



*Nat Prod Resour Repos*  
**OCTOBER 2010**  
Volume 1 No. 4 pp. 231-288  
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# Natural Products and Resources Repository

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



**National Institute of Science Communication And Information Resources**  
CSIR, New Delhi, INDIA

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## 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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I welcome all experienced authors, editors and publishers of national and international journals for their creative cooperation and enthusiastic involvement in this new endeavor. The NPARR allows free access to its contents and hence will enhance citation/visibility of papers/ technological know-how included in this repository. We look forward to provide you a comprehensive collection of quality information on natural products in coming years.

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)

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

### **NPARR 1(4), 2010-0551, Changes on flavor compounds throughout cold storage of watermelon juice processed by high-intensity pulsed electric fields or heat**

The application of HIPEF processing (35 kV/cm for 1727  $\mu$ s using bipolar pulses of 4- $\mu$ s at 188 Hz) on watermelon juice was evaluated as an alternative to conventional heat treatments (90 °C for 30 s or 90 s) in order to achieve better preservation of watermelon aroma compounds for 56 days of storage at 4 °C. HIPEF processing not only induced a rise (roughly 20%) in the concentrations of hexanal, (E)-2-nonenal, nonanal, 6-methyl-5-hepten-2-one and geranylacetone but also achieved less reductions on the retention of volatiles than the thermal treatment at 90 °C for 60 s. In contrast, the content of (Z)-6-nonenal, 1-nonanol and (Z)-3-nonen-1-ol in the untreated and processed juices remained unchanged after processing. Despite the decrease in overall flavor compounds observed during storage irrespective of the treatment applied, HIPEF-treated juices showed better flavor retention than heat-treated samples for at least 21 days of storage. Moreover, changes in aldehydes and ketones during storage of treated watermelon juices were well fitted by a model based on the Weibull distribution function. Therefore, the application of HIPEF may be appropriate to preserve the initial volatile profile of watermelon juices during storage [Ingrid Aguiló-Aguayo, Marta Montero-Calderón, Robert Soliva-Fortuny and Olga Martín-Belloso\*(Department of Food Technology, TPV-XaRTA, University of Lleida, Rovira Roure 191, 25198 Lleida, Spain), *Journal of Food Engineering*, 2010, **100**(1), 43-49]

### **NPARR 1(4), 2010-0552, The influence of beverage composition on delivery of phenolic compounds from coffee and tea**

Epidemiological data suggest that consumption of coffee and tea is associated with a reduced risk of several chronic and degenerative diseases including cardiovascular disorders, diabetes, and obesity and neurodegenerative disorders. Both coffee and tea are a

rich source of phenolic compounds including chlorogenic acids in coffee; and flavan-3-ols as well as complex theaflavins and thearubigens in tea. Coffee and tea are two of the most commonly consumed beverages in the world and thus represent a significant opportunity to positively affect disease risk and outcomes globally. Central to this opportunity is a need to better understand factors that may affect the bioavailability of specific phenolic components from coffee and tea based beverages. An overview of the phenolic composition of coffee and tea is discussed in the context of how processing and composition might influence phenolic profiles and bioavailability of individual phenolic components. Specifically, the impact of beverage formulation, the extent and type of processing and the influence of digestion on stability, bioavailability and metabolism of bioactive phenolics from tea and coffee are discussed. The impact of co-formulation with ascorbic acid and other phytochemicals are discussed as strategies to improve absorption of these health promoting phytochemicals. A better understanding of how the beverage composition impacts phenolic profiles and their bioavailability is critical to development of beverage products designed to deliver specific health benefits [Mario G. Ferruzzi\*(Department of Food Science, and Department of Foods & Nutrition, Ingestive Behavior Research Center, Purdue University, 745 Agriculture Mall Dr, West Lafayette, IN, 47906, United States), *Physiology & Behavior*, 2010, **100**(1), 33-41].

### **NPARR 1(4), 2010-0553, Traditional Aniseed-Flavored Spirit Drinks**

Aniseed spirits are produced by the distillation of pressed fermented grapes, dregs and other fermented raw materials, flavored with aniseed (*Pimpinella anisum* L), fennel (*Foeniculum vulgare*) and/or some other plants. All round the Mediterranean basin, there are other similar aniseed spirit drinks such as pastis (France), anesone (Spain), sambuca (Italy), zebib (Egypt), and arak (Syria). However, there are some differences between the production processes of these spirits and their traditional use in Mediterranean culinary cultures. Raki and ouzo appear to be more similar than the others, just like brothers from the two

shores of the Aegean Sea. Turkish raki is a type of traditional aniseed spirit produced by double distillation with aniseed (*Pimpinella anisum*) of only suma or suma and agricultural based ethanol mixture in different areas of Turkey. Ouzo can be defined as a distillation product of a mixture consisting of ethanol, anise, and other flavorful seeds, with sugar. The amounts and the repartition of the alcoholic fermentation products (fusel alcohols, esters, and aldehydes) are mainly responsible for the flavors and quality of the aniseed spirit. In this review article, Turkish raki, Greek ouzo and some different aniseed spirits were compared in their traditional, cultural roles and in their chemical and analytical structure [R. Ertan Anli and Mustafa Bayram\* (Department of Food Engineering, Ankara University, Diskapi, Ankara, Turkey), *Food Reviews International*, 2010, **26**(3), 246 - 269].

**NPARR 1(4), 2010-0554, Ozone Processing for Food Preservation: An Overview on Fruit Juice Treatments**

This paper reviews the efficacy of ozone an emerging non-thermal food preservation technique for fruit juices and highlights changes in key microbial, quality and nutritional parameters. Ozonation of fruit juices has been identified as a potential technology to meet the United States Food and Drug Administration's requirement of a 5 log reduction in pertinent microorganisms found in juices. This review suggests that it is important to identify the critical extrinsic and intrinsic control parameters governing both the efficacy and quality effects during ozonation of fruit juices [PJ Cullen, V P Valdramidis, B K Tiwari, S Patil, P Bourke and C P O'Donnell\* (UCD School of Agriculture, Food Science and Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland), *Ozone Science & Engineering*, 2010, **32**(3), 166-179].

## COSMECEUTICALS

**NPARR 1(4), 2010-0555, Cosmeceuticals in day-to-day clinical practice**

As one of the hottest and fastest growing segments of the natural, personal care industry, Cosmeceuticals are employed to carry out numerous functions, such as preventing UV damage, reducing

free radical formation, improving the skin lipid barrier, brightening and unifying skin tone, smoothing texture and reducing pore size. Vitamins and botanicals encompass a large component of the cosmeceutical market, much of which has yet to be clearly defined or regulated. It can be difficult both for the dermatologist and the consumer with respect to choosing the right regimen from the plethora of over the counter choices as well as being informed regarding potential risks and side effects. In fact, dermatologist receives minimal training with respect to this highly tapped and growing genre of topical products. There is clearly a need to research the composite active ingredients of these over-the-counter materials to further characterize their structures, develop means of deriving purified samples from clarified sources, define interactive mechanisms with the skin, and, ultimately, demonstrate efficacy and safety via evidence based means [Mukta S and Adam F\* (Manipal Hospital, Bangalore, India), *J Drugs Dermatol*, 2010, **9**(5 Suppl ODAC Conf Pt 1), s62-6.]

**NPARR 1(4), 2010-0556, Modification of skin discoloration by a topical treatment containing an extract of *Dianella ensifolia*: a potent antioxidant**

Skin hyperpigmentation, and the reactions that precipitate it, have been linked to free radicals by the fact that free radical scavengers or antioxidants can slow that hyperpigmentation. Authors have screened several hundred plant extracts for antioxidants and discovered one that is both a strong antioxidant and can reduce skin hyperpigmentation. Extracts of *Dianella ensifolia* contain 1-(2,4-dihydroxyphenyl)-3-(2,4-dimethoxy-3-methylphenyl) propane (DP), which was found to inhibit the free radical 1-1-diphenyl-2-picryl-hydrazyl (DPPH) with an EC<sub>50</sub> value of 78µm. DP was also found to inhibit Ultraviolet (UV)C-induced lipid oxidation with an EC<sub>50</sub> of about 30µm. The reduction of discoloration by different topical treatments has been assessed in human volunteers using an *in vivo* assay for the rate of fading of UVB-induced tan. Two pharmaceutical formulas containing 4% hydroquinone (HQ) were used as positive controls, and we tested the ability of DP, a plant-derived amphoteric antioxidant, to increase performance of non-HQ cosmetic formulations. It has been found that the cosmetic formula containing DP produced an increase in the rate of fading compared to the two pharmaceutical treatments containing HQ [Thomas Mammone\*, Neelam Muizzuddin, Lieve

Declercq, Dominique Clio, Hugo Corstjens, Ilse Sente, Katrin Van Rillaer, Mary Matsui, Yoko Niki, Masamitsu Ichihashi, Paolo U. Giacomoni and Dan Yarosh (125 Pinelawn Road, Melville, NY 11714), *Journal of Cosmetic Dermatology*, 2010, **9**(2), 89-95].

*NPARR* 1(4), 2010-0557, **Tobacco and the skin**

Smoking negatively impacts the health of the skin as it does every organ system. This contribution reviews the effect of cigarette smoking on wound healing, wrinkling, and aging of the skin, skin cancer, psoriasis, and other inflammatory skin diseases, hidradenitis suppurativa, acne, alopecia, lupus erythematosus, polymorphous light eruption, and tobacco-associated oral lesions. Dermatologists need to encourage their patients to discontinue this deleterious habit [Andrei I. Metelitsa\* and Gilles J. Lauzon (Division of Dermatology and Cutaneous Sciences, Department of Medicine, University of Alberta, Edmonton, Alberta, Canada T6G 2G3), *Clinics in Dermatology*, 2010, **28**(4), 384-390].

## **DYES (incl. Food colorants)**

*NPARR* 1(4), 2010-0558, **Equilibrium and kinetic studies of the cationic dye removal capability of a novel biosorbent *Tamarindus indica* from textile wastewater**

In this paper, the use of tamarind hull biosorbent (*Tamarindus indica*) has been investigated to remove cationic dyes from textile effluent. Basic Violet 6 and Basic Red18 were used as cationic dye models. The surface characteristics of tamarind hull were investigated using Fourier Transform–infrared and scanning electron microscopy. The influence of process variables such as adsorbent dosage, initial dye concentration and pH were studied. The presence of functional groups such as hydroxy and amine groups onto the tamarind hull surface were proved by Fourier Transform–infrared analysis. Data were evaluated for compliance with the Langmuir and Freundlich isotherm models. The results indicated that the data for adsorption of Basic Violet 6 and Basic Red 18 onto tamarind hull fitted well with the Freundlich isotherm model. Also, the adsorption kinetics of Basic Violet 6 and Basic Red 18 on biosorbent was studied. The rates of sorption were found to conform to pseudo-second-order kinetics with good correlation.

Results indicated that tamarind hull could be used as a biosorbent to remove cationic organics from contaminated watercourses [Shooka Khorramfar, Niyaz Mohammad Mahmoodi\*, Mokhtar Arami and Kamaladin Gharanjig (Department of Environmental Research, Institute for Color Science and Technology, Tehran, Iran), *Coloration Technology*, 2010, **126**(5), 261-268].

*NPARR* 1(4), 2010-0559, **Nonlinear optical properties of selected natural pigments extracted from spinach: Carotenoids**

Results on third order nonlinear optical susceptibilities from a series of natural pigments extracted from spinach are presented in this paper. The measurements were performed in-situ at 532 nm wavelength using degenerate four wave mixing technique (DFWM). For comparison third order nonlinear optical susceptibilities of the same pigments were also evaluated using third harmonic generation (THG) set up at 1064 nm. The electronic contribution to the observed properties was also deduced. The measurements were performed on thin films deposited on a thick glass substrate. These pigments were also identified by UV–VIS spectral analysis. All these results were in good agreement with the literature data [K. Bouchouit\*, B. Derkowska, A. Migalska-Zalas, S. Abed, N. Benali-cherif and B. Sahraoui (\*Département de Chimie, Faculté des Sciences, Université de Jijel, Algeria), *Dyes and Pigments*, 2010, **86**(2), 161-165].

*NPARR* 1(4), 2010-0560, **Chemically modified sugarcane bagasse as a potentially low-cost biosorbent for dye removal**

The use of adsorbent prepared from sugarcane bagasse, an agro waste from sugar industries has been studied as an alternative substitute for activated carbon for the removal of dyes from wastewater. Adsorbents prepared from sugarcane bagasse were successfully used to remove the methyl red (MR) from an aqueous solution in a batch reactor. This study investigates the potential use of sugarcane bagasse, pretreated with phosphoric acid (SBC), for the removal of methyl red from simulated wastewater. Phosphoric acid treated sugarcane bagasse was used to adsorb methyl red at varying dye concentration, adsorbent dosage, pH and contact time. A similar experiment was conducted with commercially

available powdered activated carbon (PAC) and untreated sugarcane bagasse (SB) in order to evaluate the performance of SBC. The adsorption efficiency of different adsorbents was in the order PAC>SBC>SB. The initial pH 3 to 6 favoured the adsorption of synthetic dyes by both SBC and SB. This prepared adsorbent was very efficient in decolorized diluted solution. It is proposed that SBC, in a batch or stirred tank reactors could be employed as a low-cost alternative in wastewater treatment for dyes removal [S.A. Saad\*, K.Md. Isa and R. Bahar (School of Environmental Engineering, Universiti Malaysia Perlis, 02600 Jejawi, Arau, Perlis, Malaysia), *Desalination*, 2010, **264**(1-2), 123-128].

**NPARR 1(4), 2010-0561, A new approach for natural dyeing and functional finishing of cotton cellulose**

A new approach for upgrading the dyeing properties of cotton knits with natural dyes as well as to enhance both the UV-protection and antimicrobial functions of the obtained dyeings was investigated. Factors affecting the dyeing and multifunctional properties of the treated substrates such as fabric structure, type and concentration of mordant, kind and percent of natural dye extract as well as dyeing regime were studied. In situ deposition of the mordant as a metal oxide onto and/or within the fabric structure followed by dyeing results in a dramatic improvement in the color strength as well as the fastness properties, in addition to an outstanding enhancement in both the UV-protection, against the harmful UV-radiation and the antibacterial activity against the hazardous G+ve and G-ve bacteria. The extent of improvement in the aforementioned properties follows the descending order: pre-mordanting followed by dyeing>dyeing only>none, and is determined by type and content of metal, physical state/chemical structure as well as extent of dye interaction and fixation, along with the fabric construction. The UV-protection properties as well as the antibacterial activities of the obtained dyeings are maintained even after 20 washing cycles [NA Ibrahim\*, AR El-Gamal, M Gouda and F Mahrous (National Research Centre, Textile Research Division, Dokki, Cairo, Egypt), *Carbohydrate Polymers*, 2010, **82**(4), 1205-1211].

**NPARR 1(4), 2010-0562, Extraction of anthocyanins from industrial purple-fleshed**

**sweetpotatoes and enzymatic hydrolysis of residues for fermentable sugars**

Recent trends in health and wellness as well as fossil fuel dependent markets provide opportunities for agricultural crops as renewable resources in partial replacement of synthetic components in food, clothing and fuels. This investigation focused on purple-fleshed industrial sweetpotatoes (ISPs), a crop which is used for industrial purposes because it produces relatively high quantities of antioxidants in the form of anthocyanins as well as high starch content for potential hydrolysis into fermentable sugars. Laboratory extraction and enzymatic hydrolysis studies were conducted on purple-fleshed ISPs in order to evaluate the effects of solvent, extraction temperature and solid loading on recovery of anthocyanins and fermentable sugars. Total monomeric anthocyanin and phenolic concentrations of the extracts were measured. Residual solids from anthocyanin extraction were subsequently hydrolyzed for sugar production (maltotriose, maltose, glucose and fructose). Extraction temperature of 80°C using acidified methanol at 3.3% (w/v) solid loading showed the highest anthocyanin recovery at 186.1mg cyanidin-3-glucoside/100g fw. Acidified solvents resulted in 10-45% and 16-46% more anthocyanins than non-acidified solvents of ethanol and methanol, respectively. On average, glucose production ranged from 268 to 395mg/g dry ISP. Solid residues that went through extraction with acidified ethanol at 50°C at 17% (w/v) solid loading had the highest average production of glucose at 395mg/g dry ISP. Residues from methanol solvents had lower glucose production after hydrolysis compared to those of ethanol based extraction. Fermentation of produced sugars from ISP residues was limited, where 38% less ethanol was produced from extraction residues compared to treatments that did not undergo initial extraction. Overall, purple-fleshed ISPs are amenable to anthocyanin and phenolic extraction, making it a suitable substrate for development of industrial colorants and dyes. However, more research is needed to obtain a suitable extraction point when trying to achieve a high recovery of anthocyanins and effective starch conversion to fermentable glucose [E. Nicole Bridgers, Mari S. Chinn\* and Van-Den Truong (Department of Biological and Agricultural Engineering, North Carolina State University, 3110 Faucette Drive, 277 Weaver Labs, Campus Box 7625, Raleigh, NC 27695-7625, United States), *Industrial*

*Crops and Products*, 2010, **32**(3), 613-620].

**NPARR 1(4), 2010-0563, Influence of source and quality on the color characteristics of annatto dyes and formulations**

Annatto dyes containing different strengths of bixin, norbixin and their formulations such as water-soluble liquid, and oil soluble liquid were measured for L\*, a\* and b\* in a Hunter color meter and the Yellow (Y) and red (R) units in a Lovibond tintometer. Seed source and dye purity had a significant effect ( $P < 0.05$ ) on the color characteristics L\*, a\*, b\* and Y and R units of bixin/norbixin dyes and their formulations. These characteristics behaved independently when different dyes diluted to a common concentration of 50 mg bixin or norbixin/L. However, when individual bixin/norbixin dyes serially diluted L\*, b\* decreased and a\* values increased with increase in concentration of bixin/norbixin. Similarly the increase in concentration of bixin/norbixin have shown decreasing trend on Y/R values due to increase in R-values in the tintometer. It has been observed that a\* and R units generally increased with increase in concentration, and L\* and b\* values decreased and Y values are almost constant in both the bixin and norbixin dyes. However the b\*/a\* values showed lower values in bixin dyes and higher in norbixin dyes. Similarly R-values were higher in bixin dyes when compared to norbixin dyes [Akula Satyanarayana\*, Pamidighantam Prabhakara Rao and Dubasi Govardhana Rao (Central Food Technological Research Institute- Resource Centre, Habshiguda, Uppal Road, Hyderabad-500 007, India), *LWT-Food Science and Technology*, 2010, **43**(9), 1456-1460].

**ESSENTIAL OILS (incl. Flavour and Fragrance)**

**NPARR 1(4), 2010-0564, Eugenol (an essential oil of clove) acts as an antibacterial agent against *Salmonella typhi* by disrupting the cellular membrane**

The antibacterial activity of eugenol and its mechanism of bactericidal action against *Salmonella typhi* was evaluated. The antibacterial activity was checked by disc-diffusion method, MIC, MBC, time course assay and pH sensitivity assay. The chemo-

attractant property of eugenol was verified by chemotaxis assay. The mode of action of eugenol was determined by crystal violet assay, measurement of release of 260nm absorbing material, SDS-PAGE, FT-IR spectroscopy, AFM and SEM.

Treatment with eugenol at their MIC (0.0125%) and MBC (0.025%) reduced the viability and resulted in complete inhibition of the organism. Eugenol inactivated *Salmonella typhi* within 60 min exposure. The chemo-attractant property of eugenol combined with the observed high antibacterial activity at alkaline pH favors the fact that the compound can work more efficiently when given *in vivo*. Eugenol increased the permeability of the membrane, as evidenced by crystal violet assay. The measurement of release of 260 nm absorbing intracellular materials, SDS-PAGE, SEM and AFM analysis confirmed the disruptive action of eugenol on cytoplasmic membrane. The deformation of macromolecules in the membrane, upon treatment with eugenol was verified by FT-IR spectroscopy. The results suggest that the antibacterial activity of eugenol against *Salmonella typhi* is due to the interaction of eugenol on bacterial cell membrane [K. Pandima Devi\*, S. Arif Nisha, R. Sakthivel and S. Karutha Pandian ((Department of Biotechnology, Alagappa University, Karaikudi 630 003, Tamil Nadu, India), *Journal of Ethnopharmacology*, 2010, **130**(1), 107-115].

**NPARR 1(4), 2010-0565, Antimicrobial action of essential oil vapours and negative air ions against *Pseudomonas fluorescens***

The antibacterial activity of essential oil (in liquid as well as in vapour phase) and negative air ions (NAI) against *Pseudomonas fluorescens* was investigated. The combined effect of NAI with essential oil vapour was also investigated to determine kill time and morphological changes in bacterial cells. The MIC of *Cymbopogon citratus* (0.567mg/ml), *Mentha arvensis* (0.567mg/ml), *Mentha piperita* (1.125mg/ml) and *Eucalyptus globulus* (2.25mg/ml) was studied via the agar dilution method. To estimate the antibacterial activity of essential oils in the vapour phase, agar plates inoculated with *P. fluorescens* were incubated with various concentrations of each essential oil vapour and zone of inhibition was recorded. Further, in order to assess the kill time, *P. fluorescens* inoculated agar plates were exposed to selected bactericidal essential oil vapour and NAI, separately, in an air-tight chamber. A continuous

decrease in bacterial count was observed over time. A significant enhancement in the bactericidal action was observed by exposure to the combination of essential oil vapour and NAI as compared to their individual action. Scanning electron microscopy was used to study the alteration in morphology of *P. fluorescens* cells after exposure to *C. citratus* oil vapour, NAI, and combination of *C. citratus* oil vapour and NAI. Maximum morphological deformation was found due to the combined effect of *C. citratus* oil vapour and NAI. This study demonstrates that the use of essential oils in the vapour phase is more advantageous than the liquid phase. Further the antibacterial effect of the essential oil vapours can be significantly enhanced by the addition of NAI. The work described here offers a novel and efficient approach for control of bacterial contamination that could be applied for food stabilization practices [A.K. Tyagi\* and A. Malik (Applied Microbiology Laboratory, Centre for Rural Development and Technology, Indian Institute of Technology Delhi, New Delhi 110 016, India), *International Journal of Food Microbiology*, 2010, **143**(3), 205-210].

**NPARR 1(4), 2010-0566, Antibacterial activity of extracts of *Myrtus communis* against food-borne pathogenic and spoilage bacteria**

The following study was conducted to investigate the efficacy of several leaf and berry extracts against a range of food-borne pathogens and food spoilage bacteria. The methanol, ethanol, and ethyl acetate extracts of *Myrtus communis* leaves and berries were examined for in vitro antibacterial activity. The methanolic leaf extract of *M. communis*, which was seen to have antibacterial activity against *Listeria monocytogenes* CECT 4032 and *Pseudomonas aeruginosa* IH, was further investigated to determine the effect of the extract on viable counts of bacteria using the bacterial cell-death time. Most of the extracts showed relatively high antibacterial activity against most of the tested microorganisms. None of the extracts was active against *Escherichia coli* K12. The results obtained confirm the antibacterial potential of the extracts of *M. communis* [Mahassine Amensour\*, Samira Bouhdid, Juana Fernández-López; Mohamed Idaomar; Nadia Skali Senhaji, Jamal Abrini (Laboratory of Biology and Health, Team Biotechnology and applied Microbiology, Department of Biology, Faculty of Science, Abdelmalek Essaadi University, Tetouan,

Morocco), *International Journal of Food Properties*, 2010, **13**(6), 1215-1224].

**NPARR 1(4), 2010-0567, A novel microwave-assisted extraction for the isolation of andrographolide from *Andrographis paniculata* and its in vitro antioxidant activity**

*Andrographis paniculata* has a long history of use in traditional medicine and andrographolide is one of its potent compounds. In this study, a rapid isolation of andrographolide (colourless, bitter and crystalline diterpene lactone) was carried out by a newly developed microwave-assisted extraction. The extraction intensity, time and amount of solvent were optimised prior to this. The conventional heating method provided a 0.4452% yield of andrographolide and microwave heating at 210 W for 40 min provided a 0.589% yield. Compared to conventional extraction procedures, the results suggested that the proposed method was an effective alternative for the extraction of andrographolide. The isolated compounds were found to be the same by UV, HPTLC and <sup>1</sup>H-NMR studies. The isolated andrographolide was tested for in vitro antioxidant activity, and showed a potent free radical scavenging activity [Soumya Vasu, Venkatesh Palaniyappan, and Shrishailappa Badami\*(Sree Siddaganga College of Pharmacy, Tumkur 572 102, Karnataka, India), *Natural Product Research*, 2010, **24**(16), 1560-1567].

## FEED/FODDER

**NPARR 1(4), 2010-0568, Effects of dietary supplementation of methionine and lysine on milk production and nitrogen utilization in dairy cows**

The effect of the content of lysine and methionine in metabolizable protein (MP) on lactation performance and N utilization in Chinese Holstein cows was determined. A control diet (C) was formulated to be adequate in energy but slightly limiting in MP. The concentration of Met and Lys in MP was 1.87 and 5.93%, respectively. The treatments were as follows (% of Met or Lys in MP): L=diet C supplemented with l-lysine-HCl at 0.49% on a dry matter (DM) basis (Met, 1.87; Lys, 7.00); M=diet C supplemented with 2-hydroxy-4-(methylthio)-butanoic acid (HMB) at 0.15% (Met, 2.35; Lys, 5.93); ML=diet C supplemented with 0.49% l-lysine HCl

and 0.15% HMB (Met, 2.39; Lys, 7.10). The diets were fed to 60 Chinese Holsteins in mid-lactation (average days in milk=120, and milk yield=32.0 kg/d) for 8 wk. Milk yield was increased by supplementation of either Lys (1.5 kg/d) or Met (2.0 kg/d), and supplementation of both Lys and Met further increased milk yield (3.8 kg/d). There was no significant difference in dry matter intake across treatment groups. Cows on treatments M (3.95%) and ML (3.90%) had higher milk fat content than those on C (3.60%) and L (3.67%), but there were no significant differences in milk protein and lactose contents or somatic cell count among treatments. Supplementation of Met or Lys significantly increased Met or Lys concentration in arterial plasma. Treatment ML had a higher conversion of intake N to milk N and lower urea N concentrations in serum, urine, and milk than did treatment C. Supplementing HMB and l-lysine-HCl to provide approximately 2.3% Met and 7.0% Lys of the MP in diets slightly limiting in MP increased milk production, milk protein yield, and N utilization efficiency [C. Wang, H.Y. Liu, Y.M. Wang, Z.Q. Yang, J.X. Liu\*, Y.M. Wu, T. Yan and H.W. Ye ((Institute of Dairy Science, Zhejiang University, Hangzhou 310029, P. R. China), *Journal of Dairy Science*, 2010, 93(8), 3661-3670].

