, while the metalloproteinase inhibitor TIMP-1 gene was up-regulated by all polyphenol extracts. In contrast, for advanced lesions, only the polyphenols from red propolis induced the down-regulation of CD36 and the up-regulation of HO-1 and TIMP-1 when compared to polyphenols from the other two types of propolis. In conclusion, polyphenols from propolis, particularly red propolis, are able to reduce atherosclerotic lesions through mechanisms including the modulation of

inflammatory and angiogenic factors. [Julio Beltrame Daleprane, Vanessa da Silva Freitas, Alejandro Pacheco, Martina Rudnicki, uciane Aparecida Faine, Felipe Augusto Dörr, Masaharu Ikegaki, Luis Antonio Salazar, Thomas Prates Ong and Dulcinéia Saes Parra Abdalla* (Department of Clinical and Toxicology Analysis, Faculty of Pharmaceutical Sciences, University of Sao Paulo, Sao Paulo, Brazil), *The Journal of Nutritional Biochemistry*, 2012, **23**(6), 557–566].

NPARR 3(3), 2012-0295, Capsaicin represses transcriptional activity of β -catenin in human colorectal cancer cells

Capsaicin is a pungent ingredient in chili red peppers and has been linked to suppression of growth in various cancer cells. However, the underlying mechanism(s) by which capsaicin induces growth arrest and apoptosis of cancer cells is not completely understood. In the present study, we investigated whether capsaicin alters β -catenin-dependent signaling in human colorectal cancer cells *in vitro*. Exposure of SW480, LoVo and HCT-116 cells to capsaicin suppressed cell proliferation. Transient transfection with a β -catenin/T-cell factor (TCF)-responsive reporter indicated that capsaicin suppressed the transcriptional activity of β -catenin/TCF. Capsaicin treatment resulted in a decrease of intracellular β -catenin levels and a reduction of transcripts from the β -catenin gene (*CTNNB1*). These results were confirmed by a reduced luciferase reporter activity driven by promoter-reporter construct containing the promoter region of the *Catnb* gene. In addition, capsaicin destabilized β -catenin through enhancement of proteosomal-dependent degradation. Western blot and immunoprecipitation studies indicated that capsaicin treatment suppressed TCF-4 expression and disrupted the interaction of TCF-4 and β -catenin. This study identifies a role for the β -catenin/TCF-dependent pathway that potentially contributes to the anticancer activity of capsaicin in human colorectal cancer cells. [Seong-Ho

Lee*, Raphael L. Richardson, Roderick H. Dashwood and Seung Joon Baek (Department of Pathobiology, College of Veterinary Medicine, University of Tennessee, Knoxville, TN 37996-4542, USA), *The Journal of Nutritional Biochemistry*, 2012, **23**(6), 646-655]

NPARR 3(3), 2012-0296, The curry spice curcumin selectively inhibits cancer cells growth *in vitro* and in preclinical model of glioblastoma

Previous studies suggested that curcumin is a potential agent against glioblastomas (GBMs). However, the *in vivo* efficacy of curcumin in gliomas remains not established. In this work, we examined the mechanisms underlying apoptosis, selectivity, efficacy and safety of curcumin from *in vitro* (U138MG, U87, U373 and C6 cell lines) and *in vivo* (C6 implants) models of GBM. *In vitro*, curcumin markedly inhibited proliferation and migration and induced cell death in liquid and soft agar models of GBM growth. Curcumin effects occurred irrespective of the p53 and PTEN mutational status of the cells. Interestingly, curcumin did not affect viability of primary astrocytes, suggesting that curcumin selectivity targeted transformed cells. In U138MG and C6 cells, curcumin decreased the constitutive activation of PI3K/Akt and NFkappaB survival pathways, down-regulated the antiapoptotic NFkappaB-regulated protein bcl-xl and induced mitochondrial dysfunction as a prelude to apoptosis. Cells developed an early G2/M cell cycle arrest followed by sub-G1 apoptosis and apoptotic bodies formation. Caspase-3 activation occurred in the p53-normal cell type C6, but not in the p53-mutant U138MG. Besides its apoptotic effect, curcumin also synergized with the chemotherapeutics cisplatin and doxorubicin to enhance GBM cells death. In C6-implanted rats, intraperitoneal curcumin (50 mg kg⁻¹ d⁻¹) decreased brain tumors in 9/11 (81.8%) animals against 0/11 (0%) in the vehicle-treated group. Importantly, no evidence of tissue

(transaminases, creatinine and alkaline phosphatase), metabolic (cholesterol and glucose), oxidative or hematological toxicity was observed. In summary, data presented here suggest curcumin as a potential agent for therapy of GBMs [Alfeu Zanotto-Filho*, Elizandra Braganhol, Maria Isabel Edelweiss, Guilherme A. Behr, Rafael Zanin, Rafael Schröder, André Simões-Pires, Ana Maria Oliveira Battastini, José Cláudio Fonseca Moreira (Centro de Estudos em Estresse Oxidativo, Departamento de Bioquímica, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Rio Grande do Sul, Brasil), *The Journal of Nutritional Biochemistry*, 2012, **23**(6), 591-601].

NPARR 3(3), 2012-0297, Value-added bioethanol from spent ginger obtained after oleoresin extraction

Spent ginger obtained after extraction of oleoresin constitutes more than 90% of the raw material and rich in carbohydrates that could be used as a substrate for the production of bioethanol. Proximate analysis and carbohydrate profiling showed it to contain 60-75% carbohydrates of which starch was the major constituent. This study was undertaken to optimize acid and enzyme hydrolysis for maximum release of fermentable sugars and subsequent fermentation to bioethanol. Enzymatic hydrolysis of the spent samples using Stargen® 002 (pH 4.5, 50°C, 20U, 20% substrate load, 48 h) was found to be better than acid hydrolysis as seen from the hydrolytic efficiency and growth of *Saccharomyces cerevisiae* NCIM 3095 therein. Hydrolytic efficiency of 89.89 and 91.35% were obtained under optimized conditions for the two samples chosen in the study. Fermentation of enzyme hydrolyzed medium showed a maximum fermentation efficiency of 81.53%, and resulted in maximum ethanol production of 43.4g/l [Essaki M. Konar, Shirish M. Harde, Lalit D. Kagliwal and Rekha S. Singhal*(Food Engineering and Technology

Department, Institute of Chemical Technology, Matunga, Mumbai 400019, India), *Industrial Crops and Products*, 2013, **42**, 299-307].

NPARR 3(3), 2012-0298, Bioactive iridoid glycoside isolated from *Morinda tinctoria* (Roxb.) roots exhibit therapeutic efficacy

Novel natural compounds endowed with sound bioactivities are currently the utmost need as leads toward drug discovery. We have isolated a novel iridoid glycoside, tinctoroid, from the roots of a prominent dye-yielding plant, *Morinda tinctoria* (Linn.) Roxb. Structural characterization was carried out employing nuclear magnetic resonance (NMR), mass spectrometry (MS), Fourier transform infrared (FTIR) and ultraviolet-visible spectroscopy (UV-vis). The compound was further evaluated for its therapeutic applicability. Antioxidant potential was assessed by DPPH radical scavenging assay and reducing power analysis. Moreover, the

glycoside was investigated to elucidate its potential for non-specific and site-specific deoxyribose degradation. Proficiency in inhibiting lipid peroxidation was adjudged using thiobarbituric (TBA) assay on mice liver homogenate. Tinctoroid was found to exhibit efficacy in protecting DNA from oxidative injury inflicted by H₂O₂. The compound demonstrated moderate cytotoxicity in liver carcinoma (Hep3B) cells. In addition, it was found to be non-toxic in Swiss Albino mice. The compound isolated from genus *Morinda*, one of the pioneer hubs of therapeutic natural products, makes tinctoroid a viable option. Furthermore, efficacy of the compound in the aforesaid assays, asserts its bioactivity and subsequently its importance as a potent therapeutic. [Dipita Bhakta, Akella Sivaramakrishna and Ramamoorthy Siva* (Division of Plant Biotechnology, School of Bio Sciences and Technology, VIT University, Vellore 632 014, Tamil Nadu, India) *Industrial Crops and Products*, 2013, **42**, 349-356]

PULP/PAPER

NPARR 3(3), 2012-0299, Pulp and paper from oil palm fronds: wavelet neural networks modeling of soda-ethanol pulping

Wavelet neural networks (WNNs) were used to investigate the influence of operational variables in the soda-ethanol pulping of oil palm fronds (viz. NaOH concentration (10-30%), ethanol concentration (15-75%), cooking temperature (150-190 °C), and time (60-180 min)) on the resulting pulp and paper properties (viz. screened yield, kappa number, tensile index, and tear index). Performance assessments demonstrated the predictive capability of WNNs, in that the experimental results of the dependent variables with error less than 6% were reproduced, while satisfactory R-squared values were obtained. It thus corroborated the good fit of the WNNs model for simulating the soda-ethanol pulping process for oil palm fronds [Zarita Zainuddin*, Wan Rosli Wan Daud, Pauline Ong, Amran Shafie (School of Mathematical sciences, Universiti Sains, Malaysia, 11800, USM, Penang, Malaysia), *BioResources*, 2012, 7(4), 571-5793].

NPARR 3(3), 2012-0300, Use of nanotechnology for high performance cellulosic and papermaking products

Nanotechnology is of great importance in almost all modern day industries targeting high

quality, efficiency and market potential. The large interest in the nano-scale range is due to the fact that nanomaterials can have enhanced properties, as compared to the same material with larger particle size. The modification of cellulose into different types of micro- and nano-structures has been reported in literature. In papermaking, nanotechnological advances were reported about a decade ago, though it could not be commercialized at a large scale. Nanofiber, nanofiller, nanocomposites and nanoscale chemicals to be used in pulp and paper applications are in main focus. Because of the wide abundance, renewable and environmentally benign nature, and outstanding mechanical properties of nano-based cellulosic materials, great attention has been paid to their use in pulp and paper, and other industries. There are a few challenges associated with their efficient use at a commercial scale, such as cost, lack of compatibility among materials and knowledge gap. This review of recent work discusses the manufacturing, application and properties of different nanoparticles and nano-based technological developments reported by researchers worldwide, related to cellulose and paper manufacturing [Vipul S. Chauhan and Swapan K. Chakrabarti (Thapar Centre for Industrial Research & Development, Paper Mill Campus, Yamuna Nagar – 135 001, India), *Cellulose Chemistry and Technology*, 2012, 46 (5-6), 389-400].

