

**PERFORMANCE EVALUATION OF THE FLUIDIZED BED DRYER FOR  
FIRST STAGE DRYING OF HIGH MOISTURE PADDY**

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and  
Biosystems Engineering, College of Engineering, Central Luzon State University,  
Science City of Munoz, Nueva Ecija, Philippines  
in Partial Fulfillment of the Requirements  
for the Degree of

**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING  
(AB Machinery and Power Engineering)**

**MAY 2023**

## TABLE OF CONTENTS

	PAGE
TITLE PAGE	i
ACCEPTANCE SHEET	ii
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDIX TABLE	x
LIST OF APPENDIX FIGURE	xi
ABSTRACT	xii
INTRODUCTION	1
Background of the study	1
Statement of the Problem	3
Objectives of the study	5
Significance of the study	5
Scope and limitation of the study	6
Time and place of the study	6
REVIEW OF RELATED LITERATURE	7
Moisture Content, Drying and Tempering durations	8
Temperature for Fluidized bed dryer as first stage drying	9
Fluidized bed dryer as first stage high speed dryer	10
Advantages and Disadvantages of Fluidized bed drying	10
PhilMech developed fluidized bed dryer	12
Principle of operation of the Fluidized bed dryer	16
METHODOLOGY	17
Conceptualization of the Study	17
Conceptual Framework of the Study	18
Performance Evaluation of the Fluidized Bed Dryer	19
Study Area and Test Site Condition	19
Instrument and material used during the evaluation	19
Preliminary Testing	21
Final Testing	21
Test Preparation	22

Performance test	23
Performance parameters to be evaluated	26
Heat Utilization	26
Moisture Content Reduction	26
Drying Efficiency	26
Drying System Efficiency	26
Heating System Efficiency	26
Drying Time	26
Statistical Analysis	27
Cost Analysis	28
RESULTS AND DISCUSSION	29
Measured parameters of the machine	29
Performance evaluation of the PhilMech fluidized bed dryer	31
Heat Utilization	31
Moisture Content and Removal rate	33
Heat Added to Process Air	35
Drying Efficiency	36
Drying System Efficiency	39
Heating System Efficiency	41
Drying Time	42
Cost Analysis	44
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	46
Summary	46
Conclusions	50
Recommendations	51
LITERATURE CITED	52
APPENDICES	54

## LIST OF TABLES

TABLE		PAGE
1	Instrument and materials to be used during the fluidized bed dryer evaluation	20
2	Measured parameters of the machine	29
3	Data gathered on paddy samples	31
4	Drying cost per bag of using fluidized bed dryer	44

## LIST OF FIGURES

FIGURE		PAGE
1	PhilMech Fluidized Bed Dryer	12
2	Front view of the Fluidized bed dryer	14
3	Back view of the Fluidized bed dryer	14
4	Right side view of the Fluidized bed dryer	15
5	Left side view of the Fluidized bed dryer	15
6	Conceptual framework of the study	18
7	Heat utilization of fluidized bed dryer using two different heating system	32
8	Initial, fluidized, and final moisture content of test samples in fluidized bed dryer using two different heating system	33
9	Moisture content reduction of test samples in fluidized bed dryer using 2 different heating system	34
10	Heat added to process air by the two different heating systems	35
11	Drying efficiency of the fluidized bed dryer using two different heating systems	37
12	Average air velocity of fluidized bed dryer using two heating system	38
13	Fuel consumed in kilogram using diesel and rice hull as a heating system	39
14	Drying system efficiency of the fluidized bed dryer using two different heating systems	40
15	Heating system efficiency of the fluidized bed dryer using two different heating systems	41
16	Drying time of fluidized bed dryer using two different heating system	42
17	Initial weight and final weight of paddy samples used in fluidized bed dryer using 2 different heating system	43

