

**COMPREHENSIVE SEMESTRAL REPORT ON FIELD PRACTICE AT THE
PHILIPPINE-SINO CENTER FOR AGRICULTURAL TECHNOLOGY(PhilSCAT)**

ALDRIANNE RENZ PALMA AGUSTIN

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

**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS
ENGINEERING
(Agricultural Power, Energy, and Machinery Engineering)**

JUNE 2023

TABLE OF CONTENTS

	PAGE
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF APPENDIX TABLES	xi
LIST OF APPENDIX FIGURES	xii
ABSTRACT	xiv
INTRODUCTION	
Background of the Field Practice	1
Objectives of the Field Practice	2
Activity 1. Performance Evaluation of Rice Combine Harvester according	3
Activity 2: Assistance on the performance evaluation of Rice Mill on milling of Brown Rice	3
Activity 3: Execution of different tasks assigned by the Agricultural and Biosystems Engineering Department or by the instruction of the Director.	4
Activities of the Field Practice Program	4
Significance of the Field Practice	5
Time and Place of the Field Practice Program	5
REVIEW OF RELATED LITERATURE	
Philippines-Sino Center for Agricultural Technology (PhilSCAT)	6
Agricultural Machineries and Equipment at PhilSCAT	6
Rice Harvesting	7
Rice Combine Harvester	8
Rice Milling	10
Multi-Pass Rice Mill	12

METHODOLOGY

Activity 1: Performance evaluation of the available rice combine harvester	16
Identification of Utilized Rice Combine Harvester	16
Familiarization and Operation of Rice Combine Harvester	17
Testing and Performance Evaluation of the Rice Combine Harvester	17
Site Visitation	18
Crop Conditions	18
Moisture Content	18
Grain-Straw Ratio	19
Potential Yield	19
Percent Purity	20
Loss Determination	21
Blower Loss	21
Separation Loss	22
Unthreshed Loss	22
Header Loss	22
Machine Efficiency	24
Actual Field Capacity	24
Theoretical Field Capacity	25
Field Efficiency	25
Fuel Consumption	26
Activity 2: Assistance on the performance evaluation of the existing Rice Milling Machine on milling of Brown Rice	27
Activity 3: Execution of different tasks assigned by the Agricultural and Biosystems Engineering Department or by the instruction of the Director	27

RESULTS AND DISCUSSION

Activity 1: Performance evaluation of the Zoomlion 4LZT-4.0ZD Rice Combine Harvester	28
Utilized Rice Combine Harvester	28
Testing and Performance Evaluation of Zoomlion 4LZT-4.0ZD Rice Combine Harvester	31
Site Visitation	32
Crop Conditions	32
Moisture Content	32
Grain-Straw Ratio	33
Potential Yield	34
Grain Analysis	34
Purity Determination	34
Loss Determination	35
Blower and Separation Loss	35
Unthreshed Loss	36
Summation of all Losses	37
Header Loss	38
Fuel Consumption	39
Theoretical Field Capacity	40
Actual Field Capacity	41
Field Efficiency	41
Activity 2: Assistance on the performance evaluation of the MTP 30B Complete Rice Milling Machine on milling of Brown Rice	41
Specifications of the Utilized Complete Rice Milling Machine	42
Evaluation and Analysis of the MTP-30B Rice Milling Machine in Milling Brown Rice	44
Grain Parameters	45
Performance Evaluation of Rice Milling Machine	46

Activity 3: Perform different tasks assigned by the Agricultural and Biosystems Engineering Department or by the instruction of the Director	47
Harvesting	48
Threshing	49
Seed Cleaning	51
Rice Milling	53
SUMMARY	56
CONCLUSION	61
RECOMMENDATION	63
LITERATURE CITED	64
APPENDICES	66