**NPARR 1(4), 2010-0569, The effect of harvesting strategy of grass silage on digestion and nutrient supply in dairy cows**

This study examined the effects of primary growth (PG) and regrowth (RG) timothy-meadow fescue silages harvested at 2 stages of growth on feed intake, cell wall digestion and ruminal passage kinetics in lactating dairy cows. Four dairy cows equipped with rumen cannulas were used in a study designed as a 4 × 4 Latin square with 21-d periods. The experimental silages were offered ad libitum with 8 kg/d of concentrate. Ruminal digestion and passage kinetics were assessed by the rumen evacuation technique. Silages of PG were on average more digestible than RG silages. The concentration of neutral detergent fiber (NDF) and indigestible NDF (iNDF) increased and the concentration of digestible organic matter in dry matter (DM) of silages decreased with advancing maturity in PG and RG. Cows consumed more feed DM, energy, and protein and produced more milk when fed PG diets rather than RG diets. Delaying the harvest decreased DM intake and milk production in PG and RG. There were

no differences between PG and RG in rumen pH, ammonia N, or total volatile fatty acid concentrations. The intake of N, omasal canal flow of total nonammonia N and microbial N, excretion of N in feces, and ruminal true digestibility of N were higher for PG than for RG diets. The efficiency of microbial N synthesis was not different between PG and RG. Intake and omasal canal flow of organic matter, NDF, and potentially digestible NDF (pdNDF) were higher in PG than in RG. Whole-diet digestibility of organic matter, NDF, or pdNDF in the rumen or in the total tract was not different between PG and RG despite the higher digestibility of PG silages measured in sheep. Rumen pool sizes of crude protein and iNDF were lower for PG diets, whereas the pool size of pdNDF was higher for PG diets than for RG diets. The rate of passage of iNDF was higher for PG diets than for RG diets, with no difference between them in rate of digestion or passage of pdNDF. The lower milk production in cows fed regrowth grass silages compared with primary growth silages could be attributed to the lower silage DM intake potential. Chemical composition of the silages, rumen fill, digestion and passage kinetics of NDF, or the ratio of protein to energy in absorbed nutrients could not explain the differences in DM intake between silages made from primary and regrowth grass [K. Kuoppala\*, M. Rinne, S. Ahvenjärvi, J. Nousiainen and P. Huhtanen (MTT Agrifood Research Finland, Animal Production Research, FI-31600 Jokioinen, Finland), *Journal of Dairy Science*, 2010, 93(7), 3253-3263].

**NPARR 1(4), 2010-0570, Effects of partially replacing barley silage or barley grain with dried distillers grains with solubles on rumen fermentation and milk production of lactating dairy cows**

Dried distillers grains with solubles (DDGS) has been commonly used as a dietary protein source for lactating dairy cows. However, there is a paucity of data evaluating the use of DDGS as a partial replacement of forage or grain. The objective of this study was to determine the effects of partially replacing barley silage or barley grain with corn/wheat-based DDGS on dry matter intake (DMI), chewing activity, rumen fermentation, and milk production. Six ruminally cannulated lactating Holstein cows were used in a replicated 3 × 3 Latin square design with 21-d periods. Cows were fed the

control diet (CON: 45% barley silage, 5% alfalfa hay, and 50% concentrate mix), a low forage (LF) diet or a low grain (LG) diet, in which barley silage or barley grain was replaced by DDGS at 20% of dietary dry matter, respectively. All diets were formulated to contain 18% crude protein and fed as total mixed rations. Compared with CON, cows fed the LF diet had greater DMI (26.0 vs. 22.4kg/d), yields of milk (36.4 vs. 33.0g/d), milk protein (1.18 vs. 1.05kg/d), and milk lactose (1.63 vs. 1.46kg/d), but milk fat yield was not affected. The LF diet decreased chewing time compared with the CON diet (29.7 vs. 39.1 min/kg of DMI), but did not affect rumen pH and duration of rumen pH below 5.8. Compared with CON, feeding the LG diet tended to increase minimum and maximum rumen pH, but did not affect DMI, milk yield, and milk composition in this study. These results indicate that a partial replacement of barley silage with DDGS can improve the productivity of lactating dairy cows without negatively affecting rumen fermentation and milk fat production. Barley grain can also be partially replaced by DDGS in diets for lactating dairy cows without causing negative effects on productivity [S.Z. Zhang, G.B. Penner, W.Z. Yang and M. Oba\* (Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, T6G 2P5, Canada), *Journal of Dairy Science*, 2010, **93**(7), 3231-3242].

**NPARR 1(4), 2010-0571, Flaxseed supplementation improves fatty acid profile of cow milk**

The effects of adding flaxseed or fish oil to the diet on the milk fatty acid profile of cows was studied. The experiment was conducted in the summer of 2006 and involved 24 Friesian cows that were divided into 3 groups of 8 animals according to different type of fat supplementation: a traditional diet with no fat supplementation, a diet supplemented with whole flaxseed, and a diet supplemented with fish oil. Results suggested that whole flaxseed supplementation positively affects the milk fatty acid profile during summer. In particular, milk from cows receiving flaxseed supplementation showed a decrease in saturated fatty acid, an increase in monounsaturated fatty acid, and, together with the milk from fish oil-supplemented cows, an increase in polyunsaturated fatty acid content compared with milk from control cows. As expected, both fish oil and flaxseed supplementation increased the content of n-3 polyunsaturated fatty acids in milk fat. The

increased dietary intake of C18:3 in flaxseed-supplemented cows resulted in increased levels of milk C18:1 *trans*-11 and increased conjugated linoleic acid C18:2 *cis*-9, *trans*-11 by  $\Delta^9$ -desaturase activity. Milk from flaxseed-supplemented cows together with the high conjugated linoleic acid content was characterized by low atherogenic and thrombogenic indices, suggesting that its use has less detrimental effects concerning the atherosclerosis and coronary thrombosis risk associated with the consumption of milk and dairy products. In conclusion, flaxseed supplementation improves composition and nutritional properties of milk from cows milked during times of high ambient temperature [M. Caroprese\*, A. Marzano, R. Marino, G. Gliatta, A. Muscio and A. Sevi (Dipartimento PRIME, Università di Foggia, Via Napoli 25, 71100 Foggia, Italy), *Journal of Dairy Science*, 2010, **93**(6), 2580-2588].

**FIBRES (incl. Textile and other utility fibres)**

**NPARR 1(4), 2010-0572, A new approach for natural dyeing and functional finishing of cotton cellulose**

A new approach for upgrading the dyeing properties of cotton knits with natural dyes as well as to enhance both the UV-protection and antimicrobial functions of the obtained dyeings was investigated. Factors affecting the dyeing and multifunctional properties of the treated substrates such as fabric structure, type and concentration of mordant, kind and percent of natural dye extract as well as dyeing regime were studied. In situ deposition of the mordant as a metal oxide onto and/or within the fabric structure followed by dyeing results in a dramatic improvement in the color strength as well as the fastness properties, in addition to an outstanding enhancement in both the UV-protection, against the harmful UV-radiation and the antibacterial activity against the hazardous G+ve and G-ve bacteria. The extent of improvement in the aforementioned properties follows the descending order: pre-mordanting followed by dyeing>dyeing only>none, and is determined by type and content of metal, physical state/chemical structure as well as extent of dye interaction and fixation, along with the fabric construction. The UV-protection properties as well as

the antibacterial activities of the obtained dyeings are maintained even after 20 washing cycles [N.A. Ibrahim\*, A.R. El-Gamal, M. Gouda and F. Mahrous (National Research Centre, Textile Research Division, Dokki, Cairo, Egypt), *Carbohydrate Polymers*, 2010, **82**(4), 1205-1211].

#### **NPARR 1(4), 2010-0573, Aroma finishing of cotton fabrics by means of microencapsulation techniques**

Functional textiles are being developed in order to provide fabrics with new properties and added value. They can be obtained either by using new chemical fibers or by incorporating functional agents to conventional fabrics. Microencapsulation is an effective method to protect these functional agents from reactions with moisture, light, and oxygen. If a fabric is treated with microencapsulated functional agents, higher durability of functionality is expected. This article reports the development and testing of two types of microcapsules containing essential oils for application in cotton fabrics. Microcapsules were obtained by complex coacervation using gelatin and arabic gum or by encapsulation in yeast cells in order to increase the durability of fragrances in textiles. Microcapsule characterization, such as particle size and morphology, was carried out for different oils to polymer ratios and hardening agents to polymer ratios. Padding and coating were tested as application methods. The morphology, durability of the fragrance, and laundering properties of the treated fabrics were investigated. The use of an electronic nose to measure the fragrance release from microcapsules was also evaluated. Gelatin—arabic gum microcapsules increased the durability of the fragrance on the treated fabrics and withstood one wash cycle. Fabrics treated with yeast cell microcapsules presented low fragrance intensity before washing. The fragrance was not detectable after laundering, even though the microcapsules could still be observed on the fabric [María M. Miró Specos, Germán Escobar, Patricia Marino, César Puggia, M. Victoria Defain Tesoriero and Laura Hermida\* (Instituto Nacional de Tecnología Industrial (INTI), Centro de Química - Edificio 38, Avenida General Paz 5445 B1650WAB San Martín, Buenos Aires, Argentina), *Journal of Industrial Textiles July 2010*, **40**, 13-32].

#### **NPARR 1(4), 2010-0574, Antibacterial finish for cotton fabric from herbal products**

An ecofriendly natural antibacterial finish has been prepared from the plant extracts for textile application. Herbal extracts from *Ocimum sanctum* Linn. (tulsi leaf) and rind of *Punica granatum* Linn. (pomegranate) have been applied to cotton fabric by the method of direct application, micro-encapsulation, resin cross-linking and their combinations. All the treatments show good antibacterial properties for the fabrics. Except the method of direct application, all other treatments show good washing durability up to 15 washes. The surface morphological studies using SEM show the surface coating, microcapsules and some fibrillation. The GC-MS studies reveal that the major components responsible for the antibacterial properties are Eugenol, Germacrene and Phytol. A small decrease in tensile strength and crease recovery angle is observed for resin treated and micro-encapsulated fabrics respectively. But in the combined processes no significant changes are observed [Sathianarayanan, MP, Bhat, N V\*, Kokate, S S and Walunj, V E (The Bombay Textile research Association, LBS Marg, Ghatkopar (West), Mumbai-400 086), *Indian Journal of Fibre and Textile Research*, 2010, **35**(1), 50-58].

#### **NPARR 1(4), 2010-0575, A novel method for scouring textile cotton**

A simple novel method has been developed for scouring different varieties of cotton fibres and fabrics using non-ionic surfactant and the results are compared with those of the conventional method. It is observed that the novel method does not affect the 2.5% span length, micronaire and tenacity of the cotton. However, the uniformity ratio is found to decrease on treatment. Sinking time for the treated cotton remains within the standard limits, thus making it suitable as absorbent. On comparing with conventional method, it is found that the dye uptake, and colour fastness to washing and perspiration of cotton fabrics treated with the new method are equal to or better than those of the fabrics treated with conventional method. The new method is not only simple to operate but also ecofriendly and economic [Sharma, Meena\* and Nachane, R P (Central Institute for research on Cotton Technology, Matunga, Mumbai-400019), *Indian Journal of Fibre and Textile*

*Research*, 2010, **35**(1), 72-74].

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

### **NPARR 1(4), 2010-0576, Influence of pasteurization on the active compounds in medicinal plants to be used in dairy products**

Interest from the dairy industry in adding herbal drugs to milk and yogurt products raises the question of whether these plant materials can be pasteurized. Root material of *Rhodiola rosea*, *Eleutherococcus senticosus*, and *Panax ginseng*, all plants with adaptogenic activities, was pasteurized. The content of active compounds in the root material before and after pasteurization was quantified by HPLC analysis. The results show that the eleutherosides in *E. senticosus*, and to an extent the ginsenosides from *P. ginseng*, could withstand pasteurization, whereas salidroside and rosavin from *R. rosea* did not survive pasteurization. Thus, *R. rosea* is not suitable for products requiring pasteurization [AK Jäger\*, L Saaby, DS Kudsk, KC Witt and P Mølgaard (Department of Medicinal Chemistry, Faculty of Pharmaceutical Sciences, University of Copenhagen, 2 Universitetsparken, 2100 Copenhagen, Denmark), *Jurnal of Dairy Science*, 2010, **93**(6), 2351-2353].

### **NPARR 1(4), 2010-0577, Screening of lactic acid bacteria potentially useful for sorghum fermentation**

A screening of commercial lactic acid bacteria potentially useful in the improvement of sorghum nutritional quality was done. The aim of this study was to test starter cultures to meet the prerequisites for the establishment of small-scale industrial production of sorghum fermented foods in Africa. Sorghum was fermented with commercial strains of *Lactobacillus plantarum*, *Lactobacillus brevis*, *Lactobacillus paracasei*, *Lactobacillus fermentum*, *Pediococcus pentosaceus* and *Streptococcus thermophilus*. As a result of sorghum prolamins hydrolysis, an increase in the *in vitro* protein digestibility (IVPD) was promoted. After pepsin digestion, changes occurred in the electrophoretic profile of prolamins, with a decrease of almost all fermented sample spots in comparison with the unfermented sample. Samples in which the decrease

of 45 kDa and 66 kDa oligomers was more pronounced, presented higher IVPD. Fourier Transform Infrared spectroscopy in tandem with multivariate analysis showed starch structural changes in samples fermented with *Lactobacillus brevis*, *Lactobacillus fermentum*, *Streptococcus thermophilus* and *Pediococcus pentosaceus*.

This work demonstrates that all tested bacteria promoted beneficial effects on sorghum nutritional quality and are suitable to be used as commercial starters for industrial applications. *Streptococcus thermophilus*, *Lactobacillus brevis* and *Lactobacillus fermentum* are the most promising starters as they lead to higher IVPD values (46.48, 39.19 and 36.73%, respectively) [Isabel Correia, Alexandra Nunes, Sofia Guedes, António S. Barros and Ivonne Delgado\* (Campus Universitário de Santiago, Departamento de Química, Universidade de Aveiro, 3810-193 Aveiro, Portugal), *Journal of Cereal Science*, 2010, **52**(1), 9-15].

### **NPARR 1(4), 2010-0578, Properties of field-sprouted sorghum and its performance in ethanol production**

The objective of this research was to investigate physicochemical and biochemical characteristics of field-sprouted grain sorghum and its fermentation performance in ethanol production. Five field-sprouted grain sorghum varieties, which received abnormally high rainfall during harvest, were used in this study. Enzyme activities, microstructure, flour pasting properties, kernel hardness, kernel weight, kernel size, flour size and particle distribution of field-sprouted grain sorghum were analyzed. The effect of germination (i.e., sprouting) on conversion of grain sorghum to ethanol was determined by using a laboratory dry-grind ethanol fermentation procedure. Sprouted sorghum had increased  $\alpha$ -amylase activity; degraded starch granules and endosperm cell walls; decreased kernel hardness, kernel weight, kernel size, and particle size; and decreased pasting temperature and peak and final viscosities compared with non-sprouted grain sorghum. The major finding is that the time required for sprouted sorghum to complete fermentation was only about half that of non-sprouted sorghum. Also, ethanol yield from sprouted sorghum was higher (416-423l/ton) than that from non-sprouted sorghum (409l/ton) on a 14% moisture basis [Shuping Yan, Xiaorong Wu, Jeff Dahlberg, Scott R. Bean, Finlay

MacRitchie, Jeff D. Wilson and Donghai Wang\* (Department of Biological and Agricultural Engineering, Kansas State University, Seaton Hall 129, Manhattan, KS 66506, USA), *Journal of Cereal Science*, 2010, **51**(3), 374-380].

**NPARR 1(4), 2010-0579, Application of ozone in grain processing**

Ozone is an effective fumigant for insect killing, mycotoxin destruction and microbial inactivation which has a minimal or no effect on grain quality. Studies have demonstrated that ozone which is a natural agent, may offer unique advantages for grain processing along with addressing growing concerns over the use of harmful pesticides. This paper focuses on the efficacy of ozone for preservation of food grains and discusses the possible effects on product quality. Inactivation mechanisms for micro-organisms and mycotoxins are detailed. Critical intrinsic and extrinsic factors governing inactivation are discussed along with potential grain applications [BK Tiwari\*, CS Brennan, T Curran, E Gallagher, PJ Cullen and CP O'Donnell (UCD School of Agriculture, Food Science and Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland), *Journal of Cereal Science*, 2010, **51**(3), 248-255].

**NPARR 1(4), 2010-0580, Effect of hydrothermal treatment of rice flour on various rice noodles quality**

The rice noodle industry in Thailand is facing problems regarding rice flour quality. This research aims to study the effects of hydrothermally modified rice flour on improving rice noodle quality. High-amylose rice flour (Chai Nat 1 variety) was modified using heat-moisture treatment (HMT) and annealing (ANN). Response surface methodology (RSM) with face-centered central composite design (FCCD) was applied to optimize the hydrothermal treatment condition. The effects of treatment conditions – moisture content; heating temperature and heating time on pasting; rheology; and textural properties of rice flour gel – were observed. A contour plot showed that all responses using HMT increased when moisture content and heating temperature increased. But heating time had no significant effect on response variables. ANN showed a lower response than HMT for all parameters. The optimum modified conditions were then matched with those of commercial flour for

fresh, semi-dry and dry rice noodles; this showed no significant differences in texture or cooking quality ( $P \leq 0.05$ ). The storage modulus ( $G'$ ) after cooling of HMT (19,100 Pa) was much higher than that of ANN (5490 Pa). The differences in rheological properties of both treatments supported their proper uses to achieve various rice noodle qualities. Abbreviations: ANN, annealing; cP, centipoise;  $\Delta C_p$ , heat capacity; FCCD, face centered central composite design;  $G'$ , storage modulus;  $G''$ , loss modulus;  $\Delta H$ , enthalpy; HMT, heat-moisture treatment; Mc, moisture content; Pa, Pascal;  $R^2$ , coefficient of determination; RSM, response surface methodology;  $T_c$ , conclusion temperature;  $T_g$ , glass transition temperature;  $T_{gel}$ , gelatinization temperature;  $T_o$ , onset temperature;  $T_p$ , peak temperature [Supawadee Cham and Prisana Suwannaporn\* (Department of Food Science and Technology, Kasetsart University, 50 Paholyothin Rd., Jatuchak, Bangkok 10900, Thailand), *Journal of Cereal Science*, 2010, **51**(3), 284-291].

**NPARR 1(4), 2010-0581, Production of novel dairy products using actinidin and high pressure as enzyme activity regulator**

Milk clotting for the production of novel dairy products, alternative or complementary to cheese and yogurt type products can be achieved using plant sulfhydryl proteases. The objective was to apply the protease actinidin, from *Actinidia chinensis*, as the milk clotting agent, and High pressure (HP) technology to control excessive proteolysis. The effect of the dairy substrate and the process parameters on the coagulation rate and the texture and sensory properties of the end product, were studied. Selected values of design parameters were 25% total solids, 6.49 adjusted pH, 0.35 U activity of the clotting agent actinidin, 40°C process temperature and 2h time. The selected pressure-temperature conditions, 600MPa at 40°C, were applied to stop the potentially detrimental further proteolytic action of the enzyme. Results indicated that use of actinidin for milk clotting and HP to stop the enzyme activity in the final product leads to a “fresh cheese” type dairy product [George I. Katsaros\*, George Tavantzis and Petros S. Taoukis (Laboratory of Food Chemistry & Technology, School of Chemical Engineering, National Technical University of Athens, 5 Iroon Polytechniou Str., 15780, Greece), *Innovative Food Science & Emerging Technologies*, 2010, **11**(1), 47-51].

**NPARR 1(4), 2010-0582, Influence of high-pressure processing (HPP) on physico-chemical properties of fresh cheese**

Freshly prepared rennet-coagulated soft cheese was high-pressure (HP) treated at up to 291MPa and 29min and using a full 2-factor central composite design of experiment, its physico-chemical properties (colour, fat, lipid oxidation, moisture and protein content, pH, and texture) were examined. HP treatment influenced significantly ( $p<0.05$ ) the colour, fat, moisture, lipid oxidation, hardness and adhesiveness of the fresh cheese. Fat content increased apparently as moisture decreased significantly after HP treatment of above 100MPa. Increased pressures reduced lipid oxidation but increased yellowness although the latter showed more effect over redness in the HP-treated fresh cheese. Also, increased pressures increased hardness, decreased acidity and adhesiveness in HP-treated fresh cheese although increased exposure was found to increase acidity [Charles O.R. Okpala\*, John R. Piggott\* and Carl J. Schaschke (Centre for Food Quality, Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, 204 George Street, Glasgow G1 1XW, Scotland, UK), *Innovative Food Science & Emerging Technologies*, 2010, **11**(1), 61-67].

**NPARR 1(4), 2010-0583, The development of burfi sweetened with aspartame**

Sucrose was successfully replaced with the sweetener aspartame for the preparation of the indigenous dairy product burfi. Analytical conditions were standardised for the solid phase extraction of aspartame and its degradation products from burfi followed by their reverse phase HPLC. Recovery using this method was 90-97%. Aspartame at a level of 0.065% of milk w/w scored highest in terms of sweetness perception and resembled control burfi in sweetness. Storage studies at 6–8°C revealed that aspartame-sweetened burfi resembled the control burfi in retaining the sensory profile, but showed an increase in acidity and microbial load and could not retain the texture. High-performance liquid chromatography analysis revealed no degradation of aspartame in burfi, establishing its stability and hence its sweetness on storage [Sumit Arora\*, Hemant Gawande, Vivek Sharma, Balbir Kaur Wadhwa, Vishwas George, Ghanshyam S Sharma and Ashish Kumar Singh (Dairy Chemistry Division, National

Dairy Research Institute, Karnal-132 001, Haryana, India), *International Journal of Dairy Technology*, 2010, **63**(1), 127-135].

**NPARR 1(4), 2010-0584, Evaluation of different soybean varieties for manufacture of soy ice cream**

Soy ice cream is a delicious and nutritious frozen product. Seven varieties of soybean were evaluated for their suitability in the preparation of soy ice cream. Significant differences ( $P<0.05$ ) were found between the moisture, protein, fat and ash contents of ice cream mixes prepared from different soybean varieties. The viscosity of the ice cream mix increased, while specific gravity decreased, after ageing and freezing of the mix. Significant differences ( $P<0.05$ ) were observed in the over-run and melt down time of ice cream prepared from different soybean varieties. Soy ice cream prepared from variety PK-472 was rated organoleptically superior to other varieties Namrata Sutar\*, Parag P Sutar and Gurmukh Singh [Faculty of Food Processing Technology and Bio-Energy, Anand Agricultural University, Anand, 388001, India], *International Journal of Dairy Technology* 2010, **63**(1), 136-142].

**NPARR 1(4), 2010-0585, Production of maize-bambara groundnut complementary foods fortified pre-fermentation with processed foods rich in calcium, iron, zinc and provitamin A**

Maize-bambara groundnut complementary foods are deficient in calcium, iron, zinc and vitamin A. Food-to-food fortification could be cheaper, safer and more easily adopted by local communities compared to the use of chemically pure compounds and vitamins to enrich such foods.

Maize-bambara groundnut complementary foods fortified for iron, zinc, calcium and vitamin A by blending with a multi-mix (1.41:1:2.25, w/w) of processed roselle calyces, cattle bones, and red palm oil in a 1:2.1 (w/w) ratio showed significant increases in calcium, iron, zinc and vitamin A contents of 3.26-4.225, 0.083-0.134 and 0.015-0.017 g/kg and 4855.3-7493.7µgRE/kg, respectively. The maize-bambara groundnut foods had calcium, iron, zinc and vitamin A contents that satisfy the proposed nutrient requirements for infants. Only the maize-bambara groundnut and maize-bambara groundnut malt fermented by backslipping [(MB)<sub>b</sub> and (MB<sub>m</sub>)<sub>b</sub>]

containing red palm oil emulsified with *Brachystegia eurycoma* had calcium contents significantly ( $P < 0.05$ ) higher than Nutrend, a complementary food produced by Nestle (Nigeria) PLC. These products are from raw materials produced in commercial quantities by rural farmers using household level technologies which the rural and urban poor can more easily access in order to reduce micronutrient malnutrition [Peter O Uvere \*, Eucharia U Onyekwere, Patrick O Ngoddy, (Department of Food Science and Technology, University of Nigeria, Nsukka, Nigeria 410 001), *Journal of the Science of Food and Agriculture*, 2010, **90**(4), 566-573].

**NPARR 1(4), 2010-0586, Noodle quality affected by different cereal starches**

To investigate the effects of starch characteristics on the quality of noodle making, white salted noodles (WSN) made from reconstituted flours, in which the wheat starch was substituted by different cereal starches, including waxy and non-waxy rice starches, waxy wheat starch and waxy corn starch, were prepared. The rheological properties of raw WSN were mainly influenced by the size of starch granules, where the small starch granules, such as for rice starches, exhibited high amounts of water absorption during dough preparation and a dense packing of starch granules inside a thin gluten-strand network. The rheological properties of cooked WSN were mainly dominated by the amylose content and fine structure of the amylopectin, which resulted in the differences in water absorption and cooking time required for cooked WSN [Yu-Chan Huang\* and Hsi-Mei Lai (Department of Agricultural Chemistry, National Taiwan University, No. 1, Roosevelt Rd., Sec. 4, Taipei 10617, Taiwan), *Journal of Food Engineering*, 2010, **97**(2), 135-143].

**NPARR 1(4), 2010-0587, Use of galactomannan edible coating application and storage temperature for prolonging shelf-life of Regional cheese**

The objectives of this work were to determine the influence of the application of two different coatings (galactomannan and chitosan) and of storage temperature on the gas exchange rate of “Regional” cheese; subsequently, the coating that showed the greatest influence on the cheese gas exchange and simultaneously decreased the  $O_2$  consumption ( $R_{O_2}$ ) and the  $CO_2$  production ( $R_{CO_2}$ ) rates was applied on

cheese, being the shelf-life parameters monitored through the performance of chemical and microbiological analyses. Both coatings caused a reduction of  $R_{O_2}$  and  $R_{CO_2}$  of the cheese (between 0.19- and 1.30-fold for  $R_{O_2}$  and between 0.19- and 1.50-fold for  $R_{CO_2}$ , depending on the temperatures). The cheese coated with the galactomannan coating was the one with the lower values of  $R_{O_2}$  (between 0.195 and 0.635ml/kg/h) and  $R_{CO_2}$  (between 0.125 and 0.900ml/kg/h). Temperature was also found to have an important effect on  $R_{O_2}$  and  $R_{CO_2}$ , its influence being well described by an Arrhenius equation with coefficients of determination,  $R^2$ , of 0.85 and above. The chemical and microbiological analyses showed that the application of the coating in cheese samples can be used to decrease the water loss and the colour changes during the storage time. The presence of the coating decreased the moisture loss of the cheese in 2.5% and 1.9%, and the weight loss in 3.8% and 3.1% at 4°C and 20°C, respectively. Also, the hardness of the cheese can be decreased as a result of the interaction of the presence of the coating with changes in the storing temperature. In the studied range (4-20°C) temperature has a statistically significant effect in moisture loss, colour change, hardness and total mesophilic bacterial growth. Overall, galactomannan coating can be used to improve “Regional” cheese shelf-life as it decreases  $R_{O_2}$  and  $R_{CO_2}$ , improves its weight and appearance and can be used to incorporate natural preservatives to reduce post contamination [Miguel A. Cerqueira\*, Maria J. Sousa-Gallagher, Isabel Macedo, Rocio Rodriguez-Aguilera, Bartolomeu W.S. Souza, José A. Teixeira and António A. Vicente (IBB–Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal), *Journal of Food Engineering*, 2010, **97**(1), 87-94].

**NPARR 1(4), 2010-0588, Fortification of pasta with split pea and faba bean flours: Pasta processing and quality evaluation**

Nutritionally enhanced spaghetti was produced by adding high amounts (35% db) of legume flour (split pea or faba bean) to durum wheat semolina. The production of fortified pasta required an adaptation of the pasta making process (higher hydration level and mixing speed) to limit agglomeration of particles during mixing. Moreover, addition of legume flour induced a decrease in some pasta quality attributes

(e.g. higher cooking loss, lower breaking energy). This could be attributed to the introduction of non-gluten proteins and insoluble fibres which weakened the overall structure of pasta. A modification of the sensorial properties including higher hardness and higher fracturability were also observed. Some quality attributes (e.g. lower cooking loss) of fortified pasta were improved by applying high and very high temperatures during the drying cycle, reflecting strengthening of the protein network. However, these treatments resulted in excessively firm and rubbery pasta according to the panelists [Maud Petit<sup>\*</sup>, Laurence Boyer, Chantal Minier and Valérie Micard (Montpellier SupAgro, UMR IATE, 2, Place Pierre Viala, 34060 Montpellier Cedex 01, France), *Food Research International*, 2010, **43**(2), 634-641].

