

عنوان مقاله:

Design, Construction and Evaluation of a Fan Speed Controller in a Forced Convection Solar Dryer to Optimize the Overall Energy Efficiency

محل انتشار:

مجله علوم و فناوری کشاورزی، دوره 13، شماره 4 (سال: 1390)

تعداد صفحات اصل مقاله: 13

نویسندگان:

.N. Bagheri - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

.A. Keyhani - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

S. Mohtasebi - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

A. R. Alimardani - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

.Sh. Rafee - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

G. H. Mansoori - *Department of Agricultural Machinery, University of Tehran, Karaj, P. O. Box: ۴۱۱۱, Islamic Republic of Iran*

خلاصه مقاله:

To increase agricultural crops' quality and to minimize losses in the final product and used energy during the drying process, major drying system parameters should be continuously controlled. Precise control of such parameters is attained by using automatic control systems. To optimize the overall dryer efficiency in a forced convective solar dryer, a controller was designed, constructed and evaluated. The dryer fan speed was chosen to be the controlled variable. Based upon the mathematical relations and a monitoring of the air inlet temperature to the collector, the air outlet temperature from the collector and the air outlet temperature from the drying chamber, the dryer efficiency was determined. Using the dryer control program the current and the optimized dryer efficiencies were calculated, compared and the fan speed changed accordingly to maintain the optimized efficiency. Experiments were carried out in three replications (in three days) with the results showing that the system was capable of controlling the fan speed to obtain the optimum efficiency. The dryer equipped with the designed control system worked with its highest efficiency throughout the day. Statistical analysis showed that the control system highly improved the dryer efficiency throughout its operation at a 1% probability level.

کلمات کلیدی:

Automatic control system, Fan speed, Forced-convection, Optimum efficiency, Solar dryer

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1827225>

