

Food

Abbreviation: Food

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Scope and target readership: *Food* accepts original papers that apply, at the molecular and microstructural level, to science, engineering, technology, biochemistry, engineering, practical and applied, to further the improvement of human nutrition. Pure research aimed at improving technical processes, through raw material processing to food, novel processing methods, automation, quality control and assurance, microbiological safety issues, advances in preservation and packaging technologies and sensory analysis in order to increase consumer acceptance and satisfaction are also welcome contributions. Papers may also include aspects on physical properties, quality assurance, safety, storage, distribution, marketing and use.

Food is designed for professional nutritionists and dieticians, researchers, scholars and regulatory bodies.

Some of the detailed topics in *Food* may include, among others:

- 1) Agrochemical effects on foods;
- 2) Chemistry, analysis, methodology and analysis (development and evaluation, novel techniques, automation or on-line procedures for process control, methods for food adulterants, aspects of quality assurance including the preparation and characterization of reference materials);
- 3) Economic and regulatory policies, their effects on safety and quality assessment, processing and preservation;
- 4) Manufacture, storage and marketing;
- 5) Measurement of micronutrients, macronutrients, additives and contaminants in foodstuffs and biological samples;
- 6) Microbiology: novel methods of detecting microorganisms in foods (sensory, nutritional and physiological aspects); genetics and biochemistry of microorganisms that are either used to make foods or that represent safety problems;
- 7) Pharmacological properties of ingredients (emphasizing content of bioactive ingredients);
- 8) Physico-chemical properties or changes to products that result in longer preservation, applied to transportation and shelf-life;
- 9) Preservatives, packaging systems, potential hazards of new formulations;
- 10) Processing, stability and stabilization, improvement in quality and properties;
- 11) Regulation of growth and toxin production in both model systems and complex food substrates;
- 12) Structural changes in molecules during processing and storage;
- 13) Toxicology and effects on specific organ systems, immune functions, carcinogenesis and teratogenesis;

Although not explicit in the title, research pertaining to drinks and beverages will also be accepted.

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Cover photos: Left, top: attieke semolina (Akely *et al.*, pp 48-51); left, bottom: four month-old Roselle (*Hibiscus sabdariffa* L) var. 'Terengganu' calyces (Ismail *et al.*, pp 1-16). Top right: cookies made from triticale flours; Bottom, right: triticale starch granules (León *et al.*, pp 17-24).

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Amin Ismail, Emmy Hainida Khairul Ikram, Halimatul Saadiah Mohd Nazri (Malaysia) Roselle (*Hibiscus sabdariffa* L.) Seeds - Nutritional Composition, Protein Quality and Health Benefits (pp 1-16)

ABSTRACT

Invited Review: Roselle (*Hibiscus sabdariffa* Linn) is a herbal shrub plant reported native to tropical Africa and grown in warm countries including Malaysia. This plant is grown for the calyces or petals of the flower which are mainly used to prepare herbal drink, beverages, jam and jellies. After removing the calyces, the velvety capsules containing the seeds are disposed as a by-product. In addition, it is a waste if the seeds are left untouched, without effort to exploit its usefulness and benefits. Moreover, with limited research on the usefulness of roselle seeds, no review paper on this topic has ever published. Thus, we took the initiative to prepare a review on this subject based on findings from most of our work from 2003-2007. In this paper, the most important aspects namely, nutritional composition, including antioxidant properties, protein quality and the effect of seeds on lipid profiles of hypercholesterolemic rats have been reviewed. Based on the compositional analysis, roselle seeds are rich in nutritional components especially proteins, oil and dietary fiber. The seeds are rich in lysine, arginine, leucine, phenylalanine and glutamic acid. The antioxidative effect of roselle seed extract increases when combined with other antioxidant compounds compared to when used alone. The protein quality of roselle seed powder prepared from dried and boiled seeds is similar. Roselle seeds were also reported to possess anti-hypercholesterolemia effects tested using an animal model. To exploit the seeds which contain high value health-promoting components as functional ingredients, their possible application in food products should be studied.

