

## Storage Behavior of Guava Varieties Based on Biochemical Parameters

Ankit Gavri<sup>1\*</sup>, Jeet Ram Sharma<sup>1</sup>, Sanjay kumar<sup>1</sup>, Aayush Singla<sup>1</sup>,  
Desh Raj Chaudhary<sup>2</sup> and Ajay Sharma<sup>3</sup>

<sup>1</sup>Department of Horticulture,

Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India.

<sup>2</sup>District Extension Specialist, KVK, Jhajjar,

Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India.

<sup>3</sup>Department of Mathematics and Statistics,

Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India.

(Corresponding author: Ankit Gavri\*)

(Received: 05 August 2023; Revised: 30 August 2023; Accepted: 25 September 2023; Published: 15 October 2023)

(Published by Research Trend)

**ABSTRACT:** An experiment was conducted with an aim to study biochemical changes of fifteen varieties of guava stored at ambient storage conditions at Department of Horticulture, Chaudhary Charan Singh Haryana Agriculture University, Hisar, Haryana during rainy and winter season of 2018-2019. All varieties exhibited considerable variation in their performance for most of the biochemical parameters. It was observed that there was significant increase in TSS, during both the seasons, regardless of varieties. On the other hand, acidity, pectin content and ascorbic acid of all the varieties was found to be decreased over the passage of storage time. However, all the varieties exhibit increasing trends in reducing sugar, non-reducing sugar and total sugar but during winter season sugar parameters was found to be first increased for six days then slightly decrease on 8<sup>th</sup> day. Among varieties, Hisar Safeda exhibited maximum reducing sugar and in winter season. Total sugar and reducing sugar in winter season and TSS in rainy season were recorded maximum in cv. Pant Parbhat. Pectin content during both the seasons and ascorbic acid, total sugar and non-reducing sugar in rainy season were recorded maximum in cv. L-49. Barf Khana had the maximum ascorbic acid in winter season and acidity found minimum in Arka Mridula and Allahabad Safeda in rainy and winter season respectively. Winter season fruits of all the varieties were much more superior to rainy season fruits.

**Keywords:** Ambient, Hisar Safeda, Storage, Sugar, TSS.

### INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most cherished and exquisite fruit crop of tropic and sub tropic region which belong to the family Myrtaceae. It is believed to be originated in Tropical America. Guava was introduced in India by Portuguese in the early seventeenth century. In terms of area and production, guava is the fifth most important fruit crop of India after mango, citrus, banana and apple (Saxena and Rao 2018). In India, it is grown in an area of 265 thousand hectare with annual production and productivity of 4054 thousand metric tons and 15.87 MT per hectare respectively. Madhya Pradesh is largest producer of guava followed by Uttar Pradesh and Bihar (Saxena and Rao, 2018). The area under guava in Haryana is 14.5 thousand hectare with production of 260.90 thousand tones and productivity 18tonnes per hectare (Anonymous, 2021). Hisar, Mewat, Palwal, Sonipat, Karnal, Yamunanagar are the major guava producing districts of Haryana.

Guava is known as the "Apple of the Tropics," "Poor man's Apple," and other names. In addition to being one of the most popular and delectable fruits, guavas are also high in nutrients like vitamin A, vitamin C, niacin,

riboflavin, thiamine, phosphorus, calcium, iron, and edible fibre (Rojas-Garbanzo *et al.*, 2015) Guava bears fruits almost throughout the year. However, two distinct seasons of flowering- one during April to May, the fruits of which are harvested in rainy season (late July to mid Oct) and the other in July to August, whose fruits are harvested during winter (late October to mid-February) (Mitra *et al.*, 2008).

Guava fruits have high demand due to its nutritive and remunerative value but being a climacteric and extremely perishable fruit, most of the harvested fruits become unmarketable as they over ripe within a week under ambient room conditions due to lack of post-harvest infrastructure in India. The perishability of this fruit is attributed to unfavorable physiological changes namely; loss of weight due to transpiration and respiration, and other physio-chemical and biochemical changes result in affecting the final texture and quality of the fruit. According to CIPHET report, postharvest losses in guava are maximum among all the fruits crops which are about 15.88%. Out of which, about 4% of fruit are spoiled in storage (Jha *et al.*, 2015). Hence, the growers are likely to be contingent upon another source to have the good quality fruit, which are simple and low cost techniques. Therefore, identification of those

cultivars which possess high shelf life might be one of the methods to overcome this problem. There is an obvious need to maintain a natural balance for growing best varieties with desired characters and also to meet the demand of fresh fruits round the year. Although a large number of varieties are known in guava but very little work has been done to identify or classify cultivars with longer shelf life. Therefore, the present investigation was undertaken to found out the variety with minimum biochemical changes during storage.

