

## **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.

The National Institute of Science Communication And Information Resources (NISCAIR), is a constituent establishment of Council of Scientific and Industrial Research (CSIR), New Delhi which houses globally renowned publications such as, The Wealth of India–An Encyclopaedia of Indian Raw Materials, 17 scholarly research journals and 2 abstracting journals, viz. Medicinal and Aromatic Plants Abstracts (MAPA) and Indian Science Abstracts (ISA). Since, MAPA and ISA have vast coverage on Medicinal and Aromatic Plants and all science subjects, respectively, we have now decided to extend our services on all plant and animals based natural products in faster mode i.e. electronically. With immense pleasure we announce launching of **Natural Products and Resources Repository (NPARR)** with open access to adequately fulfill the information needs of teachers, scientists, scholars and entrepreneurs for research and commercial products development from natural resources. Another feature of this repository is that authors can be users and contributors to this repository at the same time by sending soft copies of abstracts of their published papers with full citation and address of corresponding authors and information on technologies/know-how developed at their institute/university for placing under respective group of products/technologies. I trust that this collection will also help researchers in searching core and non-core journals on specified products.

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

# NATURAL PRODUCTS AND RESOURCES REPOSITORY (NPARR)

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

This repository is produced by systematic survey of research and review papers published in primary journals and providing abstracts/summaries and bibliographic details of applied research. It is covering information on all aspects of natural products and resources of plants and animals. The abstracts are presented in various categories viz. Beverages, Cosmetics, Dyes, Essential oils, Fats/Oils, Feed/Fodder, Fibre, Flavour/Fragrance, Food, Fruits, Fuel, Gum/Rubber, Insecticides /Fungicides/Nematicides, Oils/Fats, Poultry, Pulp/Paper, Spices/Condiments, Therapeutics, Vegetables, Wood, etc. Title, journal, author(s), address of corresponding author (Asterisk marked) of the original paper are provided for scientific reference and citation. NPARR inserts new products and technologies developed forthcoming conferences or educational event, book reviews, projects completed and theses awarded.

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**NATURAL PRODUCTS AND RESOURCES REPOSITORY (NPARR)****(A Quarterly Electronic Repository of Current Information on Natural Products and Resources)****C O N T E N T S****Volume 4, No. 3****July 2013****Products**

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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* 4(3), 2013-0239 **Purple grape juices prevent pentylentetrazol-induced oxidative damage in the liver and serum of Wistar rats****

Oxidative damages in hepatocytes may be caused by epilepsy and/or anticonvulsant drugs. Epilepsy is one of the most common neurological disorders, characterized by recurrent seizures, which may increase the content of reactive oxygen species. Organic and conventional grape juices are rich in polyphenols, compounds with important antioxidant activity. It is hypothesized that organic and conventional purple grape juices may have protective effect against oxidative damage induced by pentylentetrazole (PTZ) (a standard convulsant drug) in the liver and serum of Wistar rats. Animals (n = 16 in each group) received, by gavage, saline, organic grape juice or conventional grape juice (10  $\mu$ L/g of body weight) for 17 days. Subsequently, half of the rats in each group received PTZ (60 mg/kg). After 30 minutes, the animals were euthanized by decapitation. Liver and blood samples were isolated to evaluate oxidative parameters (lipid and protein oxidation, nitric oxide metabolite content, antioxidant defenses, and protein sulfhydryl content). The results of this study showed that although organic juice contains higher polyphenol content than conventional juice, both juices conferred protection against lipid and protein oxidative damage and limited the increase in PTZ-induced nitric oxide metabolite content in the liver and serum. In addition, both juices inhibited the PTZ-induced reduction in enzymatic antioxidant defenses (superoxide dismutase and catalase activities) and sulfhydryl protein content in the liver and serum. In summary, both organic and conventional grape juices were able to reduce oxidative damage induced by PTZ in the liver and serum of Wistar

rats [Adriana D. Rodrigues, Thamiris B. Scheffel, Gustavo Scola, Maitê T. dos Santos, Bruna Fank,

Caroline Dani, Regina Vanderlinde, João A.P. Henriques, Adriana S. Coitinho and Mirian Salvador\*(Instituto de Biotecnologia, Universidade de Caxias do Sul (UCS), Caxias do Sul, 95070-560 Rio Grande do Sul, Brazil), *Nutrition Research*, 2013, **33**(2), 120-125]

### ***NPARR* 4(3), 2013-0240 **Studies on development and storage of whey-based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage****

Whey-based pineapple and bottle gourd mixed herbal (WPBH) beverage was prepared with the incorporation of *Mentha arvensis* extract (0 to 4%). The storability of the beverage was studied at 7 $\pm$ 10C for 20 days. 10 ml each of pineapple and bottle gourd juice and 8 g of sugar were fixed per 100 ml of the herbal beverage. Whey quantity varied from 68 to 72 ml for 100 ml of the beverage depending upon the concentration of *Mentha* extract. The organoleptic scores and overall acceptability of the beverage improved with increase in *Mentha* extract from 0 to 2%. Addition of 3 and 4% *Mentha* extract decreased the beverage quality as beverage scored lower organoleptic scores. Acidity and TSS (Total Soluble Solids) content increased while pH decreased during storage. A significant decrease in ascorbic acid content was also observed during storage. The overall acceptability of the beverage was desirable up to 15 days of storage at refrigeration temperature. Whey based beverage prepared from pineapple and bottle gourd juices in combination with edible extract of herbal medicinal plants like *Mentha arvensis* will not have only excellent nutritional properties but will also possess therapeutic, prophylactic, antibacterial and organoleptic properties [Baljeet, S.Y.\*, Ritika,

B.Y. and Sarita, R. (Department of Food Technology, Maharshi Dayanand University, Rohtak-124001, India), *International Food Research Journal*, 2013, **20**(2), 607-612].

**NPARR 4(3), 2013-0241 Effect of packaging material on storage ability of mango milk powder and the quality of reconstituted mango milk drink**

Mango milk powder (MMP) was obtained after recirculatory convective drying, conditioning and grinding. The physico-chemical characteristics of fresh canned mango pulp and those of the finished product were estimated. The microbiological quality of the beverage showed the presence of low number of cfu (colony forming unit) as  $2.5 \times 10^3$  and ymc (yeast and mold count) as 3 per gram. The product was free from coliform bacteria. MMP was packaged in pouches of high density polystyrene, tin can, metalized polyesters and four ply laminates polythene aluminum foil-polythene-paper. The shelf life of mango milk powder was predicted on the basis of free flowability of product under controlled storage condition and was found to be maximum in tin containers (10 and 11 months, respectively) at  $30 \pm 1^\circ\text{C}$  and  $5 \pm 1^\circ\text{C}$  [Chauhan, A.K. and Patil, V. (Centre of Food Science and Technology, Banaras Hindu University, Varanasi-221005, India), *Powder Technology*, 2013, **239**, 86-93].

**NPARR 4(3), 2013-0242 Pomegranate juice intake attenuates the increase in oxidative stress induced by intravenous iron during hemodialysis**

The hemodialysis (HD) procedure induces oxidative stress (OS), which is further aggravated by intravenous (IV) iron administration, aimed at correcting anemia of patients with HD. We have recently shown that 1 year of pomegranate juice (PJ) intake attenuated OS and inflammation in patients with HD. In the current study, we hypothesized that a single dose of PJ can

attenuate the enhanced OS and inflammation induced by both the dialysis procedure and IV iron administration during HD session. Twenty-seven patients with HD were randomized to receive PJ or placebo during 1 dialysis session with IV iron. Blood samples were drawn before and after the session to assess OS biomarkers such as advanced oxidation protein products and myeloperoxidase (MPO), whereas polymorphonuclear leukocyte (PMNL) counts served as an indirect measure of inflammation. At the end of the dialysis session, an increase in advanced oxidation protein products and MPO levels as well as a decrease in PMNLs counts were observed in the placebo group, whereas no significant changes occurred in the PJ group. The postdialysis increase in MPO levels in the placebo group is a direct result of PMNL degranulation, associated with postdialysis decrease in PMNL counts. Degranulation of PMNLs leads to the release of other cell moieties, such as inflammatory mediators and proteases that enhance inflammation. We conclude that PJ intake attenuated the increase in systemic OS and inflammation induced by IV iron administration during the dialysis session. These beneficial effects illuminate the previously observed attenuation in OS and inflammation in patients with HD on prolonged PJ intake [Lilach Shema-Didi, Batya Kristal, Liora Ore, Galina Shapiro, Ronit Geron and Shifra Sela\* (Clinical Microbiology Lab and Eliachar Research Lab, Western Galilee Hospital, Nahariya, Israel), *Nutrition Research*, 2013, **33**(6), 442-446].

**NPARR 4(3), 2013-0243 Acute and chronic caffeine administration increases physical activity in sedentary adults**

Caffeine is a commonly used stimulant thought to have ergogenic properties. Most studies on the ergogenic effects of caffeine have been conducted in athletes. The purpose of this study was to test the hypothesis that caffeine reduces ratings of perceived exertion and

increases liking of physical activity in sedentary adults. Participants completed treadmill walking at 60% to 70% of their maximal heart rate at baseline and for 6 subsequent visits, during which half of the participants were given caffeine (3 mg/kg) and half given placebo in a sports drink vehicle. To investigate the potential synergistic effects of acute and chronic caffeine on self-determined exercise duration, participants were rerandomized to either the same or different condition for the last visit, creating 4 chronic/acute treatment groups (placebo/placebo, placebo/caffeine, caffeine/placebo, caffeine/caffeine). Participants rated how much they liked the activity and perceived exertion at each visit. There was a main effect of time on liking of physical activity, with liking increasing

over time and an interaction of sex and caffeine treatment on liking, with liking of activity increasing in female participants treated with caffeine, but not with placebo. There was no effect of caffeine on ratings of perceived exertion. Individuals who received caffeine on the final test day exercised for significantly longer than those who received placebo. These data suggest that repeated exposure to physical activity significantly increases liking of exercise and reduces ratings of perceived exertion and that caffeine does little to further modify these effects [Patrick Schrader, Leah M. Panek, Jennifer L. Temple\* (Department of Exercise and Nutrition Sciences, School of Public Health and Health Professions, University at Buffalo, Buffalo, NY), *Nutrition Research*, 2013, **33**(6), 457-463].

## COSMETICS/COSMECEUTICALS

### **NPARR 4(3), 2013-0244 Formulation and evaluation of herbal sindoor using different natural/herbal ingredients**

Sindoor is one of the key cosmetics used by the married women of our countries. In present days the use of such product has increased and choice of shades of color and texture have been changed and become wider. The present investigation was done to formulate herbal sindoor using different natural ingredients, as these preparations are one of the key cosmetics to be used by the married women of our country. The sindoor was formulated using five different natural coloring agents in four batches (F1 to F4) and were evaluated. It was found from the present investigation that F3 has good results as compared to other formulated herbal sindoor, though a detailed clinical efficacy is still needed to establish safety profile of the formulation [Shivam Samariya, Sumeet Dwivedi, Shweta Patil, Debadash Panigrahi \* and Hemant Joshi (Ujjain Institute of Pharmaceutical Sciences, Ujjain, MP, India), *International Journal of Pharmacy Teaching & Practices*, 2013, 4(3), 752-754]

### **NPARR 4(3), 2013-0245 Formulation and Evaluation of herbal cosmetic cream to produce multipurpose effect on skin**

The aim of present study was to formulation and evaluation of the cream comprising extracts of natural products such as *Ocimum sanctum* and *Daucus carota*. Different types of formulations oil in water (O/W) herbal creams namely F1 to F3 were formulated by incorporating in cream base. The evaluations of all formulations (F1 to F3) were done on different parameters like pH, viscosity, spreadibility and stability were examined. Formulations F1 and F2 showed good spreadibility, good consistency, homogeneity, appearance, pH, spreadibility, no evidence of phase separation and ease of

removal. The formulation F1 and F2 shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin. These studies suggest that composition of extracts and base of cream of F1 and F2 are more stable and safe, it may produce synergistic action [Sharma Ankus\* and Prasar Bharat (Department of Pharmaceutical Sciences, Manav Bharti University, Laddo, Solan-173229 (H.P.), India), *Research Journal of Topical and Cosmetic Sciences*, 2013, 4(1), ]

### **NPARR 4(3), 2013-0246 Formulation and evaluation of natural lipsticks prepared from *Bixa orellana* seeds and *Beta vulgaris* root extract and their comparative study.**

Cosmetics are incredible in demand since historical time till day. Lipstick formulations are most widely used to enhance the beauty of lips and add glamors to touch to the makeup. With this aim and objectives, an attempt was made to formulate natural lipsticks by using colouring pigments of *Bixa orellana* linn seeds and *Beta vulgaris* linn root and the lipsticks were evaluated for their organolaptic properties such as spreading, hardness, shine and gloss and found to be satisfactory product to give attractive beauty. The preparation of this lipsticks with the natural ingredients like *Bixa* seeds, Beet root ,Olive oil, Ripe fruit powder of shikakai. Due to various adverse effects of available synthetic preparation ,the present work was conceived by us to formulate a herbal lipsticks having minimal or no side effects which will extensively used by the women of our communities with great surety and satisfaction [Deshmukh, Swati; Sutar, Manisha; Kumar, Sonia; Kanade, Pawankumar M.; Panke, Dhiraj and Ganesh, *International Journal of Pharmacy & Pharmaceutical Sciences*, 2013, 5 (Suppl 4), 68-70].

### **NPARR 4(3), 2013-0247 Honey in dermatology and skin care: a review**

Honey is a bee-derived, supersaturated solution composed mainly of fructose and glucose, and containing proteins and amino acids,

vitamins, enzymes, minerals, and other minor components. Historical records of honey skin uses date back to the earliest civilizations, showing that honey has been frequently used as a binder or vehicle, but also for its therapeutic virtues. Antimicrobial properties are pivotal in dermatological applications, owing to enzymatic  $H_2O_2$  release or the presence of active components, like methylglyoxal in manuka, while medical-grade honey is also available. Honey is particularly suitable as a dressing for wounds and burns and has also been included in treatments against pityriasis, tinea, seborrhea, dandruff, diaper dermatitis, psoriasis, hemorrhoids, and anal fissure. In cosmetic formulations, it exerts emollient, humectant, soothing, and hair conditioning effects, keeps the skin juvenile and retards wrinkle formation, regulates pH and prevents pathogen infections. Honey-based cosmetic products include lip ointments, cleansing milks, hydrating creams,

after sun, tonic lotions, shampoos, and conditioners. The used amounts range between 1 and 10%, but concentrations up to 70% can be reached by mixing with oils, gel, and emulsifiers, or polymer entrapment. Intermediate-moisture, dried, and chemically modified honeys are also used. Mechanisms of action on skin cells are deeply conditioned by the botanical sources and include antioxidant activity, the induction of cytokines and matrix metalloproteinase expression, as well as epithelial-mesenchymal transition in wounded epidermis. Future achievements, throwing light on honey chemistry and pharmacological traits, will open the way to new therapeutic approaches and add considerable market value to the product [Bruno Burlando\* and Laura Cornara (Dipartimento di Scienze e Innovazione Tecnologica, DiSIT, Università del Piemonte Orientale “Amedeo Avogadro”, Alessandria, Italy), *Journal of Cosmetic Dermatology*, 2013, **12**( 4), 306-313].

## DYES (incl. Food colorants)

### NPARR 4(3), 2013-0248 **Printing of wool, cotton fabrics with natural dyes**

Natural dyes are the heritage of the history to human being. Although they were used for the colouration of goods from the ancient time, it is not common to use natural dyes commercially now. But at least in some special goods it is saving its popularities too. On the other hand, it can be foreseen that the demand on the ecological, natural and organic products in all consumable articles will make natural dyes popular again. Owing to this, it is important to continue the studies on the usability of natural dyes in textile colouration techniques. This study is focused on the printing of natural dyes differently on dyeing with natural dyes. For this aim four different natural sources were used. For the printing process, pigment printing was selected and the printing was managed on wool and cotton fabrics without use of any mordants. The colour values and the fastnesses of prints were evaluated. It was observed that the natural dyes can be used in pigment printing processes and different colour values with different fastnesses could be observed [Bahtiyari, M.I\*, Benli, H. and Yavas, A. (Textile Engineering Department, Erciyes University, Kayseri, Turkey), *Asian Journal of Chemistry*, 2013, **25**(6), 3220-3224].

### NPARR 4(3), 2013-0249 **Dyeing of silk fabric with *Cuminum cyminum* L. as a source of natural dye**

In the present study an attempt has been made to dye the silk fabric with *Cuminum cyminum* L., commonly known as cumin seeds, as a source of natural dye which has not been exploited as natural dye by far. Optimization of natural dye extraction from cumin seeds with respect to buffer medium; acidic, neutral and alkaline and dyeing parameters viz., dyeing time, dyeing temperature, electrolyte concentration to aid exhaustion was done. Dyeing of silk fabric

was carried out with the aqueous extract of cumin seeds with and without mordant. Dyeings obtained without mordants were compared with those obtained by pre-mordanting with Tannic acid and various Metallic mordants viz., Potassium aluminium sulphate, Ferrous sulphate, Copper sulphate, Stannous chloride and Potassium dichromate and their combinations. Findings show that the natural dye extracted from cumin seeds has good potential in the textile dyeing and can be exploited further [Tayade, P.B. and Adivarekar, R.V.\* (Department of Fibres and Textile Processing Technology, Institute of Chemical Technology, Matunga, Mumbai, Maharashtra, India), *International Journal of ChemTech Research*, 2013, **5**(2), 699-706].

### NPARR 4(3), 2013-0250 **Investigation on the dyeing power of some organic natural compounds for a green approach to hair dyeing**

Organic compounds present in plants have been used in various experimental conditions for dyeing tests aimed to develop safe and environmentally friendly temporary and semipermanent hair dyes. Yak hairs were used as a model for the colorimetric evaluation of red, yellow, blue, and brown shades conferred to hair by selected natural compounds. Two different sources for red, yellow, blue and brown shades were tested. Anthocyanins from mulberry fruits and alizarin emerged as promising candidates for red shades, anthocyanin-blue and curcumin for blue and yellow, respectively, and p-benzoquinone and juglone for browns. The influence of pH, dye concentration, soaking time, and medium in which the dyes have been dissolved or dispersed has been studied [Boga, C.\* , Delpivo, C., Ballarin, B., Morigi, M., Galli, S., Micheletti, G. and Tozzi, S. (Dipartimento di Chimica Organica 'A. Mangini', Alma Mater Studiorum, Università di Bologna, Viale del Risorgimento 4, 40136 Bologna, Italy), *Dyes and Pigments* 2013, **97**(1), 9-18].

**NPARR 4(3), 2013-0251 Purification and incorporation of the black ink of cuttlefish *Sepia officinalis* in eye cosmetic products**

Synthetic colours used in cosmetics are a point of concern, and biotechnology has, to a certain extent, helped to resolve this problem. The present study aimed to integrate dyes from a natural extract, the black ink of cuttlefish *Sepia officinalis*, after purification, in black eye make-up products (mascara and eyeshadow). Analyses showed differences in the chemical composition of treated and untreated forms of sepia black ink. Indeed, remarkable reductions in total mineral load, water content and proteins (79.3, 58.22 and 44% respectively) were noted. Treated sepia black ink had a low content of analytes. Very satisfactory results were obtained in terms of the level of aspect, texture, colour and covering capacity of the formulated cosmetic products. Moreover, the addition of *S. officinalis* black ink to iron oxide and black bone dyes improved the level of colour, spread and covering capacity of mascara and eyeshadow [Neifar, A.\*, Ben Abdelmalek, I., Bouajila, G., Kolsi, R., Bradai, M.N., Abdelmouleh, A., Gargouri, A. and Ayed, N (Laboratory of Biodiversity and Marine Biotechnology (INSTM) - Sfax, Institut National des Sciences et Technologies de la Mer, Sfax, Tunisia), *Coloration Technology*, 2013, **129**(2), 150-154].

