Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5718

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (4):** 1498-1507 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Packaging Materials on Chemical Parameters of Guava Cv. Khaja

Soudamalla Nagaraju[1*], A. K. Banik[2]

[1]Department of postharvest technology of Horticultural crops, Bidhan Chandra Krishi Viswavidyalaya, Nadia

[2]Professor and Former Head Department of postharvest technology of Horticultural crops, Bidhan Chandra Krishi Viswavidyalaya, Nadia

*Corresponding Author E-mail: soudhamalla@gmail.com

Received: 16.07.2017 | Revised: 27.07.2017 | Accepted: 28.07.2017

ABSTRACT

The guava fruits harvested at mature green stage was packed in different microns of LDPE packages (25µ LDPE, 50µ LDPE, 75µ LDPE and 100µ LDPE) placed in ambient condition where as control was without packaging. The fruits were examined for TSS, Acidity and sugars, Ascorbic acid at different days of storage. The results revealed that fruits cv. Khaja packed in 75µ LDPE followed by 100µ LDPE under ambient condition proved to be the best treatments among all the treatments which not only extended the shelf life and increased marketable fruits but also reduced the post –harvest losses without adversely affecting the fruit quality of guava. These treatments are found obviously easy for practical application for extending the shelf life of guava.

Key words: *Acidity, Sugars, Shelf life, Guava.*

INTRODUCTION

Guava (*Psidium guajava* L.), having 2n=22, belongs to the family Myrtaceae and is native of Mexico it is originated in Brazil. It is a perennial tree of tropics and subtropics offering great economic potential. It is commercially cultivated in Pakistan, Bangladesh, India, Thailand, Mexico, Brazil, USA and several other tropical and subtropical countries of the world[17].

In India guava grown in an area of 268 thousand hectors with the production of 3668 thousand MT productio. (NHB[14]Database). It is the fifth most widely grown fruit crops in India and the major producing states are Bihar, Andhra Pradesh, Utter Pradesh, Maharashtra, West Bengal, Karnataka, Gujarat and Madhya Pradesh. Guava is the third most important fruit crop of West Bengal state besides mango and banana

Guava has limited storage potential at ambient conditions[12], which leads to glut in market and poor return to the growers. Moreover, overripe fruit at ambient conditions lead to lot of wastage and economic losses.

Cite this article: Nagaraju, S. and Banik, A.K., Effect of Packaging Materials on Chemical Parameters of Guava Cv. Khaja, *Int. J. Pure App. Biosci.* **5(4):** 1498-1507 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5718

The packaging of guava fruits in polyethylene film minimizes the post-harvest losses and chilling injury and therefore ensures better quality of fruits during cold storage. Hence, the present studies were planned to standardize the technology for storage of surplus fruit in cold storage with the use of different packaging materials.

Postharvest losses can be minimized by adopting proper postharvest handling practices and better understanding of biochemical control of fruit ripening. Postharvest life of fruits and vegetables can be extended by using LDPE. LDPE films are commonly used to minimize weight loss, reduce abrasion, damage and delay fruit ripening.

MATERIALS AND METHODS

The present investigation carried out in the laboratory of Department of Post Harvest Technology of Horticultural Crops, faculty of horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia.

PREPARATION OF FRUITS BEFORE TREATMENT

Evenly mature green fruits, free from mechanical damage and blemishes were sorted out. The fruits were then well washed with running tap water to remove the dirt, soil and other foreign matters and pre treatment with $Ca(ClO)_2$. After washing, the excess moisture was drained out from the fruits and then dried lightly at room temperature. Precaution is taken while handling the produce to minimize abrasion and bruising.

EXPERIMENTAL DETAILS

Treatment details:

T_1 = 25μ LDPE packaging

T_2 = 50μ LDPE packaging

T_3 = 75μ LDPE packaging

T_4 = 100μ LDPE packaging

T_5 = Control (without packaging)

Design of experiment: Completely Randomized Design.

No. of treatments : 5

No. of replication : 4

Variety : Guava cv. Khaja (local)

Each treatment 10 bags except control (T_5)

STORAGE CONDITION

The fruits were stored in cool, dry place on racks at room temperature in the laboratory of post harvest technology of horticultural crops. The maximum and minimum temperature during the period at ambient condition varied from 28.15^0 C and 18.85^0 C respectively and relative humidity from 49 to 86% during the period of storage.