## MATERIAL AND METHOD

For this experiment, alike fully mature fruits of all cultivars, free from any abrasion, misshapen or any insect or diseases infestation, were selected from healthy trees of uniform age and harvested from the orchard of the Guava Demonstration Centre, Bhuna which is situated at 222 m above sea level with coordinates of 29° 32' latitude and 75° 42' longitudes and stored in corrugated fiberboard boxes at ambient conditions in both the seasons viz., rainy season (32-34°C ± 2 and 70 ± 5% RH) and winter season (20-22 °C ± 2 and 70 ± 5% RH) in the Department of Horticulture, CCS Haryana Agricultural University, Hisar, which is situated at 215.2 m above sea level with coordinates of 29°10' N latitude and 75°46' E longitudes.

**Table 1: Guava varieties used for experiment.**

Allahabad Safeda	Hisar Safeda	Hisar Surkha	Lalit	Shweta
Sardar (L-49)	Pant Parbhat	Barf Khana	Aishwarya	Arka Kiran
BanarsiSurkha	Pant Red	Punjab Pink	Kg Guava	ArkaMridula

### A. Observation Recorded

Fruit samples were analysed for biochemical changes like, total soluble solids (°Brix) (TSS), titratable acidity (%), ascorbic acid (mg/100g pulp), total sugar (%), reducing sugar (%), non-reducing sugar (%) and pectin content. Observations were recorded on alternate days. TSS was measured by Hand refractometer in the range of 0-32%. Titratable acidity and ascorbic acid estimated as per the AOAC (1990). Sugars parameters were estimated by the method suggested by Hulme and Narain (1931) and pectin content was estimated by the method described by Ranganna (1979).

### B. Statistical Analysis

The experiment was carried out under Completely Randomized Design with factorial arrangements. The data recorded were analyzed by using Analysis of Variance (ANOVA). The statistical analysis was carried out by using SPSS statistical software.

## RESULT AND DISCUSSION

**Total Soluble Solids (%):** It was observed that in rainy season crop, TSS content varied significantly and extended from 8.84 per cent to 10.83 per cent in different varieties (Table 1). Maximum TSS was observed in the cv. Pant Parbhat (10.83%) followed by Hisar Surkha (10.61%), Hisar Safeda (10.45%) and

Shweta (10.43%) whereas Punjab Pink (8.84%) exhibited the lowest TSS. It was further noted that TSS content lowers down, with the advancement of storage period, irrespective of cultivars. However, there was no significant interaction between varieties and storage period.

During winter season also, TSS significantly varied among the different varieties (Table 2). Under ambient storage conditions, TSS ranged from 10.32 per cent to 12.33 per cent in different varieties and maximum TSS was observed in cv. Hisar Surkha (12.33%) which was statistically at par with Pant Parbhat (12.30%) and Punjab Pink had the minimum TSS (10.32%). TSS followed an increasing trend with the prolongation of storage time, regardless of cultivars and maximum TSS was observed on 8th day of storage. Combined effect of varieties and storage period also significantly influence the TSS. Similar pattern was also observed by Tiwari *et al.* (2017); Killadi *et al.* (2007) in guava, Hoda *et al.* (2001) in mango, Singh *et al.* (2005) in aonla, Jaishankar (2015) in sapota and Naik and Rokhade (1997) in ber. Hydrolysis of starch into sugar and transformation of organic acids might be the feasible reason of rise in the TSS during storage (Mahajan *et al.*, 2009; Kumar *et al.*, 2021).

**Titratable acidity (%):** It was clear from Fig. 1 disclosed that acidity of fruits harvested during rainy season significantly differed among the varieties. ArkaMridula (0.32%) exhibited the lowest level of titratable acidity while Banarsi Surkha (0.50%) contained the highest level of acidity. Similar to varieties; storage period also affect acidity significantly as the level of acidity decreased with the prolongation of storage period. Lowest level of acidity was recorded on 4th day while maximum acidity was found on the day of harvesting. Interaction between varieties and storage period also found significant and cv. ArkaMridula exhibited the minimum level of acidity on 4th day of storage (0.25%) and maximum acidity was found in cv. Banarsi Surkha on the harvesting day (0.55%).

In winter season crop also varieties influenced the acidity significantly (Fig. 2). Minimum level of acidity was observed in the cvs. Allahabad Safeda and ArkaMridula (0.27%), which was statistically at par with Hisar Safeda (0.28%) and the maximum level of acidity were found in the cvs. Banarsi Surkha and Lalit (0.41%). Under ambient condition storage, level of acidity exhibited the decreasing pattern against the passage of storage time and the minimum acidity was found on last day. Tiwari *et al.* (2017) reported that the change in the level of acidity during storage of different cultivars might be due to gradual decrease in pectin content and additionally due to emergence of organic acid. According to Hoda *et al.* (2001) during storage of mango,

**Ascorbic Acid (mg/100 g pulp):** It was observed that varieties had a significant influence on ascorbic acid in both the seasons (Table 3 and 4). Maximum ascorbic acid content was recorded in cv. L-49 (170.26 mg/100 g pulp) followed by Lalit (152.52 mg/100 g pulp), ArkaMridula (146.62 mg/100 g pulp) and KG Guava

