mesh = 0.180 mm), packed and stored (4°C). The cotyledons were cooked in acidified distilled water (pH 3.0) at 90°C for 30 min, cooled (25°C/4 h), inoculated with a suspension of *R. oligosporus* NRRL2710 (1 x 10^6 spores/ml), and packed in perforated polyethylene bags (15 x 15 cm). SSF was performed at 35°C and fermentation times of 24, 36, 48, 60, 72, 84, 96 and 108 h (after 108 h of fermentation the tempeh showed off odor). The resulting chickpea tempehs were dried (50°C/12 h), cooled (25°C) and milled (80-US mesh = 0.180 mm). Fermented (tempeh) chickpea flours from each fermentation time were blended with its corresponding milled seed coats and kept at 4°C. The fermentation time increased ($p < 0.05$) the antioxidant activities (ORAC value) and total phenolic contents (TPC) of chickpea grains. At 24 and 106 h of fermentation time the ORAC values of fermented chickpea flours were 6,002 and 14,633 µmol trolox equivalents/100 g sample (dw), respectively. At these fermentation times the TPC of fermented chickpea flours varied from 260 to 836 mg gallic acid equivalents/100 g sample (dw). The best combination of SSF variables process to obtain chickpea tempeh flour with the highest antioxidant activity was 35°C/108 h. These results suggest a great potential for utilization of fermented chickpea flour with added seed coats in food products for human health promotion and disease prevention.

Effect of barley bagasse, feed moisture, and barrel temperature on the extrusion of corn grits

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Cereal Foods World 57:A69

Barley bagasse from beer industry also known as brewer's spent grain is commonly used in animal feed, but its use as an ingredient for food preparation would be an interesting alternative in formulations of rich fiber products, which are in high demand worldwide. Mixtures of corn grits and fine milled barley bagasse (15-30%) were processed in a single screw extruder at varied moisture content (18-22%) and final heating zone temperature (120-160°C). The sectional expansion index (SEI) and the bulk density (BD) of the cylindrical extrudates were measured. The paste viscosity and the water absorption (WAI) and solubility indexes (WSI) of the milled and sieved extrudates were analyzed. The SEI values decreased and the BD values increased with the increase of barley bagasse content and final barrel temperature ($P < 0.05$). The WAI values increased with moisture content ($P < 0.05$). The cold paste viscosity reduced with the increase of moisture and barley content ($P < 0.05$). The effect of temperature was not significant for the response analyzed variables. Although the addition of barley bagasse presented a negative effect on the expansion of the extrudates, by reducing internal air cells and diameter, the blended flours of high barley content showed binding properties capacity, which can be useful for preparing high fiber bakery products.

Novel wheat bran and extracts with enhanced nutrient and bioactive properties

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Cereal Foods World 57:A69

The health benefits attributable to whole wheat derive mainly from the bran fraction, which provides a significant source of dietary fiber along with a substantial complement of bioactive phytochemicals including those thought to have a role in reducing the risk of many chronic diseases. The low solubility/digestibility of wheat bran fiber presumably limits its efficacy as a functional food ingredient, which depends upon the bioavailability of constituent bioactive molecules. Presumably, if the solubility of wheat bran could be increased by pretreatment, its potency as a functional food would also increase. We studied the potential of autoclaving, along with other hydrothermal treatments, to enhance the extractability (in water) of selected bioactives including phenolic antioxidants, fiber and micronutrients. Radical scavenging based antioxidant activity of soluble extracts of autoclaved bran (AB) was increased 3 to 4 fold compared to corresponding extracts of untreated bran. Folate and niacin contents in AB extracts were significantly increased by 22% and 78%, respectively. Soluble fiber including resistant oligosaccharides in dried extracts of AB was increased by ~300% from a level of 12% in untreated bran extracts. Cell and animal model experiments have produced equally compelling results reflecting a range of important bioactivities for both AB and extracts. Results of an animal trial using diet-induced hypercholesterolemic hamsters indicated that AB supplemented diets reduced plasma glucose and adiposity, and increased energy expenditure compared to a control diet without wheat bran. Results as a whole suggest that the health benefits ascribed to wheat bran likely represent a fraction of its potential. Autoclaved bran appears to have considerable value for whole grain food and health applications far beyond what may be possible with traditional wheat bran.

