Application of a Mass Transfer Model for Simulation and Prediction of Moisture Distribution in Stored Corn Grains

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Abstract

The two-dimensional, finite difference model, developed by Abbouda, et al. (1992b), was applied to predict the moisture changes of corn grains stored in vertical standing, cylindrical steel bins. The water generated by respiration of corn was incorporated into the model. A comparison between the predicted and the measured moisture data made validation of the model. In general, they were in good agreement for a test period of one year. Results indicated that the model and the parameter values used in the model are applicable for predicting moisture of unventilated stored grain.

The grain lost moisture during storage. The average moisture content at the end of a one-year period dropped from 10.00% to 9.25% and from 12.00% to 9.84% for the small bins. For the large bins, moisture content dropped from 12.00% to 10.31% and from 10.00% to 9.60%. Bin size and initial moisture content caused significant effects on the moisture changes and corn grains quality under the unventilated environmental conditions of Al-Ahsa, Saudi Arabia.