Phytochemicals

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

PHYTOCHEMICALS

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

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

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

Stevia rebaudiana leaves contain non-cariogenic and non-caloric sweeteners (steviol-glycosides) whose consumption could exert beneficial effects on human health. Steviol-glycosides are considered safe; nonetheless, studies on animals highlighted adverse effects attributed to the aglycone steviol. The aim of the present study was to develop and validate two different ultra-high-performance liquid chromatography methods with electrospray ionization mass spectrometry (UHPLC-MS) to evaluate steviol-
glycosides or steviol in Stevia leaves and commercial sweetener (Truvia®). Steviol-glycosides identity was preliminarily established by UV spectra comparison, molecular ion and product ions evaluation, while routine analyses were carried out in single ion reaction (SIR) monitoring their negative chloride adducts. Samples were sequentially extracted by methanol, cleaned-up by SPE cartridge and the analytes separated by UHPLC HSS C18 column (150mm×2.1mm I.D., 1.8µm). The use of CH2Cl2 added to the mobile phase as source of Cl− enhance sensitivity. The LLOD for stevioside, rebaudioside A, steviolbioside and steviol was 15, 50, 10 and 1ngml−1, respectively. Assay validation demonstrated good performances in terms of accuracy (89-103%), precision (<4.3%), repeatability (<5.7%) and linearity (40-180mg/g). Stevioside (5.8±1.3%), rebaudioside A (1.8±1.2%) and rebaudioside C (1.3±1.4%) were the most abundant steviol-glycosides found in samples of Stevia (n=10) from southern Italy. Rebaudioside A was the main steviol-glycosides found in Truvia® (0.84±0.03%). The amounts of steviol-glycosides obtained by the UHPLC-MS method matched those given by the traditional LC-NH2-UV method. Steviol was found in all the leaves extract (2.7–13.2mg kg−1) but was not detected in Truvia® (<1µgkg−1). The proposed UHPLC-MS methods can be applied for the routine quality control of Stevia leaves and their commercial preparations [Claudio Gardana*, Martina Scaglianti and Paolo Simonetti (Università degli Studi di Milano, DiSTAM - Dipartimento di Scienze e Tecnologie Alimentari e Microbiologiche - Sezione di Nutrizione Umana, Via Celoria 2, 20133 Milan (I), Italy), Journal of Chromatography A, 2010, 1217(9), 1463-1470].

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

High eicosapentanoic acid (EPA) accumulation of the extensively studied alga Dunaliella salina Teod. has been reported in this study. A sample of the freshwater, high-salt tolerant (31%), and carotenizing green alga D. salina (Chlorophyceae) was collected from a salt pan of Bombay (India). It was analyzed for fatty acid content. The presence of 15 fatty acids was revealed, of which 7 were saturated (SFA), 6 were monounsaturated (MUFA), and 2 were polyunsaturated (PUFA) in D. salina. The major finding was the presence of a pharmaceutically and nutraceutically important PUFA: 21.4% of eicosapentanoic acid. The major fatty acids identified were palmitic (16:0), stearic (18:0), palmitoleic (16:1), oleic (18:1n9c), linoleic (18:2n6c), and eicosapentanoic acid (20:5n3). The total polyunsaturated content obtained was 24%. Fatty acids were characterized by the relatively high abundance of polyunsaturated acids, while the C20 unsaturated acids were appreciably more abundant than the C18 unsaturated acids. This is the first report on the high-salt tolerance (31%) of the alga D. salina, accumulating 21.4% of EPA [Rahul A. Bhosale*, M. P. Rajabhoj and B. B. Chaugule (Institute of Bioinformatics and Biotechnology, University of Pune-411 007, India), International J on Algae, 2010, 12(2), 185-189].

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

A new flavonoid, isorhamnetin-3-0-α-1-rhamnopyranosyl-(1→3)-β-d-glucopyranoside (1), along with two known flavonoids 3'-O-methylorobol (2) and quercetin 3-O-β-d-glucopyranoside (3), was isolated from Alhagi maurorum. Their structures were established with the help of mass spectrometry, 1D and 2D NMR spectroscopy, and in comparison with the literature data. Compounds 1 and 2 exhibited moderate antioxidant activity in the 2,2-diphenyl-1-picrylhydrazyl free radical scavenging assay [Saeed Ahmad*, Naheed Riaz; Muhammad Saleem, Abdul Jabbar, Nisar-Ur-Rehman, Mohammad Ashraf (Department of Pharmacy, Faculty of Pharmacy and Alternative Medicine, Railway Campus, The Islamia University of Bahawalpur, Bahawalpur, Pakistan), Journal of Asian Natural Products Research, 2010, 12(2), 138- 143].

