



## A Case Study on Postharvest Handling Practices of Mango Fruits in Selected Areas of Myanmar

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**Abstract** Mango (*Mangifera indica* L.) is one of the most popular fruits in tropical countries. The postharvest losses of mango fruits in developing countries are still high and facing the economic loss. Myanmar mango is harvested only once a year, there is often an oversupply which leads to low prices and product losses at harvest time. This study was conducted to investigate the existing handling practices and to identify the losses concerned with the major problems facing the handling of mango in selected areas during mango season of May 2017. A total of 120 respondents from mango growers of Mandalay and Sagaing regions were randomly selected and interviewed using structured questionnaires. The total loss of 32%-52% of mango fruits were observed during postharvest handling and transportation due to poor transportation infrastructure and bad road conditions in production sites. The temporary transportation was used trailer which is driven by motorbike for local market and ten-wheeled truck without cooling system was used for export market. The loss in harvesting stage was 10-20% responded by the growers due to the harvesting tool and which was picking the fruit with a long bamboo-hook or ladder to reach the high plant. Thus, postharvest losses of mango fruit were the highest percent in study areas. Currently, mango growers were directly sent to local wholesale and China border markets by non-refrigerated truck. No collective bargaining takes place on the price and each farmer interacts individually with the brokers or buyers by receiving market price. The 79% of mango growers were commonly practiced for temporary bulk package of bamboo basket followed by the use of plastic crate of 15% from the farm site to destined markets All growers mostly and currently used the packaging style of individual fruit wrapping by paper in plastic crate for export market. One of the major constraints is the scarcity of labor in mango season by the results of 73% responded by the mango growers. Regarding the perception of growers, more than 50% of respondents have knowledge and experiences on postharvest handling managements, however, trainings on systematic handling practices among the stakeholders were still needed to reduce the losses.

**Keywords** handling practices, harvesting, packaging, transportation, mango supply chain

### INTRODUCTION

Mango (*Mangifera indica* L.) is an important tropical fruit around the world and it belongs to the family Anacardiaceae. The origin of mango is Indo-Burma region and it is one of the most important exportable fruits in Myanmar. Myanmar is the sixth largest country in mango production in Asia. The mango production areas in Myanmar are over 104,000 hectares with the average yield of 6.83 MT/ha (MOALI, 2018). More than one hundred varieties of mango are cultivated throughout Myanmar. Major mango production areas in Myanmar are Mandalay Region, Sagaing Region and Southern Shan State. Twenty kinds of mango species and more than 300 varieties are cultivated throughout Myanmar (VFRDC, 2003). Among these varieties, the exportable cultivars are Sein Ta

Lone, Mya Kyauk and Shwe Hin Thar. Out of them, Sein Ta Lone is very popular in both domestic consumption and export markets of China, Taiwan, Russia and Singapore. Mango is one of the most perishable fruits and have a short postharvest life of 4-8 days at room temperature (Carrillo et al., 2000). It is facing high postharvest losses in Myanmar and it is estimated in the range of 25-40% from harvest to consumption stage (FAO, 2011). In order to increase food security, it is not enough to increase the productivity in agriculture but there is also a great need to reduce the losses (Parfitt et al., 2010). The mango postharvest handling practices include series of operations such as harvesting, precooling, cleaning, selection, grading, washing, ventilation, grading, bagging, packaging and distant transportation before they reach the market (Kader, 2005). Awareness and adoption of postharvest handling technology of mango fruits by growers, producers and traders along the supply chain are still weak in Myanmar. There is paucity of information on postharvest handling practices and losses of mango concerned with the problems in commercial mango production. Therefore, this study was carried out to investigate the existing handling practices and postharvest losses by identifying the major problems facing by the mango growers.

## **RESEARCH METHODOLOGY**

This study was conducted in major mango producing areas of Mandalay and Sagaing Regions in the central part of Myanmar. A total of 120 respondents from mango orchards in 6 villages of these regions were randomly selected and interviewed using structural questionnaires. The survey was conducted in May 2017 using random sampling procedure. The questionnaires were composed of total 40 questions concerned with cultivation practices and postharvest handling practices of mango fruit and demographic facts of gender, age, education level, employment, land holding size and income. The problems encountering during harvesting, postharvest handling and growers' perception, suggestions were also collected in this study. The collected data were transferred and analyzed by using Statistical Package of the Social Science (SPSS) version 23.0 software.

