



## Farm status and knowledge level in guava post harvest system

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### Abstract

Post harvest handling of guava is the stage of crop production immediately following harvest, including cooling, cleaning, grading, packing and marketing. Post harvest handling largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product. Post harvest sector includes all points in the value chain from production in the field to the food being placed on a plate for consumption.

*Keywords: Chain, Guava, Knowledge, Post harvest system and Status*

### Introduction

Guava is most perishable, nutritious, valuable horticultural produces. India's diverse agro climate condition facilitates the guava cultivation. India ranks second in fruits production in the world, after China. According to (Patil, 2013) during 2011-12 India produced 76.424 million metric tonnes of fruits. The area under cultivation of fruits stood at 6.704 million hectares. The 2011-12 statistics reveals that India produced 2.51 million metric tonnes of guava (National Horticulture Board, 2012). There are many factors contribute to post harvest losses in guava these include environmental conditions such as heat or drought, mechanical damage during harvesting and handling, improper post harvest sanitation, poor cooling and environmental control. Efforts to control these factors are often very successful in reducing the incidence of post harvest losses. The quality and condition of produce sent to market and its subsequent selling price are directly affected by the care taken during harvesting and field handling. Even though a number of post harvest management practices are being recommended minimize the post harvest losses at field level, the fruits and vegetables growers are not following the recommended practices. Thus, the technologies vary from farmer to farmer according to their socio- practical problems in following post harvest handling. Considering the above points, it is

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characteristics, perceived training needs, availability of factors of production and the essential to understand the present status of post harvest handling practices, level of knowledge on post harvest handling practices and the constraints faced by farmers during post harvest handling so as to facilitate framing appropriate strategies to minimize the post harvest losses. Keeping this in view, the present investigation was conducted in the predominantly guava producing of Madurai district of southern Tamilnadu with the following objectives.

- a. To study the present status of post harvest handling practices of guava.
- b. To assess the knowledge level of farmers in post harvest handling practices of guava.

### Materials and Method

The study was conducted in Madurai district during 2014 year. Two district Alanganallur and Vadipatti blocks were selected based on high production of guava. From each block viz., Palamedu and Saranhangi villages were selected for the study. From each village fifteen progressive guava growers were selected based on size of land holding by using simple random sampling method. Accordingly, the total number of respondents for the study was 30. Ex-post facto design was adopted in the study. The pre-tested interview schedule was used to collect the data from the farmers by personal interview method. The appropriate statistical tools such as mean, standard deviation, percentage analysis were used and interpretations were made.

## Results and Discussion

### Status of post harvest handling practices of guava:

The facts and reasons responsible for the existing post harvest handling practices are discussed in following headings. The results pertaining to harvesting of guava is depicted in Table 1.

**Assessment of crop maturity:** All the guava growers are using field method to judge the maturity of guava. None of the farmers using scientific methods to judge the maturity of guava. The result shows that (70 %) of farmers harvest their produce based on skin color and (30 %) the farmers harvest their produce based on size and this finding has inline with (Zheng *et al.*, 2001).

**Harvesting factors:** It is observed that (73.30 %) guava growing farmers harvest their produce based on crop maturity and (26.70 %) of the farmers harvest their produce based on price index. Majority of the guava growers harvest their produce based on crop maturity and this finding has inline with (Udas *et al.*, 2005).

**Stage of harvesting:** The result shows that (53.30%) guava farmers harvest their produce at fully matured stage 30 per cent farmers harvest their produce at matured stage and 16.70 per cent farmers harvest their produce at immature stage and this finding has inline with (Olayemi *et al.*, 2010).

**Method of harvesting:** All the farmers using manual method of harvesting. Out of that (36.70%) farmers using harvesting pole and (63.30 %) farmers harvest the guava by hands and and this finding has inline with (Gudila *et al.*, 2013).

**Time of harvesting:** It was noticed that (60 %) of farmers harvest their produce in morning and (40 %) farmers harvest their produce at any time and this finding has inline with (Chikhale *et al.*, 1998).

