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STUDY ON EFFECT OF DIFFERENT PACKAGING MATERIALS ON QUALITY OF GUAVA (*PSIDIUM GUAJAVA* L.) TO EXTEND SHELF LIFE

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ABSTRACT

The present investigation was carried out at Post Graduate Laboratory of Department of Horticulture, School of Agriculture, ITM University Gwalior (M.P.) during the year 2022-2023.The present study was conducted to evaluate the effect of different packaging materials viz. newspaper, tissue papers, gunny bag, CFB Box, banana leaf, butter paper and paddy straw at room temperature (9.98°C - 25.99°C) on shelf life and physio-bio-chemical characteristics of Guava fruit. Data pertaining to the studies on different types of packaging material to extend shelf life of guava at i.e., 0, 3, 6, 9, 12 and 15 days on bio-chemical changes of guava. The maximum fruit weight was observed in T_4(CFB Box) i.e., 122.44 gm and minimum was observed in T_0(Control) on 3rd day of trial, Maximum physiological loss in weight was found in T_1(Newspaper) 18.31% and minimum PLW was found in T_4(CFB Box) 119.39 gm and minimum was observed in T_0 (Control) on 3rd day of trial, Maximum physiological loss in weight was found in T_0 (control) 18.31% and minimum PLW was found in T_4 (CFB Box) 1.36% on 6th day of experiment, maximum specific gravity was measured on 12th day of experiment was in T_4(CFB Box) i.e., 1.05 g/ml^3 and minimum was measured in T_3(Gunny bag) 1.00 g/ml^{3}land T_5(Banana leaf) 1.00 g/ml^3.The bio-chemical parameters was taken for the experiments are TSS, Acidity and Ascorbic acid. The maximum TSS was found in T_3(Gunny bag) 12.80 °Brix and minimum was recorded in T_0(Control) 7.10 °Brix at the 9th day of storage, maximum acidity was found in T_4(CFB Box) 0.44% and minimum was found in T_0(Control) 0.26% at the 12th day of storage, maximum Ascorbic acid was found in T_4(CFB Box) 197.17 mg/100g and minimum was found in T_0(Control) 181.10 mg/100g at the 15th day of storage. After all the physical and bio-chemical analysis done from 0 to 15 days of experiment the result reveled that T_4(CFB Box) was found statistically best over all other packaging materials till the 15th day of shelf life.

Keywords **:** Newspaper, tissue papers, gunny bag, CFB Box, banana leaf, butter paper, paddy and Guava (*Psidium guajava* L.)

Introduction

Guava (*Psidium guajava* L.), commonly known as Poor Man's Apple, belongs to the family Myrtaceae and is originated in the Southern part of Mexico and Central America, where from it was introduced to Asian countries in the 17th century. The common guava is a diploid (2n=22) but natural and artificial triploid (2n=33) and aneuploidy also exist in nature. The main factors depreciating post-harvest quality in guava are fast loss of green colour, excessive softening, high rot incidence and loss of turgidity. Storage under low temperatures has been considered the most efficient method to maintain quality of most fruits due to its effects on reducing respiration rate, transpiration, ethylene production, ripening, senescence, and rot development. In climacteric fruits, like most guava varieties, the reduction of temperature delays the climacteric peak and, consequently, ripening.

Guava fruits harvested green had the highest acidity and lowest TSS values. (Azzolini *et al*., 2004). Pereira *et al*. (2003) found that fruits packed in polyethylene terephthalate (PET) trays and stored at 5C had the lowest weight loss microbial spoilage and best physiobio-chemical characteristics. Packing fruits in rigid or flexible packaging retained freshness. The highest retention of green colour (20%) was observed in the polythene laminated with aluminium foil packaging (Mandhyan, 1999).

However, best physio-bio-chemical characteristics and marketability quality for up to 16 days were observed when fruit was harvested at mature green stage and wrapped in transparent polyethylene bags stored at refrigerated at 10oC (Gonzaga *et al*., 1999). Keeping in views the importance and perish ability nature of guava, an attempt has been made in the present study to evaluate the effect of different packing materials on shelf life and physio-bio-chemical characteristics of guava.

The fruit become over ripe and loses its texture and quality within 3-4 days after harvest at room temperature (Singh and Pal, 2007; Mitra *et al*., 2012). Maturity stage of guava at harvest is a critical factor for determining shelf life and quality (Azzolini *et al*., 2004; Cavalini *et al*., 2006). Skin colour is a measure of maturity and ripeness in guava. Fruit attaining maturity show signs of colour break stage from pale green to yellowish green (Asery *et al*., 2008). Guava is a perishable fruit and highly susceptible to bruising and mechanical injuries. It attributed that 18-20% post-harvest loss in guava. To reduce percent losses in guava by adopting

technologies for keeping quality through proper harvesting, post-harvest handling, proper packaging, treatments with bio-chemicals (post-harvest treatment), and storage technology (Mahajan *et al*., 2004).

Objectives

1. To evaluate the effect of organic packaging treatments on guava fruit after post-harvest.
2. To determine the effect of organic packaging treatments on bio-chemical properties of guava fruit after post-harvest.
3. To determine the suitable post-harvest organic packaging treatments on Shelf-life of guava fruit after post-harvest.

Materials and Methods

The present investigation was conducted in the laboratory of Department of Horticulture, School of Agriculture ITM University Gwalior (M.P.) 475001. India

The details of material used and techniques employed in carrying out the investigation are described under the following heads:

Location

The trial was conducted at the School of Agriculture, Department of Horticulture, ITM University, Gwalior (M.P.) India. Sithouli is located at 26.146° N, latitude and 78.187°E longitudes at an altitude of 227 m Mean Sea Level. The laboratory is situated in the campus of college. The campus of college is located on the NH-75, opp. Sithouli Railway Station, Sithouli, Gwalior, Madhya Pradesh 475001, India.

