World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:10, No:05, 2016

Performance Optimization of Low-Cost Solar Dryer Using Modified PI Controller

Authors : Rajesh Kondareddy, Prakash Kumar Nayak, Maunash Das, Vrinatri Velentina Boro

Abstract : Today, there is a huge global concern for sustainable development which would include minimizing the consumption of non-renewable energies without affecting the basic global economy. Solar drying is one of the important processes used for extending the shelf life of agricultural products. The performance of a low cost automated solar dryer fitted with cascade control scheme and modified PI controller for drying chilli was investigated. The dryer was composed of designed solar collector (air heater) fitted with cylindrical pipes to improve the air velocity and a solar drying chamber containing rack of two cheese cloth (net) trays both being integrated together. The air allowed in through air inlet is heated up in the solar collector and channelled through the drying chamber where it is utilized in drying (removing the moisture content from the food substance or agricultural produce loaded). Here, to maintain the temperature in the heating chambers and to improve performance, a modified PI (Proportional–Integral) controller was used due its simplicity and robustness. Drying time for drying chilli from the initial moisture content of 88.5% (wb) to 7.3% (wb) was estimated to be 14 hours in solar dryer whereas 32 h was observed in the open sun drying.

Keywords : cascade control, chilli, PI controller, solar dryer
Conference Title : ICAABE 2016 : International Conference on Advanced Agricultural and Biosystems Engineering
Conference Location : Paris, France
Conference Dates : May 16-17, 2016