**Field container for harvesting:** All the farmers having field container for harvesting to hold the produce during harvesting and this finding has inline with (Deshmukh *et al.*, 1998).

**Agents causing loss during harvesting:** The result revealed that (76.70 %) of farmers field the main

loss causative agent in harvesting stage is physiological agents followed by (23.30 %) of mechanical agents and this finding has inline with (Waman and Patil, 1998).

**Sorting and grading of guava:** It was observed that all the farmers follow sorting and grading and (46.70 %) farmers done grading based on size (40 %) of farmers done grading based on color while (13.30 %) of farmers done grading based on maturity of the fruit and this finding has inline with (Kubde *et al.*, 2000).

**Pre-cooling:** None of the guava growers did not cool their produce prior to marketing. They did not use any of the available pre-cooling technique to cool their produce and this finding has inline with (Palande *et al.*, 2001).

**Pre and post harvest treatments:** It was observed that none of the farmers give any pre and post harvest treatments to the produce and this finding has inline with (Gowda and Gowda, 2004).

**Packaging of guava:** The guava growers package their harvested produce for marketing and all the farmers were using guava leaves as main cushioning material. It was observed that (86.70 %) farmers using plastic crates for packaging while (13.30 %) of farmers using woven bamboo baskets for packaging. All the farmers were using guava leaves as main cushioning material during packaging and this finding has inline with (Moulasab, 2004).

**Agents causing loss in packaging of guava:** It was noticed that (80 %) of loss during packaging is caused by mechanical factors and (20 %) loss is caused by climatic factors and this finding has inline with (Selvarani and Manoharan, 2004).

**Transport of guava:** It was observed that all the farmers having on farm transport facility and they use manual method for on farm transport. In case of mode of transport to market (60 %) farmers were using lorry and van (23.30%) farmers using motor bike and (16.70 %) farmers using bus to transport their harvested crop to market. The distribution revealed that (60 %) of guava growers

**Table 1: Distribution of respondents based on harvesting of guava**

| S. No | Harvesting                                  | Frequency  |
|-------|---|------------|
| 1.    | <b>Assessment of crop maturity</b>          |            |
|       | Field method                                | 30 (100)   |
|       | Size  | 9 (30)     |
|       | Skin color                                  | 21(70)     |
| 2.    | <b>Harvesting factors</b>                   |            |
|       | Crop maturity                               | 22 (73.30) |
|       | Price index                                 | 8 (26.70)  |
| 3.    | <b>Stage of harvesting</b>                  |            |
|       | Immature stage                              | 6 (16.70)  |
|       | Matured stage                               | 9 (30)     |
|       | Fully matured stage                         | 15 (53.30) |
| 4.    | <b>Method of harvesting</b>                 |            |
|       | Harvesting pole                             | 11 (36.70) |
|       | By hands                                    | 19 (63.30) |
| 5.    | <b>Time of harvesting</b>                   |            |
|       | Morning                                     | 18 (60)    |
|       | Any time                                    | 12 (40)    |
| 6.    | <b>Field container for harvesting</b>       |            |
|       | Yes   | 30 (100)   |
|       | No  | 0          |
| 7.    | <b>Agents cause loss during harvesting</b>  |            |
|       | Physiological                               | 23 (76.70) |
|       | Mechanical                                  | 7 (23.30)  |
| 8.    | <b>Sorting and grading</b>                  |            |
|       | Size  | 14 (46.70) |
|       | Color                                       | 12 (40)    |
|       | Maturity                                    | 4 (13.30)  |
| 9.    | <b>Pre-cooling</b>                          | 0          |
| 10.   | <b>Pre and post harvest treatments</b>      | 0          |
| 11.   | <b>Packaging</b>                            |            |
|       | Woven bamboo baskets                        | 4 (13.30)  |
|       | Plastic crates                              | 26 (86.70) |
| 12.   | <b>Agents causing loss in packaging</b>     |            |
|       | Mechanical                                  | 24 (80)    |
|       | Climatic factors                            | 6 (20)     |
| 13.   | <b>Mode of transport</b>                    |            |
|       | Lorry and van                               | 18 (60)    |
|       | Motorbike                                   | 7 (23.30)  |
|       | Bus   | 5 (16.70)  |
| 14.   | <b>Agents causing loss during transport</b> |            |
|       | Mechanical                                  | 21(70)     |
|       | Climatic factors                            | 9 (30)     |