BIOCHEMICAL PARAMETERS

Biochemical quality and organoleptic evaluation of guava cv Khaja was carried out at zero 2,4,6,8,10 and 12 days after storage. Four samples per treatment were subjected to physic-chemical analysis. The parameters such as TSS, TSS and Acid ratio, total sugars, reducing sugars, titrable acidity, ascorbic acid were analyzed by the methods suggested by Ranganna[15] and (A.O.A.C[2])

STATISTICAL ANALYSIS

The analysis of the data obtained in experiment was analyzed by completely randomized design with 4 replications by adopting the statistical procedure of Gomez and Gomez[6].

RESULTS AND DISSCUSSION

Quality parameters

Total soluble solids (^{O}Brix)

Data related to total soluble solids (TSS ^{O}Brix) of mango fruits as affected by different packing materials were presented in Table-1. There was a significant rise in TSS of fruits initially from 1st day to 12th day of storage. Total soluble solids were significantly influenced by packaging materials. There was a progressive increase in Total soluble solids in all treatments from harvest to ripening and there after declining trend was noted till the end of shelf life.

On 2th day of storage significantly the lowest TSS was recorded in T_3–75 µ LDPE (6.47) followed by T_4–100 µ LDPE (6.68) and T_2–50 µ LDPE (6.87) significantly highest TSS (%) was recorded in (T_5) control (7.38).

On 4th day of storage significantly the lowest TSS was recorded in T_3–75 µ LDPE (6.47) followed by T_4–100 µ LDPE (6.68) and

T_2–50 µ LDPE (6.87) significantly highest TSS (%) was recorded in (T_5) control (7.38).

On 6th day of storage significantly the lowest TSS was recorded in $T_{3-75µLDPE}$significantly highest TSS (%) was recorded in (T_5) control (9.29).

On 8th day of storage significantly the lowest TSS was recorded in T_3–75 µ LDPE (7.23) followed by T_4–100 µ LDPE (7.06) and T_2–50 µ LDPE (7.64) significantly highest TSS (%) was recorded in (T_1) 25µLDPE (7.99).

On 10th day of storage significantly the lowest TSS was recorded in T_3–75µLDPE (7.85) it might be due to the TSS content of control fruits reduce during end of shelf life highest TSS (%) was T_1–25 µ LDPE (8.48) followed by T_2–50 µ LDPE (8.17) and T_4–100 µ LDPE (7.97).

On the 12th day of storage the TSS content was reduced in all the treatments compared to 10th day the highest TSS was recorded in T_3–75 µ LDPE (12.22) followed by T_4–100 µ LDPE (11.79) which was on par with T_2–50 µ LDPE (11.66).

Total soluble solids content of the fruits reached maximum at the ripe stage and started declining towards the end of shelf life. The increase in the Total soluble solids during ripening was due to break down of starch and polysaccharides in to sugars. Further due to over ripening/senescence the sugar is degraded to CO_2 because of respiration[18]. Total soluble solids in fruit determine its sweetness. In present study TSS content in ripe guava fruits increased continuously with the increase in storage period. The increase in TSS could be attributed to the accumulation of more soluble solids during the process of ripening in fruits as a consequence of polysaccharides[4] . Control fruits recorded increase in TSS up to 7 days and then declined sharply afterwards. Likewise[8] observed in guava that TSS of fruits was found increasing for few days in storage and later on decline in TSS was occurred.

Table 1: Effect of packaging material on TSS (^{0}Brix) of guava fruits in storage

Treatments		**Storage period (days)**						
		0	**2**	**4**	**6**	**8**	**10**	**12**
T1	25 µ LDPE	6.038	7.023	7.768	7.99	8.485	11.453	10.97
T2	50 µ LDPE	6.013	6.875	7.498	7.64	8.175	11.668	11.215
T3	75 µ LDPE	6.028	6.475	7.075	7.235	7.858	12.22	11.54
T4	100 µ LDPE	6.045	6.683	7.318	7.605	7.975	11.795	11.225
T5	Control	6.055	7.388	8.653	9.295	--	--	--
SE.m(±)		0.019	0.03	0.043	0.03	0.033	0.027	0.022
CD (0.05%)		N.S.	0.091	0.129	0.092	0.10	0.08	0.06

Titrable acidity

Titrable acidity (%) values of guava influenced by different packing materials at room temperature were presented in Table-2. significant interactions prevailed among the days of storage, treatments and their interactions.

