

**DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF
UNSHELLED CASTOR BEAN (*Ricinus communis L.*) SORTER**

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and
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This undergraduate thesis entitled “**DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF UNSHELLED CASTOR BEAN (*Ricinus communis L.*) SORTER,**” prepared and submitted by **ANA MAY PALMA DOCTOLERA** in partial fulfilment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL MACHINERY AND RENEWABLE ENERGY)** is hereby accepted:


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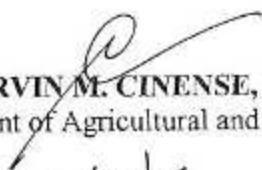

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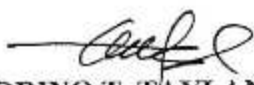

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BIOGRAPHICAL SKETCH

The author, Ana May P. Doctolera, was born on the 23rd of July 1998 in Llanera, Nueva Ecija, the only daughter of Mr. Crispin P. Doctolera Jr. and Mrs. Ana Marie P. Doctolera, by whom the latter died after she was born. She was raised in a simple life and a fearful child of God by her two grandmothers, Carmelita P. Doctolera and Anita G. Palma.

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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF APPENDIX TABLES	xi
LIST OF APPENDIX FIGURES	xiii
ABSTRACT	xv
INTRODUCTION	1
Background of the Study	1
Statement of the Problem	3
Objectives of the Study	4
Significance of the Study	4
Scope and Limitation of the Study	5
Time and Place of the Study	6
REVIEW OF RELATED LITERATURE	7
Botanical Background of Castor Bean	7
Castor Bean Usage	8
History of Castor Bean	8
Production Stages of Castor Bean	9
Postharvest Processes	10
Postharvest Losses	10
Grading and Sorting	11
Sorting Specifications	12
Length, Width, and Thickness	12
Bulk Density	12
Angle of Repose	13
Coefficient of Friction	13
Size Grading Machines	13
Modified Onion Quick Sorter	14
Drum Bean Grader	14
Groundnut In-Shell Grader	15

Castor Plant Threshing, Cleaning and Sorting Machine	15
Roller Type Grader	16
Sorting Machine	16
Design and Development of Agricultural Machinery	17
Evaluation of the Grading Machine	18
Cost Determination	19
METHODOLOGY	22
Conceptualization of the Study	22
Design Considerations	24
Physical Characteristics of Unshelled Castor Bean	24
Determination of Length, Width, and Thickness of Castor Pods	24
Determination of Bulk Density of Castor Pods	25
Determination of Angle of Repose of Castor Pods	25
Determination of Coefficient of Friction of Castor Pods	25
Design Requirements	26
Principle of Operation	27
Design Calculations	28
Hopper	28
Sorting Unit	29
Receiving Funnel	32
Oscillation Assembly	32
V-Belt and Pulley	34
Transmission Shaft	35
Prime Mover	37
Frame	37
Fabrication of the Device	39
Preparation of Samples	40
Equipment Used for Laboratory Testing and Performance Evaluation	40
Laboratory Testing	41
Preliminary Testing of the Machine	41
Problems met and modifications employed	42
Final Testing Procedure	42

Data Gathered	43
Duration of Test	43
Noise Level	43
Speed of Components	44
Sampling from Different Outlet	44
Collection of Sorted Pods	44
Evaluation of the Different Performance Parameters	45
Statistical Analysis	46
Cost Analysis	47
RESULTS AND DISCUSSION	51
Description of the Castor Bean Sorter	51
Castor Pods Sample Analysis	51
Machine Description and Specifications	51
Hopper	53
Grading Unit	53
Receiving Funnel	54
Oscillation Assembly	55
Power Transmission System	55
Frame Assembly	56
Testing and Evaluation	56
Throughput Capacity	57
Sorting System Efficiency	58
Percent Mechanical Damage	60
Noise Level	62
Power Requirement	62
Cost Analysis	63
SUMMARY, CONCLUSION AND RECOMMENDATION	66
Summary	66
Conclusion	67
Recommendation	68
LITERATURE CITED	69
APPENDICES	75

LIST OF TABLES

TABLE		PAGE
1	Sequence of the sorting speed for the sorting shaft	46
2	Castor pods sample analysis	51
3	Specifications of the unshelled Castor bean sorter	52
4	Average throughput capacity of the sorter as affected by the different speeds of the sorting shaft, kg/hr	58
5	Average sorting system efficiency of the sorter as affected by the different speeds of the sorting shaft, %	59
6	Percent mechanical damage of the sorter as affected by different speeds of the sorting shaft, %	60
7	Assumptions used on the cost analysis of the unshelled Castor bean sorter	63
8	Cost charges when operating the unshelled Castor bean sorter	64

