Fabrication and performance study of a photovoltaic integrated solar dryer

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ABSTRACT
Drying or dehydration is a simple, low-cost way to preserve food that might otherwise be spoiled. Drying removes water and thus prevents fermentation or the growth of molds. In ancient times, fruits and vegetables were exposed to direct sun light for drying. However, in this method, there are several drawbacks. In the present work, a photovoltaic integrated solar dryer has been fabricated and tested for drying of fruits and vegetables. A d.c. fan powered by photovoltaic cell has been incorporated in the system to create forced air circulation in transferring thermal energy for drying without the use of grid connected power supplies. The dryer has been coupled to a solar air heater having a sun-tracking facility and blackened absorber for enhancing solar energy absorption. The system consists of a photovoltaic panel, solar air heater and a drying chamber with chimney. This system can be used for drying various agricultural products like fruits and vegetables. In this work, the experimental study has been conducted for the forced mode of drying under no load conditions. The outlet temperatures of air heater increased with the increase in solar radiation. The outlet temperatures in the dryer were found to be around 8-9°C higher than that of the ambient air temperature.

Key words: Drying, Open sun drying, Solar dryer, Photovoltaic cell