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Nutritional enhancement and sensory quality of fortified papaya-guava fruit bars using defatted soy flour and skimmed milk powder

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Abstract

The present investigation was undertaken with the objective of enhancing the protein content and overall nutritional quality of papaya-guava fruit bars through fortification with defatted soya flour and skimmed milk powder. The fortified fruit bars recorded total soluble solids (TSS) ranging from 77.45 to 79.24 °Brix, moisture content from 14.92 to 15.01%, pH values between 3.38 and 3.87, and titratable acidity from 0.80 to 0.98%. Reducing sugars varied from 36.59 to 48.94%, while total sugars ranged from 61.15 to 74.45%. The ascorbic acid content was found to be between 81.70 and 133.70 mg/100 g, total carotenoids ranged from 849 to 1340 µg/100 g, and protein content increased from 0.69 to 2.10% across treatments. Based on sensory evaluation, treatment T₇ (60% papaya pulp + 40% guava pulp (Allahabad Safeda) + 6% skimmed milk powder) received the highest scores for colour and appearance, flavour, texture, taste, and overall acceptability at 0, 30, and 60 days of storage.

Keywords: Papaya-guava fruit bar, fortification, skimmed milk powder, storage stability

Introduction

Papaya (*Carica papaya* L.) and guava (*Psidium guajava* L.) are important tropical fruits valued for their nutritional quality and economic importance. India is the world's leading producer of papaya, with production exceeding 550 lakh tonnes annually, and the crop ranks fifth after mango, banana, citrus, and guava. Papaya is a rich source of vitamin A and also contains appreciable amounts of B-complex vitamins.

Guava, often referred to as the "poor man's apple," is widely cultivated in tropical and subtropical regions. Owing to its hardy nature, high productivity, and excellent nutritive value, it has become an important fruit crop in India, contributing nearly 4% of total fruit production. Guava is especially noted for its high vitamin C and pectin content.

Papaya pulp is attractive, mildly flavored, and low in acidity, making it suitable for blending with other fruits. Guava pulp has a characteristic aroma and good gelling properties, which support its use in processed products. Blending these two fruits offers an opportunity to develop nutritious and consumer-acceptable fruit-based products such as fruit bars.

Food fortification involves the addition of essential nutrients to improve the nutritional value of foods. Since most fruits are naturally low in protein, fortification with protein-rich ingredients such as defatted soy flour and skimmed milk powder can significantly enhance their nutritional profile. Defatted soy flour is an economical source of high-quality plant protein, while skimmed milk powder provides easily digestible animal protein with very low fat content. Their incorporation in fruit-based products may therefore improve both nutritional value and functional quality. Keeping in this view, experiment nutritional enhancement, quality assessment and sensory evaluation of fortified papaya-guava fruit bars was formulated.

Materials and Methods

Procurement of Raw Material

Fully ripened, uniform, and disease-free fruits of papaya (*Carica papaya* L.; cv. Red Lady) and guava (*Psidium guajava* L.; cv. Allahabad Safeda and Lalit) were procured from farmers' fields in Kadapa, Andhra Pradesh, India.

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Preparation of Papaya-Guava Pulp

The fruits were washed thoroughly under running tap water, peeled, and cut into small pieces. Pulp was extracted using a mechanical pulp extractor. Seeds were removed from guava pulp using the in-built sieving unit of the extractor.

Development of Fortified Papaya-Guava Fruit Bars

Blended papaya-guava pulp combinations optimized in preliminary trials were fortified with defatted soy flour (4 and 5%) and skimmed milk powder (6 and 8%). The blended pulp was heated with continuous stirring until the total soluble solids (TSS) reached 50 °Brix. The mixture was then cooled slightly and 500 ppm potassium metabisulphite (KMS) was added.

The concentrated pulp was spread on aluminium trays coated with a thin layer of ghee to a uniform thickness of 0.5 cm and dried in a cabinet dryer at 60 °C. After five hours of drying, a second layer of equal thickness was applied and drying was continued for a further eight hours. The dried sheets were cooled, cut into rectangular bars (3 × 0.5 cm), wrapped in butter paper, labelled, and stored at ambient temperature (25-35 °C).

The experiment comprised ten treatments. Treatment T₁ consisted of a blend of 60% papaya pulp and 40% guava pulp of the cultivar Allahabad Safeda, whereas T₂ included 50% papaya pulp and 50% guava pulp of the cultivar Lalit. Treatments T₃ and T₄ were obtained by fortifying the T₁ blend with 4% and 5% defatted soy flour (DSF), respectively. Likewise, T₅ and T₆ were prepared by adding 4% and 5% DSF to the T₂ blend. In T₇ and T₈, the T₁ blend was supplemented with 6% and 8% skimmed milk powder (SMP), respectively, while T₉ and T₁₀ consisted of the T₂ blend fortified with 6% and 8% SMP.

Allahabad Safeda and Lalit refer to the guava cultivars used in the respective blends, while DSF and SMP denote defatted soy flour and skimmed milk powder.

