The Study Of Paddy Harvest Losses Determination on Tidal Land in Tanjung Jabung Timur Region Jambi Province

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Abstract. Good postharvest handling is harvest handling to postharvest activities in accordance with the principles of Good Handling Practices (GHP). GHP implementation is expected to improve the quality of agricultural products and suppress lost harvest. In the paddy commodity, the implementation of GHP covers harvest based on appropriate harvest index, way to harvest, threshing, drying, grinding and storage. The objective of the study was initiated to determine harvest losses and suitability of GHP implementation in reducing losses at harvest and postharvest in the tidal land of Tanjung Jabung Timur Regency. The study was done with observation approach to determine the suitability of postharvest handling innovation based on GHP implementation. To determine of harvest losses by calculate using a formula (SP) = SPS + SSP directly in the field. The results showed that losses at harvest time based on GHP implementation was 1.6% (Inpara 3 varieties), 1.5% (Ciherang varieties) whereas with the way of farmers losses at harvest was higher about 5.1% (Inpara 3) and 4.5% (Ciherang). The results showed that in general situation the farmers were not practicing GHP on harvest and postharvest process.

1. Introduction
Increasing of paddy production was crucial related to keep food availability for humans and to achieve food security condition. Nowadays Indonesia, with a giant of population, rice is as the staple food. Therefore, according to this situation, Indonesia needs to increase paddy production. Unfortunately, the enhancement of production could be low due to inadequate handling on harvest and postharvest. Both of increase of production and minimize losses can’t be separated to achieve food sovereignty. Therefore, the enhancement of paddy production has a positive influence on the postharvest technology development, both from the postharvest equipment utilization although the quality improvement aspects and the problem solving for postharvest handling also [1]. Several references reported that aim of postharvest handling for paddy is to produce good rice and minimize losses and then maintaining the quality of rice. The postharvest handling of paddy includes threshing, drying, milling and storage [2]. The base of postharvest losses occur entire steps, start from the harvest time to postharvest. and due to the fact that these losses occur along many points of the chain and in many different manners (threshing losses, losses during loading and transportation, storage losses due to insects, rodents, rot etc.) [3]. “Rice processing like other agricultural products accompanied with high losses also. Reducing the processing losses can be one of feasible practice for increasing demand” [4]

In general, the paddy losses quite high in Jambi Province around 17.79%, which occurred at harvest time (7.26%), threshing (4.79%), drying (2.17%), milling (1.58%), and storage (1.99%) [5]. The data represents the whole entire agroecosystem in Jambi Province but specifically for tidal areas is unknown. The harvest losses for Indonesia scale was known about 9.5% so still higher [6].
The losses during harvest and postharvest occur as a result of poor implementation of the postharvest technology within the farmers level. Good handling practices are expected to reduce losses and to produce high quality of paddy then improve farmers price. The application of GHP intends to improve the quality product so producing products with high quality accordance the Indonesian National Standard (SNI) can be reached [7].

At least, there are two things need attention to minimize losses; 1) understand the biological and environmental factors involved in postharvest deterioration, and 2) use the appropriate postharvest technology procedures that will slow down deterioration and maintain quality and safety of the commodities [8]. Then, indicated an evolution of priorities within the postharvest sector of developing countries from a primarily technical focus geared towards the reduction of losses, to a more holistic approach designed to link on farm activities to processing, marketing, and distribution [9]. The objective of the study was to determine losses harvest and suitability of GHP implementation in reducing losses at harvest and postharvest in the tidal land of Tanjung Jabung Timur Regency.

