

^{e/}EVALUATION OF NATURAL CONVECTION
SOLAR DRYER

Thesis of : VICTOR S. SARMIENTO

Title : EVALUATION OF NATURAL CONVECTION

SOLAR DRYER

Undergraduate Thesis
Presented to the Faculty of the
Don Severino Agricultural College
Indang, Cavite



00002103

Evaluation of natural convection solar
dryer
621.47 Sa7 1990
T-1053

In Partial Fulfillment of the
Requirements for the Degree of Bachelor
of Science in Agricultural Engineering
(Major in Crop Processing)

by

VICTOR S. SARMIENTO

April, 1990

ABSTRACT

SARMIENTO, VICTOR S., Don Severino Agricultural College, Indang, Cavite, April, 1990. "Evaluation of Natural Convection Solar Dryer", Engr. Conrado M. Baltazar, Adviser.

This study was conducted to investigate the applicability of natural convection solar dryer in drying coffee beans and to evaluate the dryer in terms of drying rate and drying time.

A solar dryer constructed at the Don Severino Agricultural College-Affiliated Non-Conventional Energy Center was used in this study.

Results of this study revealed that solar drying method exhibited faster drying rate of 3.23% mc/hr and has a drying time of 54.67 hours as compared to direct sundrying method with a rate of 2.59% mc/hr and a drying time of 62.89 hours. It was also affected by the density of the product. Coffee density of 30 kg/m² has the highest drying rate of 4.23% mc/hr followed by 60 kg/m² with a rate of 2.85% mc/hr. The least drying rate was observed on product having 120 kg/m² density, 1.89% mc/hr.

Likewise, the drying was also affected by the density of product. The densities of 30, 60 and 120 kg/m² had a time duration of 35.33, 65.33 and 80.66 hours, respectively.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA	iii
ACKNOWLEDGMENT	iv
ABSTRACT	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF APPENDIX TABLES	xi
INTRODUCTION	1
Importance of the Study	1
Objectives of the Study	3
Time and Place of the Study	3
REVIEW OF RELATED LITERATURE	4
MATERIALS AND METHODS	6
Experimental Design	6
The Natural Convection Solar Dryer	6
The solar collector	7
The tray	7
The chimney	7
Preparation of the Samples	7
Moisture Content Determination	9
Drying rate	10
Drying time	11

	Page
RESULTS AND DISCUSSION	12
The Drying Rates	12
Drying Time of Coffee	13
Temperature and Percent Relative Humidity	16
SUMMARY, CONCLUSION AND RECOMMENDATION	20
Summary	20
Conclusion	21
Recommendation	22
LITERATURE CITED	23
APPENDICES	244