**NPARR 1(4), 2010-0589, Removal of oligosaccharides in soybean flour and nutritional effects in rats**

The objectives of this work were to establish a safe and economically viable process for the removal of raffinose oligosaccharides (RO) from soy flour and compare the effects of RO elimination from diets with regard to nutritional parameters by testing in Wistar rats. *Debaryomyces hansenii* UFV-1 was cultivated in suspension of defatted soy flour (1:10 w/v). An increase in  $\alpha$ -galactosidase activity was observed in the medium, with a consequent decrease in the RO concentration. A total reduction of RO was achieved at 36 h of incubation. The diet containing soy flour free of RO presented higher digestibility, 91.28%, in relation to the diet containing soy flour with RO, 87.14%. However, the removal of the oligosaccharides from the diet did not promote a significant improvement in the values of weight gain, and other nutritional parameters tested on rats, during the experimental period of 14 days [Ana Paula Rodrigues Brasil<sup>\*</sup>, Sebastião Tavares de Rezende, Maria do Carmo Gouveia Pelúzio and Valéria Monteze Guimarães (BIOAGRO, Universidade Federal de Viçosa, Department of Biochemistry and Molecular Biology, Av. P. H. Rolfs, Campus UFV, Viçosa, MG 36570-000, Brazil), *Food Chemistry*, 2010, **118**(2), 251-255].

**NPARR 1(4), 2010-0590, Changes in durum wheat kernel and pasta proteins induced by toasting and drying processes**

Durum wheat kernels were subjected to a toasting process and the proteins characterised by size exclusion-high performance liquid chromatography (SE-HPLC) and sodium dodecyl sulphate-polyacrylamide gel electrophoresis. With this physical process, albumins and globulins, as well as glutenins and gliadins, polymerised as seen by a shift of the SE-HPLC profile to lower elution times. The polymerisation seemed to happen mainly through disulphide bonds, even though the participation of  $\omega$ -gliadins to the aggregation suggested the involvement of other kinds of interactions. It led to the revelation of a new peak originated by thermal aggregation of small polymeric proteins. The changes in the chromatographic profile were accompanied by increasing amounts of total unextractable polymeric proteins. The replacement of semolina with toasted durum wheat flour (5%, 10%, 15%, 20% and 30%) for the production of pasta in the shape of spaghetti significantly ( $p < 0.001$ ) affected the molecular size distribution of the polymeric proteins, even though the replacement of semolina with 5% and 10% of toasted durum wheat flour (TDWF) did not significantly ( $p > 0.05$ ) change the unextractable polymeric proteins (UPP) when compared with spaghetti made with 100% durum semolina. On the other hand, the replacements of semolina with 15–30% TDWF showed significant ( $p < 0.001$ ) increase in UPP when compared with 100% durum semolina spaghetti [Carmela Lamacchia<sup>\*</sup>, Antonietta Baiano, Sara Lamparelli, Ennio La Notte and Aldo Di Luccia (Istituto per la Ricerca e le Applicazioni Biotecnologiche per la Sicurezza e la Valorizzazione dei Prodotti Tipici e di Qualità, Università degli Studi di Foggia, Via Napoli, 25-71100 Foggia, Italy), *Food Chemistry*, 2010, **118**(2), 191-198].

**NPARR 1(4), 2010-0591, Effects of heat treatment and acid-induced gelation on aroma release from flavoured skim milk**

Time dependent aroma release was studied in skim milk, heated skim milk as well as in acid-induced gels derived from them using static headspace-gas chromatography analysis. A variable order kinetic model was fitted to experimental data and was used to determine headspace equilibrium concentration and initial rates of release. When compared to water, retention in milk based matrices was increased for hydrophobic aroma compounds, while it was decreased for more hydrophilic volatiles.

Acid gelation reduced the initial rate of aroma release by a factor varying from 2.0 to 3.8, depending on the compound. Positive deviation from the first order kinetics was observed and suggests that a concentration gradient is established in the matrix during measurement. The interaction between milk based matrices and aroma compounds is discussed in relation to their chemical structure and the physico-chemical characteristics of the matrices [V. Perreault\*, M. Britten, S.L. Turgeon, A.-M. Seuvre, P. Cayot and A. Voilley (Centre de recherche STELA, Faculté des sciences de l'agriculture et de l'alimentation, Pavillon Paul-Comtois, Université Laval, Québec, Canada G1K 7P4), *Food Chemistry*, 2010, **118**(1), 90-95].

**NPARR 1(4), 2010-0592, Heat-induced changes in dairy products containing sucrose**

The aim of the present work was to analyse the influence of the variables reaction temperature, casein-sucrose ratio and pH, on the kinetic parameters of gelation reactions, the gelation time and the functionality of casein micelles in concentrated milk systems containing sucrose. Global constant rate reaction order of gelation and were calculated, the first varying between four different orders of magnitude and the second between 1 and 7. Mathematical models allowing the prediction of gelation time with a good fit ( $r^2 > 0.94$ ) were obtained. Activation energy ( $E_a$ ) for gelation decreased as pH decreased. In presence of sucrose,  $E_a$  values showed higher temperature dependence. Gel functionality showed to be pH independent. Although the kinetic aspects of the reactions were affected by pH, the thermodynamic ones remained almost unchanged. Aggregation and gelation were very fast at pH 6. When comparing gelation kinetics with those corresponding to fluorescence and colour development, gelation showed to be produced much earlier than the latter two phenomena [S.D. Rozycki\*, M.P. Buera and M.S. Pauletti (Instituto de Tecnología de Alimentos, Facultad de Ingeniería Química, Universidad Nacional del Litoral-Street, 1 de Mayo 3250, (3000) Santa Fe, Argentina), *Food Chemistry*, 2010, **118**(1), 67-73].

**NPARR 1(4), 2010-0593, Removal of oligosaccharides in soybean flour and nutritional effects in rats**

The objectives of this work were to establish a safe and economically viable process for the removal of raffinose oligosaccharides (RO) from soy flour and compare the effects of RO elimination from diets with regard to nutritional parameters by testing in Wistar rats. *Debaryomyces hansenii* UFV-1 was cultivated in suspension of defatted soy flour (1:10 w/v). An increase in  $\alpha$ -galactosidase activity was observed in the medium, with a consequent decrease in the RO concentration. A total reduction of RO was achieved at 36h of incubation. The diet containing soy flour free of RO presented higher digestibility, 91.28%, in relation to the diet containing soy flour with RO, 87.14%. However, the removal of the oligosaccharides from the diet did not promote a significant improvement in the values of weight gain, and other nutritional parameters tested on rats, during the experimental period of 14days [Ana Paula Rodrigues Brasil\*, Sebastião Tavares de Rezende, Maria do Carmo Gouveia Pelúzio and Valéria Monteze Guimarães (BIOAGRO, Universidade Federal de Viçosa, Department of Biochemistry and Molecular Biology, Av. P. H. Rolfs, Campus UFV, Viçosa, MG 36570-000, Brazil), *Food Chemistry*, 2010, **118**(2), 251-255].

**NPARR 1(4), 2010-0594, Changes in durum wheat kernel and pasta proteins induced by toasting and drying processes**

Durum wheat kernels were subjected to a toasting process and the proteins characterised by size exclusion-high performance liquid chromatography (SE-HPLC) and sodium dodecyl sulphate-polyacrylamide gel electrophoresis. With this physical process, albumins and globulins, as well as glutenins and gliadins, polymerised as seen by a shift of the SE-HPLC profile to lower elution times. The polymerisation seemed to happen mainly through disulphide bonds, even though the participation of  $\omega$ -gliadins to the aggregation suggested the involvement of other kinds of interactions. It led to the revelation of a new peak originated by thermal aggregation of small polymeric proteins. The changes in the chromatographic profile were accompanied by increasing amounts of total unextractable polymeric proteins. The replacement of semolina with toasted durum wheat flour (5%, 10%, 15%, 20% and 30%) for the production of pasta in the shape of spaghetti significantly ( $p < 0.001$ ) affected the molecular size distribution of the polymeric proteins, even though

the replacement of semolina with 5% and 10% of toasted durum wheat flour (TDWF) did not significantly ( $p>0.05$ ) change the unextractable polymeric proteins (UPP) when compared with spaghetti made with 100% durum semolina. On the other hand, the replacements of semolina with 15–30% TDWF showed significant ( $p<0.001$ ) increase in UPP when compared with 100% durum semolina spaghetti [Carmela Lamacchia\*, Antonietta Baiano, Sara Lamparelli, Ennio La Notte and Aldo Di Luccia (Istituto per la Ricerca e le Applicazioni Biotecnologiche per la Sicurezza e la Valorizzazione dei Prodotti Tipici e di Qualità, Università degli Studi di Foggia, Via Napoli, 25-71100 Foggia, Italy), *Food Chemistry*, 2010, **118**(2), 191-198].

**NPARR 1(4), 2010-0595, Effects of heat treatment and acid-induced gelation on aroma release from flavoured skim milk**

Time dependent aroma release was studied in skim milk, heated skim milk as well as in acid-induced gels derived from them using static headspace – gas chromatography analysis. A variable order kinetic model was fitted to experimental data and was used to determine headspace equilibrium concentration and initial rates of release. When compared to water, retention in milk based matrices was increased for hydrophobic aroma compounds, while it was decreased for more hydrophilic volatiles. Acid gelation reduced the initial rate of aroma release by a factor varying from 2.0 to 3.8, depending on the compound. Positive deviation from the first order kinetics was observed and suggests that a concentration gradient is established in the matrix during measurement. The interaction between milk based matrices and aroma compounds is discussed in relation to their chemical structure and the physico-chemical characteristics of the matrices [V. Perreault\*, M. Britten, S.L. Turgeon, A.-M. Seuvre, P. Cayot and A. Voilley (Centre de recherche STELA, Faculté des sciences de l'agriculture et de l'alimentation, Pavillon Paul-Comtois, Université Laval, Québec, Canada G1K 7P4), *Food Chemistry*, 2010, **118**(1), 90-95].

**NPARR 1(4), 2010-0596, Production variations of nutritional composition of commercial meat products**

Changes in nutrient composition that habitually

occur in commercial meat products in the course of production need to be considered for purposes of production systems control, consumer safety, nutritional information, labelling, official regulations or quality of food composition databases. This paper reports a study of production time variations in the nutritional composition of commercial meat products with different characteristics such as composition (protein and fat levels) and processing conditions (lean-only cuts, ground meat, fresh, cooked, brined, etc.). Proximate composition, fatty acid profile, cholesterol concentration, energy value and mineral content were evaluated. Over the year variability in nutrient composition were generally observed in meat products. The variability of composition (proximate analysis and fatty acid proportion) was greater in lean-only cut products as compared with ground meats. The relationship between fat and cholesterol contents of meat products presented correlation coefficients of 0.809 ( $P<0.001$ ) and 0.859 ( $P<0.001$ ) for the relationship between cholesterol and the sum of fat and protein contents. Several of the products considered are significant sources of Fe, Zn and K. Production variations in nutritional profiles observed in various meat products can affect the dietary assessment of some components, and also the product's nutritional labeling [F. Jiménez-Colmenero\* T. Pintado, S. Cofrades, C. Ruiz-Capillas and S. Bastida (Instituto del Frío (CSIC), Ciudad Universitaria, 28040 Madrid, Spain), *Food Research International*, 2010, **43**(10), 2378-2384].

## FRUITS

**NPARR 1(4), 2010-0597, Effect of assimilation of custard apple (*Annona squamosa*) pulp on chemical quality and cost of ice-cream**

Present investigation was conducted to study the chemical composition, quality and cost of ice-cream. Three leaves of custard apple pulp (i.e. 10, 15 and 20 %) with two levels of sugar (i.e. 10 and 15 % were compared with control where no pulp but 15% sugar was added. Levels of stabilizer, fat and total solids were kept constant at 0.15, 10 and 36%, respectively. It could be inferred that ice-cream prepared with incorporation of 15% custard apple pulp and 15 %t sugar level (T<sub>4</sub>) had overall acceptability of 8.05 scores of hedonic scale. The production cost and energy value per kg was Rs.61.42 and 97.27

kcal/100g, respectively [Yadav C.M., Karanjkar L.M. and Kashid U.B, (Department of Animal Husbandry and Dairy Science, Marathwada Agricultural University, Parbhani, 431 402, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(2)].

**NPARR 1(4), 2010-0598, Dehydration Behaviour of Plain and Fortified Banana Pulps in the Preparation of Bars**

Banana and banana-SMP pulps were dehydrated in a cross flow cabinet tray drier and the dehydration behavior was studied. The moisture loss data were used to calculate the drying rate and the moisture ratio. The results showed that the drying of banana and banana-SMP pulps takes place in the falling rate period and is governed by moisture diffusion. Mathematical relationships were established between moisture ratio and drying time for the banana and banana-SMP pulps. The incorporation of SMP in banana pulp does not affect the drying rate and drying time. The sorption isotherm was also studied for the safe storage of bars. It was observed that the banana bars, so obtained should be stored under 43.9 to 64.8% RH [Prasad K (Department of Food Engineering and Technology, Sant Longowal Institute of Engineering and Technology, Longowal – 148 106, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(1)].

**NPARR 1(4), 2010-0599, Managing faba bean residues to enhance the fruit quality of the melon (*Cucumis melo* Linn.) crop**

Mulching and/or topsoil incorporation of plant residues from green manure legumes can increase cropping system sustainability, and can supply and retain nutrients. Two field experiments were conducted in Italy over the period of 2006–2007, to investigate the effect of faba bean grown in a temperate environment to fruit morphology, quality and chemical composition of the subsequent melon (*Cucumis melo* Linn.) crop. Flowering faba bean plants were managed as mulch on the melon plant rows and cut and incorporated into the soil, in comparison with cultivated soil (control) and black plastic mulch.

The plastic mulch increased the soil temperature by about 2°C compared to cultivated soil. Interestingly, melon plants mulched with faba bean plants and plastic produced higher fruit weight and

pulp percentage, but the soil management practices also affected fruit chemical composition. Plastic mulch and faba bean plants induced an increase of total soluble solids and a decrease of acidity. Plastic mulch alone induced the lowest glucose content (0.13g/100g); treatments with faba bean plants favored the highest fructose accumulation in melon fruits (0.23g/100g). No clear differences emerged among the treatments with regard to sucrose accumulation in ‘Baggio’, but the faba bean plants managed as mulch induced a high sucrose concentration in ‘Yago’ fruits.

Treatments with faba bean plants induced the highest K<sup>+</sup> accumulation (3324 and 3077mg/kg f.w.); in fact, K<sup>+</sup> scarcely accumulated in melon fruits harvested from plants mulched with plastic (2543mg/kg f.w.). Faba bean mulching also drastically increased the PO<sub>4</sub><sup>3-</sup> accumulation. However, unclear responses were obtained for SO<sub>4</sub><sup>2-</sup> increment for ‘Baggio’, while ‘Yago’ showed drastic SO<sub>4</sub><sup>2-</sup> accumulation by mulching with faba bean plants. The soil treatments did not affect the accumulation of Mg<sup>2+</sup> [Fabio Stagnari\* and Michele Pisante (Department of Food Science, University of Teramo, Via Carlo Lerici, 1, I-64023 Teramo, Abruzzo, Italy), *Scientia Horticulturae*, 2010, 126, (3), 317-323].

**NPARR 1(4), 2010-0600, Evaluation of fresh-cut apple slices enriched with probiotic bacteria**

The aim of this study was to apply a probiotic microorganism (*Lactobacillus rhamnosus* GG; LGG) to fresh-cut apple wedges (cultivar *Braeburn*) and measure entrapment and stability of the microorganism. Instrumental eating quality parameters (Colour Lab, texture, soluble solids, titratable acidity and pH) and sensory acceptability were also monitored to investigate if application of the probiotic significantly influenced eating quality. Apple samples were cut into skin-on wedges and were dipped in an edible buffer solution containing approximately 10<sup>10</sup>cfu/ml of LGG. LGG were enumerated on each test day (0, 2, 4, 6, 8 and 10) on whole wedges, on wedges flushed with a buffer solution (2% tri-sodium citrate), and on the flush-off liquid itself. All three samples sets contained ca. 10<sup>8</sup>cfu/g over the test period, which is sufficient for a probiotic effect, and is comparable to counts of probiotic bacteria in commercially available dairy products. This included the sample set of wedges which had been flushed with buffer solution

indicating good adherence of the bacteria over the test period. Physicochemical properties of the apple wedges containing LGG compared to the control remained stable over the 10 day period. Cryo scanning electron microscopy and confocal scanning laser microscopy demonstrated good adherence of LGG to the surface of apple wedges [Christian Rößle\*, Mark A.E. Auty, Nigel Brunton, Ronan T. Gormley and Francis Butler (Ashtown Food Research Centre, Teagasc, Ashtown, Dublin 15, Ireland), *Innovative Food Science & Emerging Technologies*, 2010, **11**(1), 203-209].

**NPARR 1(4), 2010-0601, Changes in bioactive compounds and antioxidant activities in pomegranate leaves**

Pomegranate leaves are an important source of potentially healthy bioactive compounds. Changes in total phenolics, flavonoids, alkaloids and antioxidant activities in pomegranate leaves were recorded from April 18th to September 16th, 2007. Total levels of phenolics and flavonoids decreased significantly in the early stages of leaf growth, and then increased gradually until the end of September. However, concentrations of total alkaloids increased during leaf growth and development. Antioxidant activities in pomegranate leaves were significantly correlated with the level of total phenolics and flavonoids. All bioactive compounds measured from pomegranate leaves increased during leaf growth and development. These trends suggest that the optimum picking time for tea is before May and bioactive compounds should be extracted from pomegranate leaves after August [Lihua Zhang, Yujiao Gao, Yuanhu Zhang\*, Jing Liu and Junwei Yu (State Key Laboratory of Crop Biology, Shandong Agricultural University, Taian 271018, China), *Scientia Horticulturae*, 2010, **123**(4), 543-546].

**NPARR 1(4), 2010-0602, Antioxidant and antimicrobial activity of pomegranate peel extract improves the shelf life of chicken products**

The antioxidant and antimicrobial potential of pomegranate peel and seed extract was investigated. Pomegranate peel extract (PE) showed excellent antioxidant activity while the seed extract (PS) did not have any significant activity. The IC<sub>50</sub> value of PE for 2, 2-diphenyl-1-picrylhydrazyl radical scavenging was 4.9µg/ml while that of Butylated hydroxy toluene

was 21.2µg/ml, indicating that it was a stronger antioxidant. The efficacy of PE in scavenging hydroxyl and superoxide anion radical was also very high. It also had good reducing power and iron chelation capacity. PE showed good antimicrobial activity against *Staphylococcus aureus* and *Bacillus cereus* having minimum inhibitory concentration of 0.01%. *Pseudomonas* could be inhibited at a higher concentration of 0.1% while it was ineffective against *Escherichia coli* and *S. typhimurium*. Addition of PE to popular chicken meat products enhanced its shelf life by 2-3 weeks during chilled storage. PE was also effective in controlling oxidative rancidity in these chicken products [Sweetie R. Kanatt\*, Ramesh Chander and Arun Sharma (Food Technology Division, Bhabha Atomic Research Centre, Trombay, Mumbai 400 085, India), *International Journal of Food Science & Technology*, 2010, **45**(2), 216-222].

**NPARR 1(4), 2010-0603, Suitability of newly evolved antioxidant rich grape cultivars for processing into juice and beverages**

Four grape cultivars, *i.e.* Portan, Chasan-B, H-516 and Muscat Hamburg were processed into juice, nectar and ready-to-serve beverage. Among the four cultivars, H-516 was found to have the maximum total soluble solids (19.67B), maximum ascorbic acid (8.13 mg/100g), maximum specific gravity (1.0886), good juice yield (62.38%) and maximum anthocyanins (5.47 mg/100g). Organoleptically, juice from cultivar H-516 was found to have the maximum overall acceptability scores (8.92), followed by Chasan-B (8.25), Portan (8.13) and Muscat Hamburg (8.25) on a 9-point hedonic scale by a panel of eight semi-trained judges. Nectar and ready-to-serve beverage prepared from these grape cultivars also scored highest for H-516 cultivar. Even after twelve months storage juice from cultivar H-516 was scored highest in its overall acceptance (8.63), taste (8.50) and colour (8.88) by a panel of eight judges on a 9-point hedonic scale [Aggarwal Poonam\* and Gill M.I.S (Department of Food Science & Technology, Punjab Agricultural University, Ludhiana, 141 004), *Indian Journal of Horticulture*, 2010, **67**(1), 102-107].

**NPARR 1(4), 2010-0604, Effect of short-term air storage after removal from controlled-atmosphere storage on apple and fresh-cut apple quality**

One of the realities of apple distribution for long-term stored fruit is that a controlled-atmosphere (CA) storage room will be unsealed and fruit held in air storage and marketed over several weeks. This work was conducted to determine the effect of post-CA air storage of whole fruit on potential shelf life for fresh-cut apple slices. Fresh-cut slices of 'Spartan' and 'Delicious' apples held in post-CA air storage for 2 or 4 weeks showed the least changes in cut surface color as compared with those made from apples immediately on removal from CA. Shelf life was most improved by post-CA air storage in the 'Spartan' apples, which were more advanced in maturity as compared with the 'Delicious' apples. Internal ethylene concentration, firmness, and respiration changed significantly with post-CA air storage, suggesting a relationship between physiological status of the whole fruit and shelf life of slices made from that fruit. The results support the hypothesis that apples had suppressed physiological activity in CA storage and are susceptible to accelerated deterioration upon cutting. Holding fruit for 2 weeks in air storage allowed recovery of physiological activity, which resulted in greater resistance to deterioration in response to fresh-cut processing [Peter MA Toivonen\*, Paul A Wiersma, Cheryl Hampson, Brenda Lannard (Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Summerland, British Columbia, Canada V0H 1Z0), *Journal of the Science of Food and Agriculture*, 2010, **90**(4), 580-585].

**NPARR 1(4), 2010-0605, Effect of ethylene and 1-MCP treatments on strawberry fruit ripening**

Strawberry is a soft fruit, considered as non-climacteric, being auxins the main hormones that regulate the ripening process. The role of ethylene in strawberry ripening is currently unclear and several studies have considered a revision of the possible role of this hormone. Strawberry fruit were harvested at the white stage and treated with ethephon, an ethylene-releasing reagent, or 1-methylcyclopropene (1-MCP), a competitive inhibitor of ethylene action. The effects of the treatments on fruit quality parameters and on the activity of enzymes related to anthocyanin synthesis and cell wall degradation were evaluated. Some aspects of ripening were accelerated (anthocyanin accumulation, total sugar content and increment of phenylalanine ammonia-lyase (PAL; EC 4.3.1.24) and  $\beta$ -galactosidase (EC 3.2.1.23)

activities), while others were repressed (chlorophyll levels and increment of endo-1,4- $\beta$ -glucanase (EC 3.2.1.4) and  $\beta$ -xylosidase (EC 3.2.1.37) activities) or unchanged (reducing sugar content, pH, titratable acidity and  $\alpha$ -L-arabinofuranosidase (EC 3.2.1.55) activity) by ethylene. 1-MCP treatment caused the opposite effect. However, its effects were more pronounced, particularly in anthocyanin accumulation, phenolics, PAL and polygalacturonase (EC 3.2.1.15 and EC 3.2.1.67) activities. These observations probably indicate that strawberry produces low levels of ethylene that are sufficient to regulate some ripening aspects [Natalia M Villarreal, Claudia A Bustamante, Pedro M Civello, Gustavo A Martínez\* (Facultad de Ciencias Exactas, Universidad Nacional de La Plata (UNLP), 1900 La Plata, Argentina), *Journal of the Science of Food and Agriculture*, 2010, **90**(4), 683-689].

**NPARR 1(4), 2010-0606, Influence of harvest maturity on quality and shelf-life of litchi fruit (*Litchi chinensis* Sonn.)**

The impact of picking maturity on eating quality and shelf-life of cold-stored litchi fruit was evaluated for the Thai cultivars 'Hong Huey' and 'Chacapat'. Pericarp colour at harvest was specified by a litchi maturity index (*LMI*) and subsequent pericarp browning by a postharvest litchi colour index (*PLCI*), both being application-oriented indices deduced from the CIELab colour space. Fruit lots harvested within 15-20 days were distinguished as to their physiological maturity at harvest by means of principal component analysis (PCA). Irrespective of cultivars, titratable acids (*TA*), *LMI*, and fruit size contributed most to the specification of harvest maturity among seven ripeness attributes. Fruit quality was evaluated throughout cold storage (5°C, 21 or 30 days) based on 13 attributes representing aril, pericarp and fruit properties, including the contents of acids and ethanol, activities of browning enzymes, and respiration rates. Rapid loss of pericarp moisture and high enzyme activities, mainly of peroxidase, accompanied visually perceivable pericarp browning within 3-5 days irrespective of harvest maturity. Subsequently, shelf-life was chiefly limited by increasing ethanol contents. According to the overall quality differences detected by PCA, there was an impact of harvest time on fruit quality throughout. As revealed by partial least squares regression (PLS) for both key factors, quality of 'Hong Huey' and

'Chacapat' fruit was determined by picking maturity at 42% and 27% and storage time at 17% and 25%. Most important, pink to red-shelled 'Hong Huey' and pink-shelled 'Chacapat' fruit, as specified by *TA*, *LMI* and size ranges at harvest, provided optimum eating quality and were superior to green-red-shelled breaker fruit in long supply chains [Mareike Reichel, Reinhold Carle, Pittaya Sruamsiri and Sybille Neidhart\* (Institute of Food Science and Biotechnology, Chair of Plant Foodstuff Technology, Hohenheim University, Garbenstrasse 25, 70599 Stuttgart, Germany), *Postharvest Biology and Technology*, 2010, **57**(3), 162-175].

**NPARR 1(4), 2010-0607, Optimization of postharvest ultrasonic treatment of strawberry fruit**

Freshly harvested strawberry fruit were treated at ultrasonic powers from 250 to 450W at a constant frequency of 40kHz for different times (5-15min). Response surface methodology (RSM) based on a two factors three level central composite design was applied to optimize ultrasonic treatments on decay incidence, microbial population and quality maintenance of strawberries. According to response surface analysis, the optimal treatment parameters were an ultrasonic power of 250W and treatment time of 9.8min. Decay incidence and quality parameters of strawberries treated at the determined optimum conditions were compared with a water treatment during storage for 8d at 5°C. An ultrasonic treatment was found to be effective in inhibiting decay incidence and preserving quality in strawberries, and these results suggest that such a treatment may provide an alternative for extending shelf-life and maintaining quality of strawberry fruit [Shifeng Cao, Zhichao Hu\* and Bin Pang (Nanjing Research Institute for Agricultural Mechanization, Ministry of Agriculture, Liuying 100, Nanjing 210014, PR China), *Postharvest Biology and Technology*, 2010, **55**(3), 150-153].

**NPARR 1(4), 2010-0608, Physiology and quality response of harvested banana fruit to cold shock**

Experiments were conducted to examine softening and quality responses of harvested banana fruit to cold shock treatment intended to extend shelf-life. Fruit were immersed in ice-water for 1h, then treated with or without 100µl/l ethylene for 24h at

24°C, and finally stored at 20°C. Fruit firmness, chlorophyll content, ethylene production, respiration rates, contents of pectin, starch and sugar, and the activities of the cell wall modifying enzymes polygalacturonase (PG), pectin methylesterase (PME) and CMCase (cellulase, endo-1,4-β-glucanase) were analyzed. Total amylase activity was also measured. Immersion in ice-water for 1h effectively inhibited ripening-associated processes, including peel de-greening and pulp softening during storage or ripening. The delay in ripening was also manifest in reduced ethylene production and respiration rates. The inhibition of softening by cold shock treatment was related to decreased PG and PME activities, that is, retardation of pectin solubilization/degradation. Reduced activities of CMCase and total amylase and conversion of starch to sugar by ice-water immersion also contributed to the delay in softening of harvested banana fruit [Haiyan Zhang, Shaoyu Yang, Daryl C. Joyce, Yueming Jiang, Hongxia Qu and Xuewu Duan\*(South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, PR China), *Postharvest Biology and Technology*, 2010, **55**(3), 154-159].

