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Quality evaluation and storage study of papaya guava fruit bar

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Abstract
Among the different blending ratios of papaya cv. Red Lady and guava cv. Lalit (100:0, 80:20, 60:40, 50:50, 40:60) in preparation of fruit bar, 50% papaya pulp and 50 guava pulp (L) treatment (T_4) recorded as best blending ratio as the treatment recorded maximum sensory score and overall acceptability (8.67) and also with better ascorbic acid (127.32 mg/100 g), total carotenoids (1218 µg/100 g) and protein (1.00%) contents.

Keywords: Blending ratio, papaya, guava, and sensory score

Introduction
Papaya (*Carica papaya* L.) and Guava (*Psidium guajava* L.) are important tropical fruits and claim superiority over other fruits by virtue of their commercial and nutritional values. Papaya (*Carica papaya* L.) is regarded as the wonder fruit of the tropics and subtropics. It was originated in Mexico as a result of cross between the two species of the genus Carica. It is the fifth most important crop in India after mango, banana, citrus and guava. The fruit is an excellent source of vitamin A (2020 IU/100g) and also rich source of other vitamins like thiamine, riboflavin, nicotinic acid (Jain *et al*., 2011) [9]. India is the largest producer of papaya in the world with an annual production of about 5508 lakh tonnes from an area of about 126 lakh hectare (NHB 2014-15) [17]. In Andhra Pradesh, papaya was cultivated in an area of 18.40 lakh hectares with annual production of about 1471.68 tonnes (NHB, 2014-15) [17].
Guava, the poor man's apple, is one of the most common fruits grown widely in tropical and subtropical regions of the world. It was originated in tropical America, stretching from Mexico to Peru and gradually became a crop of commercial significance in several countries because of its hardy nature, prolific bearing, high vitamin C content, minerals and high remuneration with less maintenance. The high vitamin C content of guava makes it a power house in combating free radicals and oxidation which are key enemies that cause many degenerative diseases (Kadam *et al*., 2012) [10]. In recent years, guava cultivation has become popular due to increasing international trade, nutritional value and value added products. Guava has well-established markets in more than 60 countries. The largest producers are India, Mexico, Brazil, Cuba, Venezuela, USA, Australia, New Zealand, China, Thailand (Negi and Shailendra, 2007) [16].
In India, guava has become an important fruit crop contributing to 4 per cent of total fruit production and ranks fourth in production after mango, banana and citrus with an estimated production of 4083 lakh tonnes from 251 lakh hectares (NHB database, 2014-15) [17].
The fresh papaya and guava fruits have limited shelf life. Therefore, it is necessary to utilize this fruit for making different products to increase its availability over an extended period and to stabilize the price during glut season. Unfortunately papaya fruit has not caught the fancy of the consumers as much as it deserves, mainly because of its odour which is not appealing and thus limits its commercial exploitation at processing levels. However, papaya fruit has blood red pulp, good taste and low acid content hence; it can be used for blending with other fruits and also for preparation of nutritional enriched food products (Attri *et al*., 2014) [4]. Whereas guava emits a sweet aroma which is pleasant, refreshing and acidic in flavour and besides being rich source of pectin, its pulp shows compatibility and suitability for blending and making mixed fruit products *viz*., jam, jelly, candy, leather etc. However, blending of these two fruits could be an economic preposition to utilize them profitably (Jain *et al*., 2011) [9].

Materials and Methods
The present investigation was carried out at College of Horticulture, Anantharajupeta, during the year 2015-16. The details of the materials used and methods adopted during the investigation were elucidated in this chapter under following headings.

Procurement of raw materials

Major area of papaya cultivation in Kadapa district is under Red Lady variety. It is early, vigorous and high-yielding papaya variety with excellent fruit quality. Fruits are short, oblong shaped with red flesh, aromatic and very sweet. Lalit is a very popular commercial variety of guava. Fruits are medium, round, smooth with skin colour yellow on ripening, pink pulped, with few medium soft seeds and have good keeping quality. Fully matured ripened guava and papaya fruits were obtained from farmer field in and around Anantharajupeta.

