

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

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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