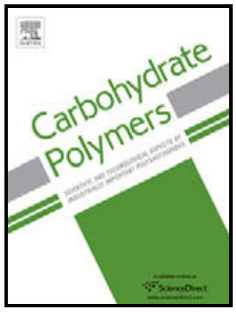

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Physicochemical properties of starches with variable amylose contents extracted from bambara groundnut genotypes

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Abstract

The Physicochemical properties of starches extracted from five bambara genotypes were investigated. Bambara starch granules were predominantly oval shaped with a smooth surface and an average size of 26±0.2 µm. The amylose contents (20-35%) varied significantly among genotypes. X-ray diffraction revealed the C-type pattern for all starches with relative crystallinity range: 29-35%. FTIR spectra of bambara starches showed variable peak intensities at 2931, 1655 and 860 cm^{-1}, which corresponds to C-H stretching, H_2O bending vibrations and C-O stretching, respectively. Bambara genotype with the highest amylose content showed the lowest intensity at wavenumber 2931 cm^{-1}. With the exception of oil absorption which was similar, swelling power, water absorption and paste clarity of starches were significantly different among genotypes. Genotype with high amylose content showed restricted swelling, low paste clarity and great ability to absorb water. All bambara starches displayed a shear thinning behaviour ($n < 1$).

Keywords: Bambara, genotypes, physicochemical properties, rheology, starch

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1. Introduction

Bambara groundnut (*Vigna subterranea*) is a good source of protein (19-21%) and carbohydrate (57-67%) (Kapsto, Njintang, Nguemtchouin, Scher, Hounhouigan, & Mbofung, 2014; Sirivongpaisal, 2008; Onimawo, Momoh, & Usman, 1998), similar to legumes such as cowpea (Oyeyinka, Oyeyinka, Karim, Kayode, Balogun, & Balogun, 2013) and peas (Wang & Castonguay, 2014). The bambara plant is highly drought tolerant and thus, well adapted to the changing climate. However, bambara groundnut is neglected and under-utilized in Southern Africa. Traditionally, bambara is consumed by boiling freshly harvested grains and eaten as a relish with maize-meal porridge (Swanevelder, 1998). Matured grains are dried and ground into flour for making puddings. The under-utilization of many crops including