Preparation of papaya and guava pulp

Red Lady and Lalit were used for extraction of pulp for fruit bar preparation of papaya and guava. These fruits were washed in clean tap water. Then, they were cut into pieces. By using pulp extractor papaya and guava pulp was extracted. Guava seeds were separated from pulp by sieve installed in the pulp extractor. The pulp recovery is more in papaya fruit (78.0%) when compared to guava fruit (54.5%). The papaya guava fruit bar was prepared by mixing the pulp (1kg) in different proportions as per the treatment with 250g sugar. The mixture was heated with continuous stirring till it reached to 50^0 Brix. The boiled mass was slightly cooled and 500 ppm of KMS was added.

Drying

The concentrated pulp mixture was spread on trays (smeared with ghee) up to 0.5 cm thickness and dried in cabinet drier at 60^0C. After five hours of drying, second layer of 0.5 cm thickness was spread over the first layer and continued for eight hours. The product was dried before packing.

Cutting, filling and packing

Dried sheets of each blend were cooled and cut into rectangular pieces of 3 × 0.5 cm size. The cut pieces were packed individually in butter paper and labelled with details of treatments and replications and stored at temperature 25.35° C. The fruit pulp from these varieties was blended at different proportions as per the treatments. Papaya guava fruit bar was prepared according to the methodology given by Attri *et al*. (2014) [4] with slight modification. Then processed pulp mixture was loaded in aluminium trays and kept in cabinet dryer for drying The treatment combinations are given in table 1.

Table 1: Treatment details

Treatments	Red lady papaya pulp (%)	Lalit guava pulp (%)
T_1 (control)	100	-
T_2	80	20
T_3	60	40
T_4	50	50
T_5	40	60

Physico-chemical analysis

Biochemical quality and organoleptic evaluation of papaya guava fruit bar was carried out at zero, 30 and 60 days after storage. Two samples per treatment were subjected to physic-chemical analysis. The parameters such as TSS, pH, total sugars, reducing sugars, titrable acidity, ascorbic acid and overall acceptability were analyzed by the methods suggested by Ranganna (1986) [20]. Moisture content was determined on fresh weight basis (Saini, 2001) [22]. Protein content and total carotenoids in papaya guava bar sample was estimated by using Lowry (1951) [14] method and procedure suggested by Srivastava and Kumar (2009) [27], respectively.

Statistical analysis

The data for various physico-chemical attributes and sensory evaluation were analyzed by using Completely Randomized Design (CRD). The data was statistically analyzed according to (Panse and Sukhatme, 1985) [18].

Results and Discussion

Moisture content (%)

The highest moisture content (15.05%) in fruit bar at zero days of storage was recorded in T_1 (with 100% papaya pulp) followed by T_2 (80% papaya pulp + 20% guava pulp (L)) (15.03%). The lowest moisture content (14.99%) was recorded in fruit bar T_5 (with 40 per cent papaya pulp + 60 per cent guava pulp (L) at zero days of storage furnished in Table 2.

At 30 days of storage, highest moisture content (15.04%) was recorded in fruit bar with 100 per cent papaya pulp (T_1) and the lowest moisture content (14.98%) with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5). The moisture content recorded were maximum (15.02%) at 60 days of storage in fruit bar with 100 per cent papaya pulp (T_1), whereas minimum (14.96%) in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5). A close perusal of data indicates that there was slight decrease in moisture content of papaya guava fruit bar with the advancement of storage period irrespective of blending ratios (Table 2). There was a slight decrease in moisture content may be due to evaporation of water from bar during storage (Bhatt and Jha, 2015) [5]. These findings are also in conformity with observations made by other workers in case of guava leather by Safdar *et al*. (2014) [21].

Total soluble solids (°Brix)

Total soluble solids ranged from 74.15 °Brix (T_1) to 80.05 °Brix (T_5) among the treatments (Table 2). The highest total soluble solids 79.15°Brix was recorded in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) followed by 77.45°Brix in 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) and 76.14°Brix in 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3) at zero day of storage, however, the treatments T_5, T_4 and T_3 are on par with each other. While lowest total soluble solids, 74.15 °Brix was recorded in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage.

