

RESEARCH PROGRAMME

**Effect of postharvest treatment of improvement of
the shelf life in Guava(*Pisidium guajava* L.)**

DISSERTATION REPORT -1

Submitted to the
**LOVELY PROFESSIONAL UNIVERSITY,
PHAGWARA, PUNJAB, INDIA**

In partial fulfillment of the requirements for the award of degree of

MASTER OF SCIENCE
IN
(HORTICULTURE)
BY

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May,2018

CERTIFICATE

Certified that this synopsis of Manpreet Kaur, registration no. 11719790, entitled “**Effect of postharvest treatment of improvement of the shelf life in Guava(*Pisidium guajava L.*)**” has been formulated and finalized by the student himself on the subject.

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1. INTRODUCTION

Guava (*Psidium guajava*) belongs to family Myrtaceae and fourth most important fruit crop of India. Origin of guava is tropical America and well grown under tropical and subtropical regions. It is also known as “Apple of Tropics”. Production area of guava in India is 260 M hectare and having productivity of 13.9 MT hectare (NHB, 2016). Bihar is leading state for production of guava. Area in Punjab for the production of guava is 8689 hectare and production is 195529 MT.

Guava is a climacteric fruit crop. Due to climacteric in nature, guava fruit is having high rate of respiration and short shelf life. High respiration rate resulted early deteriorated during storage. With the ripening fruit firmness decrease gradually as well as TSS will increase rapidly (Bashir, 2003). We prefer different methods to extend shelf life and biochemical properties of stored fruits of guava. Store fruits at low temperature, use of antioxidants, chemical and organic coating are common methods to store guava fruits (Reyes, 1995).

Different parts of guava plant use for different purpose (i.e. fruits and leaves). Fruits of guava is not only use for table purpose it also use in processing industry for making value additional fruits like jam, jelly, juice, candy etc. Guava fruit is rich in Vitamin C and pectin content. For making jelly pectin content is mainly required. Guava is pectin rich fruit which is highly desirable for making jelly. Mature fruits are having good biochemical composition according to aspects of quality as compared to ripe fruits. Pectin content will decrease when mature fruit move towards the ripening stage (Chyan, 1992). Guava plant parts are used for development of many pharmaceutical products because guava plant also have medicinal value.

According to Government of India Ministry of Food Processing Industries (2016) total postharvest losses of fruits and vegetable are 4.5- 15.8% which have cost of Rs.40811 crore. Post harvest handling of guava is more important because it have high rate of post-harvest losses than other crops. Due to post harvest mishandling of crop, fruits lost their quality, appearance and market value. To reduce the losses we can prefer edible coating by chemicals or plant growth regulators. Edible coatings slow down the rate of respiration and provide partial barrier, maintain the quality of the fruit, preserve texture and colour of fruit as well as enhance the market acceptability (Mahajan, 2017)

Post-harvest treatments have capacity to preserve the quality and storage life of fruits. The clear objective of chemical treatment is to reduce the losses of fruit quality and increase shelf life of guava. There are some chemicals beside fungicides which are responsible for delaying ripening, senescence and extend the storage life of fruits. Ethylene scavengers use to retain the ethylene under the threshold level. Other than chemicals plant growth regulators are also effective to increase post-harvest life of guava. Phytochemicals viz., plant growth regulators at different concentration have been reported to enhance shelf life and value of guava during storing (Sharma *et al.*, 2002).

