Bayberry (*Myrica rubra* Sieb. et Zucc.) kernel: A new protein source

During the bayberry (*Myrica rubra* Sieb. et Zucc.) seed kernel oil extraction process, defatted flour (as a by-product) may be a vegetable protein source with huge exploitation potential. In order to evaluate its potential for food use, a study was done by researchers working at Department of Food Science and Nutrition, Zhejiang University, Hangzhou, China on the chemical compositions and selected processing functional properties (e.g., solubility, water- and oil-holding capacity, foaming and emulsifying properties and gelation) of defatted flour and protein isolate derived from bayberry seed kernel.

Bayberry kernel protein isolate (BKPI) was isolated from bayberry kernel defatted flour (BKDF) by isoelectric precipitation. BKPI was evaluated for chemical composition and selected functional properties with defatted kernel flour as reference. BKPI contained over 90% dry weight (DW) of protein versus 60.5% DW of protein in BKDF. It possessed a well-balanced amino acid composition according to the FAO/WHO reference except for a low content of lysine. BKPI had a solubility profile similar to that of BKDF, with minimum solubility observed at pH 4.0 and maximum solubility at pH 12.0. BKPI exhibited minimum foaming capacity (31.1%) and maximum foaming stability (72.7%) at pH 4.0. Minimum emulsifying capacity and emulsifying stability of BKPI and BKDF were observed at pH 4.0. BKPI had a least gelation concentration 6% (w/v) at pH 4.0. Results indicated that bayberry kernel has potential to be exploited as a new protein source in China [Cheng Jiyu, Zhou Shaohuan, Wu Dan, Chen Jianchu, Liu Donghong and Ye Xingqian, Bayberry (*Myrica rubra* Sieb. et Zucc.) kernel: A new protein source, *Food Chem*, 2009, 112 (2), 469-473].

Composition and characteristics of oil extracted from flaxseed-added corn tortilla

Flaxseed has recently gained attention as a functional food, and the effect of adding flaxseed (10, 15 and 20%) to tortillas was evaluated by scientists at Mexico and Venezuela. The physico-chemical characteristics and the free fatty-acid (FFA) content of the oil extracted from flaxseed-added corn tortilla were determined. The results showed that the lipid (4.27%) and protein content (9.10%) of the control sample was statistically lower ($P \leq 0.01$) than the tortillas added with flaxseed. In general, the total amylase content did not change with the flaxseed-added content; however, the amylase apparently decreased with the amount of flaxseed, indicating the presence of starch-lipid complexes. The saponification value was 95.37 (mg KOH/g oil) in the tortilla added with 10% flaxseed and increased to 100 (mg KOH/g oil) for the 20% flaxseed treatment. The peroxide value was observed to increase ($P < 0.05$) when the flaxseed flour was added at 10, 15 and 20%. In this study, the tortillas exhibited a high amount of total unsaturated fatty acids, 26.32-30.08% (oleic acid). Thus, the flaxseed-added corn tortilla could represent a valuable staple in improving the nutritional value of the original food product [Rendón-Villalobos JR, Bello-Pérez LA, Agama-Acedo E, Islas-Hernández JJ, Osorio-Díaz P and Tovar J, Composition and characteristics of oil extracted from flaxseed-added corn tortilla, *Food Chem*, 2009, 117 (1), 83-87].

Effects of seasonings on physical properties and MRI $T_2$ map of cooked spaghetti

Spaghetti, a very popular Italian food, is also preferred by the Japanese, in addition to Japanese noodles. The effect of seasonings on the texture of cooked spaghetti was examined by sensory and shearing tests by scientists at Japan. Spaghetti tossed with sucrose, trehalose, salt, and monosodium glutamate and their mixture retarded deterioration of the
Banana (Musa paradisiaca Linn.) is a starchy food that contains a high proportion of undigestible compounds, such as resistant starch and non-starch polysaccharides. The scientists at Mexico and Spain conducted studies to use unripe banana flour as a food ingredient to make pasta (spaghetti) of high quality, on the basis of low-carbohydrate digestibility, and increased resistant starch and antioxidant phenolics. Formulations consisting of 100% durum wheat semolina (control) and mixtures of semolina:banana flour of 85:15, 70:30 and 55:45 were prepared for spaghetti processing. Nutritional composition, in vitro kinetics of starch digestion and antioxidant capacity were determined. The addition of banana flour increased the indigestible fraction and the content of phenolic compounds in the spaghetti. As a consequence of the compositional changes, a slow, low rate for the enzymatic hydrolysis of carbohydrates was observed. Moreover, banana flour spaghetti possessed increased antioxidant capacity [Ovando-Martinez Maribel, Sáyago-Ayerdi Sonia, Agama-Acevedo Edith, Goñi Isabel and Bello-Pérez Luis A, Unripe banana flour as an ingredient to increase the undigestible carbohydrates of pasta, Food Chem, 2009, 113 (1), 121-126].