(146.49 mg/100 g pulp) and on the other hand cv. Hisar Surkha (117 mg/100 g pulp) contained the minimum amount of ascorbic acid. In addition, during winter season Barf Khana (193.89 mg/ 100 g pulp) contained significantly higher amount of ascorbic acid which was statistically at par with cv. L-49 (193.76 mg/100 g pulp) and the lowest amount of ascorbic acid was manifested in variety Hisar Surkha (123.51 mg/100 g pulp). Storage period also significantly affected the ascorbic acid content as the ascorbic acid content declined with the passage of storage time and hence maximum ascorbic acid was found on the day of harvesting in both the seasons. Killadi *et al.* (2007) in guava, Pandey *et al.* (2006); Kishor *et al.* (2018) in apple, Hoda *et al.* (2001) and Karuna *et al.* (2015) in mango and Singh *et al.* (2005) in aonla also reported that ascorbic acid declined with the passage of storage time. According to Tiwari *et al.* (2017), decrease in ascorbic acid with the passage of storage period might be due to oxidation or transformation of L-ascorbic acid into dehydroascorbic acid under the action of ascorbic acid oxidase.

**Total sugars (%):** Data dispensed in Table 5 exhibited significant variation in total sugars among different varieties. Maximum total sugars was observed in the cv. L-49 (7.04%) which was statistically at par with cv. Pant Parbhat (6.95) followed by Shweta (6.78%), ArkaMridula (6.65%) and KG Guava (6.64%) and minimum amount of total sugar was found in cv. BanarsiSurkha (5.89%). Discounting the effect of varieties, storage period also had significant effect on total sugars. At ambient storage conditions, total sugars observed to be increased during storage and maximum total sugars was observed on 4<sup>th</sup> day of storage. Total sugars also significantly impacted by the combined effect of varieties and storage period. Maximum total sugars was observed in cv. L-49 on 4<sup>th</sup> day of storage (7.42 %) and statistically at par with Pant Parbhat (7.41%) and Shweta (7.30%) on 4<sup>th</sup> day only while minimum total sugar was observed on harvesting day in the cv. BanarsiSurkha (5.44%).

In winter season also, total sugars significantly varied among the varieties (Table 6). The total sugars ranges from 6.52 per cent to 8.47 per cent in different varieties. Maximum and minimum total sugars was recorded in cv. Pant Parbhat (8.47%) and Pant Red (6.52%), respectively. Storage period also had significant impact on total sugars content. It was noted total sugar increased swiftly in all the varieties till 6<sup>th</sup> day and slightly decrease on 8<sup>th</sup> day. Maximum total sugars was found on 6<sup>th</sup> day (7.86%) whereas minimum on the day of harvesting (6.65%). Regardless of above two factors, interaction between varieties and storage period also significantly influenced the total sugars. Maximum total sugars was observed in Pant Parbhat on 6<sup>th</sup> day (8.81%) which was statistically at par with Shweta on 6<sup>th</sup> day of storage (8.69%) and minimum was found in Pant Red on harvesting day (5.76%). From the research of Hoda *et al.* (2001) in mango, Kishor *et al.* (2018) in apple and Kumar (2006) in ber, it was clear that total sugar first increased for some time then decreased as in the case of winter season of present investigations. During initial storage days, Hydrolysis of starch into

sugar might be the conceivable explanation for increase in the total sugar (Mahajan *et al.*, 2009). Hoda *et al.* (2001) stated that exploitation of total sugar in respiration might be the possibility for decrease in total sugar content after certain period of time.

**Reducing sugar (%):** Reducing sugar was found to be significantly varied by the effect of varieties (Fig. 3). Maximum reducing sugar was observed in cv. Hisar Safeda (4.29%) followed by ArkaMridula (4.16%), Pant Parbhat (4.12%) and Barf Khana (4.05%) whereas Pant Red (3.10%) found to be contained least reducing sugar content. Reducing sugar also varied significantly by the effect of storage period and it was found to be increased, regardless of varieties, with the passage of storage period. Reducing sugar also varied significantly by interaction between varieties and storage period maximum reducing sugar was found in Hisar Safeda on 4<sup>th</sup> day (4.62%) which was statistically at par with Pant Parbhat (4.60%) and ArkaMridula (4.49%) on 4<sup>th</sup> day of storage and minimum was observed in Arka Kiran on harvesting day (2.59%).

It was observed that reducing sugar was significantly influenced by the effect of varieties in winter season also (Fig 4). Pant Parbhat (5.35%) contained significantly maximum reducing sugar content followed by Shweta (5.25%) and Hisar Safeda (5.23%) and minimum reducing sugar was recorded in Pant Red (3.65%). Discounting the effect of varieties, reducing sugar also varied significantly along with passage of storage period. It was recorded that reducing sugar changed with an increasing trend up to 6<sup>th</sup> day after that slow decline in reducing sugar was observed. Maximum reducing sugar was noted on 6<sup>th</sup> day in all the varieties. Interaction between varieties and storage period also significantly affected the reducing sugar. Maximum reducing sugar was observed in cv. Pant Parbhat on 6<sup>th</sup> day (5.88%) of storage and minimum was observed in Pant Red on harvesting day (3.21%). Conversion of starch to sugar might be the feasible cause of initial escalation in reducing sugars content of guava fruits, whereas, the following reduction in sugars was conceivably due to degradation of sugars for respiration during storage (Jayachandran *et al.*, 2007).

