EXPERIMENTAL STUDIES ON HEAT TRANSFER OF SOLAR GREENHOUSE CORN DRYER WITH TWO CIRCULATION DUCTS

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ABSTRACT

Conventional drying has several disadvantages, such as time consuming and its dependence in weather. Based on these reasons, we designed a dryer equipment which is needed in Gorontalo district for improving corn quality. The dryer employs greenhouse type consisting of 3 main components, i.e. drying chamber, dryer bed variation, and opening of duct variation. The dryer has dimension of 1m in length, 0.8 m in width, 0.6 in height, 5 mm of glass thickness, 3 mm of aluminium thickness, 60° in roof angle, and 100 mm ducts diameter with 300 mm in height made of PVC tubes. The result showed that the best dryer performance is on 6th variation with aluminium as dryer’s bed material and 100% opening of the lower duct. It was shown that for 5kg corn grains it only requires 9 hours of drying period to achieve 12.9% water content reaching the SNI-01-03920-1995 standard. The corn grains weight is changed from 5 kg prior to drying process to 3.1 kg. The highest temperature of chamber is 63°C. The heat of evaporation (Q) was calculated and the value is 4212.143269 J/m².s, and the evaporated mass (Mev) is 1866.2575 gram. The best dryer efficiency is about 11% with air flow rate of 3.5 m/s, while the best drying process efficiency is 21% for 2nd variation which uses 100% opening of lower duct.

Keywords : corn, dryer, variation, moisture contain, mass, evaporation rate