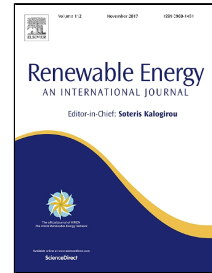


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Thermodynamic analysis of the drying process of bananas in a small-scale solar updraft tower in Brazil

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1 **Thermodynamic analysis of the drying process of bananas in a small-scale solar updraft**  
2 **tower in Brazil**

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15

16 Abstract

17 This paper presents a thermodynamic analysis of the drying of bananas inside a small-scale  
18 prototype solar updraft tower in Belo Horizonte, Brazil. A model based on the first and second  
19 laws of thermodynamics was developed, using the ambient conditions and airflow parameters  
20 data obtained in the experimental prototype. The exergy rates were determined, and it was  
21 concluded that the incident solar radiation plays an important role on the drying process of  
22 bananas, the higher the solar radiation, the higher the exergy rates. The exergetic efficiency was  
23 compared to that obtained without products inside the solar updraft tower, and it was found that  
24 the exergetic efficiency increased from about 20% to 27% with load.

25 Keywords: Solar updraft tower; Exergetic analysis; Drying.

26 1. Introduction

27 With the rapid consumption of fossil energy and changes to the global climate, renewable energy  
28 technologies have become important. Solar updraft towers represent a possible use of solar energy  
29 to generate a solar induced convective airflow. The basic idea of the device is to combine the  
30 greenhouse and the chimney effects. It consists of three main components: a solar collector, a  
31 tower, and wind turbines. The incident solar radiation heats the soil under the collector, which

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