Climatic Conditions

The subtropical climate in Gwalior has both Summer , Rainy and Winter seasons. It can get as hot as 46^0C in the Summer and as cold as 3^0C to 7^0C in the Winter. The meteorological observatory at the Sithouli Farm, School of Agriculture, Gwalior, recorded the mean of weekly values of weather parameters during the investigation period

Experimental materials

The mature and uniform size of guava were procured from the Instructional cum Research Orchard, and different types of packaging materials like; Control, News Paper, Tissue Paper, Gunny Beg, CFB Box, Banana Leaf, Butter Paper, Paddy Straw were carried out as per treatments to Department of Horticulture, School of Agriculture, ITM University, Gwalior for completing the experiments.

Experimental details

Experiment comprised of 8 treatments consisting of post-harvest treatments of Packaging of guava fruits was done. Experimental details are presented in table -1.

Table 1 : Detail of the treatments

Symbol	Treatments
T_0	Control
T_1	News Paper
T_2	Tissue Paper
T_3	Gunny Beg
T_4	CFB Box
T_5	Banana Leaf
T_6	Butter Paper
T_7	Paddy Straw

Table 2 : Detail of the experimental programme:

Name of crop	Guava (*Psidium guajava* L.)
Treatments	8
Replication	3
Fruit per treatment	9
Total number of fruits	72
Design	Completely Randomized Design (CRD)

Selection of fruits for experiment

Fresh, fully mature, uniform sized and free from any injury & infection fruits were harvested and taken from 10 years old trees of guava (*Psidium guajava* L.) for this study from Department of Horticulture, School of Agriculture, ITM University, Gwalior (M.P.).India

Storage

After harvesting fruits were washed under running tap water and air dried. Initial parameters were recorded before Packaging after that fruits were packed in the different packaging materials as per treatments and stored at ambient room temperature. The Packed fruits were subjected to various physical and bio-chemical, observation, as per details given below at 3rd, 6th, 9th 12th, and 15th day of storage (Kumar, 2022).

Observations recorded

(A) Physical parameters:

1. Fruit Weight (g)
2. Physiological Loss in Weight
3. Specific gravity (ml)

(B) Bio-chemical parameters:

1. Total Soluble Solids (°Brix)
2. Acidity (%)
3. Ascorbic Acid (mg/100g)

Physical parameters:

Fruit Weight (g):

Three fruits per treatment weighed on an electronic balance and average weight (g) was obtained by dividing the total weight of the fruits with the number of fruits. Average fruit weight = Total weight of fruits (g)/ Number of fruits.

Physiological Loss in Weight (PLW) :

To determine (PLW %), 9 fruits each replication were noticeable and labelled. The recognizable and labelled fruits were weighed before storage under each treatment. Their weight was determined on 0 (initial), 3rd, 6th, 9th 12th and 15th of storage days. PLW in weight was conveyed based on original weight of fruit suggested by Srivastava and Tandon (1968).

$$\text{PLW}(\%) = \frac{\text{Initial Weight} - \text{Final Weight}}{\text{Initial Weight}} \times 100$$

Specific gravity: (ml)

The Specific gravity was obtained by dividing the weight of the fruit by the volume of the fruit.

Bio-chemical parameters:

Total Soluble Solids (^{0}Brix):

The sample fruits were crushed to form a homogenized sample and then the juice was extracted through muslin cloth. The extract was used for determination of T.S.S (°Brix) at 0, 3, 6, 9, 12 and 15 days after storage by digital refractometer.

Acidity (%):

Taken 10 ml fruit juice of guava fruit

↓

10 time diluted with distilled water and made up the final volume 100 ml

↓

Taken 1 N NaOH solution in 100 ml burette

↓

Taken 10 ml fruit juice from 100 ml

↓

Added 1-2 drop of phenolphthalein indicator

↓

Titrated against the 0.1 N NaOH

↓

Appearance of light pink colour denote the end point

↓

Calculated the titratable acidity by the of using following formula

$$\text{Acidity}(\%) = \frac{\text{Titer value} \times \text{Normality of NaOH} \times \text{Volume made up} \times \text{Eq. Wt. of acid} \times 100}{\text{Volume of sample taken for estimation} \times \text{Wt. of sample taken} \times 100}$$

(Ranganna, 2010)

Ascorbic acid (mg/100g)

Ascorbic acid content was estimated by grinding 5 g fruit pulp with 3.0 per cent metaphosphoric acid as buffer. The extract was filtered with muslin cloth in 50 ml volumetric flask and volume was made up with 3 % HPO_3 (Metaphosphoric Acid) solution in case of fresh fruits, whereas 5 ml sample was taken into 50 ml volumetric flask and volume was made up with 3 % HPO_3 (Metaphosphoric Acid) solution in case of prepared products. Thereafter 5 ml aliquot were titrated against 2, 6- dichlorophenol-indophenol dye solution. The end point was marked by appearance of pink colour, which persisted at least for 15 seconds (Ranganna, 2010). The vitamin-C content was expressed as mg/100 ml or g sample after calculation using following formula:

$$\text{Vitamin C} = \frac{\text{Titrate value} \times \text{Dye factor} \times \text{volume made up}}{\text{Aliquot taken} \times \text{weight of the sample traken m}} \times 100$$

Statistical analysis

The data obtained from set of observation for each character were subjected to "Analysis of Variance" as advocated by Panse and Sukhatme (1985). The skeleton of ANOVA as per design.

Result and Discussion

The data recorded on physical and bio-chemical parameters of guava fruit were statistically analysed and presented under the following appropriate headings. Data pertaining to the studies on deferent types of packaging material to extend shelf life of guava at i.e., 0, 3, 6, 9, 12 and 15 day on physico-bio-chemical changes of guava are presented in this chapter.

