

ABSTRACT

Nepal is an agricultural country having a large percentage of the population engaged in agriculture. It is blessed with plenty of lands appropriate for cultivating a variety of crops however post-harvest issues related to food preservation still linger today as a central attention seeker. Crop failures due to a lack of appropriate and affordable preservation and storage systems invite food waste and scarcity resulting in severe problems for farmers and consumers. Besides, the conservation of highly perishable food products and plants during large transportation distances and storage is a sensitive issue in the food industry as well. In this study, we are sincerely focused on these post-harvest issues concerning proper and effective food preservation techniques. Drying food is one of the fine processes of preserving food which increases its shelf life ensuring the preservation of all of its constituent nutrients if the appropriate and effective procedure is followed.

The aim of this work is to study food dehydration using hybrid energy sources from solar and an electric heating coil through forced convection. The input energy from dual sources enhances the drying rate and overall efficiency. In addition, we have inclined our study towards the comparative study between different drying mechanisms and procedures by performing drying under different temperatures and drying air velocities. Experimental investigations were performed with and without solar insolation during the winter season, in which the sunshine periods were affected by climatic discontinuity, prompted by cold input air interference.

Results showed the drying time was observed to be 4 hours and a reduction in energy usage of 77%. The energy contributions of the solar and electric heating coil at varying air velocities were also determined.

Keywords: Hybrid/Combination technology, Post-harvest issues, Solar hybrid dryer, Vegetable, and fruit drying.