Characterization of native and modified sweet potato starch for its physicochemical, thermal, and pasting properties

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Cereal Foods World 57:A69

Sweet potato starches were characterized to understand the changes upon modification by heat moisture treatment (HMT) with 28% moisture content at 110°C for different duration of 4, 8, 12 and 16 hrs in the physico-chemical, rheological (RVA), and thermal (DSC) properties of starch isolated from the sweet potato variety PSP-21 and to compare these findings with those of native sweet potato starch. The swelling power and solubility of modified starch decreased from 11.76 to 9.63% and 14 to 11%. The sediment volume decreased with longer duration of treatment in modified starches (11 to 6 ml) as compared to native starch (31 ml). The modified starches showed higher paste clarity as compared to the native one. Water binding capacity increased in modified samples (71 to 76%) as compared to the native one (63%) which may be attributed to the fact that the hydrophilic tendency of starch increases after heat moisture treatment. The amylose content decreased in modified samples with longer duration. The native sweet potato starch had a pasting profile characterized by a high peak viscosity (PV) (5484 cP) with a high breakdown (3511 cP). After HMT, there was a marked decrease in the PV values as compared to native starch and gradually decreased with longer treatment. The hot paste viscosity increased after modification but decreased with time. The cold paste viscosity increased after modification but decreased further with time of modification. The DSC characteristics were also affected significantly after modification. The gelatinization enthalpy decreased during HMT from 80.32 to 34.15 J/g but increased upon longer treatment. Further, the modified starches are characterized by the scanning electron microscopy to get an insight into the starch structure during the modification process. The modified starches can be used for specific products and different applications as per need.

Use of a new multitoxin clean-up column and fully stable ^{13}C-labelled internal standards for multitoxin mycotoxin analysis by LC-MS/MS

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Cereal Foods World 57:A69

The popularity of LC-MS/MS methodologies for analysis of mycotoxins is increasing. However, interferences from matrix components in these methods can lead to differences and difficulty in analyte ionization. Ionization efficiencies can vary between matrix samples and pure standard calibrants, causing the mass spectrum to show different signal intensities. Because of this, the sample analyte peak cannot be compared to the calibration curve (made from pure standard calibrants) for concentration values. ^{13}C isotope-labeled internal standards were used to help overcome this ionization effect by stabilizing the system to the effects of signal suppression and signal enhancement. Furthermore clean-up of the matrix was necessary to analyze complex sample matrices for a wide variety of mycotoxins, while reaching the low limits of detection necessary in the globalization of trade. A method utilizing this technology was developed for the simultaneous detection of 15 mycotoxins in cereal grains, mixed feeds, and corn by products. The mycotoxins included Aflatoxins (B1, B2, G1, and G2), Ochratoxin A, Zearalenone, Type A Trichothecenes, and Type B Trichothecenes. LODs ranged from 0.02 µg/kg to 0.16 µg/g for the aflatoxins and Ochratoxin A. LODs ranged from 0.28 µg/kg to 68.65 µg/kg for the various Type A Trichothecenes, Type B Trichothecenes, and Zearalenone. The %RSD of multiple repetitions of spiked samples was less than 15% overall, with most data showing %RSD less than 10%. Recoveries of the mycotoxins from spiked matrices varied by mycotoxins; however, all recoveries were greater than 70% for all included mycotoxins. The use of ^{13}C isotope-labeled internal standards in conjunction with the MycoSpin™ 400 Multitoxin Clean-Up Column allows for a method which is applicable to analysis of a wide variety of matrices, with no limitations by molecular mass, and a straightforward sample preparation.

Effect of damage caused by *Fusarium avenaceum* on durum wheat quality

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Cereal Foods World 57:A69

Depending on the year and region, *Fusarium avenaceum* can be the primary fungus associated with Fusarium head blight in major durum wheat growing