NPARR, 1(2), 2010-0255, Botryorhodines A–D, antifungal and cytotoxic depsidones from Botryosphaeria rhodina, an endophyte of the medicinal plant Bidens pilosa Linn.

An endophytic fungus (Botryosphaeria rhodina) was isolated from the stems of the medicinal plant Bidens pilosa Linn. (Asteraceae) that is known for its anti-inflammatory, antiseptic and antifungal effects. The ethyl acetate extract of the fungal isolate exhibits significant antifungal activity as well as potent cytotoxic and antiproliferative effects against several cancer cell lines. Activity-guided fractionation resulted in the isolation of a complex of four depsidones, botryorhodines A-D and the auxin indole carboxylic acid. Botryorhodine A and B show moderate to weak cytotoxic activities against HeLa cell lines with a CC50 of 96.97 μm and 36.41 μm, respectively. In addition, they also show antifungal activity against a range of pathogenic fungi such as Aspergillus terreus (MIC 26.03 μm for botryorhodine A and 49.70 μm for B) and the plant pathogen Fusarium oxysporum (MIC 191.60 μm for botryorhodine A and 238.80 μm for B). A potential role of the endophyte in modulating fungal populations living within or attacking the host plant is discussed [Randa Abdou, Kirstin Scherlach, Hans-Martin Dahse, Isabel Sattler and Christian Hertweck* (Leibniz Institute for Natural Product Research and Infection Biology, Hans Knöll Institute (HKI), Beutenbergstr. 11a, 07745 Jena, Germany), Phytochemistry, 2010, 71(1), 110-116].

PULP/PAPER

NPARR, 1(2), 2010-0256, Pulp and paper production from spruce wood with kraft and modified kraft methods

In this study, kraft and modified kraft pulping methods were applied for spruce (Picea orientalis) wood collected from the Black Sea Region of Turkey. Fiber properties, carbohydrate contents, strength and optical properties of resultant paper were included to determine the properties of these pulp samples. Optimum kraft, kraft-borohydride (NaBH₄), kraft-anthraquinone (AQ) and kraft-ethanol pulping conditions were determined. After determining screened yield, kappa number, viscosity, fibre length, fibre coarseness, α-cellulose, holocellulose, lignin and ash content, breaking length, tear indexes and burst indexes of the obtained pulp samples, the differences of SEM image of each pulp sample were captured and evaluated. The results indicated that kraft-AQ pulps from spruce wood exhibited better characteristics than the other pulp samples with lower kappa number, higher paper strength properties and optical properties. However, kraft-NaBH₄ method gave pulps with closer characteristics to kraft-AQ and also gave a higher screened yield and α-cellulose ratio than the others [Ahmet Tutus*, Saim Ates and Ilhan Deniz (Department of Forest Industrial Engineering, Faculty of Forestry, Kahramanmaras Sutcu Imam University (KSU) 46100, Kahramanmaras, Turkey), African Journal of Biotechnology, 2010, 9(11), 1648-1654].

NPARR, 1(2), 2010-0257, Fungal pretreatment of wheat straw and its effect on the soda-AQ pulps

In this study, the effects of Ceriporiopsis subvermispora and Phlebia subserialis fungal pretreatments of wheat straw on the pulp and paper properties of soda-AQ pulps were investigated. Also, cationic poly(vinyl alcohol) was used as a dry strength additive to compensate for the loss in the strength properties [Pedram Fatehi, Saim Ates and Yonghao Ni* (University of New Brunswick, Fredericton, Canada), Nordic Pulp & Paper Research Journal, 2009, 24(2), 193-198].

SPICES/CONDIMENTS

NPARR, 1(2), 2010-0258, Effects of extracts of spices on rumen methanogenesis, enzyme activities and fermentation of feeds in vitro

An experiment was conducted to study the effects of boiling water, methanol and ethanol extracts (0, 0.25 and 0.50 ml) of seeds of Foeniculum vulgare Linn. (fennel), flower buds of Syzygium aromaticum Linn. (clove), bulbs of Allium sativum Linn.(garlic), bulbs of Allium cepa Linn. (onion) and roots of Zingiber officinale Rosc. (ginger) on rumen methanogenesis,
fibrolytic enzyme activities and fermentation characteristics in vitro.