Background Problems

Post-harvest losses in guava fruits is estimated to be at 3.4–15.1% due to its perishable in nature (Madan and Ullasa, 1993). Because of high moisture content and thin and soft skin, guava fruits are subjected to higher rate of transpiration, respiration, ripening and other biological activities, even after harvest, which deteriorate the quality of the fruits in a short period and finally make them unmarketable. Increase in PLW (physiological loss in weight), TSS and sensory rating while decrease in firmness, acidity and ascorbic acid have been reported by Deepthi *et al.* (2016) under ambient conditions. Furthermore, its susceptibility towards pest and microbial attack results in short postharvest life (El-Anany and Hassan, 2013). Thus, it is necessary to reduce rates of these physico-chemical changes in order to increase the storage lifespan of guava fruits. After harvesting changes occur continuously till fruit decrease their quality for consumption and go through losses because of climacteric nature of guava fruit. (Rana, 2015) Production rate of C_2H_4 and CO_2 were advanced in the mature fruit. Brown *et al.* (1983). After harvesting due to fungus attack Biochemical composition of fruit will deteriorate. (Gadgile, 2017). Dhillon *et al.* (1987) also observed that total pectin content increased during early developmental stages but decreased as fruit approached ripe stage in cultivars, ‘Safeda’ and ‘Sardar’.

PROPOSED RESEARCH OBJECTIVE

1. To enhance shelf life of guava fruit.
2. To reduce spoilage incidence during storage.
3. To assess the quality of fruit after postharvest treatments.
4. To enhance the consumer acceptability.
5. To find out effective post-harvest treatment to extend the shelf life of guava.

2. REVIEW OF LITERATURE

Gorther (1969) reported that application of 500 ppm of NAA helped in retarding ripening of pineapple and extended its marketable life.

In a similar experiment, Singh *et al* (1981) found that enhance the storage life of guava fruits by delaying the onset of senescence under storage dipping of guava by use of 1% calcium nitrate. Calcium nitrate minimized the loss in weight, reduced respiration rate and disease percentage and finally maintained the edible quality of guava fruits for more than 6 days.

Holdsworth (1983) recommended a storage temperature of 7 to 10°C with a shelf life of 2-3 weeks for guava fruits.

Dhoot *et al* 1984 reported that NAA@150ppm for five minutes dip + 150 gauge polythene with 0.05% vents resulted in 2.9% weight loss and 3.4 / 4.0 organoleptic score and was found suitable for prolonging the guava fruits shelf life cv. 'Sardar' for 12 days .

Singh *et al* (1987) concluded that pre and post-harvest treatment of calcium compound i.e. calcium chloride and calcium nitrate helped in maintaining the quality of mango cv. 'Amrapali' for more than 8-10 days, while fruits under control remained for four days under storage.

Singh (1988) reported reduced loss in weight (5.71%) of guava when fruits were treated with 1% calcium nitrate during storage compared to control (7.64%).

Singh (1988) also reported that application of higher concentrations of NAA (100ppm) and GA3 (40ppm) were effective in minimizing the rot percentage of guava fruits.

Garcia *et al* (1996) conducted an experiment in which some fruits of strawberries after harvesting (*Fragaria* × *Ananassa* cv. Tudla) were kept as control, treated with water, or treated at 25 or 45 °C with different solution of calcium chloride (CaCl₂) and subsequently stored for 1 day at low temperature (1°C). Its physical and chemical parameters were then recorded at 18 °C after 3 days interval. Among the all treatments best result were given by the treated fruits with 1% CaCl₂ solution which improves the quality and reduce the spoilage. It also effective to preserving total soluble solids content and fruit firmness. Whereas, there was no effect of the treatments on the sensorial quality of fruits.

Akhtar *et al* (2010) conducted an experiment on mature fruits of loquat. Three different concentrations of calcium chloride viz; 1%, 2% , 3% were taken as post harvest treatments and fruits were kept in cold store. The results showed that lower concentration of calcium chloride (i.e. 1%) was not much effective as compared to calcium chloride concentration of 2% and 3%.

Kumar *et al* (2012) reported that application of 1% calcium chloride is helpful in maintaining fruit colour at room temperature as it plays an active role in delaying the ripening of fruits. It was observed that when guava fruits were stored at 25°C, application of calcium nitrate at 1% helped in delaying loss of skin colour.

Madhav *et al* (2016) reported suppressed production of ethylene and respiration when the guava fruits, were dipped in Salicylic acid @ 1 mM and 2 mM and for 12 days stored at 10°C.