## LIST OF APPENDIX TABLE

APPENDIX TABLE	PAGE
1 ANOVA for Heat Utilization	55
2 Descriptives for Heat Utilization	55
3 Post Hoc Comparison among means for Heat Utilization	55
4 ANOVA for Moisture Content Reduction	55
5 Descriptives for Moisture Content Reduction	55
6 Post Hoc Comparison among means for Moisture Content Reduction	56
7 ANOVA for Moisture Content Reduction per minute	56
8 Descriptives for Moisture Content Reduction per minute	56
9 Post Hoc Comparisons among means for Moisture Content Reduction per minute	56
10 ANOVA for Heat Added to Air	56
11 Descriptives for Heat Added to Air	57
12 Post Hoc Comparisons among means for Heat Added to Air	57
13 ANOVA for Drying Efficiency	57
14 Descriptives for Drying Efficiency	57
15 Post Hoc Comparison among means for Drying Efficiency	58
16 ANOVA for Drying System Efficiency	58
17 Descriptives for Drying System Efficiency	58
18 Post Hoc Comparison among means for Drying System Efficiency	58
19 ANOVA for Heating System Efficiency	58
20 Descriptives for Heating System Efficiency	59
21 Post Hoc Comparison among means for Heating System Efficiency	59
22 ANNOVA for Drying Time	59
23 Descriptives for Drying Time	59
24 Post Hoc Comparison among means for Drying Time	59
25 Latent heat of water (kJ/kg) at different temperature.	60
26 Drying performance test sheet	61

## LIST OF APPENDIX FIGURE

APPENDIX FIGURE		PAGE
1	Ambient temperature and humidity measurement	62
2	Grain temperature measurement	62
3	Fresh paddy moisture content measurement	63
4	Heating the rice hull furnace	63
5	Heating of diesel burner	64
6	Control setting	64
7	Loading of the test samples	65
8	Manual loading of rice hull	65
9	Digital thermometer instrument used	66
10	Tacometer Instrument used	66
11	Pitot tube + manometer instrument used	67
12	Suction air velocity and pressure measurement	67
13	Recording of suction air velocity and pressure	68
14	Blower air velocity and pressure measurement	68
15	Recording of blower air velocity and pressure	69
16	Digital voltmeter instrument	69
17	Measurement of volt and ampere	70
18	Recording of Data	70
19	Recording of control settings	71
20	Control panel	71
21	Measurement of paddy temperature after it pass the fluidized	72
22	Clearing of paddy samples	72
23	Unloading of paddy samples	73
24	Air drying of fresh and dried paddy samples	73
25	Moisture content measurement of dried samples	74
26	Packed samples	74
27	Cleaning of paddy residue after drying	75
28	Cleaning of residue in fluidized bed column	75

## ABSTRACT

**STO. TOMAS, GRACIANO T.**, Department of Agricultural and Biosystems Engineering, College of engineering, Central Luzon State University, Science City of Muñoz Nueva Ecija, Philippines, **MAY 2023, PERFORMANCE EVALUATION OF FLUIDIZED BED DRYER FOR FIRST STAGE DRYING OF HIGH MOISTURE PADDY**

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The fluidized bed dryer for paddy was designed by PhilMech as a two-stage drying system. The dryer served as the first-stage dryer for the immediate removal of free water to a more manageable level of 18-22% moisture content wet basis. The heat source of the dryer can be adapted to diesel or biomass such as rice hull.

This study was conducted to evaluate the performance of the fluidized bed dryer in first stage drying of high moisture paddy using 2 different heat sources. Three experimental runs using diesel and another three runs using rice hull were made. The performance evaluation was done at Bagong Buhay ng Mabini Multi-Purpose Cooperative. Two tons of high moisture paddy were used in each batch, and a total of 6 batch was done.

Drying parameters such as heat utilization, moisture content reduction, heat added to the air, drying efficiency, drying system efficiency, and heating system efficiency were measured, computed and analyzed. Ambient condition, crop condition and dryer performance were recorded for every test run. The PAES 202:2015 or the Heated air mechanical dryer test procedure used as the reference for the drying performance test. Results were analyzed using Analysis of Variance (ANOVA) and the comparison among means was done using Tukey's Test. Simple cost analysis for price per kilo (kg) of wet paddy to be dried at the fluidized bed dryer were also carried out.

Based on the performance evaluation made on the fluidized bed dryer, it resulted to a measured drying condition for the developed fluidized bed dryer was at temperature of 70°C, with an air velocity of 9 m/s and static pressure of 3.5 inH<sub>2</sub>O.

The fluidized bed dryer resulted to a high drying system efficiency and heating system efficiency when diesel burner is used as a heating system.

The drying parameters such as heat utilization, drying efficiency, drying system efficiency, heating system efficiency and drying time are significantly affected by the fuel used in heating system. In terms of fuel used, the use of rice hull furnace resulted to a higher fuel consumption compared to the use of diesel burner as a heating system.

Using simple cost analysis on using diesel burner heating system in the fluidized bed dryer will incur a total of P0.83 to dry a kilogram of paddy, on the other hand, using a rice hull furnace resulted to lower drying cost of Php 0.74 per kilogram of paddy.

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