2. Materials And Methods
The assessment was done in the Marga Mulya village, Rantau Rasau district, Tanjung Jabung Timur regency on August 2015. The data were obtained based on the observation of the GHP application and then continued by descriptive analysis related with the suitability of the handling in the farmers level. The determination of lost harvest done by calculating in the field directly and using the formula to get the losses results: 

\[ L = LH + LTS \]

\[ \text{L: losses; LH: lost at harvesting; LTS: lost on temporary stacking} \]

3. The Suitability Harvest and Postharvest Handling
Based on observations, the farmers did not recognize the GHP concept both at harvest time even if at post harvest activities. Not easy for the farmers to improve the way how they did harvest activity. They enjoy the old way because of it alike habitual for years. Different planting time at the same area cause of pests attack such as birds, insects or rodents difficult to solve. Frequently, this condition could be a trigger for farmers did harvest step as soon as possible even ignore the optimal harvest index.

Table 1 shows a comparison of harvest time and postharvest handling technology in accordance between application concept of GHP with the level of farmer’s technology in the tidal land.

| No. | Postharvest Step | GHP | Farmer Technology |
|-----|------------------|-----|-------------------|
| 1.  | Harvest          | -   | Index harvest     |
|     |                  | -   | Harvesting tool (sabit) |
|     |                  | -   | Combine Harvester |
|     |                  |     | Ignoring index harvest |
|     |                  |     | Sickle |
| 2.  | Threshing        | Thresher | manual |
| 3.  | Drying           | Sun Drying, use layer | Sun drying without layer |
| 4.  | Cleaning         | Thresher, trampling | trampling |
| 5.  | Storage          | Water content 14% | Ignoring (unmeasured) |
| 6.  | Packing          | PICS technology | Plastic bag |

4. The Determination of Paddy Harvest Losses in The Tidal Land
The result showed the losses harvest on the farmers way tend to be high around 5.1% (Inpara 3) and 4.5% (Ciherang). The harvesting step with GHP application can reduce losses about 1.6% (Inpara 3) and 1.5% in Ciherang. The water content average higher at 28%. Counting losses in the rice harvest tidal area of Jambi Province.
Table 2. The Result of Harvest Losses in Paddy Tidal Area in Jambi Province

| No. | Method | Varieties | SSP (%) | SPS (%) | SP (%) |
|-----|--------|-----------|---------|---------|--------|
| 1.  | GHP    | Inpara    | 1.01    | 0.64    | 1.65   |
|     |        | Ciherang  | 1.29    | 0.25    | 1.54   |
| 2.  | Farmer | Inpara    | 3.67    | 1.43    | 5.10   |
|     |        | Ciherang  | 2.26    | 0.21    | 4.50   |

The Result of Harvest Losses in Paddy Tidal Area in Jambi Province

5. Discussion

In general, the result showed that the losses in agricultural products could happen on the harvest step and it is crucial to reduce production of the rise in Indonesia. The optimum harvest index is an initial stage which has to watched by farmers before doing harvesting activity. The determination of optimal time for harvest activity based on; 1). 90-95% of the plants began yellowing and partly the flag leaf has dried, 2). The moisture content of the grain reaches 21-26%, 3). optimum time can be calculated around 30-35 days after flowering [10].

The farmer’s skill and knowledge related harvest time and postharvest handling are very important within determining of losses. The farmer element in postharvest handling of agricultural commodities is very important. The most of handlers involved in harvesting, packaging, transporting and marketing in developing countries have limited or no appreciation for the need for, or how, to maintain quality and safety of produce [11]. Actually, to change farmers mindset was a challenge to achieve high productivity by GHP conceps and improve the quality product as well. Over all, the production accuracy and adherence entire GHP chain during harvest and postharvest activities is a must and greatly recommended as an attempt to minimize damage mainly by contamination microorganisms [12].

The highest losses value cause of the farmers way whole varieties (Inpara 3 and ciherang). Due to the farmer did not practice the GHP principles in whole steps, losses in paddy not easy to minimize. Generally, the farmer were in hurry, did harvesting so the gesture of farmers contributes on removing the grain along harvest time, so a lot of grain lost on the field. Stacking paddy in the temporary time after harvesting was done by the farmers and certainly accumulate losses around the field. The highest of water content give affect also for losses in grain (paddy). The water content at the harvesting about 25% impact on losses around 2% -3.2% [13].

