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Comparative studies of the proximate, microscopic and thermal properties of processed maize, wheat, millet, cassava and Bambara nut flours

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This research investigated and compared the proximate composition, microscopic and thermal properties of some grains (maize, wheat and millet), a root crop (cassava) and a leguminous crop (Bambara nut) with the intent to formulate novel food product with the desired characteristics for industrial processing. Native cassava flour is known to exhibit physicochemical characteristics that discourages its applications in food systems. However, composite flour formulation and the use of additives have the capacity to encourage the use of unmodified cassava flour to process food of an acceptable standard. Bambara nut is however a leguminous crop but very high in ash and mineral contents which affects the taste and flavor of products produced from it. Furthermore, the high mineral composition of Bambara nut contributes to increased anti-nutrients that contribute to high energy requirement during processing. Thus, these studies were carried out in response to processing needs. The results obtained showed increased starchy materials of the maize grain compared to the other grains while the Bambara nut, been a legume, has the least carbohydrate content. Microscopically, the millet flour showed silvered-white indentations that evidenced presence of protein in the intact structure, unlike the other grains. The increased content of protein in the maize could be attributed to increased activity of α-amylase in the maize grain soaked for 48 hours. The DSC (Next-Generation Sequencing) of the flours indicates the A+V-type polymorphs were present in the flours. Wheat and maize flours contained high values of the amylose that could have contributed to the increased values of the enthalpy in their flours, although maturity of the grain during harvest could influence the amylose content and consequently, the enthalpy of foods. The FTIR (Fourier-transform infrared spectroscopy) -Spectroscopic studies showed that the millet flour possessed more ordered structure compared to the other grains. However, the Bambara nut flour has the highest ordered structure. Furthermore, cassava with more peaks contained more polymorphs and is expected to possess more complex structure.

Biography

Theophilus M. Ikegwu was born in 1979. He attended Central School, Oshiri and Oshiri Community Secondary School between 1989-2000. Subsequently, he gained admission in 2003 to study Food Science and Technology in University of Nigeria, Nsukka, and after a successful one year Mandatory National Service, he proceeded with his Master's Degree in 2010. As an academic, he started as an Assistant Lecturer in April, 2013 in Madonna University, Akpugo Campus in the Department of Food Science and Technology. He subsequently transferred his services to Ibrahim Badamasi Babangida University, Lapai, Niger State and Nnamdi Azikiwe University, Awka, Anambra State in 2014 and 2017, respectively. In 2015, he had a Fellowship Award under the National Office for Technology Acquisition and Promotion (NOTAP) that is been sponsored by De United Foods Industries Limited (DUFIL). Additionally, he was a lead researcher for a TETFund Research Grant on two occasions, and equally participated actively for the writing of a National Research Grant Award won by the Ibrahim Badamasi Babangida University, Lapai, Niger State in 2017. One of the research work (Process Development, Production and Evaluation of Egg Powder and Analogue Egg Product as Suitable Ingredients for Industrial Utilization) had been published into a book which could be accessed online. Furthermore, the young researcher has published more than ten (10) journal articles and attended various conference proceedings. In June 2018, he was one of the Local Organizing Committee Members for the 4th Regional Food Science and Technology Summit held in Awka, Anambra State where he served as the Secretary of the Committee. Theo, as he is fondly called, has served as a reviewer in some journals and also an Associate Editor to Journal of Foods, Natural and Life Sciences.

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