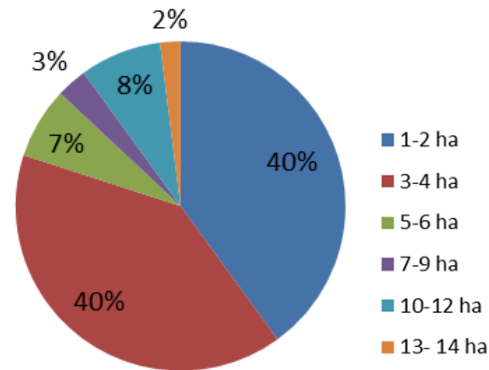
## **RESULTS AND DISCUSSION**

### **Assessment on Socio-Demographic Characteristics of the Respondents**

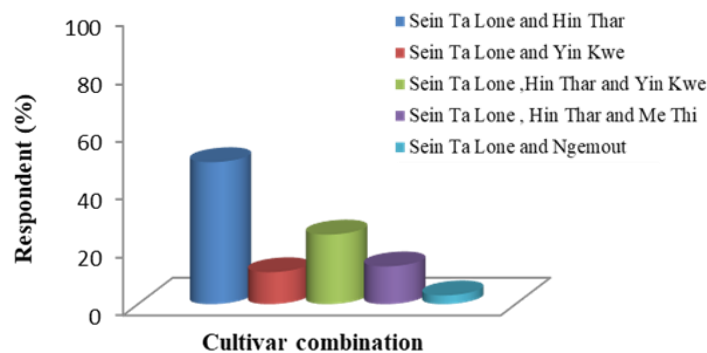
Socioeconomics factors of mango growers include age, educational status and land holding size. It reveals that the farm size of mango growers ranged from one to 14 hectares and about 40 % of mango growers possessed 1-2 hectares, another 40 % possessed 3-4 hectares. The growers who possessed more than 10 hectares were recorded as 10% in study areas (Fig.1). The most cultivated and demandable mango varieties were Sein Ta Lone and Shwe Hinn Thar observing about 50% followed by 24% of these two varieties and Yin Kwe mango (Fig. 2). It can be assumed that Sein Ta Lone and Shwe Hin Thar mangoes are the most market demand by the consumers and other cultivars of Mathe and Nga Mout were growing together with Sein Ta Lone and Shwe Hinn Thar mangoes. According to survey, the age of mango respondents with the range of both 31-40 year and 41-50 years belonged to 36% respectively whereas the rest of 28% were older than 50 years showing 18% and 10% belonged to age group of 20-30 years in both study areas. The majority of household heads were within the middle age and mainly males whereas the females were served as household workers in the orchard. It is evident that the educational status of respondents ranged from primary to graduate level. Most growers were graduate level of 29% followed by the 27% of high school level. The rest of 27% and 19% were secondary level and primary education level, respectively.

Handling practices of mango fruits include the stages of precooling, cleaning, sorting, grading, packaging and transportation from farm site to consumers. Individual fruit wrapping was commonly practiced for local and distant markets. The bulk packaging items for mango fruits were bamboo basket, plastic crate and wooden box. Among them, about 80% of bamboo basket was used for local market followed by the 14% for plastic crate for export market. The rest of 4% was wooden box and 2% was carton box used in locally (Table 1). It can be assumed that bamboo basket is easily available with low cost in Myanmar. It was agreed with the report of FAO (2011) and that packaging generally

provides protection for the product to reduce losses and to maintain fruit quality with the enhancement of product value.



**Fig. 1 Distribution of mango farm size in study areas**



**Fig. 2 Distribution percent of different mango varieties among the respondents handling practices of mango in study area**

**Table 1 Access to handling practices by packaging materials by mango growers**

Item	Respondents (%)
Bulk packaging type	
1.Wooden crate	4.00 (n =100)
2.Plastic crate	14,25 (n =95)
3.Bamboo basket	79 .75 (n=110)
4. Carton box	2.00 ( n= 80 )
Total	100
Individual packaging item	
1.Paper	100 (n =110)
2.Net sac	0
Total	100

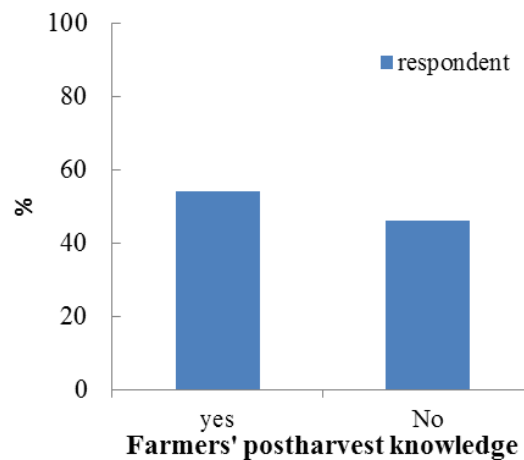
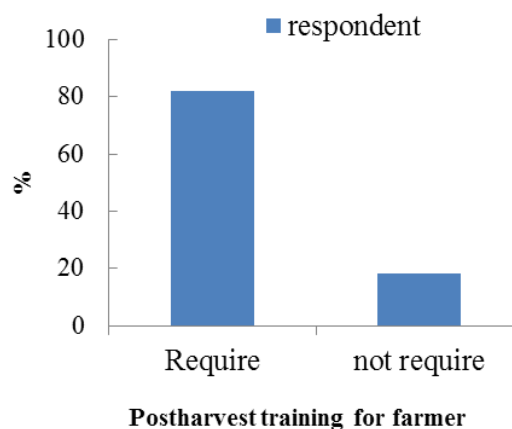
**Losses of Mango during Handling Practices in Study Area**

