Food

NPARR, 8(2), 2017-284 Effects of fermented edible seeds and their products on human health: Bioactive components and bioactivities

There is a long history of using fermentation in food production. Edible seeds, such as certain beans and cereal grains, are important in the human diet and provide many health benefits. Various microbes, such as lactic acid bacteria, molds, and yeasts, considered as generally recognized as safe (GRAS) microbes, are commonly used to ferment edible seeds and their products. Fermentation can change bioactive components and produce new bioactivities. In order to highlight the importance of fermentation on bioactive components and bioactivities in edible seeds, this review, therefore, summarizes recent relevant studies and discusses fermentation procedures and influences of fermentation on their bioactive components and bioactivities. Overall, fermented edible seeds and their products contain enhanced bioactive components, especially γ-aminobutyric acid and natural phenolics, and they possess versatile bioactivities, such as antioxidant and anti-cancer effects, and, therefore, can be recommended as an important part of the human diet, or they can be developed into functional foods to help in the prevention of certain chronic diseases [Gan, R.-Y., Li, H.-B., Gunaratne, A., Sui, Z.-Q. and Corke, H* (Dept. of Food Science and Engineering, School of Agriculture and Biology Shanghai Jiao Tong Univ. Shanghai 200240 China) Comprehensive Reviews in Food Science and Food Safety, 2017].

NPARR, 8(2), 2017-285 Lipid class specific quantitative analysis of n-3 polyunsaturated fatty acids in food supplements

Supplementation products containing n-3 PUFA from marine sources serve a large market. Although the amount of eicosapentaenoic acid and docosahexaenoic acid in the products is provided by the manufacturer, no or little information is available on their lipid pattern. Therefore, we quantitatively analyzed the fatty acid pattern in the lipid fractions triglycerides, phospholipids, ethyl esters, and free fatty acids in supplementation products by means of solid phase extraction and gas chromatography. Twelve products from the European and U.S. markets containing fish, krill, algal, or plant oil were analyzed. Total n-3 PUFA content ranged from 68 g/100 g fat (fish oil) to 42 g/100 g fat (algal oil) to 17 g/100 g fat (krill oil). On the basis of the n-3 PUFA containing lipid class, the supplements can be separated dominantly in ethyl ester, re-esterified triglyceride, triglyceride, and phospholipid containing products. Algae-based products contained natural triglycerides, krill oils a complex mixture of phospholipids, triglycerides, and free fatty acids, and fish oil products either ethyl esters, re-esterified triglycerides, or triglycerides. Even products of the same class and source showed distinct differences in their lipid pattern. A specification of the lipid composition of n-3 PUFA products would allow distinguishing the different (qualities of) supplements [Kutzner, L., Ostermann, A.I., Konrad, T., Riegel, D., Hellhake, S., Schuchardt, J.P. and Schebb, N.H* (Institute for Food Toxicology and Analytical Chemistry, University of Veterinary Medicine Hannover, Bischofsholer Damm 15, Hannover, Germany) Journal of Agricultural and Food Chemistry, 2017, 65(1), 139-147].

NPARR, 8(2), 2017-286 Analysis of vegetable's peels as a natural source of vitamins and minerals

Peels of vegetables and fruits are considered waste products and thrown into the environment. However, some researches on the peels of fruits revealed the presence of important phytochemicals having diverse biological activities. In the current study, peel samples of seven underground vegetables namely, Beta vulgaris, Brassica rapa, Daucus carota, Ipomoea batatas, Raphanus sativus, Solanum tuberosum and Zingiber officinale were evaluated for
vitamin and mineral contents. The vitamin C content of the peels ranged between 43.6 to 122.5 mg/100g, while riboflavin, thiamin and niacin levels were between 0.3 to 0.8 mg/100g, non-detection to 0.4 mg/100g and 0.2 to 1.6 mg/100g, respectively. Appreciable amounts of various minerals such as calcium, sodium, magnesium, iron, manganese, zinc, potassium and phosphorus were detected in the peel samples. The overall findings confirmed that peels are rich source of minerals and vitamins and can be utilized as food, feed and dietary ingredients after appropriate processing [Khattak, K.F* and Rahman, T.U (Department of Chemistry, Abdul Wali Khan University, Mardan, Khyber Pakhtunkhwa, Pakistan) International Food Research Journal, 2017, 24(1), 292-297].