The different treatment combinations in experiment are T₁: 60% papaya pulp + 40% guava pulp (AS), T₂: 50% papaya pulp + 50% guava pulp (L), T₃: 60% papaya pulp and 40% guava pulp (AS) + 4% DSF, T₄: 60% papaya pulp and 40% guava pulp (AS) + 5% DSF, T₅: 50% papaya pulp and 50% guava pulp (L) + 4% DSF, T₆ : 50% papaya pulp and 50% guava pulp (L) + 5% DSF, T₇: 60% papaya pulp and 40% guava pulp (AS) + 6% SMP, T₈: 60% papaya pulp and 40% guava pulp (AS) + 8% SMP, T₉: 50% papaya pulp and 50% guava pulp (L) + 6% SMP, T₁₀: 50% papaya pulp and 50% guava pulp (L) + 8% SMP.

Note: AS: Allahabad Safeda, L: Lalit, DSF: Defatted soya flour, SKM: Skimmed milk powder

Physico-Chemical and Sensory Evaluation

Fruit bars were analysed at 0, 30, and 60 days of storage. Two samples per treatment were evaluated for moisture content, TSS, pH, titratable acidity, reducing sugars, total sugars, ascorbic acid, total carotenoids, protein content, microbial load, and sensory quality.

Moisture content was determined on a fresh-weight basis. TSS, sugars, acidity, pH and ascorbic acid were estimated following the methods of Ranganna (1986) [3]. Protein content and total carotenoids were determined according to Lowry *et al.* (1951) [5] and Srivastava & Kumar (2009) [6], respectively. Microbial count was assessed following

Harrigan and McCance (1976) [7]. Sensory evaluation was conducted using a 9-point hedonic scale by a trained panel.

Statistical Analysis

The experiment was laid out in a Completely Randomized Design (CRD). Data were analysed using analysis of variance (ANOVA) following the procedure of Panse and Sukhatme, and treatment means were compared at the 5% level of significance.

Moisture content (%)

The moisture content of the fortified papaya-guava fruit bars did not differ significantly among the treatments during storage at 0, 30, and 60 days. Moisture values ranged from 14.92% in T₆ to 15.01% in T₁. In T₁ (60% papaya pulp + 40% guava pulp, Allahabad Safeda), moisture content declined slightly from 15.01% at 0 days to 14.98% at 60 days, although it remained the highest among all treatments throughout the storage period (Fig 1). The lowest values were recorded in T₆ (50% papaya pulp + 50% guava pulp, Lalit + 5% defatted soy flour) with 14.95%, 14.94%, and 14.92% at 0, 30, and 60 days, respectively. The gradual reduction in moisture may be attributed to slow evaporation from the product surface during storage. Comparable results have been reported for sapota-papaya bars and blended fruit leathers. Similar trends in moisture behavior were also documented in sapota-papaya fruit bars by Sreemathi *et al.* (2008) [10] and in olive-apple blended fruit leather by Khan *et al.* (2014) [11].

Total soluble solids (°Brix)

No significant differences in total soluble solids (TSS) were observed among the treatments at 0, 30, and 60 days of storage. The highest TSS values were recorded in treatment T₈ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 8% skimmed milk powder), with readings of 79.24 °Brix at 0 days, 79.79 °Brix at 30 days, and 80.05 °Brix at 60 days of storage (Fig.1). The lowest TSS value was recorded in treatment T₂ (50% papaya pulp + 50% guava pulp, cv. Lalit), which increased to 78.35 °Brix by the end of the 60-day storage period. The gradual increase in TSS during storage may be attributed to the conversion of residual polysaccharides into soluble sugars through acid hydrolysis. These findings are consistent with earlier reports on guava leather (Safdar *et al.*, 2014) [13] and papaya toffee and leather (Attri *et al.*, 2014) [14].

Titrateable Acidity (%)

Significant differences in titrateable acidity were observed among the treatments at 0, 30, and 60 days of storage (Fig 2.) The maximum titrateable acidity (0.98%) was recorded in T₁ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda) and T₂ (50% papaya pulp + 50% guava pulp, cv. Lalit) after 60 days of storage. At 0 days, T₁ (0.98%) and T₂ (0.98%) were statistically at par, followed by T₉ (0.91%), which comprised 50% papaya pulp + 50% guava pulp (cv. Lalit) supplemented with 6% skimmed milk powder. The lowest titrateable acidity at 0 days (0.83%) was noted in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour).