**Pectin content (%):** It is procured from the Fig. 5 that in rainy season, pectin content varied significantly among the cultivars. At ambient storage conditions, out of all the cultivars, L-49 (0.84%) contained highest amount of pectin content preceded by Banarsi Surkha (0.78%), Allahabad Safeda (0.74%) and Barf Khana (0.71%) and lowest amount of pectin was found in cv. Punjab Pink (0.57%). Pectin content was also influenced significantly by storage period, irrespective of cultivars. Pectin content decreased significantly with the prolongation of storage period. Minimum pectin content was observed on 4<sup>th</sup> day (0.64%) while maximum on the day of harvesting (0.70). The interaction between varieties and storage period had no significant impact on pectin content.

It is ample clear from the Fig. 6 that in winter season also, varieties significantly influenced the pectin content under ambient storage conditions. L-49 (1.19%) exhibited the maximum pectin content followed by cvs.

Allahabad Safeda (1.16%) and Banarsi Surkha (1.13%) and minimum in cv. Shweta (0.88%). Irrespective of varieties, pectin content also significantly varied with

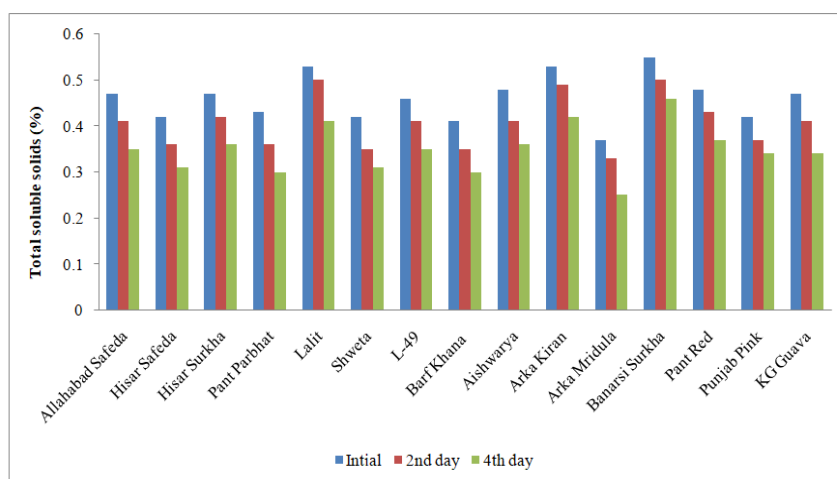
advancement of storage period. Pectin content followed the decreasing pattern with the passage of storage time. Likewise, interaction between varieties and storage period also significantly affected the pectin content.

**Table 1: TSS (%) of fruits of guava cultivars under ambient storage during rainy season.**

Varieties	Storage period (Days)			
	0	2	4	Mean
Allahabad Safeda	9.39	9.86	10.14	9.80
Hisar Safeda	10.00	10.47	10.87	10.45
Hisar Surkha	10.37	10.66	10.82	10.61
Pant Parbhat	10.46	10.90	11.14	10.83
Lalit	9.70	10.27	10.40	10.12
Shweta	10.15	10.45	10.68	10.43
L-49	9.27	9.49	9.66	9.48
Barf Khana	9.75	10.13	10.45	10.11
Aishwarya	9.56	9.98	10.28	9.94
Arka Kiran	8.78	9.18	9.41	9.12
ArkaMridula	10.03	10.49	10.85	10.46
BanarsiSurkha	9.64	10.19	10.67	10.16
Pant Red	10.00	10.38	10.51	10.30
Punjab Pink	8.42	8.86	9.25	8.84
KG Guava	9.85	10.42	10.73	10.33
<b>Mean</b>	9.75	10.23	10.49	
<b>C.D. at 5%</b>	Varieties= 0.1, Storage period= 0.06, Varieties×Storage period= NS			