NPARR, 8(2), 2017-287 A review: Modified agricultural by-products for the development and fortification of food products and nutraceuticals

Producing more food for a growing population in the coming decades, while at the same time combating environmental issues, is a huge challenge faced by the worldwide population. The risks that come with climate change make the mission more daunting. Billion tons of agriculture by-products are produced each year along the agricultural and food processing processes. There is a need to take further actions on exploring the inner potential of agro-waste to stand out as food ingredient to partially or fully substitute the foods in orthodox list. Some of the agro-waste contains the most valuable nutrients in the plant and it is truly a “waste” to dispose any of them. Furthermore, the paper aims at discussing the possible methods of modification to improve the safety and feasibility of the agro-waste either through physical, chemical or microbiological ways. The safety issues and bioactivity contains in the agro-waste also been discussed to present the better overall ideas about the employing of agro-waste in food applications [Lai, W.T., Khong, N.M.H., Lim, S.S., Hee, Y.Y., Sim, B.I., Lau, K.Y. and Lai, O.M* (Institute of Bioscience, Universiti Putra Malaysia, UPM Serdang, Selangor Darul Ehsan, Malaysia) Trends in Food Science and Technology, 2017, 59(1),148-160].

NPARR, 8(2), 2017-288 Powdered barley sprouts: Composition, functionality and polyphenol digestibility

This study was performed to evaluate the phytochemical composition, in vitro antioxidant capacity, antihyperglycaemic and anti-inflammatory activities, and simulated gastrointestinal digestion of 7-day-old freeze-dried barley sprouts (BS), one hybrid and one nonhybrid variety: ‘NS565’ (BSNS) and ‘Golozrni’ (BSG), respectively. BSNS expressed significantly higher (P ≤ 0.05) content of total phenols, chlorophyll and carotenoids. Phenolic compounds were the most dominant bioactives in both BSNS and BSG (713.25 and 479.02 mg GAE 100 g−1 DW, respectively). BSNS possessed significantly higher (P ≤ 0.05) antioxidant capacity, evaluated by DPPH and ABTS assays, and reducing power ((IC_{DPPH}^{50} = 0.54 mg mL⁻¹; IC_{50}^{ABTS} = 0.79 mg mL⁻¹; RP_{0.5} = 9.35 mg mL⁻¹). Antihyperglycaemic and anti-inflammatory activities of BSNS ((IC_{AHG}^{50} = 1.43 mg mL⁻¹; \Gamma_{CAlA}^{50} = 1.86 mg mL⁻¹) were also significantly higher (P ≤ 0.05) than BSG ((IC_{AHG}^{50} = 1.97 mg mL⁻¹; IC_{AAl}^{50} = 4.40 mg mL⁻¹). In vitro simulation of gastrointestinal digestion showed higher release of phenolic compounds in intestinal fluid than in gastric fluid [Abaros, N.E., Čanadanović-Bruton, J., Četković, G., Šaponjac, V.T., Vulić, J* and Ilić, N (Faculty of Technology, University of Novi Sad, Bulevar Cara Lazara 1, Novi Sad, Serbia), 2017, 52(1), 231-238].

