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

NPARR 4(4), 2013-0357 Physico-chemical characteristics and sensory evaluation of wheat bread partially substituted with banana (Musa acuminata X balbisiana cv. Awak) pseudo-stem flour

The physico-chemical and sensorial properties of the control (BCtr), commercial wheat flour (CWF) bread substituted with 10% BPF (banana pseudo-stem flour) (B10BPF) and B10BPF with added 0.8% w/w (flour weight basis) xanthan gum (XG) or sodium carboxymethylcellulose (CMC) (B10BPFXG and B10BPFMC, respectively) were examined. The proximate analyses revealed that the composite bread had significantly higher moisture, ash, crude fibre, soluble, insoluble and total dietary fibre contents but lower protein, fat and carbohydrate contents than the BCtr. Bread incorporated with BPF resulted in a lower volume, darker crumb and lighter crust colour than the BCtr. The addition of CMC improved the bread volume. All breads containing BPF had greater total phenolics, and antioxidant properties than the control bread. Sensory evaluation indicated that the B10BPFMC bread had the highest acceptability [Lee-Hoon Ho*, Noor Aziah Abdul Aziz and Baharin Azahari (Food Technology Division, School of Industrial Technology, Universiti Sains Malaysia, 11800 Penang, Malaysia), Food Chemistry, 2013, 139(1-4), 532-539].

NPARR 4(4), 2013-0358 Biofortification of mungbean (Vigna radiata) as a whole food to enhance human health

Mungbean [Vigna radiata (L.) R. Wilczek var. radiata] is one of the most important pulse crops grown in South, East and Southeast Asia. It provides significant amounts of protein (240 g kg\(^{-1}\)) and carbohydrate (630 g kg\(^{-1}\)) and a range of micronutrients in diets. Mungbean protein and carbohydrate are easily digestible and create less flatulence than proteins derived from other legumes. In addition, mungbean is lower in phytic acid (72% of total phosphorus content) than pigeonpea (Cajanus cajan L. Millsp.), soybean (Glycine max L.) and cereals; phytic acid is commonly found in cereal and legume crops and has a negative impact on iron and zinc bioavailability in plant-based diets. Owing to its palatable taste and nutritional quality, mungbean has been used as an iron-rich whole food source for baby food. The wide genetic variability of mineral concentrations (e.g. 0.03–0.06 Fe kg\(^{-1}\), 0.02–0.04 g Zn kg\(^{-1}\)) in mungbean indicates possibilities to improve its micronutrient content through biofortification. Therefore biofortification of existing mungbean varieties has great potential for enhancing the nutritional quality of diets in South and Southeast Asia, where protein and micronutrient malnutrition are among the highest in the world. This review paper discusses the importance of mungbean in agricultural production and traditional diets and the potential of enhancing the nutritional quality of mungbean through breeding and other means, including agronomic practices [Ramakrishnan M Nair*, Ray-Yu Yang2, Warwick J Easdown, Dil Thavarajah, Pushparajah Thavarajah, Jacqueline d'A Hughes, JDH Keatinge(AVRD South Asia, ICRISAT Campus, Hyderabad, AP, India) Journal of the Science of Food and Agriculture, 2013, 93(8), 1805-1813].

NPARR 4(4), 2013-0359 Preparation of dietary fibre-enriched materials from preharvest dropped apples and their utilisation as a high-fibre flour substitute