Physical Parameters of Fruits

Fruit weight (g):

The observations on fruit weight (g) were observed at 0, 3, 6, 9, 12 and 15 days interval and presented in table -3 and depicted in figure-1. The gradually decreased fruit weight observed during investigation. During the research trail the fruit weight significantly influenced by the various packaging material.

However, at 0 days of experiment the treatment T_1 had maximum (129.55g) fruit weight and it was followed by the treatment T_4 and T_6 while the treatment T_3 had minimum (110.78g) fruit weight.

Table 3 : Effect of different packaging material on fruit weight (g) of guava (*Psidium guajava* L.) at different days.

Treatment	At 0 Days	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	112.44	96.00	92.44	85.33	81.11	73.89
T_1	119.32	99.44	94.55	91.55	89.89	82.77
T_2	119.00	115.89	111.66	104.89	100.22	92.33
T_3	110.78	110.88	105.67	96.89	91.55	86.44
T_4	123.55	122.44	119.39	115.22	109.11	99.78
T_5	119.55	109.22	100.44	95.55	87.67	80.25
T_6	120.22	116.33	110.33	111.11	103.77	95.55
T_7	116.66	106.89	101.89	93.77	87.88	83.44
Se(m) (±)	**1.39**	**1.54**	**1.38**	**1.14**	**1.33**	**1.28**
CD at 1%	**5.76**	**6.36**	**5.75**	**4.69**	**5.49**	**5.30**

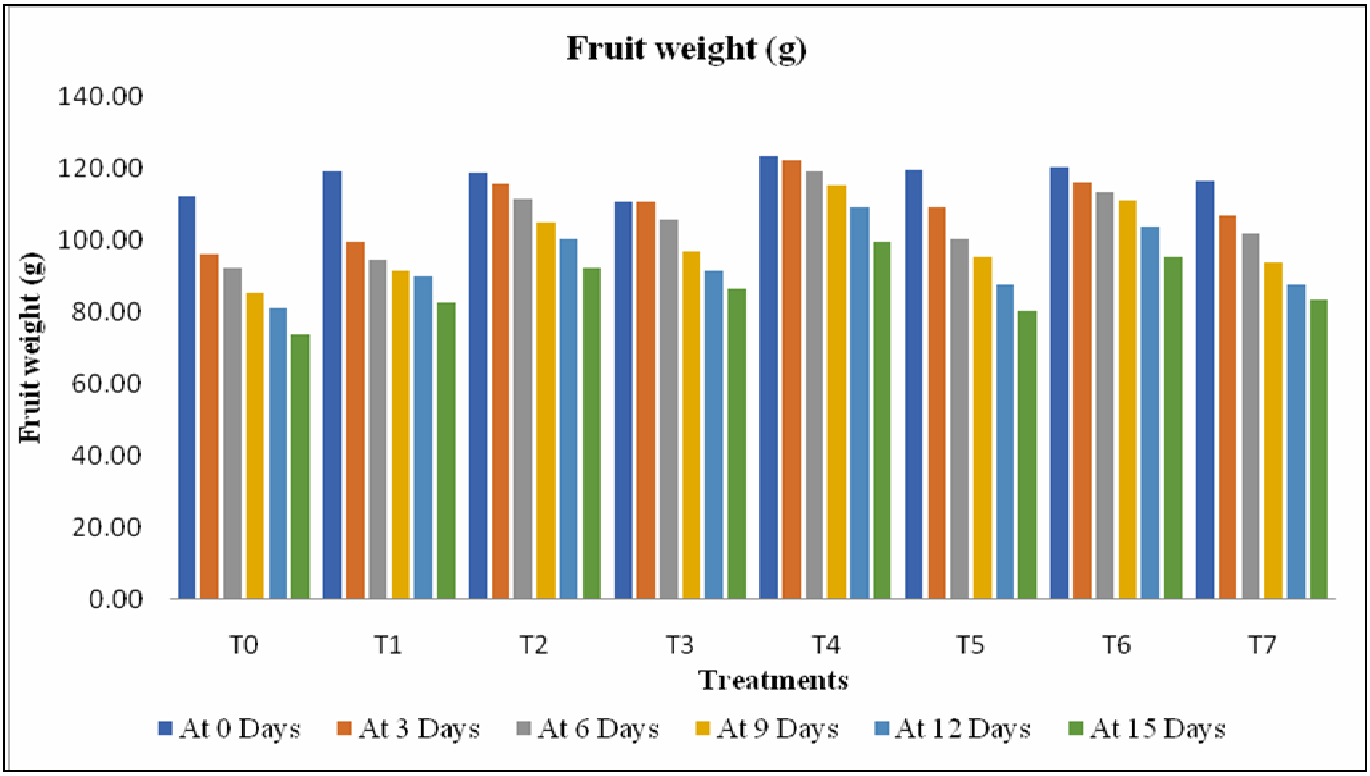

Fig. 1 : Effect of different packaging material on fruit weight (g) of guava (*Psidium guajava* L.) at different days.

At 3, 6, 9, 12 and 15 days of experiment the highest (122.44g, 119.39g, 115.22g, 109.11g and 99.78g) fruit weight were recorded from the treatment T_4 (CFB Box) it was followed by the treatment T_6, T_2 and T_3. The treatment T_4 found at par with all other treatments except T_6 (116.33g). However, the treatment T_0 (control) had minimum (96.00g, 92.44g, 85.33g, 81.11g and 73.89g) fruit weight at 3, 6, 9, 12 and 15 days of experiment.

Physiological loss in weight (PLW) (%)

The observations on physiological loss in weight (PLW) (%) was presented in table-4 and depicted in figure-2. The physiological loss in weight was significantly influenced by the various packaging material during the experiment.