Titrable acidity of fruits declined gradually from the 1st day to 12th day of storage.

On 2th day of storage significantly the maximum acidity was recorded in fruits packed of T_3–75 µ LDPE (0.77) followed by T_4–100 µ LDPE (0.72) and T_2–50 µ LDPE (0.69) significantly minimum acidity (%) was recorded in (T_5) control (0.53).

On 4th day of storage significantly the maximum acidity was recorded in fruits packed of T_3–75 µ LDPE (0.56) followed by T_4–100 µ LDPE (0.48) and T_2–50 µ LDPE (0.43) significantly minimum acidity (%) was recorded in (T_5) control (0.40).

On 6th day of storage significantly the maximum acidity was recorded in fruits packed in T_3–75 µ LDPE (0.42) followed by T_2–50 µ (0.39) LDPE and T_4–100 µ LDPE (0.37) significantly minimum acidity (%) was recorded in (T_5) control (0.33).

On 8th day of storage significantly the maximum acidity was recorded in T_3–75 µ LDPE (0.38) followed by T_4–100 µ LDPE (0.35) and T_2–50 µ LDPE (0.33) significantly minimum acidity (%) was recorded in (T_1) 25µLDPE (0.32).

The acidity of guava fruits declined further up to 12th day of storage with a higher acidity (0.26) being registered by fruits packed in (T_3) 75 µ LDPE bags.

The progressive reduction in the acidity with advancement of storage periods may be attributed to utilization of organic acid in pyruvate decarboxylation reaction occurring during the ripening process of fruits. A declining trend in acidity in guava fruits was noticed during storage and it was observed in all the treatments. The present study results are in agreement with the results of Goutam *et al*.[8] in guava, who also reported decrease in acidity with advancement of storage periods.

Table 2: Effect of packaging material on titratable acidity (%) of guava fruits in storage

Treatments		Storage period (days)						
		0	2	4	6	8	10	12
T1	25 µ LDPE	0.832	0.614	0.413	0.376	0.328	0.297	0.228
T2	50 µ LDPE	0.832	0.697	0.439	0.399	0.339	0.328	0.248
T3	75 µ LDPE	0.832	0.779	0.56	0.424	0.383	0.280	0.26
T4	100 µ LDPE	0.832	0.72	0.480	0.367	0.353	0.278	0.25
T5	Control	0.832	0.530	0.408	0.339	--	--	--
SE.m(±)			0.050	0.026	0.025	0.029	0.039	0.016
CD (0.05%)			0.151	0.081	0.076	0.089	0.119	NS

TSS/Acid ratio

The results on the effect of different packing materials on the TSS: acid ratio of mango fruits were presented in Table-3. Significant difference found among the treatments during storage.

The TSS: acid ratio of guava fruits increased gradually from the 1st day to 12th day of storage.

On 2th day of storage significantly the minimum TSS/Acid ratio was recorded in fruits packed in T_3–75 µ LDPE (8.44) followed by T_4–100 µ LDPE (9.55) and T_2–50 µ LDPE (9.95) significantly maximum TSS/Acid ratio was recorded in (T_5) control (13.74).

On 4th day of storage significantly the minimum TSS/Acid ratio was recorded in fruits packed of T_3–75 µ LDPE (12.68) followed by T_4–100 µ LDPE (15.59) and T_2–50 µ LDPE (17.25) significantly maximum TSS/Acid ratio was recorded in (T_5) control (21.44).

On 6th day of storage significantly the minimum TSS/Acid ratio was recorded in fruits packed of T_3–75 µ LDPE (17.37) followed by T_4–100 µ LDPE (20.87) and T_2–50 µ LDPE (24.30) significantly maximum TSS/Acid ratio was recorded in (T_5) control (27.62). On 8th day of storage significantly the minimum TSS/Acid ratio was recorded in fruits packed of T_3–70 µ LDPE (20.83) followed by T_4–100 µ LDPE (22.76) and T_2–50 µ LDPE (24.30) significantly maximum TSS/Acid ratio was recorded in (T_1) 25µLDPE (25.86).