Ethanol and methanol extracts of fennel, clove and garlic at 0.50ml and clove at 0.25ml inhibited \( (P<0.05) \) methane production. Carboxymethylcellulase activity was reduced \( (P<0.05) \) by ethanol and methanol extracts (0.50 ml) of fennel and clove (0.25 and 0.50 ml). The extracts of clove reduced (0.25 and 0.50 ml) xylanase and acetyesterase activities and the fennel extract (0.50 ml) reduced \( (P<0.05) \) xylanase activity. However, the extracts of garlic (0.50ml) increased \( (P<0.05) \) acetyesterase activity. Concentrations of volatile fatty acids were reduced \( (P<0.05) \) by the extracts of garlic and onion. The extracts of garlic caused a decrease \( (P<0.05) \) in acetate: propionate ratio (A:P) at 0.50ml, whereas A:P was increased \( (P<0.05) \) by the inclusion of 0.50 ml extracts of clove. Methanol and ethanol extracts of clove decreased \( (P<0.05) \) in vitro organic matter degradability. Extracts (0.50ml) of clove decreased \( (P<0.05) \) the numbers of total protozoa, small entodiniomorphs and holotrichs, whereas extracts of onion, garlic and ginger increased \( (P<0.05) \) protozoal numbers (both entodiniomorphs and holotrichs). Thus, ethanol and methanol extracts of fennel and garlic have potential to inhibit rumen methanogenesis without adversely affecting rumen fermentation [Amlan Kumar Patra *, Devki Nandan Kamra and Neeta Agarwal (Department of Animal Nutrition, West Bengal University of Animal and Fishery Sciences, 37, K. B. Sarani, Belgachia, Kolkata 700037, India), Nutr Res Pract, 2010, 4(1), 11-15].

**NPARR, 1(2), 2010-0259, Biologically important thiols in aqueous extracts of spices and evaluation of their in vitro antioxidant properties**

The levels of the biologically important thiols in aqueous extracts of different spices were determined using a sensitive high performance liquid chromatography (HPLC) technique. The spices analysed: turmeric, ginger, cardamom, mustard, fenugreek, and coriander showed different levels of thiols. Biologically important thiols or biothiols measured in these spices included glutathione (GSH), cysteine (CYS), N-acetylcysteine (NAC), homocysteine (HCYS) and \( \gamma \)-glutamyl cysteine (GGC). The results showed that thiol levels varied from 4 to 1089nm/g weight (dry or wet). Furthermore, none of the biothiols analysed were found in cumin, nutmeg, clove or star anise. The antioxidant abilities of these aqueous extracts using various in vitro antioxidant methods to correlate between the levels of these thiols and their antioxidant effects were also analysed. These results suggested that antioxidant activities may be independent of thiol content and may be, in part the combination of all the phytochemicals present. These results may be useful in explaining the effect of spices on thiol levels in in vitro and in vivo studies [Kalyan Reddy Manda, Craig Adams and Nuran Ercal* (Department of Chemistry, Missouri University of Science and Technology, Rolla, MO 65409, USA), Food Chemistry, 2010, 118(3), 589-593].

**NPARR, 1(2), 2010-0260, A new antioxidant from wild nutmeg**

Nutmeg (Myristica fragans Houtt.) and Myristica argentea Warb.) is a spice widely used in food. Argenteane is a dilignan which has been isolated from nutmeg mace (the lace-like seed membrane of nutmeg). On the basis of the experimental measurements of the lipid peroxidation inhibition, argenteane appeared to be an antioxidant as powerful as vitamin E. The present joint experimental and theoretical study helped to understand the mechanism of action of this compound. The density functional theory (DFT) calculations of the O-H bond dissociation enthalpies (BDEs) correlated with the capacity to scavenge free radicals. The results demonstrated that the central moiety is able to release one or two H atom(s) to the free radicals. This mechanism was confirmed by (i) the BDE calculations and (ii) the free radical-scavenging capacity measurements of two lignans and 3,3′-dimethoxy-1, 1′-biphenyl-4,4′-diol (i.e., the argenteane central moiety). In addition to this active part, two lipophilic chains participate in the molecule’s capacity to react with the oxidative species generated in the membrane vicinity [C.A. Calliste, D. Kozlowski, J.L. Duroux, Y. Champavier, A.J. Chulia and P. Trouillas* (Université de Limoges, EA 4021, Laboratoire de Biophysique, Faculté de Pharmacie, 2 rue du Docteur Marcland,
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87025 Limoges, France), *Food Chemistry*, 2010, **118**(3), 489-496].

