

**DESIGN, FABRICATION, AND EVALUATION OF A SMALL-  
SCALE MULTI-CROP DRYER**

**THESIS**

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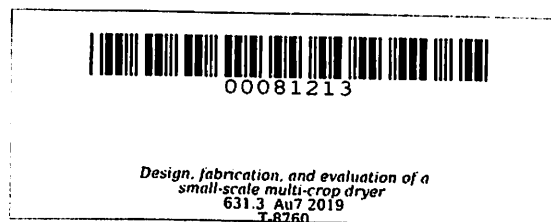
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# **DESIGN, FABRICATION, AND EVALUATION OF A SMALL-SCALE MULTI-CROP DRYER**

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## ABSTRACT

**AUSTRIA, ELIZABETH ANNE C. and MIRANDA, CHRISTOPHER D. Design, fabrication, and evaluation of a small-scale multi-crop dryer.** Undergraduate Thesis. Bachelor of Science in Agricultural Engineering. Cavite State University, Indang Cavite. April 2019. Adviser: Kevin P. Titiwa.

A small-scale multi-crop dryer was designed and developed at Cavite State University – Main Campus, Indang Cavite. It was fabricated at Trece Martires City, Cavite. Testing and evaluation of the machine took place at Poblacion 3, Indang, Cavite. It has an overall dimension of 1.40 x 0.53 x 1.90 meters (HxWxL). It is mainly composed of a furnace, transmission assembly, fan, plenum, crank system, drying chamber, and drying bin.

The machine utilizes an airflow shifter in order to change the flow of the heated-air from lower plenum to upper plenum or *vice versa* in a certain time. Parameters affecting the performance of the machine in terms of efficiencies, moisture rate reduction, power and fuel consumption, were observed.

Three treatments were used at different time interval of tilting the flapper inside the plenum ( $\frac{1}{2}$  hour, 1 hour, 1  $\frac{1}{2}$  hour). Two sets of test materials were used in the evaluation, specifically corn and coffee. In each treatment, having three replications, 25 kilograms of test materials were used. Drying using 1 and a half hour of interval on tilting the flapper obtained the highest moisture reduction rate (kg/h), percent moisture reduction rate (%/h), drying capacity, heating system efficiency of 94.76 percent, drying system efficiency of 82.41 percent, and drying time of three hours.

The fabrication cost of the machine was P 29,200.00.

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# **DESIGN, FABRICATION, AND EVALUATION OF A SMALL-SCALE MULTI-CROP DRYER**

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## **INTRODUCTION**

One of the most common way or practice of prolonging the shelf life of a perishable is drying. It is done by removing the moisture content of an agricultural produce/biomaterial through natural or artificial method of drying. It is done to decrease the mold's enzymatic action and insects' infestation. Food stuffs are usually dried to enhance their storability, transportability, texture and retainability (Adisa *et al.*, 2013).

In the Philippines, small – scale farmers use natural drying, usually sun drying. This type of drying takes about one to two days. This kind of drying practice reduces the quality and quantity of the crops. Thus, more wastes and low value products are being produced. In order to prevent it, artificial drying is where introduced. According to Food and Agriculture Organization (FAO, 1994) artificial drying is a method of exposing the grain to a forced ventilation of air that is heated to a certain degree in special appliances called