At 30 days of storage the highest total soluble solids was recorded in fruit bar prepared with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) was maximum (79.94 °Brix) which was on par with treatment (T_4) containing 50 per cent papaya pulp + 50 per cent guava pulp (L) (77.56 °Brix) and 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3) (76.94 °Brix). The TSS recorded was maximum (80.05 °Brix) in fruit bar prepared with 40 per cent papaya + 60 per cent guava pulp (L) (T_5) and lowest (75.39 °Brix) was recorded in 100 per cent papaya pulp (T_1) at 60 days of storage. The slight increase in total soluble solids during storage might be due to conversion of insoluble to soluble fraction (Aradhitha *et al*., 1996) [2]. Increasing trend in TSS content during storage corroborates with the investigations on guava leather by Sandhu *et al.* (2001) [23], blending ratios of papaya and guava pulp by Jain *et al.* (2011) [9] and guava jelly bar by Kuchi *et al.* (2014) [12].

Titrable acidity (%)

The highest titrable acidity of 1.00% was recorded in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) followed by 0.98% in 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) and 0.96% in 60 per cent guava pulp

+ 40 per cent papaya pulp (L) (T_3) at zero day of storage, however the treatments T_5, T_4 and T_3 are on par with each other.

While the lowest titrable acidity, 0.90 % was recorded in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage. The fruit bar prepared with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) recorded maximum acidity of (0.97%) which was on par with treatment (T_4) containing 50 per cent papaya pulp + 50 per cent guava pulp (L) (0.96) and (T_3) 60 per cent papaya pulp + 40 per cent guava pulp (L) (0.93%) at 60 days of storage.

The titrable acidity recorded was minimum (0.87%) in fruit bar with 100 per cent papaya pulp (T_1) at 60 days of storage. A close perusal of data indicates that there was a slight decrease in titrable acidity with the advancement of storage period (Table 2). Change in pH is directly related to change in acidity of samples. With the slight decrease in acidity of fruit bar negligible increase in pH was noticed. There was a slight decrease in acidity during storage might be due to salt formation *i.e.*, due to acid base reactions (Kuchi *et al*., 2014) [12]. Similar results were recorded on apricot fruit bar by Sharma *et al.* (2013) [25] and papaya toffee and leather by Attri *et al.* (2014) [4].

pH

There were significant differences among treatments for pH in papaya guava fruit bar at zero, 30 and 60 days of storage (Table 3). The pH values in fruit bar ranged from 3.59 (T_1) to 3.96 (T_3). Among the treatments highest pH of 3.95 was recorded in fruit bar with 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3), which was on par with treatment (T_2) 80 per cent papaya pulp + 20 per cent guava pulp (L) (3.91) and (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (3.82) at zero days of storage. In contrast, the lowest pH of 3.59 was recorded in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage. At 30 days of storage the pH recorded in fruit bar with 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3) was maximum (3.95) which was on par with treatment (T_2) containing 80 per cent papaya pulp + 20 per cent guava pulp (L) (3.92) and (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (3.83). The pH value recorded was minimum (3.59) in fruit bar with 100 per cent papaya pulp (T_1) at 30 days of storage.

The pH at 60 days of storage of fruit bar of different treatments indicated that, significantly maximum pH 3.96 was recorded in fruit bar made by 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3), which was on par with treatment (T_2) 80 per cent papaya pulp + 20 per cent guava pulp (L) (3.92) and (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (3.83). Whereas, in fruit bar made by 100 per cent papaya pulp (T_1) recorded minimum pH of 3.60 at 60 days of storage. There was a negligible increase in pH of papaya guava fruit bar was noticed in all the treatments, which might be due to formation of free acids and hydrolysis of pectin (Imran *et al*., 2000) [8]. Parallel results were obtained on mango pulp by Durrani *et al*. (2010) [6] and wood apple bar by Vidhya and Narain (2011) [29].

