

DEVELOPMENT OF GLUTEN FREE BREAD USING OSMOTIC DEHYDRATED KACHKAL BANANA

Abstract

Kachkal is the only culinary banana found in Assam and other Northeastern states. Production of fibre-rich powder of unripe banana flour is a potential ingredient for bakery products and other food products containing slowly digestible carbohydrate. An artificial neural network model was developed for prediction of water loss, solid gain and weight reduction in osmotic dehydration of kachkal banana slices in salt solution. The process parameters were temperature, processing time, salt concentration and solution to sample ratio. The model was successful to predict the water loss, solid gain and weight reduction with a mean square error of 0.554, 0.293 and 0.095 and regression coefficient of 0.966, 0.922 and 0.983 respectively. The predicted values of responses were optimized using Genetic Algorithm. The optimum result for the responses were obtained at optimum conditions of temperature, 35°C, processing time, 110 min, salt concentration, 24% and solution to sample ratio, 14. The water and solute diffusivity at optimum temperature i.e., 35°C were found to be 2.06×10^{-10} and 1.1×10^{-10} m²/s. Kachkal banana flours were produced using osmotic dehydration as pretreatment followed by tray drying at 60°C. Moisture adsorption isotherm of kachkal banana flour was determined by gravimetric method using salt solution at 40°C. Monolayer moisture content was estimated to be 5.43 kg water /kg dry solid using GAB equation which showed the best fit to the experimental data. Gluten free bread formulations using kachkal banana flour and bora rice flour at different ratio were tested and optimized using response surface methodology. Physical properties like texture, color, loaf volume and specific volume were investigated. Sensory characteristics in terms of crumb color, hardness, taste and flavor were evaluated by fuzzy logic. The breads prepared with 30:70 BRF/KBF had higher quality in terms of all the tested quality attributes. However, higher level of BRF leads to hard texture, lower loaf volume and specific volume.

Key words: Osmotic dehydration, gluten free bread, moisture sorption isotherm, diffusivity