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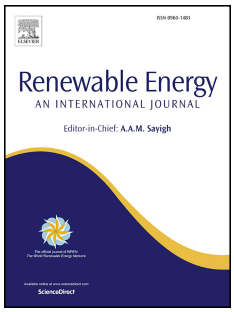

Heat transfer analysis of PV integrated modified greenhouse dryer

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Heat transfer analysis of PV integrated modified greenhouse dryer

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Abstract:

A PV integrated greenhouse dryer has been fabricated with a unique solar collector and tested in no-load condition under forced convection mode. Various important thermal performance indicators such as heat utilisation factors, convective heat transfer coefficient, coefficient of performance and percentage of net heat gain have been evaluated to validate the effectiveness of modifications. Energy, electrical and exergy efficiencies have been also analysed for installed PV system for exhaust fan. Greenhouse dryer experiments have been conducted for with and without solar collector conditions. The enhancement in the highest convective heat transfer coefficient for the greenhouse dryer with solar collector condition is 150% in comparison to the absence of solar collector. Heat utilization factor and coefficient of performance are found 10.1% and 7.9%, respectively, higher than greenhouse dryer without solar collector. The maximum energy and exergy efficiencies are found 16.8% and 21.4% for greenhouse dryer with and without solar collector, respectively. These results represent the effectiveness of solar collector placed inside the dryer and insulated north wall. The designed greenhouse dryer with solar collector is proposed as most suitable dryer for crop drying in the temperature range of 40-70^{o}C.

Keywords: Greenhouse dryer with solar collector; Coefficient of performance; Heat utilization factor; Exergy efficiency; Percentage of net heat gain.

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