At 3 days of experiment the minimum (0.10%) physiological loss in weight was recorded in the treatment T_4 (CFB Box) it was followed by the treatment T_4, T_2 and T_6 while the maximum (16.66 %) PLW was found in the treatment T_1 (Newspaper). Therefore, at 6 days experiment the treatment T_4 (CFB Box) had minimum (1.36%) physiological loss in weight it was followed by the treatment T_6, T_2 and T_3, respectively. The maximum (18.31%) physiological loss in weight was observed in the treatment T_1 (News Paper).

Table 4 : Effects of different packaging material on PLW (%) of guava (*Psidium guajava* L.) at different days.

Treatment	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	16.66	18.31	24.09	27.85	34.26
T_1	14.63	14.62	23.26	24.67	30.63
T_2	2.62	7.23	11.82	15.73	22.31
T_3	0.90	3.97	12.50	17.33	21.92
T_4	0.10	1.36	6.69	11.63	19.19
T_5	8.65	16.81	20.05	26.66	32.86
T_6	3.23	7.50	7.55	13.63	20.50
T_7	8.38	12.18	19.61	24.65	28.46
SE(m) (±)	**1.52**	**1.18**	**1.56**	**1.96**	**1.72**
CD at 1%	**6.27**	**3.53**	**4.67**	**4.96**	**5.16**

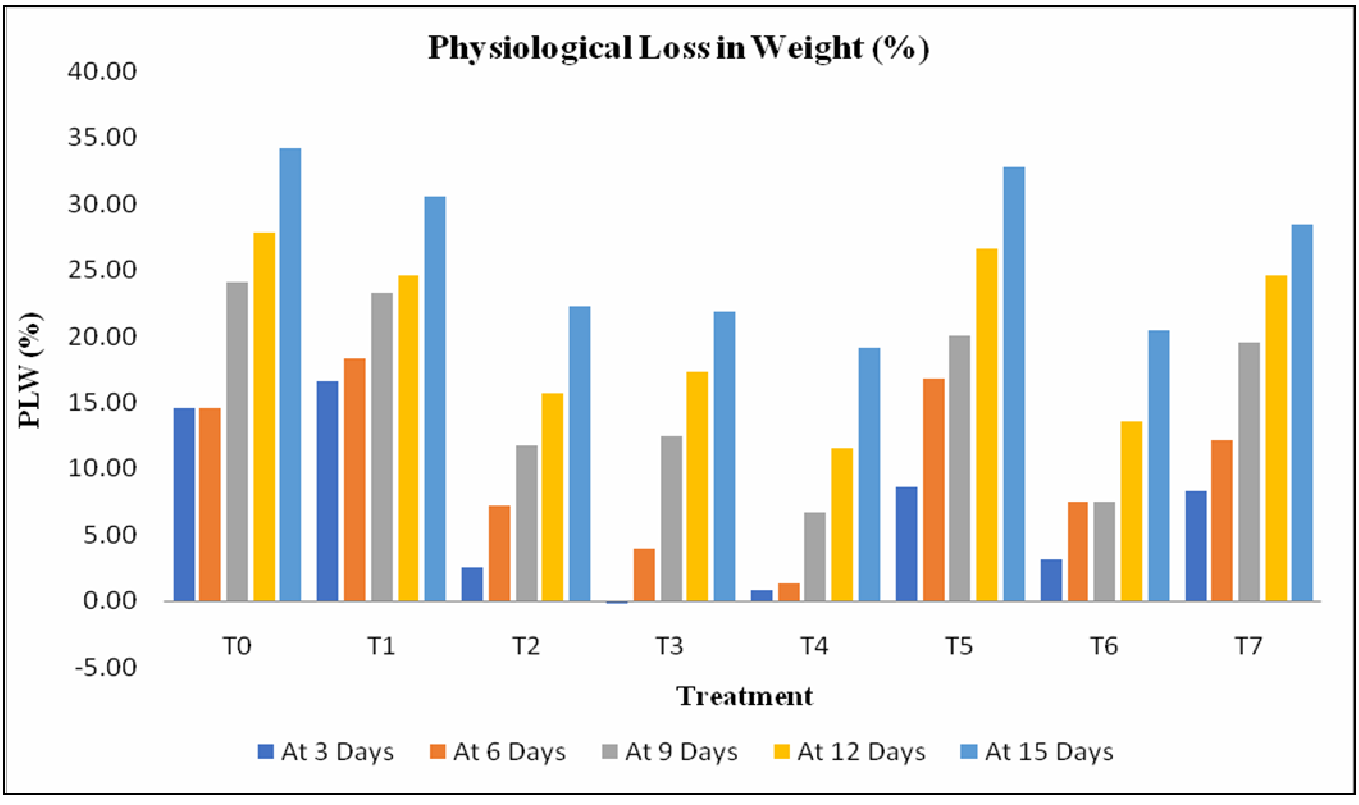

Fig. 2 : Effects of different packaging material on PLW (%) of guava (*Psidium guajava* L.) at different days.

However, at, 9, 12 and 15 days of experiment the treatment T_4 showed lowest (6.69%, 11.63% and 19.19%) physiological loss in weight. It was followed by the treatment T_6, T_2 and T_3, respectively. The treatment T_0 (control) had maximum (24.09%, 27.85% and 34.26%) physiological loss in weight during the experiment.

Specific gravity of fruit

The specific gravity of guava fruit (g/ml^3) was observed at 0, 3, 6, 9, 12 and days. The very minute difference in specific fruit was observed in the different treatment during the investigation. The specific gravity of guava fruit is presented in table -5.

