

The field performance evaluation of a solar dryer for drying medicinal plants

C.J. De Mel¹, A.R. Ariyaratne² and C.P. Rupasinghe¹

¹ Dept. of Agric. Engineering, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya

² Dept. of Agric. Engineering, Faculty of Agriculture, University of Peradeniya

Abstract

Herbals, as ingredients in Ayurvedic medicine play a significant role in the country's economy. Since a part of the national requirement is produced locally, the industry has to depend on imports which utilize hard earned foreign exchange of the country. Attempts have been made to enhance production of herbs to develop livelihood of people and to save foreign exchange which can be spent on other essentials. The final quality of herbs which are produced by cultivators depends on both the pre and post harvesting operations. Among the post harvest operations, drying is an important procedure to obtain high quality since unfavorable drying conditions can lead to loss of chemicals that are found in herbs.

A solar dryer was designed for drying of herbs grown in the district of Hambantota which has favorable radiation levels during the year. The dryer consisted of an array of flat plate solar collectors for air heating and a drying chamber. The dryer was designed to provide uniform velocity and temperature to obtain consistent drying conditions in a series of trays. Two fans with a power consumption of 100W were used to produce air flow through the chamber. The dryer was installed in Ambalantota and evaluated for performance in drying of herbs.

The dryer has a loading capacity of 20–50 kg of fresh material depending of bulk density. Eight tests were conducted for drying of the herbs *Polpala*, *Ranawara*, *Ardathoda* bark and root. The temperature of the air in dryer was 48°C with corresponding ambient temperature of 32.7°C. The average collector efficiency was 57.72% while the system drying efficiency was 16.91%. Drying rate, drying efficiency and moisture curves were used to predict the performance of the solar dryer. The performance of the dryer was found to be excellent in the tests conducted.

Morphological, Sensory and Microbial characters were used to compare the drying quality of open sun dried and solar dried medicinal plant samples. Sensory and Visual evaluation tests were conducted to compare the sensory and morphological characteristics. There was a significant quality improvement when dried with the solar dryer in comparison to the open sun dried products. The sensory panel identified solar

dried herbs as better quality products than the open sun dried ones. Microbial laboratory test that was conducted to compare the microbial characters showed solar dried products had less mold count after one month of storage period (13×10^3 - 14×10^3) than the open sun dried samples. Therefore, the performance evaluation indicated excellent performance of the dryer with the superior quality products in comparison to the open sun drying.

Keywords: Solar Dryer, Herbs, Drying Rate