**NPARR 4(3), 2013-0252 Studies on the application of natural dye extract from *Bixa orellana* seeds for dyeing and finishing of leather**

The types of dyestuff that are used by tanneries generally vary depending on the product range needed along with the dictates of the fashion world. It is a fact that each tannery uses between 50 and 100 different types of dyestuffs. Leather industry primarily uses dyestuffs such as acid, basic, metal complex, reactive and sulfur dyes. Many of the synthetic dyes used for leather dyeing are difficult to degrade due to their complex structure and xenobiotic properties. Hence, there is a need for development of more degradable or natural materials for use as a coloring agent for leathers, which would be eco benign. Thus, the present study aims at extraction of color from *Bixa orellana* seeds and employing the same in dyeing and finishing of leather. The leathers dyed and finished using the natural dye extract showed better coloring properties. It is the first time, where this material is reported for their use in leather processing [Tamil Selvi, A\*, Aravindhan, R., Madhan, B. and Raghava Rao, J. (Centre for Human and Organizational Resources Development, Central Leather Research Institute, Council of Scientific and Industrial Research, Adyar, Chennai 600 020, India), *Industrial Crops and Products*, 2013, **43**(1), 84-86].

## ESSENTIAL OILS (incl. Flavour and Fragrance)

### NPARR 4(3), 2013-0253 **Antioxidant status of fruit peel of *Citrus reticulata* essential oil on 1, 2 dimethyl hydrazine induced rat colon carcinogenesis**

In this study 1, 2 Dimethyl hydrazine is used as a chemical agent for producing specific type of colon cancer by methylation of the DNA, membrane lipid peroxidation, protein oxidation, cell destruction, altering the cell signaling etc. In cellular redox process, release the by-product reactive oxygen species and reactive nitrogen species free radicals. The enzymic antioxidant such as GSH, GPx, CAT, etc. scavenge free radicals and help to decrease the incidence of oxidative stress induced damage. Plants antioxidant can easily donate electrons to reactive free radicals and thus retard radical chain reactions. Hence, the present study was selected an extract of *Citrus reticulata* essential oil (CREO). Results were observed in Erythrocyte lysate levels of LPO increased and decreased the levels of GSH, GPx and CAT, where as in colon homogenate decreased the levels of LPO and CAT, where as increased the levels of GSH, GPx, levels of SGPT, SGOT, and ALP increased in DMH group. Also fecal and colon homogenates bacterial enzymes  $\beta$ -Glucosidase,  $\beta$ -Glucuronidase and mucinase were increased levels in DMH group as compared to control. Administration of CREO to DMH treated rats significantly reverse the oxidative stress and may acts as a chemopreventive agent to DMH rats [Sanganna, B.\* and Kulkarni, A.R. (Karpagam University, Coimbatore, India), *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 2013, 4(1), 340-349].

### NPARR 4(3), 2013-0254 **Phytochemical profile and antioxidant activity of the essential oil from *Blumea eriantha* DC.**

The present study was designed to evaluate the phytochemical composition and

antioxidant activity of essential oil from *Blumea eriantha* DC. collected from Seawoods, Navi Mumbai (Maharashtra, India). The essential oil was extracted by hydrodistillation using Clevenger type apparatus and subjected to GC-FID, GC-MS and HPTLC analysis. Furthermore antioxidant activity of essential oil was investigated by 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. Total 72 compounds were identified representing 96.83% of the oil. The main components of the essential oil are Ocim-(4E,6Z)-ene <allo->(13.72%), Caryophyllene <(E)-> (9.71%), Caryophyllene oxide (5.76%), Carvotanacetone (5.36%), Pinene <alpha-> (3.90%), Eudesmol <7-epi-alpha-> (3.74%). HPTLC fingerprint of essential oil was also developed in order to carry out easy and fast identification of essential oil constituents. The oil showed activity as a radical scavenger at  $437.92 \pm 4.22 \mu\text{g/ml}$ . The present study describes the phytochemical profile and antioxidant activity of essential oil from *Blumea eriantha* DC. These findings will be helpful in further application of this plant in cosmetics as well as traditional medicines [Pednekar, P.P.\*, Vakil, B.V., Sane, R.T., Datar, A.G. (Guru Nanak Institute for Research and Development, G. N. Khalsa College, Matunga, Mumbai 400019, Maharashtra, India), *International Journal of Pharmacy and Pharmaceutical Sciences*, 2013, 5(1), 404-413].

### NPARR 4(3), 2013-0255 **Solvent-free microwave extraction of essential oil from aromatic herbs: From laboratory to pilot and industrial scale**

Solvent-free microwave extraction (SFME) has been proposed as a green method for the extraction of essential oil from aromatic herbs that are extensively used in the food industry. This technique is a combination of microwave heating and dry distillation performed at atmospheric pressure without any added solvent or water. The isolation and concentration of

volatile compounds is performed in a single stage. In this work, SFME and a conventional technique, hydro-distillation HD (Clevenger apparatus), are used for the extraction of essential oil from rosemary (*Rosmarinus officinalis* L.) and are compared. This preliminary laboratory study shows that essential oils extracted by SFME in 30 min were quantitatively (yield and kinetics profile) and qualitatively (aromatic profile) similar to those obtained using conventional hydro-distillation in 2 h. Experiments performed in a 75 L pilot microwave reactor prove the feasibility of SFME up scaling and potential industrial applications [Aurore Filly, Xavier Fernandez, Matteo Minuti, Francesco Visinoni, Giancarlo Cravotto and Farid Chemat\*(Université d'Avignon et des pays du Vaucluse, INRA, UMR408, GREEN Extraction Team, F-84000 Avignon, France), *Food Chemistry*, 2014, **150**, 193-198].

**NPARR 4(3), 2013-0256 Essential oil composition of fresh ginger cultivars from North-East India**

Essential oils of seventeen cultivars of fresh ginger from North-East India were isolated by hydrodistillation and chemoprofiled by gas chromatograph (GC) and GC–mass spectrometry (GC–MS) analysis. Among all the constituents of

essential oil, seventeen major constituents of all cultivars were emphasized. Major volatile constituents including camphene ( $8.49\pm 0.41\%$ ), neral ( $4.95\pm 0.34\%$ ), geranial ( $12.36\pm 0.46\%$ ), zingiberene ( $20.98\pm 2.34\%$ ) and  $\beta$ -sesquiphellandrene ( $7.96\pm 0.66\%$ ) were observed. Assam Fibreless cultivar showed highest yield of essential oil ( $4.17\pm 0.05\%$ ) and higher monoterpene hydrocarbon content ( $38.65\pm 0.11\%$ ) than sesquiterpene hydrocarbon ( $25.38\pm 2.3\%$ ), which is unique among all cultivars. Among all these cultivars, Assam Tinsukia had the highest citral content ( $23.66\pm 1.60\%$ ) and Meghalaya mahima had the highest zingiberene content ( $29.89\pm 0.42\%$ ). These results can serve as a valuable database for ascertaining the quality of fresh ginger for trading and manufacturing sectors engaged in ginger processing. This study is the first of its kind where the essential oil compositions of seventeen major ginger cultivars from North-East India are identified and compared [Challa Ravi Kiran, Ashok Kumar Chakka, K.P. Padmakumari Amma, A. Nirmala Menon, M.M. Sree Kumar and V.V. Venugopalan\* (Agroprocessing and Natural Products Division, National Institute for Interdisciplinary Science and Technology, Council of Scientific and Industrial Research, Trivandrum, India), *Journal of Essential Oil Research*, 2013, **25**(5), 380-387].

## FEED/FODDER

### **NPARR 4(3), 2013-0257 Dairy cattle, green fodder feeding practices in milkshed and non-milkshed areas of Bikaner district (Rajasthan)**

Green fodder was available in plenty during rainy season, while in summer season very less quantity of green fodder was available to the animals, whereas only 5.55% in milkshed area and 4.44% in non-milkshed area cattle keepers' fed green fodder to their cattle's throughout the year. Types of green fodder fed to dairy cattle were grasses (Sewan and Bhurut), moth Bajra and jawar chari are predominantly green fodder in both the areas. However, a small percentage (5.55% in milkshed and 4.44% in non-milkshed) of farmers fed lucerne and Berseem. Majority (75.55%) of the dairy cattle keepers produced more than 200 quintals green fodder in milkshed area, whereas in non-milkshed area was produced this quantity by 53.33% farmers. Season wise consumption of green fodder was significantly higher in milkshed areas as compared to non-milkshed area in rainy season. Significantly higher (86.67%) percent of cattle keeper chopped the green fodder before feeding to dairy cattle in milkshed area. The significant effect on operation flood program of milkshed area was observed towards chaffing of green fodder. However feeding green fodder, self sufficiency in green fodder production had no significant difference in milkshed and non-milkshed areas [Ramavtar Sharma, *Environment and Ecology*, 2013, **31**(1), 25-28].

### **NPARR 4(3), 2013-0258 An assessment of nutrient content of underutilized grass species of South India**

In the past and now most of the developments in conventional agriculture have concentrate on major grasses with little attention to the minor, underutilized grasses and as yet undeveloped grasses of livestock. Many underutilized grass

species are being lost each day and more of which have unknown potential will be lost. The present study is undertaken to carry out the nutrient content of twenty grass species of family Poaceae, commonly found in waste lands of South India to screen some nutritive values. The moisture content of the grass species varied between 42% to 71%, protein content 1.66% to 5.43%, sugar 1 % to 3.54%, starch from 7% to 17.74% and cellulose ranged from 1.79% to 7.60% of dry weight. Among the twenty grass species *Eragrostis amabilis* showed high nutritive value, followed by *Cynodon dactylon*, *Pycnus flavidus*, *Digitaria sanguinalis* and *Brachiaria racemosa*. Hence, these grass species of high nutritive value can be chosen for feeding the live stock [Hari Babu R and N. Savithramma, *International Journal of Pharma & Bio Sciences*, 2013, **4**(3), pB-334-B-340].

### **NPARR 4(3), 2013-0259 Feeding management practices of dairy farmers under village conditions of Tamil Nadu**

A survey was conducted in three blocks of Namakkal district by selecting 50 dairy cooperative society farmers per block, totaling 150 farmers. The data on the concentrate feed, green and dry fodder resources, feeding management practices were collected from the selected farmers by personal contact, using pre-tested schedule. The overall average number of cows available per farmer was 3.12. Except one farmer, all the farmers had followed individual feeding system. In general, majority of the farmers followed sorghum fodder feeding either alone or combined with field grass or Co-3 grass. In dry fodder feeding, maximum number of farmers used sorghum stover either singly or in combination with either paddy straw or groundnut hay. Maximum number of farmers had green fodder availability either only during post monsoon period or during rainy season or both. Majority of the farmers derived the green fodder either from cultivation or collected from field.

Only about one-fourth of the farmers had green fodder availability throughout the year. Average dry matter intake for milch cattle, pregnant cum dry animal and calves through concentrate, green and dry fodder were 3.04, 2.37, 3.29; 1.06, 1.60, 2.75; and 0.32, 0.39, 0.91 kg, respectively. 91.33 per cent of the farmers had poor knowledge on improvement of fat and SNF content of milk and only 8 per cent had fair knowledge. Only 6.67 per cent farmers attempted either mineral mixture or calcite for improvement of fat and SNF content of milk and experienced positive response [Singh, D. A. P.; Saravanakumar, V. R.; Sivakumar, K.; Ramesh, V. and Muralidharan, J., *Indian Journal of Field Veterinarians*, 2013, **8**(4), 11-13].

**NPARR 4(3), 2013-0260 Feeding of safflower (*Carthamus tinctorius*) cake in small ruminant total mixed rations: effects on growth traits and meat fatty acid composition**

Little scientific information is available that has evaluated safflower (*Carthamus tinctorius*) cake as a substitute to conventional ingredients in small ruminants diet. The objective of this work was to evaluate the effect of feeding safflower cake in total mixed rations (TMRs) on lamb and kid growth rates, carcass traits and meat

fatty acid composition. Two consecutive trials were conducted using *Comisana* breed lambs and *Garganica* breed kids. Animals were randomly allocated to two isocaloric and isonitrogenous TMRs formulated to meet or exceed nutritional requirements, and consisted of the control diet and an experimental diet contained safflower cake. Animals were slaughtered after the feeding trial which lasted 50 days and the carcass traits and meat quality were evaluated. In both slaughter trials, none of the parameters studied were ( $P > 0.05$ ) influenced by dietary treatments except for slaughter weight and cold-carcass dressing that were improved in lambs fed safflower. Feeding the safflower diet resulted in significantly lower saturated fatty acid (SFA) content in meat, as well as the n-6/n-3 polyunsaturated fatty acid (PUFA) ratio and saturation, atherogenic and thrombogenic indexes, while total PUFA and monounsaturated fatty acids (MUFA) as well as the indices related to human health increased. These results suggest that including safflower cake in diet for small ruminants can produce meat with an improved meat lipid profile. As result, safflower maintained carcass yields with no detrimental effect on meat quality [Tufarelli, V., Vicenti, A., Ragni, M., Pinto, F. and Selvaggi, M., *Iranian Journal of Applied Animal Science*, 2013, **3**(2), 243-247].

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

#### **NPARR 4(3), 2013-0261 Effect of various metallic salts on antibacterial activity and physical properties of cotton fabrics**

In this research work, the antibacterial activity of inoculated cotton fabric in various metallic salts was investigated. Copper chloride, nickel nitrate, silver nitrate, cobalt oxide, antimony oxide, titanium oxide and tin chloride were used as metallic salts. Very good antibacterial activity for silver-, copper-, nickel- and cobalt-treated fabrics were achieved, however, the effect of titanium and tin on antibacterial efficiency of cotton fabrics was moderate. The scanning electron microscope was used for morphological study. Also, the crystallinity and size of crystals for inoculated and untreated samples were studied by using X-ray diffraction method [M Ghoranneviss\* and S Shahidi (Faculty of physics, Islamic Azad University, Karaj Branch, Karaj, Iran), *Journal of Industrial Textiles*, 2013, **42**(3) 193-203].

#### **NPARR 4(3), 2013-0262 Influence of spinning parameters on milkweed/cotton DREF-3 yarn properties**

In this study, *Pergularia* milkweed fibre (70%), cotton fibre (30 %) core and 100% cotton fibre sheath DREF-3 core yarns of 74 tex were produced using different spinning parameters in order to understand their effect on yarn properties. Box–Behnken design was used for the optimization of core ratio, drum speed and suction pressure, and to evaluate the effects and interactions of the process variables on the yarn properties at a constant opening roller speed of 12,000 rpm and production speed of 100 m/min. The effects of the core/sheath ratio on all the yarn properties are significant. With an increase in the core/sheath ratio, yarn tenacity and elongation

decrease due to insufficient wrapper fibres in the yarn and yarn unevenness; imperfection increases due to higher feed rate and draft at higher core ratio. The yarn hairiness increases at higher core ratio due to higher number of short fibres in milkweed and lesser sheath fibres to cover the core fibres effectively. An increase in the spinning drum speed damages fibre in the sheath and increases the number of hooks at the end of fibres, as a result of which the core yarn tenacity decreases at higher drum speed. At a higher air suction pressure, yarn tenacity and the elongation at break increases. The drum speed and suction pressure have no significant effect on yarn unevenness and imperfections. The yarn hairiness decreases slightly with increase in drum speed and suction pressure but is insignificant [T. Karthik\* and R. Murugan (Department of Textile Technology, PSG College of Technology, Coimbatore, India), *The Journal of The Textile Institute*, 2013, **104**(9), 938-949].

#### **NPARR 4(3), 2013-0263 Extraction of high quality cellulose from the stem of *Calotropis procera***

The stem of *Calotropis procera* (vern. *Aak*) is a source of natural cellulosic bast fibres wherein the commercially valuable properties like cellulose content, fiber strength and fiber elongation are found to be intermediate between that of cotton and linen. Other than high tensile and abrasive strength, fibers from *C. procera* possess more weight per square meter than the cotton fibers. We have been trying to standardize protocol for isolation of high quality cellulose from *Calotropis*. We have compared the effects of alkali treatment and acid treatment on the yield and quality of cellulose fibers obtained. When the retted stems of *C. procera* were treated with 0.5N NaOH, the natural yield of cellulose fibers was approximately 6%. The efficiency of cellulose extraction was increased to 26% when the fibers were treated with 80% acetic acid and concentrated nitric acid (10:1). The percentage composition of cellulose was determined through infrared spectroscopy and acid detergent fiber

method by refluxing. Acid treated fibers show higher percentage of cellulose content (85%) compared to the alkali treated method. The cellulose content in fibers obtained through acid treatment is comparable with that of cotton and better than linen. The acid treated method requires significantly less time compared to the alkali treated method. Since *Calotropis* is a

wildly growing shrub in major parts of India, its use as a source of excellent cellulose fibers might have enormous economical implications [Somnath Maji, Rajesh Mehrotra and Sandhya Mehrotra\*(Department of Biological Sciences, Birla Institute of Technology and Science, Pilani, Rajasthan, India), *South Asian Journal of Experimental Biology*, 2013, **3**(3), 113-118].

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

### **NPARR 4(3), 2013-0264 Peanut consumption in adolescents is associated with improved weight status**

Studies have shown an association between nut consumption and health benefits in adults such as lower lipid levels, lower body mass indices, and reduced risk of coronary artery disease. Few studies have demonstrated these health benefits in children. To determine the association between peanut consumption and weight, intake of nutrients of concern, high-density lipoprotein, low-density lipoprotein, and cholesterol in Mexican American children, baseline data from 262 sixth-grade students (48% female) in a school-based weight management program were analyzed to compare differences between peanut and non-peanut eaters. It was hypothesized that Mexican American children who consume peanuts will be less overweight and have a better nutrient and lipid profile when compared to those who do not eat peanuts. Participants completed a food frequency questionnaire as a baseline dietary assessment before beginning the program. Children were identified as either a peanut consumer (n = 100) or non-peanut consumer (n = 162). Body mass index measurements were taken on all participants. A smaller sample of participants submitted blood for lipid analysis. Analyses revealed that children in the peanut consumer group were less likely to be overweight or obese than children in the non-peanut consumer group ( $\chi^2 = 13.9$ ,  $P = .001$ ), had significantly higher intakes of several vitamins and micronutrients (i.e., magnesium, vitamin E), and had lower low-density lipoprotein and total cholesterol levels. These results illustrate that consumption of peanuts and/or peanut butter is associated with lower weight status, improved diet, and lipid levels among Mexican American children. Future research is needed to clarify the role of peanut

consumption in children's overall health [Jennette Palcic Moreno\*, Craig A. Johnston, Abeer A. El-Mubasher, Maria A. Papaioannou, Chermaine Tyler, Molly Gee and John P. Foreyt (Department of Pediatrics-Nutrition, Baylor College of Medicine, USDA/ARS Children's Nutrition Research Center, Houston, TX 77030), *Nutrition Research*, 2013, **33**(7), 552-556].