Reducing sugars (%)

There were significant difference for reducing sugar content of papaya guava fruit bar at zero, 30 and 60 days of storage. The reducing sugars per cent in fruit bar ranged from 35.27 (T_1) to 45.36 (T_5). At zero day of storage, highest reducing sugars per cent 43.76 % was recorded in fruit bar made by 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5), which was on par with treatment (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (42.30%) followed by treatment (T_3) 60 per cent papaya pulp + 40 per cent guava pulp (L) (41.02). In contrast, lowest reducing sugars per cent (35.27%) was recorded in fruit bar made by 100 per cent papaya pulp (T_1) at zero days of storage. The fruit bar prepared with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) recorded highest reducing sugars per cent of 44.87% was on par with treatment (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (43.37%) at 30 days of storage.

The fruit bar prepared from 100 per cent papaya pulp recorded lowest reducing sugars (36.59%) at 30 days of storage. The reducing sugars at 60 days of storage of fruit bar of different treatments indicated that, significantly maximum reducing sugars (45.36%) was recorded in fruit bar made by 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) followed by 44.89% with 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4). Whereas, in fruit bar made by 100 per cent papaya pulp (T_1) recorded minimum reducing sugars (37.32%) at 60 days of storage. It was clear from the Table 3 that the reducing sugar per cent of papaya guava fruit bar slightly increased with the progress in storage period. The increase in reducing sugars during storage might be due to inversion of non reducing sugars to reducing sugars and conversion of polysaccharides to monosaccharide (Sharma *et al*., 2013) [25].

The results of increased reducing sugar per cent was also in conformity with report on sapota-papaya bar by Sreemathi *et al.* (2008) [26].

Total sugars (%)

Total sugars in fruit bar made with different blending ratios of papaya and guava pulp at zero, 30 and 60 days of storage ranged from 59.34% (T_2) to 69.31% (T_1). Among the treatments, the highest total sugars of 69.31 per cent was recorded in fruit bar made by 100 per cent papaya pulp (T_1), which was on par with treatment (T_3) 60 per cent papaya pulp + 40 per cent guava pulp (L) (67.42) and (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (66.54) at zero days of storage. In contrast, the lowest total sugar per cent of 64.32 was recorded in fruit bar made by 80 per cent papaya pulp + 20 per cent guava pulp (L) (T_2) at zero days of storage.

At 30 days of storage, highest per cent of total sugars (69.29%) recorded in fruit bar made with 100 per cent papaya pulp (T_1) and lowest (63.27%) was recorded with 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) shown in Table 3. The total sugars recorded were maximum (69.15%) at 60 days of storage in fruit bar with 100 per cent papaya pulp (T_1), whereas minimum (59.34%) in fruit bar with 80 per cent papaya pulp and 20 per cent guava pulp (L) (T_2). The slight decrease in total sugars per cent of the fruit bar samples were noted throughout the storage period (table 3). The slight decrease in total sugars per cent during storage might be due to of inversion of sugars to monosaccharide by acid hydrolysis (Muralikrishna *et al*., 1969) [15]. These results are in conformity with the findings on apricot fruit bar by Sharma *et al.* (2013) [25] and papaya toffee and papaya leather by Attri *et al.* (2014) [4].

Ascorbic acid (mg/100 g)

There were significant differences among treatments for the ascorbic acid mg/100 g in papaya guava fruit bar at zero, 30 and 60 days of storage. The ascorbic acid content of papaya guava fruit bar was in the range of 45.15 (T_1) to 148.36 mg/100 g (T_5).

At zero day of storage, the highest ascorbic acid content (148.36 mg/ 100 g) was recorded in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5), followed by treatment (T_4) with 50 per cent papaya pulp + 50 per cent guava pulp (L) (127.32 mg/100g). In contrast, the lowest ascorbic acid content 56.32 mg/100g was recorded in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage (Table. 4)

Among the treatments significantly highest ascorbic acid content of 138.42 mg/100g was recorded in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) followed by 116.29 mg/ 100g with 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) and lowest (51.42 mg/100 g) in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage. Similar trend was observed at 60 days of storage, T_5 (fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L)) had highest ascorbic acid content (126.52 mg/100 g) followed by T_4 with 50 per cent papaya pulp + 50 per cent guava pulp (L) (107.32 mg/100 g). The lowest ascorbic acid content (45.15 mg/100g) was observed in fruit bar with 100 per cent papaya pulp (T_1). The fruit bar prepared by blending of pulp of papaya variety Red Lady and guava variety Lalit showed slightly higher ascorbic acid content when compared to fruit bar with papaya variety Red Lady and guava variety Allahabad Safeda. The ascorbic acid content significantly increased with increase in blending ratio of guava pulp in preparation of fruit bar compared to 100% papaya pulp (Kumar *et al*., 2010) [13].

