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The functional compounds of sorghum distillery residue and their enhancing temperature adaptation effects on fishes

Sorghum distillery residue (SDR) has been an underutilized co-product produced at 250 tons per day in Kinmen Kaoliang Liquor Co. Its crude protein and carbohydrate contents are 20.84% and 64.46% respectively. SDR is rich in nutrients and bioactive substances, which could be a plant-protein source to substitute for fishmeal. SDR was fermented with *Coriolus versicolor* LH1 to hydrolyze the crude fiber to improve the digestibility to produce f-SDR. Tilapia was used to assess the bioactivity of SDR and f-SDR. Their bioactive compounds were identified. Phenolic acids include gallic acid, 3,4-dihydroxy benzoic acid, *p*-hydroxybenzoic acid; isoflavones including daidzin; phytosterols including β -sitosterol; policosanols including hexacosanol, octacosanol and triacontanol, were identified. The functional components contributing to the anti-cold and anti-heat stress effects including phytosterols, policosanols and phenolic acids were higher in f-SDR than SDR. Phytosterols increased by 54% including ergosterol, stigmasterol and β -sitosterol; policosanols increased by 67% including hexacosanol and octacosanol; phenolic acids increased by 46% including gallic acid, *p*-coumaric acid, *p*-hydroxybenzoic acid and ferulic acid. The content of tannin was reduced by 36.42%, triterpenoids increased by 54.5%, the β -D-glucans content was significantly increased from 5.68 ± 0.07 mg/g to 8.60 ± 0.68 mg/g. The (1,3)- β -D-glucans was the main polysaccharide type of which molecular weight ranged 0.18-5.9 kDa, and a small amount of molecules ranged 200-2000 kDa. Sweet-taste amino acids (taurine, glycine, and alanine) and bitter amino acids (isoleucine, arginine) contents increased slightly, umami amino acid (glutamic acid) content increased 2.33 times. White shrimp were attracted to f-SDR feeds likely due to these amino acids. We confirmed that SDR and f-SDR containing, phenolic, policosanols and phytosterols improved energy metabolism and inhibited plasma LDL oxidation, lipoxylase activity and blood rheology of tilapia and white shrimp. They showed potential to develop into feed materials to enhance temperature-adaptation of fishes.

Biography

Prof. Pan is the Chair Professor of the Food Science Department at the national Taiwan Ocean University, Keelung. She is also the President of Taiwan Quality Food (TQF) Association (formerly known as Taiwan Food GMP Association). Prof. Pan has a Ph.D. in Food Science from Rutgers University, USA and MSc in Food Science and Technology from University of Massachusetts, USA. She is a Fellow of the Institute of Food Technologists (IFT) and a Fellow of the International Academy of Food Science and Technology (IAFoST). She was the recipient of Outstanding Research Award, National Science Council (1994) and National Outstanding Women's Award (1982).

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