NPARR, 8(2), 2017-289 Effects of high hydrostatic pressure processing and subsequent storage on phenolic contents and antioxidant activity in fruit and vegetable products

Fresh fruits and vegetables have been reported to possess a variety of bioactivities
partly due to their high abundance of phenolics. However, traditional thermal pasteurisation during fruit and vegetable processing typically induces a pronounced loss of phenolic compounds. In contrast, nonthermal pasteurisation techniques, especially high hydrostatic pressure (HHP) processing, are beneficial to the retention of phenolics. In addition to more effectively keeping original freshness, flavour and colour of fruit and vegetable products to the greatest extent, in most cases, HHP processing and subsequent storage more effectively sustain the levels of phenolic compounds and antioxidant activity in fruit and vegetable products compared with thermal pasteurisation. Therefore, HHP processing has a huge potential to preserve fruit and vegetable products rich in phenolic compounds [Zhao, G., Zhang, R. and Zhang, M* (Sericultural & Agri-Food Research Institute, Guangdong Academy of Agricultural Sciences/Key Laboratory of Functional Foods, Ministry of Agriculture/ Guangdong Key Laboratory of Agricultural Products), 2017, 52(1), 3-12].

Analyzing key factors of consumer's acceptance for defected fruits and vegetables

According to the study research, carried out by Food and Agriculture Organization of the United Nations (FAO) in 2011, every year over the globe, there are over one-third of eatable fruits and vegetables been wasted or damaged. With the additional loss from the supply and marketing process and the waste caused by the consumer side, the total squandering every year can be accumulated up to 1.3 billion tons. If that food were reserved, it could have fed more than eight hundred and sixty million people, who suffer from hunger or malnutrition. Despite that we all are aware of this cruel fact, you would found us still wasting food ceaselessly. If we put more concerns in our daily lives, this is what we would find. In view of the over extravagant consuming style nowadays, the third-biggest supermarket chain in France, Intermarche, took action. Intermarche has conducted a series of plans for renovation to rescue fruit and vegetables, especially for those appearance are not good and could not get on shelves, from going to waste. In Taiwan, we are also expecting to have similar projects to alleviate the pain of production dilemmas and to make the most of the food resources. Therefore, this study is to investigate cases of renovation programs for defective fruits and vegetables and to further discuss of the key acceptance factor via consumers through interviews. Hoping in the future, we can promote a chain of a dynamic system that links the producers, sellers, and consumers all together. For that, it helps to create a great consumer society, which pays attention to ecology, environment, and human integrity [Wei, M.-Y. and Tu, J.-C* (National Yunlin University of Science and Technology, Graduate School of Design, 123 University Road, Section 3, Douliou, Yunlin, Taiwan) Proceedings of the IEEE International Conference on Advanced Materials for Science and Engineering: Innovation, Science and Engineering, IEEE-ICAMSE 2016, 2017, 7840251, 116-118].

Microencapsulation of the green pigment of alfalfa and its applications on heated food

The present study was aimed to evaluate the encapsulation of the green pigment of alfalfa and investigate its applications in heated food. Alfalfa were collected and subjected to extraction. Extracted dye was microencapsulated and its efficiency was measured. Distribution of the particle sizes and L* (lightness), a* (redness), and b* (yellowness) color indexes were also determined. The efficiency of juicing method was higher than grinding; however, the weight of residues was lower in juicing. Combination of centrifugation and filtration resulted in lower efficiency and higher weight of residues compared to using centrifugation alone. The pH of samples was 6.5. Application of filtration and centrifugation caused increase in the levels of a*
and L* factors and decrease in b*. Emulsion stability against homogenization was reduced in low proportions of the oil phase. Results showed the higher levels of resistance of the microencapsulated dye samples against heating procedure. Practical applications: This research addressed the effects of microencapsulation of the green pigment of alfalfa on its stability against high temperature and acidic pH and also application of encapsulated green pigment on heated foods. Results of this study presented a suitable way for enhancement of the stability of green pigment of alfalfa as a valuable and cheap source of chlorophylls as an eatable dye in food industry [Raei, A., Yasini Ardakani, S.A*., and Daneshi, M (Department of Food Science and Technology, Faculty of Agriculture and Natural Resources, Yazd Branch, Islamic Azad University Yazd Iran) Journal of Food Process Engineering, 2017, 1-9].

