

storage at 10.5 or 9.3% m.c., respectively. The deterioration retardation featured a reduced inoculum on kernel surfaces. *Aspergillus parasiticus* did not colonize kernels independently of m.c. and fumigation treatments. There was a strong positive correlation between CFUs and ergosterol or FFA content when the data of fumigated and non-fumigated samples were analyzed separately. However, this relationship was absent when data were pooled to disregard the fumigation effect. The correlation between ergosterol and FFA content remained high regardless of the fumigation treatment ($r=0.99$). The ergosterol or FFA content of stored groundnuts can be used interchangeably, as a sensitive indicator, to assess deterioration caused by xeric storage fungi. However, the latter was preferable because it was simpler to assess and provided a direct indication of economic losses due to reduced oil yield [O.D. Dhingra, G.N. Jham, F.Á. Rodrigues^a, G.J. Silva Jr. and M.L.N. Costa (^aDepartamento de Fitopatologia, Universidade Federal de Viçosa, Av. Ph Rolfs s/n, 36570-000 Viçosa, Minas Gerais, Brazil), *J Stored Prods Res*, 2009, **45**(1), 24-31].

NPARR 1(1), 2010-85, Efficacy of combining Niger seed oil with malathion 5% dust formulation on maize against the maize weevil, *Sitophilus zeamais* (Coleoptera: Curculionidae)

The combined effects of Niger seed oil and malathion, 5% dust, against the maize weevil, *Sitophilus zeamais*, were evaluated to determine the minimum effective rate(s) of the combinations that can provide adequate protection to maize seed against attack by weevils. Niger seed oil at the rates of 0, 10, 20, 30, 40, 50 and 100% of the recommended application rate, 5ml/kg, was combined with malathion at the respective rates of 100, 50, 40, 30, 20, 10 and 0% of the recommended application rate, 0.5g/kg. All combinations provided complete protection to maize seed from the maize weevil up to 90 days after infestation. To determine the residual effects of the treatments, weevils were reintroduced to the grain that had been treated 90 days previously. In addition to 100% malathion, 10% Niger seed oil+50% malathion and 20% Niger seed oil +40% malathion, were fully effective in controlling *S. zeamais* for a further

156 days after this re-infestation. Therefore, these combinations could be considered as a potential component in an effort to establish integrated management of the maize weevil. Residual performance of both oil and malathion against the weevils was primarily affected by the dose of malathion, with higher doses of malathion providing greater protection for a longer period. Niger seed oil treatment lowered the level of seed germination at the application rate of 5ml/kg of maize [Ahmed Ibrahim Yuya, Abraham Tadesse, Ferdu Azerefegne and Tadele Tefera^a (^aGeorg-August-University, Department of Crop Science, Agricultural Entomology Section, Grisebachstr. 6, 37077 Goettingen, Germany), *J Stored Prod Res*, 2009, **45**(1), 67-70].

OILS/FATS

(incl. Edible oils, Butter, etc.)

NPARR 1(1), 2010-86, Apparent solidification time test for detection of foreign oils and fats adulterated in clarified milk fat, as affected by season and storage

An apparent solidification time (AST) test was developed for the detection of foreign fats and oils in milk fat. AST values at 18°C for buffalo and cow milk fats ranged from 2min 30s to 2min 48s and 2min 56s to 3min 26s, while for pig body fat, goat body fat and hydrogenated vegetable oils, AST values were 1min 30s, 0min 40s and 1min 50s, respectively. Vegetable oils yielded no AST values, suggesting that adulteration can be detected using the AST method in the case of some but not all possible adulterants [Arun Kumar, Darshan Lal Ghai^a, Raman Seth and Vivek Sharma (^aDairy Chemistry Division, National Dairy Research Institute, Karnal, India), *Intern J Dairy Technol*, 2009, **62**(1), 33-38].