**Table 2: TSS (%) of fruits of guava cultivars under ambient storage during winter season.**

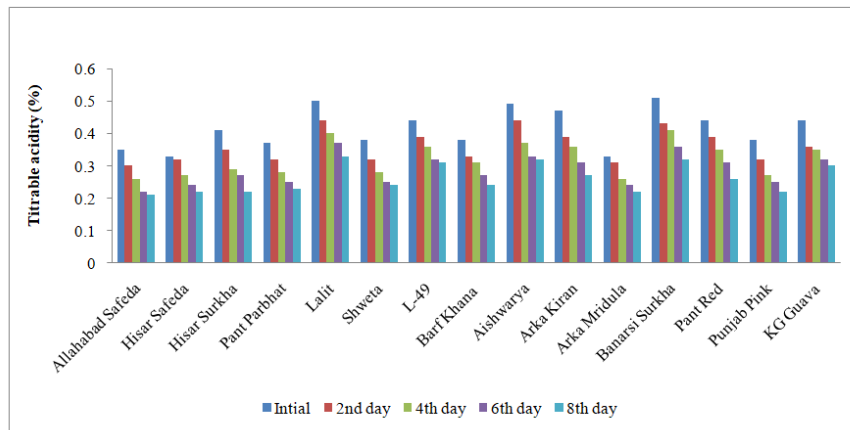
Varieties	Storage period (Days)					
	0	2	4	6	8	Mean
Allahabad Safeda	10.25	10.83	11.28	11.65	11.94	11.19
Hisar Safeda	11.53	11.78	12.28	12.58	12.76	12.19
Hisar Surkha	11.56	11.88	12.41	12.83	12.96	12.33
Pant Parbhat	11.57	11.97	12.34	12.70	12.90	12.30
Lalit	10.23	10.55	10.90	11.31	11.49	10.90
Shweta	10.94	11.35	11.57	11.85	12.03	11.55
L-49	10.23	10.54	10.92	11.38	11.87	10.99
Barf Khana	10.06	10.38	10.77	10.95	11.10	10.65
Aishwarya	9.71	10.10	10.55	10.80	11.06	10.44
Arka Kiran	10.28	10.92	11.23	11.60	11.30	11.07
ArkaMridula	10.86	11.34	11.96	12.10	12.22	11.70
BanarsiSurkha	9.84	10.24	10.66	10.92	11.30	10.59
Pant Red	10.37	10.64	10.87	11.24	11.28	10.88
Punjab Pink	9.52	9.88	10.38	10.81	11.00	10.32
KG Guava	11.07	11.43	11.83	12.13	12.36	11.77
<b>Mean</b>	10.53	10.92	11.33	11.66	11.84	
<b>C.D. at 5%</b>	Varieties= 0.13, Storage period= 0.06, Varieties × Storage period= 0.22					



**Fig. 1.** Titratable acidity (%) of fruits of guava cultivars under ambient storage during rainy season.

**Table 3: Ascorbic acid (mg/100 g pulp) content of fruits of guava cultivars under ambient storage during rainy season.**

Varieties	Storage period(Days)				Mean
	0	2	4		
Allahabad Safeda	138.56	127.83	108.67		125.02
Hisar Safeda	160.33	144.77	121.32		142.14
Hisar Surkha	133.55	122.17	98.26		117.99
Pant Parbhat	158.63	143.30	118.97		140.30
Lalit	174.56	157.93	125.07		152.52
Shweta	163.55	143.70	109.70		138.98
L-49	189.73	174.63	146.40		170.25
Barf Khana	167.53	159.13	119.70		148.79
Aishwarya	144.34	133.37	116.83		131.51
Arka Kiran	158.47	148.70	120.03		142.40
ArkaMridula	164.63	156.30	118.93		146.62
BanarsiSurkha	145.17	132.83	118.60		132.20
Pant Red	160.25	141.80	117.00		139.68
Punjab Pink	165.25	145.90	126.20		145.78
KG Guava	161.27	149.57	128.63		146.49
<b>Mean</b>	159.05	145.46	119.62		
<b>C.D. at 5%</b>	Varieties= 3.15, Storage period= 1.40, Varieties×Storage period= 5.42				



**Fig. 2.** Titratable acidity (%) of fruits of guava cultivars under ambient storage during winter season season.

**Table 4: Ascorbic acid (mg/100 g pulp) content of fruits of guava cultivars under ambient storage during winter season.**

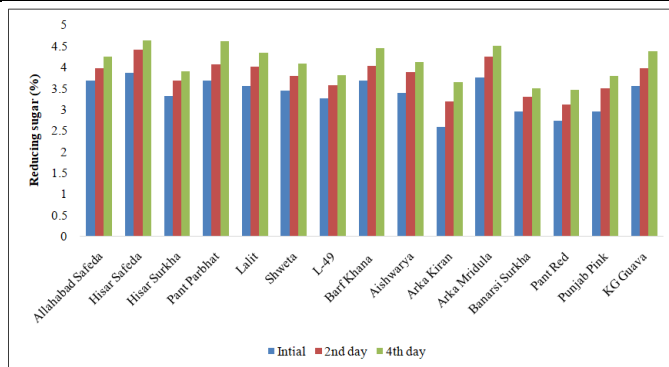
Varieties	Storage period(Days)					Mean
	0	2	4	6	8	
Allahabad Safeda	161.00	152.00	133.33	118.33	106.95	134.32
Hisar Safeda	176.60	162.40	144.00	134.53	120.32	147.57
Hisar Surkha	156.67	138.40	123.33	104.33	94.80	123.51
Pant Parbhat	213.83	186.90	162.87	128.87	114.94	161.48
Lalit	186.07	166.03	148.63	127.87	112.90	148.30
Shweta	221.23	213.27	183.37	149.50	134.91	180.46
L-49	241.83	221.00	191.13	167.13	147.71	193.76
Barf Khana	221.27	207.03	194.80	183.45	162.91	193.89
Aishwarya	160.23	136.47	120.43	109.40	93.74	124.05
Arka Kiran	177.90	154.50	134.20	123.73	117.00	141.47
ArkaMridula	164.63	150.07	129.73	117.60	107.20	133.85
BanarsiSurkha	153.53	138.10	124.10	115.70	107.19	127.73
Pant Red	156.77	132.73	127.87	115.87	111.03	128.86
Punjab Pink	158.03	147.03	120.97	107.24	100.47	126.75
KG Guava	170.20	153.17	137.07	124.53	113.57	139.71
<b>Mean</b>	181.32	163.94	145.06	128.54	116.38	
<b>C.D. at 5%</b>	Varieties=2.57, Storage period=1.48, Varieties×Storage period= 5.74					