Characterization of endogenous enzymes of milled rice and its application to rice cooking

Rice is one of the most important crops in the world, especially in Asian countries. It is well-known that the preference for cooked rice is affected by the amounts of chemical components as well as physical properties such as softness and stickiness. Therefore, understanding the accumulation process of chemical components is important in obtaining a desirable cooked rice. Thus, the relationship between the activities of endogenous enzymes in milled rice and accumulation of chemical components in the rice grains during cooking was investigated by scientists at Japan. Maltose and soluble starch were optimally hydrolyzed around 60°C by both crude extracts and purified α-glucosidases of milled rice. Gelatinization onset temperature of rice flour was determined to be 63°C with DSC analysis under usual cooking condition. Hydrolytic activities on carbohydrates and proteolytic activities of milled rice were enhanced at pH 5 compared to pH 7 at the range of 4-80°C. When rice was cooked at pH 5, glucose and amino acids highly accumulated with soaking for 16 h before heating. They propose a new method of cooking with prolonged soaking at acidic pH, which is effective for increasing the amounts of chemical components in cooked rice [Mahashi Yuka, Ookura Tetsuya, Tominaga Noriko and Kasai Midori, Characterization of endogenous enzymes of milled rice and its application to rice cooking, Food Res Int, 2009, 42 (1), 157-164].
Effect of chemical and biological dipping on acrylamide formation and sensory properties in deep-fried potatoes

Researchers at Italy studied the effect of chemical and biological pre-treatments on acrylamide formation in deep-fried potatoes. Prior to deep-frying, potatoes cubes were subjected to lactic acid fermentation in the presence or in the absence of glycine, as well as to immersion in an aqueous solution of the amino acid alone. The effects of each pre-treatment on deep-fried potatoes were compared by evaluating acrylamide formation, browning development as well as sensory attributes and preference. Results showed that deep-fried potatoes subjected to the glycine and fermentation pre-treatments had 35 and 50% less acrylamide content than the water-dipped ones. Lactic acid fermentation in the presence of glycine resulted the most effective in decreasing acrylamide formation up to 70%. Such a pre-treatment did not affect the sensory perceived browning, flavour, sourness and crispness of the deep-fried potatoes. Hence, the results reported clearly show that all the considered pre-treatments carried out before deep-frying significantly reduced acrylamide formation in deep-fried potatoes. Among these, lactic acid fermentation in the presence of glycine resulted the most effective and allowed to produce deep-fried potatoes comparable in colour and appreciated as much as the water-dipped ones [Anese Monica, Bortolomeazzi Renzo, Manzocco Lara, Manzano Marisa, Giusto Cristina and Nicoli Maria Cristina, Effect of chemical and biological dipping on acrylamide formation and sensory properties in deep-fried potatoes, Food Res Int, 2009, 42 (1), 142-147].