|     |   |                                |
|-----|---|--------------------------------|
| 15. | <b>Marketing</b>  |                                |
|     | Local market  | 9 (30)                         |
|     | Farmers market (Uzlavarsandai)  | 3 (10)                         |
|     | Whole sale market   | 15 (50)                        |
|     | Directly to merchants   | 3 (10)                         |
| 16. | <b>Agents causing loss during marketing</b>                                       |                                |
|     | Climatic factors  | 11 (36.70)                     |
|     | None  | 19 (63.30)                     |
| 17. | <b>On farm storage facility</b><br>(For yes, mode of on farm storage given below) | Yes 23 (76.70)<br>No 7 (23.30) |
|     | Shade under the tree  | 17 (56.70)                     |
|     | Temporary protective structures   | 6 (20)                         |
|     | None  | 7 (23.30)                      |
| 18. | <b>Processing and value addition</b><br>(Reason for non-adoption)                 |                                |
|     | Lack of knowledge and awareness   | 10 (33.30)                     |
|     | Small scale farming   | 20 (66.70)                     |
| 19. | <b>Time spent on Post harvest handling</b>  |                                |
|     | 1-5 hrs   | 12 (40)                        |
|     | 5-10 hrs  | 18 (60)                        |

(\* )Parenthesis in percentage

were using cushioning and wrap during transport and they use guava leaves as main cushioning material 40 per cent of the farmers did not use any cushioning and wrapping during transport and this finding has inline with (Kumar, 2004).

#### **Agents causing loss during transport of guava:**

Majority of loss (70 %) is mainly caused by mechanical factors and (30%) loss is caused by climatic factors the major factor responsible for loss during transport is mechanical factor and this finding has inline with (Gowda and Gowda, 2004).

**Marketing of guava:** The result shows that (50 %) of farmers sell their produce through whole sale market (10 %) through farmers' market (10%) of farmers sell their produce directly to merchants

and (30 %) through local market. All the farmers did not dispose their produce in time to market. There was a delay in harvesting to market post harvest chain and also in sending the guava to market. The main reason is (10%) is due to unavailability of labor and (50%) is due to lack of transport system for timely transport to market and (40%) is due to fluctuation in marketing time and this finding has inline with (Olayemi *et al.*, 2010).

**Agents causing loss during marketing of guava:**

It was observed that (36.70 %) loss in marketing is caused by climatic factors and (63.30%) markets did not have any loss causative factors and this finding has inline with (Olayemi *et al.*, 2010).

**Storage of guava:** The result shows that (76.70 %) of farmers having on farm storage facility from this (56.70 %) of farmers using shade under the tree as main on farm storage technique and (20 %) farmers using temporary protective structures for on farm storage. (23.30 %) farmers did not have any on farm storage technique. The farmers never store their produce for long time selling and to improve marketing life. The guava growers have a distance range of 21-50 Km to access cold storage godown. But none of the farmer using cold storage godown to store their produce and this finding has inline with (Zheng *et al.*, 2001).

**Processing and value addition of guava:** None of the farmers done processing and value addition of guava. The reason for none adoption is lack of knowledge and awareness (33.30 %) and (66.70 %) is mainly due to small scale farming and this finding has inline with (Gudila *et al.*, 2013).

**Time spent on post harvest handling of guava:**

The time spent on post harvest handling denotes the times taken to complete the process of post harvest handling from the harvesting to marketing its observed that (40 %) take 1-5 hrs and (60 %) farmers take 5-10 hrs time to complete the post harvest handling prior to selling and this finding has inline with (Moulasab, 2004).

**Knowledge level of farmers in post harvest handling practices of guava:** The results pertaining to knowledge level of farmers in post

harvest handling practices of guava is depicted in Table 2.

