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Assessment of Rice Farmers' Knowledge and Perception of Harvest and Postharvest Losses in the Coastal Municipality of Palanan

Keith A. Ramos*[1], Lucila V. Rocha[2], Artemio A. Martin Jr.[3], Raphy A. Sugue[4]
[1] Isabela State University, Echague, Isabela, Philippines
[2, 3, 4] Faculty of College of Agriculture, Isabela State University, Echague, Isabela Philippines
*Corresponding Author email: *keithaddunramos03@yahoo.com*

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Abstract

Aim: This study examined rice farmers' understanding and perspectives regarding harvest and postharvest losses in Palanan, a coastal municipality.
Methodology: Using descriptive statistics and Slovin's formula, questionnaires were administered through face-to-face interviews. A total of 324 (261 male and 63 female) rice farmers were randomly surveyed from the 17 barangays of Palanan, Isabela.
Results: Results indicate a predominance of middle-aged farmers, with ages 30 to 59 representing 87.4% of the sample, showcasing a comprehensive representation across different age brackets. Farmers acknowledge significant losses during transportation, threshing, drying, and storage, with traditional methods often linked to higher losses. They recognize the impact of factors like drying materials, milling methods, rice variety, and crop management on yield and grain quality. Challenges in managing postharvest losses include inadequate storage facilities, although farmers perceive financial support and extension services as effective solutions.
Conclusion: The study underscores the need to invest in infrastructure, financial aid, and extension services to enhance farmers' capacity in mitigating losses and improving rice production efficiency.

Keywords: Rice farmers, harvest losses, post-harvest losses, Methods of harvesting

INTRODUCTION

Globally, the Food and Agriculture Organization of the United Nations (FAO) projects that food production needs to increase by 70% to meet the needs of the world's anticipated population of 9.1 billion by 2050. Traditionally, the focus has been on increasing food production to improve food supply. However, this approach is unsustainable due to the immense environmental costs associated with agriculture, including the use of land, water, and greenhouse gas emissions. Reducing food wastage, encompassing both food loss and food waste, is therefore critical for increasing food supply without exacerbating environmental degradation (FAO, 2009).

Rice, as one of the world's three major food crops, is essential for almost half of the global population, particularly in low- and lower-middle-income countries. Among the stakeholders in the rice value chain—farmers, processors, and marketers—farmers experience the highest losses (IRRI, 2015). These losses, particularly during post-harvest handling and on-farm storage, have a direct impact on farmers' incomes and contribute to food insecurity. Studies indicate that a significant portion of rice losses occurs during the harvest process, which involves cutting or reaping the stalks, bundling, and transporting them (Hodges & Maritime, 2016).

Harvesting operations occur on the field and consist of cutting the stalks or reaping the panicles and bundling for transportation. Cutting or reaping is done by knife, serrated sickle, paddy mower, reaper, or combine harvester. In developing countries, harvesting is mainly done using traditional hand tools (i.e., knife and serrated sickle), which are considered inefficient practices. Traditional practices were considered ineffective, not because of the clear evidence of high loss, but because they were distinguished by "ancient" activities uninfluenced by contemporary technology. Harvest loss mainly manifests as physical loss. When cutting or reaping the straws, grains may be scattered across the

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field, plowed into the soil, and eaten by birds and rodents. However, according to Qu et al. (2021), the use of combine harvesters weakens the delineation between the post-processing stages of rice (i.e., reaping, threshing, and winnowing) compared to manual operations, making it difficult to strictly distinguish the losses that occur at these stages. Therefore, they defined the process from field reaping to on-farm storage places as the harvesting process and estimated the harvest loss during this process divided into four stages: reaping, threshing, winnowing, and field transportation. Consequently, the studies on rice harvest loss we reviewed are not only limited to reaping loss, but also include threshing, winnowing, and field transportation loss. Threshing is the process of removing the paddy kernels or grains from the panicles. This operation could be done by trampling, banging, pedal thresher, power thresher, and combine harvester. Threshing loss refers to grains remaining on the panicles or scattered on the threshing floor. After threshing, the immature grains, rice straw, stones, sand, chaff, and other foreign materials are removed from the threshed paddy by sieving or wind, during which paddy may also be removed, resulting in a winnowing loss. Field transportation refers to transferring the grain from the field or winnowing places to warehouses, and loss may be caused by spillage.