**NPARR 1(4), 2010-0609, Biocide application for increasing storage periods and maintaining quality and chemical constituents of banana fruits**

Banana fruits were treated with biocides formulated from essential oils of anise, coriander or black cumin seeds. Treated and non-treated fruits were stored at temperatures of 5, 10, 15 and 20°C. Samples were stored for periods of 10, 20, 30, 40, 50 and 60 days. The collected samples in each interval were subjected to estimation of decay development and quality degree, in addition to the chemical constituents of starch, sugars, vitamin C of pulp and peel chlorophyll content. Results reveal that non-treated banana fruits decayed continuously by lapse of storage periods. However, this decay was significantly delayed by lowering the storage temperature. Soaking banana fruits in the tested biocides showed a positive potential for interrupting the decay in stored banana fruits and this promising impact was much more pronounced at lower storage temperature. Further, biocide treated banana fruits kept their good quality for longer storage periods compared to non-treated fruits, due to lower ripening rates which promisingly prolonged shelf-life. As the starch content gradually decreased during storage, the

total sugar content increased. On the other hand, biocide application retarded the conversion of starch into simple sugars, especially at the low temperature rate. Additionally, the imposed treatments maintained vitamin C in banana pulp and lowered the decline in peel chlorophyll content [Gihan A. Mahmoud\*, Kareem M. K. El-Tobgy; M. A. Abo-El-Seoud (Horticulture Research Institute, Agricultural Research Center, Giza, Egypt), *Archives Of Phytopathology And Plant Protection*, 2010, **43**(9), 910-921].

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

### **NPARR 1(4), 2010-0610, Bioethanol production from biomass of *Saccharum spontaneum* Linn.**

Sustainable development is the underpinning principle in the panacea for almost every environmental concern. Generation of energy from the biomass can solve the purpose of environmentalists. Bioethanol and biodiesel that comprises biofuel is one such form of green energy. The major drivers for bioethanol production in India are energy security, slower potential for global warming and converting waste to energy. For Bioethanol lignocellulosic biomass is the most abundant renewable resource that can serve as substrate for its production. Bioethanol may be produced by three different modes – synthetically, direct fermentation of sugars (I<sup>st</sup> generation fuels) and from other carbohydrates that can be converted to fermentable sugars (II<sup>nd</sup> generation fuels). Synthetically, ethanol can be produced by hydration of ethylene either directly in one step or indirectly in three steps. Fermentation of sugars to ethanol is a very old and well – known process, which has great industrial importance. This process is still the subject of much research and development in research institutes with the aim of getting higher product and lower by – product yields. The present work deals with the fermentation of lignocellulosic biomass (*Saccharum spontaneum*) to ethanol by *Pichia stipitis*. This process comprises of four steps viz. pretreatment of substrate, hydrolysis, detoxification and eventually fermentation to produce Bioethanol. Hydrolysates are produced by either chemical or enzymatic methods with recovery rate of 60% in chemical method and 88% in enzymatic method. Chemical hydrolysis in

turn can avail various physical, chemical and biological pretreatment methods for easy hydrolysis. Hydrolysates are nasty solutions that microorganisms are not necessarily pleased to stay with; hence required detoxification by employing various procedures like direct neutralization, activated charcoal, overliming or enzymatic detoxification. This detoxified hydrolysate of *Saccharum spontaneum* is then subjected to fermentation by *Pichia stipitis* for the production of ethanol [Gupta Priti (Division of Genetics, IARI, New Delhi), *Journal of Biofuels*, 2010, **1**(1), 10].

### **NPARR 1(4), 2010-0611, Use of algae as biofuel sources**

The aim of this study is to investigate the algae production technologies such as open, closed and hybrid systems, production costs, and algal energy conversions. Liquid biofuels are alternative fuels promoted with potential to reduce dependence on fossil fuel imports. Biofuels production costs can vary widely by feedstock, conversion process, scale of production and region. Algae will become the most important biofuel source in the near future. Microalgae appear to be the only source of renewable biodiesel that is capable of meeting the global demand for transport fuels. Microalgae can be converted to bio-oil, bioethanol, bio-hydrogen and biomethane via thermochemical and biochemical methods. Microalgae are theoretically very promising source of biodiesel [Ayhan Demirbas\*(Sirnak University, Engineering Faculty, Sirnak, Turkey), *Energy Conversion and Management*, 2010, **51**(12), 2738-2749].

### **NPARR 1(4), 2010-0612, Characterization of *Manihot* residues and preparation of activated carbon**

Rind, vascular system and pith of raw *Manihot* stems were studied in this work. The characterization included proximate and ultimate analysis and the determination of cellulose, hemicellulose, lignin, functional groups, acidic–basic groups, the point of zero charge, the specific surface area and the thermal behavior of each stem part. Carbonization was performed at 500 C and 800 C. The results indicated that the raw residues exhibit mainly acidic character in the order: rind>vascular system ≈pith with 1.80, 1.35 and 1.35mol/kg acidic groups, respectively. The

carbon obtained at 500°C of the different parts of the stem was mesoporous and the carbons obtained at 800°C from the vascular system exhibited 61% microporosity. The raw residues presented smaller specific surface area than the carbonized samples. They removed however, 95% of the acid dye methyl orange and 50% of the basic dye methylene blue [C.M. Antonio-Cisneros and M.P. Elizalde-González\* (Centro de Química, Instituto de Ciencias, Universidad Autónoma de Puebla, Apdo. Postal J-55, Puebla, Pue 72571, Mexico), *Biomass and Bioenergy*, 2010, **34**(3), 389-395].

**NPARR 1(4), 2010-0613, Life cycle assessment of village electrification based on straight jatropha oil in Chhattisgarh, India**

A decentralized power generation plant fuelled by straight jatropha oil was implemented in 2006 in Ranidhera, Chhattisgarh, India. The goal of this study was to assess the environmental sustainability of that electrification project in order to provide a scientific basis for policy decisions on electrifying remote villages. A full Life Cycle Assessment (LCA) was conducted on jatropha-based rural electrification and then compared with other electrification approaches such as photovoltaic (PV), grid connection and a diesel-fuelled power generator. In summary, the jatropha-based electrification in Ranidhera reduces greenhouse gas emissions over the full life cycle by a factor of 7 compared to a diesel generator or grid connection. The environmental performance is only slightly improved, mainly due to the high air pollution from pre-heating the jatropha seeds. With additional measures oil extraction and overall efficiency could be further improved. However, environmental benefits can only be achieved if jatropha is cultivated on marginal land and land use competition can be excluded. Under these conditions, jatropha-based electricity generation might be a useful alternative to other renewable electrification options, as the technology is very sturdy and can be maintained even in remote and highly under-developed regions [Simon Michael Gmünder\*, Rainer Zah, Somnath Bhattacharjee, Mischa Classen, Prodyut Mukherjee and Rolf Widmer (Technology and Society Lab, Swiss Federal Laboratories for Materials Testing and Research (EMPA), Überlandstr. 129, 8600 Dübendorf, Switzerland), *Biomass and Bioenergy*, 2010, **34**(3), 347-355].

**NPARR 1(4), 2010-0614, Biodiesel production from waste chicken fat based sources and evaluation with Mg based additive in a diesel engine**

In this study, chicken fat biodiesel with synthetic Mg additive was studied in a single-cylinder, direct injection (DI) diesel engine and its effects on engine performance and exhaust emissions were studied. A two-step catalytic process was chosen for the synthesis of the biodiesel. Methanol, sulphuric acid and sodium hydroxide catalyst were used in the reaction. To determine their effects on viscosity and flash point of the biodiesel, reaction temperature, methanol ratio, type and amount of catalyst were varied as independent parameters. Organic based synthetic magnesium additive was doped into the biodiesel blend by 12µmol Mg. Engine tests were run with diesel fuel (EN 590) and a blend of 10% chicken fat biodiesel and diesel fuel (B10) at full load operating conditions and different engine speeds from 1800 to 3000rpm. The results showed that, the engine torque was not changed significantly with the addition of 10% chicken fat biodiesel, while the specific fuel consumption increased by 5.2% due to the lower heating value of biodiesel. In-cylinder peak pressure slightly rose and the start of combustion was earlier. CO and smoke emissions decreased by 13% and 9% respectively, but NO<sub>x</sub> emission increased by 5% [Metin Gürü\*, Atilla Koca, Özer Can, Can Çınar and Fatih Şahin (Gazi University, Engineering and Arch. Faculty Chemical Eng. Dept., 06570 Ankara, Turkey), *Renewable Energy*, 2010, **35**(3), 637-643].

**NPARR 1(4), 2010-0615, Performance and emission analysis of cottonseed oil methyl ester in a diesel engine**

In this study, performance and emissions of cottonseed oil methyl ester in a diesel engine was experimentally investigated. For the study, cottonseed oil methyl ester (CSOME) was added to diesel fuel, numbered D2, by volume of 5% (B5), 20%(B20), 50%(B50) and 75%(B75) as well as pure CSOME (B100). Fuels were tested in a single cylinder, direct injection, air cooled diesel engine. The effects of CSOME-diesel blends on engine performance and exhaust emissions were examined at various engine speeds and full loaded engine. The effect of B5, B20, B50, B75, B100 and D2 on the engine power, engine torque, BSFC'S and exhaust gasses temperature were clarified by the performance tests. The influences of blends on CO, NO<sub>x</sub>, SO<sub>2</sub> and smoke opacity were

investigated by emission tests. The experimental results showed that the use of the lower blends (B5) slightly increases the engine torque at medium and higher speeds in compression ignition engines. However, there were no significant differences in performance values of B5, B20 and diesel fuel. Also with the increase of the biodiesel in blends, the exhaust emissions were reduced. The experimental results showed that the lower contents of CSOME in the blends can partially be substituted for the diesel fuel without any modifications in diesel engines [Hüseyin Aydın\* and Hasan Bayindir (Department of Automotive, Faculty of Technical Education, Batman University, Batman 72060, Turkey), *Renewable Energy*, 2010, **35**(3), 588-592].

**NPARR 1(4), 2010-0616, Comparison of performance and emissions of diesel fuel, rapeseed and soybean oil methyl esters injected at different pressures**

Fuel properties of rapeseed oil and soybean oil methyl esters (e.g. density, cetane number and viscosity etc.) are similar to those of the diesel fuel. These methyl esters can be used as diesel engine fuel by mixing with diesel fuel. In this study a comparison of diesel fuel, the rapeseed oil methyl ester and the soybean oil methyl ester was made from the engine performance and emissions point of view. The tests were carried out with a four-cylinder diesel engine for three different injection pressures such as 250, 300 and 350 bar with each of these fuels. For the purpose of comparison, tests were also conducted at full load conditions with diesel fuel. As the result, the performance and emission values of rapeseed oil (R) and soybean oil (S) methyl esters were found to be nearly the same with those of diesel fuels (D) when injection pressure was increased to 300 bar İsmet Çelikten\*, Atilla Koca and Mehmet Ali Arslan (Department of Mechanical Education, Faculty of Technical Education, Gazi University, 06500, Teknikokullar, Ankara, Turkey), *Renewable Energy*, 2010, **35**(4), 814-820].

**NPARR 1(4), 2010-0617, Biodiesel production from waste chicken fat based sources and evaluation with Mg based additive in a diesel engine**

In this study, chicken fat biodiesel with synthetic Mg additive was studied in a single-cylinder, direct injection (DI) diesel engine and its effects on engine

performance and exhaust emissions were studied. A two-step catalytic process was chosen for the synthesis of the biodiesel. Methanol, sulphuric acid and sodium hydroxide catalyst were used in the reaction. To determine their effects on viscosity and flash point of the biodiesel, reaction temperature, methanol ratio, type and amount of catalyst were varied as independent parameters. Organic based synthetic magnesium additive was doped into the biodiesel blend by 12 µmol Mg. Engine tests were run with diesel fuel (EN 590) and a blend of 10% chicken fat biodiesel and diesel fuel (B10) at full load operating conditions and different engine speeds from 1800 to 3000 rpm. The results showed that, the engine torque was not changed significantly with the addition of 10% chicken fat biodiesel, while the specific fuel consumption increased by 5.2% due to the lower heating value of biodiesel. In-cylinder peak pressure slightly rose and the start of combustion was earlier. CO and smoke emissions decreased by 13 and 9%, respectively, but NO<sub>x</sub> emission increased by 5% [Metin Gürü\* Atilla Koca, Özer Can, Can Çınar and Fatih Şahin (Gazi University, Engineering and Arch. Faculty Chemical Eng. Dept., 06570 Ankara, Turkey), *Renewable Energy*, 2010, **35**(3), 637-643].

**NPARR 1(4), 2010-0618, Comparative study of bio-ethanol production from mahula (*Madhuca latifolia* Linn.) flowers by *Saccharomyces cerevisiae* cells immobilized in agar agar and Ca-alginate matrices**

Batch fermentation of mahula (*Madhuca latifolia* Linn., a tree commonly found in tropical rain forest) flowers was carried out using immobilized cells (in agar agar and calcium alginate) and free cells of *Saccharomyces cerevisiae*. The ethanol yields were 151.2, 154.5 and 149.1 g/kg flowers using immobilized (in agar agar and calcium alginate) and free cells, respectively. Cell entrapment in calcium alginate was found to be marginally superior to those in agar agar (2.2% more) as well as over free cell (3.5% more) as regard to ethanol yield from mahula flowers is concerned. Further, the immobilized cells were physiologically active at least for three cycles [150.6, 148.5 and 146.5 g kg<sup>-1</sup> (agar agar) and 152.8, 151.5 and 149.5 g/kg flowers (calcium alginate) for first, second and third cycle, respectively] of ethanol fermentation without apparently lowering the productivity. Mahula flowers, a renewable, non-food-grade cheap carbohydrate substrate from non-

agricultural environment such as forest can serve as an alternative to food grade sugar/starchy crops such as maize, sugarcane for bio-ethanol production [Shuvashish Behera, Shaktimay Kar, Rama Chandra Mohanty and Ramesh Chandra Ray\* (Microbiology Laboratory, Central Tuber Crops Research Institute (Regional Centre), Bhubaneswar 751019, Orissa, India), *Applied Energy*, 2010, **87**(1), 96-100].

**NPARR 1(4), 2010-0619, Performance and emission characteristics of a Kirloskar HA394 diesel engine operated on fish oil methyl esters**

The high viscosity of fish oil leads to problem in pumping and spray characteristics. The inefficient mixing of fish oil with air leads to incomplete combustion. The best way to use fish oil as fuel in compression ignition (CI) engines is to convert it into biodiesel. It can be used in CI engines with very little or no engine modifications. This is because it has properties similar to mineral diesel. Combustion tests for methyl ester of fish oil and its blends with diesel fuel were performed in a kirloskar H394 DI diesel engine, to evaluate fish biodiesel as an alternative fuel for diesel engine, at constant speed of 1500rpm under variable load conditions. The tests showed no major deviations in diesel engine's combustion as well as no significant changes in the engine performance and reduction of main noxious emissions with the exception on NO<sub>x</sub>. Overall fish biodiesel showed good combustion properties and environmental benefits [Sharanappa Godiganur\*, Ch. Suryanarayana Murthy and Rana Prathap Reddy (Department of Mechanical Engineering, Reva Institute of Technology and Management, Yalahanka, Bangalore, Karnataka, India), *Renewable Energy*, **35**(2), 355-359].

**NPARR 1(4), 2010-0620, Biodiesel production from residual oils recovered from spent bleaching earth**

This work was to study technical and economic feasibilities of converting residual oils recovered from spent bleaching earth generated at soybean oil refineries into useable biodiesel. Experimental results showed that fatty acids in the SBE residual oil were hexadecenoic acid (58.19%), stearic acid (21.49%) and oleic acid (20.32%), which were similar to those of vegetable oils. The methyl ester conversion via a transesterification process gave a yield between 85

and 90%. The biodiesel qualities were in reasonable agreement with both EN 14214 and ASTM D6751 standards. A preliminary financial analysis showed that the production cost of biodiesel from SBE oils was significantly lower than the pre-tax price of fossil diesel or those made of vegetable oils or waste cooking oils. The effects of the crude oil price and the investment on the production cost and the investment return period were also conducted. The result showed that the investment would return faster at higher crude oil price [Yi-Pin Huang and James I. Chang\*(Department of Safety, Health and Environmental Engineering, National Kaohsiung First University), *Renewable Energy*, 2010, **35**(1), 269-274].

**NPARR 1(4), 2010-0621, Fatty acid methyl esters (FAMEs) from castor oil: Production process assessment and synergistic effects in its properties**

Fatty acid methyl esters (FAMEs) from castor oil have been synthesized by methanolysis catalyzed by sodium methoxide and the optimal transesterification conditions have been found. However, some properties of the castor FAME render it unsuitable in pure state for its direct use as fuel in internal combustion engines. Thus, blends with reference diesel have been prepared and their properties have been evaluated. Among these properties, the oxidative stability of the blends shows a negative anti-synergistic effect, that is, all the blends have an induction period lower than the pure reference diesel and the pure castor FAME. On the contrary, the lubricity shows a positive synergistic effect, the wear scar of the blends being always lower than those of the pure components. The cold-filter plugging point of the blends shows also a singular effect, since the filterability remains identical to that of the reference diesel until around 50vol% of castor FAME has been blended with it. The blends of castor FAME and reference diesel until approximately 40vol% of castor FAME meet most of the specifications of the EN 590 standard [Laureano Canoira\*, Juan García Galeán, Ramón Alcántara, Magín Lapuerta and Reyes García-Contreras (Department of Chemical Engineering and Fuels, ETS Ingenieros de Minas, Universidad Politécnica de Madrid, Ríos Rosas 21, 28003 Madrid, Spain), *Renewable Energy*, 2010, **35**(1), 208-217].

## **GUM/RUBBER (incl. Latex, Resin, Pectin, Mucilage, Cellulose, etc.)**

### **NPARR 1(4), 2010-0622, Preparation and physicochemical evaluation of chitosan/poly(vinyl alcohol)/pectin ternary film for food-packaging applications**

Chitosan/poly(vinyl alcohol)/pectin ternary film was prepared by solution casting method in this study. The prepared ternary film was characterized by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and X-ray diffraction (XRD). The characteristic change of shapes in the IR spectra are observed in a strong peak at  $1620\text{ cm}^{-1}$  for the interchain or intermolecular ionic salt bonds between amino groups of chitosan and carboxyl groups of pectin of the ternary film. The XRD result proves that the chitosan–poly(vinyl alcohol)–pectin ternary film is crystalline. The result of SEM indicates that the surface of chitosan–poly(vinyl alcohol)–pectin ternary film is rough, and heterogeneous. The thermogravimetric analysis (TGA) depicts the weight losses at  $200\text{--}300^\circ\text{C}$  resulting from ternary film for degradation of chitosan molecule. The microbiological screening has demonstrated the antimicrobial activity of the film against pathogenic bacteria viz., *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas*, and *Candida albicans* against the measurement of clear zone diameter included diameter of film strips, the values of which were always higher than the diameter of film strips. Overall, the ternary film happens to be a suitable material for food-packaging applications [S. Tripathi, G.K. Mehrotra and P.K. Dutta\*(Department of Chemistry, Motilal Nehru National Institute of Technology, Allahabad 211004, India), *Carbohydrate Polymers*, 2010, **79**(3), 711-716].

### **NPARR 1(4), 2010-0623, Comparative studies on the physico-chemical properties of hemicelluloses obtained by DEAE-cellulose-52 chromatography from sugarcane bagasse**

Water- and alkali-soluble hemicelluloses isolated from dewaxed sugarcane bagasse were sub-fractionated on DEAE-cellulose-52 chromatography and obtained six hemicellulosic sub-fractions by eluting with water, 0.1M and 0.3M NaCl aqueous solution, respectively. Sugar composition and

molecular weight analysis revealed that the lower molecular weight ( $14,180\text{--}43,590\text{ gmol}^{-1}$ ) and more branches of hemicelluloses could be extracted by the hot water, which are rich in glucose, galactose, and xylose, while the higher molecular weight ( $75,430\text{--}138,170\text{ gmol}^{-1}$ ) and more linear hemicelluloses were able to be dissolved into 1% NaOH aqueous solution, which are rich in xylose, principally resulting from l-arabino-(4-*O*-methyl-glucurono)-d-xylans. In addition, it was found that with increasing the concentration of NaCl (aqueous), the hemicellulosic sub-fractions with both higher arabinose to xylose ratio and higher molecular weight were eluted. Based on the FT-IR, sugar composition and  $^1\text{H}$  and  $^{13}\text{C}$  NMR comparative studies, the alkali-soluble hemicellulosic sub-fractions had a classical structure, with a backbone of  $\beta$ -(1 $\rightarrow$ 4)-linked xylosyl residue substituted with arabinose at C-2 and/or C-3 of main chain, whereas the difference may occur in the distribution of branches along the xylan backbone [Feng Peng, Jun-Li Ren, Feng Xu, Jing Bian, Pai Peng and Run-Cang Sun\*(State Key Laboratory of Pulp and Paper Engineering, South China University of Technology, Guangzhou 510640, China), *Food Research International*, 2010, **43**(3), 683-693].

### **NPARR 1(4), 2010-0624, Structure and physicochemical properties of palmyrah (*Borassus flabellifer* L.) seed-shoot starch grown in Sri Lanka**

Starch from palmyrah (*Borassus flabellifer* Linn.) seed-shoot flour was isolated and its composition, morphology, structure and physicochemical properties were determined. The yield of starch was 38.4% on a whole flour basis. The shape of the granule ranged from round to elliptical. Bound lipid, total lipid, apparent amylose, total amylose and resistant starch contents were 0.03%, 0.04%, 30.9%, 32.7% and 32.2%, respectively. The X-ray pattern was of the A-type and relative crystallinity was 34.1%. Palmyrah starch exhibited a high proportion (31.8%) of short amylopectin chains (DP 6-12) and a low proportion (1.2%) of long amylopectin chains (DP>36). Gelatinization temperatures were  $73.1\text{--}82.0^\circ\text{C}$  and enthalpy of gelatinization was 13.6J/g. Pasting temperature, viscosity breakdown and set-back were  $76.5^\circ\text{C}$ , 147 and 74BU, respectively. Palmyrah starch exhibited high granular swelling, and restricted amylose leaching. Susceptibility towards *in vitro*  $\alpha$ -amylolysis and retrogradation was low. The results showed that

physicochemical properties of palmyrah starch were largely influenced by strong interactions between amylose–amylose and/or amylose–amylopectin chains within the granule interior [S. Naguleswaran, T. Vasanthan\*, R. Hoover and Q. Liu (Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, Canada T6G 2P5), *Food Chemistry*, 2010, **118**(3), 634-640].

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

**NPARR 1(4), 2010-0625, Herbicidal activity of a medicinal plant, *Peganum harmala* Linn., and decomposition dynamics of its phytotoxins in the soil**

This study evaluates the herbicidal potential of *Peganum harmala* Linn. (Zygophyllaceae) residues on seedling growth of *Avena fatua* Linn. (Poaceae) and *Convolvulus arvensis* Linn. (Convolvulaceae), and decomposition dynamics of its phytotoxins in the soil. Results show that among the different *P. harmala* plant parts used, leaves were the most toxic and caused the greatest negative effect on seedling length, seedling dry weight, leaf area and chlorophyll content of *A. fatua* and *C. arvensis*. Both weed species differed in their sensitivity to *P. harmala* residues. Higher reduction in plant growth parameters occurred in *C. arvensis*. In the presence of charcoal and depending on source of residue, receiver plants or amount of residues, the inhibitory effects of *P. harmala* on both test plants were eliminated or significantly reduced. Total phenolic acid content was higher in soil amended with leaf residues than that of soils with stem or root residues. Our findings revealed that a higher inhibitory effect *P. harmala* residues on both target species was obtained when weed seeds were sown 1 or 3 days after residue decomposition in the soil started. Total phenolic contents were maximum in the soil 1 day after decomposition, whereas phenolic amounts rapidly decreased with increasing decomposition. In conclusion, *P. harmala* residues had potent herbicidal activity and could be used as a natural herbicide for weed control [Hamid Sodaeizadeh\*, Mohammad Rafieiohossaini and Patrick Van Damme (Laboratory of Tropical and Subtropical Agronomy and Ethnobotany, Coupure links 653, B-9000 Gent, Belgium), *Industrial Crops*

*and Products*, 2010, **31**(2), 385-394].

**NPARR 1(4), 2010-0626, *Xanthium strumarium* a possible biocontrol agent against *Helicoverpa armigera***

Water extract of 10%, 20% was not effective in causing death, even arresting growth of larvae where as 10% and 20% acetone extract, and 20% methanol extract of plant part were most effective in causing death of larvae suggesting antifeedant properties. Results show possible use of *X. strumarium* in the control of bollworm [Alkari Sonali\* and Chaturvedi Alka (Department of Botany, R.T.M. Nagpur University, Nagpur -440 033, Maharashtra, India), *Journal of Entomological Research*, 2010, **34**(2)].

**NPARR 1(4), 2010-0627, Effect of caffeine on larval mortality of *Aedes aegypti*: Efficiency related to solution concentration and age**

In two experiments, the duration of the effect of caffeine (CAF) solutions on larval mortality (LM) of *Aedes aegypti* was analyzed. In the first, LM was studied using solutions at 0.2, 0.5, 1.0 and 2.0 mg/mL aged from zero to five days in artificial breeding sites exposed to the laboratory environment (LE). In the second, the solutions aged at 1.0, 2.0 and 2.5 mg/ml closed flasks were stored in LE or in the refrigerator (R), and the effect on LM was tested in the experimental breeding sites at 30 days interval. In the first, the duration of the effect increased with the solution age in each CAF concentration. CAF at 1.0 and 2.0 mg/ml, without addition of food, produced 100% LM until 25 days after preparation; with food, at 11 and 18 days, respectively. In the second the effectiveness of CAF solutions lasted up to the seventh month, irrespective of whether they were stored in R or in LE. No adult emerged at any of the CAF concentrations used in second experiment [Guirado Marlucci Monteiro\* and de Campos Bicudo Hermione Elly Melara (São Paulo State University - UNESP, Instituto de Biociências, Letras e Ciências Exatas, Departamento de Biologia, Laboratório de Vetores, Brazil), *Journal of Entomological Research*, 2010, **34**(1)].

**NPARR 1(4), 2010-0628, Chemical composition and larvicidal activity of leaf essential oil from *Clausena dentata* (Willd) M. Roam. (Rutaceae)**

**against the chikungunya vector, *Aedes aegypti* Linn. (Diptera: Culicidae)**

Larvicidal activity of essential oil and isolated compounds from *Clausena dentata* leaves were tested against early fourth instar *Aedes aegypti* larvae. GC-MS analysis of essential oil revealed the presence of fourteen compounds of which the major compounds were sabinene (21.27%), biofloratriene (19.61%), borneol (18.34%) and  $\beta$ -bisabolol (17.68%). The essential oil of *C. dentata* exhibited significant larvicidal activity, with 24h LC<sub>50</sub> and LC<sub>90</sub> values of 140.2 and 341.6 mg/l, respectively. Larvicidal activities of the four major compounds of essential oil were also tested. The LC<sub>50</sub> values of sabinene, biofloratriene, borneol and  $\beta$ -bisabolol were 27.3, 47.4, 43.5 and 33.2mg/l, respectively. Results of this study show that the leaf essential oil of *C. dentata* and its four major compounds may be a potent source of natural larvicides [Sankaran Rajkumar\* and Arulsamy Jebanesan (Department of Zoology and Wildlife Biology, AVC College, Mannampandal – 609 305, Tamil Nadu, India), *Journal of Asia-Pacific Entomology* 2010, **13**(2), 107-109].