Preharvest dropped apples from a weather disaster are generally discarded or used in animal feed due to reduced market value. In this study, they were utilised to produce dietary fibre-enriched materials (DFEMs) and their baking performance in a food system was then evaluated as a high-fibre and low-calorie flour substitute.
Hydrothermal treatment and fractionation of preharvest dropped apple powder produced fibre-rich fractions (856.2 mg kg\(^{-1}\)). The use of DFEMs increased the pasting properties of wheat flour and improved dough mixing stability. When DFEMs were incorporated in the cookie formulation (2, 4 and 6 g dietary fibre per serving), the cookie dough exhibited increased elongational viscosity and solid-like behaviour which became more pronounced with increasing levels of DEFMs. After baking, reduced spread was observed in DFEM cookies which could be readily attributed to their rheological characteristics. However, greater moisture retention by DFEMs produced cookie samples with softer texture. DFEMs prepared from preharvest dropped apples could be successfully evaluated in a cookie model system as a high-fibre and low-calorie substitute for wheat flour. This study suggests a new value-added application of preharvest dropped fruits, positively extending their use for better healthful diets [Yujeong Kim, Yongwook Kim, In Young Bae, Hyeon Gyu Lee, and Suyong Lee* (Department of Food Science & Technology and Carbohydrate Bioproduct Research Center, Sejong University, 98 Gunja-dong, Gwangjin-gu, Seoul, 143–747, Korea), Journal of the Science of Food and Agriculture, 2013, 93, (8)1974-1978].

NPARR 4(4), 2013-0360 Studies on the Effect of butter milk solids and vegetable oil on preparation of “filled Chhana”

The production of Chhana is confined to the eastern region of the country. It contains less than 70 percent moisture and approximate 50 percent fat on dry matter basis. Chhana is an acid coagulated indigenous milk product which is very widely used in India as a base material for the preparation of various sweetmeats like sandesh, rasogolla, cham-cham, rasmalai, balsahi, Khurma, pantooa etc. Butter milk containing about 10% milk solids, after modifying the composition with vegetable oil and skim milk powder (3.0% fat and 8.5% SNF), can be converted into chhana like product to be utilized in making various sweetmeats, viz Rasogolla, Sandesh, Cham-cham, Rasmalai, Pantua, and Rajbhog etc. Vegetable oil, being cheaper than milk fat, can be mixed with butter milk to obtain a filled chhana which would definitely be cheaper than the normal chhana. It will be helpful for people suffering from protein energy malnutrition because this product is rich in protein and energy and it will be also helpful for people suffering from lactose intolerance where diet should contain restricted amounts or no lactose because in the absence of enzyme lactase, lactose is not hydrolyzed to glucose and galactose. Almost 90 per cent of lactose content of initial milk is lost in whey during chhana preparation. On other hand it will be helpful from economic point of view for those people who come under economically weaker section because by replacing milk fat with edible vegetable oil the cost of the product can considerably be reduced [Singh Upendra, Kant Rajni*, Prakash Saurabh, Kumari Sonia (Department of Food Science & Technology, Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Science, Allahabad-211007), Trends in Biosciences, 2013, 6(6), 854-857].

NPARR 4(4), 2013-0361 Odour quality of spray-dried hens’ egg powders: The influence of composition, processing and storage conditions

This study aimed to determine whether compositional or processing parameters have an influence on the odour quality of egg powders. The parameters tested were: whole egg vs. egg yolk, polyunsaturated fatty acid (PUFA) enrichment, spray-drying temperature (160 °C vs. 180 °C), production scale (industrial vs. pilot plant), storage temperature (15 °C vs. 30 °C) and time (1, 2, 4 and 8 months). The quality of egg powders was evaluated by sensory analysis using free sorting, and by gas chromatography coupled to mass spectrometry and olfactometry. PUFA
enrichment and spray-drying temperature do not affect the odour of egg yolk powders. There are significant differences between the odour of whole-egg and egg-yolk powders as well as between powders produced on an industrial scale or in a pilot plant. An increase in the odour intensity of egg powders was observed during storage, while unpleasant odours were perceived when the egg powders were stored at 30°C [Cécile Rannou*, Florence Texier, Michelle Moreau, Philippe Courcoux, Anne Meynier and Carole Prost (ONIRIS, UMR CNRS 6144 GEPEA, Rue de la Géraudière, BP 82225, 44322 Nantes Cedex 3, France.), Food Chemistry, 2013, 138, (2-3), 905-914].

