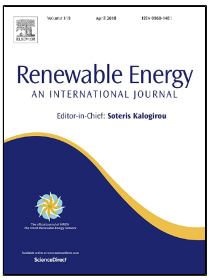
Accepted Manuscript



Integrated Hybrid Solar Drying System and its Drying Kinetics of Chamomile

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PII:	S0960-1481(18)30061-2
DOI:	10.1016/j.renene.2018.01.055
Reference:	RENE 9660
To appear in:	*Renewable Energy*
Received Date:	05 July 2017
Revised Date:	23 December 2017
Accepted Date:	16 January 2018

Please cite this article as: Baher M.A. Amer, Klaus Gottschalk, M.A. Hossain, Integrated Hybrid Solar Drying System and its Drying Kinetics of Chamomile, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.01.055

Integrated Hybrid Solar Drying System and its Drying Kinetics of Chamomile

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Abstract

An integrated solar system was examined and worked for drying chamomile during the summer season 2013 in Germany. The system consisted of collector, heat exchanger, reflector, main drying chamber below collector, additional drying chamber and supplementary electric heaters immersed in water tank. It could also storage of solar energy into water during the time of sun-shine and reuse this energy at cloudy weather or off sunshine time to raise the temperature of drying air inside the system. The capacity of main drying chamber ranged 32-35 kg of fresh chamomile and 10-12 kg for the other separate drying chamber. Air temperature inside the dryer could be maintained as desired range for drying chamomile using a temperature controller. The integrated dryer was operated about 30 to 33 hours to reduce the moisture contents of chamomile from 72-75% to 6% (wb) compared to 60 hours to reduce it to 9-10% (wb) using open sun drying method.

Nine mathematical models for drying kinetics of chamomile were tested to determine the parameters of the best suitable models for those plants. It is found Midili model was the best model to define drying kinetics of chamomile for the main and additional drying chambers in solar system.

Key words: Solar Drying, Integrated, Hybrid, Chamomile, Store energy, drying kinetics.

Nomenclature

t	Drying time (hr)
DR	Drying rate (kg_{water} /$kg_{dry\ base}$.hr)