SPICES/CONDIMENTS

NPARR 3(3), 2012-0301, Effects of high hydrostatic pressure on color of spinach purée and related properties

Changes in instrumental color parameters, chlorophyll *a* and *b*, activity of chlorophyllase, Mg-dechelataase, peroxidase and polyphenol oxidase, total phenolic compounds and pH of spinach purée were assessed after high hydrostatic pressure (HHP) (200, 400 and 600 MPa for 5, 15 and 25 min) treatments at room temperature. HHP treatments induced a better retention of visual green color ($-a^*$ and L^* values) and chlorophyll contents of spinach purée. As for chlorophyll degradation-related enzymes, the results indicated that chlorophyllase activity decreased at all pressures; however, Mg-dechelataase activity was dramatically activated after HHP treatment at 400 and 600 MPa. Peroxidase exhibited higher resistance to HHP; however, polyphenol oxidase, which is responsible for enzymatic browning, was suppressed progressively with increase in pressure level from 200 to 600 MPa. In addition, the pH value of HHP-treated spinach purée was increased to be close to neutral pH, which could effectively inhibit chlorophyll degradation. No significant differences ($P > 0.05$) were found after extending the treatment times at the same level of pressure. HHP treatments effectively prevent chlorophyll degradation and enzymatic browning in spinach purée and retain a better original fresh green color of spinach compared with conventional thermal treatment [Rongrong Wang, Tingting Wang, Qian Zheng, Xiaosong Hu, Yan Zhang* and Xiaojun Liao (College of Food Science and Nutritional Engineering, China Agricultural University, Beijing 100083, China), *Journal of the Science of Food and Agriculture*, 2012, **92**(7), 1417-1423].

NPARR 3(3), 2012-0302, An important spice, *Pimenta dioica* (Linn.) Merrill: A Review

Pimenta dioica (Linn.) Merrill. Family: Myrtaceae, well known for its berries called Pimento, has been used as an important spice since time immemorial, for its culinary as well as medicinal qualities. It is also known as Allspice due to its intricate aroma which is a medley of aroma from spices such as Clove, Nutmeg and Cinnamon. In India, the leaves of *Pimenta* are used to flavor rice which gives it a typical aroma. Traditional culinary practice uses the dried berries for marinating meat. Various compounds have been isolated from the plant which belongs to categories like phenylpropanoids, tannins, glycosides and essential oil. The present article is a humble effort to study the work done till date on this important spice [Priya S Rao, Sheth Navinchandra, KN Jayaveera, *International Current Pharmaceutical Journal*, 2012, **1**(8), 221-225].

NPARR 3(3), 2012-0303 Chemopreventive effects of cardamom (*Elettaria cardamomum* L.) on chemically induced skin carcinogenesis in Swiss albino mice

The chemopreventive potential of cardamom was evaluated on 7,12-dimethylbenz[*a*]anthracene-initiated and croton oil-promoted mouse skin papillomagenesis. A significant reduction in the values of tumor incidence, tumor burden, and tumor yield and the cumulative number of papillomas was observed in mice treated orally with 0.5 mg of cardamom powder in suspension continuously at pre-, peri-, and post-initiation stages of papillomagenesis compared with the control group. The average weight and diameter of tumors recorded were also comparatively lower in the cardamom-treated mouse group. Treatment of cardamom suspension by oral gavage for 15 days resulted in a significant decrease in the lipid peroxidation level of the liver ($P < .01$). In addition, the reduced glutathione level was significantly elevated in comparison with the control group ($P < .05$) following cardamom suspension treatment.

Taken together, these findings indicate the potential of cardamom as a chemopreventive agent against two-stage skin cancer [Samir Qiblawi, Awdah Al-Hazimi, Mohammed Al-Mogbel, Ashfaque Hossain, and Debasis

Bagchi*(Department of Pharmacological and Pharmaceutical Sciences, University of Houston College of Pharmacy, Houston, TX 77204, USA), *Journal of Medicinal Food*, 2012, **15**(6), 576-580].

SUGARS (incl. Natural sweeteners, Jaggery, Palm sugar, Honey, etc.)

NPARR 3(3), 2012-0304, Comparison of pretreatment strategies for conversion of coconut husk fiber to fermentable sugars

In the present study, coconut husk was employed as biomass feedstock for production of bioethanol, due to its abundance in Malaysia. Due to the complex structures of coconut husk, a pretreatment process is crucial in extracting fermentable sugars from the embedded cellulose matrix for subsequent ethanol fermentation process. The ground coconut husk was subjected to three different pretreatment processes inclusive of thermal, chemical, and microwave-assisted-alkaline techniques, prior to enzymatic hydrolysis and fermentation process. The composition profile of coconut husk was significantly altered upon the microwave-assisted-alkaline treatment as compared to the untreated sample, with the cellulose content increasing from 18-21% to 38-39% while lignin content decreased from 46-53% to 31-33%. Among the pretreatment methods applied, enzymatic hydrolysis of coconut husk pretreated by microwave-assisted-alkaline method recorded the highest yield of fermentable sugars, 0.279 g sugar/g substrate. SEM imaging showed the obvious and significant disruption of coconut husks' structure after microwave-assisted-alkaline pretreatment. In conclusion, by employing suitable pretreatment technique in treating the lignocellulosic materials of coconut husk, the extracted fermentable sugar is a potential substrate for bioethanol production [Ding, T. Y., Hii, S. L., and Ong, L. G. A., *BioRes.* 2012, **7**(2), 1540-1547].

NPARR 3(3), 2012-0305, Preservation of sugarcane juice using hurdle technology

Sugarcane juice was subjected following treatments viz. pasteurization at 80°C for 10min+chemical treatments (KMS @ 150 ppm

and citric acid @ 0.05%); pasteurization at 80°C for 10 min+chemical treatments (KMS @ 150ppm and citric acid @ 0.05%)+sterilization at 80°C for 20min. All the samples were packed in glass bottles, polyethylene Tetraphelate (PET) bottles and low density polyethylene pouches (LDPE) and then irradiated at 0.25, 0.5 and 1.0 kGy and stored for 90 days at room and low temperature. Non-irradiated samples were taken as control. On treatment moisture content, ascorbic acid, viable bacterial count and viable yeast and mold count were decreased significantly ($P>0.05$) where as no significant effect was observed on reducing and total sugars in cane juice. Among the three packaging material used glass and PET was found to be at par in increasing the shelf life of sugarcane juice in comparison to LDPE pouches. On storage, ascorbic acid and total sugars were decreased significantly ($P>0.05$). Moisture content, viable bacterial count and viable yeast mold count were increased on storage. Irradiation and packaging material statistically showed no significant differences on organoleptic properties of juice but storage showed changes in sensory scores. Among all the treatments pasteurization at 80°C for 10 min+chemical treatments (KMS @ 150 ppm and citric acid @ 0.05%)+sterilization at 80°C for 20 min was found to be best in maintain the shelf life of juice up to 60 days at room temperature and 90 days at low temperature with 1.0 kGy irradiation doses. Among glass bottles, PET bottles and LDPE pouches, glass and PET were found to be best in maintaining the quality of juice [S. Sankhla*, A. Chaturvedi, A. Kuna and K. Dhanlakshmi(S-2/203, Old Mahavir Nagar, Tilak Nagar, New Delhi 110018, India), *Sugar Tech*, 2012, **14**(1), 26-39].

NPARR 3(3), 2012-0306, Partial purification and characterization of acid invertase from the fresh and stale sugarcane juice

Soluble acid invertases from the fresh and stale cane juice of variety CoJ83 were purified by

fractional precipitation with ammonium sulphate and ion exchange chromatography with DEAE-cellulose. Three isoforms of acid invertase were identified in juice of fresh cane and four isoforms of enzyme were found in juice of stale cane. The isoforms obtained were characterized for their kinetic parameters. Optimum pH and optimum temperature range of isoforms from fresh cane juice were 4.5–5.0 and 35–45°C, however isoforms of invertase from juice of stale cane were having optimum pH of 4.0–4.5 and optimum temperature 40–55°C. Isoforms identified from juice of stale canes were kinetically more efficient in comparison to isoforms identified from juice of fresh canes, as they were having higher V_{max}/K_m values than isoforms from fresh cane juice. $MnCl_2$ inhibited the soluble acid

invertase isoforms of fresh cane completely, but it was unable to inhibit completely the enzyme isoforms of juice of stale cane. $ZnCl_2$, $NiCl_2$, KCl , sodium metasilicate, sodium lauryl sulphate and $KMnO_4$ inhibited the activity of different invertase isoforms in both fresh and stale cane juice, but this inhibition percent was relatively less in stale cane enzyme isoforms as compared to enzyme isoforms from juice of fresh cane. This points to the existence of structural and conformational differences among invertase isoforms in juice of fresh and stale cane [Surekha Bhatia, Jyoti, S. K. Uppal, S. K. Batta and S. Bhatia (Department of Processing and Food Engineering, Punjab Agricultural University, Ludhiana 141004, India), *Sugar Tech*, 2012, **14**(2), 148–155].

THERAPEUTICS

NPARR 3(3), 2012-0307 Evaluation of protective effect of *Aegle marmelos* Corr. in an animal model of chronic fatigue syndrome

To evaluate ethanolic extract of leaves of *Aegle marmelos* in an experimental animal model of chronic fatigue syndrome for potential therapeutic benefit was conducted. Age/weight-matched female Wistar albino rats were grouped into five groups. (Group I- V) (n = 8). Group I served as naïve control and II served as stress control. Except for group I animals, other group animals were subjected to forced swimming every day for 15 minutes to induce a state of chronic fatigue and simultaneously treated with ethanolic extract of *Aegle marmelos* (EEAM) 150 and 250 mg/kg b.w. and Imipramine (20 mg.kg b.w.), respectively. Duration of immobility, anxiety level and locomotor activity were assessed on day 1, 7, 14 and 21 followed by biochemical estimation of oxidative biomarkers at the end of the study. Treatment with EEAM (150 and 250 mg/kg b.w.) resulted in a statistically significant and dose dependent reduction ($P < 0.001$) in the duration of immobility, reduction in anxiety and increase in locomotor activity. Dose dependent and significant reduction in LPO level and increase in CAT and SOD was observed in extract treated animals. The results are suggestive of potential protective effect of *A. marmelos* against experimentally induced CFS [Vanphawng Lalremruta and Gurunath S Prasanna* (Department of Pharmacology, KLE University's College of Pharmacy, Rajajinagar, Bangalore, India), *Indian J Pharmacol*, 2012, **44**(3), 351-56].