A similar trend continued during storage. After 30 days, the highest titrateable acidity (0.97%) was again recorded in T₁ and T₂, followed by T₈ (0.89%), while the lowest value (0.82%) was observed in T₄ and T₆. At 60 days, T₁ and T₂

continued to show the highest acidity (0.96%), followed by T₉ (0.88%), whereas the lowest value (0.80%) was recorded in T₆. An increase in the proportion of defatted soy flour in the papaya-guava blend was associated with a reduction in titratable acidity, which may be attributed to dilution of the natural fruit acids by the added flour (Anju *et al.*, 2014) [15]. Overall, titratable acidity declined from 0.98% to 0.80% during the 60-day storage period. This decrease may be due to acid-base reactions and salt formation during storage [16]. Comparable findings have been reported in papaya toffee and leather (Attri *et al.*, 2014) [14] and apricot fruit bars (Sharma *et al.*, 2013) [17].

pH

Significant differences in pH were observed among the treatments at 0, 30, and 60 days of storage (Fig. 2.) The highest pH values (3.86, 3.86, and 3.87 at 0, 30, and 60 days, respectively) were recorded in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour). These values were statistically comparable with T₂, T₅, T₉, and T₁₀, and the same trend persisted throughout the storage period. In contrast, the lowest pH (3.38) at 0 days was recorded in T₁ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda). The pH of T₁ remained unchanged up to 30 days, followed by a marginal increase to 3.39 at 60 days.

A slight but consistent increase in pH was observed during storage across all treatments. This gradual rise may be attributed to the formation of free acids and hydrolysis of pectic substances during storage. Similar trends in pH behaviour during storage have been reported in mango pulp (Durrani *et al.*, 2010) [19] and wood apple bars (Vidhya and Narain, 2011) [20].

Reducing Sugars (%)

The reducing sugar content of fortified papaya-guava fruit bars varied significantly among treatments at 0, 30, and 60 days of storage (Fig. 3). At 0 days, the highest reducing sugar (47.45%) was observed in T₈ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 8% skimmed milk powder), which was statistically comparable with T₉ and T₁₀. The lowest reducing sugar content (37.54%) at 0 days was recorded in T₄ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 5% defatted soy flour).

During storage, T₁₀ (50% papaya pulp + 50% guava pulp, cv. Lalit + 8% skimmed milk powder) exhibited the highest reducing sugar content, reaching 48.14% at 30 days and 48.94% at 60 days, followed by T₈ (48.36%) and T₉ (47.34%). The lowest values were consistently observed in T₄, with 38.37% at 60 days. Overall, fruit bars fortified with skimmed milk powder maintained higher reducing sugar levels than those supplemented with defatted soy flour. The gradual increase in reducing sugars during storage is likely due to the hydrolysis of polysaccharides into monosaccharides and the conversion of non-reducing sugars into reducing sugars. These results are consistent with previous studies on papaya toffee and leather (Attri *et al.*, 2014) [14] and fortified mango bars (Parekh *et al.*, 2014) [21].

Total Sugars (%)

The total sugar content of fortified papaya-guava fruit bars differed significantly among treatments at 0, 30, and 60 days of storage (Fig.3.). At 0 days, the highest total sugars (74.45%) were recorded in T₈ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 8% skimmed milk

powder), which was statistically comparable to T₇ (73.34%). The lowest total sugars (64.32%) were observed in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour).

During storage, T₈ consistently maintained the highest total sugar content, recording 73.32% at 30 days and 72.61% at 60 days, comparable to T₇ (71.54% at 60 days). The lowest values were consistently observed in T₂ (50% papaya pulp + 50% guava pulp, cv. Lalit), with 63.27% at 30 days and 61.15% at 60 days. The higher sugar content in bars fortified with skimmed milk powder is attributed to its naturally high carbohydrate content. A slight decrease in total sugars during storage may result from acid-catalyzed hydrolysis, converting some sugars into monosaccharides. These findings are consistent with previous reports on papaya toffee and papaya leather (Attri *et al.*, 2014) [14] and wild apricot fruit bars (Sharma *et al.*, 2013) [17].

Ascorbic Acid (mg/100 g)

Significant differences were observed among treatments for ascorbic acid content in fortified papaya-guava fruit bars at 0, 30, and 60 days of storage Fig. 4. At 0 days, the highest ascorbic acid content (133.70 mg/100 g) was recorded in T₁₀ (50% papaya pulp + 50% guava pulp, cv. Lalit + 8% skimmed milk powder), followed by T₉ (131.80 mg/100 g), T₂ (127.32 mg/100 g), T₈ (120.40 mg/100 g), and T₇ (118.90 mg/100 g). The lowest content (103.50 mg/100 g) was observed in T₄ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 5% defatted soy flour).

After 30 days of storage, T₁₀ retained the highest ascorbic acid (129.50 mg/100 g), followed by T₉ (121.10 mg/100 g), while T₄ recorded the lowest value (93.60 mg/100 g). At 60 days, T₉ exhibited the highest ascorbic acid content (108.40 mg/100 g), followed by T₂ (107.32 mg/100 g), whereas the lowest level (81.70 mg/100 g) was observed in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour).

Fruit bars fortified with skimmed milk powder consistently retained higher ascorbic acid content, likely due to the protective effect of the protein matrix [22]. The gradual decline in ascorbic acid during storage is attributed to its oxidation to dehydroascorbic acid, subsequent conversion to 2,3-diketogluconic acid, and eventual formation of furfural compounds, which contribute to browning. These findings are consistent with previous reports on sapota-papaya bars (Sreemathi *et al.*, 2008) [10], guava nectar (Karanjalkar *et al.*, 2013), and wood apple fruit bars (Vidhya & Narain, 2011) [20].