Alberto Edel León, Gabriela T. Pérez, Pablo D. Ribotta (Argentina) Triticale Flours: Composition, Properties and Utilization (pp 17-24)

ABSTRACT

Invited Review: Triticale (*X Triticosecale* Wittmack) is an artificial hybrid of wheat (*Triticum* sp.) and rye (*Secale* sp.) first bred in laboratories during the late 19th century. In little more than a century, triticale has developed from a biological curiosity to a practical crop. Plant breeders have made efforts to overcome main problems of triticale: preharvest sprouting, susceptibility to diseases, sensitivity to photoperiod, and production of shriveled grains. Triticale world production is in constant growth, in 2005 15,000,000 t were produced all over the world. Today, it is used all over the world as forage or grain. The chemical composition of triticale has similarities with wheat and rye, showing intermediate values in many of the parameters. Due to presence of rye proteins, triticale flours have low gluten content, deficient gluten viscoelasticity, and, consequently, produce breads with inferior quality than wheat. However, triticale is still an alternative for human food, essentially in areas where soil and climate conditions limit wheat growth. In Latin America triticale performs well in southern semi-arid regions and in Brazilian acid soils. In some parts of eastern and northern Europe where wholemeal flours are used today for breadmaking, triticale breeding is increasing progressively. In this article we approach the aspects linked with the utilization of triticale flours for human consumption.

Sahar F. Deraz, Ashraf A. Khalil (Egypt) Strategies to Improve Protein Quality and Reduce Antinutritional Factors in Mung Bean (pp 25-38)

ABSTRACT

Invited Review: Legume seeds contain 20-25% protein, which is 2-3 times higher than the content in cereals, and have therefore been considered as leading candidates for protein supply to malnourished areas of the world. Mung beans are a good source of energy, proteins, vitamins, minerals and dietary fiber. They are relatively inexpensive compared to meat foods and as they have high carbohydrate content. Mung beans can be useful as high energy foods for peasants and nomadic farmers. The high lysine content of mung beans makes them an excellent enhancer of protein quality when combined with cereal grain proteins. However, like other pulses, utilization of mung bean proteins is below the potential partly due to the deficiency of some of the essential amino acids in their proteins and also due to the presence of some antinutritional factors associated with their protein. Protease inhibitors, lectins, gossypol, flatulence-causing factors and others are among the antinutritional factors associated with the legume meal proteins. We report here many investigations carried out in order to reduce or even remove the content of antinutritional factors and enhance the nutritional quality of mung beans. Finally, we discuss the possibilities of mung bean flour to improve and upgrade the nutritional quality of the diets and the health of low-income people in developing countries.

Philippe Jeandet (France), Stefano Capelli (Italy), Michel Laure, Sandrine Jégou (France), Alberto Cirio (Italy), Yann Vasserot (France) Control of Oxygen Enrichment during Bottling in the Sparkling Winemaking Process (pp 39-42)

ABSTRACT

Technique Paper: A method useful for oxygen management during the last step (i.e. disgorging and bottling) in the production of sparkling wines is described here. This study evaluates the benefits of a new apparatus for bottling sparkling wines that is able to control the oxygen environment in the neck of a bottle. Data showed that when corking occurred under controlled atmosphere ($O_2 = 6\%$ and $O_2 = 3.5\%$), oxygen intake by bottles was reduced by factors of, respectively, 6 and 10, as compared to bottling under non-controlled atmosphere ($O_2 = 20.8\%$). Moreover, tasting experiments carried out on the wines following bottling (with or without any control of oxygen enrichment) clearly demonstrated that wines obtained under controlled atmosphere are less evolved and show less oxidation notes than do the ones obtained under non-controlled atmosphere.

K.K. Kumar, Manas R. Swain, Smita H. Panda, Umesh C. Sahoo, Ramesh C. Ray (India) Fermentation of Litchi (*Litchi chinensis* Sonn.) Fruits into Wine (pp 43-47)

ABSTRACT

Original Research Paper: A wine from litchi (*Litchi chinensis* Sonn. var. *Shahi*) fruits having high nutritional value was prepared by fermentation using wine yeast (*Saccharomyces cerevisiae* var. *bayanus*). The wine was light yellow in colour, acidic in test [titratable acidity (0.59 g tartaric acid/100 ml)], rose-flavoured and with tannin (0.72 mg/100 ml) and low ethanol (6.5%) concentration. The sensory evaluation rated the litchi wine quite acceptable as an alcoholic beverage. Principal component analysis (PCA) reduced the eight original analyses (proximate) variables to two independent components (factors, PC1 and PC2), which accounted for 100% of the variation of litchi wine. Similarly, PCA analysis reduced the five original sensory attributes to three independent components (PC1, PC2 and PC3) that accounted for 79.3 % of the variation of litchi wine.