**NPARR, 1(2), 2010-0261, Correlation of metabolites in the leaf and berries of selected black pepper varieties**

The biochemical component which attributes pungency to black pepper (*Piper nigrum* Linn.) is mainly the alkaloid piperine, the aroma and flavour are attributed by components like α- and β-pinenes, sabinene, myrcene, limonene, β-caryophyllene, camphene, etc. Our study revealed that the biochemical profile varies in the leaf and berries of black pepper. Total phenols, total starch, total carbohydrate and protein content from leaves and berries of selected 26 black pepper cultivars were evaluated. The concentration of oil, oleoresin, piperine and the essential oil constituents from both leaves and berries were also compared in these cultivars. Germacrene-D and elemol were found to be the major constituents of leaf oil. β-Caryophyllene was high in berries and it showed more variability in berries compared to leaf samples. Berry oil constituents namely, pinene, sabinene, myrcene and limonene were not detected in the leaf oil. Different leaf metabolites showed cumulative direct effect on berry constituents [T. John Zachariah*, A.L. Safeer, K. Jayarajan, N.K. Leela, T.M. Vipin, K.V. Saji, K.N. Shiva, V.A. Parthasarathy and K.P. Mammootty (Indian Institute of Spices Research, Calicut 673012, Kerala, India), *Scientia Horticulturae*, 2010, **123**(3), 418-422].

**SUGARS (incl. natural sweeteners, jaggery, palm sugar, honey, etc.)**

**NPARR, 1(2), 2010-0262, Dual-stage sugar substitution in strawberries with a Stevia-based sweetener**

The present study introduces and analyzes a new process denominated dual-stage sugar substitution (D3S). This process aims to induce sugar substitution in strawberries. In a first stage, high-calorie sugars (sucrose, fructose and glucose) are partially removed from the fruit samples and in a second stage, low-calorie sugar (stevioside and rebaudioside) is incorporated to the fruit to maintain its sweetness. The process was evaluated by studying the use of ultrasound application in one or both stages of the D3S process. Best performance of the process was obtained by subjecting the fruit samples to ultrasound in the sugar removal stage followed by immersion of the samples in *Stevia*-based solution without application of ultrasound in the sweetener incorporation stage. These operating conditions result in the highest sugar removal during the first stage, highest water loss during the process and highest sweetener incorporation during the second stage of the D3S process.

The work described in this research is relevant to the production of dried fruits. A process to produce low-calorie dried fruit is presented. The process removes high-calorie sugars from the fruit and replaces it with a natural low-calorie sugar restoring the sweetness of the fruit [Juan Garcia-Noguera, Curtis L. Weller, Francisca I.P. Oliveira, Sueli Rodrigues and Fabiano A.N. Fernandes* (Universidade Federal do Ceará, Departamento de Engenharia Química, Campus do Pici, Bloco 709, 60455-760 Fortaleza, CE, Brazil), *Innovative Food Science & Emerging Technologies*, 2010, **11**(1), 225-230].

**NPARR, 1(2), 2010-0263, Effect of moderate intake of sweeteners on metabolic health in the rat**

The rise in prevalence of obesity, diabetes, metabolic syndrome and fatty liver disease has been linked to increased consumption of fructose-containing foods or beverages. The study was conducted to compare the effects of moderate consumption of fructose-containing and non-caloric sweetened beverages on feeding behaviour, metabolic and serum lipid profiles and hepatic histology and serum liver enzymes, in rats. Behavioral tests determined preferred (12.5-15%) concentrations of solutions of agave, fructose, high fructose corn syrup (HFCS), a combination of HFCS and Hoodia (a putative appetite suppressant), or the non-caloric sweetener Stevia (*n*=5/gp). HFCS intake was highest, in preference and self-administration tests. Groups (*n*=10/gp) were then assigned to one of the sweetened beverages or water as the sole source of liquid at night (3 nights/wk, 10wks). Although within the normal range,