**NPARR 1(4), 2010-0629, Evaluation of *Lippia scaberrima* essential oil and some pure terpenoid constituents as postharvest mycobiocides for avocado fruit**

Mycobiocides are attracting research interest worldwide as possible postharvest pathogen control measures to replace synthetic fungicides. In this study, the application of two essential oils as fungicides was evaluated. Initially, the *in vitro* antifungal effects of *Lippia scaberrima* essential oil and three of the major oil components, (*d*)-limonene, R-(–)-carvone, and 1,8-cineole, as well as that of S-(+)-carvone, were investigated against *Colletotrichum gloeosporioides*, *Lasiodiplodia theobromae*, and an *Alternaria* isolate. The oil and terpenoids caused significant inhibition of the mycelial growth of all the pathogens when applied at a concentration of 2000 $\mu$ l l<sup>-1</sup>. The most potent volatile component of *L. scaberrima* essential oil, able to inhibit all the pathogens tested, proved to be R-(–)-carvone. The efficacy of the essential oil (1000 and 2000 $\mu$ l l<sup>-1</sup>) incorporated into the commercial coating was confirmed on fruit inoculated with two of the pathogens. A simulated export trial was done using *Lippia* essential oil, in addition to *Mentha spicata* (spearmint) essential oil, as supplements for fruit

coatings. Results indicate that essential oils rich in R-(–)-carvone could be valuable alternatives to synthetic fungicides for the postharvest management of avocado fruit. The combination of essential oils with a commercial coating, acceptable to the organic market, offers additional protection to this vulnerable commodity [Thierry Regnier\*, Sandra Combrinck, Wilma du Plooy and Ben Botha (Department of Chemistry, Tshwane University of Technology, PO Box 56208, Arcadia, Pretoria 0001, South Africa), *Postharvest Biology and Technology*, 2010, **57**(3), 176-182].

**NPARR 1(4), 2010-0630, Effects of brassinosteroids on postharvest disease and senescence of jujube fruit in storage**

The effects of brassinosteroids (BRs) against blue mould rot caused by *Penicillium expansum* and on senescence of harvested jujube fruit were investigated. Brassinosteroids at a concentration of 5  $\mu$ M effectively inhibited development of blue mould rot and enhanced the activities of defense-related enzymes, such as phenylalanine ammonia-lyase, polyphenoloxidase, catalase and superoxide dismutase. However, BRs did not have direct antimicrobial activity against *P. expansum in vitro*. BRs significantly delayed fruit senescence by reducing ethylene production and maintained fruit quality. It is suggested that the effects of BRs on reducing decay caused by *P. expansum* may be associated with induction of disease resistance in fruit and delay of senescence [Zhu Zhu, Zhanquan Zhang, Guozheng Qin and Shiping Tian\* (Key Laboratory of Photosynthesis and Environmental Molecular Physiology, Institute of Botany, the Chinese Academy of Sciences, Xiangshan Nancincun 20, Haidian District, Beijing 100093, China), *Postharvest Biology and Technology*, 2010, **56**(1), 50-55].

**NPARR 1(4), 2010-0631, Control of citrus postharvest green and blue mold and sour rot by tea saponin combined with imazalil and prochloraz**

Tea saponin (TS), generally regarded as a safe compound, was evaluated to control postharvest decay of citrus fruit. TS inhibited mycelial growth and spore germination of *Penicillium italicum*, *P. digitatum* and *Geotrichum candidum*. The influence of TS on the growth of hyphae and germination of

spores of *P. italicum*, *P. digitatum* and *G. candidum* was determined individually and in combination with imazalil and prochloraz. The results indicated the best ratio of TS (8:2) with a low rate of prochloraz or imazalil to control *P. italicum*, *P. digitatum* and *G. candidum*. TS was compatible with these fungicides at this ratio and consistently improved their performance to control blue mold, green mold or sour rot on inoculated 'Shatang' mandarin fruit and the combination also could prolong the persistence of TS residues in the fruit. The level of disease control provided by the synergistic combinations tested was higher than that of the individual treatments of these fungicides. TS alone or in combination with a low rate of prochloraz or imazalil significantly reduced postharvest decay in 'Shatang' mandarin fruit without impairing any of the other fruit quality parameters [Weining Hao, Guohua Zhong, Meiyang Hu\*, Jianjun Luo, Qunfang Weng and Muhammad Rizwan-ul-Haq (Key Laboratory of Natural Pesticide and Chemical Biology (Ministry of Education), South China Agricultural University, Guangzhou, 510640, PR China), *Postharvest Biology and Technology*, 2010, **56**(1), 39-43].

**NPARR 1(4), 2010-0632, Evaluation of kukui oil (*Aleurites moluccana*) for controlling termites**

The application of many chemical-based pesticides to protect wood has been greatly restricted in the United States and elsewhere. A possible natural product that can be used for wood preservation is the oil from the nut of the kukui plant, *Aleurites moluccana* (Linn.) Willd., which has been reported, based on native folklore, to protect canoes against marine borer damage. The objective of this study was to determine whether the kukui oil would have termite control properties.

Oil obtained by mechanical pressing of the nut from the kukui plant was used to treat southern yellow pine (*Pinus* spp.) wood. Wood blocks were impregnated with various mixtures of the oil and acetone using a vacuum-pressure-infiltration chamber to attain a range of oil contents in the wood. Laboratory studies with the Formosan termite (*Coptotermes formosanus*) showed that the oil-treated wood was resistant to termite damage when the wood contained >27% kukui oil by weight. Results also indicated that the oil acted primarily as a feeding deterrent and not a toxic agent [F.S. Nakayama\* and W.L. Osbrink (U.S. Arid Land Agricultural Research

Center, USDA-ARS, 21881 N. Cardon Lane, Maricopa, AZ 85138, USA), *Industrial Crops and Products*, 2010, **31**(2), 312-315].

**NPARR 1(4), 2010-0633, Effect of feeding *Mucuna pruriens* on helminth parasite infestation in lambs**

*Mucuna pruriens* is a tropical legume anecdotally reputed to have anthelmintic properties. This study was conducted to examine the validity of such claims and also if ingestion of *Mucuna* seeds reduces helminth parasite infestation in lambs. Thirty-six Dorper×Katahdin ram lambs were assigned to three treatments, a cottonseed meal based control diet, a diet in which *Mucuna* replaced cottonseed meal and the control diet with levamisole (7.5mg/kg body weight) administration. All diets were isonitrogenous and isocaloric. The 12 lambs in each treatment were assigned randomly to 4 pens, each containing 3 lambs. Lambs were trickle infected three times per week by gavage with infectious *Haemonchus contortus* larvae (2000larvae/lamb) for 3 weeks.

Levamisole treatment decreased fecal egg counts by 87% and abomasal worm counts by 83%. *Mucuna* intake did not statistically affect fecal egg counts or abomasal worm counts, though numerical ( $P>0.10$ ) reductions of 7.4% and 18.1%, respectively were evident. Anemia indicators, feed intake, and lamb growth were unaffected by treatment. Levamisole reduced the *Haemonchus* parasite burden in lambs significantly but feeding *Mucuna* reduced the burden by levels unlikely to eliminate the clinical effects of parasitism. Feeding *Mucuna* seeds (MUC) to lambs infested with *Haemonchus* resulted in a slight non-statistical ( $P<0.05$ ) reduction in counts of fecal eggs and abomasal worms but administering levamisole (ANT) resulted in statistically significant ( $P<0.05$ ) reductions of these measures [C.M. Huisden, A.T. Adesogan\*, J.M. Gaskin, C.H. Courtney, A.M. Raji and T. Kang (Department of Animal Sciences, Institute of Food and Agricultural Science, University of Florida, United States), *Journal of Ethnopharmacology*, 2010, **127**(3), 669-673].

**NPARR 1(4), 2010-0634, Acaricidal activities of the essential oils from several medicinal plants against the carmine spider mite (*Tetranychus cinnabarinus* Boisd.) (Acarina: Tetranychidae)**

A screening for pesticidal activity of plant extracts with some known medicinal attributes could

lead to the discovery of new agents for pest control. In the backdrop of recent revival of interest in developing plant-based insecticides, the present study was carried out to find an alternative to synthetic miticides currently used in the control of the devastating greenhouse pest, carmine spider mite (*Tetranychus cinnabarinus* Boisd.) (Acarina: Tetranychidae). The acaricidal activities of essential oils obtained from medicinal plants such as oregano (*Origanum onites* L.), thyme (*Thymbra spicata* Linn. subsp. *spicata*), lavender (*Lavandula stoechas* Linn. subsp. *stoechas*) and mint (*Mentha spicata* Linn.) were evaluated against the adults of *T. cinnabarinus* under laboratory conditions. Chemical compositions of the essential oils were also determined by GC-MS analysis. Carvacrol was the principal compound present in the essential oils of thyme and oregano (70.93% and 68.23%, respectively), whereas  $\alpha$ -thujone (65.78%) and carvone (59.35%) were the major constituents in lavender and mint essential oils, respectively. Volatile phase effects of different concentrations of the essential oils used were determined. Laboratory bioassay results indicated that all essential oils caused complete mortality of spider mites at different concentrations that are not phytotoxic to the host plant. Although all essential oils show acaricidal activities in a dose-dependent manner, essential oils of thyme and oregano have a marked acaricidal activity against carmine mite adults (at 5.0 and 7.5  $\mu\text{g/ml}$  air concentrations, respectively). The mean lethal concentrations ( $\text{LC}_{50}$ ) of the essential oils of thyme, oregano, mint and lavender were 0.53, 0.69, 1.83 and 2.92  $\mu\text{g/ml}$  air, respectively. The results of the present study concluded that plant essential oils could be useful in promoting research aiming at the development of new agent for pest control from the plants with medicinal values [Erdal Sertkaya, Kamuran Kaya and Soner Soylu\* (Mustafa Kemal University, Department of Plant Protection, Agriculture Faculty, 31034 Antakya, Hatay, Turkey), *Industrial Crops and Products*, 2010, **31**(1), 107-112].

**NPARR 1(4), 2010-0635, Environmentally friendly pesticides: Essential oil-based w/o/w multiple emulsions for anti-fungal formulations**

The essential oils, Eucalyptus (E), Linalool (L) and Marjoram (M) to prepare several formulations of w/o/w double emulsion type were studied. Span 80 and Tween 80 were the lipophilic and hydrophilic

emulsifiers, respectively, with xanthan gum as thickener. Successful formulations showed stability at room temperature and 4°C for 30 days. These formulations showed also water-dilution tolerance, and retained more than 70% of electrolyte included in the internal aqueous phase. Pesticide activity of the used oils against four fungi has been remarkably increased, based on the value of  $\text{EC}_{50}$ , upon using in the form of w/o/w double emulsion. We have recorded up to 70% loss in required  $\text{EC}_{50}$  in most cases. The absence of organic solvents, unlike many common pesticide formulations, the aqueous pool embracing the environmentally safe oils and the property of controlled electrolyte release make such formulations attractive to be the subject of further more detailed studies [Gamal M.S. ElShafei\*, M.M. El-Said, Hanaa A.E. Attia and T.G.M. Mohammed (Chem. Dpt., Fac. of Sci., Ain Shams University, Abbassia, Cairo, Egypt), *Industrial Crops and Products*, 2010, **31**(1), 99-106].

**NPARR 1(4), 2010-0636, Biological efficiency of polyphenolic extracts from pecan nuts shell (*Carya Illinoensis*), pomegranate husk (*Punica granatum*) and creosote bush leaves (*Larrea tridentata* Cov.) against plant pathogenic fungi**

Bioactive compounds extracted from plants or agro-industrial residues have great potential as novel fungicide sources for controlling pathogenic fungi. In this study antifungal activity of polyphenolic extracts from *Larrea tridentata* leaves, *Carya illinoensis* shells and *Punica granatum* husk were evaluated *in vitro* against eight different plant pathogenic fungi and ten isolates of *Fusarium oxysporum*. Phenolic solutions of gallic and ellagic acids were also tested at different concentrations. The polyphenolic extracts tested have a high efficiency to inhibit the mycelial growth of *Pythium sp.*, *Colletotrichum truncatum*, *Colletotrichum coccodes*, *Alternaria alternata*, *Fusarium verticillioides*, *Fusarium solani*, *Fusarium sambucinum*, and *Rhizoctonia solani*. *L. tridentata* polyphenolic extracts also efficiently inhibited the mycelial growth of eight out of ten *F. oxysporum* isolates. These results showed that the polyphenolic extracts tested possess antifungal activities against a broad spectrum of plant pathogenic fungi and could be used as potential antifungal agents for the control of fungal plant diseases [Eduardo Osorio, Mariano Flores, Daniel Hernández, Janeth Ventura, Raúl Rodríguez and Cristóbal N. Aguilar\* (Department of

Food Research, School of Chemistry, Universidad Autónoma de Coahuila, 25000, Saltillo, Coahuila, Mexico), *Industrial Crops and Products*, 2010, **31**(1), 153-157].

**NPARR 1(4), 2010-0637, Use of essential oil of *Laurus nobilis* obtained by means of a supercritical carbon dioxide technique against post harvest spoilage fungi**

The aspects of the antifungal activity of essential oil of laurel (*Laurus nobilis*) obtained by means of a supercritical carbon dioxide (SFE-CO<sub>2</sub>) technique against post harvest spoilage fungi, have been studied in this research work by tests performed under *in vitro* and *in vivo* conditions. The measurement of antifungal activity of the oil, for its potential application as botanical fungicide, is very useful to find alternatives to synthetic fungicides. The present paper reports, for the first time, the results about the antifungal activity of laurel oil, obtained by a semi-industrial process that utilize a SFE-CO<sub>2</sub> technique, against three plant pathogenic fungi. The determination of the main active substances was carried out by gas chromatography analysis: laurel oil was characterized by high content ( $\geq 10\%$ ) of 1.8-cineole, linalool, terpineol acetate, methyl eugenol and a low content ( $< 10\%$ ) of linalyl acetate, eugenol, sabinene,  $\beta$ -pinene,  $\alpha$ -terpineol. The inhibition of the mycelial growth of *Botrytis cinerea*, *Monilinia laxa* and *Penicillium digitatum* was evaluated *in vitro* at the concentration range of 200, 400, 600, 800 and 1000  $\mu\text{g/ml}$ . *M. laxa* was totally inhibited by application of the oil at the lowest concentration, *B. cinerea* was completely inhibited at the highest concentration, and a fungistatic action was observed in both cases. *P. digitatum* was only partially inhibited at all the concentration ranges. The activity of the oil, placed in the form of spray on the fruit skin at the concentration range of 1, 2 and 3 mg/ml, was studied by biological tests. Both curative and protective activities of the oil have been evaluated on peaches, kiwifruits, oranges and lemons artificially inoculated with *M. laxa*, *B. cinerea* and *P. digitatum*, respectively. A very good antifungal activity has been found on kiwifruits and peaches when the oil was placed before the inoculation at a concentration of 3 mg/ml (68 and 91% of decay inhibition respectively). The same activity has been found on peaches when the oil was placed after the infection (76% of decay inhibition). The application of the oil

did not caused any phytotoxic effect and kept any fruit flavour, fragrance or taste. This study has demonstrated that the essential oil of *L. nobilis* extracted by a SFE-CO<sub>2</sub> technique, is one potential and promising antifungal agent which could be used as botanical fungicide in the postharvest protection of peaches and kiwifruits against *M. laxa* and *B. cinerea* [Ugo De Corato\*, Oliviero Maccioni, Mario Trupo and Giuseppe Di Sanzo (ENEA – Department of Biotechnologies, Agroindustry and Health Protection – Trisaia Research Centre, S.S. 106 Jonica, Km. 419,500, 75026 Rotondella, Matera, Italy), *Crop Protection*, 2010, **29**(2), 142-147].

**OILS/FATS (incl. Edible oils, Butteretc.)**

**NPARR 1(4), 2010-0638, Safflower oil- A boon to health**

Dietary fats requirement in relation to growing heart problems in present days has been reviewed. None of the vegetable oils has ideal Omega-6( $\alpha$ -linoleic)/Omega-3 (linolenic) ratio of 4:5. Although safflower oil has high level of Omega-6 (70 -75%) fatty acid, its autoxidation *in vitro* causes serious problems. This autoxidation of polyunsaturated fatty acid may be reduced by increasing the level of tocopherol (Vit-E), particularly the gammatocopherol. Recombination breeding in safflower involving lines, such as, CR-39 and CR41 (having high gammatocopherol content) and blending safflower oil with other oils (rice bran, corn oil, mustard oil, flaxseed oil, sesame oil, etc.) needs intensive researches [Kumar H.\* and Lal J.P. (Department of Genetics and Plant Breeding, Banaras Hindu University, Varanasi - 221 005, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(1)].

**NPARR 1(4), 2010-0639, Extraction of sesamin from sesame oil using macroporous resin**

Sesamin is drawing research attention, due to its effects on the various body regulators. Currently there are two methods employed to separate sesamin: solvent extraction and steam stripping, but both methods have disadvantages in large-scale manufacturing systems. An innovative method for sesamin extraction from sesame oil has been unveiled in this paper, which employs macroporous resin as an

adsorbing surface. The final product, sesamin crystal, has been obtained by crystallization of the desorption product. The concentration of sesamin in the desorption product was 9.7%, nearly 20-fold greater than in the starting sesame oil. After further refining, the concentration of sesamin in the final crystalline product reaches 76%. The procedure described in this paper demonstrates that a high concentration of sesamin can be obtained by employing resin adsorption [Jia-Chun Zhou\*, Da-Wei Feng and Guo-Sheng Zheng (Department of Food Science and Technology, College of Biotechnology, East China University of Science and Technology, Shanghai 200237, China), *Journal of Food Engineering*, 2010, **100**(2), 289-293].

**NPARR 1(4), 2010-0640, Vermicomposting of olive oil mill wastewaters**

The disposal of olive oil mill wastewaters (OMW) represents a substantial environmental problem in Italy. A vermicompost process could be an alternative and valid method for the management of OMW. In a laboratory experiment, the OMW were absorbed onto a ligno-cellulosic solid matrix and 30 adult earthworms of *Eisenia fetida* specie were added. The experiment was carried out for 13 weeks. The number of earthworms increased throughout the experimental period and after 2 weeks about 90% of the earthworms had become sexually mature. The decrease in total organic carbon (about 35%), C: N ratio (from 31.2 to 12.3) and biochemical parameters (hydrolytic enzymes averagely 40% and dehydrogenase 23%), and the increase in humification rate (pyrophosphate extractable carbon (PEC) from 17.6 to 33.3 mg/g<sup>1</sup>, and PEC : water-soluble carbon from 1.76 to 2.97) indicated the mineralization and the stabilization of organic matter at the end of the vermicomposting process. At the end of the experiment, the extracellular  $\beta$ -glucosidase, phosphatase, urease and protease activities, measured in the pyrophosphate extract of the vermicompost, were found to be always higher or equal to that measured at the beginning of the vermicomposting process, suggesting that the enzymes bound to humic matter resisted biological attack and environmental stress. Moreover, the results obtained from the phytotest showed that the OMW lose their toxicity and stimulate plant germination and growth [Cristina Macci\* (Institute of Ecosystem Studies (ISE), CNR, 56124, Pisa, Italy), *Waste Manag Res*, 2010, **28**, 738-

747].

## PHYTOCHEMICALS

**NPARR 1(4), 2010-0641, Chicoric acid levels in commercial basil (*Ocimum basilicum*) and *Echinacea purpurea* products**

Fresh basil (*Ocimum basilicum*) leaves contain chicoric acid, which is the principal phenolic compound in *Echinacea purpurea* and purportedly an active ingredient in dietary supplements derived from *E. purpurea*. Here the concentrations of chicoric acid in dried and fresh basil products available to consumers, and how these concentrations compare to those from *E. purpurea* are reported. A wide range of chicoric acid concentrations (6.48-242.50mg/100g or 100ml) were found in the dried basil flakes, fresh basil leaves, *E. purpurea* extracts, and *E. purpurea* capsules. Fresh basil leaves had higher concentrations of chicoric acid than dried basil flakes. Although *E. purpurea* extracts and capsules contained higher concentrations of chicoric acid than fresh basil leaves, basil could be an economical and more readily available source for chicoric acid for consumers. Additionally, cultivar selection, dehydration processing improvements, and proper storage methods may improve the final chicoric acid levels of future basil crops and products [Jungmin Lee\* and Carolyn F. Scagel (United States Department of Agriculture, Agricultural Research Service, PWA, Horticultural Crops Research Unit Worksite, 29603 U of I Ln., Parma, ID 83660, USA), *Journal of Functional Foods*, 2010, **2**(1), 77-84].

**NPARR 1(4), 2010-0642, Evaluation of steviol and its glycosides in *Stevia rebaudiana* leaves and commercial sweetener by ultra-high-performance liquid chromatography-mass spectrometry**

*Stevia rebaudiana* leaves contain non-cariogenic and non-caloric sweeteners (steviol-glycosides) whose consumption could exert beneficial effects on human health. Steviol-glycosides are considered safe; nonetheless, studies on animals highlighted adverse effects attributed to the aglycone steviol. The aim of the present study was to develop and validate two different ultra-high-performance liquid chromatography methods with electrospray ionization mass spectrometry (UHPLC-MS) to evaluate steviol-

glycosides or steviol in Stevia leaves and commercial sweetener (Truvia<sup>®</sup>). Steviol-glycosides identity was preliminarily established by UV spectra comparison, molecular ion and product ions evaluation, while routine analyses were carried out in single ion reaction (SIR) monitoring their negative chloride adducts. Samples were sequentially extracted by methanol, cleaned-up by SPE cartridge and the analytes separated by UHPLC HSS C<sub>18</sub> column (150mm×2.1mm I.D., 1.8µm). The use of CH<sub>2</sub>Cl<sub>2</sub> added to the mobile phase as source of Cl<sup>-</sup> enhance sensitivity. The LLOD for stevioside, rebaudioside A, steviolbioside and steviol was 15, 50, 10 and 1ngml<sup>-1</sup>, respectively. Assay validation demonstrated good performances in terms of accuracy (89-103%), precision (<4.3%), repeatability (<5.7%) and linearity (40-180mg/g). Stevioside (5.8±1.3%), rebaudioside A (1.8±1.2%) and rebaudioside C (1.3±1.4%) were the most abundant steviol-glycosides found in samples of Stevia (n=10) from southern Italy. Rebaudioside A was the main steviol-glycosides found in Truvia<sup>®</sup> (0.84±0.03%). The amounts of steviol-glycosides obtained by the UHPLC-MS method matched those given by the traditional LC-NH<sub>2</sub>-UV method. Steviol was found in all the leaves extract (2.7–13.2mg kg<sup>-1</sup>) but was not detected in Truvia<sup>®</sup> (<1µgkg<sup>-1</sup>). The proposed UHPLC-MS methods can be applied for the routine quality control of Stevia leaves and their commercial preparations [Claudio Gardana\*, Martina Scaglianti and Paolo Simonetti (Università degli Studi di Milano, DiSTAM - Dipartimento di Scienze e Tecnologie Alimentari e Microbiologiche - Sezione di Nutrizione Umana, Via Celoria 2, 20133 Milan (I), Italy), *Journal of Chromatography A*, 2010, **1217**(9), 1463-1470].

**NPARR 1(4), 2010-0643, *Dunaliella salina* Teod. as a prominent source of eicosapentaenoic acid**

High eicosapentaenoic acid (EPA) accumulation of the extensively studied alga *Dunaliella salina* Teod. has been reported in this study. A sample of the freshwater, high-salt tolerant (31%), and carotenizing green alga *D. salina* (*Chlorophyceae*) was collected from a salt pan of Bombay (India). It was analyzed for fatty acid content. The presence of 15 fatty acids was revealed, of which 7 were saturated (SFA), 6 were monounsaturated (MUFA), and 2 were polyunsaturated (PUFA) in *D. salina*. The major finding was the presence of a pharmaceutically and nutraceutically important PUFA: 21.4% of

eicosapentaenoic acid. The major fatty acids identified were palmitic (16:0), stearic (18:0), palmitoleic (16:1), oleic (18:1n9c), linoleic (18:2n6c), and eicosapentaenoic acid (20:5n3). The total polyunsaturated content obtained was 24%. Fatty acids were characterized by the relatively high abundance of polyunsaturated acids, while the C20 unsaturated acids were appreciably more abundant than the C18 unsaturated acids. This is the first report on the high-salt tolerance (31%) of the alga *D. salina*, accumulating 21.4% of EPA [Rahul A. Bhosale\*, M. P. Rajabhoj and B. B. Chaugule (Institute of Bioinformatics and Biotechnology, University of Pune-411 007, India), *International J on Algae*, 2010, **12**(2), 185-189].

**NPARR 1(4), 2010-0644, Antioxidant flavonoids from *Alhagi maurorum***

A new flavonoid, isorhamnetin-3-*O*-[ $\alpha$ -1-rhamnopyranosyl-(1→3)]- $\beta$ -d-glucopyranoside (**1**), along with two known flavonoids 3'-*O*-methylroborol (**2**) and quercetin 3-*O*- $\beta$ -d-glucopyranoside (**3**), was isolated from *Alhagi maurorum*. Their structures were established with the help of mass spectrometry, 1D and 2D NMR spectroscopy, and in comparison with the literature data. Compounds **1** and **2** exhibited moderate antioxidant activity in the 2,2-diphenyl-1-picrylhydrazyl free radical scavenging assay [Saeed Ahmad\*, Naheed Riaz; Muhammad Saleem, Abdul Jabbar, Nisar-Ur-Rehman, Mohammad Ashraf (Department of Pharmacy, Faculty of Pharmacy and Alternative Medicine, Railway Campus, The Islamia University of Bahawalpur, Bahawalpur, Pakistan), *Journal of Asian Natural Products Research*, 2010, **12**(2), 138- 143].

**NPARR 1(4), 2010-0645, New triterpenoids from *Arisaema jacquemontii***

Phytochemical investigation of the roots of *Arisaema jacquemontii* led to the isolation of two new triterpenoids, which were characterized by NMR, IR, and MS spectra as 30-nor-lanost-5-ene-3 $\beta$ -ol (**1**) and 30-norlanost-5-ene-3-one (**2**) [Salika Jeelani\*, M. Akbar Khuroo, T. K. Razadan (Department of Chemistry, University of Kashmir, Srinagar, Jammu & Kashmir, India), *Journal of Asian Natural Products Research*, 2010, **12**(2), 157-161].

**NPARR 1(4), 2010-0646, Two novel sulfur compounds from the seeds of *Raphanus sativus* Linn.**

The seeds of *Raphanus sativus* L., known as Lai-fu-zi in traditional Chinese Medicine, are always roasted before clinical use for avoiding nausea. During an investigation of the chemical difference between roasted and pre-roasted products, two novel sulfur-containing compounds, which mainly existed in the pre-roasted products, were isolated. Their structures and absolute configurations were established by spectroscopic and X-ray diffraction analysis [Xin Zhang\*; Hong-Bing Liu, Jing-Jing Jia and Wen-Hai Lv (School of Chinese Pharmacy, Shandong University of Traditional Chinese Medicine, Jinan, China), *Journal of Asian Natural Products Research*, 2010, **12**(2), 113-118]

**NPARR 1(4), 2010-0647, Anti-hyperglycemic effect of 11-hydroxypalmatine, a palmatine derivative from *Stephania glabra* tubers**

A palmatine derivative, named 11-hydroxypalmatine (**4**), has been isolated from the tubers of *Stephania glabra*, together with three known alkaloids, palmatine (**1**), dehydrocorydalmine (**2**), and stepharanine (**3**). The structures of the compounds were elucidated by means of spectroscopic analysis including 2D NMR experiments. The hypoglycemic activity of **4** was evaluated against alloxan-induced diabetic mice. The test compound was administered at doses of 25, 50, and 100mg/kg, p.o., 36h after alloxan injection (60mg/kg, i.v.). The alloxan-induced diabetic mice showed significant reduction in blood glucose after treatment with the test compound by 52% as compared to the positive control glibenclamide (54%) and the diabetic control (27%) [Deepak Kumar Semwal\*, Usha Rawat, Ravindra Semwal, Randhir Singh, Gur Jas Preet Singh (Department of Chemistry, University of Garhwal, Srinagar, Uttarakhand, India), *Journal of Asian Natural Products Research*, 2010, **12**(2), 99-105].