The survey was conducted to examine the main reasons of mango losses during the pre-harvest, harvest and postharvest periods. There was no respondent for pre-harvest loss. However, postharvest loss of mango during handling and transportation was higher than those of the harvest loss. About 65% of postharvest loss was recorded during handling practices and transportation followed by the harvest time loss of 32% was due to higher plants by the use of long bamboo pole and ladder. The other losses of 1-2% were identified as wind condition, pest and disease infestation. Thus, total losses of 32-52% were observed due to improper handling practices, transportation system and harvesting practices (table-2). Most respondents reported that the mango fruits were mostly and temporarily transported by 86% of trailers which was driven by motorbike from farm to local market.

**Table 2 Losses of mango fruits by the sample respondents in study areas**

Item	Losses (%)	Respondents (%)	Reasons
Preharvest	0		Falling the small fruits due to wind
Harvest time	10-20	32 (n=100)	Due to harvesting tool a) using a long stick or scissors to cut the fruit from the tree b) climbing the tree or using a ladder to reach high plant
Postharvest	21-30	65 (n=100)	During handling practices and transportation
Others	1- 2	3 (n=72)	Pest, disease infestation and climatic condition
Total	32- 52	100	

The bad nature of road networks at the farm site and unfavorable factors during transportation resulted in great postharvest losses. The following (Figs. 3 and 4) show knowledge background on handling practices and growers' perception on training requirement. More than 50% of respondents had their own sets of criteria for postharvest handling managements and knowledge. However, half of growers and labors had no knowledge concerned it and they still used traditional harvesting method and handling practices that means mango directly piled on the ground with no paper, sheet or straw with stack and also harvested mangoes with stalk which caused dropping the latex that resulted in negative effects on fruit quality and increase in postharvest losses. Thus, about 80% of respondents answered to give trainings on postharvest handling managements for labors and growers. Therefore, educational training on postharvest managements such as biological pest control, advanced harvesting technique, systematic handling and packaging practices would greatly help in reducing the postharvest losses of mango fruit.

**Fig. 3 Postharvest knowledge by the mango growers in study areas****Fig. 4 Farmers' perceptions on postharvest training in study areas**

## **CONCLUSION**

Almost 100% of the respondents were commonly practiced by paper packaging to individual fruit for distant transportation along the sale process. Therefore, handling and packaging practices should be systematically managed to reduce postharvest losses and to maintain the quality of the products. It is suggested that the use of enough labors (pickers and packers) and they should be trained to reduce losses at harvest time and postharvest losses. It is needed to change the attitudes of growers to adopt innovation in farming cultivation practices and community among the growers. Moreover, to be modernized orchard and easy to manage for harvest, changing the attitude of the growers is one of the constraints and transportation as a result of undulations on roads are one of the major causes of postharvest losses. Furthermore, farmers do not have good storage facilities at the farm level, and this forces them to sell their fruits immediately after harvest. And also, no collective bargaining takes place on the price of mango. According to the study, some respondents in study areas were practicing on sizing and grading of mango fruit for export market by the use of machinery and this may be regarded as quality criteria. Although growers have the knowledge and awareness on postharvest handling practices and managements for mango export market, they have not tried to carry out practically and systematically these practices. Therefore, trainings and awareness program on postharvest technologies in fruit production is needed to train the mango growers and stakeholders for the advancement of postharvest handling practices. Moreover, cooperation with public and private partnership should support them to take these actions.

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## **REFERENCES**

- Carrillo, L.A., Ramirez-Bustamante, F., Valdez-Torres, J.B., Rojas-Villegas, R. and Yahia, E.M. 2000. Ripening and quality changes in mango fruit as affected by coating with an edible film. *J. Food Quality* 23, 470-486.
- Food and Agriculture Organization (FAO). 2011. Perishability and produce losses. In *Prevention of Postharvest Food Losses, FAO/UNDP/AFMA Regional Training Workshop*, 42-48.
- Kader, A.A. 2005. Increasing food availability by reducing postharvest losses of fresh produce. *Acta. Hort.* 682, 2169.
- Kader, A.A. 2008. Mango quality attributes and grade standards: A review of available information and identification of future research needs (Report to the National Mango Board). *Kader Consulting Services, Bull.*, 152, 51, California.
- Ministry of Agriculture, Livestock and Irrigation (MOALI). 2018. Myanmar agriculture in brief 2018. Ministry of Agriculture, Livestock and Irrigation, Nay Pyi Taw, Myanmar.
- Parfitt, J., Barthel, M. and Macnaughton, S. 2010. Review food waste within food supply chains: Quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365, 1554, 3065-3081.
- Vegetables and Fruits Research Development Centre (VFRDC). 2003. Annual report of fruits and vegetables research and development center. Myanmar Agriculture Service, Ministry of Agriculture, Livestock and Irrigation, Myanmar.