LIST OF FIGURES

FIGURE		PAGE
1	Fruit ear of a Castor (a), pods consist of three carpels with thorns (b)	7
2	Production stages of the Castor bean plant	10
3	Conceptual Framework of the study	23
4	Flow Chart of activities in sorting Unshelled Castor bean	28
5	Design of the hopper	29
6	Design of the sorting unit	30
7	Arch length in contact between the rod and the unshelled Castor bean	31
8	Design of the receiving funnel	32
9	Shear-Moment diagram of the shaft	33
10	Design of the frame	38
11	The unshelled Castor bean sorter	52
12	Classification of Castor pods according to size, small (A), medium (B), and large (C)	57
13	Graph showing break-even point and break-even weight of Castor pods	65

LIST OF APPENDIX TABLES

APPENDIX TABLE		PAGE
1	Mass of Castor pods for each class in 5 kg of sample (small, medium, and large), kg	76
2	Mass of Castor pods collected in each respective receiving outlets (small, medium, and large) after the samples were sorted, kg	76
3	Mass of sorted Castor pods in each class (small, medium, and large) after the operation, kg	77
4	Percentage of sorted Castor pods in each class (small, medium, and large) after the operation, %	77
5	Sorting efficiency of the sorter in classifying 5 kg of Castor pods at different classes (small, medium, and large), %	78
6	Analysis of variance on the total sorting system efficiency of the sorter, %	78
7	Comparison among means on the sorting system efficiency of the sorter as affected by the different speeds of the sorting shaft, %	78
8	Elapsed time in sorting 5 kg sample of Castor pods, sec	78
9	Analysis of variance on the throughput capacity of the sorter, kg/hr	79
10	Comparison among means on the throughput capacity of the sorter as affected by the different speeds of the sorting shaft, kg/hr	79
11	Mass of damaged Castor pods in each class (small, medium, and large) after the samples were sorted, kg	79

12	Analysis of variance on percent mechanical damage of the sorter, %	79
13	Comparison among means on the percent mechanical damage of the sorter as affected by the different speeds of the sorting shaft, kg/hr	80
14	Sound level test, dB	80
15	Bill of Materials	81

LIST OF APPENDIX FIGURES

APPENDIX FIGURE		PAGE
A	Fabrication of the machine	83
1	Measuring the materials for fabrication	83
2	Cutting the materials using a cut-off machine	83
3	Fabrication of the sorting unit	84
4	Fabrication of the frame	84
5	Installation of the oscillation device	85
6	Cutting the G.I. sheet using a shear	85
B	Sample collection and preparations	86
7	Pruning of Castor pods from the tree	86
8	Removing dirt, damaged, stones, and stalks from the samples	86
9	Measuring the length, width and height of Castor pods	87
10	Manual sorting of the samples using Vernier Caliper	87
11	Labeling of the samples using paint	88
12	Samples of 5 kg for each treatment	88
C.	Final testing of the machine	89
13	Driving pulleys for varying the speed of the sorting unit	89
14	Determining the speed using a tachometer	89
15	The grading operation	90

16	Laboratory testing of the machine using an electric dynamometer	90
17	Samples after the sorting operation	91
18	Quantifying damaged samples	91

ABSTRACT

DOCTOLERA, ANA MAY P., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **June 2019, DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF UNSHELLED CASTOR BEAN (*Ricinus communis L.*) SORTER.**

Adviser: **MARLON T. DELOS SANTOS, M.Sc.**

The study was carried out to design, fabricate, and evaluate the performance of unshelled Castor bean sorter in classifying Castor pods by size. The specific goal of this study was to determine the appropriate oscillation speed to facilitate its sorting performance and perform simple cost analysis on the device.

The unshelled Castor bean sorter was designed and drawn based on the physical characteristics of the Castor pods. The machine was fabricated based on design plans and specifications. The components of the sorter include the hopper, sorting unit, receiving funnel, oscillation assembly, power transmission system, and frame. The sorting unit was designed with slatted stainless steel (6.35 mm diameter, 40 cm long) by which the clearance varies from 15 mm, 20 mm, and 25 mm. These gaps were sized up based on the actual sizes of Castor pods. The diameter of Castor pods as testing samples were 16mm to 20 mm, 21 to 25 mm, and 26 mm and above – small, medium, and large.

Three different sorting speeds of the shafts (430 rpm, 358 rpm, and 307 rpm) were evaluated. Five (5) kilograms of mixed Castor pods were used in the treatment at three (3) replications. Results showed that the appropriate sorting speed was at 358 rpm giving a system efficiency of 73.49% in sorting, and throughput capacity of 400.53 kg/hr.

Likewise, the amount of damaged pods was only 1%, the lowest among the three treatments.

The overall cost of the device was Php19,338.20 with a break-even weight of 16,115.17 kg/yr of Castor pods at a custom rate of Php1.2/kg and a breakeven operational cost of Php8,379.87/yr. Equivalent annual fixed cost of the device was Php21,310.70 and variable cost of Php71.84/hr.

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