Inappropriate index of harvest effects on losses of quantity. Harvesting was not done in optimal conditions, this indicated by high of water content about 28% when harvest time whereas, the optimum of water content recommended around 21% to 26%. There are many impacts when the paddy harvested in the inappropriate index as low quality of grain caused by vacuous grain, reduce of production caused by the low yields and more husk when milling time. The harvesting was done on the optimum index have a minimize losses (3.35%) in other hand respite time exactly increase the losses up to 5.63% to 8.64% [13].

Lack of infrastructure is one of a problem for the farmers to reduce losses. There is no drying floor near paddy field, poor facilities to drying grain as well. They dried and stacked grain on the floor without layer so that the losses not easy to stop. The application of plastic layer at drying time is one of the solutions to relocate the fall grain along activity. Then, no grain lost and the farmers can collect it easily. The reference mention that uses of the layer during drying and stacking time can reduce the losses by about 0.94% to 2.36% [14].

The utilization of harvest tool is an important thing to reduce the lost harvest. The innovation of tools for harvesting is hope improve the facility and handling also. For example, used of combine harvester quite effective to reduce losses at harvest time. The data was about 1.47% for Inpara 3 and 1.51% ciherang varieties.

Reducing losses is an effort to save famers income. Therefore, minimizing lost on harvest step means saving a lot of money for them. If the value of losses obtained 4.5% - 5.1% per ha and productions per hectare was 4 tons so, the farmers will lose their money around Rp.765,000-
Rp.1.020.000 only at harvest step. Imagine that, if losses happened almost on whole steps postharvest (threshing, drying, milling, and storage) then the loss of money will be going higher totally.

6. Conclusion
The Application of the GHP principles can improve postharvest handling of the paddy, keep a quality, added value and reduce losses entire chain of postharvest activities. The innovation of technology can improve postharvest handling in the tidal land and increase the quality of product and minimize lost harvest also. The paddy varieties have influence losses determine and the application of combine harvester recommended as an innovative tool in the tidal land, Tanjung Jabung Timur region, Jambi Province. Lack of infrastructure, poor of facilities and poor of technology were several constrains that have been solved to support system of agricultural in Tindal land in Jambi Province.

7. References
[1] Nofriati D and Yenni Yusriani 2014 Proceeding Regional Forum Aceh p 264
[2] Suroso 2004 The Handling Postharvest Technology of Paddy. Quality Control of rice and Corn. PT Pusri dan IPB. Bogor
[3] Cardoen D et.al 2015 J. Resources, Conservation and Recycling 101 143-153
[4] Nasihrahmadi A et.al. 2014 J. Rice Science 21 (2) 116-122
[5] Anonymous 2008 Annual Report. Official of Agriculture and Horticulture. Jambi Province. Jambi.
[6] Patiwiri AW 2004 The Condition and Problem of Processing Company of Paddy in Indonesia. Paper. National Workshop. Jakarta.
[7] Anonymous 2007 Guideline of Postharvest Handling (GHP-GMP) and Organic Plant Processing. Directorate General of Processing Agricultural Products and Marketing. Departement of Agriculture.
[8] Kader AA 2005 Acta Hort. 682 2169.
[9] Mrema GC and Rolle RS 2002 Proceeding. 9th JIRCAS Intl. Symp. p 13-20
[10] Damardjati DS, H Suseno dan S Wijandi 1981 Agriculture Reseach 1 19 – 26
[11] Kader AA 2010 Acta Hort. 877
[12] Kader A A and Rolle R S 2004 The Role of Postharvest Management in Assuring the Quality and Safety of Horticultural Produce. Rome, FAO Agric. Serv. Bull. 152 51
[13] Purwadaria HK 1990 Technique of Postharves handling in Paddy. Paper. Trainning Postharvest in Crop and Paddy. Bogor.
[14] Nugraha S, A Setyono dan R Tahir 1995 Proceeding. Symposium of Crops Research Bogor 863-874