Pierre Martial Thierry Akely, N'guessan Georges Amani (Ivory Coast), Oueizou Azouma (Togo), Charlemagne Nindjin (Ivory Coast) Influence of Pressing Force on Physicochemical and Sensory Qualities of Fermented Cassava Mash and Attieke Semolina (pp 48-51)

ABSTRACT

Original Research Paper: The quality of attieke semolina is highly dependent on traditional processing technologies, of which certain effects, such as pressing force, are unknown. The aim of this study was to improve and consolidate attieke semolina processing by controlling the fermented cassava mash pressing process. The effect of pressing force was studied with a traditional press. The application of three forces (0.91, 1.55 and 2.58 kN) on 1100 g fermented cassava dough with 66% moisture content over 10, 15 and 20 minutes showed that 1.55 ± 0.3 kN could produce attieke semolina of good texture with better physicochemical qualities and residual cyanide not exceeding 10 mg/ml.

Kouadio Claver Degbeu, N'Guessan Georges Amani, Serges Clement Aoussi, Yao Denis N'dri (Ivory Coast) Longitudinal Distribution and Physico-Chemical Properties of Yam (*Dioscorea* spp.) Tuber Starches (pp 52-56)

ABSTRACT

Original Research Paper: Granule size distribution of yam starches and tissues varies within the longitudinal axis of the tuber. In this study, starch was isolated from three parts of yam tubers (proximal, middle and distal) of two species: *D. alata* (*Bètè-bètè* and Tda 1176) and *D. cayenensis rotundata* (*Krenglè* and Tdr 95/19156), to investigate the effect of sectional variation on medullar parenchyma tissues and functional properties of starch. Cytoplasm air, cell wall thickness as well as intercellular space increased from the distal zone to the proximal part. Starch properties varied according to the species. The two varieties of *D. alata* had decreasing starch granule sizes from the proximal extremity ($23.3 \pm 6.5 \mu\text{m}$) toward the distal zone ($17.9 \pm 6.2 \mu\text{m}$), while those of *D. cayenensis* had smaller size granules in the proximal section than the middle and distal sections where the sizes were identical. Starch from the middle section of *Bètè-bètè* variety gave a clearer gel ($35.1 \pm 1.3\%$) than the proximal ($28.5 \pm 1.3\%$) and distal ($29.2 \pm 2.9\%$) extremities, and could be used to thicken fruit pie filling. Starch from the distal sections of the two varieties of *D. alata* (Tda 1176 and *Bètè-bètè*) were more resistant to syneresis at -20°C , and could be more useful for frozen food. Starch from the proximal part showed a general low breakdown viscosity. This stability is required for UHT products.

These results suggest that not only does granule size distribution vary according to species and between the different parts of the tuber but there are differences in some of some starch properties as well.

Khairul Kamilah Abdul Kadir, Azrina Azlan, Zulkhairi Amom, Norhaizan Mohd Esa, Maznah Ismail (Malaysia) Nutritional Composition of Germinated Brown Rice Porridge (pp 57-60)

ABSTRACT

Original Research Paper: In industrialized and developed countries more people are seeking preventive medicine rather than a curative approach. Considering germinated brown rice (GBR) is dense in dietary fibers, nutrients and antioxidants, the development of instant nutritious GBR porridge (GBRP) was proposed. The nutrient composition and fatty acid profile of GBRP were investigated. A comparison between GBRP, white rice porridge (WRP) and commercial porridge (CP) was carried out. GBRP contained significantly higher ($P < 0.05$) ash (0.86 g/100 g sample) and dietary fiber (8.03 g/100 g sample) contents compared to WRP (0.81 g/100 g and 4.84 g/100 g sample) and CP (0.74 g/100 g sample and 6.46 g/100 g sample). Higher ash content was correlated with a higher level of sodium, calcium, potassium and magnesium. Protein content of GBRP was also significantly higher ($P < 0.05$; 1.74 g/100 g sample) than CP (1.17 g/100 g sample). Interestingly, GBRP had 0.17 g/100 g sample of fat, which is four-fold higher than in WRP (0.04 g/100 g sample) and CP (0.03 g/100 g sample). The higher percentage of fat was correlated to a higher level of unsaturated fatty acids (USFA) than saturated fatty acids (SFA). The results from the present study revealed a higher potential of GBRP as a healthier option that is abundant in health-promoting compounds.