### **NPARR 4(3), 2013-0265 Daily flaxseed consumption improves glycemic control in obese men and women with pre-diabetes: a randomized study**

The study hypothesis was that fasting glucose, insulin, fructosamine, C-reactive protein, and interleukin-6 decrease and adiponectin increases with daily flaxseed consumption in overweight or obese individuals with pre-diabetes. In this randomized, cross-over study overweight or obese men and postmenopausal women (n = 25) with pre-diabetes consumed 0, 13, or 26 g ground flaxseed for 12 weeks. Glucose, insulin, homeostatic model assessment (HOMA-IR), and normalized percent of  $\alpha$ -linolenic fatty acid (ALA) were significantly different by treatment (multiple analysis of variance,  $P = .036$ ,  $P = .013$ ,  $P = .008$ ,  $P = .024$  respectively). Paired  $t$  tests showed glucose decreased on the 13 g intervention compared to the 0 g period [13g =  $-2.10 \pm 1.66$  mg/L (mean  $\pm$  SEM), 0 g =  $9.22 \pm 4.44$  mg/L,  $P = .036$ ]. Insulin decreased on the 13 g intervention but not the 26 g ( $P = .021$ ) and 0 g ( $P = .013$ ) periods (13 g =  $-2.12 \pm 1.00$  mU/L, 26 g =  $0.67 \pm 0.84$  mU/L, 0g =  $1.20 \pm 1.16$  mU/L). HOMA-IR decreased on the 13 g period but not on the 26 g ( $P = .012$ ) and 0 g ( $P = .008$ ) periods (13g =  $-0.71 \pm 0.31$ , 26g =  $0.27 \pm 0.24$ , 0g =  $0.51 \pm 0.35$ ). The  $\alpha$ -linolenic fatty acid decrease for the 0 g period was different than the 13 g ( $P = .024$ ) and 26 g ( $P = .000$ ) periods (13 g =  $0.20 \pm 0.04$ , 26g =  $0.35 \pm 0.07$ , 0g =  $-0.01 \pm 0.07$ ). Fructosamine, high sensitivity C-reactive protein, adiponectin, and high-sensitivity interleukin-6 had no significant

differences. Flaxseed intake decreased glucose and insulin and improved insulin sensitivity as part of a habitual diet in overweight or obese individuals with pre-diabetes [Andrea M. Hutchins\*, Blakely D. Brown, Stephen C. Cunnane, Stephanie G. Domitrovich, Earle R. Adams and Courtney E. Bobowiec (University of Colorado Colorado Springs, Colorado Springs, CO), *Nutrition Research*, 2013, **33**(5), 367-375].

**NPARR 4(3), 2013-0266 Jerusalem artichoke powder as a food additive in dairy products and fat replacers**

The aim of the present study was to investigate whether the Jerusalem artichoke powder produced by a simple drying method is suitable for replacing inulin in dairy products and in fat replacer mixtures. Rheological properties of milk drinks were tested by rotational method measuring the flow curve and fitting the Herschel-Bulkley model. The Jerusalem artichoke powder showed similar rheological behaviour as the commercially available inulin and proved to be a more effective thickener in milk drinks as indicated by the higher consistency values at the same concentration. Panelists found milk drinks prepared with Jerusalem artichoke powder to have similar sensorial quality as prepared with inulin. Fat replacer mixtures were tested by oscillatory tests using amplitude sweep method. The samples containing Jerusalem artichoke powder had lower complex viscosity and initial  $G'$  and  $G''$  values indicating weaker gel forming properties compared to inulin. However, lower slope of  $G'$  and  $G''$  indicated their better spreadability. The organoleptic texture properties of fat replacer prepared with Jerusalem artichoke powder proved to be slightly better than that of the inulin containing mixture. Based on our results, the Jerusalem artichoke powder seems to be suitable to replace inulin as a natural additive in certain food products [P. Penksza, R. sárosi, R. Juhász\*, K. Manninger-kóczán, B. Szabó-Nótin<sup>1</sup>, L.

Szakács and J. Barta (Corvinus University of Budapest Department of Food Preservation, Faculty of Food Science Villányi út 29-43 H-1118 Budapest Hungary), *Acta Alimentaria*, 2013, **42**(1), 53-62].

**NPARR 4(3), 2013-0267 Winter wheat hull (husk) is a valuable source for tricetin, a potential selective cytotoxic agent**

The flavone, tricetin (5, 7,4'-trihydroxy-3',5'-dimethoxyflavone) has great potential as an anticancer agent, due to its specific chemopreventive activity. In spite of these characteristics, its use in preclinical studies is still limited, mainly because of its limited availability and high production cost. Tricetin is found mainly in cereal grains, such as wheat, rice, barley, oat and maize. However, its concentration in these plants is not sufficient for commercial use. To find a reliable, rich source of tricetin, we investigated its distribution in different parts of wheat (*Triticum aestivum*) and designed an efficient method for its isolation and purification. The highest amount ( $770 \pm 157$  mg/kg dry weight) was found in the husks of winter wheat. This concentration is one of the highest in any plant species and is considered as a cheap source of natural tricetin. The purified wheat husks tricetin was found to be a selective potent inhibitor of two cancer cell lines of liver and pancreas, while having no side effects on normal cells. This selective action suggests that tricetin could be considered as a potential candidate for pre-clinical trials as a chemopreventive agent. In addition, fibre-rich crude wheat husk could be used as a natural chemopreventive agent in food supplement [Amira Moheb, Melanie Grondin, Ragai K. Ibrahim, René Roy and Fathey Sarhan\* (Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 8888, Succursale Centre-ville, Montréal, Québec, Canada H3C 3P8), *Food Chemistry*, 2013, **138**(2-3), 931-937].

## FRUITS

### **NPARR 4(3), 2013-0268 Pomegranate and type 2 diabetes**

Over the last decade, various studies have linked pomegranate (*Punica granatum* Linn), a fruit native to the Middle East, with type 2 diabetes prevention and treatment. This review focuses on current laboratory and clinical research related to the effects of pomegranate fractions (peels, flowers, and seeds) and some of their active components on biochemical and metabolic variables associated with the pathologic markers of type 2 diabetes. This review systematically presents findings from cell culture and animal studies as well as clinical human research. One key mechanism by which pomegranate fractions affect the type 2 diabetic condition is by reducing oxidative stress and lipid peroxidation. This reduction may occur by directly neutralizing the generated reactive oxygen species, increasing certain antioxidant enzyme activities, inducing metal chelation activity, reducing resistin formation, and inhibiting or activating certain transcriptional factors, such as nuclear factor  $\kappa$ B and peroxisome proliferator-activated receptor  $\gamma$ . Fasting blood glucose levels were decreased significantly by punicalic acid, methanolic seed extract, and pomegranate peel extract. Known compounds in pomegranate, such as punicalagin and ellagic, gallic, oleanolic, ursolic, and uallic acids, have been identified as having anti-diabetic actions. Furthermore, the juice sugar fraction was found to have unique antioxidant polyphenols (tannins and anthocyanins), which could be beneficial to control conditions in type 2 diabetes. These findings provide evidence for the anti-diabetic activity of pomegranate fruit; however, before pomegranate or any of its extracts can be medically recommended for the management of type 2 diabetes, controlled, clinical studies, are needed [Saleem Banihani\*, Samer Swedan, and Ziyad Alguraan (Department of Medical Laboratory Sciences, Jordan University of

Science and Technology, Irbid 22110, Jordan), *Nutrition Research*, 2013, **33**(5), 341-348].

### **NPARR 4(3), 2013-0269 Influence of chemical and bio-fertilizers on growth, flowering, fruit yield and quality of guava (*Psidium guajava* L.) cv. Allahabad Safeda**

Treatment of 75% N + 75% P<sub>2</sub>O<sub>5</sub> +100% K<sub>2</sub>O+ *Azotobacter* 5ml/tree + PSB 5ml/tree resulted significantly maximum tree height (3.80 m), East West tree spread (5.20 m), North South tree spread (5.13 m) at harvesting stage, minimum number of days for flowering (32.33 days), maximum number of flowers per branch (25.33), fruit set per branch (90.20%) and fruit retention (92.96%), fruit diameter (10.07 cm), fruit weight (215.06 g) and pulp weight (193.44 g), yield attributing characters, number of fruits per tree (144.33), fruit yield per tree (32.13 kg) and per hectare (89.01 q) and shelf life of fruit (12.50 days) [Godage S. S, Parekh N. S, Nehete D. S, Jagtap V. M. (Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand (India), 388 110), *BIOINFOLET*, 2013, **10**(2a),480-485].

### **NPARR 4(3), 2013-0270 Preparation of guava jam blended with sapota**

Jam is prepared from fruit pulp by boiling with sufficient quantity of sugar to a moderately thick consistency. There are different types of fruit jams like strawberry jam, mango jam, pineapple jam, apple jam and mixed fruit jam. Hence an attempt was made to find out the possibilities of mixing guava and sapota for making jam and utilizing a major portion of marketable surplus of guava. Guava and Sapota pulp was blended in the ratios of 100:0, 90:10, 80:20, 70:30, and 60:40 respectively to prepare blended jams. The treatment of T<sub>4</sub>, 60% guava pulp and 40% sapota pulp, showed significantly less titrable acidity (1.05%), higher TSS (74.2°Brix) and total sugar (67.28%). Among the blended jams, the highest score for colour (8.64),

flavor (8.88), consistency (8.97), taste (8.12), and overall acceptability (8.78) was judged in the treatment 60% guava pulp and 40% sapota pulp. Treatment T<sub>4</sub>, 60% guava pulp and 40% sapota pulp was more in red color [ Er. Patil M. M.\*, Er.

S. B. Kalse and Er. A. A. Sawant (College of Agriculture Engineering and technology, Dist-Ratnagiri-415 712, India), *Agricultural Engineering International: CIGR Journal*, 2013, **15**(1), 167-172].

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

### **NPARR 4(3), 2013-0271 High-rate biogas production from waste textiles using a two-stage process**

The efficacy of a two-stage Continuously Stirred Tank Reactor (CSTR), modified as Stirred Batch Reactor (SBR), and Upflow Anaerobic Sludge Blanket Bed (UASB) process in producing biogas from waste textiles was investigated under batch and semi-continuous conditions. Single-stage and two-stage digestions were compared in batch reactors, where 20 g/L cellulose loading, as either viscose/polyester or cotton/polyester textiles, was used. The results disclosed that the total gas production from viscose/polyester in a two-stage process was comparable to the production in a single-stage SBR, and in less than two weeks, more than 80% of the theoretical yield of methane was acquired. However, for cotton/polyester, the two-stage batch process was significantly superior to the single-stage; the maximum rate of methane production was increased to 80%, and the lag phase decreased from 15 days to 4 days. In the two-stage semi-continuous process, where the substrate consisted of jeans textiles, the effect of N-methylmorpholine-N-oxide (NMMO) pretreatment was studied. In this experiment, digestion of untreated and NMMO-treated jeans textiles resulted in 200 and 400 ml (respectively) methane/g volatile solids/day (ml/g VS/day), with an organic loading rate (OLR) of 2 g VS/L reactor volume/day (g VS/L/day); under these conditions, the NMMO pretreatment doubled the biogas yield, a significant improvement. The OLR could successfully be increased to 2.7 g VS/L/day, but at a loading rate of 4 g VS/L/day, the rate of methane production declined. By arranging a serial interconnection of the two reactors and their liquids in the two-stage process, a closed system was obtained that converted waste textiles into biogas [Azam

Jeihanipour, Solmaz Aslanzadeh, Karthik Rajendran, Gopinath Balasubramanian and Mohammad J. Taherzadeh (School of Engineering, University of Borås, 50190 Borås, Sweden), *Renewable Energy*, 2013, **52**, 128-135].

### **NPARR 4(3), 2013-0272 Experimental investigations of performance, emission and combustion characteristics of Karanja oil blends fuelled DIC I engine**

Vegetables oils are simplest route of biofuel utilization in direct injection compression ignition (DIC I) engines however several operational and durability problems are encountered while using straight vegetable oils in CI engines due to their high viscosity and low volatility. Reduction of viscosity by blending or exhaust gas heating leads to savings in chemical processing cost incurred on transesterification. In this experimental study, performance, emission and combustion characteristics of Karanja oil blends (K10, K20, K50 and K100) with mineral diesel were investigated in unheated conditions in a direct injection CI engine at different engine loads and constant engine speed (1500 rpm) vis-à-vis baseline data from mineral diesel. Analysis of performance parameters such as brake specific fuel consumption (BSFC), thermal efficiency, and exhaust gas temperature; mass emissions of various gaseous pollutant species; combustion parameters such as in-cylinder pressure rise, instantaneous heat release and cumulative heat release etc. were carried out. Detailed combustion analysis revealed that the combustion duration increased significantly even with smaller concentration of Karanja oil in the fuel blend. HC, CO and Smoke emissions were found to decrease for 20-50% (v/v) Karanja oil content in the fuel blends [Avinash Kumar Agarwal and Atul Dhar (Engine Research Laboratory, Department of Mechanical Engineering, Indian Institute of Technology Kanpur, Kanpur 208016, India), *Renewable Energy*, 2013, **52**, 283-291].

**NPARR 4(3), 2013-0273 Recent advances in liquid biofuel production from algal feedstocks (Review)**

Major challenges of the modern world: energy security, oil price, resources depletion and climate change, have prompted significant advances in research and development of biomass-derived energy and fuels. Algal biofuels are seen as one of the most promising solutions of global energy crisis and climate change for the years to come. Major advantages of algae are potentially high yield and no competition with food crops for arable land and fresh water resource. This review summarises recent advances in algal biofuel production and focuses on synthesis of transportation fuel rather than characterising algal feedstocks or their well-documented potential as bioenergy resource. The available literature covering production of bioethanol, biodiesel and other potential liquid fuels are evaluated. Overall finding from this study suggests that to date the most effective methods of producing biofuels from algal feedstocks are: fermentation of microalgae to bioethanol and production of biodiesel via in situ transesterification of microalgal biomass. The real breakthrough however is expected from metabolic engineering of photosynthetic organisms to produce and secrete biofuels that promises significant simplification of downstream processing [Daroch, M.<sup>a</sup>, Geng, S. and Wang, G.\* (Shenzhen Engineering Laboratory for Algal Biofuel Technology Development and Application, School of Environment and Energy, Peking University Shenzhen Graduate School, Shenzhen 518055, China), *Applied Energy*, 2013, **102**, 1371-1381].

**NPARR 4(3), 2013-0274 Heat integration of biochemical ethanol production from straw - A case study**

Ethanol produced from lignocellulosic biomass is a desired, renewable fuel that can help to reduce our dependence on oil. In order to

achieve the commercial deployment of this fuel good economic and environmental performance are mandatory. Both these targets are tackled by the efficient use of process heat. This work deals with the heat integration of the biochemical production of ethanol from straw. Process simulation and pinch analysis are applied to investigate a base case design of the production process. The energy intensive unit operations distillation and evaporation are in the focus of this pinch analysis. Pressure and heat load modifications of these sections are applied to improve the process design. For this improved process design a heat exchanger network is synthesized. Energy stream and pinch analysis revealed that process residues easily suffice to provide the investigated process with heat. The design modifications of the distillation and evaporation sections lead to increased heat integration. Consequently, a 15% reduction of the utility targets compared to the base case is obtained in the improved design. The heat exchanger network for the improved design is simple, yet the increase in utility consumption compared to the utility targets is quite modest. As a result, in the network only 51% of waste biomass suffices to provide the process with heat. The exceeding biomass can be used for the recovery of energy or material by-products, which highlights the need for efficient polygeneration concepts [Kravanja, P., Modarresi, A. and Friedl, A.\* (Vienna University of Technology, Institute of Chemical Engineering, Thermal Process Engineering - Process Simulation, Getreidemarkt 9/166-2, 1060 Wien, Austria ), *Applied Energy*, 2013, **102**, 32-43].

**NPARR 4(3), 2013-0275 Environmental life cycle assessment of rapeseed straight vegetable oil as self-supply agricultural biofuel**

Biofuels are nowadays considered a questionable environmental alternative to fossil fuels. In that context, this work analyses the environmental impacts when introducing

rapeseed on the traditional and current wheat and barley agricultural rotation by means of a comparative life cycle assessment (LCA). The introduction of rapeseed, the correctness of its conversion to obtain straight vegetable oil and its use as self-consumption biofuel in tractors are evaluated. Life cycle assessment is used in this work to evaluate the impacts of different considered scenarios. A sensitivity analysis has also been conducted. The results presented show a modest environmental improvement (diminishment of 6 out of the 10 analyzed environmental impacts) when introducing rapeseed to local crop rotations and its partial conversion to oil to be used as fuel in existing diesel engines. Additionally, the ratio between the energy obtained and the total energy input shows moderate positive results when comparing the latter case with the current one. Results from this study can be used to support research and decision making to assess the convenience of introducing alternative fuels in agricultural exploitations [Grau, B.\*, Bernat, E., Rita, P., Jordi-Roger, R., Antoni, R. (Escola d'Enginyeria d'Igualada, Universitat Politècnica de Catalunya, Plaça del Rei 15, 08700 Igualada, Catalunya, Spain), *Renewable Energy*, 2013, **50**, 142-149].

**NPARR 4(3), 2013-0276 Marine macroalgae: An untapped resource for producing fuels and chemicals (Review)**

As world energy demand continues to rise and fossil fuel resources are depleted, marine macroalgae (i.e., seaweed) is receiving increasing attention as an attractive renewable source for producing fuels and chemicals. Marine plant biomass has many advantages over terrestrial plant biomass as a feedstock. Recent breakthroughs in converting diverse carbohydrates from seaweed biomass into liquid biofuels (e.g., bioethanol) through metabolic engineering have demonstrated potential for seaweed biomass as a promising, although relatively unexplored, source for biofuels. This

review focuses on up-to-date progress in fermentation of sugars from seaweed biomass using either natural or engineered microbial cells, and also provides a comprehensive overview of seaweed properties, cultivation and harvesting methods, and major steps in the bioconversion of seaweed biomass to biofuels [Wei, N., Quarterman, J. and Jin, Y.-S.\* (Institute for Genomic Biology, University of Illinois at Urbana-Champaign, Urbana, IL 61801, United States), *Trends in Biotechnology*, 2013, **31(2)**, 70-77].

**NPARR 4(3), 2013-0277 Biodiesel from *Citrus reticulata* (mandarin orange) seed oil, a potential non-food feedstock**

Oil extracted from *Citrus reticulata* (mandarin orange) seeds was investigated as a potential feedstock for the production of biodiesel. The biodiesel fuel was prepared by sodium methoxide-catalyzed transesterification of the oil with methanol. Fuel properties that were determined include cetane number, cloud, pour, and cold filter plugging points, kinematic viscosity, oxidative stability, flash point, sulfur content, ash content, density and acid value. The citrus seed oil methyl esters were found to satisfy both ASTM D6751 and EN 14214 biodiesel standards. The NMR spectra of the methyl esters of *C. reticulata* seed oil are reported [Rashid, U.\*, Ibrahim, M., Yasin, S., Yunus, R., Taufiq-Yap, Y.H. and Knothe, G. (Institute of Advanced Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia), *Industrial Crops and Products*, 2013, **45**, 355-359].

**NPARR 4(3), 2013-0278 Seashore mallow (*Kosteletzkya pentacarpos*) as a salt-tolerant feedstock for production of biodiesel and ethanol**

Seashore mallow (*Kosteletzkya pentacarpos*) is a non-invasive perennial nonclonal halophytic oilseed-producing dicot that was investigated as a feedstock for production of biodiesel from seeds and ethanol from residual stem biomass. Seashore mallow seeds contained

19.3 mass % oil, which after extraction with hexane and pretreatment with catalytic sulfuric acid was converted into methyl esters in 94 mass % yield utilizing homogenous base catalysis. The principal components identified were methyl linoleate (48.9%), palmitate (24.4%) and oleate (18.3%). Fuel properties were characterized and compared to biodiesel standards ASTM D6751 and EN 14214. Also investigated were blends with petrodiesel. Lastly, seashore mallow stems were rich in neutral carbohydrates (51.8 mass %). After simultaneous saccharification and fermentation employing a native *Saccharomyces cerevisiae* yeast strain, the stems provided ethanol and xylose yields of 104 g/kg and 47.8 g/kg, respectively. Of the four pretreatment methodologies explored, dilute ammonium hydroxide provided the highest yield of sugars [Moser, B.R.\*, Dien, B.S., Seliskar, D.M. and Gallagher, J.L. (Bio-Oils Research Unit, National Center for Agricultural Utilization Research, Agricultural Research Service, United States Department of Agriculture, 1815 N. University St., Peoria, IL 61604, United States), *Renewable Energy*, 2013, **50**, 833-839].