Properties of enzyme modified corn, rice and tapioca starches

Scientists at Central Food Technological Research Institute, CSIR, Mysore, India aimed their work to study the hydrolysis of starch with enzymes at different conditions and characterize the products in terms of structural, functional and rheological aspects. Corn, rice and tapioca starches were partially hydrolyzed by treating the starch dispersions with heat stable α-amylase. Dextrose equivalent (DE) of 8-12 was achieved by hydrolyzing the starch samples (10-20% w/v) for 30 min at 90 ± 2°C. Scanning electron micrographs showed that starch granules had broken down to smaller particles. High performance liquid chromatography with refractive index detection indicated that oligosaccharides with broad molecular weight distributions are present in the reaction products. Hydrolyzed starch dispersions were analyzed for their rheological properties. The storage modulus values (\(G'\)) for 20% solid containing slurries were 7373 and 1470 Pa for untreated and enzyme treated samples, respectively, indicating a marked decrease in solid properties due to enzyme action. The complex viscosities (\(\eta^*\)) for native corn starch and hydrolyzed corn starch were 8243 and 1637 Pas, respectively, which indicate that the enzyme treatment decreases the overall resistance of the sample to flow such that the product can spread easily. Further, 13C CP/MAS NMR and FTIR studies revealed the loss of ordered structures in the enzyme modified starches. Free flowing fat substitute in the form of fine powder was prepared by spray drying the hydrolyzed starch slurry. Therefore, these modified starches may be suitable to formulate products that can easily flow and spread [Khatoon Sakina, Srerama YN, Raghavendra D, Bhattacharya Suvendu and Bhat KK, Properties of enzyme modified corn, rice and tapioca starches, Food Res Int, 2009, 42 (10), 1426-1433].

Effects of flour free lipids on textural and cooking qualities of Chinese noodles

The relationships between textural and cooking qualities of Chinese noodles and flour lipids were investigated by scientists at China using fractionation and reconstitution methods. Removal of free lipids (FL) or excess FL caused significant decreases in hardness and cohesiveness of noodles. The highest hardness and cohesiveness of noodles were...
obtained at certain FL levels (1.84 and 1.24 g/100 g flour, respectively). Tensile strength and breaking length of noodles both reached the highest values when FL content in the flour was adjusted to about half of the original level. A good correlation was found between cohesiveness and cooking loss of noodles ($r = -0.967$). Hardness and cohesiveness of cooked noodles increased linearly with the increase of polar lipids (PL) relative proportion of FL ($r = 0.939$ and 0.900, respectively). Entire replacement of PL with nonpolar lipids in flour led to a significant decrease in springiness of noodles. The results suggested that PL play an important role in obtaining strong noodle texture. These findings indicate that lipids, though only a minor component in flour, have significant effects on noodle texture and cooking quality, which deserve to be considered when breeding the noodle wheat varieties [Lu Qiyu, Guo Siyuan and Zhang Shaobing, Effects of flour free lipids on textural and cooking qualities of Chinese noodles, Food Res Int, 2009, 42 (2), 226-230].

### Comparative studies on the functional properties of various protein concentrate preparations of peanut protein

Peanut (*Arachis hypogaea* Linn.) protein concentrate (PPC) could be a good source of protein fortification for a variety of food products for protein deficient consumers in developing countries as well as a functional ingredient for the peanut industry. The production of PPC could also add value to defatted peanut flour, a low value by-product of peanut oil production. The effect of different preparations on the functional properties of peanut protein concentrates was studied by scientists at China. Peanut protein concentrates were isolated from defatted peanut flour by isoelectric precipitation, alcohol precipitation, isoelectric precipitation combined with alcohol precipitation, alkali solution with isoelectric precipitation and their functional properties (protein solubility, water holding/oil binding capacity, emulsifying capacity and stability, foaming capacity and rheology) were evaluated. The results showed that the protein solubility, foaming capacity and stability of protein prepared by alkali solution with isoelectric precipitation were the best of all the peanut protein products. But the protein prepared by alcohol precipitation had better water holding/oil binding capacity, which was significantly different from other protein products. The emulsifying stability of protein concentrate prepared by different methods was significantly lower than that of defatted protein flour. The protein prepared by isoelectric precipitation and isoelectric precipitation combined with alcohol precipitation had better gel properties which indicated that they were a potential food ingredient [Wu Haiwen, Wang Qiang, Ma Tiezheng and Ren Jiajia, Comparative studies on the functional properties of various protein concentrate preparations of peanut protein, Food Res Int, 2009, 42 (3), 343-348].