**Harvesting:** It was observed that all the farmers were aware of maturity determination of guava and (76.70 %) of farmers were aware of stage of harvesting that have long shelf life and (66.70 %) farmers were aware of correct time to harvest the produce. Majority of the farmers have knowledge in maturity determination and correct stage and correct time of harvesting of fruits and vegetables. This is mainly due to the experience and acquired practical skills and knowledge in harvesting selling and this finding has inline with (Bhople *et al.*, 1996).

**Pre and post harvest treatments:**

The result shows that (83.30 %) guava growers had knowledge about the benefits of washing and all the farmers had knowledge about gas used for artificial ripening. None of the farmers having knowledge about the chemicals used to control post harvest infection, loss, method of removing field heat and waxing. Majority of the farmers had knowledge about the benefits of washing and none of the farmers had knowledge about the chemicals used to control post harvest infection, loss, delay ripening, method of removing field heat and waxing selling and this finding has inline with (Waman and Patil, 1998).

**Grading:** It was noticed that all the farmers have knowledge about grading techniques and objective of grading. All the farmers had knowledge in grading. This is because of the graded produce all ways have more market value and price than mixed produce so grading facilitate the farmers to get reasonable price for produce in market. For this purpose farmers mainly done grading these have the influence in the knowledge level of farmers in grading and this finding has inline with (Mehta *et al.*, 2000).

**Recommended packaging:** The study revealed that (86.70 %) of farmers were aware of recommended packaging material for guava and 13.30 per cent farmers did not were aware of recommended packaging material for guava. all the farmers had knowledge about ideal cushioning material used for guava. Majority of the farmers

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have adequate knowledge in packaging of produce. Some of farmers mainly banana growers don't were aware of packaging material suitable for banana because from the earlier days they sell the banana as bunches so they did not use any packaging material for banana so they do not were aware of recommended packaging material for banana. The farmers were aware of ideal cushioning and wrapping material for their respective produce. The realized importance of these practices and contact with marketing sources might have favored the situation and this finding has inline with (Raju *et al.*, 2002).

**Transport:** Transportation technique suitable for distant market and criterion considered for distant

market is known by majority (76.70 %) of the farmers (70 %) of farmers were aware of stage of fruit suitable for distant market. It was observed that equal percentage of farmers have knowledge in transport system and criterion considered during transport and this finding has inline with (Moulasab, 2004).

**Marketing techniques:** All the guava growers had knowledge about various marketing techniques to sell their produce. All the farmers were aware of existing marketing channels to sell their produce because the entire farmers mainly get money through selling of produce through available marketing system and this finding has inline with (Kumar, 2004).

**Table 2: Distribution of guava growers based on knowledge level**

| S. No | Details of post harvest handling practices    | Known      | Unknown    |
|-------|---|------------|------------|
| 1.    | <b>Harvesting</b>                             |            |            |
|       | Maturity determination                        | 30 (100)   | 0          |
|       | Stage of fruit shelf life noticed maximum     | 23 (76.70) | 7 (23.30)  |
|       | Correct time to harvest produce               | 20 (66.70) | 10 (33.30) |
| 2.    | <b>Pre and post harvest treatments</b>        |            |            |
|       | Chemical recommended to reduce loss           | 0          | 30 (100)   |
|       | Method of removing field heat                 | 0          | 30 (100)   |
|       | Benefits of washing                           | 25 (83.30) | 5 (16.70)  |
|       | Disinfectant agent in fruits and vegetables   | 0          | 30 (100)   |
|       | Gas used for artificial ripening              | 30 (100)   | 0          |
|       | Waxing  | 0          | 30 (100)   |
| 3.    | <b>Grading</b>                                | 30 (100)   | 0          |
|       | Objective of grading                          | 30 (100)   | 0          |
| 4.    | <b>Recommended packaging</b>                  | 26 (86.70) | 4 (13.30)  |
|       | Ideal cushioning material for guava           | 30 (100)   | 0          |
| 5.    | <b>Transport</b>                              |            |            |
|       | Transport suitable for distant market         | 23 (76.70) | 7 (23.30)  |
|       | Criterion considered for distant transport    | 23 (76.70) | 7 (23.30)  |
|       | Stage of fruit suitable for distant transport | 21 (70)    | 9 (30)     |
| 6.    | <b>Marketing techniques</b>                   | 30 (100)   | 0          |
| 7.    | <b>Storage</b>                                |            |            |
|       | Objective of storage                          | 30 (100)   | 0          |
|       | Storage temperature and RH for guava          | 0          | 30 (100)   |
|       | Chilling injury in guava                      | 0          | 30 (100)   |
| 8.    | <b>Processing</b>                             |            |            |
|       | Products prepared from guava                  | 18 (60)    | 12 (40)    |
|       | Stage of fruit suitable for processing        | 17 (56.70) | 13 (43.30) |
| 9.    | <b>Post harvest losses</b>                    |            |            |
|       | Causes for major loss                         | 24 (80)    | 6 (20)     |
|       | Post harvest diseases spread by               | 27 (90)    | 3 (10)     |
|       | Techniques for reduction of deterioration     | 22 (73.30) | 8 (26.70)  |

