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Properties of Protein Concentrate and Isolate of Cowpea and Bambara Groundnut

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Abstract

Both researchers and processors should have detailed information on the preparation and processing methods of pulse protein products, as these affect the composition, functional and rheological properties of the component proteins. The aim of this research is to investigate which extraction process; wet milling or alkaline extraction (followed by isoelectric precipitation) will result in a pure protein with significant differences in protein content, yield, functional and rheological attributes for the potential use as food ingredients.

The protein component of six pulse varieties (namely, Dr. Saunders, Bechuana white, Red, and Cream Bambara groundnut, soy commercial, and maize (Gluten-60) were extracted using wet-milling processes (with sodium metabisulphite alone (SM) and sodium metabisulphite and lactic acid (SM + LA) and alkaline extraction-isoelectric precipitation (AE-ISP) with(out) (AE-ISP and NaCl-assisted AE-ISP). Protein content and yield tests were done to determine the effect of the extraction process on protein purity. Additionally, water and oil absorption capacities and emulsification stability analyses were done to investigate the functional properties of the protein concentrates and isolates (of the six pulse varieties).

The protein content from all the six pulse varieties ranged between 49% - 83%. This shows that both wet milling and alkaline extraction have the potential to produce protein concentrate or isolate with high protein. The protein yield from all the six pulse varieties was higher (30% - 53%) for alkaline extraction-isoelectric precipitation extracts. The water absorption capacity for wet-milled extracts ranged between (2.68 ± 0.07 – 2.74 ± 0.04) (g water/ g dry protein) were higher than the alkaline extracts which ranged between (1.67 ± 0.02 - 1.69 ± 0.04) (g water/ g dry protein). Similarly, the oil absorption capacities for wet-milled extracts ranged between (2.74 ± 0.01 - 3.16 ± 0.02) (g oil/ g dry protein) were higher than the alkaline extracts which ranged between (1.26 ± 0.03 - 1.51 ± 0.04) (g oil/ g dry protein). All six pulse varieties had stable emulsions during the 1 hour, 3 hours, and 24 hours periods.

Wet-milled and alkaline extracts could potentially be used as ingredients in food formulations like those involving dough manufacturing and processing meat products.

Biography: Sarah Kandolo

Sarah is a young courageous lady who is optimistic about the many opportunities, possibilities, and silver linings on the African continent. More especially in the indigenous food or underutilized crops of Africa and their endless possibilities in African diet and advancements in Food and Nutrition research. Sarah has an intense drive and passion about climatic smart pulses and how these underutilized crops could potentially be the solution to alleviate food insecurity. Additionally, how they could improve the nutritional background of communities in Africa through food innovation. Furthermore, on her quest of becoming a phenomenal Food Scientist, she has the willingness to take a chance, to fail if necessary, and to be persistent in the learning process. Apart from research, Sarah enjoys exploring the multiple game and nature reserves across South Africa and beyond, which provide tranquil scenery while inspiring fresh ideas.