Title Thin layer drying of ginger

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Abstract

The objective of this research was to attempt to develop a new thin layer drying model for drying of ginger under non-constant conditions. Ginger, one of the most useful and versatile spices, is used in food industry, traditional medicine and pharmacy. Therefore, there is an significant trading resulting in transportation of large volumes and weights of ginger. Hence, drying is a way of improving the stability, extending the shelf life of ginger products and saving costs of storage and transport. Traditionally, drying of ginger is carried out empirically and often results in variable quality of dried product. The drying models used so far are mostly suited for constant drying conditions. A new model, taking into account variable drying conditions corresponding to the common practice used by rural processors was developed based on Fick's diffusion theory and two hypotheses formulated in this study. Eight drying runs were conducted under different sets of drying conditions. For all runs, drying conditions were changed to more gentle set points when half weight of the sample had been removed. Experimental data of moisture against time were fitted to model predicting moisture content using Excel solver to find the best-fit values for the model constants. The Arrhenius-type relationship between drying temperature and drying rate constants was introduced in global model fitting. The thin layer drying of ginger under changed conditions was generally well described by the new model with high correlation coefficient in the range of 0.991 to 0.999 for eight individual runs and 0.998 in global fitting. However, sum of squares, which is another criterion for model fitting, was still large for a number of reasons. As a result, further research related to the new model is recommended to testify the theory and the constants of the model.