The goal of proper harvesting is to maximize grain yield while minimizing grain losses and quality deterioration (IRRI, 2015). The speed of manual cutting operations risks significant crop loss due to delayed harvesting in developing countries. When harvest is delayed, shatter loss is the most-often mentioned cause of losses. Estimates of harvest losses range from 5 to 16% for rice and 8 to 18% for a range of different cereal crops. All of the cereal, oilseed and pulse crops have a narrow range of moistures for optimally-low harvest losses and high crop quality. The optimal moisture for harvest of all crops is nearly always too high to allow safe storage (Paulsen et al., 2015).

A study by Global Strategy (2015) cited that environmental agents of harvest and postharvest losses include insects, vermin, molds, temperature, weather conditions, and humidity while socio-economic factors include lack of access to market information, lack of access to financial support and pilferage, among others. Identifying the causes of rice harvest and postharvest losses is as crucial as the solution required.

The municipality of Palanan in Isabela is a significant area for rice farming, with a total of 1,852 rice farmers cultivating 1,755.0311 hectares as of August 31, 2023. The distribution of farmers and the corresponding cultivated areas include Alomanay with 65 farmers and 62.2572 hectares, Bisag with 182 farmers and 187.7241 hectares, Culasi with 132 farmers and 133.0986 hectares, Dialawyao with 158 farmers and 117.8728 hectares, Dicabisagan East with 82 farmers and 91.9978 hectares, Dicabisagan West with 148 farmers and 176.7534 hectares, Dicaduan with 64 farmers and 69.8711 hectares, Didaddungan with 18 farmers and 37.3416 hectares, Didian with 128 farmers and 140.6985 hectares, Dimalicu-licu with 40 farmers and 25.1494 hectares, Dimasari with 96 farmers and 80.0881 hectares, Dimatican with 95 farmers and 75.5628 hectares, Maligaya with 262 farmers and 217.5699 hectares, Marikit with 120 farmers and 89.7342 hectares, Sta. Jacinta with 58 farmers and 44.3733 hectares, San Isidro with 100 farmers and 83.2257 hectares, and Villa Robles with 104 farmers and 121.7126 hectares (Palanan MAO, 2023).

Objectives

The main objective of this study is to assess rice farmers' perception and knowledge of harvest and postharvest losses in the selected rice-growing community of Palanan.

Specifically, the study aimed to:

1. Identify the stages in rice production losses causes, and extent of losses.
2. Ascertain the level of adoption of rice harvesting, drying, and milling.
3. Identify the key challenges faced by rice farmers in minimizing harvest and postharvest losses in a coastal setting.
4. Determine the effectiveness of existing support systems, such as storage facilities and training programs, in mitigating harvest and postharvest losses among rice farmers in Palanan.

METHODS

Study Area

The study was conducted in the coastal, forest, and agro-ecological zones of Palanan. All seventeen barangays of the municipality were selected from the agroecological zone. Study locations were described based on the information from the Municipal Planning and Development Council of Palanan, Isabela.

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Research Design

The research design utilized in this study is descriptive research to provide a comprehensive understanding of the rice farmers' knowledge and perception of harvest and postharvest losses in Palanan, Isabela. Through the use of surveys, interviews, and observation, this research design aims to systematically collect and analyze data to accurately describe the current knowledge and perception of rice farmers about harvest and post-harvest losses. By adopting a descriptive research design, this study sought to generate valuable insights into the farmer's behavior, practices, and perceptions contributing to the development of effective interventions and policies to enhance their harvest and post-harvest practices.

Population and Sample Size of the Study

The researchers believed the population of interest was enough to suffice and answer the survey. To acquire the desirable number of respondents representing the whole population, the sufficient sample size was approximated about the total number of rice farmers using Slovin's formula, for which the margin of error was set to 5%. The said formula is given as follows:

$$n = \frac{\mathrm{N}}{1 + \mathrm{Ne}^2}$$

where n is the sample size, N is the total population number of rice farmers, and e refers to the margin (sampling) error.

The sampling frame for the rice farmers around the study area was requested from the Municipal Agriculture Office (MAO) of Palanan, Isabela. From this frame, 324 respondents out of 1,815 rice farmers were selected. The researcher aimed to achieve equal representation from all barangays in the study. To do so, the researcher divided the 324 respondents among the 17 barangays of Palanan, Isabela, obtaining a specific number of respondents per barangay.