There was a gradual decrease in the ascorbic content of papaya guava fruit bar with advancement of storage period (table 4). The decrease in ascorbic acid content may be due to oxidation of ascorbic acid to dehydroascorbic acid followed by further degradation to 2, 3-diketogluconic acid and finally to furfural compounds which enter browning reaction (Sharma *et al*., 2013) [25]. The results of decrease in ascorbic acid was also in conformity with report on guava nectar by Karanjalker *et al.* (2013) [11].

Total carotenoids (µg/100g)

Highly significant differences among treatments were observed with respect to total carotenoids content in fruit bar at zero, 30 and 60 days of storage. Total carotenoids content in fruit bar ranged from 643 µg/100 g (T_5) to 1594 µg/100g (T_1). Maximum total carotenoids content (1594 µg /100 g) was observed in fruit bar made with 100 per cent papaya pulp (T_1), followed by treatment (T_2) with 80 per cent papaya pulp + 20 per cent guava pulp (L) (1525 µg/100 g), T_3 with 60 per cent papaya pulp + 40 per cent guava pulp (L) (1344 µg/100 g), T_4 with 50 per cent papaya pulp + 50 per cent guava pulp (L) (1218 µg/100 g) at zero days of storage (Table 4).

Fruit bar prepared with higher per cent of guava pulp *viz*., T_5 (with 40 per cent papaya pulp + 60 per cent guava pulp (L)) recorded lowest total carotenoids content (974 µg/100g) at zero days of storage. There was a gradual decrease in carotenoids content of papaya guava fruit bar with the progress of storage period (table 4). The highest carotenoids content 1536 µg/100g was observed in fruit bar with 100 per cent papaya pulp (T_1) followed by 1428 µg/100 g with 80 per cent papaya pulp + 20 per cent guava pulp (L) (T_2) at 30 days of storage. The lowest carotenoids content 794 µg/100 g was observed in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) at 30 days of storage. Similar trend was observed at 60 days of storage, T_1 (fruit bar with 100 per cent papaya pulp) had highest carotenoids content (1386 µg/100 g) followed by T_2 with 80 per cent papaya pulp + 20 per cent guava pulp (L) (1273µg/100 g). The lowest carotenoids content (643 µg/100 g) was observed in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5).

There was an increase in carotenoids content as papaya pulp increased in blending ratio of fruit bar because papaya is a rich source of carotenoids (Take *et al.*, 2012) [29]. The loss of carotenoids content in the processed samples was mainly due to non-oxidative changes (cis-trans isomerisation, epoxide formation of thermal degradation) or oxidative changes (Guarte *et al.*, 2005) [7]. The result of loss in carotenoids during storage was also in conformity with report on papaya toffee and papaya leather by Attri *et al*. (2014) [4].

Protein (%)

There were significant differences among treatments for the protein content in papaya guava fruit bar at zero, 30 and 60 days of storage. In papaya guava fruit bar protein per cent was in the range of 0.63 (T_1) to 1.02 (T_5). At zero day of storage, the highest protein per cent of 1.02 was recorded in fruit bar with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5), which was on par with treatment (T_4) 50 per cent papaya pulp + 50 per cent guava pulp (L) (1.00) followed by treatment (T_3) 60 per cent papaya pulp + 40 per cent guava pulp (L) (0.95). In contrast, lowest protein per cent of 0.86 was recorded in fruit bar with 100 per cent papaya pulp (T_1) at zero days of storage (Table 4).