Total Carotenoids (µg/100 g)

Significant differences were observed among treatments for total carotenoid content in fortified papaya-guava fruit bars at 0, 30, and 60 days of storage Fig. 4. At 0 days, the highest carotenoid content was recorded in T₁ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda) at 1340 µg/100 g, while T₃ (1335 µg/100 g), T₄ (1333 µg/100 g), T₇ (1334 µg/100 g), and T₈ (1332 µg/100 g) were statistically comparable. The lowest carotenoid content at 0 days was observed in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour) and T₁₀ (50% papaya pulp + 50% guava pulp, cv. Lalit + 8% skimmed milk powder), both recording 1212 µg/100 g.

During storage, T₁ maintained the highest carotenoid levels, recording 1195 µg/100 g at 30 days and 1030 µg/100 g at 60

days. The lowest carotenoid content was observed in T₂ (50% papaya pulp + 50% guava pulp, cv. Lalit), with 1006 µg/100 g at 30 days and 849 µg/100 g at 60 days. A gradual decline in carotenoid content was evident in all treatments during storage, likely due to the thermolabile and photosensitive nature of carotenoids. These results align with previous findings on papaya toffee and leather (Attri *et al.*, 2014)^[14] and sea buckthorn leather (Kaushal *et al.*, 2013)^[26].

Protein (%)

Significant differences were observed among treatments for protein content in fortified papaya-guava fruit bars at 0, 30, and 60 days of storage (Fig 5.) At 0 days, the highest protein content (2.10%) was recorded in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour), which was statistically comparable to T₃ (2.01%), T₄ (2.04%), and T₅ (2.08%). The lowest protein content at 0 days (0.96%) was observed in T₁ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda).

During storage, the highest protein content at 30 days was observed in T₅ (1.97%), while the lowest was recorded in T₂ (0.83%). At 60 days, T₄ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 5% defatted soy flour) maintained the highest protein content (1.82%), comparable to T₃, T₅, and T₆. The lowest protein content at 60 days (0.69%) was recorded in T₁.

The decline in protein content during storage is likely due to protein degradation and Maillard-type reactions between sugars and amino acids. The incorporation of defatted soy flour effectively enhanced the protein content of the fruit bars, corroborating previous findings on protein-enriched fruit products. The higher protein content observed in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour) can be attributed to the incorporation of defatted soy flour, which is naturally rich in protein. The gradual decline in protein content during storage is likely due to its participation in Maillard browning reactions, leading to protein-sugar interactions and reduced measurable protein levels (Anju *et al.*, 2014)^[15]. These findings are consistent with previous reports on protein-enriched apricot products (Thakur & Neena, 1997)^[27] and sea buckthorn leather (Kaushal *et al.*, 2013)^[26].

Sensory Evaluation of Fortified Papaya-Guava Fruit Bars

Colour and Appearance

The evaluation of colour and appearance in fortified papaya-guava fruit bars indicated no significant differences among treatments at 0 and 30 days of storage. However, significant differences were observed at 60 days. (Table 1). The highest scores for colour and appearance were recorded in T₇ (60% papaya pulp + 40% guava pulp, cv. Allahabad Safeda + 6% skimmed milk powder), with 8.90, 8.85, and 8.75 at 0, 30, and 60 days, respectively, statistically comparable to T₂ and T₈. The lowest scores were observed in T₆ (50% papaya pulp + 50% guava pulp, cv. Lalit + 5% defatted soy flour), with 8.35, 8.15, and 8.00 at the respective intervals. The gradual decline in colour and appearance scores during storage may be attributed to Maillard reactions, enzymatic browning, and polymerization of anthocyanins with other phenolic compounds. These findings align with previous

reports on guava leather (Safdar *et al.*, 2014)^[13], wood apple fruit bars (Bhatt & Jha, 2015)^[29], and papaya toffee and leather (Attri *et al.*, 2014)^[14].

Texture

Texture scores varied significantly among treatments, with T₇ achieving the highest values (8.85 at 0 days, declining slightly to 8.75 at 60 days), comparable to T₁, T₂, T₈, and T₁₀. The lowest scores were recorded in T₅ (50% papaya pulp + 50% guava pulp, cv. Lalit + 4% defatted soy flour) at all storage intervals (Table 1). The improved texture in skimmed milk powder-fortified bars is likely due to its functional properties, whereas defatted soy flour contributed to a firmer and less desirable texture. A gradual decline in texture scores over storage is attributed to moisture absorption and minor structural changes in the fruit matrix. These results are consistent with observations in peach-soy fruit leather (Anju *et al.*, 2014)^[15] and papaya toffee and leather (Attri *et al.*, 2014)^[14].

