

FABRICATION AND EVALUATION OF A COLLAPSIBLE TYPE TENT SOLAR DRYER FOR COFFEE AND COCOA

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Coffee and cocoa are most popular and widely grown beverage crops in wet and intermediate zones of Sri Lanka with an average annual production of 1500 kg/ha and 225 kg (beans)/ha respectively. Coffee and cocoa are dried using different methods and improper drying causes post harvest losses. Artificial drying by using fossil fuels and electricity is expensive compared to sun drying. The aim of this project was to design, fabricate and evaluate a collapsible type tent solar dryer for coffee and cocoa. The dryer consists of a PVC frame, a polythene sheet, drying trays, tray supports and a solar collector. The capacity of the dryer is 18 kg for cocoa beans and 30 kg for coffee with husk, per batch. Two thin layer drying trials were conducted for each crop and temperature, relative humidity and moisture content were measured at regular time intervals.

Drying temperatures of 57 °C, 46 °C and 42 °C were achieved by the solar dryer, on bright sunny, intermediate cloudy and cloudy days respectively. The relative humidity inside the dryer was always 20-30% lower than out side under all the above atmospheric conditions. Tent solar drying and open sun drying coffee samples having initial moisture content of 65% took 27-30 and 37-44 hours respectively to reduce up to 15% recommended moisture content. But cocoa drying time did not show any significant difference between tent solar and open sun drying. In both treatments, cocoa was dried from an initial moisture content of 57.66% to recommended 7% within 16 hours. Tent solar dryer was efficient than open sun drying for coffee and an alternative to artificial drying due to its low fabrication and drying cost.

Key words: Cocoa, Coffee, Collapsible type tent solar dryer, Design, Evaluation, Fabrication