(\* ) Parenthesis in percentage

**Storage:** The main aim of storage is known by all the farmers and they do not have knowledge about storage temperature, and relative humidity required for storage of guava and to prevent chilling injury. The farmers having knowledge about the objective of storage but not having knowledge about storage temperature, Relative humidity, chilling injury, and advanced storage techniques for the storage of fruits and vegetables selling and this finding has inline with (Gudila *et al.*, 2013).

**Processing:** It was observed that (60 %) of guava growers had knowledge about products prepared from guava and (56.7 %) of farmers had knowledge about stage of fruit suitable for processing (40 %) farmers did not have knowledge about processing of guava. Apart from cauliflower growers many of the farmers were aware of processing and value addition, products prepared from their respective produce and this finding has inline with (Mehta *et al.*, 2000).

**Post harvest losses:** The result shows that (80 %) of farmers were aware of the major cause for loss during post harvest handling (90 %) of farmers were aware of the post harvest diseases (73.3 %) of farmers have knowledge about the techniques for reduction of deterioration during post harvest handling. Some of the farmers were aware of post harvest losses, causes for major loss, post harvest diseases and techniques to reduce the post harvest losses and this finding has inline with (Waman and Patil, 1998).

### **Constraints and strategies for post harvest handling of guava**

The field level experienced constraints are labor shortage for harvesting of the produce, lack of suitable tools for harvesting, high cost of packaging material, low quality of packaging material, high transportation charges, lack of vehicles for timely transport, exploitation by traders and merchants in marketing, low price for produce, price fluctuations, lack of local markets, unavailability of storage structures, inaccessibility of storage godown, distant storage structures, lack of technical guidance for storage. The key strategies are in harvesting of the guava produces; regulate the supply of adequate labor and machinery for

harvesting and development and supply of maturity index chart. Mostly, pre and post harvest treatment is promote the use of growth regulator in season times and regulate the use of sanitation spray and chemicals and promote the use of pre-cooling methods. Transportation of harvested produce is commercialization and regulation of cold, modified and controlled atmospheric transport system from farm to consumers. In marketing is regulation of marketing, giving price fixation rights to farmers, controlling of commodity flow in full season time, establishment of whole sale markets at crop intensive areas and retail shop at people intensive areas and formation of local markets and establishment of fruits and vegetables outlets by government. And, identification and establishment of cold storage structures at crop specific zones.

### **Conclusion**

Farm knowledge has drastically improved the status of guava growers in Madurai district. An enhanced guava post harvest system includes, scaling-up on equal importance to post production operations i.e. crop production will prevent the loss and helps to achieve food security. Framing of suitable farm developmental strategies, schemes, policies based on the perceived needs, crop and farm profile of guava growers. Improve the nation economy, socio economic status of farmers, nutritional and health status of people by increasing the availability through prevention of post harvest loss and proper post harvest handling practices of guava.

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