Impact of climatic condition on rice drying systems design and management

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Abstract

The drying rate and storage of rice is affected by the frequent change of weather parameters such as relative humidity of ambient air, air temperature, solar radiation, rainfall and wind. This paper describes the impact of weather change on rice drying system design and management in Bangladesh. A general simulation model (WEGDM) translated in to FORTRAN 77 language that can simulate different weather patterns was used to study the effect of weather change on rice drying system design and management. There are three major components of the model-simulator for weather variables, simulator for drying process and simulator for economic analysis. Net present value (NPV) of cash flow was used as an overall criterion to study the effect of weather on the capacity of the drying and storing system. Eight different weather patterns have been simulated to study the effect of weather using previous weather data of 24 years. All pertinent cost parameters including fixed cost and variable costs were considered. Energy cost of drying was calculated using available grain drying theories and equations. Results indicated that there was a significant effect of weather change on rice drying and storing system capacities. The model revealed that the optimum drying capacity, storage size and the benefit cost ratio for a locality in Bangladesh were 4.37 m^3/h, 547.0 m^3 and 1.58 respectively. The model could also be used to determine the optimum capacities of drying and storing facilities of other cereals under adverse weather change.