Flavour

Significant differences were observed among treatments for flavour at 0, 30, and 60 days. At 0 days, T₇ exhibited the highest flavour score (8.95), followed by T₁ and T₉, which were statistically comparable. The lowest score was observed in T₆ (8.25) (Table 2). At 30 and 60 days, T₇ maintained the highest flavour scores (8.90 and 8.80), comparable to T₁, T₂, and T₉, while T₆ recorded the lowest (8.15 and 8.00, respectively). The decline in flavour over storage is likely due to chemical changes and loss of volatile compounds, consistent with previous findings on papaya toffee and leather (Attri *et al.*, 2014)^[14] and wood apple bars (Bhatt & Jha, 2015)^[29].

Taste

Taste scores showed significant variation among treatments at all storage intervals. T₇ consistently recorded the highest scores (8.85 at 0 days; 8.80 at 30 days; 8.75 at 60 days), comparable to T₁, T₂, T₅, T₉, and T₁₀, whereas the lowest scores were observed in T₆ (8.21 at 0 days; 8.10 at 30 days; 8.05 at 60 days) (Table 2). The gradual decline in taste during storage may be attributed to fluctuations in acidity, pH, and sugar-acid ratio, corroborating reports on papaya toffee and leather (Attri *et al.*, 2014)^[14] and fortified mango bars (Parekh *et al.*, 2014)^[21].

Overall Acceptability

At 0 and 30 days, no significant differences were observed in overall acceptability among treatments; however, significant differences appeared at 60 days. T₇ achieved the highest scores (8.88 and 8.83 at 0 and 30 days; 8.76 at 60 days), comparable to T₁ and T₂, while the lowest scores were recorded in T₄ (8.38 and 8.22 at 0 and 30 days) and T₅ at 60 days (Fig: 6). The superior acceptability of T₇ is attributed to the balanced pulp blend and the incorporation of skimmed milk powder, which enhanced texture, flavour, and colour. The slight decline over storage may be due to compositional changes and loss of colour and flavour. These findings are consistent with previous studies on guava fruit bars (Vijayanand *et al.*, 2000)^[30], aonla dehydrated products (Singh *et al.*, 2006)^[31], and papaya toffee and leather (Attri *et al.*, 2014)^[14].

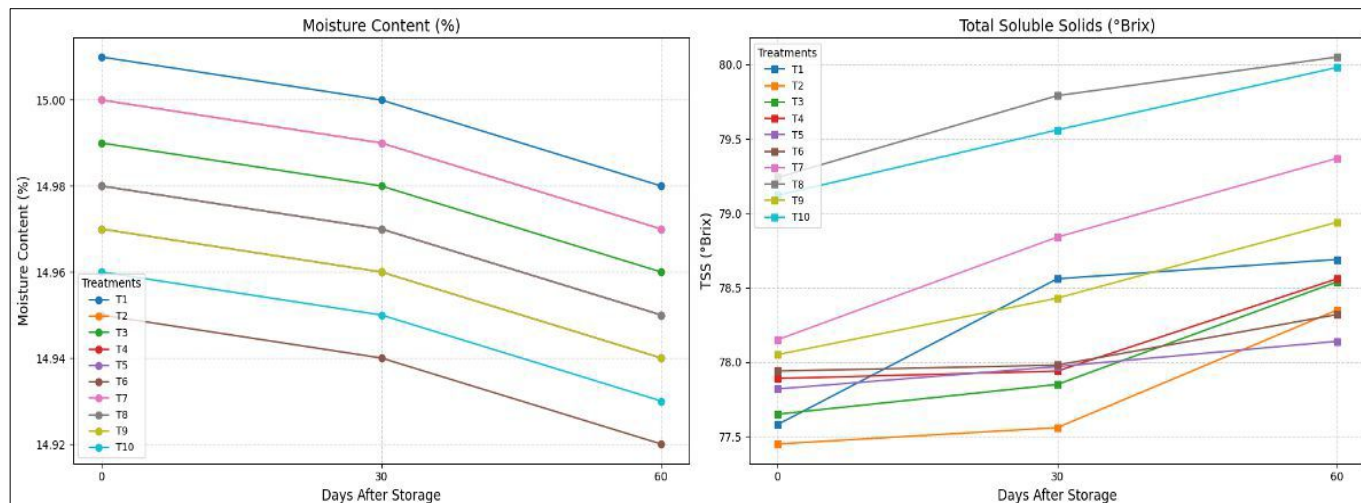


Fig 1: Influence of fortification with different concentrations of skimmed milk powder, deffated soya flour of papaya guava fruit bar at different days of storage on moisture content and total soluble solids

