

Title Modelling and optimization of drying variables in thin layer drying of parboiled paddy
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Abstract

Thin layer convective air drying studies were conducted in a laboratory model thin layer dryer designed and fabricated for this purpose. The variables selected were 70–150 °C drying air temperature, 0.5–2 m/s air velocity and 5–20 cm grain bed depth. Drying rate was limited by diffusion process due to the falling rate period in parboiled paddy. The effective moisture diffusivity in convective air drying increased with increase in drying temperature. The moisture diffusivity varied widely with change in moisture content. The prediction models developed for the drying rate constant (power model and Arrhenius model) and Lewis model for moisture ratio fitted well to the data. For maximum head yield, minimum specific energy and minimum drying time, the optimum process parameters were grain bed depth 7–10 cm, air velocity 0.55–0.68 m/s and drying air temperature 112–116 °C. This combination gave 65–68% head yield and specific energy consumption 8.5–10.7 MJ/kg of water removed.