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Comparative Evaluation of the Composition, Digestibility and Functionality of Chemically Modified Protein Isolates from Soya Bean and some Under-Utilised Legumes

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Abstract

Native proteins, particularly those from indigenous under-utilised legumes have limited application especially in industrial food systems largely because of information dearth on their quality and functionality. Because of the rising cost of soya bean, there is renewed interest in evaluating the potentials of alternatives. Consequently, two (2) under-utilised legumes, namely: Pigeon pea (PP) (*Cajanus cajan*) and African yam bean (AYB) (*Sphenosstylis sternocarpa*) were processed into their protein isolates using alkaline (NaOH) solubilisation and acid (HCl) precipitation at their various isoelectric pH. The protein isolates were modified using acetic anhydride. The protein isolates and their chemically modified forms were thereafter analysed with respect to their proximate composition, metabolisable energy (ME), *invitro* multi-enzyme protein digestibility (IVPD) and functional properties. The findings were compared with the more conventional soya bean protein isolate (SI). On the average, the PP and AYB had 92.54 and 90.13 g/100, SI had 85.8 g/100g crude protein while the modified under-utilised legumes had 92.4 and 90.5 g/100g, respectively. Ash was higher in protein isolate of PP (3.6 g/100g), AYB (3.3 g/100g) and low in SI (1.0 g/100g) while the modified form had 1.9 and 1.8 g/100g, respectively. However, ME was highest in the Soya isolate (512.4 Kcal/100g) than those of PP and AYB which ranged between 369.01 and 380.07 Kcal/100g. The protein isolates of PP and AYB were more digestible and ranged between 91.0 and 98.8 % when compared to 85.9 % in Soya bean. The Soya bean isolate had better water holding capacity (WHC), oil holding capacity (OHC) and foaming stability than the PP and AYB Isolates. The foaming capacity, emulsion capacity and emulsion stability of the modified PP and AYB protein isolates were generally higher than those of soya bean isolates. Modification generally improved protein functionality when compared with the unmodified isolates. Given the higher *in vitro* protein digestibility and other functional attributes of pigeon pea and African Yam Bean than Soya isolates, it was concluded that these under-utilised legumes seeds could serve as useful alternatives for the much more expensive soya bean.

Keywords: Chemical modification, protein isolates, soya bean, underutilised legumes, pigeon pea, African yam bean

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