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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Evaluation of temperature and energy requirements for gari processing at standard quality parameters in Togo

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Abstract

Cassava is a vital staple crop in sub-Saharan Africa (SSA) and plays a significant role in the region's food security. The crop is well adapted to the region's climate and can tolerate drought and poor soil conditions, making it an important food source for communities in rural areas. Over 300 million people in SSA are estimated to rely on cassava as a primary source of calories. However, it has a limited shelf life of one to two days. It can be processed into shelf-stable gari, a partially pre-gelatinized dry granulated cassava product, and is a staple food for millions of people in West Africa. The fermentation process during gari processing generally reduces cyanide to safety levels (10 ppm-WHO). Nevertheless, roasting, the last stage in gari processing, is one of the major bottlenecks and data on the temperature/energy requirements and process duration is scant and sporadic. Therefore, the objective was to determine the temperature and energy requirements for the roasting process at the traditional and cooperative level in Togo using a low-cost semi-controlled cooking tests method (SCCT). The mean specific energy consumption found to produce a kg of gari from dewatered cassava mash (48 % moisture content (MC) to gari (6.7 % MC) from the nine cookstoves evaluated was 7.37 kWh kg^{-1}. The roasting process alone accounted for 96.74 % of the energy consumed, which include combustion chamber, roasting pan surface, gari, and ambient temperatures of 494 °C, 142 °C, 110 °C and 33 °C, respectively. Out of the 114 batches examined, the average batch size was 2.7 kg dewatered cassava mash and 1.6 kg output gari within 20 minutes. Furthermore, a strong correlation (R^2) of 0.88 between the data of the specific energy consumption was achieved and agreed with other researchers. Overall, the outcome from this work will help improve energy efficiency, promote sustainability, enhance food security, drive economic development, and advance knowledge in the field of cassava processing. By addressing critical challenges in the production of this vital food product, the study can contribute to improving the livelihoods of millions of people in SSA.

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