**NPARR 1(4), 2010-0648, Two new steroidal saponins from *Tribulus terrestris* Linn.**

Two new steroidal saponins were isolated from the fruits of *Tribulus terrestris* Linn. Their structures were elucidated by spectroscopic and chemical analysis as (23*S*, 24*R*, 25*R*)-5 $\alpha$ -spirostane-3 $\beta$ ,23,24-triol-3-*O*-{ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 2)-[ $\beta$ -d-

glucopyranosyl-(1 $\rightarrow$ 4)]- $\beta$ -d-galactopyranoside} (**1**) and (23*S*,24*R*,25*S*)-5 $\alpha$ -spirostane-3 $\beta$ ,23,24-triol-3-*O*-{ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 2)-[ $\beta$ -d-glucopyranosyl-(1 $\rightarrow$ 4)]- $\beta$ -d-galactopyranoside} (**2**) [Tao Liu\*, Xuan Lu, Biao Wu, Gang Chen, Hui-Ming Hua, Yue-Hu Pei (School of Traditional Chinese Materia Medica, Shenyang Pharmaceutical University, Shenyang, China), *Journal of Asian Natural Products Research*, 2010, **12**(1), 30-35].

**NPARR 1(4), 2010-0649, Four new trace phenolic glycosides from *Curculigo orchoides***

Four new trace phenolic glycosides named orcinosides D (**1**), E (**2**), F (**3**), and G (**4**) were isolated from the rhizomes of *Curculigo orchoides* Gaertn. Based on comprehensive spectroscopic analyses including IR, FAB-MS, HR-ESI-MS, 1D- and 2D NMR (HSQC, HMBC), their structures were elucidated as orcinol-1-*O*- $\beta$ -d-xylopyranoside (**1**), orcinol-1-*O*- $\beta$ -d-apiofuranosyl-(1 $\rightarrow$ 2)- $\beta$ -d-glucopyranoside (**2**), orcinol-3-*O*- $\beta$ -d-apiofuranosyl-1-*O*- $\beta$ -d-glucopyranoside (**3**), and 1-*O*- $\beta$ -d-glucopyranosyl-4-ethoxyl-3-hydroxymethylphenol (**4**) [Ai-Xue Zuo\*, Yong Shen, Xue-Mei Zhang, Zhi-Yong Jiang; Jun Zhou, Jun Lü, and Ji-Jun Chen (State Key Laboratory of Phytochemistry and Plant Resources in West China, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China), *Journal of Asian Natural Products Research*, 2010, **12**(1), 43- 50].

**NPARR 1(4), 2010-0650, Clerodane diterpenoids and prenylated flavonoids from *Dodonaea viscosa***

Repeated column chromatography of the EtOAc-soluble fraction of the aerial parts of *Dodonaea viscosa* led to the isolation of two new modified clerodanes, methyl dodovisate A (**1**) and methyl dodovisate B (**2**), two new prenylated flavonoids, 5,7,4'-trihydroxy-3',5'-di(3-methylbut-2-enyl)-3,6-dimethoxyflavone (**10**) and 5,7,4'-trihydroxy-3'-(4-hydroxy-3-methylbutyl)-5'-(3-methylbut-2-enyl)-3,6-dimethoxyflavone (**11**), together with eight known compounds, dodonic acid (**3**), hautriwaic acid (**4**), hautriwaic lactone (**5**), (+)-hardwickiic acid (**6**), 5 $\alpha$ -hydroxy-1,2-dehydro-5,10-dihydroprintzianic acid methyl ester (**7**), strictic acid (**8**), dodonolide (**9**), and aliarin (**12**). The structures of the new compounds were elucidated by spectroscopic data analysis. Compounds **1-9** and **11** were evaluated

on larvicidal activity against the fourth-instar larvae of *Aedes albopictus* and *Culex pipens quinquefasciatus* [Hong-Mei Niu\*; Dong-Qin Zeng; Chun-Lin Long, Ying-Hui Peng, Yue-Hu Wang; Ji-Feng Luo, Hong-Sheng Wang; Ya-Na Shi, Gui-Hua Tang and Fu-Wei Zhao (Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China), *Journal of Asian Natural Products Research*, 2010, **12**(1) 7 - 14].

**NPARR 1(4), 2010-0651, Flavonoid glycosides of the black locust tree, *Robinia pseudoacacia* (Leguminosae)**

Four flavone glycosides isolated from extracts of the leaves of *Robinia pseudoacacia* (Leguminosae) were characterised by spectroscopic and chemical methods as the 7-*O*- $\beta$ -d-glucuronopyranosyl-(1 $\rightarrow$ 2)[ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 6)]- $\beta$ -d-glucopyranosides of acacetin (5,7-dihydroxy-4'-methoxyflavone), apigenin (5,7,4'-trihydroxyflavone), diosmetin (5,7,3'-trihydroxy-4'-methoxyflavone) and luteolin (5,7,3',4'-tetrahydroxyflavone). Assignment of glycosidic  $^1\text{H}$  and  $^{13}\text{C}$  resonances in their NMR spectra was facilitated by  $^2J_{\text{HC}}$  correlations detected using the H2BC (heteronuclear two-bond correlation) pulse sequence. Spectroscopic analysis of two known triglycosides, acacetin 7-*O*- $\beta$ -d-glucopyranosyl-(1 $\rightarrow$ 2)[ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 6)]- $\beta$ -d-glucopyranoside (previously unrecorded from this species) and acacetin 7-*O*- $\beta$ -d-xylopyranosyl-(1 $\rightarrow$ 2)[ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 6)]- $\beta$ -d-glucopyranoside ('acacetin trioside'), enabled inconsistencies in the literature relating to these structures to be resolved. Comparison of the flavonoid chemistry of leaves and flowers of *R. pseudoacacia* using LC-UV and LC-MS showed that flavone 7-*O*-glycosides, particularly of acacetin, predominated in the former, whereas the latter comprised mainly flavonol 3,7-di-*O*-glycosides, including several examples new to this species. Tissue dependent differences in flavonoid chemistry were also evident from the glycosylation patterns of the compounds [Nigel C. Veitch\*, Peter C. Elliott, Geoffrey C. Kite and Gwilym P. Lewis (Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, UK), *Phytochemistry*, 2010, **71**(4), 479-486].

**NPARR 1(4), 2010-0652, Purification and characterization of a Bowman-Birk proteinase**

**inhibitor from the seeds of black gram (*Vigna mungo*)**

A proteinase inhibitor (BgPI) was purified from black gram, *Vigna mungo* (cv. TAU-1) seeds by using ammonium sulfate fractionation, followed by ion-exchange, affinity and gel-filtration chromatography. BgPI showed a single band in SDS-PAGE under non-reducing condition with an apparent molecular mass of  $\sim$ 8 kDa correlating to the peak 8041.5Da in matrix assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrum. BgPI existed in different isoforms with pI values ranging from 4.3 to 6.0. The internal sequence "SIPPQCHCADIR" of a peak 1453.7 *m/z*, obtained from MALDI-TOF-TOF showed 100% similarity with Bowman-Birk inhibitor (BBI) family. BgPI exhibited non-competitive-type inhibitory activity against both bovine pancreatic trypsin ( $K_i$  of 309.8 nM) and chymotrypsin ( $K_i$  of 10.7  $\mu\text{M}$ ), however, with a molar ratio of 1:2 with trypsin. BgPI was stable up to a temperature of 80 °C and active over a wide pH range between 2 and 12. The temperature-induced conformational changes in secondary structure are reversed when BgPI was cooled from 90 to 25 °C. Further, upon reduction with dithiothreitol, BgPI lost both its inhibitory activity as well as secondary structural conformation. Lysine residue(s) present in the reactive site of BgPI play an important role in inhibiting the bovine trypsin activity. The present study provides detailed biochemical characteristic features of a BBI type serine proteinase inhibitor isolated from *V. mungo* [E.R. Prasad, A. Dutta-Gupta and K. Padmasree\*(Department of Plant Sciences, School of Life Sciences, University of Hyderabad, Hyderabad 500 046, India), *Phytochemistry*, **71**(4), 363-372].

**NPARR 1(4), 2010-0653, Evaluating the potential of chestnut (*Castanea sativa* Mill.) fruit pericarp and integument as a source of tocopherols, pigments and polyphenols**

The chestnut fruit processing generates large amounts of residues as pericarp (outer shell; 8.9-13.5%) and integument (inner shell; 6.3-10.1%). These materials clearly have the potential as sources of valuable co-products. The analyses of the pericarp and integument of four Portuguese chestnut cultivars (Judia, Longal, Martafinha and Lada) revealed significant contents of total phenolics, low molecular weight phenolics (gallic and ellagic acid), condensed

tannins and ellagitannins including castalagin, vescalagin, acutissimin A and acutissimin B. The integument tissues had the highest levels of total phenolics and condensed tannins. The most efficient extraction solvent for the total phenolics, total condensed tannins and low molecular weight phenolics (in Longal) was 70:30 acetone: water at 20°C. The pericarp and integument tissues of the cultivar Longal were richest in gallic acid and castalagin. It is clear that these materials could be used for the extraction of valuable phenolics Maria do Carmo B.M. de Vasconcelos, Richard N. Bennett, Stéphane Quideau, Rémi Jacquet, Eduardo A.S. Rosa and Jorge V. Ferreira-Cardoso\* (CITAB/IB&Q, Centre for the Research and Technology of Agro-Environment and Biological Sciences, Integrative Biology & Quality Area, Universidade de Trás-os-Montes e Alto Douro, Apartado 1013, 5000-801 Vila Real, Portugal), *Industrial Crops and Products*, 2010, **31**(2), 301-311].

**NPARR 1(4), 2010-0654, Chemical composition and antimicrobial properties of essential oils of three Australian *Eucalyptus* species**

The chemical composition and antimicrobial properties of the essential oils of three common Australian *Eucalyptus* species, namely *E. olida*, *E. staigeriana* and *E. dives* were determined by gas chromatography/mass spectrometry and the agar disc diffusion method, respectively. A total of 24 compounds were identified from the essential oil of *E. dives*, with the dominant compounds being piperitone (40.5%),  $\alpha$ -phellandrene (17.4%), *p*-cymene (8.5%) and terpin-4-ol (4.7%). For *E. staigeriana*, 29 compounds were identified with 1, 8-cineole (34.8%), neral (10.8%), geranial (10.8%),  $\alpha$ -phellandrene (8.8%) and methyl geranate (5.2%) being the dominant ones. In contrast, a single compound, (*E*)-methyl cinnamate, accounted for 99.4% of the essential oils of *E. oilda*, although 20 compounds were identified. The essential oils displayed a variable degree of antimicrobial activity with *E. staigeriana* oil showing the highest activity. In general, Gram-positive bacteria were found to be more sensitive to the essential oils than Gram-negative bacteria. *Staphylococcus aureus* was the most sensitive strain while *Pseudomonas aeruginosa* was the most resistant [Martin Gilles, Jian Zhao\*, Min An and Samson Agboola (School of Wine and Food Sciences, Charles Sturt University, Locked Bag 588, Wagga

Wagga, NSW 2678, Australia), *Food Chemistry*, 2010, **119**(2), 731-737].

**NPARR 1(4), 2010-0655, The methoxyflavones in *Citrus reticulata* Blanco cv. ponkan and their antiproliferative activity against cancer cells**

The major polymethoxyflavones in the fruit (ponkan) peels of *Citrus reticulata* Blanco cv. ponkan were identified as isosinensetin, sinensetin, nobiletin and tetramethyl-*o*-scutellarein by a combined separation using high-speed countercurrent chromatography and preparative high performance liquid chromatography, and structure elucidation by electrospray ionisation mass spectrometry (ESI-MS) and <sup>1</sup>H and <sup>13</sup>C nuclear magnetic resonance (NMR). The antiproliferative activity of the four compounds against four cancer cell lines (A549, HL-60, MCF-7 and HO8910) showed that isosinensetin had a lower IC<sub>50</sub> value for MCF-7 and HO8910 cancer cell lines. Determination of polymethoxyflavones in ponkan peels from different cultivation regions displayed relatively steady contents of the four compounds and a higher content of isosinensetin, which suggested that ponkan peels are excellent sources of functional polymethoxyflavones that may help prevent female cancers, such as ovarian cancer and breast cancer [Qizhen Du\*and Hui Chen (Institute of Food and Biological Engineering, Zhejiang Gongshang University, 149 Jiaogong Road, Hangzhou, Zhejiang 310035, China), *Food Chemistry*, 2010, **119**(2), 567-572].

**NPARR 1(4), 2010-0656, New diarylheptanoids from the rhizome of *Alpinia officinarum* Hance**

Three diarylheptanoids, officinaruminane A (**1**), officinaruminane B (**2**), 5(*S*)-acetoxo-7-(4-dihydroxyphenyl)-1-phenyl-3-heptanone (**3**), together with six known ones, (5*R*)-5-hydroxy-1-(4-hydroxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-3-heptanone (**4**), (5*R*)-5-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-7-(4,5-dihydroxy-3-methoxyphenyl)-3-heptanone (**5**), 1-phenyl-7-(4-hydroxy-3-methoxyphenyl)-4*E*-en-3-heptanone (**6**), 1-(4-hydroxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-4*E*-en-3-heptanone (**7**), 1-phenyl-7-(4-hydroxyphenyl)-4*E*-en-3-heptanone (**8**), and 3,6-furan-7-(4''-hydroxy-3''-methoxyphenyl)-1-phenylheptane (**9**), were isolated from the rhizomes of *Alpinia officinarum* Hance by column chromatography on silica gel,

MPLC and preparative thin-layer chromatography (TLC). The structures of these compounds were elucidated on the basis of mass spectrometry,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, HMQC and HMBC data. Among them, **1** is a diarylheptanoid with a pyridine ring, and **2** is a diarylheptane monoterpene [Ning An, Hong-wu Zhang, Li-zhen Xu, Shi-lin Yang and Zhong-mei Zou\*(Institute of Medicinal Plant Development, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100193, PR China), *Food Chemistry*, 2010, **119**(2), 513-517].

## PULP/PAPER

*NPARR* 1(4), 2010-0657, **Production of lignocellulolytic enzymes and enhancement of *in vitro* digestibility during solid state fermentation of wheat straw by *Phlebia floridensis***

Degradation by white rot fungi has the potential to increase digestibility of wheat straw and thus improve its value as animal feed. To optimize conditions for production of lignocellulolytic enzymes by *Phlebia floridensis* during solid state fermentation of wheat straw along with enhancement of *in vitro* digestibility, a response surface methodology (RSM) based experiment was designed. Effect of moisture content, inorganic nitrogen source ( $\text{NH}_4\text{Cl}$ ) and malt extract on lignocellulolytic enzymes, changes in chemical constituents and digestibility of wheat straw was evaluated. With increase in moisture content, laccase production increased up to 34-fold, while Manganese peroxidase was optimally produced in the presence of almost equal amount (50-55mg/g of WS) of  $\text{NH}_4\text{Cl}$  and malt extract. These supplements also significantly ( $p < 0.05$ ) enhanced the production of CMCase and xylanase. *In vitro* digestibility was increased by almost 50% with a loss of 27.6% and 14.6% in lignin and total organic matter, respectively. The present findings revealed *P. floridensis* to be an efficient organism for lignocellulolytic enzymes production and simultaneous enhancement in *in vitro* digestibility of wheat straw [Rakesh Kumar Sharma and Daljit Singh Arora\*(Microbial Technology Laboratory, Department of Microbiology, Guru Nanak Dev University, Amritsar 143005, India), *Bioresource Technology*, 2010, **101**(23), 9248-9253].

*NPARR* 1(4), 2010-0658, **Can the laccase mediator system affect the chemical and refining properties of the eucalyptus pulp?**

Application of a laccase mediator system (an L stage) to TCF and ECF bleached pulp from *Eucalyptus globulus* with low residual lignin content ( $\text{KN}_{\text{lig}} \leq 1.0$ ) provides useful information about its effects on hexenuronic acids, functional groups (carboxyl and carbonyl) and electrokinetic properties such as  $\zeta$  potential and surface charge. The use of laccase from *Trametes villosa* in combination with the mediator 1-hydroxybenzotriazole (HBT) was found to oxidize cellulose to carbonyl groups and reduce the amount of carboxyl groups present in TCF pulp by effect of its partially removing hexenuronic acids from it. This result may open up new prospects for improving brightness stability in pulp. In addition, the laccase mediator system modifies the surface charge and  $\zeta$  potential in the fibre suspension for the removal of ionizable groups in TCF pulp. This result has no adverse effect on the pulp refining efficiency. L treatment requires less mechanical energy than conventionally refined pulp to obtain an optimal tensile and tear index in handsheets. This behavior may be attributable to the modification of the electrokinetic properties [Edith M. Cadena, Teresa Vidal and Antonio L. Torres\* (Textile and Paper Engineering Department, ETSEIAT, Universitat Politècnica de Catalunya, Colom 11, E-08222 Terrassa, Spain), *Bioresource Technology*, 2010, **101**(21), 8199-8204].

*NPARR* 1(4), 2010-0659 **Enzymatic grafting of simple phenols on flax and sisal pulp fibres using laccases**

Flax and sisal pulps were treated with two laccases (from *Pycnoporus cinnabarinus*, PcL and *Trametes villosa*, TvL, respectively), in the presence of different phenolic compounds (syringaldehyde, acetosyringone and *p*-coumaric acid in the case of flax pulp, and coniferaldehyde, sinapaldehyde, ferulic acid and sinapic acid in the case of sisal pulp). In most cases the enzymatic treatments resulted in increased kappa number of pulps suggesting the incorporation of the phenols into fibres. The covalent binding of these compounds to fibres was evidenced by the analysis of the treated pulps, after acetone extraction, by pyrolysis coupled with gas chromatography/mass spectrometry in the absence and/or in the presence of tetramethylammonium

hydroxide (TMAH) as methylating agent. The highest extents of phenol incorporation were observed with the *p*-hydroxycinnamic acids, *p*-coumaric and ferulic acids. The present work shows for the first time the use of analytical pyrolysis as an effective approach to study fibre functionalization by laccase-induced grafting of phenols [Elisabetta Aracri, Amanda Fillat, José F. Colom, Ana Gutiérrez, José C. del Río, Ángel T. Martínez and Teresa Vidal\* (Textile and Paper Engineering Department, ETSEIAT, Universitat Politècnica de Catalunya, Colom 11, E-08222 Terrassa, Spain), *Bioresource Technology*, 2010, **101**(21), 8211-8216].

## SPICES/CONDIMENTS

### **NPARR 1(4), 2010-0660, Effect of pretreatments and packaging on shelf-life of peeled garlic cloves**

A study on minimally processed garlic was carried out to study the effect of different packages on the keeping quality during refrigerated storage. Peeled garlic cloves pretreated with CaCl<sub>2</sub>, gingelly oil and untreated garlic samples packed in LDPE and HDPE with 0.3% ventilation and without ventilation were stored at 10°C and 60–70% RH. A respiration rate of untreated garlic cloves was higher than pretreated garlic cloves. Colour values L\* and a\* values showed a decreasing trend, while b\* showed an increasing trend. The firmness of garlic cloves decreased at a steady rate with the increase in duration of the refrigerated storage. The sprouting ratio and rooting score were higher in ventilated packages than unventilated packages. At the end of storage ascorbic acid content, pyruvic acid (pungency), oleoresin, protein decreased as storage days increased, total soluble solids also increases as storage days increases. The shelf life of peeled garlic cloves pretreated with gingelly oil was enhanced from 18 to 42 days in the HDPE package without ventilation [Dronachari M., Venkatachalapathy K., Rajashekarappa KS\* (Department of Agricultural Engineering, University of Agricultural Sciences, Bangalore-560 065, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(2)].

### **NPARR 1(4), 2010-0661, Nutritional evaluation of onion powder dried using different drying methods**

Onion powders were prepared using four different drying methods viz. shade, solar, oven and microwave. Sensory analysis indicated that all the onion powders were liked moderately by the panelists. The proximate composition varied from 0.64% to 6.81% and mineral content ranged from 0.70 to 340 mg/100g, respectively.  $\beta$ -carotene and ascorbic acid contents were higher in shade dried onion powder. Polyphenol content was almost similar in all the different dried onion powders. Therefore, onion powders could be developed in the off season at remunerative prices [Sangwan Anju, Kawatra A. and Sehgal Salil (Department of Food and Nutrition, CCS Haryana Agriculture University, Hisar-125004, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(2)].

### **NPARR 1(4), 2010-0662, Effect of pretreatments and packaging on shelf-life of peeled garlic cloves**

A study on minimally processed garlic was carried out to study the effect of different packages on the keeping quality during refrigerated storage. Peeled garlic cloves pretreated with CaCl<sub>2</sub>, gingelly oil and untreated garlic samples packed in LDPE and HDPE with 0.3% ventilation and without ventilation were stored at 10°C and 60-70% RH. A respiration rate of untreated garlic cloves was higher than pretreated garlic cloves. Colour values L\* and a\* values showed a decreasing trend, while b\* showed an increasing trend. The firmness of garlic cloves decreased at a steady rate with the increase in duration of the refrigerated storage. The sprouting ratio and rooting score were higher in ventilated packages than unventilated packages. At the end of storage ascorbic acid content, pyruvic acid (pungency), oleoresin, protein decreased as storage days increased, total soluble solids also increases as storage days increases. The shelf life of peeled garlic cloves pretreated with gingelly oil was enhanced from 18 to 42 days in the HDPE package without ventilation [Dronachari M., Venkatachalapathy K. and Rajashekarappa K.S\* (Department of Agricultural Engineering, University of Agricultural Sciences, Bangalore-560 065, India), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(2)].

### **NPARR 1(4), 2010-0663, Storage of red chili pepper under hermetically sealed or vacuum conditions for preservation of its quality and prevention of mycotoxin occurrence**

The effect of storage under hermetically sealed or vacuum storage methods, compared with the traditional method, on important quality indices for Turkish red chili peppers (RCPs) was evaluated at a semi-commercial scale in a warehouse. One tonne lots of flaked and mechanically dried RCP of maximum moisture content  $10\pm 1\%$  were stored for six months under a low absolute pressure of 80-100 mm Hg, under sealed, airtight conditions, or under traditional storage conditions (bags stacked in barns; as a control). Basic quality parameters related to microbiological counts, amount of aflatoxins ( $B_1$  and total), pungency properties, colour levels, organoleptic characters and moisture contents were determined before and after 6 months of storage. The experiments indicated that the best quality RCPs were obtained by vacuum storage with quite low losses in quality indicators (capsaicin, colour and aflatoxin). Hermetic storage conditions resulted in major losses of colour, while microbial growth and aflatoxin occurrence were inhibited, and the pungency of RCP was protected. The results supported the feasibility of commercial application of airtight and vacuum storage technologies for long-term storage of RCP. The sealed flexible vacuum-hermetic storage technology introduces substantial advantages over traditional storage methods in the preservation of quality characteristics such as colour, pungency, and aflatoxin of RCP for longer storage periods [Ahmet Dogan Duman\*(Faculty of Agriculture, Department of Food Engineering, Kahramanmaraş Sutcu Imam University, Avsar Campus, Kahramanmaraş 46100, Turkey), *Journal of Stored Products Research*, 2010, **46**(3), 155-160].

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

### **NPARR 1(4), 2010-0664, Characterization of cane sugar crystallization using image fractal analysis**

Automated image analysis has emerged as a useful tool for quality evaluation and inspection of food processes and products. Image analysis techniques are aimed to the extraction of features for quantifying texture, shapes and distributions of irregular geometries recasted on a microscopy image. The monitoring of crystal growth evolution in traditional industrial processes commonly relies on the visual expertise of long-term trained operators,

which limits seriously the automated operation of the process. The objective of this study was to investigate the potential usefulness of fractal metrics; namely Fourier analysis fractal dimension and lacunarity using images, as quantitative descriptors of crystallization evolution. To our knowledge this is the first reported use of lacunarity for the characterization of images of crystallization images from direct samples of crystallization slurries. Fractal dimension and lacunarity increase with the crystallization time. Increased fractal dimension was related to the formation of large clusters in the image, and was taken as an indicative of the amount of formed crystals. On the other hand, lacunarity is an index of non-uniformity of particles on the image, such that lacunarity can be considered as an indicator of the crystal shape and size diversity. In an overall sense, the results showed that fractal analysis can be incorporated as a complementary tool for monitoring the evolution of cane sugar crystallization process [Oscar Velazquez-Camilo, Eusebio Bolaños-Reynoso, Eduardo Rodriguez and Jose Alvarez-Ramirez\*(Division de Ciencias Basicas e Ingenieria, Universidad Autonoma Metropolitana-Iztapalapa, Apartado Postal 55-534, Mexico D.F. 09340, Mexico), *Journal of Food Engineering*, 2010, **100**(1), 77-84].

### **NPARR 1(4), 2010-0665, Thermal performance evaluation of a four pan jaggery processing furnace for improvement in energy utilization**

The jaggery making from sugarcane is one of the traditional process industries contributing to the local employment and entrepreneurship opportunities to the rural population. Jaggery is a condensed form of sugarcane juice produced by evaporation of moisture. Bagasse which is internally generated during juice extraction from sugarcane is used as the fuel for evaporation in a jaggery furnace. Any efficiency improvement in the thermal performance of a jaggery furnace leads to bagasse saving which provides additional revenue for the jaggery manufacturer.

A procedure for thermal evaluation using mass and energy balance for a jaggery furnace is proposed to establish furnace performance and loss stream analysis. The proposed method is used to investigate a four pan traditional jaggery furnace in India. The loss stream analysis indicates that the theoretical energy required for jaggery processing is only 29% of total

energy supplied by bagasse combustion. The major loss is associated with heat carried in flue gas and wall losses. The air available for combustion depends upon the draft created by chimney in natural draft furnaces. The oxygen content in the flue gas is a measure of degree of combustion. A controlled fuel feeding based on the oxygen percentage in the flue gases is proposed and demonstrated. The traditional practice of fuel feeding rate is changed to control feeding rate leading to reduction in specific fuel consumption from 2.39 kg bagasse/kg jaggery to 1.73 kg bagasse/kg jaggery. This procedure can be used for evaluation of jaggery furnaces for identification and quantification of losses, which will help in improving thermal energy utilization [Vishal R. Sardeshpande\*, D.J. Shendage and Indu R. Pillai (Department of Energy Science and Engineering, Indian Institute of Technology, Bombay, India), *Energy*, 2010, **35**(12), 4740-4747].

**NPARR 1(4), 2010-0666, Effect of jaggery on the quality and intake levels of maize silage**

Silage, which is anaerobically fermented green fodder, is valued throughout the world as a source of animal feed during lean months. Several farms in India use carbohydrate sources like jaggery or molasses at 2% for preparation of silage, and this increases cost of production. The present study was undertaken to assess the effect of jaggery on quality and intake of maize silage, with an objective to find out whether additional carbohydrate source is essential in preparation of silage using green maize. Three silage types, one without jaggery (A), the second with 1% jaggery (B), and the third with 2% jaggery (C) were prepared in cylindrical bins under similar conditions. They were compared for colour, pH, lactic acid bacteria count, lactic acid content, proximate composition and silage intake by sheep. Silage type C with 2% jaggery was significantly different from the other two types with values of 3.98 and 805.66 g for pH and mean silage intake, respectively. Even though the values of pH and dry matter intake for all three silage types were within normal levels, silage type C was significantly superior in terms of fermentation and palatability. The method of preparation followed could be ideal for small holder farmers requiring less quantity of silage [Venkataramanan R, Sreekumar C, Anilkumar R, Selvaraj P, Vidhya NM, Mathagowder I. (Sheep Breeding Research Station, Sandynallah, Tamil Nadu,

643237, India), *Trop Anim Health Prod*, 2010, **42**(5), 1027-1029].

