NPARR, 1(2), 2010-0292, Effects of fruit extracts on the formation of acrylamide in model reactions and fried potato crisps

Natural products extracted from plants and fruits have attracted increasing attention for the development of effective inhibitors against the formation of acrylamide during food processing. In this study, six fruit extracts (apple, blueberry, mangosteen, longan, dragon fruit with white flesh, and dragon fruit with red flesh) were compared for their activities against acrylamide formation in chemical models containing equal molar quantities of glucose and asparagine in distilled water (160 °C for 30 min). Apple extract demonstrated potent inhibition on acrylamide formation. Blueberry, mangosteen, and longan extracts did not have significant impact, whereas dragon fruit extracts enhanced acrylamide formation. Column chromatography guided by chemical model analysis showed that the proanthocyanidin-rich subfraction played a key role in mediating the inhibitory activity. The inhibitory activity was finally corroborated in fried potato crisps. The present study identified some natural products that might have important applications in the food industry to inhibit acrylamide formation [Ka-Wing Cheng, Jian-Jun Shi, Shi-YiOu, Mingfu Wang and Yue Jiang* (Kwong Living Trust Food Safety and Analysis Laboratory and Department of Biology, Hong Kong Baptist University, Kowloon Tong, Hong Kong), Journal of Agriculture and Food Chemistry, 2010, 58(1), 49-56].

NPARR, 1(2), 2010-0293, White button mushroom (Agaricus bisporus) lowers blood glucose and cholesterol levels in diabetic and hypercholesterolemic rats

Agaricus bisporus (white button mushroom; WBM) contains high levels of dietary fibres and antioxidants including vitamin C, D and B₁₂; folates and polyphenols that may provide beneficial effects on cardiovascular and diabetic diseases. The hypothesis that intake of the fruiting bodies of WBM regulates anticholesterolemic and antiglycemic responses in rats fed a hypercholesterolemic diet (0.5% cholesterol; 14% fat) and rats with type 2 diabetes induced by injection of streptozotocin (STZ) (50 mg/kg body weight), respectively was examined. The STZ-induced diabetic male Sprague-Dawley rats fed the Agaricus bisporus powder (ABP; 200mg/kg of body weight) for 3 weeks had significantly reduced plasma glucose and triglyceride (TG) concentrations (24.7% and 39.1%, respectively), liver enzyme activities, alanine aminotransferase and aspartate aminotransferase (11.7 and 15.7%, respectively), and liver weight gain (P<.05). In hypercholesterolemic rats, oral feeding of ABP for 4 weeks resulted in a significant decrease in plasma total cholesterol (TC) and low-density lipoprotein (LDL) (22.8 and 33.1%, respectively) (P< .05). A similar significant decrease in hepatic cholesterol and TG concentrations was observed (36.2 and 20.8%, respectively) (P<.05). Decrease in TC, LDL, and TG concentrations was accompanied by a significant increase in plasma high-density lipoprotein concentrations. It was concluded that A bisporus mushroom had both hypoglycemic and hypolipidemic activity in rats [Sang Chul Jeong, Yong Tae Jeong, Byung Keun Yang, Rezuanul Islam, Sundar Rao Koyyalamudi, Gerald Pang*, Kai Yip Cho and Chi Hyun Song (Center for Plant and Food Science, College of Health and Science, University of Western Sydney, Penrith South DC, NSW 1797, Australia), Nutrition Research, 2010, 30(1), 49-56].

