Research article

Current Postharvest Management of Sesame Farmers in Selected Area of Myanmar

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Abstract This study was conducted at Pwintphyu and Pakokku Townships, Magway Region, Myanmar in September 2016 and January 2017. The objectives of this study were to identify the farmers' perception and knowledge about postharvest handling practices of sesame and to compare the postharvest handling practices of sesame farmers between different areas of Myanmar. Total of 136 respondents were interviewed to understand the farmers' practices for postharvest management of sesame. The results showed that all respondents harvested and threshed the seeds manually in both areas. In Pwintphyu Township, postharvest operations were done in the fields, however, in Pakokku Township farmers worked on the threshing floor harden by the pasted cow dung and soil. The postharvest practices: such as stacking, stalks drying and storage methods were different between two areas. Regarding the awareness of postharvest management, stages at which the highest postharvest losses occur were different between two townships due to different management. Good quality seed, high yield, low labour cost and easy to work were also pointed as the advantages of postharvest technology in both areas. Using the plastic net or tarpaulin under the stacking and stalks standing, making threshing floor, harvest in right time, using enough labour, using harvester and covering threshing floor with tarpaulin were the management practices mentioned by respondents as methods to reduce postharvest losses. The farmers are weak in knowledge about storage management such as store pest control and packaging materials. Although farmers have the knowledge of the advantages of postharvest technology and how to reduce the losses, they have not tried to carry out. Therefore, it is needed to train the sesame growers to improve their postharvest practices, and private sector should support to mechanize in postharvest operation.

Keywords sesame, postharvest, stacking, stalks drying, losses

INTRODUCTION

Postharvest food loss (PHL) is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (Hodges et al., 2011). The largest PHLs usually occur on or near the farm, where the initial choice of crop type and variety and the success of harvesting and consolidation methods are fundamental in keeping losses low (World Bank, 2010). Agricultural commodities produced on the farm fields have to

undergo a series of operations such as harvesting, threshing, winnowing, bagging, transportation, storage, processing and exchange before they reach the consumer, and there are appreciable losses in crop output at all these stages (Basavaraja et al., 2007). In less developed countries where the supply chain is less mechanized, larger losses are incurred during drying, storage, processing and in transportation (FAO, 1980).

Developing postharvest systems has the potential to raise living standards in urban and rural areas. In urban areas, it makes food available more efficiently and at a lower cost. In rural areas, postharvest activities can benefit the poorest members of society in particular, through its contribution to farm and non-farm income (Goletti and Samman, 2002). Educating and training the farmers on post-harvest operations would greatly help in reducing the post-harvest losses in food grains (Basavaraja et al., 2007). At present, improved postharvest technology is essential to ensure high yield, quantity and quality of products in Myanmar. Minimizing postharvest losses of food crops is a very effective way of reducing the area needed for production and/or increasing food availability. And there was no previous statistical study in Myanmar on postharvest handling practices of sesame farmers.

OBJECTIVES

The objectives of this study are to determine farmers' perception and knowledge about postharvest handling practices of sesame, and to compare the postharvest handling practices of farmers between the different areas of Myanmar.

MATERIALS AND METHODS

Study Sites and Methods of Data Collection

Fig. 1 Map of study sites in Magway Region, Myanmar

This study was conducted in Pwintphyu and Pakokku Townships in Magway Region, located in central Myanmar (Fig. 1). These two study areas are the largest cultivated areas of pre-monsoon and post-monsoon sesame in Myanmar. A total of 136 sesame farmers from in two townships were interviewed by using structured interview questionnaires to elicit information from farmers. Random sampling procedure was used in this study. The structured interview questionnaire was amended based on the information collected from pilot survey, and main survey was conducted in 2016 - 2017. The data concerning with demographic data of the sample respondents in selected areas such as age, educational status, family size, landholding size and their farming experience were collected. Postharvest management of respondents, problems encountering during postharvest handling and farmers' perception and suggestion on postharvest handling practices were also collected in order to determine sesame postharvest management system in study areas.

Data Analysis

The data were transferred and analyzed by the Statistical Package for the Social Science (SPSS) version 16.0 software. Descriptive statistics were used to identify demographic characteristics and postharvest handling practices of sample respondents. In order to compare the demographic and postharvest practices of different areas, student t distribution was used.

RESULTS AND DISCUSSION

Demographic Characteristics of the Sample Respondents

Among 136 respondents, 92% was male and the remaining was female farmers. In this study, the average age of the respondents was 50 years with the minimum of 19 years and maximum of 75 years. The average schooling year of respondents was 6 years. The minimum and maximum school years were 2 years and 14 years. Average farm size of sample respondents was 5.03 hectares with the minimum of 0.24 hectare and maximum of 28.34 hectares. The farm experience of farmers in this study was 27 years in the range of 2-60 years.