## THERAPEUTICS

**NPARR 1(4), 2010-0667, Antipyretic activity studies of two botanical sources of the drug Murva**

Murva is one of the controversial drugs used in Ayurvedic medicine. In the present study two botanical sources of Murva, viz. *Wattakaka volubilis* and *Maerua oblongifolia*, were tested for antipyretic activity by yeast-induced pyrexia in Wistar albino rats. Alcohol and aqueous extracts of both species significantly reduced the elevated rectal temperature in febrile rats within 30 min of their administration. The results of these studies support the traditional use of these two botanical sources of the drug Murva in the treatment of fever [V. Madhavan, Amit Kumar Shukla, Anita Murali, Usha M, S. N. Yoganarasimhan\*(Department of Pharmacognosy, M. S. Ramaiah College of Pharmacy, Bangalore 560054, India), *Asian Journal of Traditional Medicines*, 2010, **5** (5), 51-59].

**NPARR 1(4), 2010-0668, In vitro and in vivo antioxidant activity studies on the roots of *Toddalia asiatica* (Linn.) Lam. (Rutaceae)**

*Toddalia asiatica* is used in the treatment of diseases like paralysis, malarial and intermittent fever, dyspepsia, colic, diarrhea, cough, bronchitis, nausea, wounds, contaminated ulcers, epilepsy, gonorrhoea and general debility. It is known as *Kanchana* in Sanskrit. In the present study, the *in vitro* and *in vivo* antioxidant activity of alcoholic and aqueous extracts of the roots of *Toddalia asiatica* was investigated. The test extracts exhibited potential scavenging effects on DPPH, hydrogen peroxide and nitric oxide free radicals. The *in vivo* antioxidant activity was investigated using Wistar albino rats. Oxidative stress was induced by oral administration of CCl<sub>4</sub> (0.5 ml/p.o.) for seven days and the CCl<sub>4</sub> decreased hepatic levels of reduced glutathione, proteins, antioxidant enzymes viz. peroxidase, catalase, super oxide dismutase, and increased the formation of malondialdehyde in untreated positive control animals. *Toddalia asiatica* extracts significantly increased the hepatic levels of reduced glutathione, proteins, antioxidant enzymes and decreased lipid

peroxidation. This shows that the free radical scavenging/antioxidant activity of *T. asiatica* roots may be responsible for its therapeutic effect on tissue damage [V. Madhavan, Poonam Shah, Anita Murali\*, S.N. Yoganarasimhan (Department of Pharmacology, MS Ramaiah College of Pharmacy, Bangalore 560054, Karnataka, India), *Asian Journal of Traditional Medicines*, 2010, **5** (5), 187-197].

**NPARR 1(4), 2010-0669, Effect of *Plantago major* on burn wound healing in rat**

To determine the effect of *Plantago major* on healing of burn wounds, 100 male Sprague-Dawley 180220 g rats were randomly divided into 4 groups. Groups of A, B and C each comprised of 30 rats, which were treated with silver sulfadiazine, 20% and 50% *Plantago major* solution. Group D comprised of 10 rats, which were considered as control group and were treated with Oserin. After 7, 14 and 21 d of treatment, the animals were sacrificed; burn areas were examined histopathologically and scored. There was no significant difference between groups on d 7 and 14 but the difference was significant on d 21. The best results were noticed in group C receiving 50% *P. major* solution. So *Plantago major* may be a suitable substitute for silver sulfadiazine especially when applied in 50% concentration. [Amini M., Kherad M, Mehrabani D, Azarpira N., Panjehshahin M.R, Tanideh N.(Gastroenterohepatology Research Center, Department of Pathology, Nemazee Hospita), *Journal of Applied Animal Research*, 2010, **37**(1) 34].

**NPARR 1(4), 2010-0670, Effects of a grapeseed procyanidin extract (GSPE) on insulin resistance**

Flavonoids are beneficial compounds against risk factors for metabolic syndrome, but their effects and the mechanisms on glucose homeostasis modulation are not well defined. In the present study, we first checked the efficacy of grapeseed procyanidin extract (GSPE) for stimulating glucose uptake in insulin-resistant 3T3-L1 adipocytes. Results show that when resistance is induced with chronic insulin treatment, GSPE maintain a higher stimulating capacity than insulin. In contrast, when dexamethasone is used as the resistance-inducing agent, GSPE is less effective. Next we evaluated how effective different GSPE treatments are at improving glucose metabolism in hyperinsulinemic animals (fed a cafeteria diet). GSPE reduced plasma insulin levels.

The lower dose (25 mg GSPE/kg body weight per day) administered for 30 days improved the Homeostasis Model Assessment-insulin resistance index. This was accompanied by down-regulation of Pparg2, Glut4 and Irs1 in mesenteric white adipose tissue. Similarly, a chronic GSPE treatment of insulin-resistant 3T3-L1 adipocytes down-regulated the mRNA levels of those adipocyte markers, although cells were still able to respond to the acute stimulation of glucose uptake.

In summary, 25 mg/kg body weight per day of GSPE has a positive long-term effect on glucose homeostasis, and GSPE could be targeted at adipose tissue, where it might directly stimulate glucose uptake. This work also highlights the need to carefully consider the bioactive dose, since a higher dose does not necessarily correlate to a greater positive effect [Gemma Montagut, Cinta Bladé, Mayte Blay, Juan Fernández-Larrea, Gerard Pujadas, M. Josepa Salvadó, Lluís Arola, Montserrat Pinent and Anna Ardévol (Department of Biochemistry and Biotechnology, Rovira i Virgili University, Tarragona, 43007 Spain), *The Journal of Nutritional Biochemistry*, 2010, **21**(10), 961-967].

## VEGETABLES

**NPARR 1(4), 2010-0671, Preliminary assessment of nutritional value of polly dwarf (*Alocacia indica*): an Indian vegetable**

The proximate composition and mineral constituents of *Alocacia indica* Stem were evaluated. The stem contained ashes: 9.1%, crude protein: 5.44%, crude lipid: 3.25%, crude fiber: 22.9%, and carbohydrates: 59.31%. The stem also has high energy value (288.25kcal/100g) dry weight. Mineral ranges (mg/100g dry weight, DW) were: K (4.63), Na (1.62), Ca (7.37), Fe (5.04), and Zn (3.83). Comparing the tubers mineral contents with recommended dietary allowances (RDA), the results indicated that *Alocacia indica* stem could be a good supplement for some nutrients such as Fibre, Potassium, Zinc, lipid, and Carbohydrates. The wild stem could be promoted as a carbohydrate supplement for cereal-based diets in poor rural communities, while its high potassium content could be utilized for the management of hypertension and other cardiovascular conditions [Aberoumand Ali\* and Deokule S.S. (Natural Resources College, Behbahan

University, Behbahan, Iran), *Journal of Dairying, Foods and Home Sciences*, 2010, **29**(1), 27].

**NPARR 1(4), 2010-0672, Essential and non-essential element composition of tomato plants fertilized with poultry manure**

Poultry manure (PM) must be disposed of from poultry farms, but is a potentially valuable source of macro- and micronutrients for plant growth. The objective of this study was to examine the effects of poultry manure on the growth of tomato (*Lycopersicon esculentum*) plants. Yields of fruits and vegetative material of plants grown in soil with 0, 10, 20 and 40 g kg<sup>-1</sup> PM added were measured. Concentrations of N, P, K, Ca, Mg, S, Fe, Zn, Cu, Mn, Mo, Cl, Si, Br, Rb, Sr and Ba in leaves at flowering and at final harvest and in fruits were determined by polarized energy dispersive X-ray fluorescence (PEDXRF). Poultry manure fertilization improved tomato shoot growth and also fruit yield and increased leaf N concentrations at the harvest stage. In addition, P concentrations of the leaves and fruits were increased as the application rate of PM was increased. Fruit Ca and Mg were significantly reduced by increased rate of PM application, but not to the extent to cause the calcium deficiency disorder blossom end rot. Applied high levels of PM slightly increased the concentrations of leaf Mo and Br at the harvest stage. Poultry manure applications had a positive effect on the concentrations of leaf Zn, Cu, Cl and Rb at both sampling stages, but leaf Si concentration was reduced by PM treatments. The concentrations of Zn and Rb were increased in the fruits by PM treatments, but the concentrations of Br were decreased. Applied PM levels had no significant effects on the concentrations of K, S, Fe, Sr or Ba in tomato plants. It is concluded that the increased fruit yield, and the increased concentration of Zn (an element required in the human diet) and the lowered concentration of potentially harmful Br in the fruit make poultry manure a valuable growing medium for tomato production (Demir, O. Sahin, Y.K. Kadioglu, D.J. Pilbeam and A. Gunes\* (Ankara University, Faculty of Agriculture, Department of Soil Science and Plant Nutrition, TR-06110 Ankara, Turkey), *Scientia Horticulturae*, 2010, **127**(1), 16-22].

**NPARR 1(4), 2010-0673, Antioxidants profile of small tomato fruits: Effect of irrigation and industrial process**

Carotenoids and flavonoids are the main tomatoes antioxidants, having an important role for human health. This study investigates the effects of different water regime and of the industrial processing on the concentration of these compounds in tomato fruits and in tomato products. Two biotypes of Corbarini small tomatoes were cultivated in the Sarno valley (Salerno, Italy) using three different water regimes. A biochemical characterization of the fresh and of the corresponding canned products was performed. Results show that water regime influenced the antioxidant profile of tomato fruits, with marked differences between the two biotypes. Data obtained highlight that water regime markedly influenced the productivity and the quality of the tomatoes. Results also demonstrated that industrial process increased carotenoids content without causing a significant flavonoids degradation [Rita Pernice, Mario Parisi, Italo Giordano, Alfonso Pentangelo, Giulia Graziani, Monica Gallo, Vincenzo Fogliano and Alberto Ritieni\*(Department of Food Science, University of Naples Federico II, Via Università 100, Parco Gussone, Portici 80055, Napoli Italy), *Scientia Horticulturae*, 2010, **126**(2), 156-163].

## WOOD

**NPARR 1(4), 2010-0674, Topochemical investigation into the delignification of *Eucalyptus globulus* chips during semi-chemical sulfite pulping**

The course of delignification of *Eucalyptus globulus* fibers during neutral semi-chemical sulfite pulping (NSSC) was studied by universal microspectrophotometry (UMSP 80, ZEISS). UV-investigation into a cellular level enables the topochemical analyses of delignification within individual cell wall layers during cooking. Cooks were carried out in a laboratory seven liter digester with liquor circulation and electrical heating device. Chip samples were taken throughout the cooking for chemical and UV microscopic analyses. UV microscopy analysis revealed for *Eucalyptus globulus* chips a preferred lignin removal during NSSC

cooking in cell corner and compound middle lamella regions [Mathias Rehbein\*, Miguel Pereira, Gerald Koch and Othar Kordsachia (Institute of Wood Technology and Wood Biology, Federal Research Institute for Rural Areas, Forestry and Fisheries (vTI), Leuschnerstr. 91, 21031 Hamburg, Germany), *Wood Science and Technology*, 2010, 44(3), 435-449].

**NPARR 1(4), 2010-0675, Exploratory study on the impregnation of Scots pine sapwood (*Pinus sylvestris* Linn.) and European beech (*Fagus sylvatica* Linn.) with different hot melting waxes**

Scots pine sapwood (*Pinus sylvestris* Linn.) and beech (*Fagus sylvatica* Linn.) were impregnated with five waxes. The experiments indicate deep penetration into pine sapwood. Besides the viscosity, an influence of the wax polarity is presumed. Wax penetrates pine wood deeply via the cross-section, but not sufficiently enough to impregnate longer construction elements. However, the radial wax uptake exceeds the uptake via the tangential orientation and guarantees complete soaking of the sapwood tissue. The lateral wax penetration within beech is quite low and irregular. In addition to the temperature, a prolonged process procedure is decisive for an increasing wax uptake. As such, beech wood vessel elements seem to be fully impregnable via the longitudinal surface after a longer process procedure [G. Scholz, A. Krause and H. Militz\* (Department of Wood Biology and Wood Products, Georg—August—University Göttingen, Bûsgenweg 4, 37077, Göttingen, Germany), *Wood Science and Technology*, 2010, 44(3), 379-388].

**NPARR 1(4), 2010-0676, Kernel regression methods for the prediction of wood properties of *Pinus taeda* using near infrared spectroscopy**

Near infrared diffuse reflectance spectra collected in 10-mm sections were used for the estimation of air-dry density (AD), microfibril angle (MFA), stiffness (MOE), tracheid coarseness (COARS), and tracheid wall thickness (WTHICK) in wood radial strip samples obtained at breast height (1.4 m) from 60 *Pinus taeda* trees. Calibration models were developed using traditional partial least squares (PLS) and kernel regression. The kernel methods included radial basis functions-partial least squares

(RBF-PLS) and least-squares support vector machines (LS-SVM). RBF-PLS and LS-SVM models outperformed PLS-CV calibrations in terms of fit statistics. MFA and MOE, two properties that exhibited nonlinearity, showed the most significant improvements compared to PLS. In terms of predictive ability RBF-PLS performed better than PLS for the prediction of MFA, MOE, and COARS. LS-SVM showed better prediction statistics in all cases, except for WTHICK that gave similar statistics compared to PLS and was superior to RBF-PLS. By adding statistically significant factors to the PLS regressions, it was possible to capture some of the nonlinear features of the data and improve the predictive ability of the PLS models [Christian R.Mora and Laurence R Schimleck (Wood Quality Consortium, The University of Georgia, Athens, GA 30602, USA), *Wood Science and Technology*, 2010, 44(4), 561-578].

**NPARR 1(4), 2010-0677, Thermoplastic flow behavior of steamed wood flour under heat and compression**

In this study the thermoplastic flow behavior of steamed wood flour was investigated. First it was demonstrated that steamed Japanese beech flour flowed out of the nozzle under compression at high temperature in a thermal flow test with a capillary rheometer. The effects of the steaming temperature, steaming time, compressive pressure, and moisture content of wood flour on the thermal flow temperature were examined. It was shown that the higher the steaming temperature and compressive pressure, the lower the thermal flow temperature. Also, the thermal flow temperature of the sample steamed at 200C for 20 min became lowest and increasingly higher over time. Furthermore, the thermal flow temperature became linearly low with increasing moisture content of the sample under 15%, whereas it became essentially constant over 15%. It is clarified that compressive pressure and moisture content as well as the steaming conditions profoundly affect the thermoplastic flow behavior of steamed wood flour [Isoko Takahashi\*, Yasuo Takasu, Takanori Sugimoto, Youji Kikata and Yasutoshi Sasaki (Aichi Industrial Technology Institute, Kariya

448-0013, Japan), *Wood Science and Technology*, 2010, **44**(4), 607-619].

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

## CULTIVATION

**NPARR 1(4), 2010-0678, *In Vitro* Clonal Propagation of *Coleus forskohlii* via Direct Shoot Organogenesis from Selected Leaf Explants**

Present study provides an easy and efficient protocol for large scale clonal propagation of *Coleus forskohlii*, a threatened medicinal plant of commercial importance. Basal leaf lamina excised from upper three nodes of shoot was used as explant and its size, position, orientation and season of collection were initially optimized to select the most responsive explant condition. Enhanced shoot production and proliferation has been achieved on medium containing 2  $\mu\text{M}$  BA + 0.1  $\mu\text{M}$  NAA wherein, a highest number of 35 shoots/explant were produced. The regenerated shoots of varied length (3–5 cm) were transferred to root induction medium comprising of IBA, NAA and IAA (1–5  $\mu\text{M}$ ) in half-strength MS medium to determine the most suitable shoot length for proper root induction. Rooted plantlets were acclimatized in field conditions after proper hardening. Histological analysis was also carried out to confirm the nature of origin of shoot buds from leaf explants [Sahai Aastha and Shahzad Anwar\* (Plant Biotechnology Laboratory, Department of Botany, Aligarh Muslim University, Aligarh, 202 002, Uttar Pradesh, India), *Journal of Plant Biochemistry and Biotechnology*, 2010, **19**(2)].

**NPARR 1(4), 2010-0679, Parthenocarpic fruit production in loquat (*Eriobotrya japonica* Lindl.) by using gibberellic acid**

This study evaluates the effect of gibberellic acid ( $\text{GA}_3$ ) in inducing parthenocarpy in 'Algerie' loquat, as well as the optimum treatment conditions

and associated techniques, hand thinning and ringing, to produce seedless fruit with high enough quality for fresh consumption.  $\text{GA}_3$  applied in the course of the phenological growth stages 504-508 of the BBCH-scale produced seedless fruits, with the magnitude of the response depending on the concentration applied and number of treatments. Percentage of panicles bearing seedless fruitlets significantly increased with increasing  $\text{GA}_3$  concentrations up to 100  $\text{mg l}^{-1}$  and significantly and positively correlated with the number of treatments applied. Trees treated three times with 100 $\text{mg l}^{-1}$  developed more than 90% of panicles bearing almost 7 seedless fruits per panicle, which were smaller in size, drier and slightly acid but similar in TSS concentration and skin colour than seeded fruits from untreated trees. Fruit thinning to 3 fruits per panicle did not increase seedless fruit size, but ringing performed at the onset of cell enlargement stage, growth stage 702 of the BBCH-scale, significantly increased fruit size by 12-15%, depending on the year. Trees treated three times with 100  $\text{mg l}^{-1}$  of  $\text{GA}_3$  and ringed produced 26kg, on average, of seeded fruit of suitable commercial quality [C. Mesejo, C. Reig, A. Martínez-Fuentes and M. Agustí\* (Instituto Agroforestal Mediterráneo, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022 Valencia, Spain), *Scientia Horticulturae*, 2010, **126**(1), 37-41].

**NPARR 1(4), 2010-0680, Soil and water conservation techniques in cashew grown along steep hill slopes**

Cashew (*Anacardium occidentale* Linn.), the highest foreign exchange earning perennial horticultural crop in India is generally grown as a rainfed crop along steep slopes of hills or on neglected land unsuitable for any other crop. In India, cashew experiences severe moisture stress from January to May, adversely affects its flowering and fruit set. In order to harvest the rainwater and to make it available to the cashew plant during critical period, an *in situ* soil and water conservation experiment was conducted at Directorate of Cashew Research, Puttur, Karnataka, India during 2003-2010. This experiment was laid along contour with five treatments namely, modified crescent bunds, coconut husk burial, reverse terraces, catch pits and control plot without any soil and water conservation. Among the treatments, modified crescent bund and coconut husk burial were superior. These two treatments reduced the annual

runoff (22.3 and 20.4% of the annual rainfall compared to 36.9% of the annual rainfall in control), soil loss (47 and 49% of control) and nutrient loss. Also it increased the mean soil moisture content, growth of plants, yield of cashew (6.45 and 6.60 t/ha respectively compared to 4.88 t/ha in control for the first 5 harvests) and net profit from cashew garden (40% more than control). In addition to this, the groundwater level in nearby wells and ponds increased. Hence, the barren land even in steep slopes with proper soil and water conservation measures can be effectively utilized for cashew cultivation [R. Rejani\* and N. Yadukumar (Soil and Water Conservation Engineering, Directorate of Cashew Research, Puttur, D.K., Karnataka 574 202, India), *Scientia Horticulturae*, 2010, **126**(3), 371-378].

**NPARR 1(4), 2010-0681, High frequency plant regeneration through adventitious multiple shoot organogenesis in epicotyl explants of Indian gooseberry (*Emblia officinalis* Gaertn)**

Shoots regenerated adventitiously on epicotyl segments from *in vitro* seedlings of *Emblia officinalis* var. 'Kanchan'. Epicotyls derived from 2-week-old aseptic seedlings were most responsive and produced a maximum number of 303 shoots per explant in Murashige and Skoog (1962) medium (MS) augmented with 8.8  $\mu\text{M}$   $\text{N}^6$ -benzyladenine (BA) + 1.425 $\mu\text{M}$  indole-3-acetic acid (IAA). Shoots readily elongated in MS lacking growth regulators and rooted in half-salt-strength MS (1/2 MS) supplemented with indole-3-butyric acid (IBA) or  $\alpha$ -naphthalene acetic acid (NAA). The highest rooting response was recorded in 1/2 MS containing 14.7  $\mu\text{M}$  IBA. Plantlets were acclimatized inside the green house and 80% of the plantlets survived on transfer to garden soil [P. Nayak, P.R. Behera, M. Thirunavoukkarasu\* and P.K. Chand (Natural Products Department, Institute of Minerals and Materials Technology (CSIR), Bhubaneswar-751013, India), *Scientia Horticulturae*, 2010, **123**(4), 473-478].

**NPARR 1(4), 2010-0682, Influence of pruning intensities on leaf nutrient composition in some mango cultivars planted under high density**

A field experiment was conducted on mango cultivars (Amrapali, Mallika and Dashehari) planted under high density to study the changes in the nutrient composition in leaves after pruning. The maximum

nitrogen percentage was found in Amrapali in 'on' year while Dashehari recorded the lowest. Similarly, the highest phosphorus, calcium and sulphur were estimated in leaves of Mallika, whereas Amrapali had the lowest phosphorus, calcium and magnesium content. The significant difference was also observed for N, P ('on' year), Ca, Mg and S due to different pruning levels. The highest N and Ca content were observed in control (un-pruned) trees, which had the lowest levels of Mg and S. The light pruning improved the level of phosphorus but reduced the nitrogen concentration. Severe pruning led to lowest P and Mg content with better S content. The interaction effect due to cultivar and pruning intensity was found to be significant for nutrient like N, C and M. The pruning intensity did not have any significant effect on potassium content. Consequently, major nutrients (primary and secondary) reduced during flowering, while during 'on' year the N, P and Ca levels increased. In contrast, Mg and S were observed to be higher during vegetative phase [Singh Sanjay Kumar\*, Singh S.K., Sharma R.R., Srivastav Manish and Patel V.B. (Central Institute for Arid Horticulture, Bikaner, 334 006), *Indian Journal of Horticulture*, 2010, **67**(1), 16-20].

**NPARR 1(4), 2010-0683, *In vitro* shoot regeneration from cotyledonary leaf explant in chilli and bio-hardening of plantlets**

A protocol for direct shoot regeneration from cotyledonary leaf explant in chilli was developed and method for bio-hardening of *in vitro* regenerated plantlets using *Glomus mosseae*, *Gigaspora margarita* and mixed arbuscular mycorrhizal fungi (AMF) strains were standardized. The experiment was undertaken with four chilli cultivars namely KtPL-19, Pusa Sadabahar, ArCH-001 and Salem. Explants were excised from 21-day-old *in vitro* raised seedlings. Direct shoot organogenesis was observed on cotyledonary explant with slight callusing. Number of shoot buds per explant was maximum (5.73) and days taken for shoot bud induction was minimum on MS medium supplemented with 1.0  $\text{mg l}^{-1}$  of TDZ in all the cultivars. However, response of Pusa Sadabahar was better in terms of number of shoot buds than other cultivars under study. Fifteen to 20 days were required for shoot bud induction in all the cultivars except Salem which took 25–30 days. Among the different treatments tested for shoot multiplication the best treatment was MS + 6.0  $\text{mg l}^{-1}$  BAP + 1.0  $\text{mg l}^{-1}$

kinetin + 0.5 mg l<sup>-1</sup> GA<sub>3</sub>. The length of the shoot increased with increase in BAP and GA<sub>3</sub> levels. The *in vitro* regenerated shoots were inoculated on to half-strength MS medium supplemented with 1.0 mg l<sup>-1</sup> IBA where more than 90 per cent rooting was observed. When *in vitro* raised plantlets were treated with AMF high plant survival was observed. The maximum survival (97.08%) was recorded with mixed strain of *Glomus mosseae* and *Gigaspora margarita*. The root and shoot length was also maximum when plantlets were treated with mixed AMF strains. The developed protocol may be used for mass multiplication of elite chilli genotypes as well as regeneration of genetically transformed cell/tissue [Ranjan J.K.\*, Singh S.K., Chakrabarti A.K. and Pragma (Central Institute of Temperate Horticulture-Regional Station, Mukteshwar, Nainital, Uttarakhand, 263 138), *Indian Journal of Horticulture*, 2010, 67(1), 43-49].

**NPARR 1(4), 2010-0684, Effect of drip-fertigation on performance of tomato under Assam conditions**

A study was carried out to find out the effect of fertigation level of N & K through drip irrigation on growth, marketable yield, fruit quality and economics in semi-determinate tomato cultivar Arka Abha. Results indicated that plant height, branch number, fruit setting percentage, fruit number per plant, individual fruit weight and marketable yield were maximum with cent per cent fertigation of recommended dose of N & K at the rate of 75:60 kg/ha. Regarding the quality parameters, fruit length, fruit girth, percentage of placenta, edible portion, juice percentage, total soluble solid and ascorbic acid were highest similarly in cent per cent fertigation level, whereas the highest titrable acidity was recorded by fifty per cent fertigation level. Study on fertigation efficiency and economics of cultivation revealed that fertigation with cent per cent recommended dose of N & K was the most efficient treatment with fertigation efficiency of 43.24% and cost: benefit ratio of 1:2.28. It is concluded that drip fulfillment at 100% evaporation replenishment throughout the crop season with cent per cent supplementation of recommended dose of N&K (75:60 kg/ha) through emitters of 2 l/h discharge rate with emission uniformity of 8991% corresponding to 27 drip cycle with the last drip coinciding at 15 days before harvest was found to be optimum for profitable cultivation of tomato with optimum quality and

economic return [Brahma Sanchita\*, Phookan Deepa Borbora, Barua Pankaj, Saikia Luchon (KVK, Kokrajhar, Gossaigaon, 783360, Assam), *Indian Journal of Horticulture*, 2010, 67(1), 56-60].

**NPARR 1(4), 2010-0685, *In vitro* organogenesis in *Aloe barbadensis* Mill.: An aloin A rich plant**

Efficient plant regeneration in *Aloe barbadensis* Mill. was achieved using callus derived from shoot meristem. Organogenesis was maximum on MS medium supplemented with 2.5 mg/l BA, 0.25 mg/l IAA. Though sucrose (2%) showed maximum shoot bud regeneration capacity, D-glucose had an intermediary effect, however, fructose and maltose had no effect at all. Of the conditions tested shoot bud regeneration was highest (82.8) under 12 h illumination. The regenerative potential was stable up to 12 sub-cultures. The rate of shoot bud regeneration was dependent on the concentration of hormones in the nutrient media. Regenerated shoots rooted on half-strength MS medium containing 0.1 mg/l IAA and 1% sucrose. The *in vitro* derived plantlets were hardened in the nethouse with 75% light and successfully established in soil [Samantaray Sanghamitra and MaitiSatyabrata\*(Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand, 387 310, Gujarat), *Indian Journal of Horticulture*, 2010, 67(1), 80-84].

**NPARR 1(4), 2010-0686, New walnut varieties released**

**CITH Walnut-1:** A protogynous, terminal as well as lateral bearing variety and mid-season blooming variety. Nuts and kernels are very large (27.16 and 12.76 g respectively), higher kernel recovery (46.96%), higher lateral bud flowering (51.78%), higher yield (60 kg/tree), light shell colour, soft shelled, well filled kernel, plummy, very easy to remove full kernel halves light in colour. It shows tolerant to biotic stresses except white grub and susceptible to moisture stress. Suitable to grow under entire temperate climatic conditions of North Western Himalayan agro-eco system.

**CITH Walnut-2:** It is protogynous, predominantly terminal bearing and early-season blooming variety. Nuts are large (21.90g), medium kernel (11.24 g), good kernel recovery (51.27%), higher yield (60 kg/tree), semi-soft, well filled kernel, plummy, easy to remove full kernel halves and light

kernel colour. Crop has field tolerance to pests except white grub. Variety is suitable to grow under entire temperate climatic conditions of North Western Himalayan agro-eco system.

**CITH Walnut-3:** The variety is protogynous, terminal as well as lateral (16%) bearing and late in maturity. Nuts are large (18.33 g), kernel are medium (10 g), kernel recovery is high (54.55%), higher yield (40 kg/tree), good kernel flavour, well filled kernel, plummy, moderate to remove kernel halves light in colour. It shows field tolerance to pests except white grub and susceptible to moisture stress. Variety is suitable to grow under entire temperate climatic conditions of North Western Himalayan agro-eco system.]

