

DEVELOPMENT OF A HYBRID SOLAR-ELECTRICAL DRYER AND ITS PERFORMANCE ANALYSIS

Abstract

Open sun drying is an important and popular method of food preservation and is common practice for increasing shelf life of various food items across the world. Slow drying rate, uneven drying and presence of rain are few main reasons which discourage open sun drying. Other alternatives such as solar dryers and electrical dryers are used for better control over drying process. Solar dryers use solar radiation and work only during sunshine hours. Though electrical dryers can be used round the clock, high electrical energy is required for their operation. Thus the need for effective drying with efficient energy utilization encouraged us to develop a hybrid solar-electrical dryer. A drying chamber in combination with electrical heating chamber and solar air heater is used to carry out experiments to study drying behavior of potato slices and carry out performance analysis of the developed hybrid dryer. A temperature and air flow controller is also developed to control the system effectively. Performance of unloaded hybrid dryer at different air mass flow rate is studied. Potato slices are dried at 50°C and 60°C and effect of these two temperatures on moisture content of the slices are studied. The dryer is also operated on solar and electrical mode independently for drying the potato slices. The temperature variations at the output of the dryer are studied for each of the input energy sources while fed individually as well as in hybrid mode.

Keywords: Hybrid solar-electrical dryer, Temperature controller, Efficiency