Postharvest Management of Sample Respondents

All respondents harvested and threshed the seeds manually in both areas. The harvested stalks of sesame require to be piled up to a height of four to five feet. In Pwintphyu Township, the most common time for stacking was 7 days and 8 days but 5-6 days and 7 days were common in Pakokku Township and some respondents took long time (>10 days) for stacking (Table 1). Therefore, t test showed that the stacking duration (<7 days, 8 days, 10 days and >10 days) were highly significant between two study areas. Although only a few percent of respondents used the insecticide in Pakokku Township, half of the respondents used insecticide to control pest during stacking in Pwintphyu Township (Table 1). There were significant differences between the insecticide usage practices during stacking of two study areas. When piling the sesame after harvest, sometimes the insecticides are sprayed for termite control on the ground (JAICAF, 2018).

Table 1 Stacking practices by sample respondents in study area, 2016-17

		Pwintphyu (N=73)	Pakokku (N=63)	t-test
Duration	5-6 days	2 (2.74)	24 (38.10)	5.47***
	7 days	27 (36.99)	21 (33.33)	0.44^{ns}
	8 days	26 (35.62)	5 (7.94)	4.93***
	10 days	18 (4.66)	2 (3.17)	3.08***
	>10 days	-	11(17.46)	-3.62***
Insecticide usage	Beside & under the pile	31 (42.47)	1 (1.59)	7.82***
	Beside, under & inside the pile	6 (8.22)	-	2.54**
	Nil	36 (49.32)	62 (98.41)	-8.05***

*Note: Numbers in the parentheses represent percentage. *** significant at 1% level; ** significant at 5% level; ns = non- significant*

In Pwintphyu Township, 98.63% of the sample respondents practiced the threshing operation manually on the field and only 1.37% of respondents threshed on the threshing floor covered with tarpaulin. In Pakokku Township, all sample respondents made threshing floor by pasting with cow dung and soil mixture. There were two methods for drying sesame stalks: stalks standing and spreading before threshing in study areas. All respondents dried their crop by stalks standing in Pwintphyu Township but both methods were practiced in Pakokku Township (Table 2). Some

farmers in Pakokokku Township took long time for stacking and stalk drying because they made threshing floor near the house and postharvest operations were done in that place. In Pwintphyu Township, stacking and drying the stalks was done in the field where sunlight was enough to dry the stalks quickly, and it was needed to thresh the seeds as quickly as possible to reduce the losses. The t test showed that stalk drying duration (2 days, 5-7 days and >7 days) were highly significant difference between Pwintphyu and Pakokku respondents.

Table 2 Stalk drying practices by sample respondents in study area, 2016-17

		Pwintphyu (N=73)	Pakokku (N=63)	t-test
Method	Standing	73 (100)	41 (65.08)	5.77***
	Spreading	-	22 (34.92)	5.77***
Duration	2 days	56 (76.71)	1 (1.59)	14.37***
	3-4 days	15 (20.55)	8 (12.70)	1.23^{ns}
	5-7 days	2 (2.74)	23 (36.51)	-5.27***
	>7 days	-	31 (49.21)	-7.75***

*Note: Numbers in the parentheses represent percentage. *** significant at 1% level; ns=non-significant*

Table 3 Seed storage practices by sample respondents in study area, 2016-17

		Pwintphyu (N=73)	Pakokku (N=63)	t-test
Method	Woven polypropylene bag	68 (93.15)	63 (100)	-2.04**
	Woven polypropylene bag with thin plastic layer	3 (4.11)	-	1.76*
	Metal tin	1 (1.37)	-	0.93^{ns}
	Others	1 (1.37)	-	0.93^{ns}
Duration	2 months	6 (8.22)	3 (4.76)	0.41^{ns}
	3-4 months	4 (5.48)	3 (4.76)	-0.18^{ns}
	5-6 months	5 (6.85)	1 (1.59)	1.84*
	8 months	58 (79.45)	55 (87.30)	-1.62^{ns}
	Nil	9 (12.33)	1 (1.59)	1.56^{ns}
Pest control	Agrochemical	6 (8.22)	5 (7.94)	0.06^{ns}
	Organic materials	-	6 (9.52)	-2.56**
	Others	1 (1.37)	4 (6.35)	-1.47^{ns}
	Nil	66 (90.41	48 (76.19)	2.21**

*Note: Numbers in the parentheses represent percentage. ** significant at 5% level; * significant at 10% level; ns = non-significant*

Regarding to storage practices, farmers in Pakokku Township used the woven polypropylene bags for seed storage (Table 3). However, there were some farmers who used woven polypropylene bags with thin plastic layer and metal tins for seed storage in Pwintphyu Township. Eight months storage was common in both townships and farmers stored until next crop. In Ethiopia, about 61% of the respondents explain that they use polypropylene bag to store their sesame grain followed by ware houses (40%) and jute bag (28.6%). Other storages like fertilizer bags, balcony, and plastic bags are also used by few respondents. About 73% of the respondents in Ethiopia put their sesame grain in storages not for more than 3 months (The Feed the Future Innovation Lab, 2014). During storage, the majority of respondents did not control store pests except 8.22% and 7.94% of farmers who used the chemicals in Pwintphyu and Pakokku Townships respectively. About 10% of farmers used organic materials (hot pepper, neem leaves) as control measure in Pakokku Township. Other

store pest control practices, such as frequent winnowing and sun-drying during storage were also found in both areas (Table 3).