**Table 5: Total sugars (%) of fruits of guava cultivars under ambient storage during rainy season.**

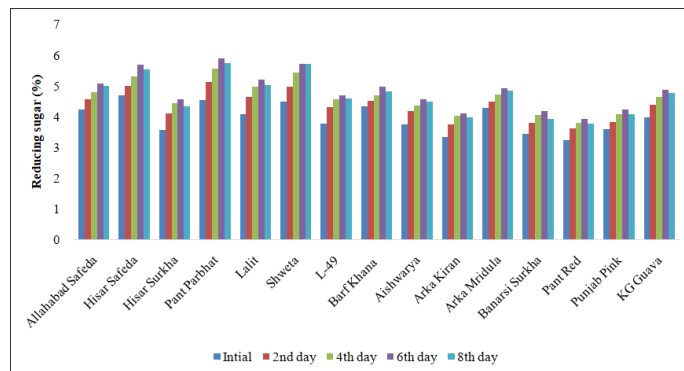
Varieties	Storage period (Days)			
	0	2	4	Mean
Allahabad Safeda	5.50	6.13	6.52	6.05
Hisar Safeda	5.54	6.33	6.80	6.22
Hisar Surkha	5.84	6.38	6.66	6.29
Pant Parbhat	6.44	7.00	7.41	6.95
Lalit	5.79	6.43	6.82	6.35
Shweta	6.14	6.89	7.30	6.78
L-49	6.63	7.07	7.42	7.04
Barf Khana	5.98	6.44	6.99	6.47
Aishwarya	5.72	6.32	6.72	6.25
Arka Kiran	5.74	6.45	6.88	6.36
ArkaMridula	5.89	6.84	7.21	6.65
BanarsiSurkha	5.44	5.96	6.28	5.89
Pant Red	5.58	6.23	6.70	6.17
Punjab Pink	5.61	6.16	6.34	6.03
KG Guava	6.25	6.73	6.94	6.64
<b>Mean</b>	5.87	6.49	6.87	
<b>C.D. at 5%</b>	Varieties= 0.10, Storage period= 0.04, Varieties×Storage period= 0.17			

**Table 6: Total sugars (%) of fruits of guava cultivars under ambient storage during winter season.**

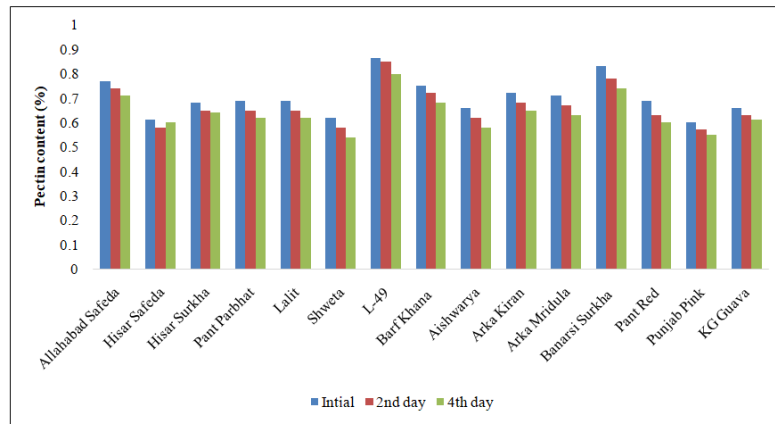
Varieties	Storage period (Days)					
	0	2	4	6	8	Mean
Allahabad Safeda	6.62	7.07	7.63	7.85	7.61	7.36
Hisar Safeda	6.38	7.08	7.84	8.00	7.90	7.44
Hisar Surkha	7.32	7.87	8.15	8.49	8.31	8.03
Pant Parbhat	7.91	8.26	8.63	8.81	8.76	8.47
Lalit	6.75	7.04	7.32	7.72	7.54	7.27
Shweta	6.96	7.66	8.12	8.69	8.51	7.99
L-49	6.95	7.39	7.61	7.81	7.72	7.50
Barf Khana	6.67	7.17	7.60	7.97	7.81	7.45
Aishwarya	6.16	6.61	6.89	7.08	6.90	6.73
Arka Kiran	6.43	7.03	7.46	7.70	7.51	7.23
ArkaMridula	6.99	7.44	7.98	8.27	8.21	7.78
BanarsiSurkha	6.47	7.07	7.52	7.96	7.74	7.35
Pant Red	5.76	6.43	6.73	6.94	6.72	6.52
Punjab Pink	5.77	6.72	6.83	6.92	6.72	6.59
KG Guava	6.64	6.94	7.37	7.68	7.46	7.22
<b>Mean</b>	6.65	7.19	7.58	7.86	7.69	
<b>C.D. at 5%</b>	Varieties= 0.07, Storage period= 0.04, Varieties×Storage period= 0.16					