At 0 days of experiment the maximum (1.09 g/ml^3) specific gravity of fruit was found in the treatment T_0 (control) it was followed by the treatment T_1, T_2 and T_3, respectively. The treatment T_4 had maximum (1.09 g/ml^3, 1.07 g/ml^3, 1.06 g/ml^3, 1.05 g/ml^{3}and 1.04 g/ml^3). It was followed by the treatment T_6, T_2 and T_3, respectively. However, the lowest (1.05 g/ml^3, 1.04 g/ml^3, 1.03 g/ml^3, 1.01g/ml^3 and 1.0 g/ml^3) specific gravity of guava fruit was observed in the treatment T_0 (control) during the investigation at different days.

Table 5 : Effect of different packaging material of specific gravity (g/ml^3)of fruit of guava (*Psidium guajava* L.) fruit at different days

Treatment	At 0 Days	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	1.05	1.05	1.04	1.03	1.01	1.00
T_1	1.06	1.05	1.04	1.03	1.01	1.00
T_2	1.06	1.06	1.05	1.04	1.03	1.02
T_3	1.06	1.01	1.01	1.00	1.00	1.00
T_4	1.05	1.09	1.07	1.06	1.05	1.04
T_5	1.08	1.06	1.04	1.03	1.00	1.01
T_6	1.06	1.07	1.06	1.05	1.04	1.03
T_7	1.04	1.05	1.05	1.04	1.02	1.01
SE(m) (±)	**0.01**	**0.01**	**0.02**	**0.04**	**0.01**	**0.03**
CD at 1%	**0.05**	**0.06**	**0.04**	**0.08**	**0.03**	**0.06**

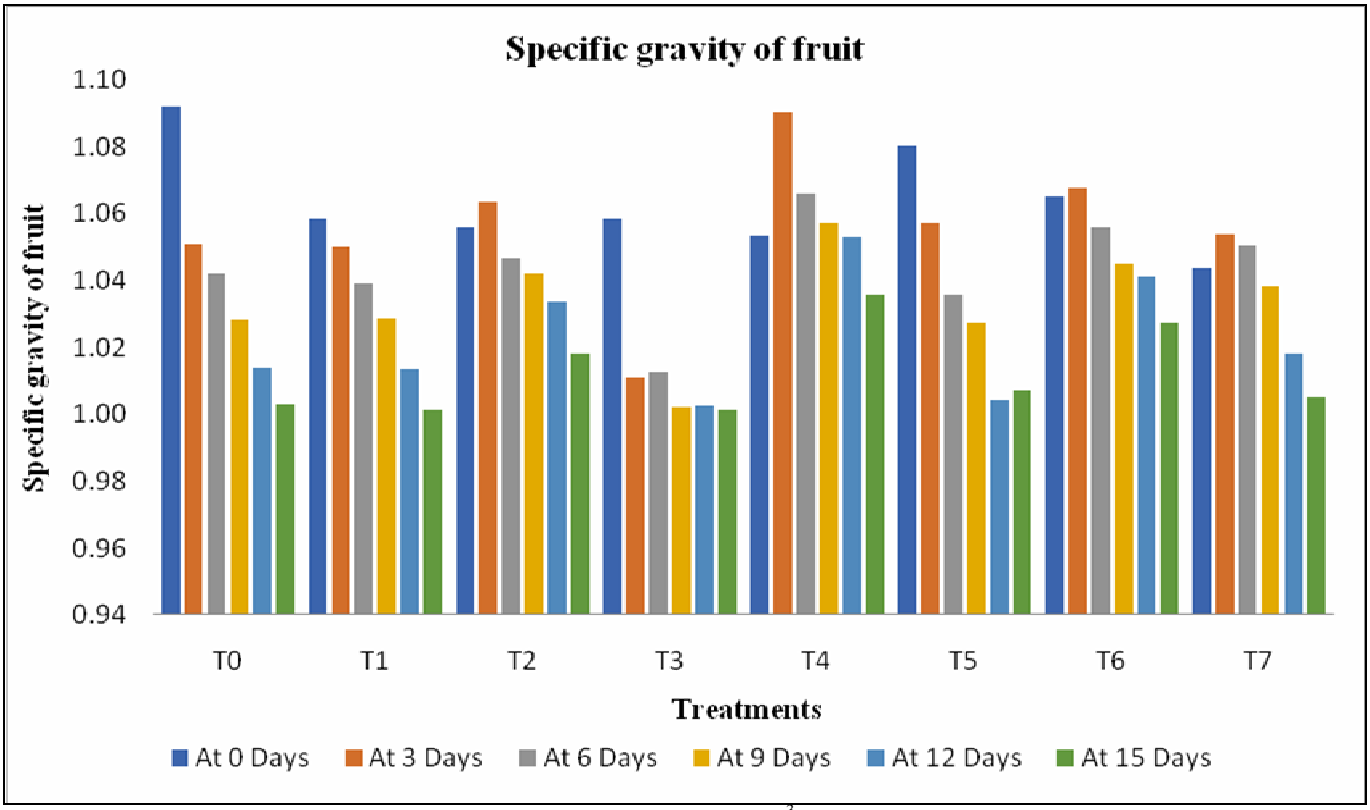

Fig. 3 : Effect of different packaging material on specific gravity (g/ml^3)of fruit of guava (*Psidium guajava* L.) at different days.

Bio-chemical Parameters:

Total soluble solid (TSS °Brix)

The observations on total soluble solid (°Brix) were observed at 0, 3, 6, 9, 12 and 15 days interval and presented in Table 4.4. The total soluble solids of guava fruits were significantly affected by the various packaging material at different storage days.