**CITH Walnut-4:** The protoandrous, terminal as well as lateral (25.35%) and late-season variety. Nuts are large (19.43 g), kernel are bold (11.54 g), higher yield (45 kg/tree), very high kernel recovery (59.39%), light shell colour, thin shelled, good kernel flavour, well filled kernel, moderately plummy, very easy to remove kernel halves and light kernel colour. It shows field tolerance to pests except white grub. Variety is suitable to grow under entire temperate climatic conditions of North Western Himalayan agro-eco system.

**CITH Walnut-5:** It is protoandrous, terminal as well as lateral bearing (29.31%) and late-season maturing variety. Nuts are large (19.84 g), bold kernel (10.40 g), higher yield (50 kg/tree), high kernel recovery (52.42%), smooth shell texture, light shell colour, good kernel flavour, well filled kernel, plummy, moderate to remove kernel halves and light kernel colour. They show field tolerance to diseases & pests except white grub. Variety is suitable to grow under entire temperate climatic conditions of North Western Himalayan agro-eco system [A.A. Sofi, M.K. Verma, N. Ahmad, R.K. Verma, J.I. Mir, D.B. Singh, Dinesh Kumar, S. Lal, S.R. Singh, K.K. Srivastava, H.A. Bhat, A.H. Pandit, M.A. Sheikh and Shazia Shah, Central Institute of Temperate Horticulture, Old Air Field, PO: Rangreth 190 007, Srinagar, J&K, Tel: 0194-2305044, Fax: 2305045) *Indian Journal of Horticulture*, 2010, **67**(1), i-vii].

## POSTHARVEST TECHNOLOGIES

### *NPARR* 1(4), 2010-0687, **Osmotic dehydration of *Aloe vera* (*Aloe barbadensis* Miller)**

*Aloe vera* possess immunomodulatory, anti-inflammatory, antibacteria effects and wound and burn healing properties, but it is a very unstable product due to its high water content. Osmotic dehydration can be used to obtain stable products from aloe. In this work the effect of osmotic dehydration (OD) on *Aloe vera* (*Aloe barbadensis* Miller) leaves was studied. Peeled and unpeeled *Aloe vera* slices (15×50mm), were immersed in sucrose solutions at 35, 50 and 65 Brix at 25 and 40°C. Moisture, effective diffusion coefficients and mass fluxes (water loss, solids gained and weight reduction) were determined. Osmotic dehydration experiments were conducted at atmospheric pressure. The best conditions for the OD of *Aloe* slices with the highest effect on diffusivity were obtained using a temperature of 40 C for peeled samples. The analysis of the effect of temperature on mass transfer kinetics showed that unpeeled samples were more effected than peeled samples [P. García-Segovia\*, C. Mognetti, A. Andrés-Bello and J. Martínez-Monzó (CUINA Group, Food Technology Department, Polytechnic University of Valencia, 46022 Valencia, Spain), *Journal of Food Engineering*, 2010, **97**(2), 154-160

### *NPARR* 1(4), 2010-0688, **Effect of the application of intermittent drying on *Ilex paraguariensis* quality and drying kinetics**

The aim of this work was to study the effects of the application of tempering periods on the drying kinetics of yerba maté branches and on the resultant quality parameters of the finished product. Experiments were carried out in a convective pilot plant drier. Air temperature (60, 80 and 100 °C) and tempering time (0, 15 and 30 min) influenced the drying kinetics and the product quality (color parameters *L* and *b*, and the sugar and caffeine contents of an infusion prepared with the material). The influence of tempering time was higher at 60°C than at the other temperatures. There were no differences between tempering times of 15 and 30 min. The Page model yielded a good fit to the experimental data, where the model parameter *k* varied with drying temperature [Laura A. Ramallo\*,

Nancy N. Lovera and Miguel E. Schmalko (Faculty of Exact, Chemistry and Life Sciences, National University of Misiones, 3300-Posadas, Argentina), *Journal of Food Engineering*, 2010, **97**(2), 188-193].

**NPARR 1(4), 2010-0689, Effect of ultrasound on banana cv Pacovan drying kinetics**

The aim of this work was to study and to model the drying kinetics of fresh and ultrasonic pretreated banana cv Pacovan using the diffusional model (Fick's second law) and an empirical two parameters model (Page model). The pretreatment was carried out in an ultrasonic bath at 30 C. The drying process was carried out in a fixed bed dryer at two different temperatures (50 and 70 C) and 3.0 m/s air velocity. Page empirical model provided the best simulation of the drying curves. The diffusional model was used to describe the moisture transfer and the effective diffusivities of water were determined and were in the order of  $10^{-9}$  m<sup>2</sup>/s. These diffusivities increased with increasing temperature and with the application of ultrasound, while the process time reduced, which can represent an economy of energy, since air drying is cost intensive [Patrícia Moreira Azoubel\*, Maria do Amparo Melo Baima, Mariana da Rocha Amorim and Sofia Sorelly Belém Oliveira (Embrapa Semi-Árido, BR 428, km 152, Zona Rural, Petrolina, PE 56302-970, Brazil), *Journal of Food Engineering*, 2010, **97**(2), 194-198].

**NPARR 1(4), 2010-0690, Composition of rosemary essential oil (*Rosmarinus officinalis*) as affected by drying method**

The influence of the drying method on volatile compounds of *Rosmarinus officinalis* was evaluated. The drying methods tested were convective (CD) and vacuum-microwave (VMD), as well as a combination of convective pre-drying and VM finish-drying (CPD-VMFD). Rosemary drying kinetics was described by a simple exponential model for CD and VMD, while VMFD kinetics consisted of two periods: linear until a critical point and exponential beyond that point. Volatile compounds of rosemary samples were extracted by steam-hydrodistillation and analyzed by GC-MS. Thirty-four compounds were tentatively identified, with  $\alpha$ -pinene, bornyl acetate, camphene and 1, 8-cineole being the major components. The total volatiles concentration of fresh

rosemary ( $135\text{gkg}^{-1}$ ) decreased considerably during both CD ( $87.2\text{gkg}^{-1}$ ) and VMD ( $61.9\text{gkg}^{-1}$ ). CPD-VMFD was the best option for drying rosemary because the time required was relatively short (30 min), and the aroma quality was good according to both instrumental ( $100\text{gkg}^{-1}$ ) and sensory analyses [Antoni Szumny, Adam Figiel, Antonio Gutiérrez-Ortíz and Ángel A. Carbonell-Barrachina\*(Departamento Tecnología Agroalimentaria, Universidad Miguel Hernández, Carretera de Beniel, 03312-Orihuela, Alicante, Spain), *Journal of Food Engineering*, 2010, **97**(2), 253-260

**NPARR 1(4), 2010-0691, Microbial decontamination of medicinally important herbals using gamma radiation and their biochemical characterisation**

A comprehensive study was carried out to assess the microbiological and biochemical characteristics of four herbals, namely, rose (*Rosa centifolia*), guggul (*Commiphora mukul*), chirata (*Swertia chirayita*), gulvel (*Tinospora cordifolia*) and four herbal formulations rasayan, shatpatryadi, scrub and kashayam. Total aerobic plate count (TAPC) was in the range of 3-7logcfu/g, whereas, presumptive coliform count in many of these samples was in the range 2-6logcfu/g. The IMViC (indole, methyl red, Voges-Proskauer, citrate) analysis and molecular characterisation (16S rDNA sequencing) ascertained the presence of *Escherichia coli* in some of the samples. A gamma radiation dose of up to 10kGy was found to be sufficient for complete microbial decontamination without affecting the bioactive properties of herbal formulations, including antioxidant potential, which was high in rasayan, shatpatryadi, scrub, rose, and guggul. The antioxidant property of these herbals could be attributed to components such as phenolics, flavonoids and colour pigments [Sanjeev Kumar, Satyendra Gautam, Sudhakar Powar and Arun Sharma\*(Food Technology Division, Bhabha Atomic Research Centre, Mumbai 400085, India), *Food Chemistry*, 2010, **119**(1), 328-335].

## NEW TECHNOLOGIES

**NPARR 1(4), 2010-0692, Separation and determination of four ganoderic acids from dried**

### **fermentation mycelia powder of *Ganoderma lucidum* by capillary zone electrophoresis**

Ganoderic acids (GAs) were bioactive secondary metabolites produced by a traditional mushroom *Ganoderma lucidum*. We describe a simple and efficient method for the separation and quantitative determination of four GAs, namely Ganoderic acid T (GA-T), Ganoderic acid Mk (GA-Mk), Ganoderic acid Me (GA-Me) and Ganoderic acid S (GA-S) from dried triterpene-enriched extracts of *G. lucidum* mycelia powder by capillary zone electrophoresis (CZE). Under the optimum conditions, the four GAs reached the baseline separation in 9 min with Glycyrrhetic acid (GTA) as internal standard. The four GAs and internal standard (GTA) were detected at a wavelength 245 nm. All calibration curves showed good linearity ( $r^2 > 0.9958$ ) within test ranges. Limit of detection (LOD) and limit of quantification (LOQ) were less than 0.6 and 1.8  $\mu\text{g/mL}$ , respectively. The relative standard deviation (R.S.D.) values of precision and recoveries were less than 5% and recoveries ranged from 91.4% to 103.6%. This was the first report on simultaneous determination of the four GAs and the results provided a firm basis for the trace analysis of GAs in dried fermentation mycelia powder of *G. lucidum* with high accuracy [Na Ding, Qing Yang, Sha-Sheng Huang, Liu-Yin Fan, Wei Zhang, Jian-Jiang Zhong and Cheng-Xi Cao\* (Key Laboratory of Microbiology of Educational Ministry, School of Life Science and Biotechnology, Shanghai Jiao Tong University, Shanghai 200240, China), *Journal of Pharmaceutical and Biomedical Analysis*, 2010, 53(5), 1224-1230].

### **NPARR 1(4), 2010-0693, Extraction of phenolics from *Vitis vinifera* wastes using non-conventional techniques**

Polyphenols, the well known naturally occurring antioxidants, are the most abundant secondary metabolites in grape wastes. Herein we investigate several non-conventional extraction methods vs classic solid-liquid extraction (SLE) to obtain phenolic compounds from grape seeds and skins. We compared SLE, ultrasound-assisted extraction (UAE), microwave-assisted extraction (MAE) and high pressure and temperature extraction (HPTE) in term of extraction yield and antioxidant power of the extract. Solvent of choice between methanol and ethanol was the former, both for skins and seeds. Quali-quantitative analyses were performed using

colorimetric and HPLC methods. The highest content in total polyphenols, *o*-diphenols and flavonoids, both for seeds (108.3, 47.0  $\text{mg}_{\text{GAE}} \text{g}_{\text{DW}}^{-1}$ , 47.2  $\text{mg}_{\text{CE}} \text{g}_{\text{DW}}^{-1}$ ) and skins (34.2, 10.1  $\text{mg}_{\text{GAE}} \text{g}_{\text{DW}}^{-1}$ , 21.6  $\text{mg}_{\text{CE}} \text{g}_{\text{DW}}^{-1}$ ) was obtained with HPTE working in a Parr reactor. While the highest antiradical power was determined in seeds extracts from MAE (78.6  $\mu\text{l}$  extract  $\mu\text{g}_{\text{DPPH}}^{-1}$ ). Prolonged extraction times (over 30 min) further increased the amount of total polyphenols, while progressively decreased the amount of flavonoids and the antiradical power [Alessandro A. Casazza, Bahar Aliakbarian, Stefano Mantegna, Giancarlo Cravotto\* and Patrizia Perego (Dipartimento di Scienza e Tecnologia del Farmaco, University of Turin, Via Pietro Giuria 9, 10125 Turin, Italy), *Journal of Food Engineering*, 2010, 100(1), 50-55].

### **NPARR 1(4), 2010-0694, Detection of adulterations of honey with high fructose syrups from inulin by GC analysis**

A GC-MS method has been developed for the detection of honey adulteration with high fructose inulin syrups (HFIS). Carbohydrate composition of HFIS with different degrees of polymerization was studied; fructose, sucrose, dianhydrides of fructose (DFAs), inulobiose, kestoses and inulotriose were detected in all the samples. Honey adulterations with 5%, 10% and 20% of HFIS were performed. Inulotriose proved to be the best marker of honey adulteration with these syrups since it was not detected in any of the honey samples analyzed [A.I. Ruiz-Matute\*, S. Rodríguez-Sánchez, M.L. Sanz and I. Martínez-Castro (Instituto de Química Orgánica General (CSIC), Juan de la Cierva 3, 28006 Madrid, Spain), *Journal of Food Composition and Analysis*, 2010, 23(3), 273-276].

### **NPARR 1(4), 2010-0695, Cereal-based biorefinery development: Utilisation of wheat milling by-products for the production of succinic acid**

A novel wheat-based bioprocess for the production of a nutrient-complete feedstock for the fermentative succinic acid production by *Actinobacillus succinogenes* has been developed. Wheat was fractionated into bran, middlings and flour. The bran fraction, which would normally be a waste product of the wheat milling industry, was used as the sole medium in two solid-state fermentations

(SSF) of *Aspergillus awamori* and *Aspergillus oryzae* that produce enzyme complexes rich in amylolytic and proteolytic enzymes, respectively. The resulting fermentation solids were then used as crude enzyme sources, by adding directly to an aqueous suspension of milled bran and middlings fractions (wheat flour milling by-products) to generate a hydrolysate containing over 95g/L glucose, 25g/L maltose and 300mg/L free amino nitrogen (FAN). This hydrolysate was then used as the sole medium for *A. succinogenes* fermentations, which led to the production of 50.6g/L succinic acid. Supplementation of the medium with yeast extract did not significantly improve succinic acid production though increasing the inoculum concentration to 20% did result in the production of 62.1g/L succinic acid. Results indicated that *A. succinogenes* cells were able to utilise glucose and maltose in the wheat hydrolysate for cell growth and succinic acid production. The proposed process could be potentially integrated into a wheat-milling process to upgrade the wheat flour milling by-products (WFMB) into succinic acid, one of the future platform chemicals of a sustainable chemical industry [M. Pilar Dorado, Sze Ki Carol Lin, Apostolis Koutinas, Chenyu Du, Ruohang Wang and Colin Webb\*(Satake Centre for Grain Process Engineering, School of Chemical Engineering and Analytical Science, University of Manchester, P.O. Box 88, Manchester M60 1QD, UK), *Journal of Biotechnology*, 2009, **143**(1), 51-59].

**NPARR 1(4), 2010-0696, Development and evaluation of a guayule seed processing system**

Freshly harvested guayule seed often contains extraneous material and floral attachments. Seed of higher germination and purity is achievable through effective threshing and separation. The main objective of this study was to develop and evaluate an effective seed processing system for guayule. A combined threshing and grading system was developed following laboratory investigation of different approaches to seed threshing and separation. The seed processing system includes a rough surface belt type threshing mechanism, a cleaning unit consisting of a three layer reciprocating screen and an air assisted momentum discrimination chamber for grading and final separation. Harvested seed was processed using the machine at three belt clearances and speeds. The processed seed was analysed for seed purity, germination, thousand seed mass, clean seed recovery

and processing efficiency. A threshing efficiency of up to 77% was achieved at processing capacity of 300g/h of clean seed. Belt clearance and speed both affected the quality of processed seed. The grading system resulted in separation of up to 63.5% of first grade seed with a purity of 98% and germination of up to 76%. It was also possible to produce heavy seeds of up to 756mg per thousand seed using the unit [G.M. Bedane\*, M.L. Gupta and D.L. George (University of Queensland, School of Land Crop and Food Sciences, Gatton, Qld 4343, Australia), *Industrial Crops and Products*, 2010, **31**(2), 378-384]

**NPARR 1(4), 2010-0697, Ultrasound-assisted extraction of polyphenols (flavanone glycosides) from orange (*Citrus sinensis* L.) peel**

The present study reports on the extraction of polyphenols especially flavanones from orange (*Citrus sinensis* L.) peel by using ethanol as a food grade solvent. After a preliminary study showing that the best yield of extraction was reached for a particle size of 2cm<sup>2</sup>, a response surface methodology (RSM) was launched to investigate the influence of process variables on the ultrasound-assisted extraction (UAE) followed by a central composite design (CCD) approach. The statistical analysis revealed that the optimised conditions were a temperature of 40 °C, a sonication power of 150 W and a 4:1 (v/v) ethanol: water ratio. The high total phenolic content (275.8 mg of gallic acid equivalent/100 g FW), flavanone concentrations (70.3 mg of naringin and 205.2 mg of hesperidin/100 g FW) and extraction yield (10.9 %) obtained from optimised UAE proved its efficiency when compared with the conventional method. Furthermore, the antioxidant activity determined by the DPPH and ORAC tests confirmed the suitability of UAE for the preparation of antioxidant-rich plant extracts [Muhammad Kamran Khan, Maryline Abert-Vian, Anne-Sylvie Fabiano-Tixier, Olivier Dangles and Farid Chemat\* (UMR408, Université d'Avignon et des Pays de Vaucluse, INRA, F-84000 Avignon, France), *Food Chemistry*, 2010, **119**(2), 851-858].

**NPARR 1(4), 2010-0698, Development of an immunochromatographic strip test for the rapid detection of deoxynivalenol in wheat and maize**

An anti-DON monoclonal antibody (Mab) was produced from a stable hybridoma cell line, 12D1, generated by the fusion of SP2/O myeloma cells with

spleen cells isolated from a Balb/c mouse immunized with DON–cationic bovine serum albumin (CBSA) conjugate. The 12D1 Mab belongs to the immunoglobulin G1 ( $\kappa$ -chain) isotype.

A colloidal gold immunochromatographic strip (ICS) test for rapid detection of deoxynivalenol (DON) in wheat and maize samples was also developed using this Mab. The ICS test, which has a detection limit of  $50 \text{ ng mL}^{-1}$  for DON and can be completed in 10 min. Analysis of DON in wheat and maize samples revealed that data obtained from ICS test were in a good agreement with those obtained from ELISA and GC/MS. The results demonstrate that the ICS test can be used as qualitative tool for screening technique of DON on-site [Yang Xu\*, Zhi-Bing Huang, Qing-Hua He, Shun-Zhou Deng, Lai-Sheng Li and Yan-Ping Li (State Key Laboratory of Food Science and Technology, Sino-Germany Joint Research Institute, Nanchang University, No. 235 Nanjing East Road, Nanchang 330047, China), *Food Chemistry*, 2010, **119**(2), 834-839].

**NPARR 1(4), 2010-0699, Detection of caraway and bay leaves irradiation based on their extracts' antioxidant properties evaluation**

Antioxidant properties of extracts prepared from native (non-irradiated) ground caraway (*Carum carvi*, L.) and bay leaves (*Laurus nobilis*, L.) samples, as well as from those  $\gamma$ -irradiated by  $\text{Co}^{60}$  source at doses from 5 to 30 kGy were studied by EPR and UV–VIS spectroscopy, and expressed as Trolox Equivalent. Ferric reducing power, thiobarbituric acid reactive substances and total phenolic compounds content of each extract were characterised, as well. In addition, character of radicals formed upon the  $\gamma$ -irradiation in solid phase was studied by means of EPR spectroscopy. For the first time, multivariate statistical methods were used for  $\gamma$ -irradiation detection. The experimental data obtained from UV–VIS and EPR, were successfully used in canonical, step-wise and  $k$ th-neighbour discriminant analyses for the differentiation and classification of  $\gamma$ -irradiated samples from those of reference. More than 92% predictability of  $\gamma$ -irradiation was achieved by cross-validation tests for both caraway and bay leaves samples, exposed even at low radiation doses [Martin Polovka\* and Milan Suhaj (Department of Chemistry and Food Analysis, Food Research Institute, P.O. Box 25, Priemysel'ná 4, SK-824 75 Bratislava, Slovak Republic), *Food Chemistry*, 2010, **119**(1), 391-401].

## Book Reviews

**Plants Affecting Human Mind: Psychoactive Plants by Dr. S K Jain, Deep Publications, B-1/118, 2<sup>nd</sup> Floor, Paschim Vihar, New Delhi- 110063, India, 2009, Hardbound, ISBN: 81-85622-19-1, Price: Rs. 700, pp. 209+xi.**

Plants which alter the state of mind or influence the functioning of central nervous system (CNS) are called psychoactive plants. They may be employed in many domains of medicine and psychiatry. Such plants occur naturally in the wild and are also grown. The literature on these plants is vast and scattered in the form of research and review papers. The present book is the first consolidated yet brief compilation on plants having biological activities that are grouped under the general term psychoactive. The plants which are used by tribals and other rural folk for various conditions of mind and nervous system have also been included in this book so that further investigation.

The book deals with about three hundred plants, most of which occur in the wild, indigenous or naturalized in India. A brief introductory background is given in Chapter I. Chapter 2 lists the scientific or the botanical Latin name, plant family, some local and English names, habit and habitat and psychoactive property. Chemistry of most of species is briefly described in a separate section. Indices of local and English names and psychoactive properties are appended. The book is illustrated with over 100 line-drawings, halftones and number of colour plates. Important chemicals obtained from different parts of various plants are described in Chapter 3. Plants having specific psychoactive activities like, anesthetic, analgesic, antihallucination or stimulant, etc are listed in Chapter 4. In chapter 5 family wise list of plants has been provided.

Though the author of this book has mentioned that it is a result of more than ten years devotion to the subject and while preparing manuscript plant taxonomists, chemists, medical officers (for discussion over medical terms) and information scientists were consulted to present the information in correct and useful manner, the psychoactive plants are less understood. Hence it is not a book of prescription for attempting treatment of any medical conditions. There has been notable interest in research on psychoactive plants in the last half century. There is still much to be investigated on pharmacological properties of plants reported in ancient literature as well as new additions based on ethnobotanical data.

Dr Jain, being an eminent taxonomist and ethnobotanist has done critical evaluation of literature and prepared the book for researchers in botany, chemistry, psychiatry and other medical scientists who believe in efficacy of natural or herbal medicine in crude form or active constituents extracted from them. The usefulness of this big compilation is beyond doubt as far as identification of the plants shown through good quality coloured pictures and line drawings given in this book. The common names index vs. botanical names appended in Chapter 6 will be highly useful for ethnobotanists and plant taxonomists both. The detailed bibliography provided at the end of the book is a bonus to its readers. Dr Jain and his team deserve appreciation for this error free, handy compilation wrapped in beautiful green cover.

**Ethnobiology: Therapeutics and Natural Resources by Dr Ashis Kumar Ghosh, Daya Publishing House, 1123/74, Deva Ram Park, Tri Nagar, Delhi-110 035, Hardbound, ISBN: 81-7035-576-1; ISBN 978-81-7035-576-2, Price: Rs. 595/US\$ 30, 2009, xvi+240p.**

Traditional knowledge on usage and conservation of natural resources is one of the most natural capital to human beings from health and livelihood point of view. As far as plant biodiversity is concerned, once it is lost, impossible to recover, same is for traditional knowledge, if it is not documented today nothing will be known tomorrow. Environmental changes, urbanization, non-judicious utilization of natural resources are the prime causes for the loss of biodiversity. Disinterest of younger generation in traditional practices and unavailability of documented records of traditional practices are the possible causes which may lead to disappearance of this

heritage in any part of the globe. So, the researchers, teachers and others who are contributing their knowledge and skill in protecting both, are doing real efforts towards the environment protection, food and health security mission as the plants which are used by tribals and other rural folk for various purposes have tremendous potentialities in new sources of raw materials for development of new drugs, food and feed for both human and veterinary care.

The literature on plants of various regions is vast and scattered in the form of research and review papers. The present book is a mirror of the traditional efforts for the utilization of natural resources. It is a compilation of research work carried out and published by the author and his team in various journals and books. The book is divided in 7 major chapters: Introduction, Beneficial plants (for human and animals), Environmental Awareness, Glossary of Medical Terms, References, List of Publications by Author in East & West and Index of Plants, Animals and Diseases.

The author of the book wish that the information given in this book may go to the farmers, potters, dye makers, sweat makers, beekeepers, herbalists who could know the potential applications of traditional heritage and it would also be useful for researchers for furthering research on preparation of various value added products and preparation of various medicines

The book will be a good companion and a helpful guide to students, research scholars, teachers and pharmaceutics. A handy compilation wrapped in beautiful cover is recommended for general reading, further research and upgradation of traditional knowledge of West Bengal region in particular and India in general.

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### **Forthcoming Conferences, Seminars, Exhibitions and Trainings**

1. International Conference on Natural Products and Biomedical Technology, 10 to 12 January 2011 Chidambaram, Tamilnadu, India; Website: <http://annamalaiuniversity.ac.in/>
2. Connecting Leather Research and Industry through Chemicals (CLRI-C) - LERIG 2011, 28 to 30 January 2011, Chennai, Tamil Nadu, India; Website: <http://clri.nic.in/lerig2011>
3. International conference on biodiversity and its conservation, 28 to 30 January 2011, Pune, Maharashtra, India; Website: [http://www.moderncollegepune.com/biodiversity\\_finalcircular.pdf](http://www.moderncollegepune.com/biodiversity_finalcircular.pdf)
4. International Conference of Biotechnology for Better Tomorrow (BTBT-2011), 6-9 February, 2011, Dr. Babasaheb Ambedkar, Marathwada, University, Aurangabad, Maharashtra, India; Website: <http://www.microbiosoc.org>; [www.bamu.net](http://www.bamu.net).
5. Current Trends in Biological Sciences, 29-30 January 2011, Ulhasnagar, Maharashtra, India, Website: <http://www.rktalrejacollege.com>
6. National Conference on Research in Chemical Sciences 2011, 1-2 February 2011, Beed, Maharashtra, India; Website: <http://www.ncrcs2011.webs.com>
7. Ramanbhai Foundation 5th International Symposium “Advances in Translational Research and Medicines”, 1-4 February 2011, Ahmedabad, Gujarat, India; Website: <http://www.rbfsymposium.net/>
8. International Conference on Chemistry for Mankind: Innovative Ideas in Life Sciences” ICCM-2011, 9 to 10 February 2011, Department of Chemistry, RTM Nagpur University, Institute of Science and S. F. S. College Nagpur, Maharashtra, India; Website: <http://www.iccm2011-rtmnu.org>
9. Conservation of Sacred Groves to Protect Local Biodiversity, 11 to 13 February 2011 CPR Environmental Education Centre, Chennai, Tamil Nadu, India; Website: <http://www.cpreec.org/>
10. Foods 2011: Processed foods - A trend beyond boundaries, 11 to 12 February 2011, M.O.P.Vaishnav College for Women, Chennai, Tamilnadu, India, Website: [http://www.mopvaishnav.ac.in/foods2011\\_brochure.pdf](http://www.mopvaishnav.ac.in/foods2011_brochure.pdf)
11. National Symposium on Integrated Farming Systems for Sustainable Agriculture- Challenges and Opportunities, 19 to 21 February 2011, Institute of Agricultural Sciences, Bundelkhand University, Jhansi, UP, India; Website: [http://www.pdfdownload.org/pdf2html/view\\_online.php?url=http%3A%2F%2Fwww.bujhansi.org%2FDocument%2FCircular%2FCircular-I](http://www.pdfdownload.org/pdf2html/view_online.php?url=http%3A%2F%2Fwww.bujhansi.org%2FDocument%2FCircular%2FCircular-I)
12. 2011 International Conference on Product Development and Renewable Energy Resources – ICPDRE 2011. 19 to 20 February 2011, Hyderabad, India; Website: <http://www.iacsit.org/icpdre/>
13. Symposium on Insect Pest Management-2011, 23 to 25 February 2011, Palayamkottai, Tamil Nadu, India; Website: <http://www.eruxavier.org>

## 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](mailto: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](mailto:sunitag@niscair.res.in); [parmod@niscair.res.in](mailto:parmod@niscair.res.in); [npr@niscair.res.in](mailto:npr@niscair.res.in)