The maximum protein content (0.87%) was observed in fruit bar with 40 per cent papaya pulp per cent guava pulp (L) (T_5), which was on par with treatment (T_4) with 50 per cent papaya pulp + 50 per cent guava pulp (L) (0.83%) and (T_3) with 60 per cent papaya pulp + 40 per cent guava pulp (L) (0.83%) at 30 days of storage. Significantly minimum protein content (0.74%) was observed in fruit bar with 100 per cent papaya pulp (T_1). Treatment with 40 per cent papaya pulp + 60 per cent guava pulp (L) (T_5) recorded significantly maximum protein content (0.73%) in fruit bar which was on par with T_4 (50 per cent papaya pulp + 50 per cent guava pulp (L)) (0.71%) followed by treatment T_3 (60 per cent papaya pulp + 40 per cent guava pulp (L)) (0.66%) at 60 days of storage.

In fruit bar made with 100 per cent papaya pulp (T_1) (0.63%) and with 80 per cent papaya pulp + 20 per cent guava pulp (L) (T_2) (0.64%) registered significantly lower protein content and both the treatments are on par with each other at 60 days of storage. There was increase in protein content of fruit bar when blending ratio of guava pulp was increased with papaya pulp while preparation of fruit bar. This might be due to higher content of proteins present in guava fruit compared to papaya (Ashaye *et al.*, 2005) [3]. The remarkable decrease in the protein content of the fruit bar was noted throughout the storage period (table 4). The decrease in protein content might be due to participation of protein in Millard reaction (Anju *et al.*, 2014) [1]. The decrease in protein per cent during storage of fruit bar made with papaya and guava was also in conformity with report on plum-soy products by Sharma Mala (1997) [24].

Overall acceptability

The parameter concerning changes in overall acceptability score of papaya guava fruit bar influenced by various treatments during the storage are furnished under Table 5. Significant difference among treatments was observed at 60 days of storage. At zero and 30 days of storage the highest score for overall acceptability 8.67 and 8.58 were recorded in fruit bar with 50 per cent papaya pulp + 50 per cent guava

pulp (L) (T_4). The least score for overall acceptability 8.32 and 8.17 was recorded in fruit bar with 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3) at zero and 30 days of storage respectively. At 60 days of storage, significantly highest overall acceptability score of 8.50 was recorded in fruit bar blended with 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) followed by T_2 (80 per cent papaya pulp + 20 per cent guava pulp (L)) (8.11). The least score for overall acceptability of 8.01 was recorded in fruit bar with 60 per cent papaya pulp + 40 per cent guava pulp (L) (T_3). There was a gradual decrease in overall acceptability score with the advancement of storage period.

Among all the treatments overall acceptability score of papaya guava fruit bar with 50 per cent papaya pulp + 50 per cent guava pulp (L) (T_4) was recorded as best blending ratio. The gradual decrease in over all acceptability score during storage might be due to change in composition of the product and loss of colour and flavour (Parekh *et al*., 2014) [19]. The result of decline in overall acceptability score during storage was also in conformity with report on papaya toffee and leather by Attri *et al.* (2014) [4] and guava jelly bar by Kuchi *et al.* (2014) [12].

Conclusion

According to the sensory evaluation and nutrient point of papaya- guava (L) fruit bar, it was elicited that overall acceptability of fruit bar the treatment (T_4) with 50 per cent papaya pulp + 50 per cent guava pulp (Lalit) noticed as best blending ratio and also with better ascorbic acid (127 mg/100g), total carotenoids (1218 µg/100g) and protein content (1.00%).

Table 2: Influence of different blending ratios of papaya guava fruit bar on moisture content (%), total soluble solids (°Brix) and titrable acidity (%) at different days of storage.

Treatments	Moisture content (%)			Total soluble solids (°Brix)			Titrable acidity (%)		
	Days after storage			Days after storage			Days after storage		
	0	30	60	0	30	60	0	30	60
T_1	15.05	15.04	15.02	74.15	74.32	75.39	0.90	0.89	0.87
T_2	15.03	15.02	15.00	75.35	76.58	77.85	0.93	0.92	0.91
T_3	15.02	15.01	14.99	76.14	76.94	77.58	0.96	0.94	0.93
T_4	15.00	14.99	14.97	77.45	77.56	78.35	0.98	0.97	0.96
T_5	14.99	14.98	14.96	79.15	79.94	80.05	1.00	0.98	0.97
S. Em. ±	0.22	0.22	0.22	1.10	1.11	1.12	0.01	0.01	0.01
CD @ 5%	NS	NS	NS	3.26	3.27	NS	0.04	0.04	0.04

NS: Non-significant; T_1: (100% Papaya pulp), T_2: (80% Papaya pulp + 20% Guava pulp), T_3: (60% Papaya pulp + 40% Guava pulp), T_4: (50% Papaya pulp + 50% Guava pulp), T_5: (40% Papaya pulp + 60% Guava pulp); Allahabad Safeda (AS).