**NPARR 4(4), 2013-0362 Storage stability of hen egg white powders in three protein/water dough model systems**

In recent years, due to the specific health benefits associated with bioactive peptides and the reduction of protein allergenicity by enzymatic hydrolysis, the utilisation of protein hydrolysates in the intermediate-moisture food (IMF) market, such as high protein nutrition bars (HPNB), has significantly increased. Currently, no reported study is related to the storage stability of dried hen egg white (DEW) and its hydrolysates (HEW) in an IMF matrix. Therefore, three DEW/HEW dough model systems (100%HEW + 0% DEW, 75% HEW + 25% DEW and 50% HEW + 50% DEW) were established using two commercial spray-dried egg white powders to study the effect of temperature and fraction of HEW on these IMF models (water activity ($a_w$): ~0.8). During storage at three different temperatures (23, 35 and 45 °C) for 70 days, the selected physicochemical properties of the dough systems were compared. Overall, kinetic analysis showed an apparent zero-order model fit for the change in the colour ($L^*$), fluorescence intensity (FI) and hardness, as a function of time, for different dough model systems. As expected, the $L^*$, FI and hardness increased as a function of time mainly due to the Maillard reaction. The amount of free amino groups decreased, with an increase in rate of loss, as temperature increased in the 100%HEW + 0%DEW model. When DEW was substituted for some HEW, the regeneration of the free amino groups after loss was observed as a function of time. Furthermore, when the percentage of HEW was decreased, the incidence of mouldy samples occurred sooner, which indicates that HEW has some antimicrobial ability, especially in the 100%HEW + 0%DEW system where mould growth did not occur [Qinchun Rao*, Jeancarlo R. Rocca-Smith and Theodore P. Labuza (Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Ave., St. Paul, MN 55108, United States), Food Chemistry, 2013, 138, (2–3), 1087-1094].

**NPARR 4(4), 2013-0363 Antioxidant activity and nutritional quality of traditional red-grained rice varieties containing proanthocyanidins**

Proanthocyanidin-containing rice varieties have been rarely reported. Antioxidant capacity, major antioxidant components, and nutritional parameters of eight traditional red-grained rice varieties containing proanthocyanidins grown in Sri Lanka were investigated. The tested traditional red varieties, on the average, had over sevenfold higher both total antioxidant capacity and phenolic content than three light brown-grained new-improved rice varieties. Major antioxidant phenolic compounds identified in this study included proanthocyanidins, phenolic acids and $\gamma$-oryzanol (ferulic acid derivatives). Proanthocyanidins were detected only in the traditional red varieties, but not found in new-improved ones. Most traditional red varieties also contained significantly higher levels of protein with well balanced amino acids and higher contents of fat, fibre and vitamin E (tocopherols and tocotrienols) than the new-improved ones.
Great variations in antioxidant capacity, major phenolics, and nutritional parameters were observed among different rice varieties. These Sri Lankan traditional red-grained rice varieties containing proanthocyanidins may be used as important genetic sources for rice breeding [Anil Gunaratne*, Kao Wu, Dongqin Li, Amitha Bentota, Harold Corke and Yi-Zhong Cai (School of Biological Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, China.), Food Chemistry, 2013, 138 (2-3), 1153-1161].

NPARR 4(4), 2013-0364 Effect of peeling and three cooking methods on the content of selected phytochemicals in potato tubers with various colour of flesh

The impact of peeling and three cooking treatments (boiling, baking and microwaving) on the content of selected phytochemicals in white-, yellow-, red- and purple-fleshed potatoes was investigated. Ascorbic acid and chlorogenic acid contents were determined by HPLC-DAD, total anthocyanin content by pH-differential spectrophotometry, glycoalkaloid, α-choconine and α-solanine contents by HPLC-ESI/MS/MS. All cooking treatments reduced ascorbic and chlorogenic acid contents, total glycoalkaloids, α-choconine and α-solanine with the exception of total anthocyanins. The losses of ascorbic and chlorogenic acids were minimised with boiling and total anthocyanin levels retained the highest. Boiling of peeled tubers decreased contents of total glycoalkaloids (α-choconine and α-solanine) and appeared as the most favourable among the three tested methods. Moreover, due to higher initial levels, red- and purple-fleshed cultivars retained higher amounts of antioxidants (ascorbic acid, chlorogenic acid and total anthocyanan) after boiling and may be healthier as compared with white or yellow cultivars [Jaromír Lachman*, Karel Hamouz, Janette Musilová, Kateřina Hejtmáková, Zora Kotíková, Kateřina Pazderů, Jaroslava Domkárová, Vladimír Pívec and Jiří Cimr (Department of Chemistry, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6 – Suchdol, Czech Republic), Food Chemistry, 2013, 138 (2-3), 1189-1197].