**NPARR 4(3), 2013-0279 Feasibility of rice straw as alternate substrate for biobutanol production**

Biobutanol has recently emerged as a potential alternate liquid fuel for gasoline and

diesel. In this work, we have studied clostridial fermentation of stress assisted-acid hydrolyzed rice straw that exhibited a typical trend of acidogenesis followed by solventogenesis. Acid hydrolysis of 5% (w/v) mixture of rice straw in water with simultaneous application of shearing stress resulted in release of 3.9% (w/v) total sugar out of which 3.1% (w/v) was reducing sugar. Glucose formed major fraction (75%) of the reducing sugar (or 2.3% w/v total sugar). Thus, essentially, 5% (w/v) of rice straw solution released nearly 46% (w/w) (i.e. 23gL<sup>-1</sup> glucose for 50gL<sup>-1</sup> rice straw solution) glucose. Anaerobic fermentation of rice straw hydrolyzate using *Clostridium acetobutylicum* NCIM 2337 resulted in production of 6.24gL<sup>-1</sup> of acetone, 13.5gL<sup>-1</sup> of butanol and only 0.82gL<sup>-1</sup> of ethanol. The net consumption of substrates was as follows: glucose 12.86gL<sup>-1</sup> (i.e. ~55%), total reducing sugar 18.32gL<sup>-1</sup> (~57%) and total sugar 24.5gL<sup>-1</sup> (~61%). Thus, higher solvents yield and significant sugar utilization makes rice straw a potential feedstock for biofuels production [Ranjan, A., Khanna, S. and Moholkar, V.S. (Centre for Energy, Indian Institute of Technology Guwahati, Guwahati 781 039, Assam, India), *Applied Energy*, 2013, **103**, 32-38].

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

### **NPARR 4(3), 2013-0280 Antifungal acetylinic thiophenes from *Tagetes minuta*: Potential biopesticide**

Apart from thiophenes, which possess wide range of biocidal activity, aerial parts of *Tagetes* sp contain essential oil. Oil components were reported to have antifungal activity, thus making whole plant of *Tagetes* very useful for exploiting as natural fungistatic agent. In the present study, *Tagetes minuta* grown in north western Himalayan condition were evaluated for its potential for use as antifungal agent. Flower essential oil showed minimal antifungal activity. Whereas, leaf essential oil was found significant antifungal activity against three phytopathogenic fungi out of eight tested fungi. ED<sub>50</sub> values were 165, 175 and 110 µg mL<sup>-1</sup> against *Rhizoctonia solani*, *Sclerotinia sclerotiorum* and *Sclerotium rolfsii*, respectively. Thiophene rich extract of *Tagetes minuta* was found comparatively lesser active (ED<sub>50</sub>: 233-484 µg mL<sup>-1</sup>) than leaf essential oil against the same fungi. The present study shows that essential oil from leaves and thiophene rich extracts from marigold roots have significantly good antifungal activity against a number of soil borne and foliar plant pathogens. The easy availability of these plants makes it an attractive potential candidate for development of natural fungicide [Saha, S.\*, Walia, S., Kundu, A., Kumar, B. and Joshi, D. (Indian Agricultural Research Institute, New Delhi, India), *Journal of Applied Botany Food Quality*, 2013, **85**(2), 207-211].

### **NPARR 4(3), 2013-0281 Efficacy of plant essential oils to control post-harvest decay of sweet cherry (*Prunus avium* L.) fruit**

The development of natural crop protection products as alternatives to the use of synthetic fungicides is currently popular. The aim of this study was to evaluate the anti-fungal

effects of several essential oils against the fungal pathogen, *Botrytis cinerea*, the causal agent of grey mould disease on sweet cherry (*Prunus avium* L.) under in vitro and in vivo conditions. Three essential oils (from fennel, black caraway, and peppermint) were each tested at five concentrations (0, 200, 400, 600, or 800 µl l<sup>-1</sup>). In vitro results showed that the essential oil of black caraway had the highest fungicidal effect. The growth of grey mould was completely inhibited by the essential oil of black caraway at 400 µl l<sup>-1</sup>. In vivo, the essential oils of black caraway, fennel, and peppermint, at all concentrations, inhibited the growth of grey mould on sweet cherry fruit compared with the untreated controls. The application of each essential oil decreased the percentage loss in fresh weight significantly, and increased the storage-life of the fruit. Black caraway oil, at 800 µl l<sup>-1</sup>, maintained significantly higher soluble solids contents, titrable acidity values, and anthocyanin and carbohydrate contents than all other treatments. These results show that plant essential oils can have a strong effect on reducing post-harvest decay and improving the quality of sweet cherry fruit. These plant essential oils could provide an alternative to synthetic chemicals to control post-harvest phytopathogenic fungi on sweet cherry fruit [Aminifard, M.H.\* and Mohammadi, S. (Department of Horticultural Science, College of Agriculture, Birjand University, Amirabad Street, Birjand 9717533, Iran), *Journal of Horticultural Science and Biotechnology*, 2013, **88**(1), 79-84].

### **NPARR 4(3), 2013-0282 Pupicidal and repellent activities of *Pogostemon cablin* essential oil chemical compounds against medically important human vector mosquitoes**

To determine the repellent and pupicidal activities of *Pogostemon cablin* (*P. cablin*) chemical compositions were assayed for their toxicity against selected important vector mosquitoes, viz., *Aedes aegypti* (*Ae. aegypti*), *Anopheles stephensi* (*An. stephensi*) and *Culex quinquefasciatus* (*Cx. quinquefasciatus*) (Diptera:

Culicidae). The plants dry aerial parts were subjected to hydrodistillation using a modified Clevenger-type apparatus. The composition of the essential oil was analyzed by Gas Chromatography (GC) and GC mass spectrophotometry. Evaluation was carried out in a net cage (45 cm×30 cm×45 cm) containing 100 blood starved female mosquitoes and were assayed in the laboratory condition by using the protocol of WHO 2010. The repellent activity of *P. cablin* chemical compositions at concentration of 2 mg/cm<sup>2</sup> were applied on skin of fore arm in man and exposed against adult female mosquitoes. The pupicidal activity was determined against selected important vector mosquitoes to concentration of 100 mg/L and mortality of each pupa was recorded after 24 h of exposure to the compounds. Chemical constituents of 15 compounds were identified in the oil of *P. cablin* compounds representing to 98.96%. The major components in essential oil were  $\alpha$ -patchoulene,  $\alpha$ -guaiene,  $\beta$ -patchoulene,  $\alpha$ -bulnesene and patchouli alcohol. The repellent activity of patchouli alcohol compound was found to be most effective for repellent activity and 2 mg/cm<sup>2</sup> concentration provided 100% protection up to 280 min against *Ae. aegypti*, *An. stephensi* and *Cx. quinquefasciatus*, respectively. Similarly, pupae exposed to 100 mg/L concentrations of *P. cablin* chemical compositions. Among five compounds tested patchouli alcohol was found to be most effective for pupicidal activity provided 28.44, 26.28 and 25.36 against *Ae. aegypti*, *An. stephensi* and *Cx. quinquefasciatus*, respectively. The percent adult emergence was inversely proportional to the concentration of compounds and directly proportional to the pupal mortality. These results suggest that the *P. cablin* chemical compositions have the potential to be used as an ideal eco-friendly approach for the control of mosquitoes. This is the first report on the mosquito repellent and pupicidal activities of the reported *P. cablin* chemical compositions [Gokulakrishnan, J., Kuppusamy, E., Shanmugam, D., Appavu,

A., Kaliyamoorthi, K. (Center for Entomotoxicity Studies, Department of Zoology, Poompuhar College, Malaiyur-609 107 Tamil Nadu, India), *Asian Pacific Journal of Tropical Disease*, 2013, **3**(1), 26-31].

**NPARR 4(3), 2013-0283 Insecticidal and genotoxic activity of *Psoralea corylifolia* Linn. (Fabaceae) against *Culex quinquefasciatus* Say, 1823**

Indiscriminate use of synthetic insecticides to eradicate mosquitoes has caused physiological resistance. Plants provide a reservoir of biochemical compounds; among these compounds some have inhibitory effect on mosquitoes. In the present study the larvicidal, adulticidal and genotoxic activity of essential oil of *Psoralea corylifolia* Linn. against *Culex quinquefasciatus* Say was explored. Essential oil was isolated from the seeds of *P. corylifolia* Linn. Larvicidal and adulticidal bioassay of *Cx. quinquefasciatus* was carried out by WHO method. Genotoxic activity of samples was determined by comet assay. Identification of different compounds was carried out by gas chromatography- mass spectrometry analysis. Essential oil obtained from the seeds of *P. corylifolia* showed potent toxicity against larvae and adult *Cx. quinquefasciatus*. The present work revealed that the essential oil of *P. corylifolia* could be used as environmentally sound larvicidal and adulticidal agent for mosquito control [Dua, V.K\*, Kumar, A., Pandey, A.C. and Kumar, S. (National Institute of Malaria Research, Health Centre, Field Unit BHEL, Ranipur, Hardwar, Uttarakhand, 249403, India), *Parasites and Vectors*, 2013, **6**(1)].

**NPARR 4(3), 2013-0284 Larvicidal efficacy of plant oils against the dengue vector *Aedes aegypti* (L.) (Diptera: Culicidae)**

The bioactivity of ten plant oils, Cedar wood (*Cedrus atlantica*), Citronella (*Cymbopogon*

*nardus*), Clove (*Myrtus caryophyllum*), Eucalyptus (*Eucalyptus globulus*), Lemon grass (*Cymbopogon flexuosus*), Orange (*Citrus sinensis*), Nutmeg (*Myristica fragrans*), Palmarosa (*Cymbopogon martinii*), Pine (*Pinus radiata*) and Tulsi (*Ocimum sanctum*) were tested at 125, 250, 500 and 1000 ppm concentrations against the third instar larvae of *Aedes aegypti*. Larval mortality was observed after 24 hours. Among the plant oils tested, orange oil exhibited highest larvicidal activity with LC<sub>50</sub> of 85.93, followed by palmarosa 50 with 88.78, tulsi with 92.48 and nutmeg oil with 93.62 ppm [Tennyson, S.\*, Samraj, D.A., Jeyasundar, D. and Chalieu, K. (Department of Zoology, Madras Christian College, Chennai 600 059, Tamil Nadu, India), *Middle East Journal of Scientific Research*, 2013, **13**(1), 64-68].

**NPARR 4(3), 2013-0285 Assessing essential oil components as plant-based preservatives against fungi that deteriorate herbal raw materials**

This study assesses the antifungal efficacy of 14 essential oil (EO) components and some of their combinations as inhibitory to the growth of the aflatoxigenic fungus *Aspergillus flavus* LHPA<sub>9</sub> isolated from biodeteriorating *Asparagus racemosus* herbal raw materials. The aim was to determine whether they could be recommended as plant-based preservatives for enhancement of the shelf life of herbal raw materials. Thymol, eugenol, menthol, and their combinations were highly efficacious as their minimum inhibitory concentration (MIC) for inhibition of fungal growth as well as aflatoxin B<sub>1</sub> secretion was less than 1.0 µl ml<sup>-1</sup>. Geranyl acetate, linalool, β-asarone, 1, 8-cineol, and E-citral were moderately antifungal as their MIC ranged between 1.0 and 5.0 µl ml<sup>-1</sup>. During antioxidant activity 2, 2-diphenyl-1-picrylhydrazyl assay, thymol, eugenol, and β-caryophyllene showed strong radical scavenging activity, whereas β-asarone and p-cymene showed moderate activity. Some combinations of EO components showed

synergism while others exhibited an additive or antagonism effect in their activity. The findings point to a recommendation that EO components are good alternatives to synthetic preservatives to prevent deterioration of stored herbal raw materials by fungal and aflatoxin contamination and free-radical oxidation [Mishra, P.K.\*, Singh, P., Prakash, B., Kedia, A., Dubey, N.K. and Chanotiya, C.S. (Laboratory of Herbal Pesticides, Centre of Advanced Study in Botany, Banaras Hindu University, Varanasi 221005, India), *International Biodeterioration and Biodegradation*, 2013, **80**, 16-21].

**NPARR 4(3), 2013-0286 Screening of some essential oils against *Trichosporon* species**

White Piedra is a superficial mycoses characterized by nodules on the hair shaft, caused by the basidiomycetous yeast *Trichosporon* species. In this study 25 essential oils were extracted and screened against two *Trichosporon* species i.e. *Trichosporon asahii* and *Trichosporon cutaneum*. Both these fungi procured from MTCC Chandigarh were maintained on yeast malt agar plates and tubes at 25°C. Two screening methods, viz. agar well diffusion assay and minimum inhibitory concentration were adopted for the study. The results showed that the maximum anti-yeast activity against *T. asahii* and *T. cutaneum* was demonstrated by oil of *Mentha piperita* showing full inhibition of both the fungi, *Melaleuca alternifolia* with an inhibition zone of 45 and 40 mm, *Cymbopogon winterians* with inhibition zone of 45 and 45 mm and *Cymbopogon flexuosus* with 35 and 30 mm inhibition zones. The oil of *Trachyspermum ammi* exhibited 10 and 20 mm, *Abelmoschus moschatus* exhibited 30 and 20 mm, *Salvia sclarea* showed 20 and 18 mm and *Jasminum officinale* exhibited 25 and 15 mm inhibition zones showing moderate activity. The oil of *Cyperus scariosus*, *Pogostemon patchouli* and *Rosa damascene* showed no inhibition zone against both the fungi while *Vetiveria zizanioides*

exhibited no inhibition in case of *T. asahii* and inhibition zone of 10 mm in case of *T. cutaneum* demonstrating comparatively low activity against both the fungi. These results support that the essential oils can be used to cure superficial mycoses and these oils may have significant role as pharmaceuticals and preservatives [Uniyal, V.\*, Saxena, S. and Bhatt, R.P. ( Department of Botany, SGRR(PG) College, Pathribagh, Dehradun- 248 001, India), *Journal of Environmental Biology*, 2013, **34**(1), 17-22].

**NPARR 4(3), 2013-0287 Housefly (*Musca domestica* L.) control potential of *Cymbopogon citratus* Stapf. (Poales: Poaceae) essential oil and monoterpenes (citral and 1, 8-cineole)**

In spite of being a major vector for several domestic, medical, and veterinary pests, the control aspect of the common housefly, *Musca domestica* L. (Diptera: Muscidae) is often neglected. In the present study, the essential oil of *Cymbopogon citratus* and its major components were evaluated for control of housefly. The chemical composition analysis of *C. citratus* oil by gas chromatographic mass spectrometry (GC-MS) revealed citral (47 %) and 1, 8-cineole (7.5 %) as principal components. The analysis of oil vapor by solid phase microextraction

(SPME/GC-MS) showed increase in citral (74.9 %) and 1, 8-cineole (8.6 %) content. Assay of oil against housefly larvae and pupae through contact toxicity assay showed lethal concentration (LC)<sub>50</sub> value of 0.41 µl/cm<sup>2</sup> and of percentage inhibition rate (PIR) of 77.3%, respectively. Fumigation assay was comparatively more effective with LC<sub>50</sub> of 48.6 µl/L against housefly larvae, and a PIR value of 100 % against housefly pupae. The monoterpenes, citral, and 1,8-cineole, when assessed for their insecticidal activity against housefly larvae, showed LC<sub>50</sub> of 0.002 and 0.01 µl/cm<sup>2</sup> (contact toxicity assay) and LC<sub>50</sub> of 3.3 and 2.4 µl/L (fumigation assay). For pupicidal assay, both citral and 1,8-cineole had a PIR value of 100 %. High efficacy of citral and 1, 8-cineole against housefly, established them to be an active insecticidal agent of *C. citratus* oil. The study demonstrates potentiality of *C. citratus* oil as an excellent insecticide for housefly control, and the results open up the opportunity of oil/monoterpenes being developed into an eco-friendly, economical, and acceptable product [Kumar, P., Mishra, S., Malik, A., Satya, S. (Applied Microbiology Laboratory, Centre for Rural Development and Technology, Indian Institute of Technology Delhi, New Delhi 110 016, India), *Parasitology Research*, 2013, **112**, 69-76].

## MANURE/FERTILIZERS

### **NPARR 4(3), 2013-0288 Ecological effects of cow manure compost on soils contaminated by landfill leachate**

The experiment was conducted to evaluate the effect of cow manure compost (CMC) application on leaching toxicity of leachate polluted soils by using *Tetrahymena pyriformis* (TP). Soils treated with various levels of leachate (0, 12.5 mL, 25 mL, 37.5 mL, and 50 mL leachate per 300 g soil) were amended with 0, 25 g and 50 g CMC, respectively. The results showed CMC application resulted in 7-18% lower leaching toxicity while excessive CMC has no significant benefit for decreasing leaching toxicity further. The alleviating effect of CMC on biotoxicity of soil extract was mainly attributed to either pH increase, high content of P and organic matter, or promotion on soil microbial metabolism and especially pH played an important role in alleviating effect. And the observations indicated that death rate (DR) of TP was more sensitive to leachate level respect to other biological parameters above and TP was effective as the test organism for leaching toxicity. Further studies are needed to unambiguously determine in-deep mechanism of toxicity impacts on TP posed by leachate pollutants [Lie Yang, Zhulei Chen\*, Ting Liu, Juan Jiang, Beitao Li, Yongmin Cao and Yingjian Yu (School of Environmental Science & Engineering, Huazhong University of Science and Technology, Wuhan 430074, PR China), *Ecological Indicators*, 2013, **32**, 14-18].

### **NPARR 4(3), 2013-0289 The influence of multicomponent fertilizers on the concentration of potassium in perennial ryegrass (*Lolium perenne* L.)**

A pot experiment on an acid brown soil was conducted in 1998-2001. Three multicomponent fertilizers were applied: Polifoska 8, Polifoska 15 and Polimag 306, Travitat the rates of 0.5; 1.0; and 1.5 gN per pot. The total forms of potassium were determined in dry matter of perennial ryegrass with the use of ASA method. The contents of these elements were higher in the fertilized variants as compared to the control. No significant differences were found among the contents of investigated elements compared in plants treated with different multicomponent fertilizers. The chemical analyses indicated that increasing rates of the fertilizers applied enhanced the contents of potassium. In the content of potassium in dry matter of perennial ryegrass (*Lolium perenne* L.) the Polifoska 8 it ranged from 3.49-4.92 %. In the content of potassium in dry matter of perennial ryegrass (*Lolium perenne* L.) the Polifoska 15 it ranged from 4.29-4.86 %. In the content of potassium in dry matter of perennial ryegrass (*Lolium perenne* L.) the Polimag 306 it ranged from 4.07-5.17%. In the content of potassium in dry matter of perennial ryegrass (*Lolium perenne* L.) the Travit it ranged from 3.84-4.73 [Beata Draszawka –Bożan (Faculty of Biology University of Szczecin, 13 Waska Street, 71-415 Szczecin, Poland E), *International Letters of Chemistry, Physics and Astronomy*, 2013, 8(2), 188-194].