### Development and characterization of extruded snacks from New Zealand *Taewa* (*Maori* potato) flours

The twin screw extrusion of raw materials to produce corn snacks and ready-to-eat (RTE) cereals has increased significantly owing to favourable economics and product quality. *Taewa* is a collective noun referring to the traditional cultivars of potatoes (*Solanum tuberosum* Linn.) that have been cultivated by *Maori*, the early settlers and natives of New Zealand for at least 200 years. These cultivars are known for their unique nutritional and sensory characteristics. Crispy extruded snacks were prepared by mixing ungelatinized dried potato flours from four different *Taewa* cultivars and a modern potato cultivar with corn flour at two different ratios (25:75; 50:50), and their quality characteristics studied by scientists at Massey University, Palmerston North, New Zealand. All of the potato flours showed differences in colour, dry matter content, starch content and pasting characteristics. Among the extrudates prepared with 25%
potato flour, Huakaroro snacks showed an $L^*$ value of 51.71, whereas pure corn flour snacks had the highest $L^*$ value of 61.22. The $b^*$ at both levels of potato flour incorporation were lowest for Tutaekuri snacks. The microstructural characteristics of the extrudates such as cell structure and cell wall thickness changed considerably when potato flour was incorporated (50%) in the extruder feed. Moemoe, Tutaekuri and 100% corn flour snacks had the highest toughness, whereas the highest crispness was observed for the Huakaroro snacks. Lower and higher cold peak viscosities of 91 and 597 cP were observed for corn and Tutaekuri extrudates (in powdered form), respectively. The extrudates with 50% potato flour had higher breakdown and lower final viscosity than those containing 25% flour. The peak $G'$ values were highest for 100% corn, Moemoe and Karuparera snack pastes [Singh Jaspreet, Kaur Lovedeep, McCarthy Owen J, Moughan Paul J and Singh Harjinder, Development and characterization of extruded snacks from New Zealand Taewa (Maori potato) flours, Food Res Int, 2009, 42 (5-6), 666-673].

**Fruit**

### Edible film based on candelilla wax to improve the shelf life and quality of Avocado

Scientists at Mexico studied the effect of addition of ellagic acid (at three different concentrations) into candelilla wax matrix on shelf life and quality of whole Avocados (*Persea americana* Mill.). Control treatments were avocados coated with candelilla wax without ellagic acid and avocados without coating. The fruits were chosen for their maturity, size, free from infection and physical defects. All those samples were inoculated with a concentrated suspension of spores of *Colletotrichum gloeosporioides*, the main phytopathogenic fungus for avocados. Experiments were carried out completely divided into randomized groups. Changes in appearance, solids content, $pH$, $a_w$, lightness ($L^*$ value) and weight loss were monitored during 6 weeks every 8 days. A sensory evaluation of avocados coated with the best edible film was also performed. Edible films were able to reduce significantly the damage caused by *C. gloeosporioides*, reducing also significantly the change in appearance and weight loss in the fruits. Use of ellagic acid as part of the edible film has an important effect to improve the quality and shelf life of avocado. They found that using this new protection system the negative effects of *C. gloeosporioides* can be successfully reduced. It was concluded that the use of an edible film based on candelilla wax with a potent antioxidant ellagic acid on whole fruits is a good alternative to conserve fresh avocados [Saucedo-Pompa Saul, Rojas-Molina Romeo, Aguilar-Carbó Antonio F, Saenz-Galindo Aide, de La Garza Heliodoro, Jasso-Cantú Diana and Aguilar Cristóbal N, Edible film based on candelilla wax to improve the shelf life and quality of avocado, Food Res Int, 2009, 42 (4), 511-515].

### Antioxidant capacity and phenolic content of selected tropical fruits from Malaysia

Tropical fruits are well known to be associated with many medicinal properties. The antioxidant capacity and phenol content of three tropical fruits pulps, namely, honey pineapple (*Ananas comosus* Merr.), a local cultivar of banana (known as *pisang mas*) (*Musa paradisiaca* Linn.) and Thai seedless guava (*Psidium guajava* Linn.) were studied by researchers at Food Technology Division, School of Industrial Technology, Universiti Sains Malaysia, Penang, Malaysia. Three solvent systems were used (methanol, ethanol and acetone) at three different concentrations (50, 70 and 90%) and with 100% distilled water. The antioxidant capacity of the fruit extracts was evaluated using a ferric reducing/antioxidant power assay and the free radical-scavenging capacity was evaluated using 2,2-diphenyl-1-picrylhydrazyl radical-scavenging assays. The efficiency of the solvents used to extract phenols from the three fruits varied considerably.