NPARR, 8(2), 2017-292 Prospects of microalgae proteins in producing peptide-based functional foods for promoting cardiovascular health

Background: Bioactive peptides have strong potential for use in functional food formulation for prevention and management of health conditions, especially cardiovascular disease (CVD). Microalgae can be used as sustainable protein sources in the production of peptide-based functional foods for preventing or treating CVD. Scope and approach: This review discusses the scientific knowledge and current trends in microalgae-derived peptides, including their chemical composition, production and potential impact in management of hypertension and oxidative stress. The prospects for commercial applications as functional food ingredients are also discussed. Key findings and conclusions: There is high potential for the production of functional foods containing microalgae-derived peptides. Peptides that inhibit angiotensin converting enzyme, and those that have antihypertensive and antioxidant properties, all of which are important in ameliorating CVD risk factors, have been successfully produced from microalgae. Future research with regards to the microalgae-derived peptides will involve the development of large-scale commercial microalgae cultivation, enhancement of protein extraction and peptide release, understanding of matrix interactions of the peptides within food products, and in vivo studies in human to validate health benefits [Ejike, C.E.C.C., Collins, S.A., Balasuriya, N., Swanson, A.K., Mason, B. and Udenigwe, C.C* (Department of Plant, Food, and Environmental Sciences, Faculty of Agriculture, Dalhousie University, Truro, Nova Scotia, Canada) Trends in Food Science and Technology, 2017, 59, 30-36].

NPARR, 8(2), 2017-293 Potential health benefits of combining yogurt and fruits based on their probiotic and prebiotic properties

Fruit and yogurt have been identified individually as indicators of healthy dietary patterns. Fruits are relatively low in energy density and are an excellent source of antioxidants and prebiotic fibers and polyphenols, which can promote digestive health. Yogurt, on the other hand, is a nutrient-dense food that is a good source of dairy protein, calcium, magnesium, vitamin B-12, conjugated linoleic acid, and other key fatty acids. In addition, it contains beneficial bacterial cultures, making it a potential source of probiotics. Yogurt's unique fermented food matrix provides added health benefits by enhancing nutrient absorption and digestion. Combining the intake of yogurt and fruit could provide probiotics, prebiotics, high-quality protein, important fatty acids, and a mixture of vitamins and minerals that have the potential to exert synergistic effects on health. Yogurt consumption has been associated with reduced weight gain and a lower incidence of type 2 diabetes, whereas fruits have established effects on reducing the risk of cardiovascular disease. Yogurt and fruits can be eaten together and may exert combined health benefits through potential prebiotic and probiotic effects. Furthermore, substituting high-energy, nutrient-deficient snacks with fruit and yogurt could reduce the intake of high-calorie obesogenic foods. In light
of the positive cardiometabolic impacts of fruit and yogurt and their association with healthy dietary patterns, there is sufficient evidence to warrant further exploration into the potential synergistic health benefits of a combined intake of fruit and yogurt [Fernandez, M.A. and Marette, A* (Quebec Heart and Lung Institute, Quebec, Canada) *Advances in Nutrition*, 2017, 8(1), 155S-164S].

**NPARR, 8(2), 2017-294** *Finger millet* [*Eleusine coracana* (L.) Gaertn.]: A minor crop for sustainable food and nutritional security

Finger millet (*Eleusine coracana* L. Gaertn) is an orphan food grain crop grown in Africa and Asia for subsistence farming. The crop has wide adaptability, resilience to fragile ecosystems and has better tolerance to abiotic stresses in comparison to major cereals. The crop grains have excellent nutritional properties and medicinal importance. Grains are rich source of calcium, dietary fibre and essential amino acids particularly tryptophan and methionine. Polyphenols and tannins in the seed coat of grains although reduce the bioavailability of mineral nutrients but, has added advantage of providing antioxidant activity. Research in recent years has revealed its nutritional value and climate resilience, which has not only brought back the importance of this crop but it is now being designated as miracle grains, wonder grains and future crop [Sood, S*, Kant, L. and Pattanayak, A (ICAR-Vivekananda Institute of Hill Agriculture, Almora, India) *Asian Journal of Chemistry*, 2017, 29(4), 707-710].