## OILS/FATS (incl. Edible oils, Butter)

### **NPARR 4(3), 2013-0290 The effect of *Moringa oleifera* leaf extract as antioxidant on stabilization of butter oil with modified fatty acid profile**

Effect of methanolic leaf extract of *Moringa oleifera* for the stabilization of butter oil with modified fatty acid profile at ambient temperature was investigated. Twelve Sahiwal cows of first and early lactation were randomly stratified into two groups in a completely randomized design and fatty acid profile of milk fat was modified by feeding 300 grams calcium salts of fatty acids (per cow per day) to one group (G-1) and the second group was not fed on calcium salts of fatty acids (G-2). Concentration of long chain fatty acids (C18:1 to C18:3) in milk of G-1 was increased from  $30.33 \pm 0.174b$  to  $35.36 \pm 0.14a\%$  as compared to G-2. Milk fat of G-1 was turned into butter oil. *Moringa oleifera* leaf extract (MOLE) was incorporated into butter oil (from milk of G-1) at three different concentrations:  $T_1 = 400$ ,  $T_2 = 600$ , and  $T_3 = 800$  ppm. All these treatments were compared with a control, without any addition of MOLE. Peroxide value of  $T_2$  in Schaal oven test (after 90 days of storage) was  $5.35 \pm 0.29b$  as compared to control  $16.64 \pm 0.42a$  (meq /kg). *p*-anisidine value and induction time (after 90 days of storage at ambient temperature) of  $T_2$  and control were  $12.45 \pm 0.63b$ ,  $28.67 \pm 1.36a$  (meq  $kg^{-1}$ ) and  $10.84 \pm 0.28a$  and  $3.95 \pm 0.14b$  hours, respectively. It was concluded that *Moringa oleifera* leaf extract at 600 ppm concentration may be used for the enhancement of oxidative stability of butter oil with modified fatty acid profile at ambient temperature [M. Nadeem\*, M. Abdullah, A. Khaliq, I. Hussain, A. Mahmud and S. Inayat (Department of Dairy Technology, University of Veterinary and Animal Sciences, Lahore, Pakistan), *Journal of Agricultural Science and Technology*, 2013, **15**(5), 919-928].

### **NPARR 4(3), 2013-0291 Phenolic extracts from wild olive leaves and their potential as edible oils antioxidants**

The kinetics solid-liquid extraction of phenolics from wild olive leaves was elaborated using different mathematical models (Peleg, second order, Elovich, and power law model). As solvents, methanol, ethanol, ethanol: water 1:1, *n*-propanol, isopropanol and ethyl acetate were used. The second order model best described the solvent extraction process, followed by the Elovich model. The most effective solvent was ethanol with optimum phenol extraction conditions 180 min, solvent to sample ratio 5:1 v/w and pH 2. Ethanol extract exhibited the highest antiradical activity among solvent and supercritical fluid extraction (SFE) extracts, which in addition showed the highest antioxidant capacity compared to synthetic and natural food antioxidants such as BHT, ascorbyl palmitate and vitamin E. Antioxidant potential of SFE extract was quite high, although its phenolic potential was not. Leaf extracts were proven to be good protectors for olive and sunflower oils at levels of 150 ppm [Theodora-Ioanna Lafka\*, Andriana E. Lazou, Vassilia J. Sinanoglou and Evangelos S. Lazos (Laboratory of Food Processing, Department of Food Technology, Technological Educational Institute of Athens, Agiou Spyridonos St., 12210, Egaleo, Athens, Greece ), *Foods*, 2013, 2(1), 18-31].

### **NPARR 4(3), 2013-0292 The effects of microwave heating on edible oils and lipid-containing food**

Lipids and lipid-containing foods are particularly sensitive to microwave heating as the specific heat of lipids is low and thus they are quickly warmed up. Microwave heating mainly promotes lipid oxidation, but it can also cause lipolysis and polymerization. This cooking method can differently impact lipid oxidation depending on the treatment conditions used

(power, temperature and time), as well as on food composition. This review provides a picture of the main degradation effects of microwave heating on vegetable oils and lipid-containing foods with emphasis on both fatty acids and cholesterol oxidation [Raffaella Inchingolo\*, Vladimiro Cardenia and Maria Teresa Rodriguez-Estrada (Department of Agricultural and Food Sciences, Alma Mater Studiorum-Università di Bologna, Bologna, Italy), *Lipid Technology*, 2013, **25**(3), 59-61].

**NPARR 4(3), 2013-0293 Minor components in oils and their effects on frying performance**

Minor components are the non-triacylglycerol constituents of oil and constitute

up to 5% of the total lipid composition. Though minor in composition, they can exert major influence on the performance of oil during frying. The effect of the minor components on frying performance depends on their chemical nature, composition and amount in the oil. Among these minor components tocopherols, phytosterols, phospholipids,  $\gamma$ -oryzanol, lignans, phenolics, and carotenoids are the most important. Here, their effect on the frying performance of edible oils is discussed [Felix A. Aladedunye\* and Roman Przybylski (Alexander von Humboldt postdoctoral fellow with Max Rubner-Institute (Federal Research Institute for Nutrition and Food), Detmold, Germany), *Lipid Technology*, 2013, **25**(4), 87-90].

## PHYTOCHEMICALS

### **NPARR 4(3), 2013-0294 Evaluation of the antinociceptive Activity of *Ocimum gratissimum* L. (Lamiaceae) essential Oil and its isolated active principles in mice**

*Ocimum gratissimum* is used in popular medicine to treat painful diseases. The antinociceptive properties of *O. gratissimum* essential oil (OgEO) and two of its active principles (eugenol and myrcene) were tested in classic models of pain (hot plate test and formalin test). Adult male C57BL/6J mice acutely received corn oil (control group, p.o.), morphine (positive control group, 5 mg/kg, i.p.), OgEO (10, 20, or 40 mg/kg, p.o.), eugenol or myrcene (both at 1, 5, or 10 mg/kg, p.o.). The highest doses of all tested drugs significantly increased the latency to lick the paw(s) in the hot plate test compared with the control group. OgEO at a dose of 40 mg/kg and eugenol and myrcene at a dose of 10 mg/kg were effective in minimizing animal pain in the first and second phases of the formalin test. The antinociceptive effect shown by all drugs tested in hot plate test was reverted by naloxone administration (1 mg/kg), indicating opioid system participation. These results demonstrate the beneficial effects of OgEO and its active principles against neurogenic and inflammatory pain. Our findings demonstrate that OgEO and its isolated active principles exhibited antinociceptive activity in murine pain models [L. I. G. Paula-Freire\*, M. L. Andersen, G. R. Molska, D. O. Köhn, E. L. A. Carlini, (Lyvia Izaura Gomes de Paula Freire, Departamento de Psicobiologia, Universidade Federal de São Paulo, Brazil, Rua Napoleão de Barros, 925, Vila Clementino, São Paulo 04024-002, SP, Brazil) *Phytotherapy Research*, 2013, **27**(8), 1220-1224].

### **NPARR 4(3), 2013-0296 Anti-Inflammatory and antimicrobial evaluation of neovestitol and vestitol isolated from Brazilian Red Propolis**

The objective of this study was to evaluate anti-inflammatory and antimicrobial activities of neovestitol and vestitol isolated from Brazilian red propolis (BRP). BRP ethanolic extract (EEP), neovestitol, and vestitol were evaluated by anti-inflammatory properties using a neutrophil migration assay. The antimicrobial activity was evaluated by minimal inhibitory and bactericidal concentrations (MIC and MBC) against *Streptococcus mutans*, *Streptococcus sobrinus*, *Staphylococcus aureus*, and *Actinomyces naeslundii*. Neovestitol, vestitol, and EEP inhibited neutrophil migration at a dose of 10 mg/kg. Regarding antimicrobial activity, neovestitol showed MICs ranging from <6.25 to 25–50 µg/mL and MBCs ranging from 25–50 to 50–100 µg/mL, while vestitol showed MICs ranging from 25–50 to 50–100 µg/mL and MBCs ranging from 25–50 to 50–100 µg/mL. Both isoflavonoids neovestitol and vestitol are consistent bioactive compounds displaying anti-inflammatory and antimicrobial activities that can strongly act in a low dose and concentration and have a promising potential to be applied in the pharmaceutical and food industries [Bruno Bueno-Silva, Severino M. Alencar\*, Hyun Koo, Masaharu Ikegaki, Gil V. J. Silva, Marcelo H. Napimoga and Pedro L. Rosalen (College of Agriculture “Luiz de Queiroz” (ESALQ), University of São Paulo (USP), C.P. 9, 13418-900 Piracicaba, São Paulo, Brazil), *J Agric Food Chem*, 2013, **61**(19), 4546-4550].

### **NPARR 4(3), 2013-0297 Identification of acteoside as the active antioxidant principle of *Premna serratifolia* root wood tissues**

*Premna serratifolia* Linn. (syn. *Premna integrifolia*) is one the most widely used plant in the Ayurvedic system of medicine. Several pharmacological activities including antioxidant effects and phytochemical investigations have been previously reported for the various parts of plant, except the root woody tissues. In the present study, the antioxidant activity and active

principle of the root woody tissues were investigated. Antioxidant effect was routinely monitored using the DPPH radical scavenging assay while phytochemical investigation was based on analysis using HPLC and Teledyne Isco flash chromatography system. Through the use of comprehensive spectroscopy studies, the isolated active antioxidant principle was identified as acteoside (verbacoside). Acteoside, which was about four times more active ( $18.3 \pm 3.7 \mu\text{g/ml}$ ;  $11.4 \pm 2.3 \mu\text{M}$ ) than the crude root wood extract ( $73.8 \pm 2.4 \mu\text{g/ml}$ ), could account for most of the reported pharmacological activity on *P. serratifolia* [Lekshmi V. Bose, George K. Varghese and Solomon Habtemariam\* (Pharmacognosy Research Laboratories, Medway School of Science, University of Greenwich, Chatham, Maritime, Kent ME4 4TB, UK), *Phytopharmacology*, 2013, **4**(2), 228-236].

**NPARR 4(3), 2013-0298 Identification of 1, 8-Cineole, Borneol, Camphor, and Thujone as anti-inflammatory compounds in a *Salvia officinalis* L. infusion using Human Gingival Fibroblasts**

Drinking or gargling *Salvia officinalis* L. infusion (sage infusion) is thought to soothe a sore throat, tonsillitis, and inflamed, red gums, although structure-based scientific evidence for the key anti-inflammatory compounds in sage infusion is scarce. Human gingival fibroblasts (HGF-1) were treated with sage infusion (SI) or SI fractions containing either its volatile components and water (aqueous distillate, AD) or its dry matter (DM) for six hours. SI, AD, and DM reduced a mean phorbol-12-myristate-13-acetate/ionomycin (PMA/I)-stimulated release of the pro-inflammatory interleukins IL-6 and IL-8 by more than 50% ( $p < 0.05$ ). Cellular uptake experiments and subsequent GC-MS analysis using stable-isotope-labeled internal standards revealed the presence of 1,8-cineole, borneol, camphor, and  $\alpha$ - $\beta$ -thujone in SI-treated cells; LC-MS analysis demonstrated the presence of

rosmarinic acid. A significant, more than 50% mean inhibition of PMA/I-induced IL-6 and IL-8 release was demonstrated for the volatile compounds 1,8-cineole, borneol, camphor, and thujone, but not for the nonvolatile rosmarinic acid when applied in concentrations representative of sage infusion. Therefore, the volatile compounds were found to be more effective than rosmarinic acid. 1,8-Cineole, borneol, camphor, and  $\alpha$ - $\beta$ -thujone chiefly contribute to the anti-inflammatory activity of sage infusion in human gingival fibroblasts [Miriam M. Ehrnhöfer-Ressler, Kristina Fricke, Marc Pignitter, Joel M. Walker, Jessica Walker, Michael Rychlik and Veronika Somoza\* (Department of Nutritional and Physiological Chemistry, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria), *J Agric Food Chem*, 2013, **61** (14), 3451-3459].

**NPARR 4(3), 2013-0299 Antibacterial and anti-inflammatory effects of *Syzygium jambos* L. (Alston) and isolated compounds on acne vulgaris**

Bioassay guided isolation of ethanol extract of the leaves of *S. jambos* led to the isolation of three known compounds namely; squalene, an anacardic acid analogue and ursolic acid which are reported for the first time from this plant. The ethanol extract of *S. jambos* and one of the isolated compound namely, anacardic acid analogue were able to inhibit the growth of *P. acnes* with a noteworthy minimum inhibitory concentration (MIC) value of 31.3 and 7.9  $\mu\text{g/ml}$ , respectively. The ethanol extract and three commercially acquired compounds namely; myricetin, myricitrin, gallic acid exhibited significant antioxidant activity with fifty percent inhibitory concentration ( $\text{IC}_{50}$ ) ranging between 0.8-1.9  $\mu\text{g/ml}$  which was comparable to that of vitamin C, the reference antioxidant agent. The plant extract, compounds ursolic acid and myricitrin (commercially acquired) significantly inhibited the release of inflammatory cytokines IL 8 and TNF  $\alpha$  by suppressing them by 74 -

99%. TEM micrographs showed the lethal effects of selected samples against *P. acnes*. The interesting antibacterial, antioxidant and anti-inflammatory effects of *S. jambos* shown in the present study warrant its further investigation in clinical studies for a possible alternative anti-acne

agent [Richa Sharma, Navneet Kishore, Ahmed Hussein and Namrita Lal\* (Department of Plant Science, Faculty of Agricultural and Biological Science, University of Pretoria, Pretoria 0002 South Africa), *BMC Complementary and Alternative Medicine* 2013, **13**, 292].

## PULP/PAPER

### **NPARR 4(3), 2013-0300 Test and analysis on the wearability of bamboo pulp fabric**

In order to have a better understanding the wearability of bamboo pulp fabric and enhance the research and development level of this kind of products, the fabric performances such as the strength, elongation, air permeability, moisture permeability have been test and discussed in this paper. The results shown that: the breaking strength of fabric increases when the bamboo pulp fiber content reduces; when the bamboo pulp fiber content increased, the breaking elongation, wear resistance performance, wicking performance, crease recovery performance, moisture permeability, air permeation rate and tearing strength of fabric also increased [Ma, S. (Nantong Textile Vocational Technology College, Nantong, Jiangsu 226007, China), *Advanced Materials Research*, 2013, 671-674, 1844-1847].

### **NPARR 4(3), 2013-0301 Pre-extraction of hemicelluloses from bagasse fibers: Effects of dry-strength additives on paper properties**

The aim of this study was to further evaluate the viability of the integrated pulp mill biorefinery concept. On one side the properties of hot-water pre-extractions were studied, in order to determine the effect of extraction on soda pulping and bleachability. On the other side, the performance of two dry-strength agents on the paper properties obtained from extracted and un-extracted (control) samples were investigated. It was found that hemicelluloses removal of the depithed bagasse chips was 24.6% at 140°C for 10min with a solid to liquor ratio (S:L) of 1:8 (w/w), and that mass removal increased with extraction time and temperature. The hemicelluloses removal reached 65.5% at 170°C for 30min. The residual extracted bagasse were subjected to soda pulping at 160°C for 1h with 11, 14 and 17% active alkali charge and a S:L of

1:5 (w/w). Conventional elemental chlorine free bleaching (D<sub>0</sub>ED<sub>1</sub>) sequence was also used to compare the results with the un-extracted ones. Compared with the control sample, the overall pulp yield for extracted bagasse increased considerably while Kappa number and rejects decreased moderately. In addition, yield and Kappa number of the pulps improved with increasing alkali charge from 11% to 17%. After pre-extraction, better brightness compared with the control pulp was also shown. However, hot-water extraction was found to negatively impact some pulp properties including decreases in burst and tensile indices while addition of chitosan and cationic starch could improve the strength properties. Overall, papers treated with chitosan gave superior mechanical properties compared to the papers treated with cationic starch [Hamzeh, Y., Ashori, A., Khorasani, Z., Abdulkhani, A. and Abyaz, A. (Department of Wood and Paper Science and Technology, Faculty of Natural Resources, University of Tehran, Karaj, Iran), *Industrial Crops and Products*, 2013, 43(1), 365-371].

### **NPARR 4(3), 2013-0302 Effect of packaging material on storage ability of mango milk powder and the quality of reconstituted mango milk drink**

Mango milk powder (MMP) was obtained after recirculatory convective drying, conditioning and grinding. The physico-chemical characteristics of fresh canned mango pulp and those of the finished product were estimated. The microbiological quality of the beverage showed the presence of low number of cfu (colony forming unit) as  $2.5 \times 10^3$  and ymc (yeast and mold count) as 3 per gram. The product was free from coliform bacteria. MMP was packaged in pouches of high density polystyrene, tin can, metalized polyesters and four ply laminates polythene aluminum foil-polythene-paper. The shelf life of mango milk powder was predicted on the basis of free flowability of product under controlled storage condition and was found to be

maximum in tin containers (10 and 11 months, respectively) at  $30\pm 1^{\circ}\text{C}$  and  $5\pm 1^{\circ}\text{C}$  [Chauhan, A.K. and Patil, V. (Centre of Food Science and Technology, Banaras Hindu University, Varanasi-221005, India), *Powder Technology*, 2013, **239**, 86-93].

## RUBBER/GUM

### **NPARR 4(3), 2013-0303 Study of algal biomass harvesting using cationic guar gum from the natural plant source as flocculant**

Microalgae are small in size with negatively charged surface. They are usually stable in suspension culture and hard to flocculate. The present work emphasizes on the synthesis of cationic guar gum (CGG) by the introduction of quaternary amine groups onto the backbone of guar gum (GG) from N-(3-chloro-2-hydroxypropyl) trimethyl ammonium chloride (CHPTAC). The optimal dosage of the synthesized cationic guar gum is used to flocculate two different green algae, viz. *Chlorella* sp. CB4 and *Chlamydomonas* sp. CRP7 [Banerjee, C., Ghosh, S., Sen, G., Mishra, S., Shukla, P. and Bandopadhyay, R.\* (Department of Biotechnology, Birla Institute of Technology, Mesra, Ranchi 835215, Jharkhand, India), *Carbohydrate Polymers*, 2013, **92**(1), 675-681].

### **NPARR 4(3), 2013-0304 Evaluation of natural flocculants for conventional water treatment**

Drinking water is contaminated from the chemicals and biological impurities around the world mostly in rural area. These contaminations may come from natural sources and leaching of waste deposits which cause a major human health hazard in many parts of the world. There has been very little scientific research work into the use of natural flocculants to purify raw water. Most of the research studies that have been done on conventional water purification in developing countries have focussed on conventional water purification systems using inorganic and polyelectrolyte flocculants. Such systems are very expensive for rural communities in these developing countries as our objective is to provide water that is safe for human consumption by using facilities which can be constructed and

operated at a reasonable cost. There is a need to evaluate natural flocculants for conventional water treatment in order to develop inexpensive ways for developing countries to purify their water. In this study, the natural flocculants such as Moringa seeds powder, Guar Gum seeds powder, aluminium sulphate and polyelectrolyte were tested in a jar test apparatus to determine the optimum operating conditions for water or wastewater treatment plants. The results showed that the addition of *Moringa oleifera* seeds powder, Guar Gum seeds powder, aluminium sulphate and polyelectrolyte flocculants improved the quality of raw water. The raw water samples from all treatment plants showed a reduction in turbidity that was more than 70% when all the four flocculants applied synergistically [Afolabi, A.S., Sigwadi, R., Abdulkareem, A.S., and Mateescu, C.M.\* (Department of Civil and Chemical Engineering, College of Science, Engineering and Technology University of South Africa, P/Bag X6, Florida 1710, Johannesburg, South Africa), *Applied Mechanics and Materials*, 2013, **248**, 298-303].

