Power Ultrasound Application on Convective Drying of Banana (Musa paradisiaca), Mango (Mangifera indica L.) and Guava (Psidium guajava L.)

Erika K. Méndez, Carlos E. Orrego, Diana L. Manrique, Juan D. Gonzalez, Doménica Vallejo

Abstract**—**High moisture content in fruits generates post-harvest problems such as mechanical, biochemical, microbial and physical losses. Dehydration, which is based on the reduction of water activity of the fruit, is a common option for overcoming such losses. However, regular hot air drying could affect negatively the quality properties of the fruit due to the long residence time at high temperature. Power ultrasound (US) application during the convective drying has been used as a novel method able to enhance drying rate and, consequently, to decrease drying time. In the present study, a new approach was tested to evaluate the effect of US on the drying time, the final antioxidant activity (AA) and the total polyphenol content (TPC) of banana slices (BS), mango slices (MS) and guava slices (GS). There were also studied the drying kinetics with nine different models from which water effective diffusivities (Deff) (with or without shrinkage corrections) were calculated. Compared with the corresponding control tests, US assisted drying for fruit slices showed reductions in drying time between 16.23 and 30.19%, 11.34 and 32.73%, and 19.25 and 47.51% for the MS, BS and GS respectively. Considering shrinkage effects, Deff calculated values ranged from $1.67*10^{-10}$ to $3.18*10^{-10}$ m^2/s, $3.96*10^{-10}$ and $5.57*10^{-10}$ m^2/s and $4.61*10^{-10}$ to $8.16*10^{-10}$ m^2/s for the BS, MS and GS samples respectively. Reductions of TPC and AA (as DPPH) were observed compared with the original content in fresh fruit data n all kinds of drying assays.

Keywords**—**Banana, drying, effective diffusivity, guava, mango, ultrasound.