**NPARR, 8(2), 2017-295** *Moringa oleifera* seeds and oil: Characteristics and uses for human health

*Moringa oleifera* seeds are a promising resource for food and non-food applications, due to their content of monounsaturated fatty acids with a high monounsaturated/saturated fatty acids (MUFA/SFA) ratio, sterols and tocopherols, as well as proteins rich in sulfated amino acids. The rapid growth of Moringa trees in subtropical and tropical areas, even under conditions of prolonged drought, makes this plant a reliable resource to enhance the nutritional status of local populations and, if rationalized cultivation practices are exploited, their economy, given that a biodiesel fuel could be produced from a source not in competition with human food crops. Despite the relatively diffuse use of Moringa seeds and their oil in traditional medicine, no pharmacological activity study has been conducted on humans. Some encouraging evidence, however, justifies new efforts to obtain clear and definitive information on the benefits to human health arising from seed consumption. A critical review of literature data concerning the composition of Moringa oil has set in motion a plan for future investigations. Such investigations, using the seeds and oil, will focus on cultivation conditions to improve plant production, and will study the health effects on human consumers of Moringa seeds and their oil [Leone, A*, Spada, A., Battezzati, A., Schiraldi, A., Aristil, J. and Bertoli, S (International Center for the Assessment of Nutritional Status (ICANS), University of Milan, Via Sandro Botticelli 21, Milan, Italy) *International Journal of Molecular Sciences*, 2016, 17(12), 2141].

**NPARR, 8(2), 2017-296** Beneficial effects of enrichment of chicken meat with n-3 polyunsaturated fatty acids, vitamin E and selenium on health parameters: A study on male rats

Consumption of chicken meat enriched with bioactive compounds such as n-3 polyunsaturated fatty acids (PUFAn-3), vitamin E (vE) and selenium (Se) can help prevent many diseases and can be used to deliver those substances to humans. This might be of importance as chicken meat consumption is increasing worldwide. The effects of enriching chicken meat with PUFAn-3, vE and Se through dietary interventions were studied in rats. Four groups of Ross 308 female broilers from day 22 to day 35 of age were fed control diet (L) that contained...
lard and 80 mg vE and 0.3 mg Se/kg, or diets that contained rape seeds and fish oil with the same level of Se and vE as in the control diet, the same level of Se as in the control and 150 mg vE/kg, or 150 mg of vE and 0.7 mg Se/kg. Broiler carcasses were boiled, deboned, lyophilized and pooled by group. Boiled edible components of chicken carcass (BECC) were included (240 g/kg) in the diets fed to four groups of ten 10-week-old Wistar male rats for 8 weeks. Inclusion of BECCs modulated dietary fatty acid profile in the rat diets. Feeding these diets did not influence parameters related to growth or relative weights of internal organs in the rats. Feeding BECCs with lower PUFAn-6/n-3 decreased the n-6/n-3 ratio in the rat brain and liver, and increased the proportion of docosahexaenoic acid in the brain lipids. Liver cholesterol level was similar among the experimental groups, whereas the concentration of vE in the liver of rats fed BECC with increased vE levels was higher than that in the rats fed BECC with the basal vE level. Haematological and biochemical parameters in blood were within the normal range for rats, but a few rats showed a tendency towards increased levels because of the higher vE and Se level. The health-promoting effect of feeding rats PUFAn-3 enriched BECC was more pronounced when an increased dietary level of vE was used, but the increased level of Se did not provide the rats with additional benefits. Thus, the findings indicate that BECC enriched with PUFAn-3 and vE by a dietary intervention is a functional food with great potential of implementation [Konieczka, P.*, Rozbicka-Wieczorek, A.J., Czauderna, M. and Smulikowska, S (The Kielanowski Institute of Animal Physiology and Nutrition, Polish Academy of Sciences, Instytutuca 3, 05-110 Jabłonna, Poland) Animal, 2016, 1-9].

