

ABSTRACT

Although forced convection solar grain dryers achieve greater drying rates than natural convection dryers, optimum air velocity, grain layer thickness and drying air temperatures are necessary for improved performance. Number of trays used also affects performance. This study investigated the moisture removal rate (ratio of mass of moisture removed to mass of wet grain per hour) of a solar grain under different drying conditions. The effect of air velocity, layer thickness, number of trays and temperature on moisture removal rate (MRR) was investigated. MRR increased with increase in both drying air velocity and temperature at constant layer thickness. For 0.02 m thickness, MRR increased from 0.048 to 0.061 kg moisture / (kg wet grain. hour). However this increase was only significant at lower temperatures (below 45°C). Changing from 40 to 45°C caused a significant increase, but increasing temperature above 45°C did not. Also, MRR decreased with increase in layer thickness at constant air velocity. At 0.408 m/s air velocity, as layer thickness increased from 0.02 to 0.08 m, MRR decreased from 0.061 to 0.022 kg moisture / (kg wet grain. hour). Finally, when drying a given layer thickness, use of two trays did not significantly improve MRR.