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

Phytochemical investigation of the roots of Arisaema jacquemontii led to the isolation of two new triterpenoids, which were characterized by NMR, IR, and MS spectra as 30-nor-lanost-5-ene-3β-ol (1) and 30-norlanost-5-ene-3-one (2) [Salika Jeelani*, M. Akbar Khuroo, T. K. Razadan (Department of Chemistry, University of Kashmir, Srinagar, Jammu & Kashmir, India), Journal of Asian Natural Products Research, 2010, 12(2), 157-161].
NPARR 1(4), 2010-0646, Two novel sulfur compounds from the seeds of Raphanus sativus Linn.

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

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

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

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

Two new steroidal saponins were isolated from the fruits of Tribulus terrestris Linn. Their structures were elucidated by spectroscopic and chemical analysis as (23S, 24R, 25R)-5α-spirostan-3β,23,24-triol-3-O-{α-L-rhamnopyranosyl-(1→2)-β-d-glucopyranosyl-(1→4)|β-d-galactopyranoside} (I) and (23S,24R,25S)-5α-spirostan-3β,23,24-triol-3-O-{α-L-rhamnopyranosyl-(1→2)-β-d-glucopyranosyl-(1→4)|β-d-galactopyranoside} (2) [Tao Liu*, Xuan Lu, Biao Wu, Gang Chen, Hui-Ming Hua, Yue-Hu Pei (School of Traditional Chinese Materia Medica, Shenyang Pharmaceutical University, Shenyang, China), Journal of Asian Natural Products Research, 2010, 12(1), 30-35].

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

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

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

Repeated column chromatography of the EtOAc-soluble fraction of the aerial parts of Dodonaea viscosa led to the isolation of two new modified clerodanes, methyl dodovisate A (1) and methyl dodovisate B (2), two new prenylated flavonoids, 5,7,4′-trihydroxy-3′,5′-di(3-methylbut-2-enyl)-3,6-dimethoxyflavone (10) and 5,7,4′-trihydroxy-3′-(4-hydroxy-3-methylbutyl)-5′-(3-methylbut-2-enyl)-3,6-dimethoxyflavone (11), together with eight known compounds, dodonic acid (3), hauitiwaiic acid (4), hauitiwaiic lactone (5), (+)-hardwickiic acid (6), 5α-hydroxy-1,2-dehydro-5,10-dihydropristazianic acid methyl ester (7), strictic acid (8), dodonolide (9), and aliarin (12). The structures of the new compounds were elucidated by spectroscopic data analysis. Compounds 1-9 and 11 were evaluated
on larvicidal activity against the fourth-instar larvae of *Aedes albopictus* and *Culex pipens quinquefasciatus* [Hong-Mei Niu*; Dong-Qin Zeng; Chun-Lin Long, Ying-Hui Peng, Yue-Hu Wang; Ji-Feng Luo, Hong-Sheng Wang; Ya-Na Shi, Gui-Hua Tang and Fu-Wei Zhao (Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China), Journal of Asian Natural Products Research, 2010, 12(1) 7 - 14].

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

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

**NPARR** 1(4), 2010-0652, Purification and characterization of a Bowman-Birk proteinase inhibitor from the seeds of black gram (*Vigna mungo*)

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

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

The chestnut fruit processing generates large amounts of residues as pericarp (outer shell; 8.9-13.5%) and integument (inner shell; 6.3-10.1%). These materials clearly have the potential as sources of valuable co-products. The analyses of the pericarp and integument of four Portuguese chestnut cultivars (Judia, Longal, Martainha and Lada) revealed significant contents of total phenolics, low molecular weight phenolics (gallic and ellagic acid), condensed
tannins and ellagitannins including castalagin, 
vescalagin, acutissimin A and acutissimin B. The 
tingent tissues had the highest levels of total 
phenolics and condensed tannins. The most efficient 
extraction solvent for the total phenolics, total 
condensed tannins and low molecular weight 
phenolics (in Longal) was 70:30 acetone: water at
20°C. The pericarp and integment tissues of the 
cultivar Longal were richest in gallic acid and 
castalagin. It is clear that these materials could be 
used for the extraction of valuable phenolics Maria do 
Carmo B.M. de Vasconcelos, Richard N. Bennett, 
Stéphane Quideau, Rémi Jacquet, Eduardo A.S. Rosa 
and Jorge V. Ferreira-Cardoso* (CITAB/IB&Q, 
Centre for the Research and Technology of 
Agro-Environment and Biological Sciences, Integrative 
Biology & Quality Area, Universidade de Trás-os-
Montes e Alto Douro, Apartado 1013, 5000-801 Vila 
Real, Portugal), Industrial Crops and Products, 2010, 
31(2), 301-311].