However, due to the insufficient number of farmers available for surveying in some barangays, only 8 farmers from Brgy. Didaddungan were surveyed, while 15 farmers from Sta. Jacinta participated. The number of farmers surveyed in Maligaya was increased to 21, as it has the highest number of farmers in the municipality of Palanan.

Data Gathering Instrument

The questionnaire used in the study was carefully validated to ensure that the questions were accurate, relevant, and reliable. The content of the questionnaire was divided into two (2) sections: socio-demographic information and Rice production Characteristics. In the socio-demographic section, respondents were asked to provide personal information such as age, gender, civil status, years of farming, educational attainment, and income (Appendix Table 31). This information was important to help understand the context and background of the assessment of rice farmer's knowledge and perception of harvest and postharvest losses in the coastal municipality of Palanan.

To identify the rice production characteristics, the farmers were asked to extensively examine various aspects of rice production, starting with an in-depth analysis of cultivated varieties and the machinery used during harvest and postharvest phases. It further explores the causes of postharvest losses specific to rice, scrutinizing methods employed for threshing and the stages at which losses are most experienced. The section investigates farmers' understanding of postharvest losses, their existing knowledge base regarding these losses, and the challenges they encounter in managing harvest effectively. Finally, it delves into the support systems available to farmers in mitigating losses and assesses the overall cost of production. By dissecting these elements, the research endeavors to provide a comprehensive understanding of the nuances surrounding rice production, harvest, and postharvest stages, ultimately aiming to offer tailored recommendations and interventions to minimize losses and enhance efficiency in the rice farming sector.

Coordination with the Municipal Agriculture Office and Barangay Captains

Dr. Jose Marie Monteclaro head of the Agriculture Office at the Municipal Agricultural Office (MAO) of Palanan provided the profile of the 17 barangays in Palanan, Isabela. Moreover, Barangay captains of the said barangays were provided with the list of rice farmers interviewed in their barangays.

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Data Collection

A survey method was conducted face-to-face using a structured questionnaire that was used to collect data from three hundred twenty-four (324) rice farmers in the 17 barangays of Palanan, Isabela, Philippines to assess rice farmers' perception and knowledge of harvest and postharvest losses in selected rice growing communities of Palanan. As the respondents were interviewed, their responses were noted down by the researcher. The responses were then analyzed to determine farmers' perceptions and knowledge of harvest and postharvest losses in the selected rice-growing community of Palanan.

Data Analysis

The data collected were analyzed with the aid of the descriptive statistical tool of frequency and percentage to determine the demographic characteristics and the Farmers' perceptions of harvest and postharvest losses. In the remaining sections of the study, the researchers used a 5-point Likert scale to measure the opinions and attitudes of rice farmers about their knowledge and perception of harvest and post-harvest losses. The data collected were then processed using Microsoft Excel.

RESULTS and DISCUSSION

Socio Demographic Profile of the Respondents

The age distribution of the respondents participating in the study on the assessment of rice farmers' knowledge and perception of harvest and postharvest losses in the coastal municipality of Palanan. The majority of respondents fall within the age ranges of 30 to 59 years old, collectively representing 87.4% of the sample. Specifically, the age groups of 30-39, 40-49, and 50-59 constitute significant portions of the respondents, with frequencies of 61 (18.8%), 72 (22.2%), and 84 (25.9%) respectively. This indicates that the study primarily captured the perspectives of middle-aged rice farmers.

The age groups of 20-29 and 60-69 also contribute notably to the sample, with frequencies of 17 (5.2%) and 60 (18.5%) respectively, showcasing a diverse representation across different age brackets. While the age groups of 15-19 and 70 above have relatively smaller frequencies, their inclusion in the study ensures a broader perspective encompassing younger and older rice farmers within the community.

47.8% of farmers are among those with only an elementary education. A further 0.9% just know how to read and write, and 0.6% have never attended school. The combined percentage of 49.3% indicates that over half of the farmers surveyed had only a short history of formal schooling. Conversely, a lower proportion of farmers (32.1%) possess a secondary education (high school diploma). Only 8.3% of the population has completed postsecondary education, meaning they hold a college or university degree.

Farmers with lower levels of education may have less access to information about new technologies, better farming techniques, and sustainable agricultural practices. Additionally, it might make it more difficult for them to comprehend intricate agricultural laws or negotiate farming-related government programs (Muthumanickam et al., 2022).