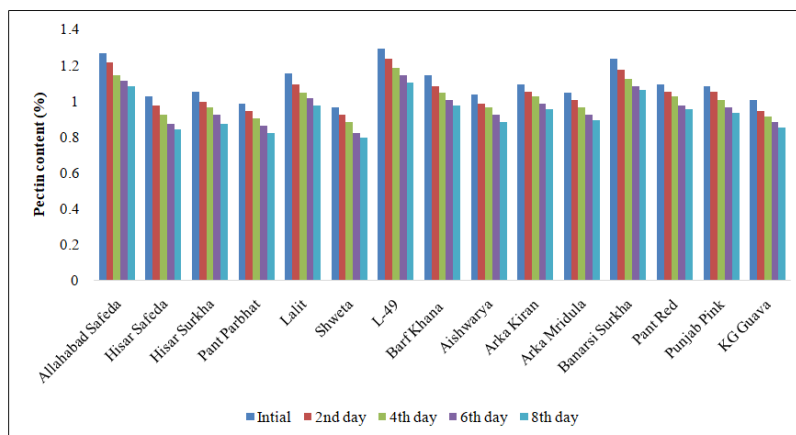
**Fig. 3.** Reducing sugar (%) of fruits of guava cultivars under ambient storage during rainy season.



**Fig. 4.** Reducing sugar (%) of fruits of guava cultivars under ambient storage during winter season.



**Fig. 5.** Pectin content (%) of fruits of guava cultivars under ambient storage during rainy season.



**Fig. 6.** Pectin content (%) of fruits of guava cultivars under ambient storage during winter season.

L-49 had the highest amount of pectin content on the day of harvesting (1.29%) and cv. Shweta had the lowest amount of pectin on 8<sup>th</sup> day (0.79%) of storage. Jain *et al.* (2003) recorded the similar outcomes that total pectin content of guava fruits declined from ripe stage to over ripe stage. According to Chandra *et al.* (2011) breakdown of insoluble protopectin to soluble pectin by the action of pectin methyl esterase enzyme might be credible reason for the decrease in the pectin content during the storage period.

## CONCLUSIONS

The obtained results showed decline in ascorbic acid, acidity and pectin content, with the passage of storage period, during both the seasons, irrespective of cultivars. On the other hand, TSS was found to be following an increasing trend. Among varieties, Hisar Safeda exhibited maximum reducing sugar. Firmness, total sugar, specific gravity and reducing sugar in winter season and TSS in rainy season were recorded maximum in cv. Pant Parbhat. Pectin content during both the seasons and ascorbic acid, total sugar and non-reducing sugar in rainy season were recorded maximum in cv. L-49. Barf Khana had the maximum ascorbic acid in winter season and acidity found minimum in ArkaMridula and Allahabad Safeda in rainy and winter season respectively. Winter season fruits of all the varieties were much more superior to rainy season fruits.

**Acknowledgement.** The authors wish to acknowledge Department of Horticulture, CCS Haryana Agricultural University, Hisar, India for providing all kind of support to facilitate this experiment. Authors would also like to thank all the scientists & persons associated with this research and significantly contributed directly and indirectly for successful completion of the experiment.

**Conflict of Interest.** None.

## REFERENCES

- AOAC (1990). Official Methods of Analysis.15th Edn. Association of Official Analytical Chemist, Washington, D.C.
- Chandra, D., Kumar, R. and Misra, K. K. (2011). Effect of low cost wrapping and cushioning materials on physico-chemical properties of guava (*Psidium guajava* L.) fruits. *Progressive Horticulture*, 43(1), 130-133.
- Hoda, M. N., Yadav, G. S., Singh, S. and Singh, J. (2001). Storage behaviour of mango (*Mangifera indica*) hybrids. *The Indian Journal of Agricultural Sciences*, 71(7), 469-472.
- Hulme, A. C. and Narain, R. (1931). The ferricyanide method for determination of reducing sugars. A modification of Hagedorn Jesen- Hanes Techniques. *Biochemistry Journal*, 25, 1051-1061.
- Jain, V. (2005). Studies On evaluation of aonla (*Emblica officinalis* Gaertn.) cultivars for fruit growth, shelf-life and processing technology of beverages under Chhattisgarh condition. Doctoral dissertation, Indira Gandhi Krishi Vishwavidyalaya, Raipur.
- Jaishankar, H. P. (2015). Effect of post-harvest treatments and storage studies on different varieties of sapota