### **NPARR 4(3), 2013-0305 Exploring potential new gum source *Aegle marmelos* for food and pharmaceuticals: Physical, chemical and functional performance**

Gums constitute a major group of naturally occurring polymers. Their abundance and low cost makes them a preferred choice for use in food and pharmaceuticals. The gum obtained from unripe fruits of *Aegle marmelos* is edible and has been recommended in ancient system of medicine for medicinal uses. However, its physico-chemical properties have not been evaluated. The gum particles obtained after freeze drying were observed to possess rough surface and moderate negative charge of -16.7.mV. They exhibited fair flow (angle of repose 37.2°) and moderate compressibility (Carr's Index 17.65%) desired of an excipient. High swelling index (4.2) and better emulsion

stability and capacity than gum arabic indicated its promising functionality in pre-disperse systems. In addition, high degree of substitution (7.4) could be utilized for derivatization/interaction with other polymers for modifying the drug release profiles [Jindal, M., Kumar, V., Rana, V. and Tiwary, A.K.\* (Department of Pharmaceutical Sciences and Drug Research, Punjabi University, Patiala 147 002, Punjab, India), *Industrial Crops and Products*, 2013, **45**, 312-318].

**NPARR 4(3), 2013-0306 Pharmaceutical applications of various natural gums, mucilages and their modified forms (Review)**

A large number of plant based pharmaceutical excipients are available today. Gums and mucilages are the most commonly available plant ingredients with a wide range of applications in pharmaceutical and cosmetic industries. They are being used due to their abundance in nature, safety and economy. They have been extensively explored as pharmaceutical excipients. They are biocompatible, cheap and easily available. Natural materials have advantages over synthetic ones since they are chemically inert, nontoxic, less expensive, biodegradable and widely available. They can also be modified in different ways to obtain tailor-made materials for drug delivery systems and thus can compete with the available synthetic excipients. Recent trend toward the use of plant based and natural products demands the replacement of synthetic additives with natural ones. In this review, we describe the pharmaceutical applications of various natural gums, mucilages and their modified forms for the development of various drug delivery systems [Prajapati, V.D., Jani, G.K., Moradiya, N.G., and Randeria, N.P. (Department of Pharmaceutics and Pharmaceutical Technology, SSR College of Pharmacy, Sayli-Silvassa Road, U.T. of Dadra and Nagar Haveli, Sayli, Silvassa 396 230, India), *Carbohydrate Polymers*, 2013, **92**(2), 1685-1699].

**NPARR 4(3), 2013-0307 Green synthesis of copper oxide nanoparticles using gum karaya as a biotemplate and their antibacterial application**

Copper oxide (CuO) nanoparticles have attracted huge attention due to catalytic, electric, optical, photonic, textile, nanofluid, and antibacterial activity depending on the size, shape, and neighboring medium. In the present paper, we synthesized CuO nanoparticles using gum karaya, a natural nontoxic hydrocolloid, by green technology and explored its potential antibacterial application. Methods: The CuO nanoparticles were synthesized by a colloid-thermal synthesis process. The mixture contained various concentrations of  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  (1 mM, 2 mM, and 3 mM) and gum karaya (10 mg/mL) and was kept at  $75^\circ\text{C}$  at 250 rpm for 1 hour in an orbital shaker. The synthesized CuO was purified and dried to obtain different sizes of the CuO nanoparticles. The well diffusion method was used to study the antibacterial activity of the synthesized CuO nanoparticles. The zone of inhibition, minimum inhibitory concentration, and minimum bactericidal concentration were determined by the broth microdilution method recommended by the Clinical and Laboratory Standards Institute. Results: Scanning electron microscopy analysis showed CuO nanoparticles evenly distributed on the surface of the gum matrix. X-ray diffraction of the synthesized nanoparticles indicates the formation of single-phase CuO with a monoclinic structure. The Fourier transform infrared spectroscopy peak at  $525\text{ cm}^{-1}$  should be a stretching of CuO, which matches up to the  $\text{B}_{2u}$  mode. The peaks at  $525\text{ cm}^{-1}$  and  $580\text{ cm}^{-1}$  indicated the formation of CuO nanostructure. Transmission electron microscope analyses revealed CuO nanoparticles of  $4.8 \pm 1.6\text{ nm}$ ,  $5.5 \pm 2.5\text{ nm}$ , and  $7.8 \pm 2.3\text{ nm}$  sizes were synthesized with various concentrations of  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  (1 mM, 2 mM, and 3 mM). X-ray photoelectron spectroscopy profiles indicated that the O 1s and Cu 2p peak

corresponding to the CuO nanoparticles were observed. The antibacterial activity of the synthesized nanoparticles was tested against Gram-negative and positive cultures. Conclusion: The formed CuO nanoparticles are small in size ( $4.8 \pm 1.6$  nm), highly stable, and have significant antibacterial action on both the Gram classes of bacteria compared to larger sizes of synthesized CuO ( $7.8 \pm 2.3$  nm) nanoparticles. The smaller size of the CuO nanoparticles ( $4.8 \pm 1.6$  nm) was found to be yielding a maximum zone of inhibition compared to the larger size of

synthesized CuO nanoparticles ( $7.8 \pm 2.3$  nm). The results also indicate that increase in precursor concentration enhances an increase in particle size, as well as the morphology of synthesized CuO nanoparticles [Padil, V.V.T. and Černík, M. (Laboratory of Chemical Remediation Processes, Institute for Nanomaterials, Advanced Technology and Innovation, Technical University of Liberec, Studentská 1402/2, Liberec, Czech Republic) , *International Journal of Nanomedicine*, 2013, **8**, 889-898].

## SPICES/CONDIMENTS

### **NPARR 4(3), 2013-0308 Grinding of coriander seeds: modeling of particle size distribution and energy studies**

Coriander seeds were ground in an impact type hammer mill and a pin mill to study the pattern of particle size distribution and their relationship with energy consumption. The particle size distribution for all samples was best described by the Rosin-Rammler-Bennett (RRB) and model with high degree of correlation coefficient compared to the Gaudin-Shumann (GS) model and Log-normal function. Particle size distribution was also characterized by various size parameters such as: uniformity index, size range variation coefficient, mass relative span, skewness, kurtosis, size guide number, coefficient of uniformity, and the coefficient of gradation and geometric standard deviation. Energy consumption for grinding was studied based on classical grinding laws, namely, Bond's, Rittenger's and Kick's law. Bond's Work index varied from 0.5 to 4.3 kJ kg<sup>-1</sup> depending on the size reduction ratio. Energy consumption followed a linear relationship with size reduction ratio [M G Shashidhar, T. P. Krishna Murthy, K. Ghiwari Girish and B. Manohar\* (Department of Food Engineering, CSIR-Central Food Technological Research Institute, Mysore, India), *Particulate Science and Technology: An International Journal*, 2013, **31**(5), 449-457].

### **NPARR 4(3), 2013-0309 Effect of different packaging systems and chlorination on the quality and shelf life of green chili**

The experiment was conducted to evaluate the effect of packaging materials on the quality and shelf life of green chili (*Capsicum annuum*) using passive modification of modified atmosphere packaging system. The modified atmosphere was created by making perforation in the polypropylene packets. Green chili pre-treated with chlorine water and then packaging in

0.3% perforated polypropylene packet resulted substantial reduction of weight loss and rotting/shriveling. These treatment combinations also considerably retained vitamin C,  $\beta$ -carotene, moisture content, etc. Under this condition the retention of quality and shelf life of green chili could be extended up to 10 days at ambient condition as compared to non-treated and without packaging [Mohammad Mizanur Rahman, Md. Miaruddin, Md. Golam Ferdous Chowdhury, Md. Hafizul Haque Khan and MA Matin, *Bangladesh J Agril Res*, 2012, **37**(4), 729-736].

### **NPARR 4(3), 2013-0310 *Coriandrum sativum*: A promising functional and medicinal food**

*Coriandrum sativum* is a promising functional food which not only provides nutrition, but also has medicinal benefits. It is a widely grown herb and most commonly used spice in India. Coriander is cultivated for both leaves and seeds. The traditional use of coriander is two-fold: medicinal and culinary. It contains bio-active components, mainly  $\alpha$ -pinene,  $\alpha$ -terpinene and limonene along with flavonoids, coumarins, phthalides and phenolic acids. *Coriandrum sativum* has been reported to have several potential health benefits like antioxidant activity, digestive stimulant, anti-hypertensive, cholesterol-lowering, anticancer effect and many more. This potential can further be explored and exploited to develop new formulations and coriander can be used as a complete and promising functional food [Chawla Snigdha\* and Thakur Monika (School of Biotechnology, Gautam Buddha University, Greater Noida, Uttar Pradesh - 201308, India), *Medicinal Plants - International Journal of Phytomedicines and Related Industries*, 2013, **5**( 2), 59-65].

### **NPARR 4(3), 2013-0311 *Foeniculum vulgare* Mill (Umbelliferae) attenuates stress and improves memory in Wister rats**

The anti-stress and memory-enhancing properties of *F. vulgare* extract in experimental

rats was evaluated. *F. vulgare* plant extract was obtained using Soxhlet extraction technique. The extract, at doses of 50, 100 and 200 mg/kg body weight, was administered orally with an orogastric tube. Urinary levels of vanillylmandelic acid (VMA) and ascorbic acid in rats were used to evaluate anti-stress activity. Conditioned avoidance response was measured in normal and scopolamine-induced amnesic rats to study the memory-enhancing effects. Lipid peroxidation inhibition assay in liver and brain homogenates of rats was used to evaluate antioxidant activity. Daily administration of *F. vulgare* extract (50, 100 and 200 mg/kg body weight) 1 h prior to induction of stress significantly ( $p < 0.05$ ) altered the stress-induced urinary biochemical levels of VMA from  $395.79 \pm 11.23$  to  $347.12 \pm 12.28$ ,  $311.21 \pm 12.48$  and  $258.86 \pm 10.26$   $\mu\text{g}/\text{kg}$ , respectively, in 24 h, as

well as ascorbic acid excretion levels from  $65.74 \pm 9.42$  to  $78.59 \pm 8.44$ ,  $108.41 \pm 15.62$  and  $125.82 \pm 16.94$   $\mu\text{g}/\text{kg}$  also within the same period, respectively. These changes occurred in a dose-dependent fashion, and the levels in the control groups were unchanged within the same period. The memory deficits induced by scopolamine (1mg/kg, i.p.) in rats was reversed by *F. vulgare* dose-dependently. The extract also exhibited potent antioxidant effect by inhibition of lipid peroxidation in both rat liver and brain homogenates to a greater extent than the standard antioxidant, ascorbic acid. Thus *F. vulgare* may be useful in the management of stress and stress-related disorders on account of its multiple actions such as anti-stress, memory-enhancing and antioxidant effects [S Koppula and H Kumar, *Tropical Journal of Pharmaceutical Research* 2013, **12**(4), 553-558].

## THERAPEUTICS

### **NPARR 4(3), 2013-0312 Ethnobotanical survey of malaria prophylactic remedies in Odisha, India**

An ethnobotanical survey was carried out among 20 traditional healers who were sampled based on recommendations of local elders and local non-government organizations. Data were collected through semi-structured interview. The study revealed the use of 16 traditional plant species belonging to 12 families for prevention of malaria. *Andrographis paniculata*, *Azadirachta indica*, *Nyctanthes arbor-tristis*, *Ocimum sanctum*, *Piper nigrum*, *Zingiber officinale* were the most commonly reported plants for their malaria prophylactic use by the healers of three districts of Odisha. Most of the remedies were used in decoction form. Findings of this study provide a lead to explore traditional plants for malaria preventive potential through further pre-clinical and clinical studies [Prakash B. Nagendrappa, Muruli P. Naik and Unnikrishnan Payyappallimana\* (Institute of Ayurveda and Integrative Medicine (I-AIM), (Formerly Foundation for Revitalisation of Local Health Traditions, FRLHT) No. 74/2, Jarakabande kaval, Attur P.O., Via Yelahanka, Bangalore-560 106, Karnataka, India), *Journal of Ethnopharmacology*, 2013, **146**(3), 768-772].

### **NPARR 4(3), 2013-0313 Hepatoprotective evaluation of the total flavonoids extracted from flowers of *Abelmoschus manihot* (L.) Medic: *In vitro* and *in vivo* studies**

The decoction of the flowers of *Abelmoschus manihot* (L.) Medic is traditionally used for the treatment of jaundice and various types of chronic and acute hepatitis in Anhui and Jiangsu Provinces of China. Phytochemical studies have indicated that total flavonoids extracted from flowers of *Abelmoschus manihot* (L.) Medic (TFA) were the major constituents of the flowers. The present study was designed to

investigate the hepatoprotective effect of the plant extracts against carbon tetrachloride (CCl<sub>4</sub>) induced hepatocyte damage *in vitro* and liver injury *in vivo*. These results suggested that TFA protected mice against CCl<sub>4</sub>-induced liver injury through antioxidant stress and antiinflammatory effects. This finding justified the use of this plant in traditional medicine for the treatment of liver diseases [Guo Ai, Qingchuan Liu, Wei Hua, Zhengming Huang\* and Dewen Wang (Department of Pharmacy, 302 Hospital of PLA, Beijing 100039, PR China), *Journal of Ethnopharmacology*, 2013, **146**(3), 794-802]

### **NPARR 4(3), 2013-0314 Study on the mechanism of the bronchodilatory effects of *Cynodon dactylon* Linn. and identification of the active ingredient**

In the traditional medicine, *Cynodon dactylon* Linn. is used in asthma, but scientific studies to provide evidence for medicinal uses are sparse. Thus this study was undertaken to provide evidence for medicinal use in asthma as a bronchodilator, and to identify active ingredient(s). *In vivo*, acetylcholine (ACh)-induced bronchospasm was conducted in guinea pig while isolated rat tracheal strip was suspended in organ bath to measure the concentration response curve using multichannel data acquisition system. The chloroform extract of *Cynodon dactylon* (CECD) protected against ACh-induced bronchospasm in guinea pigs, similar to atropine. In the *in vitro* studies, CECD relaxed carbachol (CCh) and high K<sup>+</sup>-induced contraction of rat tracheal strip, similar to atropine and verapamil respectively, suggesting antimuscarinic and calcium channel blocking (CCB) activities, which were confirmed by rightward shifting of CCh and Ca<sup>2+</sup> concentration response curve (CRC). The phosphodiesterase (PDE) inhibitory activity was confirmed by potentiation of isoprenaline-induced inhibitory response, similar to papaverine. Densitometry analyses led to the identification of scopoletin as an active ingredient. Effectively, it significantly

inhibited high  $K^+$ , and  $Ca^{+2}$  induced contractile response, similar to verapamil. The phosphodiesterase (PDE) inhibitory activity was confirmed by direct evidence of potentiation of isoprenaline-induced inhibitory response, similar to papaverine. These results suggest that the bronchodilator activity of CECD is partly due to presence of scopoletin, and mediated possibly through CCB and PDE inhibition [Maulik R. Patel, Yagnik S. Bhalodia\*, Nimish L. Pathak, Maulik S. Patel, Kunal Suthar, Nilesh Patel, Dharmesh K. Golwala and Nurudin P. Jivani (C. U. Shah College of Pharmacy and Research, Faculty of Pharmaceutical Sciences, C. U. Shah University, Opp. I.B.P. Petrol Pump, Surendranagar–Ahmedabad Highway, Wadhwan 363030, Surendranagar, Gujarat, India), *Journal of Ethnopharmacology*, 2013, **150**(3), 946-952].

**NPARR 4(3), 2013-0315 Efficacy of *Adiantum capillus-veneris* Linn. in chemically induced urolithiasis in rats**

Ethnopharmacological relevance: *Adiantum capillus veneris* Linn has been recommended in ancient literature of Unani system of medicine as an important ingredient of many formulations for the treatment of urolithiasis. Its decoction has long been used for the same purpose by several Unani physicians. To investigate the antiurolithiasic effect of the hydro alcoholic extracts of *Adiantum capillus - veneris* Linn. in male Sprague Dawley rats. The effects of oral administration of hydro alcoholic extract of test drug were studied on calcium oxalate urolithiasis. A total of 48 rats were used for the study. The animals were divided into six groups of eight animals each. Plain control rats were treated with distilled water only, throughout the study period, whereas in other groups nephrolithiasis was induced by providing drinking water containing 0.75% ethylene glycol and 1% ammonium chloride for 7 days. Thereafter, urine was examined for the presence of crystals. Negative control group A rats were sacrificed after 7 days, whereas negative control

group B was left untreated up to the end of study. Test groups were treated with 127.6 mg/kg and 255.2 mg/kg of test drug and standard control with Cystone (750 mg/kg) for 21 days. At the end of experiment, number of crystals in urine and levels of calcium, phosphorus, urea and creatinine in serum were observed. Histopathological study of the kidney was done by light microscopy. Urine microscopy showed significant reduction ( $p<0.001$  and  $p<0.01$ ) in the number of crystals in test groups A and B respectively. Serum levels of calcium, phosphorous, and blood urea were found to be decreased significantly in all the groups. In both the test groups, serum creatinine level was found to be similar as in plain control. The animals treated with test drug showed much improvement in body weight. Histopathology of kidney showed almost normal kidney architecture in treated groups. The above findings indicate the antiurolithic activity of *Adiantum capillus-veneris* Linn. and thus, validate the claims of Unani physicians for its medicinal use in urolithiasis [Ajj Ahmed\*, Abdul Wadud, Nasreen Jahan, Alia Bilal and Syeda Hajera (Department of Ilmul Avia Pharmacology, National Institute of Unani Medicine, Kottigepalaya, Magadi Main Road, Bangalore 560091, India), *Journal of Ethnopharmacology*, 2013, **146**(1), 411-416].

**NPARR 4(3), 2013-0316 Anti-inflammatory effects of *Viola tricolor* gel in a model of sunburn in rats and the gel stability study**

*Viola tricolor*, popularly known as heartsease has been empirically used in several skin disorders, including burns. The objective of this study was investigate the antinociceptive and antiinflammatory effect of a gel containing extract of *Viola tricolor* flowers on thermal burn induced by UVB irradiation and to perform gel stability study. The antinociceptive and anti-inflammatory effect were evaluated by static and dynamic mechanical allodynia model, paw

edema, and neutrophilic cell infiltration. Metabolites compounds were quantified by HPLC. The gel stability study was performed analyzing organoleptical aspects, besides pH, viscosity, and quantification of rutin by HPLC. In the results were evidenced changes in threshold in static and dynamic mechanical allodynia ( $I_{\max}=100\pm 10\%$  and  $49\pm 10\%$ , respectively), paw edema ( $I_{\max}=61\pm 6\%$ ), and myeloperoxidase activity ( $I_{\max}=89\pm 5\%$ ). Such effects may be attributed, in part, to rutin, salicylic and chlorogenic acids, and others compounds found in this species. No important changes were detected in the stability study, in all aspects analyzed in temperature below 25 °C. These findings suggest that *Viola tricolor* gel has an antinociceptive and antiinflammatory effect in the ultraviolet-B-induced burn, since maintain the temperature below 25 °C. [Mariana Piana, Mariane Arnoldi Silva, Gabriela Trevisan, Thiele Faccim de Brum, Cássia Regina Silva, Aline Augusti Boligon, Sara Marchesan Oliveira, Marina Zadra, Carin Hoffmeister, Mateus Fortes Rossato, Raquel Tonello, Luciane Varini Laporta, Robson Borba de Freitas, Bianca Vargas Belke, Roberta da Silva Jesus, Juliano Ferreira and Margareth Linde Athayde\* (Phytochemical Research Laboratory, Department of Industrial Pharmacy, Federal University of Santa Maria, Avenida Roraima 1000, Camobi, Santa Maria, RS, Brazil), *Journal of Ethnopharmacology*, 2013, **150** (2), 458-465].