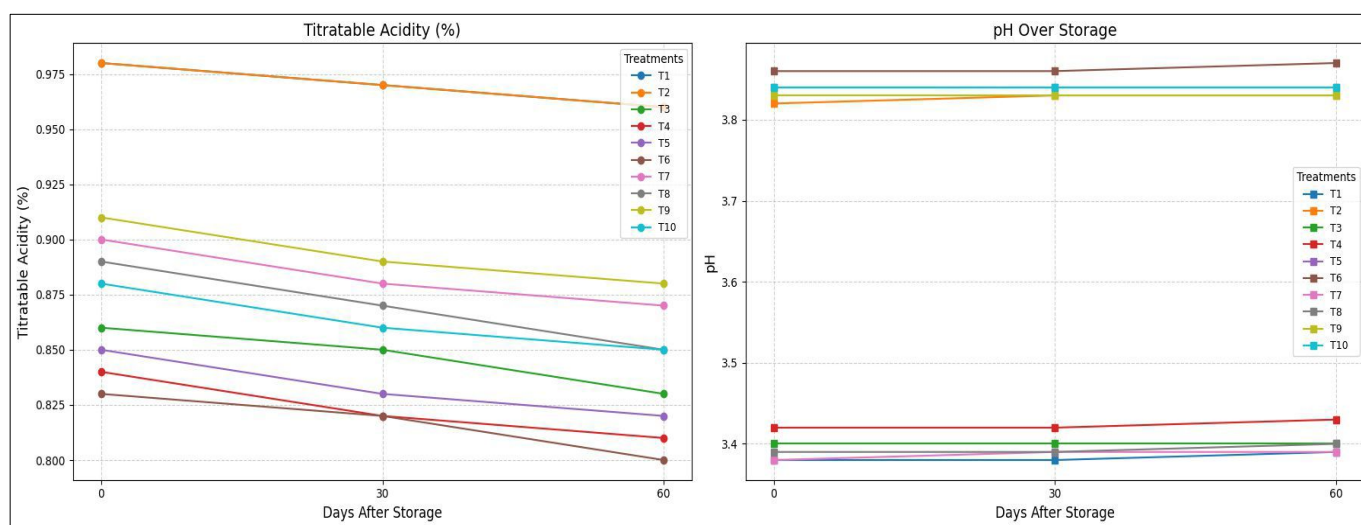


Fig 2: Influence of fortification with different concentrations of skimmed milk powder, deffated soya flour of papaya guava fruit bar at different days of storage on titrable acidity and pH

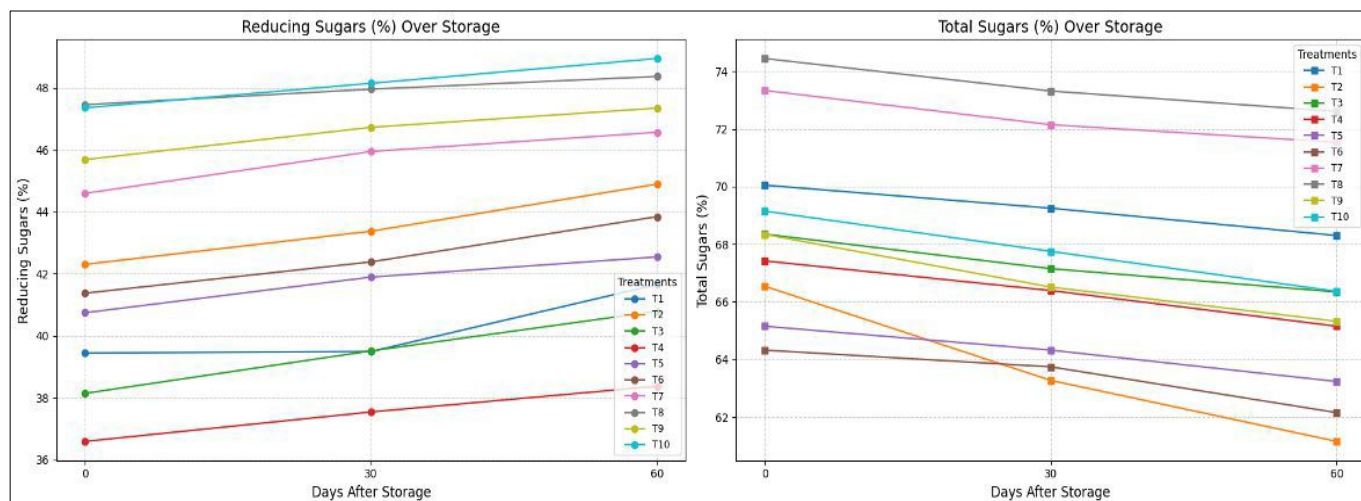


Fig 3: Influence of fortification with different concentrations of skimmed milk powder, deffated soya flour of papaya guava fruit bar at different days of storage on reducing sugars and total sugars

