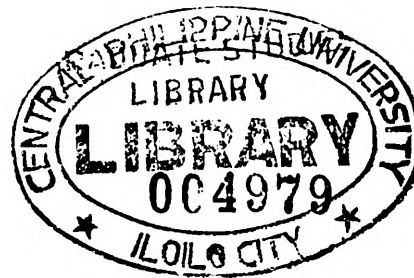


# **DESIGN AND EVALUATION OF A MINI- FLATBED DRYER HEATED WITH LIQUEFIED PETROLEUM GAS**

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## **ABSTRACT**

This study was conducted at the Appropriate Technology Center, Department of Agricultural Engineering, College of Agriculture, Central Philippine University, Iloilo City from June 1, 2002 to October 5, 2002. The objective of the study was to design and evaluate a mini-flatbed paddy dryer for small farmers that is heated by a liquefied petroleum gas.

The dryer basically consists of: a drying bin where wet paddy is held during drying, a plenum chamber where the velocity pressure of moving heated air is converted to static pressure; a vane-axial fan that moves heated air in the dryer and pushes it up across the bed of the grain, an LPG burner and a tank which supplies the needed heat for drying, and a prime mover that is used to drive the fan. It was fabricated using local materials such as BI sheet, angle bars, and flat bars as materials. It has a square-type bin and a plenum chamber having a dimension of 0.91 m wide in both sides and a bed thickness and plenum height of 0.9 m high. The 8-bladed vane axial fan has a diameter of 14 in. and is driven by a 1.5 hp electric motor. The LPG gas burner is a jet-type burning device which obtain flammable gas from an 11-kg LPG gas tank.

Performance evaluation showed that the dryer can load an average of 422.6 kg and can dry paddy at a rate of 54.57 kg per hour. At a drying temperature of 44 C, an ambient conditions of 32-34 °C air temperature, and a relative humidity of 65-72%, paddy with an initial moisture content of 23.7% can be dried to 13.2% moisture content within an average period of 7.7 hours. The computed moisture reduction rate of paddy in the dryer is 1.5% per hour. Results also showed that the rate of LPG consumption in drying paddy averages to 0.21 kg per hour. Moreover, calculations showed that one tank LPG can be used to dry 3.71 loads of paddy samples. The average electrical energy consumption by the dryer is 7.819 kW-hr.

It was observed that the dryer can be simply operated without difficulty by the farmers themselves. It does not impart odor to the paddy samples being dried.

Operating cost analysis showed that one sack of paddy can be dried at P14.70. Because of the low capacity and utilization of the dryer, the payback period is quite long which is within the range of 2.18 to 6.54 years. Return of investment and benefit-cost ratio range from 15.3 to 45.8% and from 0.189 to 0.758, respectively.