NPARR 1(1), 2010-87, Conjugated linoleic acid content of milk from buffaloes fed a mustard oil-based diet

Fifteen Murrah buffaloes were distributed in groups I, II and III. The group I animals were fed with groundnut cake-based concentrate, group II animals with mustard cake-based concentrate and group III with 2% of

mustard oil added to the group II feed. Conjugated linoleic acid (CLA) estimation in milk was done by using GC. The average total CLA contents (mg/g milk fat) in the three groups were 6.84, 12.12 and 19.50mg/g of fat, respectively. Hence, it was concluded that addition of 2% mustard oil resulted in a 185% increase in milk fat total CLA content [C Kathirvelana and A K Tyagi (^aDairy Cattle Nutrition Division, National Dairy Research Institute, Karnal 132 001, Haryana, India), *Intern J Dairy Technol*, 2009, **62**(2), 141-146].

NPARR 1(1), 2010-88, The role of comprehensive chromatography in the characterization of edible oils and fats-A Review

Chromatography has a very long history in the analysis of edible oils and fats. Hyphenations of two chromatographic methods, or couplings of a chromatographic separation technique with spectroscopic detection and identification devices, are used if the resolving power of the technique needs to be improved. More recently, the analytical benefits of comprehensive two-dimensional (2D) chromatography, in its various operational modes, have been exploited by the oil and fat chromatographic community. In comprehensive 2D chromatography, the entire sample injected is subjected to two independent separation processes. In the present contribution, the principles of comprehensive 2D chromatography are briefly discussed. Next, the advantages of comprehensive separations for lipid analysis are illustrated using the concept of generic chromatographic applications. This concept distinguishes three generic reasons to apply chromatographic separations: target compound analysis, group-type separation, and chromatographic fingerprinting. Examples of how comprehensive multi-dimensional methods were successfully applied to solve problems in the edible oils and fats area are given. We believe that these multi-dimensional techniques truly add new dimensions to oil and fat analysis, providing researchers in the area with novel tools for unraveling edible oil or fat samples with their complex compositions [Hans-Gerdssen I^a, Herrald Steenbergen, Sjaak de Koning (^aUnilever Research and Development, Vlaardingen, The Netherlands), *Eur J Lipid Sci Technol*, 2009, **111**(12), 1171-1184].

NPARR 1(1), 2010-89, Lipids and of fatty acids of edible crabs of the north-western Pacific

Analyses of lipids and fatty acids in muscles and hepatopancreas of five commercially exploited crabs inhabiting the Sea of Japan and the Okhotsk Sea, namely *Paralithodes camtschaticus*, *Paralithodes platypus*, *Chionoecetes opilio*, *Chionoecetes angulatus* and *Chionoecetes japonicus*, have been carried out. The total lipid level (TL) in muscles ranged from 0.53% of wet weight (ww) to 1.57% of ww and the amount of phospholipids exceeded that of triglycerides. The TL contents in the hepatopancreas of all crabs were higher than in muscles and varied between 10.2% ww in *C. angulatus* and 19.8% ww in *P. platypus*, the major class of lipids being triglycerides. The main polar lipids in the hepatopancreas and muscles were phosphatidylcholine (PC) and phosphatidylethanolamine (PE). Among polyunsaturated fatty acids (PUFAs), the *n*-3 fatty acids have dominated; 16:0, 18:1*n*-9, 20:5*n*-3 and 22:6*n*-3 were the main fatty acids contained in the tissues studied. In all the crabs, excluding *C. angulatus*, the PUFAs *n*-3/*n*-6 ratio in muscles varied between 7.02 and 10.3 while, in the hepatopancreas, the ratio varied between 4.00 and 6.62 [Nikolay A. Latyshev, Sergey P. Kasyanov^a, Vladimir I. Kharlamenko and Vasily I. Svetashev (^aA. V. Zhirmunsky Institute of Marine Biology, Far East Branch, Russian Academy of Sciences, Palchevsky 17, Vladivostok 690041, Russia), *Food Chem*, 2009, **116**(3), 657-661].

NPARR 1(1), 2010-90, Effect of solvent hydration and temperature in the deacidification process of sunflower oil using ethanol

This work presents liquid-liquid experimental data for systems composed of sunflower seed oil, ethanol and water from 10 to 60 °C. The influence of process variables (temperature (*T*) and water concentration in the solvent (*W*)) on both the solvent content present in the raffinate (S_{RP}) and extract (S_{EP}) phases and the partition of free fatty acids (k_2) was evaluated using the response surface methodology, where flash calculations were performed for each trial using the UNIQUAC equation. Water content in the solvent was the most important factor on the responses of S_{EP} and k_2 .

Additionally, statistical analysis showed that the S_{RP} was predominantly affected by temperature factor for low water content in the solvent [Maitê S. Cuevas, Christianne E.C. Rodrigues^a and Antonio J.A. Meirelles (^aLES, Separation Engineering Laboratory, Department of Food Engineering (ZEA-FZEA), University of São Paulo (USP), P.O. Box 23, 13635-900 Pirassununga, São Paulo, Brazil), *J Food Eng*, 2009, **95**(2), 291-297].

NPARR 1(1), 2010-91, Pumpkin (*Cucurbita maxima* Duch.) seed oil extraction using supercritical carbon dioxide and physicochemical properties of the oil

Pumpkin (*Cucurbita maxima* Duch.) seed oil was extracted using supercritical carbon dioxide and the physicochemical properties of the oil were determined. A central composite rotatable design was used to analyse the impact of extraction parameters (temperature, time and pressure) and a response surface methodology was used to obtain optimal extraction conditions for the maximum oil yield. All three variables studied were significant demonstrating quadratic effects. The maximum yield of the extracted oil was 30.7% and the optimum conditions were 32,140kPa and 68.1°C for 94.6min which was within the experimental domain. Physicochemical properties of the oil showed that the extracted oil could be used as food oil supplement [Pranabendu Mitra, Hosahalli S. Ramaswamy and Kyu Seob Chang^a (^aDepartment of Food Science and Technology, Chungnam National University, Daejeon 305-764, Republic of Korea), *J Food Eng*, 2009, **95**(1), 208-213].

NPARR 1(1), 2010-92, Quantitative and qualitative determination of acid value of peanut oil using near-infrared spectrometry

Acid value (AV) is an important parameter to illustrate the quality as well as degree of refining of peanut oil. A rapid near-infrared reflectance spectroscopy (NIRS) method was applied to determine AV in peanut oils. A partial least squares (PLS) regression model with a coefficient of determination (R^2) of 0.9725 and a square error of cross-validation (SECV) of 0.308 was obtained. The prediction set gave a coefficient of

determination (r^2) and standard error of prediction (SEP) of 0.9379 and 0.333. Regarding qualitative evaluation, the classification of qualified peanut oil (with an acid value of less than or equal to 3mg/g) and unqualified peanut oils (with an acid value of more than 3mg/g) was conducted by using discriminant partial least squares analysis (DPLS). The results showed that DPLS technique was an effective method of classification model building, with a high correct percent of 96.55% [Yulan Rao, Bingren Xiang^a, Xiaohua Zhou, Zhimei Wang, Shaofei Xie and Jianping Xu (^aCenter for Instrumental Analysis, Key Laboratory of Drug Quality Control and Pharmacovigilance, Ministry of Education, China Pharmaceutical University, 210009 Nanjing, PR China), *J Food Eng*, 2009, **93**(2), 249-252].

NPARR 1(1), 2010-93, Comparative studies on the yield and quality of solvent-extracted oil from salmon skin

Oil was extracted from the skin of Atlantic salmon by solvent extraction with different solvent systems and analyzed for efficiency in terms of oil yield and quality. The yield of salmon skin oil (SSO) was significantly lower ($p<0.05$) with the hexane-isopropanol solvent system versus either of the chloroform-methanol systems, i.e., 32.21% on dry weight basis (dwb) against 35.15% dwb and 43.82% dwb, respectively. Second and third extractions were performed on the residue using the same solvent systems to verify any biases and to test the completeness of the first extraction. These successive extractions resulted in nominal increases in yield.

The yield of SSO from Soxhlet-hexane compared favorably with Soxhlet-petroleum ether at all the extraction times investigated. The Soxtec-hexane gave the highest oil yield of ca 62% dwb. Both hexane and petroleum ether were suitable solvents for the extraction of SSO, though the yield obtained with hexane was significant higher ($p<0.05$). The study further indicated that salmon skin was a rich source of oil (23.32-61.53% dwb) and for the various solvent systems, the free fatty acid (FFA) content was quite low (0.60-1.19%) [Alberta N.A. Aryee^a and Benjamin K. Simpson (^aDepartment of Food Science and Agricultural Chemistry, McGill University (Macdonald Campus), 21

