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

*NPARR* 3(1), 2012-063, **Effect of refining processes on antioxidant capacity, total contents of phenolics and carotenoids in palm oils**

Antioxidant capacity (AC), total phenolic content (TPC) and total carotenoid content (TCC) in palm oils at various stages of the refining process from two technological modes were determined. The obtained mean FRAP and DPPH values for the methanolic extracts of palm oils from mode 1 (19.5-102.8 μmol TE/100 g and 18.8-103.0 μmol TE/100 g) were lower than for oils from mode 2 (25.6-134.8 μmol TE/100 g and 25.4-135.4 μmol TE/100g). The total phenolics (4.1-12.4 mg GA/100g) and carotenoids (0.18-45.8 mg/100 g) in the studied oils were correlated with their antioxidant capacities determined by FRAP and DPPH methods ($r$=0.6623-0.9878). During the refining process, for both technological modes resulted in a loss of AC by 80%, TPC by 26-55% and TCC by 99%. The bleaching step caused the highest losses of AC as determined by FRAP 41% and 46%, DPPH by 43% and 48%, while TPC loss was 45% and 23% and loss of carotenoids was 49% and 56%, in mode 1 and mode 2, respectively [Aleksandra Szydłowska-Czerniak*, Konrad Trokowski, György Karlovits, Edward Szłyk (Faculty of Chemistry, Nicolaus Copernicus University, ul. Gagarina 7, 87-100 Toruń, Poland), *Food Chemistry*, 2011, **129**(3), 1187-1192].

*NPARR* 3(1), 2012-064, **Linseed oil stabilisation with pure natural phenolic compounds**

Linseed has been used for a very long time in human and animal nutrition. Currently, there is an increasing interest in linseed oil because of its particularly high content in α-linolenic acid (ALA), an omega-3 fatty acid (FA). Unfortunately, ALA turns also the oil extremely sensitive to oxidation. This study aimed at assessing four pure representative phenolic compounds, myricetin (flavonol), (+)-catechin (flavanol), genistein (isoflavone), and caffeic acid (hydroxycinnamic acid) at a concentration of 555 μmol/kg as antioxidants in refined linseed oil (RLO). Their protective effect was assessed by monitoring the hydroperoxide formation, the FA profile and the residual antioxidant concentration in RLO, along its storage at 60 °C according to the Schaal oven test procedure. Caffeic acid, (+)-catechin and myricetin were found to be more efficient than butylated hydroxyanisole (BHA), a synthetic antioxidant. Interestingly, myricetin strongly reduced ALA oxidation. These results confirm that the chemical structure of the phenolic compounds plays a major role in their antioxidant properties [D. Michotte, H. Rogez, R. Chirinos, E. Mignolet, D. Campos and Y. Larondelle* (Institut des Sciences de la Vie, UCLouvain, Croix du Sud, 2/8, B-1348 Louvain-la-Neuve, Belgium), *Food Chemistry*, 2011, **129**(3), 1228-1231].

*NPARR* 3(1), 2012-065, **Optimisation of lipase-catalysed interesterification reaction for modulating rheological and heat transfer properties of frying oil**

The present work reports the optimisation of enzyme interesterification reaction of rice bran oil (RBO) and refined, bleached, deodorized, palm olein (RBDPO) blend using immobilized 1,3-specific lipase, to improve the kinematic viscosity and heat transfer coefficient of oil, important for characterising heat transfer during the frying process. Four variables, namely RBO (20-80%) in RBO–RBDPO blend, reaction temperature (25-65°C), enzyme concentration (1-13%, w/w) and reaction time (1–13h) were selected and optimised using response surface methodology (RSM) coupled with central composite rotatable design (CCRD). The optimisation results predicted that optimum reaction conditions for preparing enzyme interesterified oil, having minimum kinematic viscosity ($2.63\times10^{-6}$ $m^2$ $s^{-1}$) and maximum heat transfer coefficient ($262.0 Wm^{-2}$ $°C^{-1}$) were at 62% RBO, temperature 65 °C, enzyme concentration 10% (w/w) and time 6.4h. The predicted values were validated experimentally and corroborated with DSC melting profile and triacylglycerol molecular species data. This investigation could help snack food industries to develop suitable oils for frying operations [Sukumar Debnath, R. Ravi and Belur R. Lokesh*(Department of Lipid Science and Traditional Foods, Central Food Technological Research Institute, Council of Scientific and Industrial Research, Mysore 570 020, India), *Food Chemistry*, 2011, **129**(4), 1444-1452].

*NPARR* 3(1), 2012-066, **Effects of caffeic acid and bovine serum albumin in reducing the rate of development of rancidity in oil-in-water and water-in-oil emulsions**

The antioxidant properties of caffeic acid and bovine serum albumin in oil-in-water and water-in-oil emulsions were studied. Caffeic acid (5 mmol/kg emulsion) showed good antioxidant properties in both 30% sunflower oil-in-water (OW) and 20% water-in-sunflower oil emulsions (WO), pH 5.4, during storage at 50 °C. Although bovine serum albumin (BSA) (0.2%) had a slight antioxidant effect, the combination of caffeic acid and BSA showed a synergistic reduction in the rate of development of rancidity, with significant reductions in concentration of total volatiles, peroxide value (PV) and *p*-anisidine value (PA) for both emulsion types. The synergistic increase in stability of the OW and WO emulsions containing BSA and caffeic acid was 102.9% and 50.4% respectively based on total oxidation (TOTOX) values, which are calculated as 2PV + PA, with greater synergy calculated if based on formation of headspace volatiles. The OW emulsion was more susceptible to the development of headspace volatiles by oxidation than the WO emulsion, even though the degree of oxidation assessed by the TOTOX value was similar [Enma Conde, Michael H. Gordon*, Andrés Moure, Herminia Dominguez (Hugh Sinclair Unit of Human Nutrition, Department of Food and Nutritional Sciences, The University of Reading, Whiteknights P.O. Box 226, Reading RG6 6AP, United Kingdom), *Food Chemistry*, 2011, **129**(4), 1652-1659].