Farmers' knowledge and perceptions of harvest and post-harvest losses

Table 1. Farmers knowledge and perceptions of harvest and post-harvest losses

Perception Statement	Weighted Mean	Descriptive Interpretation
Harvest and PHL do not usually occur in rice	2.6	Disagree
The level of rice harvest and PHL is normal	3.3	Indifferent
The level of rice harvest and PHL is too much	3.4	Indifferent
The level of rice losses is more prominent at the harvesting stage	3.4	Indifferent
The level of rice losses is more prominent during paddy transportation	3.8	Agree

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The level of rice losses is more prominent at the threshing stage	3.9	Agree
The level of rice losses is more prominent at the drying stage	3.5	Agree
The level of rice losses is more prominent at the parboiling stage	3.4	Indifferent
The level of rice losses is more prominent at the milling stage	3.1	Indifferent
The level of rice losses is more prominent at the storage stage	3.6	Agree
Harvesting with a sickle/knife increases the losses	3.5	Agree
Harvesting with a combine or reaper increases the losses	2.6	Disagree
Threshing with the traditional method increases the losses	3.7	Agree
Threshing with a mechanical thresher increases the losses	3.1	Indifferent
Drying paddy on tarpaulin or plastic sheet increases losses	3.5	Agree
Drying paddy on the cemented floor increases losses	3.1	Indifferent
Drying paddy on a raised platform increases losses	3.5	Agree
The traditional parboiling method increases losses	3.3	Indifferent
The improved parboiling method increases losses	3.3	Indifferent
Milling with traditional methods increases losses	3.7	Agree
Milling with Engelberg huller/machine increases losses	3.0	Indifferent
Rice variety influences the yield at harvest and grain quality	4.1	Agree
Good crop management increases total yield and grain quality	4.0	Agree
Timely harvesting increases total yield and grain quality	4.1	Agree
Good processing and handling methods increase rice yield and quality	3.9	Agree

The farmer respondents agreed on the following statements shown above which the researcher can use as a basis for the interpretation of the results.

Level of rice losses during paddy transportation. This suggests that farmers believe significant losses occur during the transportation of harvested paddy from the field to storage or processing facilities. Factors such as rough handling, exposure to adverse weather conditions, and inadequate packaging or transportation methods could contribute to these losses.

Level of rice losses at the threshing stage. Threshing involves separating the rice grains from the husks, and it seems farmers recognize this as a critical stage where losses may occur. Traditional threshing methods, which may be less efficient or more prone to grain damage, could contribute to these losses.

Level of rice losses at the drying stage. Drying paddy is essential to reduce moisture content and prevent mold growth, but improper drying methods or inadequate drying facilities could lead to losses. The use of tarpaulin or plastic sheets, as well as drying on raised platforms, may not provide optimal drying conditions and could contribute to losses.

Level of rice losses at the storage stage. Proper storage is crucial to prevent post-harvest losses due to pests, moisture, and mold. If storage facilities are inadequate or if grains are not properly protected, losses can occur over time.

Impact of harvesting with sickle/knife on losses. Using traditional hand tools like sickles or knives for harvesting may result in more damage to the rice plants, leading to increased losses compared to mechanized harvesting methods.

Impact of threshing with traditional methods on losses. Similarly, traditional threshing methods may be less efficient and more labor-intensive, potentially leading to higher losses compared to modern mechanical threshing techniques.

Impact of drying paddy on tarpaulin or plastic sheet on losses. Drying paddy on materials like tarpaulin or plastic sheets may not provide adequate airflow or insulation, which can result in uneven drying and increased losses due to mold or moisture.

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Impact of drying paddy on a raised platform on losses. While drying paddy on a raised platform may improve airflow and reduce ground moisture, it may also expose the grains to environmental factors like wind or rain, potentially increasing losses.

Impact of milling with traditional methods on losses. Traditional milling methods may be less efficient or precise, leading to losses in terms of grain quality or quantity compared to modern milling technologies.

Influence of rice variety on yield and grain quality. Different rice varieties may have varying levels of yield potential and grain quality characteristics, which can influence overall production outcomes.

Impact of good crop management on total yield and grain quality. Effective crop management practices, such as proper fertilization, irrigation, and pest control, can contribute to higher yields and better grain quality.