111 Lakeshore Road, Ste. Anne de Bellevue, Que., Canada H9X 3V9), *J Food Eng*, 2009, **92**(3), 353-358].

PULP/PAPER

NPARR 1(1), 2010-94, **Dissolving pulp from corn stalk residue and waste water of *Mercox* unit**

The aim of this work was to study the production of cellulosic dissolving-grade pulp, alpha-cellulose, using corn stalk residue as non-wood material and industrial waste water as pulping liquid. Industrial waste water obtained from a *Mercox* unit operating at the Kermanshah Oil Refinery in Iran and corn stalk residue obtained from local agricultural farms were used as raw materials for the experiment. The pre-hydrolysis process was performed on the corn stalk for 30min at 160°C in a mini-digester. Subsequently, the corn stalk was subjected to Kraft pulping and to pulping with industrial waste water at 170°C over a period of 90min. Upon completion of the bleaching process of each mixture, the quality of the resulting cellulosic dissolving-grade pulps was studied. The laboratory investigation compared the following parameters of importance: influence of active alkali, sulfidity, and dilution ratio of the industrial waste water on pulp properties such as yield, kappa number and degree of polymerization. Under optimum conditions, the pre-hydrolysis/kraft pulping with 20% active alkali, 25% sulfidity and HEHP bleaching resulted in acceptable levels of alpha-cellulose content (94.8%), degree of polymerization (279) and ash content (0.75%) for the produced dissolving pulp. The kraft pulping was compared with the pulping of corn stalk with industrial waste water, which increased the alpha-cellulose content to 97.4%, with a degree of polymerization of 241 and an ash content of 0.96%. Comparison of both experiments indicates that using industrial waste water in the pulping process gives satisfactory results for industrial applications using a non-wood material, yields a quality product with reduced capital investment and operation costs, and considerably helps the environmental preservation of wood-based raw materials [J. Behin^a and M. Zeyghami^a (Department of Chemical Engineering, Faculty of Eng., Razi University, Baghe Abrisham, Kermanshah, Iran), *Chem Eng J*, 2009, **152**(1), 26-35].

NPARR 1(1), 2010-95, **Adsorption of cationized barley husk xylan on kraft pulp fibres: influence of degree of cationization on adsorption characteristics**

A water-soluble (glucurono)arabinoxylan (GAX) was isolated from barley husk using chlorite delignification followed by alkaline extraction and enzymatic purification of the extract. The isolated xylan was shown to adsorb on bleached softwood kraft fibres, but the degree of adsorption was rather low under the applied conditions. This can be explained by the inhibited adsorption of GAX molecules with a relatively high degree of arabinofuranosyl substitution, as indicated by iodine complexation and neutral carbohydrate analysis of the non-adsorbing xylans. In order to increase the driving force for adsorption of the more highly substituted GAX, the xylan was cationized through a reaction in an aqueous alkaline medium with 2, 3-epoxypropyltrimethylammonium chloride (EPTMAC). The chemical modification of xylan was confirmed by using ¹H-¹³C HSQC (Heteronuclear Single Quantum Coherence) NMR, and was quantified by using elemental analysis. The GAX cationization, which introduced cationic charge densities ranging from 110 to 740 µeq/g, was shown to increase the rate and magnitude of adsorption extensively, due to the induced electrostatic interaction between the anionic fibres and the cationic xylan. Similar to non-modified xylan, cationic xylan possessed a non-electrostatic cellulose surface affinity, as shown by adsorption at high ionic-strength and on esterified (carboxyl-free) pulp fibres [Tobias Köhnke^a, Harald Brelid and Gunnar Westman^a (Organic Chemistry, Department of Chemical and Biological Engineering, Chalmers University of Technology, 412 96 Göteborg, Sweden), *Cellulose*, 2009, **16**(6)].

NPARR 1(1), 2010-96, **Effect of anthraquinone on brightness value and crystalline structure of pulp during soda processes**

The dependence of crystalline structure and optical properties of pulp on anthraquinone (AQ) added to the soda process at different cooking times was determined in this study. Wheat (*Triticum aestivum* Linn.) straw was used as the raw material for pulp. Soda and soda-AQ processes were selected for pulping at 80 min and