**NPARR 4(3), 2013-0317 Effects of *Catalpa ovata* stem bark on atopic dermatitis-like skin lesions in NC/Nga mice**

The stem bark of *Catalpa ovata* has been used as a traditional herbal medicine for the treatment of various inflammatory diseases such as itching and scabies. In the present study, we investigated the anti-AD effects of *Catalpa ovata* stem bark on *Dermatophagoides farinae*-induced AD in a NC/Nga mouse AD model. We determined dermatitis score, histology, IgE, cytokines, and chemokines related to

hypersensitive immune responses in AD. The mechanism of action was also investigated using HaCaT cells. We investigated the topical effects of *Catalpa ovata* stem bark on AD-like skin lesions in NC/Nga mice. Five category-experiments were performed, including assessment of dermatitis score; histological analysis of dorsal skin lesions; quantitative measurement of serum total IgE; quantitative measurement of cytokines (IL-1 $\beta$ , IL-4, IL-5, IL-6, IL-13, TNF- $\alpha$ ) from dorsal tissue; and RT-PCR analysis of for TSLP and TARC mRNA expression in HaCaT cells.

The clinical dermatitis score was significantly lower in *Catalpa ovata* extract (COE) groups than in the control group. Histological analysis showed that COE inhibited hypertrophy and hyperkeratosis of the epidermis, intracellular edema, and reduced the infiltration of inflammatory cells. COE significantly inhibited serum total IgE; Th2 cytokines IL-4, IL-5 and IL-13; pro-inflammatory cytokines IL-1 $\beta$ , IL6 and TNF- $\alpha$ ; the Th2 chemokine TARC and the pro-Th2 cytokine TSLP. These results demonstrate that *Catalpa ovata* stem bark may be a useful external medicine for treatment of AD. Further investigation is necessary to determine appropriate COE dosage and to evaluate the safety of this medicinal herb [Gabsik Yang, Cheol-Han Choi, Kyungjin Lee, Mihwa Lee, Inhye Ham and Ho-Young Choi\* (Department of Herbology, College of Oriental Medicine, Kyung Hee University, 1 Hoegi-Dong, Dongdaemun-Gu, Seoul, Republic of Korea), *Journal of Ethnopharmacology*, 2013, **145** (2), 416-423].

**NPARR 4(3), 2013-0318 *Withania somnifera* root extract ameliorates hypobaric hypoxia induced memory impairment in rats**

*Withania somnifera* (WS) root extract has been used traditionally in ayurvedic system of medicine as a memory enhancer and anti-stress

agent. vAim of the study. To evaluate the neuroprotective and prophylactic potential of WS root extract in ameliorating hypobaric hypoxia (HH) induced memory impairment and to explore the underlying molecular mechanism. WS root extract was administered to male Sprague Dawley rats during a period of 21 days pre-exposure and 07 days exposure to a simulated altitude of 25,000 ft. Spatial memory was assessed by Morris Water Maze. Neurodegeneration, corticosterone, acetylcholine (Ach) levels, acetylcholine esterase (AChE) activity, oxidative stress markers and nitric oxide (NO) concentration were assessed in the hippocampus. Synaptic and apoptotic markers were also investigated by immunoblotting. To study the role of NO in regulating corticosterone mediated signaling, the neuronal nitric oxide synthase (n-NOS) inhibitor, L-Nitro-arginine methyl ester (L-Name) and NO agonist sodium nitroprusside (SNP) were administered from 3<sup>rd</sup> to 7<sup>th</sup> day of hypoxic exposure. Administration of WS root extract prevented HH induced memory impairment and neurodegeneration along with decreased NO, corticosterone, oxidative stress and AChE activity in hippocampal region. Inhibition of NO synthesis by administration of L-Name reduced corticosterone levels in hippocampus during hypoxic exposure while co-administration of corticosterone increased neurodegeneration. Administration of sodium nitroprusside (SNP) along with WS root extract supplementation during hypoxic exposure increased corticosterone levels and increased the number of pyknotic cells. WS root extract ameliorated HH induced memory impairment and neurodegeneration in hippocampus through NO mediated modulation of corticosterone levels [Iswar Baitharu, Vishal Jain, Satya Narayan Deep, Kalpana Barhwal Hota, Sunil Kumar Hota, Dipti Prasad and Govindasamy Ilavazhagan\* (Defence Institute of Physiology and Allied Sciences, DRDO, At/Po: Timarpur, Lucknow Road, Delhi-110054, India), *Journal of Ethnopharmacology*, 2013, **145**( 2), 431-441].

*NPARR* 4(3), 2013-0319 ***In vitro* anti-*Helicobacter pylori* activity of a flavonoid rich extract of *Glycyrrhiza glabra* and its probable mechanisms of action**

*Glycyrrhiza glabra* Linn. is regarded useful for peptic ulcer in traditional systems of medicine in India and *Helicobacter pylori* has been considered as one of the causative factors for peptic ulcer. Aim of the present study is to evaluate the anti-*Helicobacter pylori* action of GutGard<sup>®</sup>, a flavonoid rich extract of *Glycyrrhiza glabra* and further to elucidate the possible mechanisms of its anti-*Helicobacter pylori* action. Agar dilution and microbroth dilution methods were used to determine the minimum inhibitory concentration of GutGard<sup>®</sup> against *Helicobacter pylori*. Protein synthesis, DNA gyrase, dihydrofolate reductase assays and anti-adhesion assay in human gastric mucosal cell line were performed to understand the mechanisms of anti-*Helicobacter pylori* activity of GutGard<sup>®</sup>. GutGard<sup>®</sup> exhibited anti-*Helicobacter pylori* activity in both agar dilution and microbroth dilution methods. Glabridin, the major flavonoid present in GutGard<sup>®</sup> exhibited superior activity against *Helicobacter pylori* while glycyrrhizin did not show activity even at 250 µg/ml concentration. In protein synthesis assay, GutGard<sup>®</sup> showed a significant time dependent inhibition as witnessed by the reduction in <sup>35</sup>S methionine incorporation into *Helicobacter pylori* ATCC 700392 strain. Additionally, GutGard<sup>®</sup> showed a potent inhibitory effect on DNA gyrase and dihydrofolate reductase with IC<sub>50</sub> value of 4.40 µg/ml and 3.33 µg/ml respectively. However, the extract did not show significant inhibition on the adhesion of *Helicobacter pylori* to human gastric mucosal cell line at the tested concentrations. The present study shows that, GutGard<sup>®</sup> acts against *Helicobacter pylori* possibly by inhibiting protein synthesis, DNA gyrase and dihydrofolate reductase [Mannanthendil Kumaran Asha, Debnath Debraj, D'souza Prashanth, Jothie Richard Edwin, H.S. Srikanth, Nithyanantham

Muruganantham\*, Shekhar Michael Dethe, (R&D centre, Natural Remedies Pvt. Ltd.,  
Bhaskar Anirban, Balachandran Jaya, Bangalore, Karnataka, India), *Journal of*  
Mundkinajeddu Deepak and Amit Agarwal *Ethnopharmacology*, 2013, **145**(2), 581-586].

## VEGETABLES

**NPARR 4(3), 2013-0320 Carotenoid bioavailability from raw vegetables and a moderate amount of oil in human subjects is greatest when the majority of daily vegetables are consumed at one meal**

While the impact of food composition and processing on carotenoid bioavailability has been the subject of several investigations, the effect of meal patterning remains unknown. The aim of this pilot study was to assess the impact of select consumption patterns on the bioavailability of carotenoids from vegetables. On three randomized testing days, subjects consumed raw salad vegetables and 8 g canola oil over a two meal period in three meal patterns. Meal patterns included consumption of 100% of vegetables and oil in the first meal and 0% in the second, 75% in the first meal and 25% in the second, and 50% in the first meal and 50% in the second. Additional protein-rich “chef’s salad” ingredients were distributed equally between meals. We hypothesized that carotenoid absorption would be highest when 50% of vegetables and oil were consumed at each meal and lowest when 100% were consumed at once. Blood was collected 0 to 12 hours postprandially and triacylglycerol-rich lipoprotein fractions (TRL) were isolated by ultracentrifugation. TRL carotenoid concentrations were analyzed by high performance liquid chromatography–diode array detector. Considering all carotenoids, absorption expressed as area under the curve was greatest when  $\geq 75\%$  of vegetables were consumed in a single meal ( $P < .05$ ). Absorption of carotenes also followed this trend ( $P < .05$  for  $\alpha$ - and  $\beta$ -carotene). For xanthophylls, consuming all vegetables in one meal increased absorption compared to intake of 50% at each meal ( $P < .05$ ). These data suggest that carotenoid absorption may be the greatest when daily recommended vegetables are consumed in one meal compared to smaller doses over multiple meals [Shellen R.

Goltz, Teryn N. Sapper, Mark L. Faill, Wayne W. Campbell and Mario G. Ferruzzi (Department of Food Science, Purdue University, West Lafayette, IN 47907, USA) *Nutrition Research*, 2013, **33** (5), 358-366].

**NPARR 4(3), 2013-0321 *Citrullus lanatus* ‘sentinel’ (Watermelon) extract reduces atherosclerosis in LDL receptor-deficient mice**

Watermelon (*Citrullus lanatus* or *C. lanatus*) has many potentially bioactive compounds including citrulline, which may influence atherosclerosis. In this study, we determined the effects of *C. lanatus*, provided as an extract of the cultivar ‘sentinel,’ on hypercholesterolemia-induced atherosclerosis in mice. Male low-density lipoprotein receptor-deficient mice at 8 weeks old were given either *C. lanatus* ‘sentinel’ extract (2% vol/vol;  $n = 10$ ) or a mixture of matching carbohydrates (2% vol/vol;  $n = 8$ ) as the control in drinking water while being fed a saturated fat-enriched diet for 12 weeks *ad libitum*. Mice consuming *C. lanatus* ‘sentinel’ extract had significantly increased plasma citrulline concentrations. Systolic blood pressure was comparable between the two groups. Consumption of *C. lanatus* ‘sentinel’ extract led to lower body weight and fat mass without influencing lean mass. There were no differences in food and water intake and in urine output between the two groups. *C. lanatus* ‘sentinel’ extract administration decreased plasma cholesterol concentrations that were attributed to reductions of intermediate-/low-density lipoprotein cholesterol. Plasma concentrations of monocyte chemoattractant protein-1 and interferon-gamma were decreased and those of interleukin-10 were increased in mice consuming *C. lanatus* ‘sentinel’ extract. Intake of *C. lanatus* ‘sentinel’ extract resulted in reductions of atherosclerosis in both aortic arch and thoracic regions. In conclusion, consumption of *C. lanatus* ‘sentinel’ extract led to reduced body weight gain, decreased plasma cholesterol

concentrations, improved homeostasis of pro- and anti-inflammatory cytokines, and attenuated development of atherosclerosis without affecting systolic blood pressure in hypercholesterolemic mice [Aruna Poduri, Debra L. Rateri, Shubin K. Saha, Sibin Saha and Alan Daugherty (Saha Cardiovascular Research Center, University of Kentucky, Lexington, KY 40536), *The Journal of Nutritional Biochemistry*, 2013, **24**(5), 882-886].

**NPARR 4(3), 2013-0322 Conversion of a non-water soluble potato starch waste into reducing sugars under non-conventional technologies**

In this exploratory work, the comparison of the utilisation of different non-conventional technologies (ultrasound and microwave irradiations) for the depolymerisation of a complex industrial starch-based waste into reducing sugars was investigated. Reducing sugars could then be converted into higher value-added compounds such as higher alcohols. The experiments were performed on three different starting materials named as 'Potato flour', 'Wet potato sludge' and 'Dry potato sludge'. The conversion of 'Potato flour' into reducing sugars reached in acidic conditions 61% within an hour under microwave irradiation, 70% and 84% within 120 min under low and high frequency ultrasonic irradiation, respectively [Audrey Hernoux, Jean-Marc Lévêque, Ulla Lassi, Sonia Molina-Boisseau and Marie-France Marais

(Laboratoire de Chimie Moléculaire et Environnement, Université de Savoie, 73376 Le Bourget du Lac Cedex, France), *Carbohydrate Polymers*, 2013, **92**(2), 2065-2074].

**NPARR 4(3), 2013-0323 Physico-chemical characterisation of molasses and its effects on the growth of *Abelmoschus esculentus* (Lady's Finger)**

Physiochemical characterization of diluted molasses and three different soils were carried out for additive plant nutrients such as phosphorous, potassium and other physical and chemical parameters. The seeds of Lady's finger (of make Ankur) were sown in each polythene bag containing 0%, 0.2%, 0.5%, 1%, 1.5% etc. blended soil with diluted molasses. The growth of plants was monitored regularly after every month up to three months from the date of plantation for all the three soils in rainy, winter and summer seasons of the year 2009-10. From the commercial viewpoint, the overall maximum numbers of fruits were founded in rainy and winter season at 0.2-0.5% blending concentration and in summer it was at 0.5-1.0% blending. The present work shows the possibility of use of effluents by blending with soil for better plant growth [P.B. Thakare, M.D. Chaudhary and W.K. Pokale (Arts, Commerce and Science College, Arvi, Dist. Wardha, (M.S), India.), *World Applied Sciences Journal*, 2013, **21**(6), 869-872].

## WOOD

### **NPARR 4(3), 2013-0324 Decay protection of wood against brown-rot fungi by titanium alkoxide impregnations**

Decay resistance of pine sapwood treated with titanium alkoxide solutions was tested against the brown-rot fungi *Coniophora puteana* and *Poria placenta* for exposure times of 10 and 16 wk. In practice, wood-specimens were vacuum-impregnated by alcoholic solutions of titanium alkoxide with concentrations in the range of 5-16 mass % (solid content in solution) and subsequently cured under different humidity conditions. Results reveal that treated wood degraded up to 5% in comparison to untreated one that deteriorated 38% and 50%, respectively against both wood-decay fungi. Even full protection (mass loss below 3%) was achieved against brown rot with titanium alkoxide solution containing solid content of around 5 mass% with a weight percentage gain (WPG) of 9 mass%. With increased concentration, fungal resistance decreased slightly which was associated with more cracks and imperfections formed in the deposited layers of titanium dioxide in the adjacent wood matrix. Thermal analysis verified that a considerable amount of precursor remained in the wood structure as un-hydrolyzed organic residues. These organics, being bioactive, had the tendency to induce similar fungicidal effects as those of conventional fungicides. The amount of organic residues is correlated with the decay resistance of the tested samples. In a prolonged decay test, mass losses of 16-wk incubated samples do not show behavior different from that of the wood samples incubated for 10 wk. This result implies that the decay protection is permanent and confirms further the fungicidal activity of titanium-alkoxide-treated wood [M. Shabir Mahr, T. Hubert, I. Stephan and H. Militz, (BAM Federal Institute for Materials Research and Testing, Unter den Eichen 44-46, 12203 Berlin, Germany), *International Biodeterioration & Biodegradation*, 2013, **77**, 56-62].

### **NPARR 4(3), 2013-0325 Antitermitic and antioxidant activities of heartwood extracts and main flavonoids of *Hymenaea stigonocarpa* Mart.**

*Hymenaea stigonocarpa*, is an endemic tree from the Brazilian cerrado (savannah) and popularly known as jatobá-do-cerrado. The wood of this species is resistant to biodegradation and is used in naval and civil construction. Cuttings from heartwood of this species showed resistance to fungi and termites. In this paper, we report the antitermitic and antioxidant activities of *H. stigonocarpa* heartwood ethyl acetate extract and its main flavonoids constituents, hultenin (1), taxifolin (2), quercetin (3) and 7-methoxycathequin (4). The structure elucidation of the isolated flavonoids was performed by spectroscopic methods. The ethyl acetate extract possesses highest antitermitic and antioxidant activity when compared with isolated flavonoids.[Claudia A. MaranhãoIrapuan O. Pinheiro, Andréa L.B.D. Santana, Luciana S. Oliveira, Márcia S. Nascimento and Lothar W. Bieber, (Departamento de Antibióticos, Universidade Federal de Pernambuco, UFPE, 50740-520 Recife, PE, Brazil), *International Biodeterioration & Biodegradation*, 2013, **79**, 9-13].

### **NPARR 4(3), 2013-0326 Assessing essential oil components as plant-based preservatives against fungi that deteriorate herbal raw materials**

This study assesses the antifungal efficacy of 14 essential oil (EO) components and some of their combinations as inhibitory to the growth of the aflatoxigenic fungus *Aspergillus flavus* LHPA<sub>9</sub> isolated from biodeteriorating *Asparagus racemosus* herbal raw materials. The aim was to determine whether they could be recommended as plant-based preservatives for enhancement of the shelf life of herbal raw materials. Thymol,

eugenol, menthol, and their combinations were highly efficacious as their minimum inhibitory concentration (MIC) for inhibition of fungal growth as well as aflatoxin B<sub>1</sub> secretion was less than 1.0 µl ml<sup>-1</sup>. Geranyl acetate, linalool, β-asarone, 1, 8-cineol, and E-citral were moderately antifungal as their MIC ranged between 1.0 and 5.0 µl ml<sup>-1</sup>. During antioxidant activity 2, 2-diphenyl-1-picrylhydrazyl assay, thymol, eugenol, and β-caryophyllene showed strong radical scavenging activity, whereas β-asarone and p-cymene showed moderate activity. Some combinations of EO components showed synergism while others exhibited an additive or antagonism effect in their activity. The findings point to a recommendation that EO components are good alternatives to synthetic preservatives to prevent deterioration of stored herbal raw materials by fungal and aflatoxin contamination and free-radical oxidation [Prashant Kumar Mishra, Priyanka Singh, Bhanu Prakash, Akash Kedia, Nawal Kishore Dubey and C.S. Chanotiya, (Laboratory of Herbal Pesticides, Centre of Advanced Study in Botany, Banaras Hindu University, Varanasi 221005, India), *International Biodeterioration & Biodegradation*, 2013, **80**, 16-21].

*NPARR* 4(3), 2013-0327 **Studies on different softwood grafting techniques in jamun (*Eugenia jambolana*)**

*Eugenia jambolanais* mostly propagated through seeds, which exhibit a great variation due to inevitable heterozygosity. For producing pedigree plants of a variety, the presence of any asexual propagational technique is prerequisite. For this purpose, nursery experiments were conducted at Horticultural Research Institute, AARI, Faisalabad during the year 2009-10 and 2010-11 for standardization of asexual propagational technique in jamun. Three grafting techniques i.e. T-budding, T-grafting and cleft grafting were studied. On the basis of two years means, maximum success percentage (65.25%) was measured in the plants budded by T-grafting. The plants sprouted in 30.50 days and produced 13.5 numbers of leaves on 27 cm long twig. Minimum success (10.75%) was measured in cleft grafting. The results provided useful information on clonal multiplication of elite germplasm of jamun in vitro for developing commercial nurseries [Malik Mohsin Abbas, Muhammad Afzal Javed, Saeed Ahmad, Naseem Sharif and Mazz Aziz (Horticultural Research Institute, AARI, Jhang Road, Faisalabad, Pakistan), *Journal of Agricultural Research*, 2013, **51**(2), 169-174].