NPARR, 8(2), 2017-297 The effect of substituting milk fat by peanut oil on the quality of white soft cheese

Objective: This study was carried out to investigate the effect of using peanut oil extract from peanut seeds (Arachis hypogea L.) variety NC7on the properties of the white soft cheese. Methodology: Quality properties of peanut oil including oxidative stability, characterize and quantitative of tocopherol isomers, antioxidants and the content of free fatty acids was examined before white soft cheese was made by using of fresh skim milk and butter oil 4% (control, C), peanut oil 4% (T1) and addition of two commercial stabilizers to peanut oil cheese, S1 (mono and diglyceride of fatty acids E471 and whey protein powder, 1:1) and S2 (mono and diglyceride of fatty acids E471, guar gum E412, sodium carboxymethyl cellulose E466 and xanthan gum E415, 1:1:1:1). The S1 and S2 stabilizers were added at a ratio of 1% to white soft cheese made by peanut oil as T2 and T3, respectively. Produced cheeses were stored at 5±2°C for three months and examined for chemical analysis, ripening indices, oxidative stability and organoleptic properties. Results: The results showed that using of S1 and S2 as cheese stabilizers decreased the loss of oil in cheese whey comparing with the control treatment as well as the treatment without stabilizer (T1). The fatty acids content of cheeses were varied and the most abundant fatty acids were palmitic acid, stearic acid and myristic acid, which was 35.41, 16.02 and 8.24 %, respectively in control cheese samples (C). These values were higher than the values in treatments T1, T2 and T3, which ranged 10.35-10.56, 4.45-4.98 and 1.16-1.82%, respectively. Conclusion: There were high concentrations of unsaturated fatty acids compared with saturated fatty acids. Oleic acid had a high percentage in cheese containing peanut oil (T1, T2 and T3), which made it more stable for oxidation and recorded high scores for sensory evaluation compared to the control. The use of peanut oil with S1, which containing whey protein powder improved oxidative stability and organoleptic properties of the produced cheese [Khalifa, S.A.*, Omar, A.A. and Mohamed, A.H (Department of Food Science, Faculty of Agriculture, Zagazig University,
The 2015–2020 Dietary Guidelines for Americans advocate for increasing vegetable intake and replacing energy-dense foods with those that are nutrient-dense. Most Americans do not eat enough vegetables, and particularly legumes, each day, despite their well-established benefits for health. Traditional hummus is a nutrient-dense dip or spread made from cooked, mashed chickpeas, blended with tahini, olive oil, lemon juice, and spices. Consumers of chickpeas and/or hummus have been shown to have higher nutrient intakes of dietary fiber, polyunsaturated fatty acids, vitamin A, vitamin E, vitamin C, folate, magnesium, potassium, and iron as compared to non-consumers. Hummus consumers have also been shown to have higher Healthy Eating Index 2005 (HEI-2005) scores. This may be, in part, due to hummus’ higher Naturally Nutrient Rich (NNR) score as compared to other dips and spreads. Emerging research suggests that chickpeas and hummus may play a beneficial role in weight management and glucose and insulin regulation, as well as have a positive impact on some markers of cardiovascular disease (CVD). Raw or cooked chickpeas and hummus also contain dietary bioactives such as phytic acid, sterols, tannins, carotenoids, and other polyphenols such as isoflavones, whose benefits may extend beyond basic nutrition requirements of humans. With chickpeas as its primary ingredient, hummus—and especially when paired with vegetables and/or whole grains—is a nutritious way for Americans to obtain their recommended servings of legumes. This manuscript reviews the nutritional value and health benefits of chickpeas and hummus and explores how these foods may help improve the nutrient profiles of meals [Wallace, T.C*., Murray, R. and Zelman, K.M (Department of Nutrition and Food Studies, George Mason University, Fairfax, VA, United States) Nutrients, 2016, 8(12), 766].