

EVALUATION OF TRAY SOLAR DRYER FOR CACAO BEANS

MARIA FE E. REPONTE

**THESIS SUBMITTED TO THE FACULTY OF THE INSTITUTE OF
COMPUTING, ENGINEERING AND TECHNOLOGY, DAVAO
DEL SUR STATE COLLEGE, MATTI, DIGOS CITY
IN FULFILLMENT OF THE
REQUIREMENTS FOR
THE DEGREE OF**

**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS
ENGINEERING**

MAY 2024

ABSTRACT

REPONTE, MARIA FE E., Davao del Sur State College (DSSC) Institute of Computing, Engineering and Technology, Mati, Digos City. May 2023. **"EVALUATION OF TRAY SOLAR DRYER FOR CACAO BEANS"**. Undergraduate Thesis.

Adviser: **EDUARDO F. AQUINO, MSME**

The evaluation of tray solar dryer for cacao beans was conducted at Davao del Sur State College (DSSC). The testing of samples was dried in the tray solar dryer in 2 batches operated separately for trials. It was revealed that the moisture content of the samples was reduced from 48% to 6.5% for the first batch of operation same as the second batch reduced from 48.3% to 6.5%.

It was found out that the total mean of drying rate in the second batch (2.48 g/min) was relatively high than the first batch (1.97 g/min). For the drying capacity, it was observed that the second batch (297.71 g/hr) was relatively high than the first batch (285.07 g/hr).

In addition, the drying recovery revealed that the first batch (96%) was relatively high than the second batch (95%). It also observed that the drying efficiency in the first batch (4.5%) was higher than the second

batch (3.7%). While the air flow rate of first batch (4.83 m³/min) was lower than second batch (5.35 m³/min).

In terms of drying time, the second batch with two layers required less time (48 hours) than the first batch (60 hours). According to its financial analysis, using 4 trays had a higher return on investment of tray solar dryer for cacao beans of 80% and a payback period of 1.2 years than using 6 trays, which had 73% and 1.4 years of payback period.

In conclusion, the result of the parameters in the two batches had difference from each other due to weather condition every day. It varies from time to time because of the temperature that was uncontrolled.

Keywords: cacao beans dryer, tray solar dryer, drying rate, drying recovery, drying efficiency