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

## **POSTHARVEST TECHNOLOGIES**

**NPARR 4(3), 2013-0328 Effectiveness of almond gum trees exudate as a novel edible coating for improving postharvest quality of tomato (*Solanum lycopersicum* L.) fruits**

The use of coatings is a technique used to increase postharvest life of the fruit. Almond gum exudate was used, in comparison with gum arabic, at concentrations of 10% as a novel edible coating, to preserve the quality parameters of tomato (*Solanum lycopersicum*). Fruits were harvested at the mature-green stage of ripening. Results showed that the coatings delayed significantly ( $p < 0.05$ ) the changes in color, weight loss, firmness, titratable acidity, ascorbic acid content, soluble solids concentration, and decay percentage compared to uncoated control fruits. Sensory evaluation proved the efficacy of 10% almond gum and gum arabic coatings to maintain the overall quality of tomato fruits during storage period (20 days). In addition, the difference between gum arabic and almond gum coatings was not significant ( $p > 0.05$ ) except for pulp color. Therefore, we can suggest the use of almond gum exudate as a novel edible coating extends the shelf-life of tomato fruits on postharvest [Nesrine Mahfoudhi\* Moncef Chouaibi and Salem Hamdi (Food Preservation Laboratory, High Institute of Food Industry, Elkhadra, Tunisia), *Food Science and Technology International*, 2013, June 3, 1082013212469617].

**NPARR 4(3), 2013-0329 Cost effective bentonite clayed pyramid technologies for household fruits and vegetables storage**

In the present study we focus on bentonite clay pyramid used for storing household fruits and vegetables up to nine days and it was compared with other two storage systems like refrigerator and room temperature that were considered as control. Parameters like physiological loss of weight, heterotrophic microbial count and organoleptic quality were analyzed for the stored products such as bitter guard, chilly and orange. The results revealed that the pyramid storage system which minimized the physiological loss of weight reduced microbial number and prevented spoilage compared with two control storage conditions. Conversely the pyramidal system maintains lower level of organoleptic value than refrigerator but higher than room storage system. On the other hand, the significant impact of this clayed pyramid storage system is found on the least decay percentage, and shelf life extension of vegetables was further increased. In addition to the parameters, the clayed pyramid storage system had more storing capacity for the household fruits and vegetables storage. It was concluded that this low cost and pollution free technology system is more suitable for storage food samples effectively than room temperature and little bit less than refrigerator storages, respectively, in rural as well as urban areas. However, this initial step provides opportunity for carry out further research in this new field [Abdullah A. Al-Arfaj, A. M. Murugan, Arunachalam Chinnathambi and M. I. Al-Hazmi ((Department of Botany and Microbiology, College of Science, King Saud University, Riyadh, Kingdom of Saudi Arabia), *Journal of Food, Agriculture & Environment*, 2013, **11**(2), 175-180].

**NPARR 4(3), 2013-0330 Evaluation of wrapping materials for reducing post harvest decay loss in mango fruits**

The effect of different wrapping materials on post harvest decay loss of mango fruits under ambient conditions (17-25°C (RH 70-80%)) was

studied. Results revealed that post harvest decay loss can be minimized significantly through proper wrapping of fruits during storage. Fruits wrapped with news paper up to 15 days of storage exhibited low decay loss percent. In general, the fruit loss due to fungal attack increased with increasing duration of storage [Simon Sobita, Lal Abhilasha,

Srivastava Renu, Singh Lakhveer and Sharma Vinod (Department of Plant Protection, Sam Higginbottom Institute of Agriculture, Technology & Sciences Formerly Allahabad Agricultural Institute-Deemed University, Allahabad, U.P.-211007), *Trends in Biosciences*, 2013, **6**(3), 288-289].

**NPARR 4(3), 2013-0331 Effects of chitosan-based coatings containing peppermint essential oil on the quality of post-harvest papaya fruit**

Edible coatings comprised of antimicrobial polymers based on chitosan are promising technologies to preserve post-harvest fruit quality. In this study, we investigated the potential utility of a coating made from chitosan modified by N-acylation with fatty acid to preserve post-harvest papaya quality. Peppermint essential oil (EO) was added to the chitosan-based coatings as an antifungal agent. A formulation which contained a high concentration of peppermint EO (1.0%) without chitosan apparently damaged the peel, resulting in higher peel discolouration, less colour development and lower marketability. The most promising treatment was unmodified chitosan (1%) in combination with peppermint EO (0.2%). The fruits treated with this formulation showed less peel discolouration than the experimental control and 100% of the fruits were marketable. The modified chitosan apparently increased the hydrophobicity of the coating resulting in a loss of firmness and delayed colour development of coated fruits during ripening [Isabelle Picard, Robert G. Hollingsworth, Marisa Wall, Kate Nishijima, Stéphane Salmieri, Khanh Dang Vu

and Monique Lacroix (Research Laboratory in Sciences Applied to Food, INRS-Institut Armand Frappier, Canadian Irradiation Center, 531 Boulevard des Prairies, Laval, Quebec, H7V 1B7, Canada), *International Journal of Postharvest Technology and Innovation*, 2013, **3**(2), 178-189].

**NPARR 4(3), 2013-0332 Safety assessment of the post-harvest treatment of button mushrooms (*Agaricus bisporus*) using ultraviolet light**

Wild mushrooms are an excellent source of vitamin D. The presence of vitamin D in mushrooms is attributed to sunlight exposure, which catalyzes the conversion of fungal ergosterol to vitamin D<sub>2</sub> via a series of photochemical/thermal reactions. Mushroom growers now incorporate UV light treatments during processing to produce mushrooms with levels of vitamin D that compare to those in wild mushrooms. Presented herein is a comprehensive review of information relevant to the safety of introducing vitamin D mushrooms, produced using UV light technologies, to the food supply. Historical reference to the use of UV light for production of vitamin D is discussed, and studies evaluating the nutritional value and safety of vitamin D mushrooms are reviewed. Traditional safety evaluation practices for food additives are not applicable to whole foods; therefore, the application of substantial equivalence and history-of-safe-use is presented. It was demonstrated that vitamin D in mushrooms, produced using UV light technologies, are equivalent to vitamin D in mushrooms exposed to sunlight, and that UV light has a long-history of safe use for production of vitamin D in food. Vitamin D mushrooms produced using UV light technologies were therefore considered safe and suitable for introduction to the marketplace [R R Simon, JF Borzelleca H F DeLuca and CM Weaver, *Food and Chemical Toxicology*, 2013, **56**, 278-289].

## CULTIVATION

### **NPARR 4(3), 2013-0333 Mild Fe-deficiency improves biomass production and quality of hydroponic-cultivated spinach plants (*Spinacia oleracea* L.)**

It is of great practical importance to improve yield and quality of vegetables in soilless cultures. This study investigated the effects of iron-nutrition management on yield and quality of hydroponic-cultivated spinach (*Spinacia oleracea* L.). The results showed that mild Fe-deficient treatment (1  $\mu$ M FeEDTA) yielded a greater biomass of edible parts than Fe-omitted treatment (0  $\mu$ M FeEDTA) or Fe-sufficient treatments (10 and 50  $\mu$ M FeEDTA). Conversely, mild Fe-deficient treatment had the lowest nitrate concentration in the edible parts out of all the Fe treatments. Interestingly, all the concentrations of soluble sugar, soluble protein and ascorbate in mild Fe-deficient treatments were higher than Fe-sufficient treatments. In addition, both phenolic concentration and DPPH scavenging activity in mild Fe-deficient treatments were comparable with those in Fe-sufficient treatments, but were higher than those in Fe-omitted treatments. Therefore, we concluded that using a mild Fe-deficient nutrition solution to cultivate spinach not only would increase yield, but also would improve quality [Chong-Wei Jin, Yue Liu, Qian-Qian Mao, Qian Wang and Shao-Ting Du, *Food Chemistry*, 2013, **138**(4), 2188-2194].

### **NPARR 4(3), 2013-0334 Income generation through potato cultivation in Rewa district of Madhya Pradesh**

Diversification helps in increasing income and reducing risk associated with the farming. Due to returns potato cultivation is gaining importance in the Rewa district. The study shows that the average yield of potato in the study area was 11.11 tons per hectare. The maximum yield

(11.46 tons per hectare) was obtained on large size of farm's due to efficient use of inputs. Farm business income was higher in case of small farmers and decreased with the increase of size of holding. This shows the efficiency of smaller farmers to scale up potato production. The cost benefit ratio of potato production to the tune of 1.52 was found to be satisfactory and will be helpful in promoting nature for potato production in the area. However, cold storage facilities may help in increasing returns at farmers' level [Rajput L. S., Nirajan, H. K., Singh, K. C., Pradeep Mishra and Shrivastava, S. N., *Environment and Ecology*, 2013, **31**(No. 2B), 984-987].

### **NPARR 4(3), 2013-0335 Exotic medicinal plants-current status and future priorities**

Augmentation of new genetic resources either through indigenous collections or by importing from other countries is an important activity of any crop improvement programme. Indian history had witnessed the invasion of many world communities like British, French, Portuguese, Dutch, Arabians, Muslims etc with whom a diverse genetic base of many crop plants were also introduced in the country's flora. Many of these species have been adapted well and naturalized in Indian climate and are being used in various facets of life. The pharmaceutical industry is also backed by many such plants. Of the forty major commercial medicinal plants utilized by the Indian pharmaceutical companies, about 27 per cent have originated in other countries. The percentage is still higher in case of commercial aromatic plants viz., 52 per cent of the total aromatic component. The gradual increase in the utilization of exotic plants by the pharma-aroma-companies is because many plants have been introduced into cultivation and are now a part of regular agriculture system. The National Bureau of Plant Genetic Resources (NBPGR), New Delhi under ICAR is instrumental in providing this genetic variability of medicinal plants at both fronts. The import of

plant genetic resources into India is governed by Plant Quarantine (Regulation of Import Into India) Order, 2003. Access to genetic resources of Indian origin by foreign nationals is governed by Biological Diversity Act, 2002 of Government of India based on the principle of 'Sovereign rights of Nations' as promulgated under the legally binding Convention on Biological Diversity (CBD), 1992. The Convention provides for appropriate access to genetic resources and transfer of relevant technologies on mutually agreed terms, subject to prior informed consent [Vandana Tyagi; Veena Gupta and Singh, S. P. , *International Journal of Plant Sciences (Muzaffarnagar)*, 2013, **8**(1), 10-18].

**NPARR 4(3), 2013-0336 Utilization of salt-affected environments in cultivation of medicinal and aromatic plant.**

Salinity adversely reduces the overall productivity of plants including crops by inducing numerous abnormal morphological,

physiological and biochemical changes that cause delayed germination, high seedling mortality, poor crop stand, stunted growth and lower yields. More than 1100 species of vascular plants are found distributed in saline habitats of India, out of which several have medicinal properties. Various experiments in arid and semi-arid regions of Indian sub-continent on salty soils and irrigating judiciously with saline water have shown that several aromatic and medicinal plants such as Goose berry, neem, Bael, Arjun, Jatropha, Vasaka, Ashawagandha, Castor, Isabgol, Periwinkle, Indian aloe, Senna, Mallati, Tulsi, Dill, Celery, German Chamomile, Vetiver, Palmarosa and Lemon grass can successfully be grown with saline irrigation and in moderate alkali soil without applying any amendment. This paper is an attempt to indicate that cultivation of aromatic and medicinal plants on degraded lands through biosaline agriculture is very much feasible [Dagar J. C.; Mukesh Kumar; Amit Kumar, *International Journal of Agricultural and Statistical Sciences*, 2013, **9**(1), 273-283].

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

1. **National Conference on New Approach in Chemical Sciences and Advancement in Renewable Energy** , 4-5, April 2014, Ghaziabad, Uttar Pradesh, India, Website: <http://www.ncnacsar.in>
2. **International Conference on Advances in Sustainability of Materials and Environment**, 10-11, April 2014, Nagercoil, Kanyakumari District, Tamil Nadu, India, Website: <http://icasme14.com>
3. **International Conference on Emerging Trends in Traditional and Technical Textiles**, 11- 12 April 2014, Jalandhar, Punjab, India, Website: <http://www.icett2014.in>
4. **10th Indo-Australian Conference on Biotechnology: Conference on Epithelial Development Function and Disease – New Frontiers and Therapies**, 11 - 13 April 2014, Manipal, Karnataka, India, Website: <http://indoausbiotech.manipal.edu>
5. **International Conference on Faunal Biodiversity and their Conservational Strategies**, 22- 23 March 2014, Lucknow, Uttar Pradesh, India, Website: [http://www.lkouniv.ac.in/conference/march\\_2013\\_zoology.pdf](http://www.lkouniv.ac.in/conference/march_2013_zoology.pdf)
6. **2014 1st Journal Conference on Bioscience, Biochemistry and Bioinformatics (JCBBB 2014 1st)**, 29th to 30 March 2014, Shanghai, China, Website: <http://www.ijbbb.org/jcbbb/1st>
7. **International Conference on Agriculture and Forestry 2014 (ICOAF 2014)**, 10- 11 June 2014 Colombo, Sri Lanka, Website: <http://agroconference.com/>
8. **Two Day National Conference on "Plant Pathology"**, Event Serial -4905, Latur, Maharashtra, India, Website: <http://shahucollegelatur.org.in/news/a-national-conference-on-plant-pathology-plant-pathology.php>
9. **National conference on Recent advances in Biosciences and Drug Discovery**, Event Serial - 3502, Haridwar, Uttaranchal , India ; Website <http://www.gkv.ac.in>

## ANNOUNCEMENTS

### **INDIAN JOURNAL OF NATURAL PRODUCTS AND RESOURCES**

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 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); [ijnpr@niscair.res.in](mailto:ijnpr@niscair.res.in)

### **RAW MATERIALS HERBARIUM AND MUSEUM DELHI (RHMD)**

Herbarium is a repository of dried specimens of plants collected from far and wide and is arranged in a systematic order. Plant specimens in herbaria and their raw material samples serve as reference materials for any plant-based research and as source materials for information on utilization, conservation, planning and management. The herbarium specimens have become resources for generating the profiles of chemical constituents and DNA fingerprinting. The herbarium specimens could be used as standard reference materials while identifying the plant specimens and the crude drug samples. Further, the herbaria could provide information on folk-lore, ethnomedicine or traditional medicine from which new medicines could be evolved.

Because of wide spread belief that herbal medicines are safer than synthetic drugs, demand for Indian medicinal plants has increased many fold in the national and international markets. Due to high demand but limited cultivation of medicinal plants in India, more than 95 per cent plants are being harvested from the wild. Consequently there is gap in demand and supply, therefore, the collectors and traders involved in commercialization of medicinal plants often mix other related plant materials to the genuine one or an altogether a distinct plant material is sold in the market in place of genuine one. Thus usage of such adulterated or spurious raw material for manufacturing medicine affects the efficacy of the finished product and could cause deleterious effect on human health.

Considering the demand for natural products including medicines and other products for various purposes, universities, colleges, institutes and various other R & D labs are focusing on research works especially pharmacological, phytochemical and ethnobotanical studies. First and foremost requisite for these findings is the correct identification of the plant/crude drug collection, preservation and identification. It is a fact that without correct name literature search is incomplete. Therefore, before starting actual R & D work, researchers need to have correct identification and nomenclature of the plant specimen for any novel finding or to validate an ethnobotanical report.

While starting the revised series of The Wealth of India-An Encyclopaedic Dictionary of Indian Raw Materials in 1978, National Institute of Science Communication and Information Resources (NISCAIR), formerly known as NISCOM, a constituent establishment of Council of Scientific Industrial Research (CSIR), has set up a Raw Materials Herbarium & Museum, housing authentic samples of economically important raw materials of plant, animal and mineral origin of India as a whole, in one place, to disseminate and showcase knowledge on these resources through authenticated collection of samples, herbarium sheets borrowed and collected from fields from throughout India. It is open to the scientists, researchers, industries, entrepreneurs, traders, students and the public. **The NISCAIR Herbarium & Museum was assigned the acronym RHMD (Raw Materials Herbarium & Museum, Delhi) by the International Association for Plant Taxonomy and it appeared in the publication "Index Herbarium, New York, USA" (1990).** The RHMD houses over 8000 specimens comprising more than 5000 species of economic and medicinal plants of India and the Museum containing over 3500 samples of crude-drugs, animal and mineral specimens.

The facility backed up by the knowledge stored in the Wealth of India, is a veritable storehouse of information on the raw materials of India, and is a place useful to students to gain knowledge on economic biology and geology. Based on this facility and the available expertise, we do authentication/identification of the specimens/samples received under possible botanical or common names of the plant(s) and issue a certificate.

#### **DECLARATION**

- Authentication of herbarium specimen or crude drug sample (s) pertains to the quantity/quality of specimens/samples received in RHMD.
- Authentication is done on the basis of macroscopic studies followed by detailed scrutiny of literature and matching the samples with authenticated specimens preserved in RHMD.
- Samples/specimens submitted to RHMD are non-returnable.
- This service is provided for societal intervention and facilitate biological science students/entrepreneurs/ institutes, etc.
- Nominal service charges are taken to maintain the received samples and specimens for further reference and consultation.
- For the identification of dried well pressed plant specimens properly fixed on a herbarium sheet with leaves, flower, fruit, etc., Rs.250/- per plant are charged.
- For crude drug (Leaves, fruits, flowers, root, rhizome etc.) identification, we charge Rs.500/- per sample.

**REQUEST FORM FOR AUTHENTICATION (Download)**

Sir/Madam,

I/would like to get done authentication of enclosed herbarium specimen(s)/crude drug sample (s) from Raw Materials Herbarium & Museum, Delhi (RHMD). Detailed information about the specimen(s)/crude drug sample (s) available with me is given below:

1. Botanical Name (Possible):-----
2. Market/Trade/Local/Hindi/Vernacular name:-----
3. Part of specimen: Root/Rhizome/Stem/Aerial part/Leaves/Flowers/Fruits/Seeds, Bark,etc.-----
4. Date/Season of Collection:-----
5. Place of collection:-----
6. Use (if known )-----
7. Purpose of Authentication-Research/Academic/Trade/Cultivation/Drug preparation, etc.-----  
-----

I am enclosing herewith DD (No. & date and amount .....  
in the favour of the Director NISCAIR/Depositing the cash Rs.------(Rs.-----  
-----towards the prescribed charges for authentication of -----(No.) Herbarium Specimen and/or  
------(No.) Crude Drug samples.

Signature

Name:  
Address:  
Phone, Mobile No.:  
E-mail ID:

**SEND TO:**

Dr. (Mrs) Sunita Garg  
Head  
Raw Materials Herbarium & Museum, Delhi (RHMD)  
National Institute of Science Communication And Information Resources (CSIR-NISCAIR)  
Dr. K. S. Krishnan Marg (inside Pusa campus)  
New Delhi-110012  
E-mail: sunitag@niscair.res.in; sunita.niscair@gmail.com; rhmd@niscair.res.in;  
Phone: 011-25846301-7, Ext. 258, 263; 25846001 (Direct)

**RHMD, CSIR-NISCAIR**

**FEEDBACK**

**(Please send by E-mail to: sunitag@niscair.res.in; prb@niscair.res.in)**

Dear Sir /Madam

1. How did you learn about the facility for authentication of Indian Raw Materials of Plant origin (crude drugs) samples and Herbarium specimens at Raw Materials Herbarium and Museum, Delhi (RHMD), NISCAIR?

- a) Through personal contact:
- b) Through Institute/College/University:
- c) Through NISCAIR Website:

2. Have you ever visited RHMD, NISCAIR? Yes/No

3. Have you availed the authentication services provided by RHMD Yes/No

4. Are you satisfied by the identification/authentication service provided by RHMD, NISCAIR?

Yes/No

If not satisfied, would you like to suggest some improvement?

.....

5. Do you know any other Institute/Dept. providing authentication service similar to RHMD, NISCAIR..... Yes/No

If yes, please provide address:

Signature

Name:

Address:

Phone, Mobile No.:

E-mail ID: