## ABSTRACT

Rice is one of the most important food items in the world. Millions of people eat rice as their staple food. The parboiling process is applied to rice with a preliminary objective of hardening the kernel in order to maximize head rice yield in milling. The moisture content of about 12-13 % wb (13.6-14.9% db) is considered to be adequate for safe storage, milling and further storage as milled rice. Drying of parboiled paddy is a very energy-intensive operation. The efficient use and management of energy is an important concern in developing of a drying system. Saving in electrical energy by adding a vibratory mechanism is expected to reduce overall energy consumption in a drying system. Still air drying studies were carried out on parboiled paddy at different temperatures ranging from 50 to 150°C for non perforated and perforated trays. The drying data was analysed for drying kinetics. The milling quality of rice dried up to 22% db in a dryer at different temperatures with subsequent shade drying was determined. The drying characteristics of parboiled paddy at different temperatures using Infra red radiations were also studied as control. A cam mechanism was chosen for vibrating the trays of grain at various depths in a drying chamber. A thin layer tray dryer with provision for vibration of trays at different amplitude, frequency, varying the temperature and flow rate of drying air was fabricated. The effect of vibration conditions and drying air was studied on 1) Drying time 2) Brokens and 3) Cooking time.

Drying time, drying rate constants, heat and mass transfer coefficients, effective moisture diffusivity and head yield were determined for still air drying. Drying rate was limited by diffusion process in parboiled paddy. The drying data was fitted to exponential and Page models. The effect of vibration of grain bed depths on drying rate of parboiled paddy and optimization of grain temperature, frequency and amplitude of vibration for drying parboiled paddy under natural and forced air convection was done by 'Design Expert software'. The effect of drying conditions and vibration parameters on the drying time, milling and cooking qualities of the dried product were studied and optimized. The empirical models were developed for their determination. Conditions for efficient operation of vibration assisted dryer were determined.

**Key words:** Parboiled paddy, Still air drying, Convective air drying, Drying kinetics, Moisture diffusivity, Milling quality.