Sesame growers in both townships decided the seed dryness by hand feeling and there was no significant difference in seed moisture determination method between in both townships (Table 4). Moisture content of seed is one of the important criteria for storage, therefore, extension service should provide the knowledge regarding minimum moisture content of sesame to store safely.

Table 4 Seed dryness testing method by sample respondents in study areas, 2016-17

	Pwintphyu (N=73)	Pakokku (N=63)	t-test
By visual	3 (4.11)	6 (9.52)	-1.23^{ns}
By hand	46 (63.01)	46 (73.02)	-1.08^{ns}
By visual & hand	23 (31.51)	10 (15.87)	2.18**
By hand & others	1 (1.37)	1 (1.59)	-0.10^{ns}

*Note: Numbers in the parentheses represent percentage. ** significant at 5% level*

Awareness of Postharvest Management by Respondents in the Study Area

In Pwintphyu Township, the highest postharvest loss was occurred in threshing time whereas harvest time loss was highest in Pakokku Township (Table 5). In Pwintphyu Township, farmers dried and threshed in the field, but sesame stalks were dried and threshed on the threshing floor in Pakokku Township. Therefore, postharvest stage which causes the highest losses was significantly different between two areas (Table 5). In Ethiopia, more than 50% of the respondents explained that weather condition such as winds and intensive rainfall, insects in field, shattering, threshing, theft, harvesting, and rodents in storage are the losses causing factors (The Feed the Future Innovation Lab, 2014).

Table 5 Stages at which the highest postharvest losses occur in study area, 2016-17

	Pwintphyu (N=73)	Pakokku (N=63)	t-test
Harvest	4 (5.48)	43 (68.25)	-10.47***
Stacking	-	2 (3.17)	-1.43^{ns}
Standing/spreading	22 (30.14)	7 (11.11)	3.01***
Threshing	47 (64.38)	11 (17.46)	6.64***

*Note: Numbers in the parentheses represent percentage. *** significant at 1% level; ns=non-significant*

Table 6 Awareness of the advantages of postharvest technology by the respondents, 2016-17

	Pwintphyu (N=73)	Pakokku (N=63)	t-test
Reduce losses	52 (71.23)	33 (52.38)	2.65***
High yield	9 (12.33)	17 (26.98)	-2.14**
Good quality seed	14 (19.18)	4 (6.35)	2.30**
High income	2 (2.74)	8 (12.70)	-2.14**
Easy to work by using machine	6 (8.22)	3 (4.76)	0.65^{ns}
Low labour cost	3 (4.11)	1 (1.59)	1.56^{ns}
No answer	6 (8.22)	9 (14.29)	-1.39^{ns}

Note: Numbers in the parentheses represent percentage. ns = non-significant

Most of the respondents in Pwintphyu and Pakokku Townships mentioned that postharvest technology can reduce losses (Table 6). Good quality seed, high yield, low labour cost and easy to work were also pointed as the advantages of postharvest handling in both areas. Therefore, there was no significant difference in awareness of farmers on the advantages of postharvest handling between Pwintphyu and Pakokku Townships (Table 6).

Respondents' Suggestions to Minimize Postharvest Losses in the Study Area

In Pwintphyu Township, more than half of the respondents, (61.64%) reported that using the plastic net or tarpaulin under the stacking and stalks standing to reduce losses. Making threshing floor was suggested by 36.99% of farmers. To harvest at right time, to use enough labour and to use thresher were also pointed by 5.48%, 4.11% and 1.37% of respondents, respectively. In Pakokku Township, 34.92% of respondents believed that using harvester reduced losses while other 31.75% supposed that covering threshing floor with tarpaulin was good practice to reduce losses. Harvest at right time, make good threshing floor and use enough labour were the suggested practices of reducing postharvest losses by 23.81%, 6.35% and 1.59% of respondents. The results showed that there are small number of respondent who mentioned the storage methods, such as packaging materials and control measures to reduce losses. Hence, respondents were weak in knowledge about improved storage practices, and extension services should provide improved storage methods to them.

CONCLUSION

All respondents in study areas were practicing their traditional postharvest handling practices and did not use any machinery. Although farmers have the knowledge and awareness of postharvest technology, they have not tried to carry out. Their storage behavior disregarded quantity and quality losses during storage. Educating and training the farmers on improved storage technologies such as biological pest control or controlled atmosphere storage would greatly help in reducing the postharvest losses in food grains. Changing attitude is one of the important steps to adopt innovation in farming community of Myanmar. Therefore, it is needed to train the sesame growers for the advancement of postharvest practices, and public and private partnership should support to take action.

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