On 10th day of storage significantly the maximum TSS/Acid ratio was recorded in fruits packed of T_3–75 µ LDPE (45.99) followed by T_4–100 µ LDPE (44.73) significantly minimum TSS/Acid ratio was recorded in T_1–25µ LDPE (38.90).

On 12th day of storage significantly the maximum TSS/Acid ratio was recorded in fruits packed of T_3–75 µ LDPE (49.92) followed by T_4–100 µ LDPE (48.56) significantly minimum TSS/Acid ratio was recorded in T_2–50 µ LDPE (48.11).

TSS: acid ratio of guava fruit increased continuously throughout the storage period though TSS had slow initial increase followed by decrease. The increase in ratio might be due to the fact that magnitude of decrease in acidity is more compared to decrease in TSS in the later stage of storage which is faceable with the results obtained by Goud[7] in sapota.

The brix-acid ratio increased significantly in all treatments mainly due to a decrease in titrable acidity during storage Artes *et al*.[1], Hess-Piece[10] and Kader[11].

Table 3: Effect of packaging material on TSS-acid ratio of guava fruits in storage

Treatments		Storage period (days)						
		0	2	4	6	8	10	12
T1	25 µ LDPE	7.274	11.456	18.811	21.557	25.869	38.907	47.77
T2	50 µ LDPE	7.244	9.953	17.253	19.272	24.308	36.369	48.114
T3	75 µ LDPE	7.262	8.444	12.689	17.377	20.835	45.993	49.924
T4	100 µ LDPE	7.283	9.553	15.599	20.878	22.764	44.732	48.526
T5	Control	7.295	13.745	21.44	27.624	--	--	--
SE.m(±)		NS	0.59	0.68	0.44	0.72	4.512	0.46
CD (0.05%)		0.008	1.75	2.18	1.76	2.22	NS	1.15

Total sugars (%)

The results on total sugars of guava fruits as influenced by different packing materials were presented in Table- 4. There was significant increase in total sugar content up to ripening and then showed a decreasing trend. There was significant difference was observed among the treatments.

On 2th day of storage significantly the lowest total sugars content was recorded in fruits packed in T_3–75 µ LDPE (7.68) followed by T_4–100 µ LDPE (7.75) and T_2–50 µ LDPE (7.80) significantly highest total sugars content was recorded in (T_5) control (8.15).

On 4th day of storage significantly the lowest total sugars was recorded in fruits packed of T_3–75 µ LDPE (8.24) followed by T_4–100 µ LDPE (8.55) and T_2–50 µ LDPE (8.76) significantly highest total sugars content was recorded in (T_5) control (9.09).

On 6th day of storage significantly the lowest total sugars was recorded in fruits packed of T_3–75 µ LDPE (8.93) followed by T_4–100 µ LDPE (9.09) and T_2–50 µ LDPE (9.16) significantly highest total sugars content was recorded in (T_5) control (9.39).

On 8th day of storage significantly the lowest total sugars was recorded in fruits packed of T_3–75 µ LDPE (9.26) followed by T_4–100 µ LDPE (9.44) and T_2–50 µ LDPE (9.60) significantly highest total sugars content was recorded in (T_1) 25µLDPE (9.87).

On 10th day of storage significantly the highest total sugars was recorded in fruits packed of T_3–75 µ LDPE (12.37) which was on par with T_4–100 µ LDPE (12.13) and T_2–50 µ LDPE (11.31) significantly lowest total sugars content was recorded in (T_1) 25 µ LDPE (10.61).

On the 12th day of storage the total sugar content of guava fruits packed in T_3–75 µ LDPE significantly trend was recorded (11.67) followed by T_4–100 µ LDPE recorded 11.23.

There was a decline in the content of total sugar content from 10th day (12.37) to 12th (11.65) day of storage with a sugar content being registered by fruits stored in 75 µ LDPE.