Adenike A.O. Ogunshe, Adeniyi A. Jayeola, Taiwo C. Ogundimu (Nigeria) Microbial Studies on Laboratory Fermentation of *Iregi* - A Potential Fermented Food Condiment from *Delonix regia* (Boj. ex Hook.) Raf. (pp 61-64)

ABSTRACT

Short Communication: Bacterial strains isolated from fermenting boiled cotyledons of *Delonix regia* in the laboratory production of *iregi* were characterised as *Bacillus cereus* var. *mycoides* (21), *B. licheniformis* (37), *B. megaterium* (10), *B. pumilus* (24), *B. subtilis* (20), *Staphylococcus aureus* (8), *S. epidermidis* (2) and *S. saprophyticus* (4). The aerobic mesophilic bacterial flora of the simulated fermenting *iregi* mash were dominated by *Bacillus* species (1.6×10^4 cfu g⁻¹), followed by enterobacteria (2.3×10^2 cfu g⁻¹), lactic acid bacteria (2.1×10^2 cfu g⁻¹) and *Staphylococcus* species (1.3×10^2 cfu g⁻¹), however, in the laboratory-fermented mash the aerobic mesophilic bacterial flora of *iregi* were *Bacillus* species (1.2×10^5 cfu g⁻¹), lactic acid bacteria (3.6×10^2 cfu g⁻¹), enterobacteria (1.1×10^2 cfu g⁻¹) and *Staphylococcus* species (1.7×10^1 cfu g⁻¹). The total aerobic mesophilic bacterial counts declined during the last three days of the fermentation but the *Bacillus* counts increased throughout the fermentation period. The pH of the fermenting mash was between 7.3 and 8.7 while the optimal temperature for fermentation was 45-46°C. Physical observation of the fermented mash showed that it was dark brown in appearance with a creamish mucilaginous slime moulding the fermented cotyledons together.

Abiodun O. Olubamiwa, Adelodun L. Kolapo (Nigeria) Evaluation of Nutritional Composition and Acceptability of Soy-Coconut Milk-Based Yoghurt Fermented With Different Starter Cultures (pp 65-69)

ABSTRACT

Original Research Paper: This study was carried out to investigate the effect of starter cultures on the nutritional composition and acceptability of soy-coconut milk-based yoghurt. The effect of the addition of non-fat dry milk (NFDM) to the yoghurt premixes on the quality of the resultant soy yoghurt was also evaluated. The pH of the yoghurt premixes at the onset of fermentation ranged between 6.29 and 6.78 and after fermentation it was between 4.74 and 5.44 with commercially available starter bringing about greatest pH reduction. The chemical composition of resulting soy yoghurts were as follows: titratable acidity as %lactic acid (0.25-0.73%), crude protein (3.13-4.69%), fat content (0.11-0.52%), total solid content (8.24-13.09%). Addition of NFDM and coconut milk to the yoghurt premixes before fermentation significantly increased the acidity, protein, ash and carbohydrate contents of the yoghurts. The sensory characteristics of soy yoghurts with the premix containing 10% coconut milk fermented with starter obtained from cow milk produced yoghurt with the best taste, aroma, colour and acceptability. Results from the present study have demonstrated that soy yoghurt could become a more acceptable product to the 'Western palate' if NFDM and an appropriate quantity of coconut milk were added to yoghurt premix before fermentation.

Kamau Murigu Patrick Njage (Switzerland), John Wangoh (Kenya) Impact of the Lactoperoxidase System on Activity of Selected Lactic Starter Cultures in Camel Milk (pp 70-74)

ABSTRACT

Original Research Paper: Sensitivity of lactic starter cultures to the lactoperoxidase (LP)-system (LPS) was investigated by monitoring acid production by mesophilic, thermophilic and *suusac* (a traditional Kenyan fermented camel milk product) starter cultures in both LPS-treated and -untreated camel milk. Camel milk samples from three different production sites in Kenya – Kajiado, Isiolo and Nanyuki Districts – were analysed for their thiocyanate concentration. Inoculation with starter was done after 0, 4 and 8 hours of storage of LP-activated samples. Natural concentration of thiocyanate occurring in the camel milk from the three sites ranged from 9.7 to 36.4 mg/l. No addition of thiocyanate was therefore necessary to activate the LPS. There was a significant slowdown in acid development in the raw camel milk inoculated immediately after activation in all three starter cultures. Holding of LPS-activated milk for 8 hours prior to inoculation reduced inhibition of lactic acid production by the starter cultures. Camel milk preserved using this method could therefore support satisfactory mesophilic and thermophilic starter culture activity if the raw camel milk is held for up to 8 hours during storage at 30°C prior to processing. Heat treatment reduced starter inhibition by the LPS for the mesophilic and thermophilic starter cultures when LPS activation, heat treatment and inoculation followed each other sequentially. However, for *suusac* starter inhibition by the LPS for non-activated samples, those activated and inoculated after 0 and 4 hours was significant but non-significant for those inoculated after 8 hours of storage. The inhibitory effect of the LPS on mesophilic and thermophilic starter culture activity in heat-treated camel milk is apparently reactivated and increases with time of preservation of the raw camel milk by the LPS.