

Design, development and performance evaluation of a largescale hybrid solar dryer

ABSTRACT

A large-scale hybrid solar dryer was developed to account the limitations encountered in traditional open sun drying. With loading capacity of 500 kg and incorporated with a hybrid heating control system, this dryer is suitable for industrial drying that requires large drying capacity and products with high moisture content. In addition, this drying system offers flexibility in switching between different combinations of air vents based on the drying purpose required. Chaotic air flow produced in the drying chamber ensure uniform temperature distribution across the drying trays in an updraft air movement. Potential application of the drying system for durian skin and chili drying were tested. Based on the performance evaluation, a maximum temperature and maximum average temperature of 66°C and 59°C, respectively, was attained in the drying chamber. The drying of chilli with the drying temperature set at 50°C and operating condition of using the ventilation fan and opening the air vent achieved the drying time of 5 days or 45 hours in total, equivalent to 9 hours of drying time per day.