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

The chemical composition and antimicrobial properties of the essential oils of three common 
Australian Eucalyptus species, namely E. olida, E. staigeriana and E. dives were determined by gas 
chromatography/mass spectrometry and the agar disc 
diffusion method, respectively. A total of 24 
compounds were identified from the essential oil of E. 
dives, with the dominant compounds being piperitone 
(40.5%), α-phellandrene (17.4%), p-cymene (8.5%) 
and terpin-4-ol (4.7%). For E. staigeriana, 29 
compounds were identified with 1, 8-cineole (34.8%), 
neral (10.8%), geranial (10.8%), α-phellandrene 
(8.8%) and methyl geranate (5.2%) being the 
dominant ones. In contrast, a single compound, (E)- 
methyl cinnamate, accounted for 99.4% of the 
dominant ones. In contrast, a single compound, (E)- 
methyl cinnamate, accounted for 99.4% of the 
essential oils of E. olida, although 20 compounds 
were identified. The essential oils displayed a variable 
degree of antimicrobial activity with E. staigeriana 
oil showing the highest activity. In general, Gram-
positive bacteria were found to be more sensitive to 
the essential oils than Gram-negative bacteria. 
Staphylococcus aureus was the most sensitive strain 
while Pseudomonas aeruginosa was the most 
resistant [Martin Gilles, Jian Zhao*, Min An and 
Samson Agboola (School of Wine and Food Sciences, 
Charles Sturt University, Locked Bag 588, Wagga 
Wagga, NSW 2678, Australia), Food Chemistry, 
2010, 119(2), 731-737].

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

The major polymethoxyflavones in the fruit 
(ponkan) peels of Citrus reticulata Blanco cv. ponkan 
were identified as isosinensetin, sinensetin, nobiletin 
and tetramethyl-α-scetellarein by a combined 
separation using high-speed countercurrent 
chromatography and preparative high performance 
liquid chromatography, and structure elucidation by 
electrospray ionisation mass spectrometry (ESI-MS) 
and 1H and 13C nuclear magnetic resonance (NMR). 
The antiproliferative activity of the four compounds 
against four cancer cell lines (A549, HL-60, MCF-7 
and H08910) showed that isosinensetin had a lower 
IC50 value for MCF-7 and H08910 cancer cell lines. 
Determination of polymethoxyflavones in ponkan 
peels from different cultivation regions displayed 
relatively steady contents of the four compounds and 
a higher content of isosinensetin, which suggested 
that ponkan peels are excellent sources of functional 
polymethoxyflavones that may help prevent female 
cancers, such as ovarian cancer and breast cancer 
[Qizhen Du* and Hui Chen (Institute of Food and 
Biological Engineering, Zhejiang Gongshang 
University, 149 Jiaogong Road, Hangzhou, Zhejiang 
310035, China), Food Chemistry, 2010, 119(2), 567-
572].

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

Three diarylheptanoids, officinaruminane A (1), 
officinaruminane B (2), 5(S)-acetoxy-7-(4-
dihydroxyphenyl)-1-phenyl-3-heptanone (3), together 
with six known ones, (5R)-5-hydroxy-1-(4-
dihydroxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-3-
heptanone (4), (5R)-5-hydroxy-1-(4-hydroxy-3-
methoxyphenyl)-7-(4,5-dihydroxy-3-methoxyphenyl)- 
3-heptanone (5), 1-phenyl-7-(4-hydroxy-3-
methoxyphenyl)-4E-en-3-heptanone (6), 1-(4-
dihydroxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-4E-
en-3-heptanone (7), 1-phenyl-7-(4-hydroxyphenyl)- 
4E-en-3-heptanone (8), and 3,6-furan-7-(4′-hydroxy-
3′-methoxyphenyl)-1-phenylheptane (9), were 
isolated from the rhizomes of Alpinia officinarum 
Hance by column chromatography on silica gel,
MPLC and preparative thin-layer chromatography (TLC). The structures of these compounds were elucidated on the basis of mass spectrometry, $^1$H NMR, $^{13}$C NMR, HMQC and HMBC data. Among them, 1 is a diarylheptanoid with a pyridine ring, and 2 is a diarylheptane monoterpane [Ning An, Hong-wu Zhang, Li-zhen Xu, Shi-lin Yang and Zhong-mei Zou* (Institute of Medicinal Plant Development, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100193, PR China), Food Chemistry, 2010, 119(2), 513-517].

**PULP/PAPER**

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

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

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

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

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

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