NPARR 3(3), 2012-0308, Antioxidant activity of a new phenolic glycoside from *Lagenaria siceraria* Stand. fruits

The antioxidant properties of different extracts of *Lagenaria siceraria* (bottle gourd) fruit were evaluated. In the process, a new

phenolic glycoside (*E*)-4-hydroxymethyl-phenyl-6-*O*-caffeoyl- β -d-glucopyranoside (**1**) was isolated and identified together with 1-(2-hydroxy-4-hydroxymethyl)-phenyl-6-*O*-caffeoyl- β -d-gluco-pyranoside (**2**), protocatechuic acid (**3**), gallic acid (**4**), caffeic acid (**5**) and 3,4-dimethoxy cinnamic acid (**6**). Their structures were elucidated by extensive NMR experiments including ^1H - ^1H (COSY) and ^1H - ^{13}C (HMQC and HMBC) spectroscopy and chemical evidences. The antioxidant potential of the compound **1** and **2** was tested in different *in vitro* assay systems such as free radical scavenging assay, 3-(4, 5-dimethylthiazole-2-yl)-2, 5-diphenyl-tetrazolium bromide (MTT) reduction assay, superoxide scavenging activity, reducing power assay and linoleic acid peroxidation assay [Rahul Mohan, Rahul Birari, Aniket Karmase, Sneha Jagtap and Kamlesh Kumar Bhutani (Department of Natural Products, National Institute of Pharmaceutical Education and Research, Sector 67, SAS Nagar, Mohali 160 062, Punjab, India), *Food Chemistry*, 2012, **132**(1), 244-251].

NPARR 3(3), 2012-0309, Phenolic content, antioxidant, anti-inflammatory and anticancer activities of the edible halophyte *Suaeda fruticosa* Forssk

Suaeda fruticosa is an edible and medicinal halophyte known for its hypoglycaemic and hypolipidaemic activities. In this study, novel biological activities of the shoot extracts related to their phenolics were investigated. Results showed an appreciable total phenolic (31.8mgGAE/gDW) in shoot extracts. The estimation of antioxidant capacities using oxygen radical absorbance capacity (ORAC method) and a cell based-assay (WS1) of four extracts (hexane, dichloromethane, methanol and water) showed that shoot methanol extract exhibit the highest antioxidant activities. The same extract displayed the utmost anti-inflammatory activity, inhibiting nitric oxide (NO) release, by 66.4% at 160 μ g/ml in lipopolysaccharide (LPS)-stimulated RAW 264.7 macrophages. Besides,

the dichloromethane extract showed the highest anticancer activity against human lung carcinoma (A-549) and colon adenocarcinoma cell lines (DLD-1, Caco-2 and HT-29) with specificity against DLD-1 ($IC_{50}=10\pm 1\mu\text{g/ml}$). These findings demonstrate the remarkable potentiality of this edible halophyte as valuable source of antioxidants which exhibit original and interesting anti-inflammatory and anticancer capacities [Samia Oueslati, Riadh Ksouri*, Hanen Falleh, André Pichette, Chedly Abdelly and Jean Legault (Laboratoire des Plantes Extémophiles, Centre de Biotechnologie à la Technopôle de Borj-Cédria (CBBC), BP 901, 2050 Hammam-Lif, Tunisia), *Food Chemistry*, 2012, **132**(2), 943-947].

NPARR 3(3), 2012-0310, Anti-inflammatory effect of phenethyl isothiocyanate, an active ingredient of *Raphanus sativus* Linne

Phenethyl isothiocyanate (PEITC) is an active ingredient of *Raphanus sativus* Linne (Cruciferae). However, regulatory mechanism of PEITC involved in caspase-1 signalling has not been fully elucidated in mast cells. First, PEITC inhibited the production of IL-6 through the inhibition of caspase-1/receptor-interacting protein 2, followed by regulation of NF- κ B/I κ B α pathway or p38 and extracellular signal-regulated kinase mitogen-activated protein kinases. Second, PEITC inhibited the IL-1 β production through the inhibition of caspase-1 proteolytic activity. Overall, these results provide a proof that PEITC can inhibit the inflammatory reactions by two distinct pathways in mast cells and open new perspectives to pharmacologically manipulate the expression and production of IL-6 and IL-1 β by molecules acting on the caspase-1 pathway [Phil-Dong Moon, and Hyung-Min Kim (Department of Pharmacology, College of Oriental Medicine, Institute of Oriental Medicine, Kyung Hee University, 1 Hoegi-dong, Dongdaemun-gu, Seoul 130-701, Republic of Korea), *Food Chemistry*, 2012, **131**(4), 1332-1339].

NPARR 3(3), 2012-0311, Haematological effects of aqueous extract of ornamental plants in male Swiss albino mice

Treatment of mice with crude extract of *Hibiscus rosa sinensis* flowers (500 mg/kg BW) and *Bougainvillea spectabilis* leaves (800 mg/kg BW) for a period of 30 days indicates a significant increase in the level of hemoglobin and count of RBC but a significant decline in the level of MCH and MCV in the former case. On the other hand, in *B. spectabilis* treated animals, the level of hemoglobin, RBC count & PCV declined significantly. Hence, it is concluded that the use of *H. rosa-sinensis* whereas may not cause any adverse effect on animals, *B. spectabilis* is to be used with care as its chronic use may cause anemia [N Mishra* and VL Tandon (Department of Bioscience and Biotechnology, Banasthali University Banasthali, Rajasthan-304022, India), *Vet World*, 2012, **5**(1), 19-23].

NPARR 3(3), 2012-0312, Antimicrobial, antioxidant and phytochemical investigations of sea buckthorn (*Hippophaë rhamnoides* L.) leaf, stem, root and seed

The antimicrobial and antioxidant activities of crude ethanolic extract from *Hippophaë rhamnoides* L. (Elaeagnaceae) leaf, stem, root and seed, and their respective fractions, obtained by liquid-liquid extraction (LLE) using hexane (HF), ethyl acetate (EAF) and water (WF), were investigated. The crude extract was obtained by Pressurised Liquid Extraction (PLE), using ethanol at 100 bar and 60°C. Antimicrobial activity was tested against food-borne and clinical microorganisms. Antioxidant activity was measured using the DPPH-radical scavenging and the ferric reducing antioxidant power (FRAP) assays. The phytochemical contents were examined by colorimetric methods. The results showed that crude extracts were active against Gram- and + strains, and that seed and root extracts were better

radical scavengers than leaf and stem extracts. For all organs, the two activities tested were found to be higher in WF. These activities were correlated with the presence of phenolic compounds in active fractions. High Performance Thin Layer Chromatography (HPTLC) fingerprints confirmed presence of phenolic compounds in active extracts and fractions [Thomas Michel, Emilie Destandau*, Gaëtan Le Floch, Marie Elisabeth Lucchesi and Claire Elfakir (Université d'Orléans, CNRS UMR 6005, Institut de Chimie Organique et Analytique (ICOA), BP 67059, rue de Chartres, 45067 Orléans Cedex 2, France), *Food Chemistry*, 2012, **131**(3), 754-760].

NPARR 3(3), 2012-0313, Antihyperlipidemic potential of *Cedrus deodara* extracts in monosodium glutamate induced obesity in neonatal rats

The antihyperlipidemic effect of *Cedrus deodara* against monosodium glutamate (MSG) induced obesity in neonatal rats was studied. The studies were carried out on newborn neonatal rats and were injected intraperitoneally with 2 mg/g of MSG on the 2nd and 4th postnatal days and 4 mg/g on 6th, 8th and 10th postnatal days. Ethanolic extract (EE) and acetone extract (AE) of *C. deodara* was administered in a dose of 100 and 200 mg/kg, p.o./day at the age of 65 days. On day 60 of treatment, body weight, locomotor activity, body temperature, and various biochemical parameters like serum glucose, total cholesterol, triglyceride, and organs weights were recorded. There was a significant reduction in body weight, organs and increased body temperature, locomotor activity after treatment with extracts. *C. deodara* decreased serum glucose, total cholesterol and triglyceride, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) levels and increased high density lipoprotein (HDL) significantly has compared to MSG-control rats. *C. deodara* extracts exhibited antihyperlipidemic effect and it possesses anti-obesity properties in MSG induced

obese rats [Sudhir Patil, T Prakash, D Kotresha, N Rama Rao and Naitik Pandey (Department of Pharmacology, Acharya and B.M. Reddy College of Pharmacy, Bangalore-560 090, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 644-647].

NPARR 3(3), 2012-0314, Protective effect of aqueous extract of *Oroxylum indicum* Linn. (root bark) against DNBS-induced colitis in rats

Aqueous root extract of *Oroxylum indicum* was evaluated in rats against dinitrobenzene sulfonic acid (DNBS) induced colitis. Rats were pre-treated orally for seven days and continued for four days after the induction of colitis with OI_{aq} (100, 200, and 400 mg/kg) or vehicle. Colitis was induced by intracolonic instillation of 25 mg of DNBS per rat dissolved in 50% alcohol and 4 days later, the colonic mucosal damage was analyzed along with food intake, body weight, colon weight, spleen weight, histological damage, myeloperoxidase (MPO) activity, malondialdehyde (MDA) levels, reduced glutathione (GSH), and nitric oxide levels in colonic tissue homogenate. Significant reduction in gross damage area, weight loss and increase in colonic and spleen weight were evident in test substance-pretreated animals' dose dependently as compared to vehicle treated control. These effects were confirmed biochemically by a reduction in colonic myeloperoxidase activity, malondialdehyde levels, nitric oxide levels, and increase in reduced glutathione (GSH) levels. Furthermore, microscopic examination revealed diminution of inflammatory cell infiltration and submucosal edema in colon segments of rats treated with OI_{aq}. The results demonstrate the protective effect of OI_{aq} in the animal model of acute colitis possibly through an antioxidant, anti-liperoxidative or due to reduction in nitric oxide generation [Shrikant V Joshi*, Bhavin A Vyas, Payal D Shah, Dinesh R Shah, Shailesh A Shah, Tejal R Gandhi (Department of Pharmacology, Maliba Pharmacy College, Gopal

Vidyanagar, Bardoli-Mahuva Road, Tarsadi - 394 350, Surat, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 656-661].

NPARR 3(3), 2012-0315 Screening of *Ficus religiosa* leaves fractions for analgesic and anti-inflammatory activities

The different fractions of dried leaves of *Ficus religiosa* Linn for analgesic and anti-inflammatory activity using different models of pain and inflammation. The analgesic activity of *F. religiosa* carried out using acetic acid-induced writhing in mice and tail flick test in rats. The anti-inflammatory activity was evaluated using carrageenan-induced rat paw edema and cotton pellet-granuloma formation in rats. Five different fractions (FRI, FRII, FRIII, FRIV and FRV) of *F. religiosa* at the dose level of 20 and 40 mg/kg, p.o were tested. The fraction FRI (40 mg/kg, p.o.) and FRIII (40 mg/kg, p.o) were found to be more effective ($P < 0.01$) in preventing carrageenan induced rat paw edema, cotton pellet granuloma formation, and acetic acid induced writhing compared to the other fractions. FRI (20 mg/kg, p.o.) and FRIII (20 mg/kg, p.o.) were also found to be more effective in increasing latency period in tail flick method. Out of five different fractions of *F. religiosa* leaves tested, FRI and FRIII possess potent analgesic and anti-inflammatory activities against different models of inflammation and pain [Vishal Gulecha*, T Sivakumar, Aman Upaganlawar, Manoj Mahajan and Chandrashekhara Upasani (Department of Pharmacology, SNJB'S SSDJ College of Pharmacy, Neminagar, Chandwad, Nashik; Department of Medicinal Chemistry, Nandha College of Pharmacy, Erode, Tamil Nadu, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 662-666].

NPARR 3(3), 2012-0316, Neuroprotective activity of *Wedelia calendulacea* on cerebral ischemia/reperfusion induced oxidative stress in rats

This study was undertaken to evaluate the neuroprotective activity of *Wedelia calendulacea* against cerebral ischemia/reperfusion induced oxidative stress in the rats. The global cerebral ischemia was induced in male albino Wistar rats by occluding the bilateral carotid arteries for 30 min followed by 1 h and 4 h reperfusion. At various times of reperfusion, the histopathological changes and the levels of malondialdehyde (MDA), glutathione peroxidase (GPx), glutathione reductase (GR), glutathione-s-transferase (GST), and hydrogen peroxide (H_2O_2) activity and brain water content were measured. The ischemic changes were preceded by increase in concentration of MDA, hydrogen peroxide and followed by decreased GPx, GR, and GST activity. Treatment with *W. calendulacea* significantly attenuated ischemia-induced oxidative stress. *W. calendulacea* administration markedly reversed and restored to near normal level in the groups pre-treated with methanolic extract (250 and 500 mg/kg, given orally in single and double dose/day for 10 days) in dose-dependent way. Similarly, *W. calendulacea* reversed the brain water content in the ischemia reperfusion animals. The neurodegeneration also conformed by the histopathological changes in the cerebral-ischemic animals. The findings from the present investigation reveal that *W. calendulacea* protects neurons from global cerebral-ischemic injury in rat by attenuating oxidative stress [Tigari Prakash, Dupadahalli Kotresha and Rama Rao Nedendla* (Department of Pharmaceutical Chemistry, Chalapathi Institute of Pharmaceutical Science, Guntur - 522 034, Andhra Pradesh, India), *Indian Journal of Pharmacology*, 2011, **43**(6) 676-682].

NPARR 3(3), 2012-0317, Antidiarrheal potential of standardized extract of *Rhododendron arboreum* Smith flowers in experimental animals

To investigate standardized ethyl acetate fraction of *Rhododendron arboreum* (EFRA) flowers for antidiarrheal activity in experimental

animals. A simple sensitive high performance thin layer chromatography (HPTLC) method was used for the determination of hyperin in EFRA. The standardized fraction was investigated for castor oil, magnesium sulfate-induced diarrhea, measurement of gastrointestinal transit using charcoal and castor oil-induced entero-pooling. The concentration of hyperin in flowers of *R. arboreum* was found to be 0.148% by HPTLC. Oral administration of EFRA at 100, 200 and 400 mg/kg exhibited dose-dependent and significant ($P < 0.05-0.001$) antidiarrheal potential in castor oil and magnesium sulfate-induced diarrhea. EFRA at doses of 100, 200 and 400 mg/kg also produced significant ($P < 0.05-0.001$) dose-dependent reduction in propulsive movement in castor oil-induced gastrointestinal transit using charcoal meal in rats. EFRA was found to possess an antienterpooling in castor oil-induced experimental animals by reducing both weight and volume of intestinal content significantly. These findings demonstrate that standardized ethyl acetate fraction of *R. arboreum* flowers has potent antidiarrheal activity thus justifying its traditional use in diarrhea and have great potential as a source for natural health products [Neeraj Verma, Anil P Singh, Amresh Gupta, PK Sahu, Ch V Rao* (Department of Pharmacology, Pharmacognosy and Ethnopharmacology Division, National Botanical Research Institute (Council of Scientific and Industrial Research), Rana Pratap Marg, Lucknow, Uttar Pradesh, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 689-693].

NPARR 3(3), 2012-0318, Sedative and antiepileptic effects of *Anthocephalus cadamba* Roxb. in mice and rats

The aim of the present study was to evaluate the sedative and antiepileptic activities of ethanolic extract of *Anthocephalus cadamba* (ACE) bark in various experimental animal models. ACE was tested at three doses viz. 100, 200 and 400 mg/kg p.o. We used ketamine-

induced sleeping time model to test the sedative property of the extract where, onset and duration of sleep were observed. A paradigm of anticonvulsant models (pentylene-tetrazole, isoniazid and maximal electroshock-induced seizures) were used to evaluate its protective effect against absence and generalized types of seizures. Onset of clonic convulsions, tonic extension and time of death were observed in PTZ and INH-induced seizure models. In MES model, duration of tonic hind leg extension and onset of stupor were observed. ACE showed significant increase in ketamine induced sleeping time. It also exhibited significant increase ($P < 0.05, 0.01$ and 0.001) in latency to clonic convulsion, tonic extension and time of death in PTZ and INH models at all tested doses, whereas in the MES model, the lower dose was found to be effective when compared with the higher doses (200 and 400 mg/kg, p.o.). The results of the present investigation demonstrated that ACE possesses sedative and antiepileptic activities [Pandian Nagakannan, Basavaraj D Shivasharan, Veeresh P Veerapur*, Boreddy S Thippeswamy (Department of Pharmacology, Sree Siddaganga College of Pharmacy, Tumkur, Karnataka, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 699-702].

NPARR 3(3), 2012-0319, Anticonvulsant and muscle relaxant activity of the ethanolic extract of stems of *Dendrophthoe falcata* (Linn. f.) in mice

To investigate the anticonvulsant and muscle relaxant activity of ethanolic extract of stems of *Dendrophthoe falcata* in mice. The ethanolic extract of stems of *D. falcata* (100, 300 and 500 mg/kg, p.o.) was studied for its anticonvulsant effect on maximal electroshock-induced seizures and muscle relaxant activity at the same dose level using rota rod and traction test in mice. The fresh stems of *D. falcata* were collected during the month of September 2009 from district Barabanki, U.P. The plant material

was authenticated by Dr. Tariq Husain (Scientist Herbarium), National Botanical Research Institute, Lucknow (reference no. 97307). Preliminary phytochemical analysis revealed presence of proteins, carbohydrates, glycosides, steroids, triterpenes, flavonoids, tannins and phenolic compounds. *D. falcata* ethanolic extract (DFEE) (100, 300 and 500 mg/kg, p.o.) significantly ($P < 0.001$) inhibited seizures induced by MES, reduced the duration of Hind limb tonic extensor phase (HLTE) and a decline in motor coordination. The ethanolic extract possesses anticonvulsant activity and muscle relaxant activity [Pooja Sinoriya, R Irchhaiya, Bhawna Sharma, Gayatri Sahu and Santosh Kumar (Institute of Pharmacy, Bundelkhand University, Jhansi, Uttar Pradesh, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 710-713].

NPARR 3(3), 2012-0320, Aqueous extract of *Annona squamosa* (L.) ameliorates renal failure induced by 5/6 nephrectomy in rat

To assess the renoprotective activity of the water extract of *Annona squamosa* in 5/6 nephrectomized animals. For evaluating the renoprotective effects of *A. squamosa*, 5/6 nephrectomized rats were used as a model for renal failure. The effects of hot-water extract of leaves of *A. squamosa* L. at a dose 300 mg/kg bw on biochemical and urinary parameters like plasma urea, plasma creatinine, and urine

creatinine were analyzed. For elucidating its effect on oxidative stress, renal superoxide dismutase (SOD) levels were measured. Leaves of *A. squamosa* were collected during December 2009 from Visnagar, Gujarat. These were washed with water and 50 g of fresh leaves (kept at 25°C for 5 days in absence of sunlight) were extracted in 1 l of boiling water for 2 h and concentrated to half of the volume by boiling in a water bath. The dark-brown extract thus obtained was cooled, filtered using Whatman No. 1 filter paper, and the filtrate was centrifuged at 10,000 rpm at 25°C. The supernatant was concentrated up to 100 ml on rotavapour under reduced pressure. The lyophilized concentrated crude extract was used for the study. Nephrectomized rats (5/6) showed a significant rise in plasma urea and creatinine levels with a stable fall in urine creatinine. Treatment with *A. squamosa* extract (300 mg/kg bw) lead to a significant fall in the plasma urea and creatinine values with partial restoration to normal values along with a significant rise in the activity of SOD. Thus, therapeutic strategies against oxidative stress could be effective in renal diseases. This study provides an indication to investigate further the efficacy of *A. squamosa* as a novel agent for alleviating renal failure [Aaishwarya B Deshmukh and Jayvadan K Patel*(Department of Pharmacology, Nootan Pharmacy College, Visnagar- Gujarat, India), *Indian Journal of Pharmacology*, 2011, **43**(6), 718-721].

VEGETABLES

NPARR 3(3), 2012-0321, Micropropagation of *Sauropus androgynus* (L.) Merr.—An important green leafy vegetable

A micropropagation protocol has been developed for *Sauropus androgynus* (L.) Merr. using uninodal explants in Murashige and Skoog (MS) medium supplemented with various concentrations of cytokinins, benzyl adenine (BA) and kinetin (Kn). Shoot induction was observed in 1.0 mg/L BA and 0.1 mg/L Kn after 25 d and more number of shoots was achieved in shoot induction medium. Rooting was induced from shoots in MS medium supplemented with various concentrations of indole 3-butyric acid (IBA) and naphthalene acetic acid (NAA). All the shoots were rooted in 0.5 mg/L IBA and 0.2 mg/L NAA after 25 d. Rooted plants were transferred to soil and successfully acclimatized [Eganathan, P and Parida, Ajay (Department of Biotechnology, M. S. Swaminathan Research Foundation, Taramani, Chennai-600 113), *Indian Journal of Biotechnology*, 2012, **11**(2), 235-237]

NPARR 3(3), 2012-0322, Effects of different rootstocks on aroma volatile compounds and carotenoid content of melon fruits

Grafting plants on resistant rootstocks is an effective tool for controlling soil borne diseases and represents a common practice in land-intensive melon cultivation. Although it is known that type of rootstock alters both yield and quality attributes of the fruit, the horticultural industry has traditionally focused only on yield. The increasing consumer attention for high quality vegetable crops makes it indispensable to carefully select rootstocks/scion combinations able to ensure also a high quality fruits. In this regards the research aimed to evaluate the effects of grafting on melon volatile aroma compounds and carotenoid content that are quality parameters rarely investigated till now in grafted melon. Five *Cucurbita maxima* × *Cucurbita moschata* hybrids

(namely Polifemo, AS10, RS841, P360 and ELSI) and two genotypes of melon (Energia and Sting), selected for their disease resistance, were tested as rootstocks for melon cv. Proteo under greenhouse conditions. All the used rootstocks exhibited a good affinity with the scion, with Polifemo showing, in the early harvest, a productivity higher than control (about 60%) and a significant increase in fruit number. As regards the volatile compounds, the content of key aroma esters ethyl 2-methylbutanoate and ethyl butanoate resulted lower in most of the grafted samples (20-55% and 63-95% less than control, respectively), except in sample from Proteo/Sting grafting combination. The aroma of melons grafted on pumpkin hybrid and on Energia rootstocks resulted more similar to the control. The use of pumpkin hybrids rootstocks determined an improvement of qualitative and quantitative carotenoid profile for the presence of lutein (5.5-13.7 mg kg⁻¹ of fresh weight) in fruit samples from Elsi, P360, RS841 and AS10 grafting combinations and the higher amount of β-carotene (about eightfold more than control) and α-carotene (about 56% more than control) in P360 sample, whereas the melon genotype rootstocks determined a decrease in the amount of β-carotene (about 55% less than control). In conclusion, the *Cucurbita* rootstocks resulted acceptable for melon cv. Proteo, both for productivity and quality of fruits, whereas Sting rootstock caused a reduction in fruit quality parameters [C. Conduro*, A. Verzera, G. Dima, G. Tripodi, P. Crinò, A. Paratore and D. Romano (Dipartimento di Chimica Organica e Biologica, Università degli Studi di Messina, 98166 Messina, Italy), *Scientia Horticulturae*, 2012, **148**(4), 9-16].

NPARR 3(3), 2012-0323, A comparative study on the polyphenolic content, antibacterial activity and antioxidant capacity of different solvent extracts of *Brassica oleracea* vegetables

Brassica vegetables are rich in polyphenols, flavonoids and glucosinolates.

Investigation was undertaken to optimise the best solvents among 60% ethanol, acetone and methanol for the extraction of polyphenols from Brassica vegetables. Furthermore, different properties such as antibacterial activity and antioxidant capacity were also investigated. Results showed that a 60% methanolic extract showed the highest total phenolic content which was 23.6, 20.4 and 18.7mg gallic acid equivalents (GAE)g⁻¹ extract for broccoli, Brussels sprouts and white cabbage, respectively. The hydroxybenzoic acid content of various solvent extracts ranged from 5.86 to 8.91GAEg⁻¹ extract for broccoli, 2.70 to 5.44GAEg⁻¹ extract for Brussels sprouts and 3.69 to 4.86GAEg⁻¹ extract for white cabbage, while the hydroxycinnamic acid content ranged from 0.78 to 1.26 chlorogenic acid equivalents (CAE)g⁻¹ extract for broccoli, 1.41 to 3.45 CAE g⁻¹ extract for Brussels sprouts and 0.49 to 1.14 CAE g⁻¹ extract for white cabbage. A concentration-dependent antioxidative capacity was confirmed for different reactive oxygen species, and moderate antibacterial activity was observed against a number of Gram-negative and Gram-positive food spoilage and food pathogenic bacteria. Solvents significantly affected polyphenolic content and its different properties, and the methanol was found to be the best solvent for the extraction of polyphenols from studied Brassica vegetables [Amit K. Jaiswal, Nissreen Abu-Ghannam* and Shilpi Gupta (School of Food Science and Environmental Health, College of Sciences and Health, Dublin Institute of Technology, Cathal Brugha Street, Dublin 1, Ireland), *International Journal of Food Science & Technology*, 2012, **47**(2), 223-231].

NPARR 3(3), 2012-0324 Breastfeeding mothers consume more vegetables and a greater variety of fruits and vegetables than non-breastfeeding peers: The influence of socioeconomic position

This study compared the diets of breastfeeding and non-breastfeeding mothers

from socioeconomically diverse regions of Melbourne to determine whether breastfeeding is a marker for healthier maternal dietary intakes. This cross-sectional study obtained information via self-reported questionnaire from 529 first-time Melbourne mothers. Breastfeeding status was determined when the children were 3.9 months. Diet information was obtained using a validated Food Frequency Questionnaire. Maternal diet was assessed by seven indicators: average daily intake of fruit, vegetables, non-core drinks, non-core sweet snacks, non-core savoury snacks, variety of fruit and variety of vegetables eaten in the preceding 12 months. Associations between breastfeeding status and each dietary variable were assessed using linear regression analyses. Socioeconomic position, maternal body mass index and the cluster-based sampling design were controlled for. Of the 529 subjects, 70% were breastfeeding their child. Compared with non-breastfeeding mothers, breastfeeding mothers were found to consume more serves of vegetables ($P=0.001$), a greater variety of fruit and vegetables ($P=0.001$ and $P\leq 0.001$ respectively), and sweet snacks were consumed more frequently ($P=0.006$). Differences were observed between low and high socioeconomic position mothers for fruit serves ($P=0.003$), vegetable serves ($P=0.010$) and fruit variety ($P=0.006$). These associations persisted after controlling for socioeconomic position and maternal body mass index. The association between infant feeding (breastfeeding) and some aspects of maternal diet provides further evidence suggesting a link between maternal and child diets from a younger age than previously examined [Deborah A. Leslie*, Kylie D. Hesketh and Karen J. Campbell (Centre for Physical Activity and Nutrition Research, Deakin University, 221 Burwood Highway, Burwood, Melbourne, Vic. 3125, Australia), *Nutrition & Dietetics*, 2012, **69**(2), 84-90].

NPARR 3(3), 2012-0325, Efficacy of household washing treatments for the control of *Listeria monocytogenes* on salad vegetables

The efficacy of household decontamination methods at reducing *Listeria monocytogenes* on fresh lettuce (*Lactuca sativa*), cucumber (*Cucumis sativus*) and parsley (*Petroselinum sativum*) was studied. Inoculated vegetable pieces were immersed in washing solutions and surviving *L. monocytogenes* enumerated. Parameters investigated were storage temperature prior to washing, dipping water temperature, agitation, acetic acid concentration and immersion time. The results indicated that the storage temperature significantly affects the efficacy of dipping vegetables in water for the control of *L. monocytogenes*, as the reduction in count was greatest when products had been stored at cooler temperatures. Decontamination with acetic acid (up to 2.0% v/v) was shown to have some effect in most cases, but the highest observed decrease in count was 2.6 log cfu/g. Experiments investigating the effect of exposure time to acetic acid (0.5% and 1.0% v/v, up to 30 min immersion) indicated that immersing the vegetables for more than 10 min is of minimal benefit. The most significant factor affecting washing and decontamination efficacy was the vegetable itself: *L. monocytogenes* colonizing cucumber epidermis was far more resistant to removal by washing and to acid treatment than that on the leafy vegetables, and *L. monocytogenes* on parsley was the most susceptible. This shows that published decontamination experiments (often performed with lettuce) cannot necessarily be extrapolated to other vegetables [Aikaterini Nastou, Jonathan Rhoades, Petros Smirniotis, Ioanna Makri, Michael Kontominas and Eleni Likotrafiti* (Laboratory of Food Microbiology, Department of Food Technology, Alexandrian Technological Educational Institute of Thessaloniki, 57400 Thessaloniki, Greece), *International Journal of Food Microbiology*, 2012, **159**(3), 247-253]

NPARR 3(3), 2012-0326, Comparative study on antioxidant activity of organic and conventionally grown roots and tubers vegetables of India

The antioxidant activity and total phenolic content of eight organic roots and tubers, namely beet root (*Beta vulgaris*), carrot (*Daucus carota*), small onion and big onion (*Allium cepa*), potato (*Solanum tuberosum*), white and red radish (*Raphanus sativus*) and turnip (*Brassica rapa*) were determined using three different extractions viz. ethanolic, methanolic and water extractions, each in triplicates. The organic samples were procured from farms which were certified by TNOCD, INDO CERT and EU certification. The total phenolic content (TPC) was measured by the Folin-Ciocalteu method using Gallic acid (GA) as standard. Antioxidant activity (AOA) was studied using DPPH, ABTS and FRAP assay, and the results were expressed in Trolox equivalence (TE) per gram of fresh sample. TPC ranged between 48.56±12.92 to 1237.91±55.27 GA/g of fresh sample analysed. Water extracts of organic and conventional potato, carrot, red radish and beet root and organic methanolic extracts of white radish and small onion had highest total phenolic content. Ferric reducing antioxidant power (FRAP) was ranked in the following decreasing order beet root > red radish > small onion > turnip > potato > white radish > big onion > carrot of methanolic extracts. Radical scavenging activity against DPPH radical scavenging activity was higher in methanolic and water extracts of beet root > small onion > turnip > white radish > red radish > potato > big onion > carrot. AOA by ABTS method was more in beet root > turnip > small onion > potato > red radish > white radish > big onion > carrot of water extracts. Among eight roots and tubers assayed beetroot, turnip and small onion reported highest AOA and TPC [Maheswari S. U.; Mohankumar J. B. and Uthira L., *Electronic Journal of Environmental, Agricultural and Food Chemistry*, 2012, **11**(2), 136-147].

NPARR 3(3), 2012-0327, Simultaneous extraction and quantitation of carotenoids, chlorophylls and tocopherols in Brassica vegetables

Brassica oleracea vegetables, such as broccoli (*B. oleracea* L. var. *italica*) and cauliflower (*B. oleracea* L. var. *botrytis*), are known to contain bioactive compounds associated with health, including three classes of photosynthetic lipid-soluble compounds: carotenoids, chlorophylls, and tocopherols. Carotenoids and chlorophylls are photosynthetic pigments. Tocopherols have vitamin E activity. Due to genetic and environmental variables, the amounts present in vegetables are not constant. To aid breeders in the development of *Brassica* cultivars with higher provitamin A and vitamin E contents and antioxidant activity, a more efficient method was developed to quantitate carotenoids, chlorophylls, and tocopherols in the edible portions of broccoli and cauliflower. The novel UPLC method separated five carotenoids, two chlorophylls, and two tocopherols in a single 30 min run, reducing the run time by half compared to previously published protocols. The objective of the study was to develop a faster, more effective extraction and quantitation methodology to screen large populations of *Brassica* germplasm, thus aiding breeders in producing superior vegetables with enhanced phytonutrient profiles [Ivette Guzman, Gad G. Yousef, and Allan F. Brown* (Department of Horticultural Science, Plants for Human Health Institute, North Carolina State University, 600 Laureate Way, Suite 1329, Kannapolis, North Carolina 28081, United States), *J Agric Food Chem*, 2012, **60**(29), 7238-7244].

NPARR 3(3), 2012-0328, **Cruciferous vegetables intake and risk of prostate cancer: A meta-analysis**

A systematic literature search up to June 2011 was carried out in PubMed, and the references of retrieved articles were screened. The summary relative risks with 95% confidence interval for the highest versus the lowest intake of cruciferous vegetables were calculated. Heterogeneity and publication bias were also evaluated. Seven cohort and six population-based case-control studies met the inclusion criteria of the meta-analysis. A significantly decreased prostate cancer risk was observed overall in the cruciferous vegetables intake group (relative risks=0.90; 95% confidence interval 0.85-0.96) and the subgroup of case-control studies (relative risks=0.79; 95% confidence interval 0.69-0.89), but not in cohort studies (relative risks=0.95; 95% confidence interval 0.88-1.02). No heterogeneity and publication bias were detected across studies. Cruciferous vegetables intake is related to the decreased risk of prostate cancer. Because of the limited number of studies, further prospective studies are needed to explore the protective effect of cruciferous vegetables on prostate cancer [Ben Liu, Qiqi Mao*, Min Cao and Liping Xie (Qiqi Mao, Department of Urology, The First Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou, Zhejiang Province 310003, China), *International Journal of Urology*, 2012, **19**(2), 134-141].

WOOD

NPARR 3(3), 2012-0329, The technology on producing the first class plywood using fast growing Eucalyptus timber

There were three key factors including glue quantity of veneer, hot-pressing time, hot-pressing temperature to be researched on the effect of plywood performance, which gave an effective conclusion about technology parameter. The results indicated that the three factors obviously were related to the bonding strength and ranked as hot-pressing time > glue quantity of veneer > hot-pressing temperature in sequence. The best groups for production technology were that glue quantity of veneer was 320 g/m² with hot-pressing time and temperature of 1.2 mm/min and 135° C, respectively (Kai Fu Li *et al*, *Applied Mechanics and Materials*, 2012, **193-194**, 496-499).

NPARR 3(3), 2012-0330, Constructional bamboo plywood process control and production process

Focusing on the problems of the bamboo plywood existing in the construction field, we have proposed an optimal process for the building bamboo plywood through controlling the preparation process of the bamboo plywood. In our work, moso bamboo was selected as the objective and then a variety of performances of the bamboo plywood were tested with the heat-up-heat-down process. Experiments show that in the same conditions of MC 10%, RC 7%-8%, the best optimum processes of 12mm thick constructional bamboo plywood is 15min pressing time, the pressing temperature between 155°C to 160°C and the sheet density of 0.85 g/cm³. The optimal process to make the

performance of bamboo plywood substantially exceeded the European standard the OSB/4 levels. It can provide practical application of engineering and production design with reference value and theoretical basis for the bamboo plywood [Ming Zhi Feng *et al*, *Applied Mechanics and Materials*, 2012, **184-185**, 728-731).

NPARR 3(3), 2012-0331, Evaluation and application of the invasive weed *Mikania micrantha* as an alternative reinforcement in recycled high density polyethylene

In this study *Mikania micrantha* particle (MP) and fiber (MF) were added to recycled high density polyethylene (rHDPE) for producing natural fiber (or particle) reinforced plastic composites (NFRPC) by the flat-platen pressing process. The results showed that the flexural strength and stiffness of NFRPC were significantly improved through incorporating *M. micrantha* particle and fiber. Higher aspect ratio of reinforcement displayed stronger mechanical properties. The vertical density profile in composites significantly influenced the mechanical properties of NFRPC. A conventional V-shaped profile and a uniform vertical density profile (homo-profile) were observed in MP and MF based NFRPC, respectively. Additionally, with increasing lignocellulose content, a more uniform vertical density profile and higher wood screw holding strength were observed. These results indicate *M. micrantha* particle and fiber are excellent reinforcements for NFRPC applications [Chen, Y.-L., Lin, C.-Y., Wu, T.-L., Chung, M.-J., Chen, T.-Y., Yang, T.-H., Chen, H.-C., and Wu, J.-H*(Department of Forestry, National Chung Hsing University, Taichung, 402, Taiwan), *BioRes.*, 2012, **7(2)**, 2403-2417]., Taiwan].

OTHERS (incl. Cultivation, Distribution, New species, Postharvest Technologies, Packaging Technology, New technologies/Know How Developed, Book reviews, Forthcoming events)

CULTIVATION

NPARR 3(3), 2012-0332, Effect of supplementing compost with grapeseed meal on *Agaricus bisporus* production

This work assesses the agronomic performance of grapeseed meal, before and after oil extraction, in nutritional compost supplement when growing the mushroom species *Agaricus bisporus* (Lange) Imbach. The effect of formaldehyde treatment before using this compost is also considered. Materials were applied at different doses at spawning. Along with non-supplemented compost, three commercial nutritional supplements were used as controls. In general terms, grapeseed meal performance was similar to that of commercial delayed-release nutrients, but improved the non-supplemented compost response. We highlight that grapeseed enhances performance as larger yields of harvested mushrooms were obtained with greater dry weight content; however, their protein content was lower. The best performance was displayed by fresh formaldehyde-treated grapeseed (6000 ppm) when applied to the 10 g kg⁻¹ compost dose. The findings suggest that grapeseed meal offers a great potential to be applied on a commercial scale. The addition of grapeseed resulted in an enhanced performance as shown by the higher number of harvested mushrooms. The use of grapeseed meal (extracted or non-extracted), a low-cost ingredient with high levels of carbohydrates, may suppose an economic profit on the basis of the positive effect of adding carbon in the mushroom cultivation [Arturo Pardo-Giménez, Diego C Zied, Manuel Álvarez-Ortí, Manuela Rubio and Jose E Pardo* (Escuela Técnica Superior de Ingenieros Agrónomos, Universidad de Castilla-La Mancha, Campus Universitario, s/n 02071,

Albacete, Spain), *Journal of the Science of Food and Agriculture*, 2012, **92**(8), 1665-1671].

NPARR 3(3), 2012-0333, Effect of NaCl salinity on the growth and mineral nutrition of one month old *Prosopis juliflora* (Sw.) DC. seedlings

The effect of NaCl salinity on the growth and mineral nutrition of one month old *Prosopis juliflora* seedlings was studied with the help of sand culture experiment. The seedlings were treated with 100, 200 and 300 mM NaCl concentrations, respectively. It was found that there was stimulation in plant growth at low concentrations of salt while at higher concentrations it was hampered causing a marked decrease in the fresh (60%) and dry weight (80%). The level of sodium, chloride and calcium was found to increase in the roots as well as leaves with increasing levels of salinity in the rooting medium. The level of potassium and phosphorus however, was found to decrease in the leaves and roots of seedlings grown under NaCl stress [Amol V. Patil and Baburao A. Karadge (Department of Botany, Shivaji University, Kolhapur (MS) India 416 004), *Pharmacognosy Journal*, 2012, **4**(31), 63-66].

NPARR 3(3), 2012-0334, Assessing the benefits of *Azotobacter* bacterization in Sugarcane: A Field appraisal

Biofertilizers have long been assessed as powerful technology to obtain sustainable enhanced crop production. The present investigation revealed the positive effects of inoculation of *Azotobacter* biofertilizer on growth and yield parameters in sugarcane var. CoJ 83 under field conditions.

Application of *Azotobacter* biofertilizer at both the nitrogen levels (N75% Rec and N100% Rec levels) resulted in significant increase in the cane yield over the respective controls. Maximum increase in cane yield was recorded by *Azotobacter* inoculation at recommended dose of

nitrogen. Inoculation with *Azotobacter* at N75% Rec level of N fertilizer resulted in cane yield that was observed to be statistically at par with N100% Rec level. The application of this biofertilizer would not only be beneficial keeping in view the phenomenon of enhanced productivity using environmentally benign technology, but also would be useful to obtain better yield with improvement of the soil microbial ecology/soil food web [Satwant Kaur Gosal*, Anu Kalia, Satinder K. Uppal, Rajinder Kumar, Sohan Singh Walia, Kuldeep Singh and Harpal Singh (Department of Microbiology, Punjab Agricultural University, Ludhiana, Punjab 141004, India), *Sugar Tech*, 2012, **14**(1), 61-67].

NPARR 3(3), 2012-0335, Intercropping medicinal plants in black pepper

Different intercropping composing several medicinal plants in black pepper was studied. Black pepper var. Panniyar-1 planted with *Asparagus* gave maximum yield (1998 kg/ha) followed by *Alpinia* (1,700 kg/ha). Highest income was obtained with *Cryspogon* intercropping (B: C ratio = 2:3:1) [Thankamani C.K*, Kandiannan K. and Hamza S. (Indian Institute of Spices Research, Kozhikode - 673 012, Kerala), *Indian Journal of Horticulture*, 2012, **69**(1), 133- 135].

NPARR 3(3), 2012-0336, Effect of supplementing compost with grapeseed meal on *Agaricus bisporus* production

This work assesses the agronomic performance of grapeseed meal, before and after oil extraction, in nutritional compost supplement when growing the mushroom species *Agaricus bisporus* (Lange) Imbach. The effect of formaldehyde treatment before using this compost is also considered. Materials were applied at different doses at spawning. Along with non-supplemented compost, three commercial nutritional supplements were used as controls. In general terms, grapeseed meal performance was similar to that of commercial delayed-release nutrients, but improved the non-

supplemented compost response. It is highlighted grapeseed enhances performance as larger yields of harvested mushrooms were obtained with greater dry weight content; however, their protein content was lower. The best performance was displayed by fresh formaldehyde-treated grapeseed (6000 ppm) when applied to the 10 g kg⁻¹ compost dose. It is suggested that grapeseed meal offers a great potential to be applied on a commercial scale. The addition of grapeseed resulted in an enhanced performance as shown by the higher number of harvested mushrooms. The use of grapeseed meal (extracted or non-extracted), a low-cost ingredient with high levels of carbohydrates, may suppose an economic profit on the basis of the positive effect of adding carbon in the mushroom cultivation [Arturo Pardo-Giménez, Diego C Zied, Manuel Álvarez-Ortí, Manuela Rubio, Jose E Pardo* (Escuela Técnica Superior de Ingenieros Agrónomos, Universidad de Castilla-La Mancha, Campus Universitario, s/n 02071, Albacete, Spain), *Journal of the Science of Food and Agriculture*, 2012, **92**(8), 1665-1671].

NPARR 3(3), 2012-0337, Performance feasibility and economic viability of sugarcane planter in western plane zone of Uttar Pradesh, India

Sugarcane is a major commercial crop consuming more labour force for planting. Sugarcane planting is a time consuming and labour intensive operation in sugarcane cultivation. In the traditional method in India, all the sugarcane cultivation processes are carried out by manual labour except land preparation. Sugarcane planting requires manual power and a pair of bullock or a tractor with ridger to plant sugarcane setts in one hectare on an average. Although number of useful machines have been designed, developed and being manufactured for cultivating sugarcane, but due to lack of extension and socioeconomic reasons, still majority of the farmers are using indigenous tools and equipments. Shortage of timely labour

availability and exorbitant wages compel our farmers to limit their acreage under sugarcane crop. Therefore there is an urgent need to mechanize sugarcane planting operations for reducing the cost of planting, as well as, for reducing the human drudgery involved. The field trials of Khalsa make three row automatic sugarcane planter was conducted for planting of sugarcane at farmers' field as well as at research farm. The performance indicators of the planter, viz. field capacity, efficiency etc. were calculated. The effective field capacity was 0.38 ha/h with field efficiency up to 70.4% [Sanjay Kumar and B. R. Singh (Department of Agricultural Engineering and Food Tech, SVPUA&T, Meerut, Uttar Pradesh, India), *Sugar Tech*, 2012, **14**(2), 101-108].

NPARR 3(3), 2012-0338, Wider row spacing in sugarcane: A Socio-economic performance analysis

This article deals with the various sociological and economical issues concerned with wider row (150 cm) spaced planting in sugarcane. The study was conducted in Sakthi Sugars Ltd. Tamil Nadu state of South India during 2007–2009. Farmers realized increased net returns through improved cane productivity of 20-30 t/ha apart from the economic benefit of growing intercrops. Wide row planting also facilitated mechanization and reduced cost of cultivation. In spite of the constraint of small land holdings, all the farmers favoured the continued adoption of this technology. The study helps to get a better understanding of the performance of wider row spacing in farmer's fields and their apprehensions of this fast spreading technology in South India [T. Rajula Shanthi and G. R. Muthusamy (Extension Section, Sugarcane Breeding Institute, Coimbatore 641 007, India), *Sugar Tech*, 2012, **14**(2), 126-133].

NEW SPECIES

NPARR 3(3), 2012-0339, ***Pogostemon rajendranii* - Lamiaceae, a new species from Nilgiri Biosphere Reserve in the Southern Western Ghats, India**

Pogostemon Desf. is a well defined genus, globally represented by 96 species (Mabberely, 2005). The presence of exerted stamens bearing moniliform hairs marks it out from the Labiatae. A taxonomic review of the genus *Pogostemon* Desf. and related genera was carried out by Bhatti and Ingrouilie (1997). It is represented 79 taxa in South and Southeast Asia. India has the highest number of *Pogostemonous* species in the world, is represented by 56 taxa (53 species and 3 varieties). Of which 22 taxa (19 species and 3 varieties) are endemic. During an assesment of biodiversity of the Nilgiris, a distinct population of a *Pogostemon* was collected at Thalai Kundha areas of Nilgiris. On critical study, it turned out to be a hitherto undescribed species, which described and illustrated here. It differs from allied species *P. vestitus* in the herbaceous nature with very short petiole, 6- 9 celled hairs. The fruits are quite distinct by its elliptic shaped nutlets.

Pogostemon rajendranii* R. Sasi and R. Sivalingam *sp. nov. Herbs, 10-15 cm high, puberulous; Stems solid, terete, very hairy especially at the base, hairs pinkish, it turns golden yellow when dry, hairs 6- 10 celled. Leaves opposite, ovate, charactaceous, 1.6- 2.5 X

1-2 cm, dark green, densely hairy above, pale and sparsely hairy beneath, rounded at base, dentate along margin, lateral nerves 3- 4 pairs, acute at apex, raised and prominent beneath, subsessile or petiolate; Petiole *c.* 0.2 cm long, hairs 6- 9 celled. Inflorescence unbranched, a single terminal spike, reflexed, verticillasters, uninterrupted, upto 3. 5 cm long; Flowers dense, white, bracteates. Bracts linear, *c.*0.5X 0.1 cm; puberulous with 3- 4 celled glandular trichomes. Calyx infundibular, shorter than the corolla, texture thick, equally 5- lobed, lobes lanceolate, acuminate, ciliate along margins, tube *c.*0.4 X 0.3, upper part of the tube and teeth hairy within, hairy throughout outside, tubular inflated but symmetrical, with 5 ribs and 5 sinus unintermediate veins; Corolla 2- lipped, tube *c.* 0.8 X 0.1 cm, exerted, lower lip *c.* 0.2 X 0.1 cm; upper lip *c.*0.2 cm across; central tube *c.* 0.1 X 0.1 cm, glabrous. Stamens 4, subequal, exerted, purplish; filaments all inserted at a height of 2 mm in the tube, lowest *c.* 0. 5 cm; highest *c.* 0.7 cm long, bearded at the middle with pinkish moniliform hairs and tomentose at the throat. Style exerted, purplish, glabrous, *c.* 0.6 cm long; stigma bifid, lobes *c.* 0.2 cm long. Nutlets 3- 4 *c.* 0.1 cm, elliptic, reticulate surface, black when mature. Type: India, Tamil Nadu, Nilgiri Hills, Thalai Kundha, 2600 - 2876 m, Dec. 2011, R. Sasi, 006159 (MH Holotype; BUH - Isotype) [Sasi Ramasamy and Sivalingam Ramamoorthy* (Department of Botany, School of Life Sciences, Bharathiar University, Coimbatore, Tamil Nadu, South India), *Asian Journal of Plant Science and Research*, 2012, 2(4), 515-517].

NEW TECHNOLOGIES/KNOW HOW DEVELOPED

NPARR 3(3), 2012-0340, Lipid production from sweet sorghum bagasse through yeast fermentation

Cryptococcus curvatus has great potential in fermenting unconditioned hydrolysates of sweet sorghum bagasse. With hydrolysates obtained by enzymatic hydrolysis of the solid pretreated by microwave with lime, the maximal yeast cell dry weight and lipid content were 10.83g/l and 73.26%, respectively. For hydrolysates obtained in the same way but without lime, these two parameters were 15.50g/l and 63.98%, respectively. During yeast fermentation, glucose and xylose were consumed simultaneously while cellobiose was released from the residual bagasse. The presence of lime, on one hand, made cellulose more accessible to enzymes as evidenced by higher total reducing sugar release compared to that without during enzymatic hydrolysis step; on the other hand, it caused the degradation of sugars to non-sugar chemicals during pretreatment step. As a result, higher lipid yield of 0.11g/g bagasse or 0.65ton/hectare of land was achieved from the pathway of microwave pretreatment and enzymatic hydrolysis while 0.09g/g bagasse or 0.51ton/hectare of land was attained from the process of lime-assisted microwave pretreatment followed by the same enzymatic saccharification [Yanna Liang, Tianyu Tang, Thara Siddaramu, Ruplal Choudhary and Arosha Loku Umagiliyage (Department of Civil & Environmental Engineering, 1230 Lincoln Dr., Southern Illinois University Carbondale, Carbondale, IL 62901, USA), *Renewable Energy*, 2012, **40**(1), 130-136].

NPARR 3(3), 2012-0341, Biodiesel production from crude canola oil by two-step enzymatic processes

Crude canola oil (CCO) contains about 100-300 ppm of phospholipids, which have shown negative effects on biodiesel/buffer solution phase separation, resulting in low biodiesel production yield. Therefore, phospholipids should be removed before transesterification by a degumming process for efficient production of biodiesel. In this study, two-step enzymatic processes (degumming and transesterification) were carried out for the production of biodiesel from CCO. Degumming of CCO was performed using phospholipase A2 as a degumming reagent. The initial phospholipid content was reduced to less than 5 ppm by enzymatic degumming. The effects of three formulations of enzyme catalyst on the efficiency of transesterification were investigated. As a result, conversion rates of degummed CCO to fatty acid methyl esters (FAME) were 68.56%, 70.15%, and 84.25%, respectively. Lipase formulation composed of a 1:1 (vol: vol) enzyme mixture of *Rhizopus oryzae* and *Candida rugosa* showed the best performance among those tested. In order to recover and reuse the lipase catalyst efficiently, a 1:1 enzyme mixture of *R. oryzae* and *C. rugosa* was immobilized on silica gel. The immobilized lipase was used in subsequent transesterification optimization experiments. Optimization of transesterification was performed by response surface methodology (RSM). A total of 20 experiments based on RSM were carried out, and the optimal reaction conditions appeared to be 24.4% (w/w) immobilized catalyst, 13.5% (w/w) buffer solution, and 15.8% (w/w) methanol based on oil mass. Conversion rate of degummed CCO to FAME was determined to be 88.9% under optimal conditions [Myung Gwi Jang, Deog Keun Kim, Soon Chul Park, Jin Suk Lee and Seung Wook Kim (Department of Chemical and Biological Engineering, Korea University, Anam-dong, Sungbuk-ku, Seoul 136-701, Republic of Korea), *Renewable Energy*, 2012, **42**, 99-104].

POSTHARVEST TECHNOLOGIES

NPARR 3(3), 2012-0342, The application of various disinfectants by fogging for decreasing postharvest diseases of strawberry

In this study, chlorine dioxide (ClO_2), sodium hypochlorite (NaClO), hydrogen peroxide (H_2O_2), citric acid ($\text{C}_6\text{H}_8\text{O}_7$) and ethanol (EtOH) were applied to strawberry fruit using a fogger with an ultrasonic aerosol generator that can produce spheres at $1.2 \mu\text{m}$ in diameter. Fruit were treated at room temperature for 30 min while with the fogger operating and for an additional 30 min in the fog consisting of disinfectants. Treated fruit were stored at 1°C for 5 days and an additional 2 days at 20°C . The percentage of infected fruit and microorganism populations on the surface of the fruit and in the storage air were evaluated to determine the efficacy of treatments. Chlorine dioxide, hydrogen peroxide, sodium hypochlorite, citric acid and ethanol significantly reduced the percentage of infected fruit. The percentage of decay was reduced to 14.5% from 83.2% by the hydrogen peroxide treatment at $2000 \mu\text{LL}^{-1}$ and to 32.5% by sodium hypochlorite at $2000 \mu\text{LL}^{-1}$ in the first experiment. In addition, all chemicals significantly reduced the total number of microorganisms on the fruit surface and in the storage atmosphere. Hydrogen peroxide at $2000 \mu\text{LL}^{-1}$ achieved approximately a 2log reduction on the surface microorganism population in the first experiment. The study showed that application of disinfectants by fogging was effective in reducing postharvest diseases of strawberry [Tianjia Jiang, Lifang Feng and Jarring Li (College of Food Science and Biotechnology, Zhejiang Gongshang University, Food Safety Key Lab of Zhejiang Province, Hangzhou 310035, PR China), *Postharvest Biology and Technology*, 2012, **66**, 30-34].

NPARR 3(3), 2012-0343 Short postharvest storage under low relative humidity improves

quality and shelf life of minimally processed baby spinach (*Spinacia oleracea* L.)

The maintenance of relative humidity (RH) after harvest is not always possible and can influence the quality of the raw material for minimal processing. The objective of this study was to evaluate if short-term postharvest exposure to different RH conditions such as high (99%), medium (85%) and low (72%) influenced the quality and shelf life of minimally processed baby spinach. Weight loss, water content (WC), osmotic potential, electrolyte leakage, headspace gas composition, sensory evaluation, colour, texture and microbiological populations were evaluated before and after processing, as well as during shelf life. Baby spinach exposed to low RH conditions on the one hand significantly showed lower water content and higher osmotic potential and stiffness after exposure for 36 h at 15°C when compared to high RH conditions. After processing, samples exposed to low RH were rehydrated and no differences in dehydration were observed among samples exposed to different RH conditions. However, the percentage of damaged leaves increased significantly from 7.5% to 12.5% due to the process, this percentage particularly increasing with increasing RH. On the other hand, processed baby spinach exposed to high RH had a higher respiration rate, higher percentage of leaf damage, and increased electrolyte leakage, causing a decrease in quality resulting in a shelf life 4 d shorter than baby spinach exposed to low RH. The observed changes were mainly linked to a significant postharvest breakage, which influenced the susceptibility to microbial colonization. Psychrophilic bacteria and *Pseudomonas* counts of samples exposed to high RH were 1 log higher than those exposed to low and medium RH. To minimize the impact of leaf damage, baby spinach should be processed at medium-low hydration levels. This study shows that controlled RH after harvest is critical as it can influence the microbiological population and

the maintenance of acceptable visual quality. [María S. Medina, Juan A. Tudela, Alicia Marín, Ana Allende and María I. Gil (Research Group on Quality, Safety and Bioactivity of Plant Foods, Food Science and Technology Department, CEBAS-CSIC, P.O. Box 164, E-30100 Espinardo, Murcia, Spain), *Postharvest Biology and Technology*, 2012, **67**, 1-9].

NPARR 3(3), 2012-0344, Browning of fresh-cut eggplant: Impact of cutting and storage

Browning is a major postharvest problem in fresh-cut fruit and vegetables. This phenomenon is markedly observed in eggplant which immediately turns brown after cutting. In the current study, mechanics of cutting and further processing were found to have profound effects on the browning process. Browning was significantly inhibited by cutting using a sharp blade (thickness, 0.04 mm) and immediate dipping in water for 10 min, followed by ambient air-drying and packaging. Scanning electron and fluorescence microscopic examinations showed that sharp blade cutting caused less physical injury and cell death, resulting in reduced leaching of phenolics and polyphenol oxidase activity and hence lesser browning. For commercial acceptability of the technique, storage studies were performed at ambient, 10 and 4°C, which indicated that fine cut samples could be stored up to 5, 12, and 16 days at these temperatures, respectively, with organoleptically acceptable scores [Bibhuti B. Mishra, Satyendra Gautam and Arun Sharma (Food Technology Division, Bhabha Atomic Research Centre,

Mumbai 400085, India) *Postharvest Biology and Technology*, 2012, **67**, 44-51].

NPARR 3(3), 2012-0345, Changes in microbial and postharvest quality of shiitake mushroom (*Lentinus edodes*) treated with chitosan-glucose complex coating under cold storage

The effect of chitosan, glucose and chitosan-glucose complex (CGC) on the microbial and postharvest quality of shiitake (*Lentinus edodes*) mushroom stored at 4±1°C for 16 days was investigated. Mushroom weight loss, respiration rate, firmness, ascorbic acid, total soluble solids, microbial and sensory quality were measured. The results indicate that treatment with CGC coating maintained tissue firmness, inhibited increase of respiration rate, reduced microorganism counts, e.g., pseudomonads, yeasts and moulds, compared to uncoated control mushroom. The efficiency was better than that of chitosan or glucose coating treatment. In addition, CGC coating also delayed changes in the ascorbic acid and soluble solids concentration. Sensory evaluation proved the efficacy of CGC coating by maintaining the overall quality of shiitake mushroom during the storage period. Our study suggests that CGC coating might be a promising candidate for maintaining shiitake mushroom quality and extending its postharvest life [Tianjia Jiang, Lifang Feng and Jarring Li (College of Food Science and Biotechnology, Zhejiang Gongshang University, Food Safety Key Lab of Zhejiang Province, Hangzhou 310035, PR China), *Food Chemistry*, 2012, **131**(3), 780-786].

Book review

Herbal Drugs: Quality & Chemistry by D.D. Joshi, Studium Press LLC, Texas USA, ISBN: 1-933699-88-4, Year, 2011, Pages: i-xii + 330, Binding: Hard, Language: English.

The activities shown by various plant parts vary as per the presence of amount of particular phytochemical, edaphic, climatic and seasonal factors. Quality of the collected raw material also contributes to high, low or medium activity. Seeing the growing market of crude drugs, there is high demand of standardized herbal drugs in the global market. The standardization of medicinal plants explains the potential of the drug, food value, nutrients, etc. therefore, standardization starting from procurement of quality medicinal plants, analysis of raw materials for authentication, foreign matter, heavy metal detection, etc. is essential especially for plant materials collected from fields. Application of latest analytical technologies to explain the therapeutic value of herbal medicines is also to be emphasized.

This book is divided in to four sections: section 1 deals with the utilization of plant species and traditional knowledge, as both are important in the herbal medicine trade. So description of Arabian, Egyptian, Chinese and Indian civilizations connected with herbal and their quality for utilization, in brief have been described. Section 2 describes the chemistry of herbals which may contain thousands of different compounds. Art and techniques for generation of chemical finger prints as evidence for claims made with herbals and its utility for regulatory approval have been described, with latest updates. Section 3 includes utilization of herbals e.g. as drug and food supplement both together, adaptogenic, cardio vascular, immuno-enhancer, nervine tonic, cosmeceuticals, aphrodisiac and antioxidants. The fourth section of this book describes the various techniques used to produce the high value active ingredients as pure phytochemical, standardized herbal extract, from the various parts of plants. Criteria for the selection of herb, analysis for active principles, extraction and purification, process control, finger print development and characterization of the finished product have been focused with microbial content, heavy metals and pesticide residues.

The book is recommended as a guide for the selection of herb from suitable source, using validated analytical method and manufacturing process in the field of standardized herbal extracts and pure phytochemicals. The book will be helpful in selecting standard norms and practices, to develop globally acceptable quality of herbals for cure and quality life with defined constituents. The quality of the paper and printing are good to handle this handy monograph.

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Forthcoming Conferences, Seminars, Exhibitions and Trainings

1. **National Conference on Environment and Biodiversity of India, 3 to 4 November 2012**
Organized by North East Centre for Environmental Education and Research at Jamia Millia Islamia, New Delhi, Website: <http://www.ebiconference.com/>
2. **IInd WCMANU-2012, Global Change : Impact on Biodiversity, Cultures & Technology, 3 to 5 November 2012** organized by International Council for Man & Nature & Sevadal Mahila Mahavidyalaya, Nagpur, Maharashtra, India, Website: <http://www.wcmanu.com>.
3. **International Conference on Biodiversity and Sustainable Energy Development, 19 to 21 November 2012**, Hyderabad, Andhra Pradesh, India, Organized by Omics Group Conferences, Hyderabad Andhra Pradesh India, Website: <http://omicsonline.org/biodiversity2012>.
4. **13th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Industries, 28 to 30 November 2012**, New Delhi, India, Website: <http://www.mpes-cami-swemp.com/intro.html>.
5. **Biofest-2012 International Bio Conference and Event, 12 to 13 December 2012, Hyderabad**, Andhra Pradesh, India, Website: <http://www.brightice.org>.
6. **National Seminar On Sustainable Energy Development-Opportunities And Challenges, 3to14 December 2012**, Palayamkottai, Tamil Nadu, India, Website: <http://www.sxcbotany.com>.
7. **UGC Sponsored Two-Day National Seminar-Significance of Green Strategies for Environmental Protection NSGSEP – 2012, 14 to 15 December 2012**, Vijayawada, Andhra Pradesh, India, Website: <http://kbncollege.ac.in/che.pdf>
8. **Recent Trends and Future Prospects in Life Sciences, 27 to 28 December 2012, Ahmedpur dist. Latur, Maharashtra, India**, Website: <http://mgmahmedpur.org/National%20Conference%20on%20Recent%20Trends%20and%20Future%20Prospectus%20in%20Life%20Sciences.pdf>
9. **2nd National Conference on Environment and Biodiversity of India (EBI 2012), 29 to 30th December 2012, New Delhi, Delhi, India**, Website: <http://www.ebiconference.com/>

ANNOUNCEMENTS

Original research Papers and Reviews on topics dealt within this repository are invited for publication in peer reviewed, quarterly journal (March, June, September and December), ***Indian Journal of Natural Products and Resources*** (Formerly known as ***Natural Product Radiance***). For details visit nopr@niscair.res.in. The papers may be sent to Dr (Mrs) Sunita Garg, Editor or to Mrs Parmod Singla, Associate Editor, Periodicals Division, National Institute of Science Communication and Information Resources (NISCAIR), CSIR, Dr K. S. Krishnan Marg (Inside Pusa Campus). New Delhi-110012; Phone: (091)-11-25846001, (091)-11-25846304-07, Ext.258, 255. Fax: (091)-11-2584 7062. E-mail: sunitag@niscair.res.in; parmod@niscair.res.in; ijnpr@niscair.res.in