NPARR, 1(2), 2010-0294, Tomato powder is more protective than lycopene supplement against lipid peroxidation in rats

The hypothesis that tomato powder (TP) is more protective than lycopene-beadlet (LB) treatment in rats fed with or without H₂O₂ was tested by comparing their beneficial effects on serum and hepatic lipids, peroxidation product (malondialdehyde [MDA]) and serum lipoproteins. In groups receiving no H₂O₂, TP and LB similarly lowered MDA, a major lipid peroxidation product, moderately in the serum but
markedly in the liver, more than their respective controls. Hydrogen peroxide consumption elevated liver and serum MDA levels similarly among all treatments, but induced no increase in serum MDA for the TP group, which indicated a stronger protection against lipid peroxidation by TP than by LB treatment. Although the TP and LB diets provided equal amounts of lycopene, serum and liver lycopene levels for treatments with or without $H_2O_2$, they were markedly elevated in TP but still higher in LB group than controls. This indicated a greater lycopene bioavailability in LB than TP. Importantly, TP and LB treatments with or without $H_2O_2$ consumption lowered serum total cholesterol and triglycerides by one fifth, as well as decreased serum low-density lipoprotein cholesterol by more than one third of their respective levels in controls. Similarly, liver total cholesterol was markedly lowered (>1/3) by TP or LB treatment, but liver triglycerides were lowered to one fourth by only TP treatment, of the levels in their respective controls. Thus, TP appeared to be more protective because of its additional ability to prevent the $H_2O_2$-induced rise in serum MDA and seemed to lower liver triglycerides more than LB treatment [Ali A. Alshatwi, Manal A. Al Obaaid, Sahar A. Al Sedairy, Abdullah H. Al-Assaf, Jun Jun Zhang and Kai Y. Lei* (Department of Nutrition and Food Science, University of Maryland, College Park, MD 20742, USA), Nutrition Research, 2010, 30(1), 66-73].

**NPARR, 1(2), 2010-0295, Steeping preservation of baby corn**

Baby sweet corn (Zea mays var. rugosa Bonaf.) is used in Asian cuisine and considered a specialty item outside of Asia. Dehusked baby corn, harvested at 2 and 4 days after silk emergence, was preserved in a steeping solution and packed in glass jars. The steeping solution used concentrations of acetic acid from 0.5 to 2.0% and sodium chloride from 2 to 8%. Baby corn ears were either not blanched or blanched for 2, 4, or 8 min. Blanched and unblanched samples were stored at room temperature and under refrigeration. Steeped baby corn was analyzed for total soluble solids (TSS), acidity, salt, texture, colour, ash, total solids, sugars, and starch. Baby corn harvested within 2 days of silk emergence was found to be optimum for steeping preservation. Baby corn blanched for 4 min had better colour retention and less salt and acid penetration than unblanched corn. The equilibrium concentration, as measured by TSS of the steeping solution, varied between 7.0 and 7.2 °Brix. Acetic acid was more effective in controlling microbes than was sodium chloride. The concentrations of TSS, acidity, total solids, salt, and ash content of ears were affected by concentration of acid and salt in the steeping solution. Even though baby corn can be preserved with 2% salt and 1% acid, the colour and taste were detrimentally affected. The combination of 6% salt and 0.75% acid was found to be best for steeping preservation of baby corn as indicated by organoleptic factors [Poonam Aggarwal and Ravneet Kaur* (Department of Food Science and Technology, Punjab Agricultural University, Ludhiana, India), International Journal of Vegetable Science, 2010, 16(2) 103-117].

**NPARR, 1(2), 2010-0296, Quantitative and qualitative aspects of elephant foot yam**

There is little information on quantitative and qualitative aspects of elephant foot yam [Amorphophallus paeoniifolius (Dennst) Nicholson] specifically concerning nutritional status. Various traits of 12 cultivars of this crop were evaluated. Variability was observed for growth and yield components. Some traits were correlated. Potassium was the most abundant (327.83 mg/100 g) macromineral followed by phosphorus (166.91 mg/100 g), calcium (161.08 mg/100 g) and iron (3.43 mg/100 g). The mean soluble oxalate content (13.53 mg/100 g) was safe from the viewpoint of accumulation of urinary oxalate leading to kidney stones. The cvs. Singur and NDA-9 appear to be the most promising ones from which improved lines could be obtained. This information will provide breeders with the ability to develop desirable types having high yield and better nutritional profile [Arup Chattopadhyay*, B. Saha, S. Pal, A. Bhattacharya, H. Sen (AICRP on Vegetable Crops, Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia, West Bengal, India), International Journal of Vegetable Science, 2010, 16(1), 73-84].