LIST OF FIGURES

FIGURE		PAGE
1	Parts of a combine harvester	10
2	Typical flow process of a rice mill	13
3	Conceptual framework of the field practice activity	15
4	Rice combine harvester and its parts (front)	29
5	Rice combine harvester and its parts (side)	30
6	The student and instructor from PhilSCAT during the training on how to operate the rice combine harvester	31
7	A single worker is shown as the operator of the rice combine harvester	48
8	The other two workers gathering the harvested rice in sacks	49
9	The area where the rice is harvested manually	50
10	Thrown-in type thresher mounted on a tractor	50
11	The workers feeding the cut stalks on to the threshing cylinder	51
12	Seed cleaning in process	51
13	The sacks of seeds that was cleaned	52
14	Two different varieties milled in philscat: red rice and black rice	53

LIST OF TABLES

TABLE		PAGE
1	Parameters of the Zoomlion 4LZT-4.0ZD Rice Combine Harvester	28
2	Moisture content of the sample	32
3	Grain-straw ratio	33
4	Potential yield per square meter	34
5	Percent purity for each 500 grams sample	35
6	Blower and separation loss	36
7	Unthreshed loss	37
8	Summation of losses	38
9	Header loss	39
10	Operating speed	40
11	Specifications of the MTP 30B complete rice milling machine	42
12	Paddy input condition	45
13	Performance evaluation of rice milling machine	46
14	List and dates of agricultural activities in PhilSCAT	54

LIST OF APPENDIX TABLES

TABLE		PAGE
1	Calendar of field practice	67
2	Summary of activities during the field practice	68

LIST OF APPENDIX FIGURES

FIGURE		PAGE
1	Organizational chart	75
2	Driving of riding type mechanical rice transplanter	76
3	Driving of Zoomlion 4LZT-4.0ZD rice combine harvester	76
4	Cleaning, sorting, and separation of sample for loss determination	77
5	Complete rice milling Machine in Workshop III, PhilSCAT	77
6	Milling of rice with Engr. Edgar Coloma	78
7	Weighing of samples (Pre-harvest loss)	79
8	Removal and weighing of grains for the determination of Grain-straw ratio	80
9	Removal and weighing of grains for the determination of grain-straw ratio	80
10	Weight of grains and straw	81
11	Gathering of data for header loss	81
12	Gathering of loose grains on the ground for the computation of header loss	82
13	Gathering of 500 grams sample for purity determination	82
14	Gathering of 500 grams sample for purity determination	83
15	Gathering of data for loss determination	83
16	Setting up of 1 square meter plots for the initial gathering of samples	84
17	Milling of rice	84
18	Gathering of data for the performance evaluation of rice milling machine	85

19	Gathering of data for the performance evaluation of rice milling machine	85
20	Seed cleaning process in PhilSCAT	86
21	Seed cleaning process in PhilSCAT	86
22	Collection of harvested palay in the grain output	87
23	Harvesting of rice in KAMALIG-CLSU	87
24	Rice combine harvester during operation	88
25	Sacks of threshed grain using a throw-in type thresher	88
26	Sacks of threshed head grain using a thrown-in type thresher	89
27	Feeding of rice stalks in threshing cylinder	89

ABSTRACT

AGUSTIN, ALDRIANNE RENZ P., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, June 2023. **COMPREHENSIVE SEMESTRAL REPORT ON FIELD PRACTICE AT THE PHILIPPINE-SINO CENTER FOR AGRICULTURAL TECHNOLOGY(PhilSCAT)**

Adviser: **MARVIN M. CINENSE, Ph. D**

This field practice was conducted at the Philippine-Sino Center for Agricultural Technology (PhilSCAT), Science City of Muñoz, Nueva Ecija. From April 2023 to May 2023. In this field practice, three major activities were done in the chosen institution, these activities are: Performance evaluation of the Zoomlion 4LZT-4.0ZD Rice Combine Harvester; Assistance on the performance evaluation of the MTP 30B Complete Rice Milling Machine on milling of Brown Rice; Execution of different tasks assigned by the Agricultural and Biosystems Engineering Department or by the instruction of the Director.

The field practice under the Bachelors of Science in Agricultural and Biosystems Engineering in Central Luzon State University should complete at least 240 hours in an Agricultural related institution. Philippine Sino-Center for Agricultural Technology (PhilSCAT) is one of the institutions that can really cater the necessary needs and activities of a field practice for it to be successful. PhilSCAT have the facilities and resources to help the students conduct their activities to finish their field practice.

