Characterisation of Resulting Flours from Heat-Treated Bambara Groundnut Seeds using Microwave or Infrared Heat Treatment Alone and in Combination

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Abstract

Introduction: Bambara groundnut is a nutrient-dense and drought-tolerant indigenous African pulse. Application of heat treatment to Bambara seeds may cause useful changes in resulting flours. This study was conducted to determine the effect of heat treatment (130 °C) of pre-conditioned (20 and 53% moisture) Bambara groundnut seeds on physicochemical properties of resulting flours to produce high protein bread.

Methodology: Bambara seeds (conditioned 20% or 53% moisture) were infrared, or microwave heat treated done alone and in combination for 0, 5 and 10 minutes at 130°C. Seeds were dried at 50°C then milled into flour. The resulting flours were analysed for microscopy, pasting and thermal properties.

Results and Discussion: Flours from microwave and combined treatment had a reduction in water and nitrogen solubility indices at both 20% and 53% moisture levels. Heat treatment of Bambara seeds caused starch pre-gelatinisation and protein aggregation in resulting flours. The protein and starch aggregation increased with increasing moisture level and treatment time. Differential Scanning Calorimeter (DSC) showed a decrease in endothermic peak as heat treatment time increased (0,5 to 10 min) for all heat treatments.

Pasting temperature significantly increased with heat treatment but there was a decrease in final paste viscosities. There was a correlation between the decrease in flour viscosities and increasing heat treatment time. The combined treatment caused a more significant reduction in pasting viscosities of resulting flour, at 20% and 53% moisture levels, than flours from infrared or microwave heat treatment.

Conclusions: Flours from heat-treated Bambara seeds have low viscosities and this could be beneficial when compositing Bambara to wheat. The unavailability of starch to form a viscous paste due to the surrounding protein matrix around the starch granules may help explain the resulting flour low viscosities.

Biography: Peter Mukwevho

Peter Mukwevho is a PhD student and lecture at the Department of Consumer and Food Sciences at the University of Pretoria