Kaur (2016) reported that winter crop of guava cv. Shweta did not exhibit any signs of spoilage till 7th day of storage in all the treatments including control under cold condition. Whereas, least spoilage was reported in Salicylic acid (SA) treated fruits @ 300 ppm under cold storage. The spoilage was further increased up to 21 days and fruits gave pitiable appearance in almost all the treatments of (SA).

Banina *et al* (2016) reported that vitamin C content in tomato was decreased during storage 10°C and it was maintained with postharvest treatments of SA. Tomato fruits treated with SA showed comparatively higher levels of vitamin C than control.

Amanullah (2017) conducted a study in which he used salicylic acid to treat guava fruits. He took different concentrations of salicylic acid (0, 400, 500, 600 and 700 µmol) and recorded physical and chemical parameters of stored fruits at room temperature. After 5 day interval he recorded data on physical parameters like fruit weight, weight loss%, fruit colour, decay%, fruit firmness and biochemical parameters are TSS, ascorbic acid contents, total sugars, reducing sugars, non-reducing sugars, total phenolic contents and total antioxidants were calculated at five days interval at ambient storage condition. The results showed utmost values for TSS, total titrable acidity, total sugars, non-reducing sugars, reducing sugars, ascorbic acid contents, total phenolic compound and total antioxidants were noticed in fruits

which were treated with (Salicylic Acid) 600 μmol . treated fruits with 600 μmol had lower values for colour loss , fruit decay and weight loss as compared to other SA concentrations.. The data exposed that during short term storage, to increase the shelf life of guava fruit application of 600 μmol Salicylic acid concentration is a helpful postharvest treatment. Whereas, application of Naphthalene acetic acid (NAA) at 150ppm and Benzyl adenine (BA) at 15ppm were found optimum in arresting ripening process of guava cv. 'Sardar' (L-49) fruits.

3. MATERIAL AND METHODOLOGY

3.1 Proposed Treatments

Effect of postharvest treatment of improvement of the shelf life in Guava(*Pisidium guajava* L.) Under Ambient condition.

- Treatment 1** Calcium chloride 1%
- Treatment 2** Calcium chloride 2%
- Treatment 3** Calcium nitrate 1%
- Treatment 4** Calcium nitrate 2%
- Treatment 5** Salicylic acid 100ppm
- Treatment 6** Salicylic acid 200ppm
- Treatment 7** Naphthalene Acetic Acid 100ppm
- Treatment 8** Naphthalene Acetic Acid 200ppm
- Treatment 9** Control

Effect of postharvest treatment of improvement of the shelf life in Guava(*Pisidium guajava* L.) Under Cold storage condition

- Treatment 1** Calcium chloride 1%
- Treatment 2** Calcium chloride 2%
- Treatment 3** Calcium nitrate 1%
- Treatment 4** Calcium nitrate 2%
- Treatment 5** Salicylic acid 100ppm
- Treatment 6** Salicylic acid 200ppm

Treatment 7 Naphthalene Acetic Acid 100ppm

Treatment 8 Naphthalene Acetic Acid 200ppm

Treatment 9 Control

Method of treatment – Dipping (1-3 min)

No. of replication in each treatment – 5

No. of fruits per replication – 5

4. OBSERVATION RECORDED

Following observations will be recorded at intervals of every 3 days in ambient condition and at 7 days in cold storage conditions.

Physical analysis

1. Fruit weight (g)
2. Fruit length (mm)
3. Fruit breadth(mm)
4. Fruit firmness(kg/cm²)
5. Spoilage percentage
6. Specific gravity
7. Palatability rating

Biochemical analysis

1. Total soluble solids (°B)
2. Acidity (%)
3. Vitamin C(mg/100gm)
4. Total sugar

PROPOSED EXPECTED OUTCOME

Storage life of guava at ambient temperature is not more than one week because of climacteric nature of it. By adopting these postharvest treatments, we will able to extend shelf life of Guava more than one week at ambient temperature. Cold storage conditions with post harvest treatments is very much effective to enhance the shelf life and to maintain the quality of Guava fruit.

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