Impact of timely harvesting on total yield and grain quality. Harvesting at the optimal time when rice grains are mature and moisture content is appropriate can maximize yields and maintain grain quality.

Impact of good processing and handling methods on rice yield and quality. Proper processing and handling techniques throughout the post-harvest stages can minimize losses and ensure that rice maintains its quality from field to market.

Challenges and Support Systems in Managing Harvest and PHL.

According to the results, farmers are cognizant of the difficulties posed by PHL and understand the value of improved storage facilities, resources, and expertise. To deal with these issues, it appears that better support systems are required. This can entail making investments in the creation of infrastructure for adequate storage facilities in rural regions. Financial programs can also make it simpler for farmers to obtain loans or subsidies in exchange for implementing better PHL practices. Enhancing the accessibility and efficacy of training programs on appropriate harvesting, storage, and handling practices to decrease losses can also be achieved by strengthening extension services.

Table 2. Farmer's challenges and Support Systems in Managing Harvest and PHL

Perception Statement	Weighted Mean	Descriptive Interpretation
Lack of proper storage facilities contributes significantly to PHL	4.5	Strongly agree
The availability of financial support for adopting better postharvest practices is adequate	4.5	Strongly agree
Extension Services or training programs effectively educate farmers on minimizing losses.	4.5	Strongly agree

Conclusions

The findings from the assessment of farmers' knowledge and perceptions of harvest and postharvest losses shed light on various aspects of rice production processes. Farmers acknowledge the occurrence of losses at different stages, including transportation, threshing, drying, and storage, with traditional methods often associated with increased losses compared to mechanized approaches. Moreover, factors such as the choice of drying materials and milling methods, as well as the influence of rice variety and crop management practices, significantly impact yield and grain quality. These insights underscore the importance of implementing interventions to mitigate losses and improve production efficiency. Additionally, the study highlights the challenges farmers face in managing postharvest losses, particularly the lack of proper storage facilities. However, farmers also express confidence in the availability of financial support and the effectiveness of extension services in addressing these challenges. Moving forward, it is imperative to invest in infrastructure, financial assistance programs, and capacity-building initiatives to provide farmers with the necessary resources and knowledge to enhance postharvest practices and sustainably improve rice production outcomes.

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Recommendations

Therefore, the researchers recommend the following:

1. Prioritize Investments in the Creation and Improvement of Storage Facilities to Mitigate Postharvest Losses.
2. Develop and Expand Financial Assistance Programs Tailored to Rice Farmers to Incentivize Investments in Technologies and Practices Aimed at Reducing Postharvest Losses.
3. Expand and Strengthen Extension Programs to Provide Comprehensive Education and Training on Postharvest Management Techniques to Rice Farmers.
4. Encourage the Adoption of Mechanized Equipment such as Combine Harvesters and Mechanical Threshers to Minimize Postharvest Losses and Enhance Efficiency in Rice Production.
5. Promote Collaborative Platforms and Knowledge Exchange Networks to Foster Information Sharing and Best Practice Adoption Among Rice Farmers, Researchers, Extension Workers, and Other Stakeholders.

REFERENCES

FAOSTAT (2013). *FAO statistical yearbook: World food and agriculture*. Food and Agriculture Organization of the United Nations. http://www.fao.org/docrep/018/i3107e/i3107e00.htm

Global Strategy (2015). *Improving methods for estimating postharvest losses: A review of methods for estimating grain postharvest losses working paper (No. 2)*. http://www.gsars.org/wp-content/uploads/2015/09/WP-Reviewof-Methods_for_estimating_grain-loss-160915.pdf

Hodges, R. J., & Maritime, C. (2012). *Postharvest weight losses of cereal grains in sub-Saharan Africa*. Natural Resources Institute, University of Greenwich.

IRRI (2015). *Harvesting*. http://www.knowledgebank.irri.org/step-by-step-production/postharvest/harvesting#when-toharvest

Palanan Municipal Agriculture Office (2023). Rice Farmers Summary 2023

Paulsen, M. R., Kalita, P. K., & Rausch, K. D. (2015). Postharvest losses due to harvesting operations in developing countries: A review. In *2015 ASABE Annual International Meeting* (p. 1).

Qu, X., Kojima, D., Wu, L., & Ando, M. (2021). The losses in the rice harvest process: A review. *Sustainability, 13*(17), 9627.