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EVALUATION OF THIN-LAYER DRYING MODELS FOR DESCRIBING MICROWAVE DRYING OF ZUCCHINI

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In this study, zucchini slices at different thicknesses (5 and 10 mm) were dried using a microwave oven. The effect of microwave power (180-540 W) on some drying characteristics (drying rate, drying time, moisture content, effective diffusivity, activation energy) of zucchini was investigated. The drying rate of the samples was improved by increasing microwave power and reducing sample thickness. The drying curves were fitted to thirteen different thin layer models. RMSE (root mean square error), χ^2 (chi-square) and R^2 (coefficient of determination) were used to compare the relative goodness of fit of experimental data. Logarithmic, Midilli et al. and Wang and Sing models were found to give better predictions than the others. The coefficients of the models were determined by non-linear regression analysis. Fick's diffusion model was applied to calculate the effective diffusivities. The effective diffusivity values were varied in the range of $1.65\text{-}11.05\times10^{-8}$ m^2/s. The dependence of the effective moisture diffusivity on the microwave power was represented with an Arrhenius-type relationship. The activation energies were calculated as 46.6 and 13.2 W/g for samples thickness of 5 and 10 mm, respectively. It was also found that drying in microwave oven has reduced the drying time by 52-58% compared to hot air drying.

Keywords: Microwave drying, zucchini, modeling

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