However, at the 0 days of experiment the maximum (13.90 °Brix) TSS was observed from the treatment T_3 and was followed by the treatment T_4 and T_5. The treatment T_3 found at par with all other treatments except treatment T_4 (13.67 °Brix). The minimum (8.17 °Brix) total soluble solids was observed from the treatment T_0 (control) at 0 day of experiment. However, at 3 and 6 days of experiment increasing trend was recorded in the treatment T_3 (Gunny bag). The maximum (15.70 and 12.80 °Brix) total soluble solids were recorded from the treatment T_4 (CFB Box) at 3 and 6 days. It was followed by the treatment T_4 and T_5. The treatment T_3 found at par with all other treatments except treatment T_4 and T_7 (14.63 °Brix and 12.07 °Brix) at 3 days of experiment and at 6 days of experiment the treatment T_3 at par with all other treatments except T_4 (15.90 °Brix), T_5 (12.73 °Brix) and T_2 (12.50 °Brix). Therefore, the minimum (8.60 °Brix and 9.40 °Brix) was noted in the treatment T_0 (control) at 3 and 6 days of experiment.

Table 6 : Effect of different packaging material on total soluble solid (TSS) (°Brix) of guava fruit (*Psidium guajava* L.) at different days

Treatment	At 0 Days	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	8.17	8.60	9.40	7.10	5.10	4.67
T_1	8.83	9.43	10.00	8.67	6.20	5.60
T_2	10.43	11.50	12.50	9.43	6.93	6.37
T_3	12.00	13.07	13.90	11.67	8.67	8.13
T_4	13.67	14.63	15.70	12.80	9.53	9.07
T_5	10.93	11.57	12.73	10.67	8.03	7.03
T_6	10.07	10.97	12.07	9.67	7.43	6.93
T_7	10.80	12.07	12.50	10.00	7.63	6.67
SE(m) (±)	**0.50**	**0.68**	**0.78**	**0.46**	**1.03**	**1.00**
CD at 1%	**2.06**	**2.79**	**3.21**	**1.91**	**4.24**	**4.12**

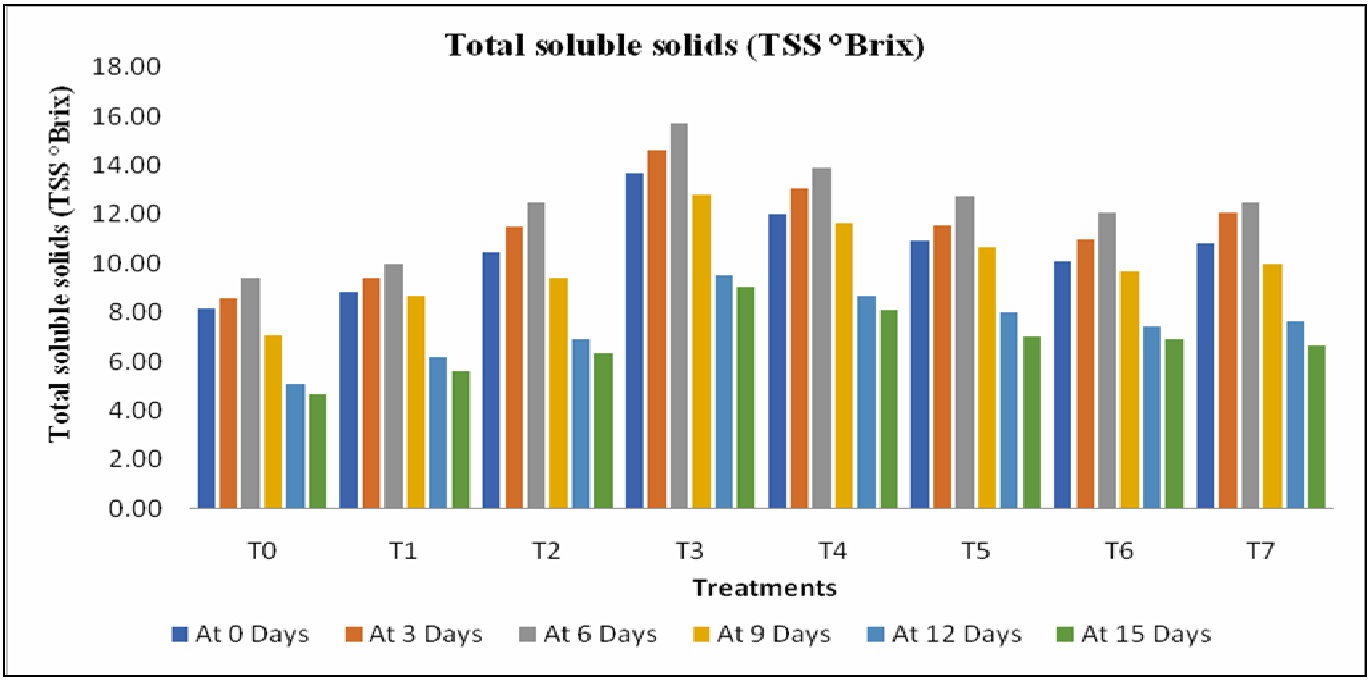

Fig. 4 : Effect of different packaging material on total soluble solid (TSS) (°Brix) of guava (*Psidium guajava* L.) at different days.

However, at 9, 12 and 15 days of experiment the highest (12.80, 9.53 and 90.9 °Brix) total soluble solids were recorded in the treatment T_3 (Gunny bag). It was followed by the treatment T_4 and T_5. The lowest (7.10, 5.10 and 4.67 °Brix) in the treatment T_0 (control) at 9, 12 and 15 days of experiment.

Acidity (%)

Data pertaining to acidity (%) was observed at 0, 3, 6, 9, 12 and 15 days interval and presented in Table 7. The acidity (%) of guava fruits was significantly affected by the various packaging material at different storage days.

However, at 0 days of experiment the maximum (0.53 %) acidity was found in the treatment T_4 (CFB boxes) and it was followed by the treatment T_3 and T_5. The treatment T_4 found at par with all other treatments except treatment T_5 (0.47%). The minimum (0.33 %) acidity was noted from the treatment T_0 (control) at o days of experiment. At 3 days of experiment the increasing trend was noted in the treatment T_4. However, the treatment T_4 produced highest (0.56%) acidity and it was followed by the treatment T_3 and T_4 while the minimum (0.36%) acidity was noted in the treatment T_0 (control).