**NPARR, 1(2), 2010-0297, Postharvest application of ethylene and 1-methylcyclopropene either**
before or after curing affects of onion (Allium cepa Linn.) bulb quality during long term cold storage

The storability of onion bulbs is dependent on the incidence and rate of sprout growth. Exogenous ethylene applied continuously has been demonstrated to act as a sprout suppressant in onion. However, the ethylene binding inhibitor, 1-methylcyclopropene (1-MCP), can also suppress sprouting in onion. Given this seemingly contradictory result, the precise role that ethylene plays during onion storage and the effect of curing on its efficacy is not understood. Therefore, ‘Sherpa’ and ‘Wellington’ onion bulbs were treated before or after curing (28°C for 6 weeks) with a single dose of 10μL L⁻¹ ethylene or 1μL L⁻¹ 1-MCP for 24h at 20°C, or no treatment (control). Replicated out-turns were sampled during 38 weeks storage at 0-1°C. Sprout growth (31 weeks after harvest) was reduced in ‘Sherpa’ treated before curing with ethylene or before or after curing with 1-MCP. However, sprout growth of ‘Wellington’ was not affected by any treatment. Following treatment, the cured, thick-skinned ‘Wellington’ released a lower concentration of treatment gas compared with the newly harvested, thin-skinned ‘Sherpa’. Onion bulb respiration rate increased immediately after being treated with ethylene but to a lesser extent or not at all when treated with 1-MCP. Fructose concentrations of onions treated with ethylene or 1-MCP before curing were not significantly different, however, after curing concentrations were about 2-fold higher compared with the control. Mean glucose and sucrose concentrations for both cultivars were higher immediately after being treated with ethylene but to a lesser extent or not at all when treated with 1-MCP. Ozone could be seen as an alternative to refrigeration in order to enhance tomato shelf life in areas where cold facilities are not available. However, the effect of ozone on fruit ripening and quality is still unclear. From the other side, it is well known that tomato ripening can be correlated to the development of red colour. Therefore, experiments were carried out to develop a redness index to characterize the dynamics of ripening which was further used to characterize the effect of ozone on storage and ripening. Several gaseous ozone treatments were applied. Colour changes from green to red were monitored. Ozone treatment delayed both the development of red colour as well as of rotting. Colour development and rotting followed a trend like that described by Hill’s equation. Shelf life was enhanced by 12 days when treated tomatoes were stored at 15 °C. The longer shelf life was mainly due to a reduction in surface microbial count. Analysis through mathematical modeling allowed establishing the dynamics of shelf life as a function of red color development [Suhas S. Zambre, K.V. Venkatesh and N.G. Shah* (Centre for Technology Alternative for Rural Areas, Indian Institute of Technology Bombay, Mumbai 400 078, India), Journal of Food Engineering, 2010, 96(3), 463-468].

NPARR, 1(2), 2010-0299, Effects of conventional and multistage drying processing on non-enzymatic browning in tomato

The effect of different drying temperatures on the development of non-enzymatic browning in tomato was studied. In particular, the influence of product moisture and temperature on the colour change during drying at various temperatures in the range of 50-90° N was investigated. The extent of browning was evaluated spectrophotometrically as tomato extracts absorbance at 420nm. As a result of analysis of experimental data, a multistage drying process of tomato was developed. In this method, drying was realized at decreasing air temperature, arranged such, that the temperature inside the fruit did not exceed acceptable level of 55°N. Higher product quality and shorter drying time in comparison with the conventional drying at constant air conditions were observed [Serghei Cerniºev (Department of Technological Processes, Institute of Research and
The oils, micronutrients and heavy metal contents of tomato seeds and tomato (*Lycopersicon esculentum* Mill.) fruits from different Turkish resources were determined. The tomato seed oil contains more than 84% unsaturated fatty acids, such as oleic acid, linoleic acid and linolenic acid. The fatty acid composition of tomato seed oil was similar to that of soybean oil. Under supercritical conditions, partial thermal degradation occurs on the double bonds of unsaturated aliphatic carbons chains in fatty acids. Linoleic acid was the major unsaturated fatty acid in tomato seed oil. The concentrations of metals (Pb, Cd, Fe, Cu, Zn, Na, K, Ca and Mg) were determined in tomato samples [Ayhan Demirbas (Sila Science, Universite Mah., Mekan Sok., No: 24, 61040 Trabzon, Turkey), *Food Chemistry*, 2010, 118(3), 504-507].

