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Assessing the Physical Traits, Cooking Quality and Nutritional Diversity of Bambara Groundnut (*Vigna subterranean* L. Verdc) Genotypes

Amanda Ruzive[1], Laurencia Govender[1], Admire Shayanowako[2], Tafadzwa Mabhaudhi[2]

[1]University of KwaZulu Natal, Pietermaritzburg, South Africa. [2]Centre for Transformative agricultural and food systems, Pietermaritzburg, South Africa

Abstract

Bambara groundnut (BGN) (Vigna subterranean (L.) Verdc.) is a nutritious and multiple stress-tolerant legume whose potential contribution to the region's food and nutrition security is constrained by the 'Hard to Cook' (HTC) phenomenon. The seed requires prolonged boiling times and, therefore, a high energy requirement, which limits the consumption of BGN. This challenge is not peculiar to BGN but to many legumes. BGN is a nutrient-balanced legume that has the potential to alleviate food and nutrient deficiencies. However, utilization is limited by its HTC traits. Plant breeders and dietitians/nutritionists should work together to develop genotypes with high nutritional content, fast cooking, and desirable texture. The objective was to examine the physical traits, cooking quality, and nutritional composition of BGN. One hundred and fifty-six genotypes were assessed for physical and cooking quality traits, and twenty were selected for nutritional analysis. Before cooking, BGNs were evaluated for their seed colour, weight, volume, density, hydration capacity, swelling capacity, pH, electrical conductivity, and nutritional composition. The traditional cooking method was conducted, and cooking time was determined using the finger pressing method. The seed texture and nutritional composition were evaluated after cooking using Texture analyser TA-TX2 and Association Analytical Chemist methods respectively. Different genotypes showed significant variation in their cooking quality traits and proximate and mineral content composition. The seed size of BGN seeds ranged from 0.23-0.86 g, seed volume from 0.19-0.68 ml, hydration capacity from 0.01-0.45, swelling capacity from 0.02-0.6, cooking time from 40-147 minutes, and texture from 5.4-33.1 N. Hydration properties, swelling properties, seed size, texture, degree of lightness, pH, and electrical conductivity were significantly correlated to cooking time. The total mineral (Ash), fat, and moisture content showed significant variation ($p<0.001$), while Neutral Detergent Fibre (NDF) and protein content showed a significant difference between raw and cooked samples ($p<0.05$). Cooking significantly increased protein, fat, NDF, zinc, sodium, and copper content, however, the process also significantly reduced iron, moisture, and total mineral (Ash). The BGN lines S19/Ankpa4-100, S19/Ankpa4-92, IITA686/LunT-403, and S19/Ankpa4-234 could be used as sources of reduced cooking time genes. The results could contribute to the genetic improvement of BGN.