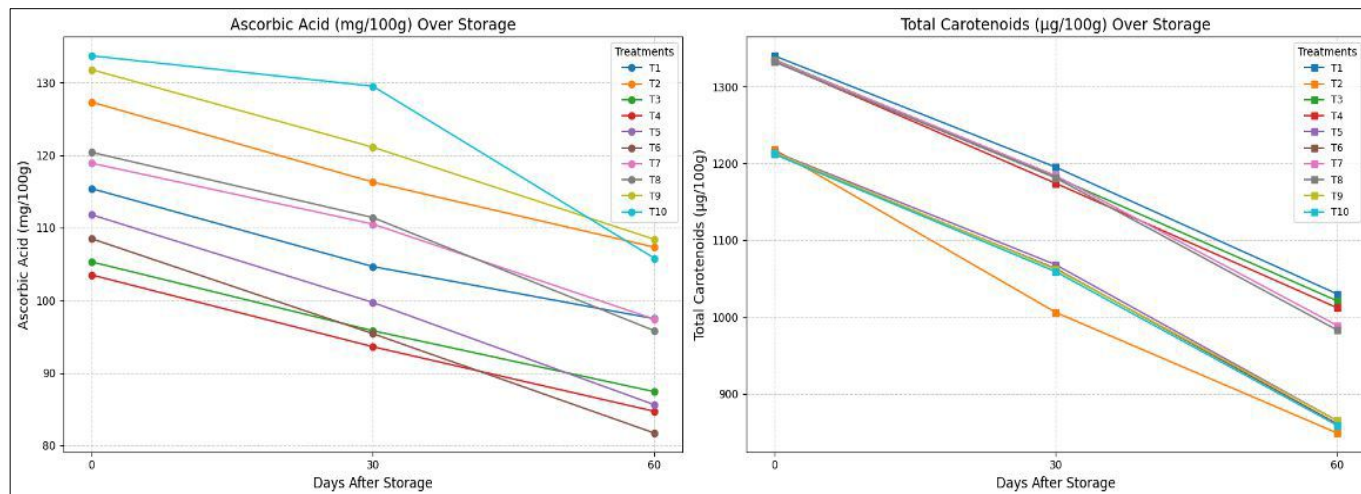


Fig 4: Influence of fortification with different concentrations of skimmed milk powder, defatted soya flour of papaya guava fruit bar at different days of storage on ascorbic acid and total carotenoids

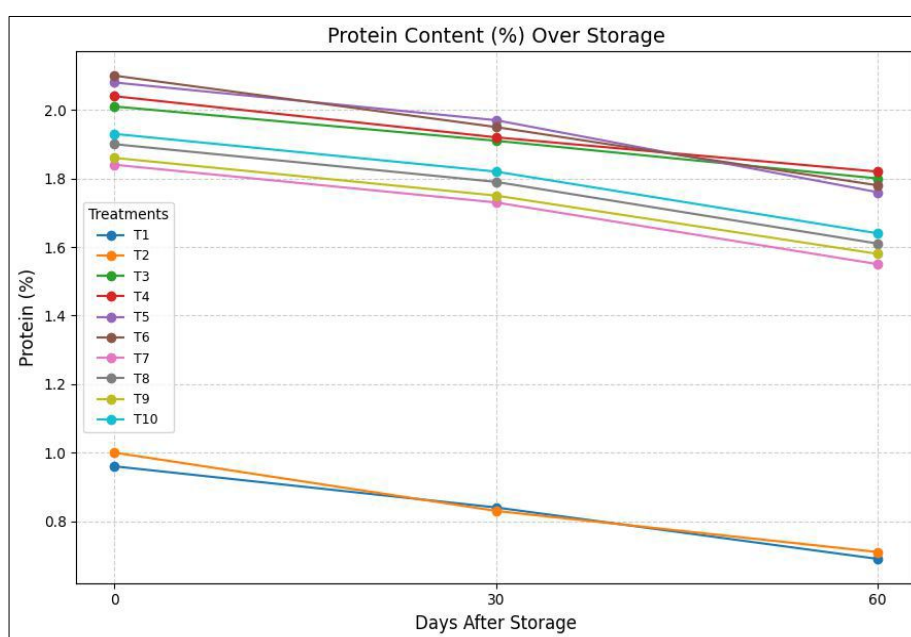
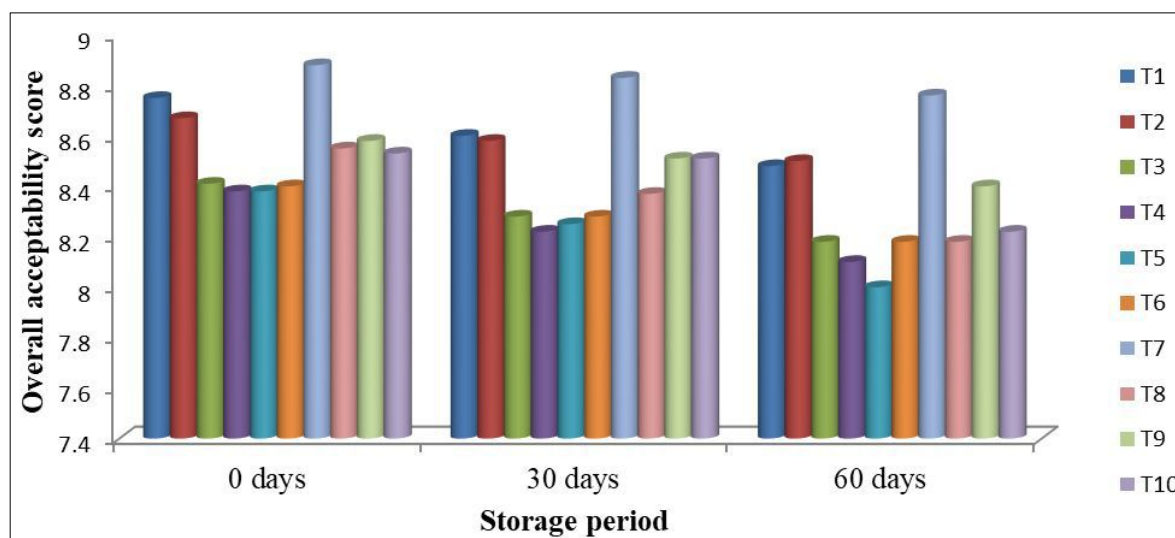