- (*Manilkara achras* (Mill.) Fosberg). M.Sc. Thesis, KRC College of horticulture, Arabhavi, (University of horticultural sciences, Bagalkot).
- Jayachandran, K. S., Srikari, D. and Reddy, Y. N. (2007). Post-harvest application of selected antioxidants to improve the shelf life of guava fruit, 735, 627-632. In: Proceedings of 1st International Guava Symposium, December 5-8, 2005, Central Institute of Sub-tropical Horticulture, Lucknow.
- Jha, S. N., Vishwakarma, R. K., Ahmad, T., Rai, A. and Dixit, A. K. (2015). Report on assessment of quantitative harvest and post-harvest losses of major crops and commodities in India. All India Coordinated Research Project on Post-Harvest Technology, ICAR-CIPHET, 130.
- Karuna, K., Mankar, A., Kumar, M., Tiwari, D. K. and Nirgude, V. (2015). Studies on shelf-life of some promising mango (*Mangifera indica* L.) hybrids under ambient condition. *Journal of Postharvest Technology*, 3(1), 1-13.
- Killadi, B., Singh, M. D., Singh, B. P. and Singh, R. A. (2007). Shelf life evaluation of guava (*Psidium guajava* L.) cultivars. *Acta Horticulturae*, 735, 603-607.
- Kishor, A., Narayan, R., Brijwal, M., Attri, B. L., Kumar, A. and Debnath, S. (2018). Storage behaviour of apple cultivars under ambient conditions. *Indian Journal of Horticulture*, 75(2), 319-325.
- Kumar, S., Baswal, A. K. and Ramezani, A. (2021). Impact of carbo-xymethyl cellulose-based edible coating on storage life and quality of guava fruit cv. 'Allahabad Safeda' under ambient storage conditions. *Journal of Food Measurement and Characterization*, 15, 4805-4812.
- Mahajan, B. V. C., Sharma, S. R. and Dhall, R. K. (2009). Optimization of storage temperature for maintaining quality of guava. *Journal of Food Science and Technology*, 46(6), 604-605.
- Mercadante, A. Z., Steck, A. and Pander, H. (1999). Carotenoids from guava (*Psidium guajava* L.): isolation and structure elucidation. *Journal of Agricultural and Food Chemistry*, 47(1), 145-151.
- Mitra, S. K., Gurung, M. R. and Pathak, P. K. (2008). Guava production and improvement in India: An overview, 787, 59-66. In: Proceedings of International Workshop on Tropical and Subtropical Fruits, January 15, 2007.
- Naik, K. R. and Rokhade, A. K. (1997). Storage studies in ber cultivars. *Karnataka Journal of Agricultural Sciences*, 10(2), 383-386.
- Pandey, G., Verma, M. K. and Tripathi, A. N. (2006). Studies on storage behaviour of apple cultivars. *Indian Journal of Horticulture*, 63, 368-371.
- Ranganna, S. (1979). Handbook of Analysis and Quality Control for Fruit and Vegetables Products, 2nd Edn. Tata McGraw Hill Publication Company Limited, 7 West Patel Nagar, New Delhi, pp. 9- 10 and 105-106.
- Rojas-Garbanzo, C., Winter, J., Montero, M. L., Zimmermann, B. F. and Schieber, A. (2019). Characterization of phytochemicals in Costa Rican guava (*Psidium friedrichsthalianum*-Nied.) fruit and stability of main compounds during juice processing-(U) HPLC-DAD-ESI-TQD-MSn, *Journal of Food Composition and Analysis*, 75, 26-42.
- Saxena, M. and Rao, S. P. (2018). Horticultural statistics at a glance 2018. NHB, Ministry of Agriculture, Government of India, Gurgaon, Haryana.
- Singh, B. P., Pandey, G., Sarolia, D. K., Pandey, M. K. and Pathak, R. K. (2005). Shelf-life evaluation of aonla cultivars. *Indian Journal of Horticulture*, 62(2), 137-140.
- Singh, G. (2013). *Guava*. Westville Publishing House, New Delhi, p. 64-65.
- Singh, N., Sharma, D. P., Kumari, S. and Kalsi, K. (2018). Techniques for crop regulation in guava-a review. *International Journal of Farm Sciences*, 8(2), 131-135.
- Tiwari, A., Pal, A. K., Singh, S. P., Jain, V. K. and Pal, S. (2017). Varietal influence on post-harvest weight loss and bio-chemical changes under ambient storage of guava fruits. *Indian Journal of Ecology*, 44(6), 848-851.

**How to cite this article:** Ankit Gavri, Jeet Ram Sharma, Sanjay Kumar, Aayush Singla, Desh Raj Chaudhary and Ajay Sharma (2023). Storage Behavior of Guava Varieties Based on Biochemical Parameters. *Biological Forum – An International Journal*, 15(10): 616-623.