NPARR 4(4), 2013-0365 Effect of incorporating hydrothermal, kilned and defatted oats on antioxidant and chapatti making properties of wheat flour

Oats were subjected to treatments like defatting, hydrothermal cooking and kilning, milled into flour and then the control and treated flours were incorporated into wheat flour at 25% and 50% levels and chapatti making behaviour and antioxidant properties were studied. The treatments significantly affected the antioxidant properties of oats. Incorporating oat flours to wheat increased total phenolic content but lowered the antioxidant activity however both were decreased significantly upon baking. The reducing power of the oat blended flour was higher than the wheat flours and ranged from 8.0 to 15.5 μmol AAE/g and was further increased upon baking. The metal chelating activity of flour blends varied from 62.0% to 73.8% and further increased upon baking. After baking the total flavonoid content was lowered and ranged from 308 to 389 μg CE/g. The non-enzymatic browning index significantly increased up to 27.6% upon baking [Hardeep Singh Gujral, Paras Sharma, Balmeet Singh Gill and Sumandeep Kaur (Department of Food Science and Technology, Guru Nanak Dev University, Amritsar, India), Food Chemistry, 2013, 138 (2-3), 1400-1406].

NPARR 4(4), 2013-0366 Quality and antioxidant properties of breads enriched with dry onion (Allium cepa L.) skin

The aim of the study was to investigate the effect on the antioxidant properties and
sensory value of bread of adding ground onion skin (OS). For a determination of bioaccessibility and bioavailability in vitro the human gastrointestinal tract model was used. OS contained mastication-extractable quercetin (4.6 mg/g). Quercetin from OS was highly bioaccessible during in vitro conditions, but only approximately 4% of quercetin released during simulated digestion was bioavailable in vitro. The antioxidant potential of bread with OS was significantly higher than the activity noted in the control. In particular, OS addition significantly fortified bread with bioaccessible lipid oxidation preventers and compounds with reducing and chelating abilities. The 2–3% OS addition caused significant improvement of antioxidant abilities (further increases in the OS supplement did not increase the activity of bread). Sensory evaluation showed that replacement of wheat flour in bread with up to 3% OS powder gave satisfactory consumer acceptability [Urszula Gawlik-Dziki*, Michał Świeca, Dariusz Dziki, Barbara Baraniak, Justyna Tomiło and Jarosław Czyż (Department of Biochemistry and Food Chemistry, Faculty of Food Science and Biotechnology, University of Life Sciences, Skromna Str. 8, 20-704 Lublin, Poland), Food Chemistry, 2013, 138 (2-3), 1621-1628].

The potato and bean sprouts were tested using dynamic mechanical analysis (DMA), in air with 90% humidity between 30 and 90 °C. Temperature plots of storage (SM i.e. elastic) and loss (LM i.e. inelastic) moduli were obtained. The SM and LM values were the basis for the calculation of the loss tangent (LT), the parameter expressing the ratio of inelastic to elastic parenchyma toughness. As expected, the tissue toughness decreased with increasing temperature. For both moduli, the characteristic temperature area with temperature slope minimum was observed – it was termed the negative peak on the temperature slope plots or separation point. It was shown that the negative peak was related to an increase in the inelastic part of the tissue toughness. These changes were interpreted as a consequence of pore protein denaturation followed by changes of the internal stresses inside the parenchyma cells [Jiří Blahovec, Magdaléna Lahodová and Martin Kindl* (Department of Physics, Czech University of Life Sciences, 16521 Prague 6-Suchdol, Czech Republic), Journal of Food Engineering, 2013, 117(93), 299-303].