The total and reducing sugars were found to be increased up to ripening there after showed a decline at the end of shelf life in all the treatments. Similar trends of reducing and total sugars contents were reported by Selvaraj *et al*[16] in papaya,[9] in Alphonso mangoes and sapota The initial raise in sugars content may be due to conversion of starch into sugars, while later the decrease was due to consumption of sugars for respiration during storage.

The sugars decreased as the storage period proceeded. This may be due to utilization of sugars in respiration .The higher level of sugars on initial day would have stimulated carbon flow through glycolysis, increasing cytoplasmic pyruvate and thereby other TCA intermediates, leading to an increase in NAD (P) H in the matrix and ultimately stimulating oxidase activity, an enzyme responsible for the alternative pathway of respiration[13].

Table 4: Effect of packaging material on Total sugars of guava fruits in storage

Treatments		Storage period (days)						
		0	2	4	6	8	10	12
T1	25 µ LDPE	7.01	7.95	8.79	9.26	9.87	10.61	10.22
T2	50 µ LDPE	7.01	7.80	8.76	9.16	9.60	11.31	10.86
T3	75 µ LDPE	7.01	7.68	8.24	8.93	9.26	12.37	11.67
T4	100 µ LDPE	7.01	7.75	8.55	9.09	9.44	12.13	11.23
T5	Control	7.01	8.15	9.09	9.39	---	---	---
SE.m(±)			0.077	0.156	0.104	0.137	0.245	0.231
CD (0.05%)			0.235	0.476	0.317	0.417	0.745	0.874

Reducing sugars (%)

The results on reducing sugars of guava fruits as influenced by different packing materials were presented in Table-5. There was a significant increase in the reducing sugar content of guava fruits from 1st day to 12th day of storage.

All the treatments recorded a significant increase in reducing sugar content. Among the treatments, the fruits packed in (T_3) 75 μ LDPE recorded significantly higher reducing sugar percentage values (6.82) than rest of the treatments.

On 2nd day of storage significantly the lowest reducing sugars content was recorded in fruits packed in T_3–75 μ LDPE (4.36) followed by T_4–100 μ LDPE (4.62) and T_2–50 μ LDPE (4.76) significantly highest reducing sugars content was recorded in (T_5) control (5.04).

On 4th day of storage significantly the lowest reducing sugar content was recorded in fruits packed of T_3–75 μ LDPE (4.85) which was on par with T_4–100 μ LDPE (4.92) and T_2–50 μ LDPE (5.11) significantly highest total sugars content was recorded in fruits packed in (T_5) control (5.32).

On 6th day of storage significantly the lowest reducing sugars content was recorded in fruits packed in T_3–75 μ LDPE (5.13) followed by T_4–100 μ LDPE (5.23) and T_2–50 μ LDPE (5.35) significantly highest reducing sugars content was recorded in (T_5) control (5.61).

On 8th day of storage significantly the maximum reducing sugar content was recorded in fruits packed of T_3–75 μ LDPE (6.45) which was on par with T_4–100 μ LDPE (6.29) and T_2–50 μ LDPE (6.11) .Significantly lowest total sugar content was recorded in (T_5) control (5.94).

On 10th day of storage significantly the maximum reducing sugar content was recorded in fruits packed of T_3–75 μ LDPE (6.82) which was on par with T_4–100 μ LDPE (6.74) and fruits packed T_2–50 μ LDPE recorded 6.11% reducing sugars whereas control fruits significantly recorded lowest total sugar content (5.94).

On 12th day of storage significantly the maximum reducing sugar content was recorded in fruits packed of T_3–75 μ LDPE (6.56) which was on par with T_4–100 μ LDPE (6.44) and fruits packed T_2–50 μ LDPE recorded 6.30% reducing sugars whereas fruits packed in T_3–25 μ LDPE significantly recorded lowest total sugar content (5.88).

There was decline in the reducing sugar content from 10th day to 12th day of storage with sugar content (6.82) being registered by fruits stored in (T_3) 75 μ LDPE.

In control low sugars were recorded due to exposure of fruit to atmosphere without any treatment and concomitant increase in respiration. But in treated fruits slow build-up of the sugars occurs. There was a gradual increase in total sugars and reducing sugars which reached its maximum at ripe stage and there after decreased gradually[3].

It was observed from the data that non reducing sugars percentage increased up to ripening and the decreased thereafter.