Based on the results discussed, the efficiency of the rice combine harvester was within the performance criteria set the by PAES 224:2015 Agricultural Machinery- Rice Combine Harvester- Specifications. The computed field efficiency was at 88.25%, while the minimum efficiency set by the standards is at 75%.

The performance evaluation of the rice milling machine in milling of brown rice showed a milling recovery of 74.12%. The conditions of the paddy input greatly affected this result, as it is the basis whether the rice grains will withstand the mechanical stress of the process. The Agricultural and Biosystems Engineering Division of PhilSCAT handles and performs activities relevant to the student deployed. These activities helped the student gain technical skills required to productively perform these tasks in the future. With technical supervision, activities such as harvesting, threshing, seed cleaning, and milling of rice have been observed and performed by the student first hand. These experiences would help the students on choosing a correct and relevant path to pursue after graduating.

Overall, the field practice conducted in the Philippine Sino-Center for Agricultural Technology under the Agricultural and Biosystems Engineering Division can be concluded successfully. The activities done during this field practice does not only serve as a requirement to finish the degree but also to further educate the students on how to be a professional agricultural and biosystems engineer.

LITERATURE CITED

- Afzalnia, S., Shaker, M., & Zare, E. (2004). Comparison of different rice milling methods. *Canadian biosystems engineering*, 46(3), 63-66.
- Bekana, D., Antoniev, A., Zach, M., & Mareček, J. (2015). Monitoring of agricultural machines with used engine oil analysis. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63(1), 15-22.
- Dhankhar, P., & Hissar, T. (2014). Rice milling. *IOSR J. Eng*, 4(5), 34-42.
- IRRI. 2015. Steps to Successful rice production. International Rice Research Institute, Department of Agriculture. International Rice Research Institute. Philippines.
- JAWLEKAR, S. B., & Shelare, S. D. (2020). Development and performance analysis of low cost combined harvester for rabi crops. *Agricultural Engineering International: CIGR Journal*, 22(1), 197-201.
- Khodabakhshian, R., & Shakeri, M. (2010). Oil analysis of agricultural machinery. In *6th National Conference on Agriculture Machinery Eng. & Mechanization (in Persian with English abstract)*. Iran, Mashhad.
- Khodabakhshian, R., & Shakeri, M. (2011). Prediction of repair and maintenance costs of farm tractors by using preventive maintenance. *International Journal of Agriculture Sciences*, 3(1), 39.
- Khodabakhshian, R. (2013). Maintenance management of tractors and agricultural machinery: Preventive maintenance systems. *Agricultural Engineering International: CIGR Journal*, 15(4), 147-159.
- Kumbár, V., & Dostál, P. (2013). Oils degradation in agricultural machinery. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 61(5), 1297-1303.
- Philippine Center for Postharvest Development and Mechanization. 2020. *Reference Manual on Rice Milling*. Philippine Center for Postharvest Development and Mechanization, Department of Agriculture. Philippine Center for Postharvest Development and Mechanization. Philippines.

- Philippine Center for Postharvest Development and Mechanization. 2020. *Reference Manual on Harvesting and Threshing*. Philippine Center for Postharvest Development and Mechanization, Department of Agriculture. Philippine Center for Postharvest Development and Mechanization. Philippines.
- Sejkorova, M., & Hurtova, I. (2019). Engine oil analysis-effective instrument to evaluate the reliability of tractors engines. *Engineering for Rural Development*.
- Siddiqui, A. W., & Ben-Daya, M. (2009). Reliability centered maintenance. *Handbook of maintenance management and engineering*, 397-415.
- Tang, Z., Li, Y., Li, X., & Xu, T. (2019). Structural damage modes for rice stalks undergoing threshing. *Biosystems Engineering*, 186, 323-336.
- Tang, Z., Ren, H., Li, X., Liu, X., & Zhang, B. (2020). Structure design and bearing capacity analysis for crawler chassis of rice combine harvester. *Complexity*, 2020, 1-15.
- Villano, R., & Fleming, E. (2006). Technical inefficiency and production risk in rice farming: evidence from Central Luzon Philippines. *Asian economic journal*, 20(1), 29-46.