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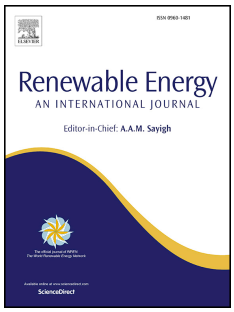

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M.W. Kareem, Khairul Habib, M.H. Ruslan, Bidyut Baran Saha

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Thermal performance study of a multi-pass solar air heating collector system for drying of Roselle *(Hibiscus sabdariffa)*

M.W. Kareem[1], Khairul Habib[1,*], M.H. Ruslan[2], Bidyut Baran Saha[3,4]

[1]Department of Mechanical Engineering, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak Darul Ridzuan, Malaysia

[2]Solar Energy Research Institute, Universiti Kebangsaan Malaysia Bangi Selangor 43600, Malaysia

[3]International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan

[4]Mechanical Engineering Department, Kyushu University 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan

Corresponding author, E-mail address: khairul.habib@petronas.com.my

Tel: +60 5 368 7146, Fax: +60 5 365 6461

Abstract

This article presents a study on the performance of a forced convective multi-pass solar air heating collector (MPSAHC) system assisted with granite as a sensible energy storing matrix. Experimental drying of Roselle was carried out in August 2015 at Solar Energy Research Site of Universiti Teknologi PETRONAS, Malaysia (4.385693^{o} N and 100.979203 S). The present investigation was conducted under the daily average relative humidity, solar irradiance, ambient temperature and wind speed of 64.5%, 635.49 Wm^{-2}, 32.24^{o}C, and 0.81 ms^{-1}, respectively. An average drying rate of 33.57 $g\cdot(kg\cdot m^{2}\cdot h)^{-1}$ was achieved while the system optical efficiency, collector efficiency, drying efficiency and moisture pickup efficiency of 70.53%, 64.08%, 36.22% and 66.95% were obtained, respectively. MPSAHC dryer was 21 h faster with fair color retention when compared to open sun drying approach (OSDA) that was conducted together