Table 7: Effect of different packaging material on acidity (%) of guava (*Psidium guajava* L.) at different days

Treatment	At 0 Days	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	0.33	0.36	0.31	0.29	0.26	0.23
T_1	0.41	0.44	0.40	0.37	0.34	0.30
T_2	0.44	0.47	0.45	0.41	0.37	0.32
T_3	0.51	0.54	0.48	0.44	0.40	0.36
T_4	0.53	0.56	0.50	0.47	0.44	0.37
T_5	0.47	0.50	0.47	0.42	0.38	0.34
T_6	0.36	0.40	0.33	0.31	0.28	0.25
T_7	0.42	0.46	0.43	0.40	0.35	0.31
SE(m) (±)	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**	**0.01**
CD at 1%	**0.06**	**0.06**	**0.05**	**0.05**	**0.06**	**0.06**

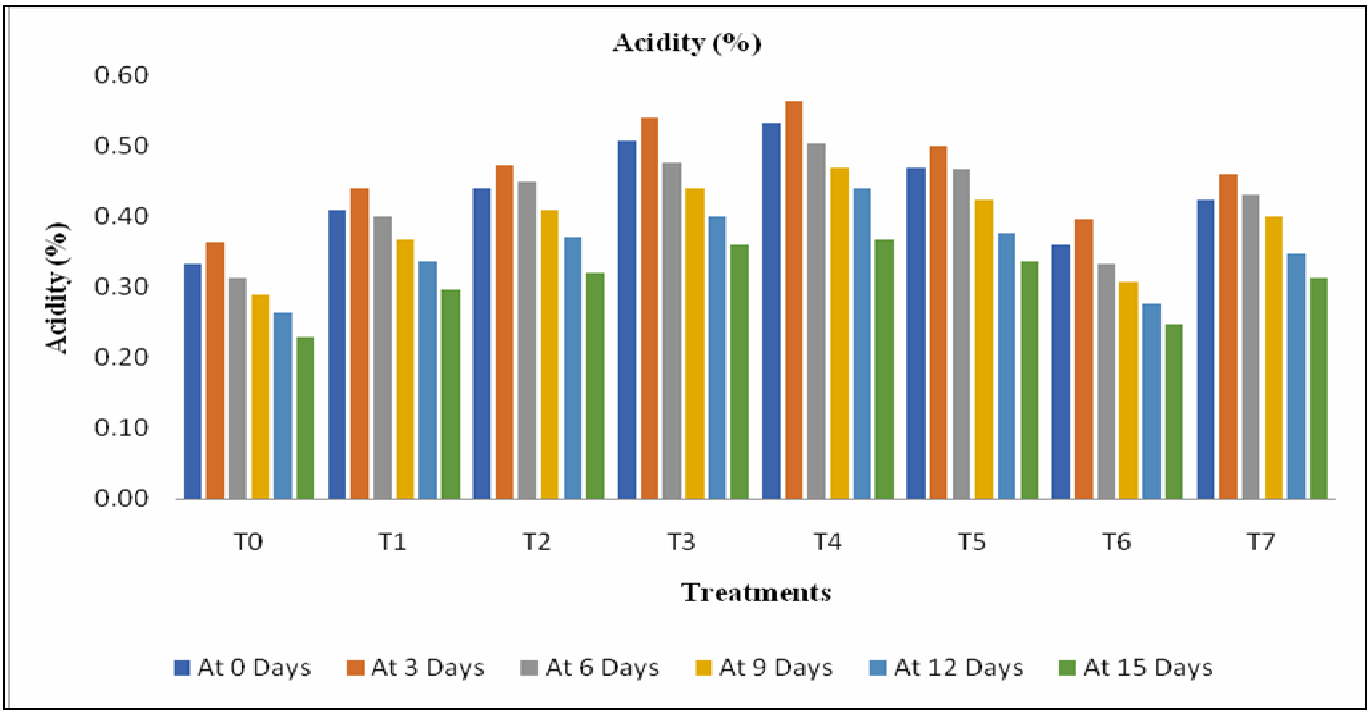

Fig. 5 : Effect of different packaging material on acidity (%) of guava (*Psidium guajava* L.) at different days.

At 6, 9, 12 and 15 days of experiment the decreasing trend was recorded in the acidity of guava fruits under various packaging material. However, the maximum (0.50, 0.47, 0.44 and 0.37%) acidity were noted in the treatment T_4 (CFB boxes) and it was followed by the treatment T_3 and T_5. The minimum (0.31, 0.29, 0.26 and 23 %) acidity was found in the treatment T_0 (control) at 6, 9, 12 and 15 days of experiment.

Ascorbic acid (mg/100g)

Data pertaining to ascorbic acid (mg/100g) was observed at 0, 3, 6, 9, 12 and 15 days interval and presented in Table 8. The ascorbic acid (mg/100g) of guava fruits was significantly affected by the various packaging material at different storage days. The decreasing trend was recorded in the ascorbic acid (mg/100g) acid of guava fruits when increasing the storage period.

However, at 0, 3, 6, 9, 12 and 15 days of experiment the maximum (206 19, 203.00, 201.33, 200.07, 199.00 and 197.17 mg/100g) was recorded from the treatment T_4 (CFB boxes). It was followed by the treatment T_6, T_5 and T_3, respectively. At 0 day the treatment T_4 found at par with all other treatments except treatment T_6 (203.73 mg/100g). However, at 3 days of experiment the treatment T_4 found at par with all other treatments except treatment T_6 (200.37 mg/100g), T_7 (198.70 mg/100g), T_3 (198.43 mg/100g) and T_5 (198.40 mg/100g). At 6 and days theT_4 found at par with all other treatments except treatment T_6 (198.77 mg/100g) and T_6 (196.77 mg/100g). The treatment T0 (control) had minimum (192.67, 188.33, 187.10, 185.13, 182.83 and 181.10 mg/100g) ascorbic acid at 0, 3, 6, 9, 12 and 15 days of experiment.

