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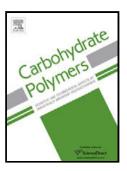
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Physicochemical properties of starches with variable amylose contents extracted from bambara groundnut genotypes Samson Oyeyinka<sup>a</sup>, Suren Singh<sup>a</sup>, Patrick Adebola<sup>b</sup>, Abe Gerrano<sup>b</sup> Eric Amonsou<sup>a</sup>, <sup>a</sup>Department of Biotechnology and Food Technology, Durban University of Technology, South Africa <sup>b</sup>Agricultural Research Council-Vegetable and Ornamental Plant Institute, Pretoria, South Africa

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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<sup>-1</sup>, which corresponds to C-H stretching, H<sub>2</sub>O bending vibrations and C-O stretching, respectively. Bambara genotype with the highest amylose content showed the lowest intensity at wavenumber 2931 cm<sup>-1</sup>. 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).

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

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#### 1. Introduction

27 Bambara groundnut (Vigna subterranea) is a good source of protein (19-21%) and 28 carbohydrate (57-67%) (Kapsto, Njintang, Nguemtchouin, Scher, Hounhouigan, & Mbofung, 29 2014; Sirivongpaisal, 2008; Onimawo, Momoh, & Usman, 1998), similar to legumes such as 30 cowpea (Oyeyinka, Oyeyinka, Karim, Kayode, Balogun, & Balogun, 2013) and peas (Wang 31 & Castonguay, 2014). The bambara plant is highly drought tolerant and thus, well adapted to 32 the changing climate. However, bambara groundnut is neglected and under-utilized in 33 Southern Africa. Traditionally, bambara is consumed by boiling freshly harvested grains and 34 eaten as a relish with maize-meal porridge (Swanevelder, 1998). Matured grains are dried and 35 ground into flour for making puddings. The under-utilization of many crops including

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