GUM/RUBBER (incl. Latex, Resin, Pectin, Tannin, Mucilage, Starch, Cellulose, etc.)

NPARR 2(2), 2011-195, Selection of cultivars for minimization of waste and of water consumption in cassava starch production

When considering the sustainability of a business, deciding on the industrial use of starchy raw materials requires more than just the information on their agricultural productivity and starch yield. The main goal of this work was to investigate ten different cultivars to select for industrial applications seeking to minimize residue generation and water consumption in the production of cassava starch. The cassava cultivars that are richer in starch (22.61–22.89 g 100 g$^{-1}$) generated the smallest amounts of residues (420.63–423.52 kg ton$^{-1}$ of cassava roots) and required the smallest amounts of water for processing. There is an inverse relationship between the dry matter content in cassava roots and the amount of solid residues generated. One of the cultivars stood out for showing the following features: high starch yield, little tendency for generation of residues, low requirement of water for processing, easiness in the peeling process, and high content of total solids; therefore such features can suggest its use for starch extraction with wastes minimization [Helayne Aparecida Maieves, Daiana Cardoso De Oliveira, Júlia Rodrigues Frescura and Edna Regina Amante* (Food Science and Technology Department, Federal University of Santa Catarina, Rod. Admar Gonzaga, 1346, Florianópolis, Santa Catarina, CEP 88034001, Brazil), Industrial Crops and Products, 2011, 33, (1), 224-228].

NPARR 2(2), 2011-196, Gorse (Ulex europaeus) as a possible source of xylans by hydrothermal treatment

Autocatalytic hydrothermal process conditions were used to study Ulex europaeus (Gorse) as a source of xylan compounds. The aim was to study the possibilities for using this unutilised biomass material to produce xylans. Ulex is an evergreen shrub that grows in the northwest of Spain and has no economic value. Therefore, Ulex is considered a promising candidate as a biomass source. Ulex showed a total xylose content of 12%, thus qualifying it as a suitable material to extract xylan-derived compounds. Autohydrolysis was applied to extract xylans from Ulex. To find the best conditions for xylan extraction, samples of Ulex were subjected to different temperatures and time conditions. Results indicate that autohydrolysis is a suitable method to selectively extract xylans at temperatures between 160 and 190 °C for 5–30 min, reaching a maximum xylan recovery of almost 63% of the initial xylan at 180 °C for 30 min, with only small effects on cellulose and lignin contents [Pablo Ligero, Alberto de Vega*, Johannes C. van der Kolk and Jan E.G. van Dam (Department of Physical Chemistry and Chemical Engineering, Faculty of Sciences, University of A Coruña, Alejandro de la Sota, 1, 15004 A Coruña, Spain), Industrial Crops and Products, 2011, 33 (1), 205-210].

NPARR 2(2), 2011-197, Rheological interactions between Lallemantia royleana seed extract and selected food hydrocolloids

Lallemantia royleana (Balangu) is a mucilaginous endemic plant which is grown in different regions of world. The flow behaviour of Balangu seed extract (BSE) and its mixture with xanthan, guar and locust bean gums at 1:3, 1:1 and 3:1 ratios, in addition to control samples (0% BSE), were evaluated. To describe the rheological properties of samples, the power law model was fitted on apparent viscosity–shear rate data. To evaluate the interaction between BSE and selected hydrocolloids in dilute solutions, the relative viscosity was also investigated.

There was no significant difference between the consistency coefficient of guar and locust bean solutions and their blends substituted with 250 g kg$^{-1}$ BSE. The BSE–xanthan mixture at 1:3 and 1:1 ratios had consistency index equal to xanthan solution. BSE–locust bean gum at all ratios, BSE–xanthan at 1:3 ratio and BSE–guar gum at 1:1 and 3:1 ratios indicated relative viscosity lower than values calculated assuming no interaction. The intrinsic viscosity value of BSE was determined 3.50 dL g$^{-1}$.

The apparent viscosities of BSE, selected hydrocolloids and their blends were the same at a shear rate of 293 s$^{-1}$ and the commercial gums can be
substituted by 250 g kg\(^{-1}\) and 500 g kg\(^{-1}\) BSE [T Mohammadi Moghaddam, Seyed M A Razavi *and B Emadzadeh (Department of Food Science and Technology, Ferdowsi University of Mashhad (FUM), P.O. Box 91775-1163, Mashhad, Iran), \textit{Journal of the Science of Food and Agriculture}, 2011, 91(6), 1083-1088].