Table 8 : Effect of different packaging material on ascorbic acid (mg/100g) of guava (*Psidium guajava* L.) at different days

Treatment	At 0 Days	At 3 Days	At 6 Days	At 9 Days	At 12 Days	At 15 Days
T_0	192.67	188.33	187.10	185.13	182.83	181.10
T_1	195.33	191.67	190.13	188.50	186.10	184.17
T_2	200.67	197.00	194.77	192.80	190.67	188.73
T_3	200.67	198.43	196.87	194.43	192.13	189.50
T_4	206.10	203.00	201.33	200.07	199.00	197.17
T_5	201.13	198.40	197.03	195.83	193.50	191.43
T_6	203.73	200.37	198.77	196.77	194.50	192.10
T_7	201.10	198.70	196.70	193.67	191.67	190.47
SE(m) (±)	**1.11**	**1.17**	**0.99**	**0.95**	**1.08**	**1.07**
CD at 1%	**4.57**	**4.85**	**4.11**	**3.92**	**4.46**	**4.41**

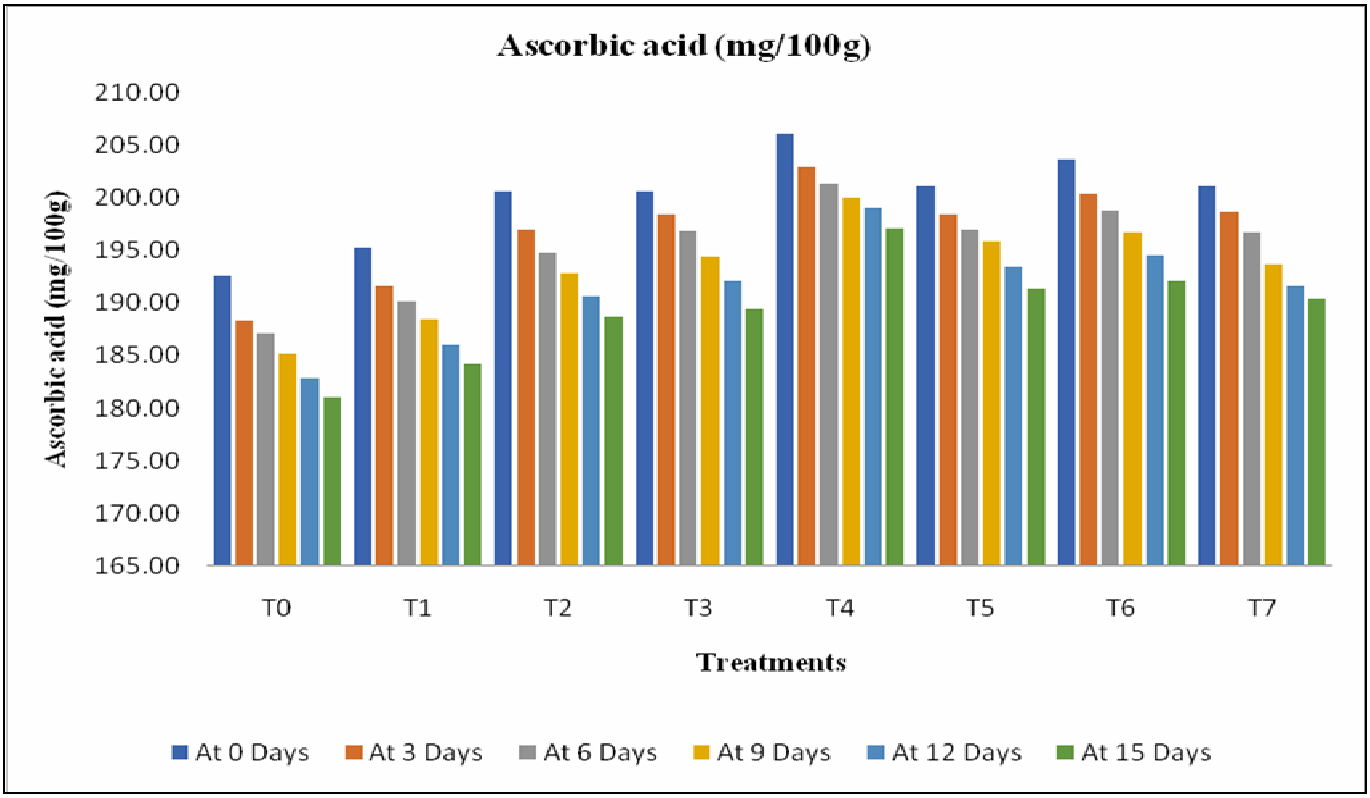

Fig. 6 : Effect of different packaging material on ascorbic acid (mg/100g) of guava (*Psidium guajava* L.) at different days.

Conclusion

Result concluded that the different packing material *viz.,* Control, News Paper, Tissue Paper, Gunny Beg, CFB Box, Banana Leaf, Butter Paper, Paddy Straw were used for induced the shelf life of guava were significantly influenced the different physical and bio-chemical parameters of guava. It was recorded that the treatment T_4 (CFB Box) is best for the fruit weight (g), physiological loss in weight (%), fruit volume (ml), Specific Gravity(g/ml^3). bio-chemical parameters (viz., Total soluble solids (^{o}Brix), acidity (%) and Ascorbic acid (mg/100g)reported best for storage of guava to extent shelf life up to 15th day of storage.

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