Table 3: Influence of different blending ratios of papaya guava fruit bar on pH, reducing sugars (%), total sugars (%) at different days of storage.

Treatments		pH		Reducing sugars (%)			Total sugars (%)		
		Days after storage		Days after storage			Days after storage		
	0	30	60	0	30	60	0	30	60
T_1	3.59	3.59	3.60	35.27	36.59	37.32	69.31	69.29	69.15
T_2	3.91	3.92	3.92	38.12	39.94	41.36	64.32	63.39	59.34
T_3	3.95	3.95	3.96	41.02	42.36	43.15	67.42	66.31	65.15
T_4	3.82	3.83	3.83	42.30	43.37	44.89	66.54	63.27	61.15
T_5	3.71	3.72	3.72	43.76	44.87	45.36	65.54	64.37	62.14
S. Em. ±	0.06	0.06	0.06	0.59	0.61	0.63	0.96	0.92	0.90
CD @ 5%	0.16	0.16	0.16	1.76	1.80	1.86	2.83	2.72	2.64

NS: Non-significant; T_1: (100% Papaya pulp), T_2: (80% Papaya pulp + 20% Guava pulp), T_3: (60% Papaya pulp + 40% Guava pulp), T_4: (50% Papaya pulp + 50% Guava pulp), T_5: (40 % Papaya pulp + 60 % Guava pulp).

Table 4: Influence of different blending ratios of papaya guava fruit bar on ascorbic acid (mg/100g), total carotenoids (µg/100 g) and protein (%) at different days of storage.

Treatments	Ascorbic acid (mg/100 g)			Total carotenoids (µg/100 g)				Protein (%)	
	Days after storage			Days after storage				Days after storage	
	0	30	60	0	30	60	0	30	60
T_1	56.32	51.42	45.15	1594	1536	1386	0.86	0.74	0.63
T_2	94.34	86.59	78.35	1525	1428	1273	0.89	0.77	0.64
T_3	119.39	109.54	100.34	1344	1204	1050	0.95	0.83	0.66
T_4	127.32	116.29	107.32	1218	1006	849	1.00	0.83	0.71
T_5	148.36	138.42	126.52	974	794	643	1.02	0.87	0.73
S. E m. ±	1.73	1.59	1.46	18.50	15.98	13.78	0.01	0.01	0.01
CD @ 5%	5.11	4.68	4.30	54.5	47.1	40.6	0.04	0.04	0.03

NS: Non-significant; T_1: (100% Papaya pulp), T_2: (80% Papaya pulp + 20% Guava pulp), T_3: (60% Papaya pulp + 40% Guava pulp), T_4: (50% Papaya pulp + 50% Guava pulp), T_5: (40% Papaya pulp + 60% Guava pulp); Allahabad Safeda (AS).

Table 5: Influence of different blending ratios of papaya guava fruit bar on overall acceptability score at different days of storage.

Treatments		Overall acceptability score	
		Days after storage	
	0	**30**	**60**
T1	8.39	8.27	8.03
T2	8.43	8.29	8.11
T3	8.32	8.17	8.01
T4	8.67	8.58	8.50
T5	8.35	8.21	8.05
S. Em. ±	0.12	0.12	0.12
CD @ 5%	NS	NS	0.34

NS: Non-significant; NA: Not applicable, T_1: (100% Papaya pulp), T_2: (80% Papaya pulp + 20% Guava pulp), T_3: (60% Papaya pulp + 40% Guava pulp), T_4: (50% Papaya pulp + 50% Guava pulp), T_5: (40 % Papaya pulp + 60% Guava pulp).

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