Title Modelling convection drying of blanched parsley root slices

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Abstract

The mathematical model describing the drying curve of single blanched parsley root slices (not touching each other) under conditions of natural convection was formulated on the basis of the general theory of heat and mass transfer laws. The course of the drying curve was described in two ways: (1) using the linear model of the first drying period (without shrinkage) with a model of the second drying period and (2) using the model of first drying period considered for shrinkage with the model of second drying period. Two models for shrinkage were analysed: linear and exponential. The second drying period was described by two models which approximated the shape of dried particles to an infinite plane and finite cylinder. Mathematical models of the first and second drying period were verified using the experimental data. The drying of 3 mm-thick parsley root slices was examined at an air temperatures of 60 °C. Before drying, the slices were blanched by the following methods: 3 min in boiling 5% brine solution, 3 min in boiling water, and 6 min in boiling water. The verification confirmed that the following mathematical models describe the drying curve with satisfactory accuracy: the linear model or models with shrinkage in the first drying period and the model of a finite cylinder in the second drying period. The values of relative error were not higher than 1% for linear model, 10% for models with shrinkage, 40% for models of the finite cylinder drying. The correlation between the data obtained from mathematical models and empirical data was high (the correlation coefficient varied from 0.97 to 0.99).