

Seed Drying Using a Heat Pump

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Abstract

The objectives of this research were to design, construct and test a heat pump dryer for paddy seed working with a mixed flow (LSU type) dryer. In this study, paddy seed was dried in an open air-loop from initial moisture content of 13.5% w.b. to 22.2% w.b. to final moisture content of about 12% w.b., inlet drying air temperature was 43 °C, specific air flow rate was 9 m³/min-m³ paddy and evaporator bypass air ratio on specific energy consumption, COP_{hp}, SMER, and MER were investigated. Experimental results showed that COP_{hp} and SMER increased to maximum at evaporator bypass air ratio of 0% and decreased with increasing bypass air ratio. Quality of paddy seed was very good with mean germination of sun drying and heat pump drying of 98% and 97% and mean vigor of sun drying and heat pump drying of 96% and 95%, respectively. From cost evaluation of paddy seed drying with and initial moisture content of 22.2% w.b. and final moisture content of 12.4 % w.b., it was found that total cost of seed drying was 2.81 baht/kg water evaporation of which baht 0.63(US\$ 1= Baht 40) was energy cost, Baht 0.41 was maintenance cast and Baht 1.77 was fixed cost.

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