Mathematical Modelling of Thin Layer Drying Kinetics of Onion Slices Hot-air Convection, Infrared Radiation and Combined Infrared-Convection Drying

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A B S T R A C T Article history: Received Received in revised form Accepted Available online Keywords: Drying kinetics modelling, Drying methods, Onion slices, Infrared radiation, Convection, Combination drying Onion slices were dried in convection hot-air, infrared radiation and combined infraredconvection hot air dryers. A systematic experimental design was applied to analyse drying kinetics due to the effect of type of dryer, infrared radiation intensity, drying air temperature and drying air velocity, until a final moisture content of 7 ± 1 % (wet basis) was attained. Mathematical modelling of thin layer drying kinetics under the different drying methods were studied and verified with experimental data. Eleven different mathematical drying models were compared according to three statistical parameters namely, the correlation coefficient (R^2), chi-square (χ^2) and modelling efficiency (EF). Drying curves obtained from the experimental data were fitted to the-thin layer drying models. The results show that, the Midilli et al. model obtained the highest (EF and R^2) value and the lowest (χ^2) values for both dryers. Therefore, this model is the best for describing the drying curves of onion slices under all the drying processing conditions.