**In vitro evaluation of red and green lettuce (Lactuca sativa Linn.) for functional food properties**

Lettuce (*Lactuca sativa* Linn.) is an important leafy vegetable consumed fresh or in salad mixes. The functional food properties of selected commercial red and green lettuce varieties grown under field conditions were compared. Both lettuce cultivars were extracted with water at biological (38 °C) and room temperatures (22 °C) at pH 2. The residues from each extraction were further extracted, sequentially with methanol and ethyl acetate. The extracts were evaluated for their *in vitro* lipid peroxidation (LPO) and cyclooxygenase enzyme (COX) inhibitory activities. Amongst the extracts tested, all three extracts of red lettuce showed higher LPO and COX-1 and -2 enzyme inhibitory activities than did the green lettuce extracts. Red lettuce contained a single anthocyanin, cyanidin-3-O-β-glucopyranoside (1), which immediately converted to cyanidin-3-O-(6′-malonyl-β-glucopyranoside methyl ester) (2) and cyanidin-3-O-β-glucopyranoside (3) under laboratory conditions. Anthocyanins 1 and 2 inhibited LPO by 88 and 91.5%, respectively, at 0.25μM concentration. Also, they inhibited COX-2 enzyme by 78.9% and 84.3% and COX-1 by 64% and 65.8%, respectively, at 5μM. The chicoric acid (4), amongst other phenolics, such as quercetin glucoside, ferulic and caffeic acids, isolated from both green and red lettuce, showed 85.6, 45.6 and 94% of LPO, COX-1 and -2 enzyme inhibitions at 50μM, respectively. This is the first report of the LPO, COX-1 and -2 enzyme inhibitory activities of compounds 1, 2 and 4. The variation of phenolics in the red and green lettuces and specifically the lack of anthocyanins in green lettuce, might account for the higher biological activity obtained with the red variety [Vanisree Mulabagal, Mathieu Ngouajio, Ajay Nair, Yanjun Zhang, Aditya L. Gottumukkala and Muraleedharan G. Nair* (Bioactive Natural Products and Phytoceuticals, Department of Horticulture, 173 National Food Safety and Toxicology Center, Michigan State University, East Lansing, MI 48824, USA), *Food Chemistry*, 2010, 118(2), 300-306].

**Investigation of off-odour and off-flavour development in boiled potatoes**

The development of a sensory evaluation system, using a quantitative descriptive analysis (QDA) scheme, to define the sensory attributes of boiled potato slices was investigated. A HS-SPME–GC–MS technique for a rapid determination of volatile components in boiled potatoes was also investigated. In addition to the mechanism of generation of off-odours and off-flavours in boiled potatoes (POF), the effects of the use of food additives after cooking were examined. POF formation, analysed by both sensory evaluation and HS-SPME, demonstrated an oscillating mechanism of formation of volatile compounds, probably related to enzymatic lipid oxidation and hydroperoxide generation. In particular, POF were strongly correlated with the presence of 2-pentenal, 2-hexenal, 2-heptenal, 2-pentylfuran and 2-decenal. In all, about 50 compounds were detected by HS-SPME technique. Treatment with ascorbate or citrate, after cooking and before storage, did not prevent the formation of off-flavours, in contrast to sodium pyrophosphate. Potassium meta-bisulphite prevented
POF formation, but caused the creation of other off-flavours detected by a trained panel [Giampaolo Blanda*, Lorenzo Cerretani, Patrizia Comandini, Tullia Gallina Toschi and Giovanni Lercker (Dipartimento di Scienze degli Alimenti, Università di Bologna, Piazza Goidanich, 60, 47023 Cesena (FC), Italy), *Food Chemistry, 2010, 118(20), 283-290].