As the fruit ripening advances starch, hemicelluloses and organic acids get converted into various forms of sugars irrespective of the treatment present investigation revealed that the total sugars of mango fruits were increased up to certain periods of storage and declined there after till the end of shelf life.

The total reducing, non reducing sugars in guava fruits increased up to 10th days of storage and subsequently decrease at the end of storage and the decrease at the later stage of storage may be attributed to their utilization in respiration less increment in sugars during storage in treated fruit wall due to less weight loss that caused less dehydration of the fruit .

Table 5: Effect of packaging material on Reducing sugars of guava fruits at different days in storage

Treatments		Storage period (days)						
		0	2	4	6	8	10	12
T1	25 µ LDPE	4.04	4.91	5.19	5.55	5.98	6.05	5.88
T2	50 µ LDPE	4.04	4.76	5.11	5.35	6.11	6.53	6.308
T3	75 µ LDPE	4.04	4.36	4.85	5.13	6.45	6.829	6.56
T4	100 µ LDPE	4.04	4.62	4.92	5.23	6.29	6.748	6.44
T5	Control		5.04	5.32	5.61	5.94	5.765	-
SE.m(±)			0.090	0.098	0.084	0.209	0.108	0.077
CD (0.05%)			0.273	0.297	0.256	0.636	0.328	0.239

Ascorbic Acid (mg 100 g^{-1})

Analysis of ascorbic acid as influenced by packaging material for guava was shown in Table-6. There was significant difference among the treatments with respect to ascorbic acid. It is evident from the data that the ascorbic acid of guava significantly decreased with each successive storage period. On the 2nd of the storage Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75µ LDPE (425.35) followed by T_4 -100 µ LDPE (393.37) and T_2 -50 µ LDPE (375.57)whereas, lowest was observed in T_5 -control (306.77).

On the 4th day of storage Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75 µ LDPE (284.37) followed by T_4 -100 µ LDPE (267.75) and T_2 -50 µ LDPE (264.78) whereas, lowest was observed in T_5-control (237.10).

On the 6th day of storage non significant difference was observed among the treatments however Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75 µ LDPE (262.34) followed by T_4 -100 µ LDPE (260.45) and T_2 -50 µ LDPE (236.80) whereas, lowest was observed in T_5 -control (217.50).

On the 8th day of storage there was non significant difference was observed among the treatments however Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75 µ LDPE (254.70) followed by T_4 -100 µ LDPE (228.20) and T_2 -50 µ LDPE (215.80) whereas, lowest ascorbic acid content was observed in T_5-control (201.17).

On the 10th day of storage non significant difference was observed among the treatments however Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75 µ LDPE (244.55) followed by T_4 -100 µ LDPE (225.05) and T_2 -50 µ LDPE (202.05) whereas, lowest was observed in T_5 -control (173.95).

On the 12th day of storage non significant difference was observed among the treatments however Significantly highest ascorbic acid was recorded in fruits packed in T_3 -75 µ LDPE (195.25) followed by T_4 -100 µ LDPE (183.47) and T_2 -50 µ LDPE (175.97) whereas, lowest was observed in T_1 -100 µ LDPE (163.30) Fruits packed in T_3 -75 µ LDPE could retain a higher level of ascorbic acid might be due to reduced activities of oxidizing enzymes and also due to low O_2 permeability of this film that result in higher retention of Ascorbic acid up to last day of storage. Fruits packed in 100 µ LDPE, 50 µ LDPE contain lees ascorbic acid compared to 75 µ LDPE this might be due to high O_2 concentration in LDPE films which increase oxidation of ascorbic acid by oxidizing enzymes which ultimately decrease in ascorbic acid content of fruits.

Ascorbic acid content decreased as the storage period increased. This may be attributed to the degradation of ascorbic acid to dehydro ascorbic acid by oxidative enzymes Decrease in vitamin C during storage had been reported in guava by (Goutam *et al.*[8]).