Fig 5: Influence of fortification with different concentrations of skimmed milk powder, defatted soya flour of papaya guava fruit bar at different days of storage on protein content



AS-Allahabad Safeda, L-Lalit, DSF-Defatted Soya Flour, SMP-Skimmed Milk Powder

Fig 6: Influence of fortification with different concentrations of skimmed milk powder, defatted soya flour of papaya-guava fruit bar at different days of storage on overall acceptability score

Table 1: Influence of fortification with different concentrations of skimmed milk powder, defatted soya flour of papaya guava fruit bar at different days of storage on colour and appearance score and texture score

Treatments		Colour and appearance score			Texture score		
		Days after storage			Days after storage		
		0	30	60	0	30	60
T ₁	60% papaya pulp + 40% guava pulp (AS)	8.70	8.40	8.25	8.75	8.70	8.60
T ₂	50% papaya pulp + 50% guava pulp (L)	8.85	8.75	8.65	8.65	8.55	8.45
T ₃	60% papaya pulp and 40% guava pulp (AS) + 4% DSF	8.50	8.40	8.30	8.40	8.25	8.15
T ₄	60% papaya pulp and 40% guava pulp (AS) + 5% DSF	8.40	8.25	8.15	8.45	8.30	8.15
T ₅	50% papaya pulp and 50% guava pulp (L) + 4% DSF	8.45	8.30	8.10	8.35	8.25	8.00
T ₆	50% papaya pulp and 50% guava pulp (L) + 5% DSF	8.35	8.15	8.00	8.50	8.35	8.10
T ₇	60% papaya pulp and 40% guava pulp (AS) + 6% SMP	8.90	8.85	8.75	8.85	8.80	8.75
T ₈	60% papaya pulp and 40% guava pulp (AS) + 8% SMP	8.65	8.50	8.45	8.80	8.75	8.70
T ₉	50% papaya pulp and 50% guava pulp (L) + 6% SMP	8.50	8.45	8.30	8.50	8.35	8.15
T ₁₀	50% papaya pulp and 50% guava pulp (L) + 8% SMP	8.60	8.40	8.20	8.70	8.65	8.60
SEM ±		0.14	0.14	0.14	0.14	0.14	0.14
C D 5%		NS	NS	0.41	NS	NS	0.41

AS-Allahabad Safeda, L-Lalit, DSF-Defatted Soya Flour, SMP-Skimmed Milk Powder

Table 2: Influence of fortification with different concentrations of skimmed milk powder, defatted soya flour of papaya guava fruit bar at different days of storage on flavour and taste score

Treatments		Flavour score			Taste score		
		Days after storage			Days after storage		
		0	30	60	0	30	60
T ₁	60% papaya pulp + 40% guava pulp (AS)	8.90	8.80	8.70	8.65	8.50	8.40
T ₂	50% papaya pulp + 50% guava pulp (L)	8.60	8.55	8.50	8.60	8.50	8.45
T ₃	60% papaya pulp and 40% guava pulp (AS) + 4% DSF	8.45	8.30	8.15	8.30	8.20	8.15
T ₄	60% papaya pulp and 40% guava pulp (AS) + 5% DSF	8.40	8.20	8.00	8.28	8.15	8.10
T ₅	50% papaya pulp and 50% guava pulp (L) + 4% DSF	8.35	8.20	8.05	8.40	8.25	8.15
T ₆	50% papaya pulp and 50% guava pulp (L) + 5% DSF	8.25	8.15	8.00	8.21	8.10	8.05
T ₇	60% papaya pulp and 40% guava pulp (AS) + 6% SMP	8.95	8.90	8.80	8.85	8.80	8.75
T ₈	60% papaya pulp and 40% guava pulp (AS) + 8% SMP	8.50	8.30	8.10	8.55	8.35	8.10
T ₉	50% papaya pulp and 50% guava pulp (L) + 6% SMP	8.65	8.60	8.55	8.70	8.65	8.60
T ₁₀	50% papaya pulp and 50% guava pulp (L) + 8% SMP	8.40	8.20	8.00	8.45	8.35	8.10
SEM ±		0.14	0.14	0.14	0.12	0.13	0.14
C D 5%		0.42	0.42	0.41	0.34	0.37	0.41

AS-Allahabad Safeda, L-Lalit, DSF-Defatted Soya Flour, SMP-Skimmed Milk Powder

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