NPARR, 1(2), 2010-0303, Tuberculosis yield and quality characteristics of potatoes for off-season crops in a Mediterranean environment

There is little research on evaluating the compatibility of potatoes for double cropping in southern Italy. The aim of this investigation was to assess tuber yield and some qualitative traits of tubers such as skin colour, tuber dry matter content and tuber nitrate content, both in winter-spring and in summer-autumn crops, as influenced by genotype and harvest time. Yield, skin colour and dry matter content of tubers were higher in the winter-spring crop than in the summer-autumn crop, attributable to the advantageous lag time in spring between solar radiation and temperatures and the disadvantageous lag in autumn. ‘Spunta’ and ‘Arinda’ performed well within each crop season, whereas ‘Ninfa’ showed an important yield loss in autumn. In both off-season crops, delaying tuber harvest until leaf senescence increased yield and improved quality attributes such as tuber dry matter content and skin colour, whereas nitrate contents significantly decreased in the winter-spring crop and increased in the summer-autumn crop. ‘Ninfa’ showed less tendency than ‘Arinda’ and ‘Spunta’ to accumulate nitrate in tubers in both off-season crops. It might be advantageous to examine in further research which mechanisms sustain compatibility to the autumn and assess other quality characteristics for the fresh market in the contrasting climatic conditions of the two off-season crops [Anita Ierna* (Istituto per I Sistemi Agricoli e Forestali del Mediterraneo (CNR), Sect. Catania, Str.le V. Lancia, Blocco Palma, I-95121 Catania, Italy), *Journal of the Science of Food and Agriculture, 2010, 90(1), 85-90].

NPARR, 1(2), 2010-0304, Saline drip irrigation and polyethylene mulch on yield and water use efficiency of bell peppers

Saline water has been successfully applied to crops via drip irrigation. However, application of saline water through this irrigation system in combination with polyethylene mulch has not been evaluated yet. Two experiments were carried out under greenhouse conditions to evaluate effects of saline irrigation (ranging from 0.2 up to 9.0 dS·m⁻¹ and from 0.5 to 4.5 dS·m⁻¹, respectively) and polyethylene mulch on the yield and water use efficiency (WUE) of sweet peppers (*Capsicum annuum* Linn.). Soil temperature was higher under an infrared-transmitting polyethylene mulch than under a black mulch or bare soil. Mulched plants required less water at all salinity levels than plants grown in bare soil. Salinity levels above the control (0.2 and 0.5 dS·m⁻¹) significantly reduced total and marketable yield and WUE. Mulched plants had greater WUE and significantly higher marketable yields than those grown in bare soil. Fruit size and pericarp thickness were significantly reduced with increasing salinity; total soluble solids (TSS) increased. Soil salinity was reduced with the use of plastic mulches relative to bare soil [Dagobiet Morales-Garcia*, Katrine A. Stewart, Philippe Seguin and Chandra Madramootoo (Department of Plant Science, Macdonald Campus of McGill University, Sainte-Anne-de-Bellevue, Quebec, Canada), *International Journal of Vegetable Science, 2010, 16(1), 3-14].

WOOD

NPARR, 1(2), 2010-0305, Effect of drying and rewetting cycles on the structure and physicochemical characteristics of softwood fibres for reinforcement of cementitious composites

The changes produced in cellulosic fibres when they are subjected to successive drying and rewetting cycles could have an important impact on the resistance and durability of cement mortar composites based on these fibres. In this paper, unbleached, oxygen delignificated, semi-bleached, and fully bleached softwood pulps have been subjected to drying and rewetting cycles and the corresponding dried pulps characterized. The morphological structures and thermal stabilities were investigated with X-ray diffraction and thermogravimetric analysis. While the water retention values decrease significantly with drying and rewetting