

ABSTRACT

This study generally aimed to design, fabricate and evaluate downdraft rice husk gasifier with flatbed dryer. The designed downdraft rice husk gasifier was evaluated in terms of fuel consumption rate, percentage amount of char, specific gasification rate, and electric consumption; the performance of flatbed dryer was evaluated in terms of drying capacity, moisture reduction rate, heating system efficiency, heat utilization, energy consumption and drying efficiency. The evaluation procedure was based on PAES 202:2000 and PAES 265:2015. The results revealed that the average fuel consumption rate of downdraft rice gasifier in drying three rice varieties was 1.51 kg/hr. The average percent amount of char produced were 15.27 percent. The average specific gasification rate was 0.0028 hr⁻¹ kg cm⁻². The average energy consumption was 22.80 watt-hr. The average drying capacity of flatbed dryer was 12.54 kg/hr. The average moisture reduction rate was 1.26 kg/hr. The average heating system efficiency was 64.60 percent, and the average heat utilized was 19,271.73 kJ/kg. The average energy consumption of flatbed dryer 7.11 kW-hr, and the average drying efficiency was 75.40 percent. The total expenditures of the machine was Php. 40, 200.20. The total fixed and variable cost was Php. 33.02/day and Php.213.26/ day, respectively. The break even drying cost was Php.0.09/bag. If the machine is offered for custom hiring, the drying fee is Php.12.32/bag with 30 percent mark-up.

Keywords: Downdraft, Rice Husk, Gasifier, Flatbed Dryer.