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# Physicochemical properties of flours of natural and microbial fermented cassava (*Manihot esculenta*, Crantz.)

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Cassava (*Manihot esculenta* Crantz) is one of the most important staple food crops grown in tropical Africa. It plays a major role in efforts to alleviate the African food crisis because of its efficient production of food energy, year-round availability, tolerance to extreme stress conditions, and suitability to present farming and food systems in Africa. Thus, the objectives of this study were to investigate natural and microbial fermentation techniques to produce nutritionally-enhanced modified flour and to compare the physiochemical properties of the modified flours.

The flours were compared in terms of their proximate composition, thermal and physicochemical properties. Proximate composition revealed that there were no significant differences for all parameters between both flours for different treatments at $p<0.05$; however, significant difference was observed for total acid and pH for both treatments, with values of the microbial fermented cassava flour (MFC) higher for the total acid and lower for the pH, which is an indication that more acid is contained in the flour sample. Starch content was higher in natural fermented cassava (NFC) and microbial fermented cassava flours at 72 hours (98.6%) and at 24 hours (98.4) and lowest at 24 hour (84.15%) and 72 hours (85.1), respectively. Gelatinization in NFC flour occurred at a lower temperature range (62.03-71.75°C) compared with MFC flour (61.98-71.55°C) with the endothermic gelatinization enthalpy having slightly higher values in flour of microbial than NFC flour, although minimal differences were observed. Swelling and solubility patterns indicated lower relaxation temperature, and higher swelling and solubilization rates in MFC flour compared with NFC flour. However, no significant differences were observed for solubility for both treatments at temperatures 60, 70, and 80°C respectively, although significant differences were observed at 90°C, with values of microbial fermented flour having higher values than those of the natural fermented flour at both treatments. The pasting characteristics of 9% (db, dry basis) flour slurry of natural fermented cassava showed higher final viscosity, trough, and setback but lower breakdown ratios compared with flour of microbial fermented.

This indicates that flour of natural fermented cassava paste might be better in withstanding processing conditions and would present a slightly superior thickening characteristic than flour of microbial fermented cassava paste. The differences in the viscoelastic properties and physico-functional characteristics of the natural and microbial fermented cassava flour could be used in their selection for specific food and industrial processing applications.

Keywords: Cassava, Proximate composition, Gelatinization, Physiochemical properties, Nutrition, Food security

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