\textit{NPARR} 2(2), 2011-198, \textbf{Production of Okara and Soy Protein Concentrates Using Membrane Technology}

Microfiltration (MF) membranes with pore sizes of 200 and 450 nm and ultrafiltration (UF) membranes with molecular weight cut off of 50, 100, and 500 kDa were assessed for their ability to eliminate nonprotein substances from okara protein extract in a laboratory cross-flow membrane system. Both MF and UF improved the protein content of okara extract to a similar extent from approximately 68% to approximately 81% owing to the presence of protein in the feed leading to the formation of dynamic layer controlling the performance rather than the actual pore size of membranes. Although normalized flux in MF-450 (117 LMH/MPa) was close to UF-500 (118 LMH/MPa), the latter was selected based on higher average flux (47 LMH) offering the advantage of reduced processing time. Membrane processing of soy extract improved the protein content from 62% to 85% much closer to the target value. However, the final protein content in okara (approximately 80%) did not reach the target value (90%) owing to the greater presence of soluble fibers that were retained by the membrane. Solubility curve of membrane okara protein concentrate (MOPC) showed lower solubility than soy protein concentrate and a commercial isolate in the entire pH range. However, water absorption and fat-binding capacities of MOPC were either superior or comparable while emulsifying properties were in accordance with its solubility. The results of this study showed that okara protein concentrate (80%) could be produced using membrane technology without loss of any true proteins, thus offering value addition to okara, hitherto underutilized.

Okara, a byproduct obtained during processing soybean for soymilk, is either underutilized or unutilized in spite of the fact that its protein quality is as good as that of soy milk and tofu. Membrane-processed protein products have been shown to possess superior functional properties compared to conventionally produced protein products. However, the potential of membrane technology has not been exploited for the recovery of okara protein. Our study showed that protein content of okara extract could be improved from approximately 68% to approximately 81% without losing any true proteins in the process [K.H. Vishwanathan, K. Govindaraju, Vasudeva Singh, and R. Subramanian* (Dept. of Food Engineering, Central Food Technological Research Inst., Council of Scientific and Industrial Research, Mysore 570 020, India), \textit{Journal of Food Science}, 2011, 76(1), E158-E164].

\textit{NPARR} 2(2), 2011-0199, \textbf{Selection of cultivars for minimization of waste and of water consumption in cassava starch production}

When considering the sustainability of a business, deciding on the industrial use of starchy raw materials requires more than just the information on their agricultural productivity and starch yield. The main goal of this work was to investigate ten different cultivars to select for industrial applications seeking to minimize residue generation and water consumption in the production of cassava starch. The cassava cultivars that are richer in starch (22.61-22.89 g100g\(^{-1}\)) generated the smallest amounts of residues (420.63–423.52 kg ton\(^{-1}\) of cassava roots) and required the smallest amounts of water for processing. There is an inverse relationship between the dry matter content in cassava roots and the amount of solid residues generated. One of the cultivars stood out for showing the following features: high starch yield, little tendency for generation of residues, low requirement of water for processing, easiness in the peeling process, and high content of total solids; therefore such features can suggest its use for starch extraction with wastes minimization [Helayne Aparecida Maives, Daiana Cardoso De Oliveira, Júlia Rodrigues Frescura and Edna Regina Amante* (Food Science and Technology Department, Federal University of Santa Catarina, Rod. Admar Gonzaga, 1346, Florianópolis, Santa Catarina, CEP 88034001, Brazil), \textit{Industrial Crops and Products}, 2011, 33(1), 224-228].

\textit{NPARR} 2(2), 2011-200, \textbf{Improving the barrier and...}
mechanical properties of corn starch-based edible films: Effect of citric acid and carboxymethyl cellulose

The films produced from pure starch are brittle and difficult to handle. Chemical modifications (e.g. cross-linking) and using a second biopolymer in the starch based composite have been studied as strategies to produce low water sensitive and relatively high strength starch based materials. A series of corn starch films with varying concentrations (0-20%, W/W) of citric acid (CA) and carboxymethyl cellulose (CMC) were produced by casting method. The effects of CA and CMC on the water vapor permeability (WVP), moisture absorption, solubility and tensile properties were investigated. The water vapor barrier property and the ultimate tensile strength (UTS) were improved significantly (p<0.05) as the CA percentage increased from 0 to 10% (W/W). At the level of 15% (W/W) CMC, the starch films showed the lowest WVP values (2.34×10\(^{-7}\) gPa\(^{-1}\) h\(^{-1}\) m\(^{-1}\)) and UTS increased from 6.57 MPa for the film without CMC to 16.11 MPa for that containing 20% CMC [Babak Ghanbarzadeh*, Hadi Almasi and Ali A. Entezami (Department of Food Science and Technology, Faculty of Agriculture, University of Tabriz, P.O. Box 51666-16471, Tabriz, Iran), Industrial Crops and Products, 2011, 33(1), 229].

NPARR 2(2), 2011-201, Extraction of condensed tannins from grape pomace for use as wood adhesives

The extraction of condensed tannins from grape pomace was examined using a mixture water–sodium hydroxide at 120 °C. The extracts were characterized by solution \(^{13}\)C NMR and have showed characteristic consistent with that of condensed tannins with dominant procyanidin units. The tannin fractions reactivity toward formaldehyde was studied by gel time analysis and thermomechanical analysis in bending. It has been demonstrated that the extracts obtained by using 10% of NaOH (w/w) displayed promising properties for adhesive applications [Lan Ping, Nicolas Brosse* Lauren tChrusciel, Paola Navarrete and Antonio Pizzi (Laboratoire d’Etude et de Recherche sur le MAteriau Bois, Faculté des Sciences et Techniques, Nancy-Université, Bld des Aiguillettes, F-54500 Vandoeuvre-lès-Nancy, France), Industrial Crops and Products, 2011, 33(1), 253-257].