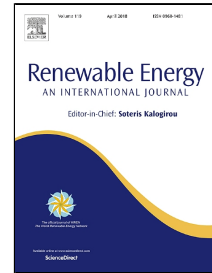


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Integrated Hybrid Solar Drying System and its Drying Kinetics of Chamomile

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1 Integrated Hybrid Solar Drying System and its Drying Kinetics of Chamomile

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11 Abstract

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

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

28
29 **Key words:** Solar Drying, Integrated, Hybrid, Chamomile, Store energy, drying kinetics.

30 Nomenclature

31
32
33 t Drying time (hr)

34 DR Drying rate ($\text{kg}_{\text{water}} / \text{kg}_{\text{dry base}} \cdot \text{hr}$)

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