I Simpósio Online Sulamericano de Tecnologia, Engenharia e Ciência de Alimentos
Online, 2 a 6 de maio de 2022

TECALI 2022

TECHNOLOGICAL PARAMETERS OF EXTRUDED SNACKS FROM MAIZE AND GERMINATED QUINOA AND KIWICHA FLOURS

Marcio Schmiele[1], Luz María Paucar-Menacho[2], William Esteward Castillo-Martinez[2], Wilson Daniel Simpalo-Lopez[2], Anggie Verona-Ruiz[2]

[1]Federal University of Jequitinhonha and Mucuri Valleys, Diamantina, Brazil (marcio.sc@ict.ufvjm.edu.br)
[2]Universidad Nacional del Santa, Nuevo Chimbote, Peru

The germination of grains activates the metabolism associated with generating a new seedling, changing the molecular structure of the components as a function of biochemical processes. This study aimed to evaluate the performance of maize and germinated quinoa (42h/20°C) and kiwicha (63h/26°C) grain flours during the thermoplastic extrusion process to obtain extruded snacks. The trials were made using a simplex-centroid mixture design and the dependent variables were analyzed using a response surface methodology (P<0.10 and R^2>0.75). The fixed parameters were feed rate (25kg/h), screw speed (120rpm), the temperature of seven zones (30, 45, 55, 75, 95, 105 and 115°C) and die (6mm ϕ). The expansion index of the trials varied between 1.00 and 2.10 (P=0.005, R^2=0.7829) and the bulk density ranged between 0.19 and 0.52mg/cm^3 (P=0.005, R^2=0.8779), and the best extrudate was obtained with higher levels of corn and lower levels of quinoa. The shear force presented data between 7.40 and 40.07N (P=0.523, R^2=0.5386) and the work of shear was between 34.21 and 331.66N/s (P=0.003, R^2=0.8750), favored by the use of higher quinoa contents. The absorption and solubility index in water was found between 4.34 and 5.84 (P=0.322, R^2=0.6514) and 9.54 and 36.96% (P<0.001, R^2=0.8861), respectively. Germinated kiwicha flour resulted in lower water absorption values and higher solubility data. For the instrumental color, the use of higher levels of maize and kiwicha flours and lower levels of quinoa flour resulted in lighter snacks (L^* = 41.36–55.31; P<0.001, R^2=0.9756) and with a greater yellowish hue (b^* = 21.35–36.52; P<0.001, R^2=0.9726) and lower values of a^* (5.71–10.13; P<0.001, R^2=0.9840). The optimal point was determined aiming at higher values of expansion index, a^* and water solubility index, lower bulk density values, work of shear and b^*, with L^* in range. The best formula was achieved using 0.35 of maize, 0.48 of quinoa and 0.16 of kiwicha, with a desirability of 77.30%.

Keywords: Desirability; dextrinization; sprouting; puffing.

Acknowledgments: The authors also thank the Universidad Nacional del Santa (UNS) and the Federal University of Jequitinhonha and Mucuri Valleys (UFVJM) for the institutional support. We are also grateful to CONCYTEC-PROCIENCIA, within the call E063-2020-01-BM (C 001-2020-FONDECYT-BM) for financial support.