Abstract

Drying rate is one of the most important characteristics of drying, reflecting the complex effect of operating and initial conditions, such as air temperature, humidity, air velocity and root size. The computation of drying rate is very difficult because of the non-linearity and coupling effects in heat and mass transfer. It is especially difficult for fresh ginseng, where drying rate depends on spatio-temporal adaptation of ginseng root to drying conditions. In this paper, a biologically inspired neural-network approach was proposed for modelling of the drying rate of ginseng. The simulation of the ginseng drying rate through a shunting equation showed a good fit with the experimental data under various operating conditions and root categories. In addition, the shunting equation takes into account the spatio-temporal adaptation of large roots, providing good prediction for a wide range of root sizes. Due to the possibility of physical interpretation of model parameters, the shunting model can be used as the state estimator of the control system to improve observability and controllability of ginseng drying.