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

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1 Physicochemical properties of starches with variable amylose contents extracted from
2 bambara groundnut genotypes
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6

7 **Abstract**

8 The Physicochemical properties of starches extracted from five bambara genotypes were
9 investigated. Bambara starch granules were predominantly oval shaped with a smooth surface
10 and an average size of 26±0.2 µm. The amylose contents (20-35%) varied significantly
11 among genotypes. X-ray diffraction revealed the C-type pattern for all starches with relative
12 crystallinity range: 29-35%. FTIR spectra of bambara starches showed variable peak
13 intensities at 2931, 1655 and 860 cm⁻¹, which corresponds to C-H stretching, H₂O bending
14 vibrations and C-O stretching, respectively. Bambara genotype with the highest amylose
15 content showed the lowest intensity at wavenumber 2931 cm⁻¹. With the exception of oil
16 absorption which was similar, swelling power, water absorption and paste clarity of starches
17 were significantly different among genotypes. Genotype with high amylose content showed
18 restricted swelling, low paste clarity and great ability to absorb water. All bambara starches
19 displayed a shear thinning behaviour (n < 1).

20
21 **Keywords:** Bambara, genotypes, physicochemical properties, rheology, starch

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26 **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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