Tropentag, September 18-20, 2019, Kassel

"Filling gaps and removing traps
for sustainable resource management"

Optimisation of Drying Conditions for Cassava Foam Powder Production and Properties of Cassava Foam Powder

Oluwatoyin Ayetigbo[1], Sajid Latif[1], Adebayo Abass[2], Joachim Müller[1]

[1] *University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*
[2] *International Institute of Tropical Agriculture (IITA), Tanzania*

Abstract

The objective of the study was to optimise the drying conditions for cassava foam into foam powder, which is a novel form of cassava product and to characterise the physicochemical properties of the foam powder. White-flesh cassava foam was produced by whipping the cassava pulp with 14.97 % glycerol monostearate (GMS) colloid and 0.51 % sodium carboxy-methylcellulose (NaCMC) for 2.07 min, and yellow-flesh cassava foam was produced by whipping the cassava pulp with 14.29 % GMS colloid and 0.6 % NaCMC for 2 min. Both foams were dried to powders at 50°C, 65°C and 80°C in drying pans of 6 mm, 8 mm and 10 mm thickness. Using response surface method, the optimal conditions for drying was identified based on criteria of maximum first and second falling rate diffusivities and minimum time to dry to 10 % moisture content. The optimum drying conditions for white cassava foam was at 80°C in 10 mm thick pans, while optimal drying conditions for yellow cassava foam was at 80°C in 8 mm thick pans. For drying of yellow cassava foam, for instance, the actual and predicted values for first falling rate diffusivity, second falling rate diffusivity and time required to dry to 10 % moisture content were 2.7×10^{-9} m^2 s^{-1} and 2.2×10^{-9} m^2 s^{-1}, 1.2×10^{-8} m^2 s^{-1} and 0.8×10^{-8} m^2 s^{-1}, and 5.3 h and 6.3 h, respectively. The dried white and yellow cassava foam powders had significantly lower total cyanogenic glucosides content, total carotenoids content, apparent amylose and swelling power, but significantly higher water solubility, water absorption capacity, oil absorption capacity and least concentration for gelation compared to that of dried non-foamed cassava pulp powder. Scanning electron micrographs revealed interactions between starch granules and the colloids that keep the white and yellow foams stable during drying.

Keywords: Cassava foam powder, diffusivity, falling rate, oil absorption capacity, response surface method, Stabiliser

Contact Address: Oluwatoyin Ayetigbo, University of Hohenheim, Inst. of Agricultural Engineering, Tropics and Subtropics, Garbenstr. 9, 70599 Stuttgart, Germany, e-mail: ayetigbo_oluwatoyin@uni-hohenheim.de