Table 6: Effect of packaging material on ascorbic acid (mg/100g) content of guava fruits in storage

Treatments		Storage period (days)						
		0	2	4	6	8	10	12
T1	25 µ LDPE	434.4	316.75	246.87	228.65	210.37	196.87	163.30
T2	50 µ LDPE	434.4	375.57	264.78	236.80	215.80	202.05	175.95
T3	75 µ LDPE	434.4	425.35	284.37	262.34	254.70	244.55	195.25
T4	100 µ LDPE	434.4	393.37	267.75	260.45	228.20	220.05	183.47
T5	Control	434.4	306.77	237.15	217.50	--	--	--
SE.m(±)		------	0.43	15.83	15.91	11.31	0.46	13.07
CD (0.05%)		------	1.69	NS	NS	ns	1.83	NS

REFERENCES

1. Artes, F., Villaescusa, R., and Tudela, J.A Modified atmosphere packaging of Pomegranate. *Journal of Food Science*., **65 (7):** 1112-16 (2000).
2. A.O.A.C Official methods of Analysis. Association of official Analytical chemists, Washington, DC. (1990).
3. Bindu Praveena, R, Sudha Vani, V. and Rajasekhar, M.. Influence of low temperature on shelf life and quality of sapota (*Manilkaraachras* (Mill.) Fosberg) fruits packed in polybags. *Acta Horticulturae*., 873-879. (2013).
4. Gautam, S.K. and Chundawat, B.S. Post-harvest changes in sapota cv. Kalipatti. II. (1990).
5. Effect of various post-harvest treatments on physicochemical attributes. *Indian Journal of Horticulture* **47(3):** 264-269 (1985).
6. Gomez, A.K. and Gomez, A.A Statistical procedure for agricultural research.[2nd] edn, john Wiley and sons, Singapore. (1984).
7. Goud, P.V., Studies on the effect of post-harvestethrel treatments on ripening of sapota cv. oval. Thesis submitted to the Andhra Pradesh Agricultural University, Hyderabad for award of M.Sc. (Ag.) degree. (1979).
8. Goutam, M, Dhaliwal, H.S. and Mahajan, B.V.C. Effect of pre-harvest calcium sprays on post-harvest life of winter guava (*Psidiumguajava* L.). *J. Fd. Sci. Tech.* **47:** 501-6. (2010).
9. Haribabu, K. and Shantha Krishnamurthy. Effect of calcium on physico- chemical

changes in Alphonso mango during ripening and storage. Australian centre for International Agricultural Research Proceedings., **50:** 390-392 (1993).

10. Hess-Pierce, B and Kader, A.A. Responses of 'wonderful' pomegranate to controlled atmospheres. Proceedings of 8th International conference.EdsQosferhaven and peppelenlos, HW. *Acta Horticulture*., 600. (2003).
11. Khader, S.E.S.A, Singh, B.P. and Khan, S.A., Effect of GA3 as a postharvest treatment of mango fruit on ripening, amylase and peroxidase activity and quality during storage. *Scientia Horiculture*., **36:** 261-266 (1988).
12. Ladaniya, M.S. and Shyam Singh. Response of Nagpur mandarin to controlled atmosphere and refrigerated conditions. Proceedings of International Symposium on Citriculture.,NRC Citrus Nagpur: 1106-17 (1999).
13. Nanda, S., Rao, D. V. S. and Shantha-Krishnamurthy. Effects of shrink film wrapping and storage temperature on the shelf life and quality of pomegranate fruits cv. Ganesh. Post harvest Biology and Technology. **22(1):** 61-69 (2001).
14. National Horticulture Board DataBase..*http://www.nhb.gov.in* (2014-15).
15. Ranganna, S. Handbook of analysis and quality control for fruits and vegetable products. IP"1 Ed. Tata- McGraw-Hill Pub. Comp. Ltd. New Delhi. (1986).
16. Selvaraj, Y., Pal, D .K. Subramanyam.and Iyer, C. P. A. Changes in the chemical composition of four cultivars of papaya during growth and development. *Journal purnal of Horticultural Science*., **57**: 135-143 (1982).
17. Watson, L. and Dallwitz, M.J. The families of flowering plant: identification and information. Available at :(http://delta-inthey.com).Accessed on 25th july, (2011).
18. Wills, R.B.H, Mc Glasson, Graham D, Lee, T.H. and Hall E.G, Post harvest an introduction to the physiology and handling of fruit and vegetables. *BSP Professional Books*, London. (1989).