Original Research Article

Preparation of Fruit Leather by Blending Guava and Papaya

Abstract

The present experiment entitled "Preparation of Fruit Leather by Blending Guava and Papaya" was carried out in post-harvest lab, Department of Horticulture, Sam Higginbottom university of Agriculture Technology and sciences, during the winter season 2021-2022.The experiment was laid out in CRD (Completely Randomized Design) with 7 treatments and 3 replications. Physico - chemical parameters such as moisture content, acidity, TSS, ascorbic acid, total sugar, pH as well as organoleptic attribute colour, flavour, taste and overall acceptability of guava and papaya leather were evaluated 0 days to 90 days of storage. An overall result of guava and papaya leather was found best in the treatment T_3 (guava 60 % + papaya 40 %) proved to be best in terms of all aspects.

Key words: Fruit leather, Blending, Guava, Papaya.

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 sub tropics. It was originated from Mexico. It is the fifth most important fruit crop in India after mango, banana ,citrus and guava India is the largest producer of papaya in the world .These fruits are excellent source of vitamin A and also rich source of other vitamins like thiamine ,riboflavin , nicotinic acid (Jain *et al.,* 2011) Presently, farmers are much interested in cultivation of papaya due to ease and convenient in its raising and the crop is of short duration .Though production technology of papaya is known and farmers are harvesting higher fruit yield .The main problem lies is its post-harvest handling and marketing. Papaya fruits are used for table purpose, good products like sauce, squash, bar, pickle, etc. are prepared. Fruits are also used in preparation of jam, tutty fruity, soft drinks, ice-cream, flavouring crystallised fruits and in syrup.

In recent years, guava cultivation has become popular due to increasing international trade, nutritional value and value added products. Guava the poor man's apple is one of the most common fruit. guava has well established markets in more than 60 countries. 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) Fruit leather or bar or slab is self-stable confectionary, dehydrated product with soft gel like texture. It has a long shelf life and does not require refrigeration. It can be prepared from fresh pulp, frozen pulp or canned fruit. It is made by drying a very thin layer of fruit puree and other ingredients in dehydrator, cabinet drier in the form of leathery sheet (Andress and Harrison,1999). natural fruit pulp based fruit bars are more tasty and nutritious since substantial quantity of dietary fibers, minerals, vitamins and other phytochemicals are

present. Fruit leathers add value to fruit which may otherwise not acceptable for the fresh produce market.

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). 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) Further, the good availability of both fruit almost throughout the year is another factor. Hence, an experiment to standardise nutritionally rich and tasty blended fruit leather from both fruits were carried out.

2.Materials and Methods

The present investigation was carried out in Post - Harvest lab. Department of Horticulture, prayagraj .

2.1 Procurement of raw material

Guava Allahabad safeda and papaya Taiwan red lady was procured from the local market prayagraj (U.P).Fully ripe fresh fruits uniform in size and shape, free from transportation injuries, insect damage and diseases which are uniformly ripened were selected. Other ingredients like sugar, citric acid were brought from local shops in prayagraj.

2.2 Preparation of guava and papaya pulp

Guava and Papaya fruits were washed properly with running tap water to remove any foreign matter. Guava fruits were peeled then repeatedly washed using tap water while papaya fruits were hand peeled. To prevent browning, ascorbic acid (mg/100g) was added to guava pulp. Both peeled fruits were cut into small pieces and pulped using a mixer. Pulp was then passed through a fine sieve to obtain a fine pulp separately. The pulp from both guava and papaya fruits were mixed at seven different ratio of T_1- 100:0, T_2 - 80:20, T_3 - 60:40, T_4 - 50:50, T_5 - 40:60, T_6-20:80 and T_7- 0:100 respectively. The total soluble solids were adjusted to 20º Brix, 0.25% acidity and 250grams sugar used. Preservative as KMS (Potassium metabisulphite) @ 600 ppm was added in all the samples.

2.3 Drying, cutting, filling, packing

Different treatment of mixed pulp of 1kg was spread on stainless steel drier trays in the form of a sheet at the rate of 250g/sq. ft The tray was then kept for drying in a dehydrator at 55 ± 50º C till a moisture content of 15% (approx.).The dried sheets of fruit leather were weighted and cut into rectangular slabs of dimension 3×0.5 cm and kept for equalization in air tight plastic boxes overnight .packaging material used was punnet boxes. Data regarding the quality of fruit bars were recorded. Fresh pulp and blended dehydrated leathers were analyzed for various physical and biochemical constituents as per methods described by A.O.A.C (1995) Total soluble solids we covered using hand Refractrometer (Erma,Japan),organoleptic quality evaluation of blended guava and papaya fruit leather was done by a panel of skilled judges by adopting a hedonic rating system having 100 points with various sub-scores as colour texture and flavour. The experiment was laid out in completely randomized design comprising of 3 replications. The mean values were evaluated by critical difference (CD) test at 5% level of significance by using ANOVA.

Chart 1 : Treatment combinations

Treatment	Treatment combinations
T_1	**100% (Guava)**
T_2	**80:20 (Guava – Papaya)**
T_3	**60:40 (Guava – Papaya)**
T_4	**50:50 (Guava – Papaya)**
T_5	**20:80 (Guava – Papaya)**
T_6	**40:60 (Guava – Papaya)**
T_7	**100% (Papaya)**

Physico - chemical analysis and organoleptic evaluation of guava and papaya fruit leather was laid out in 0,30,60 and 90 days of interval. Three samples per treatment were subjected to physic-chemical analysis. The parameters such as TSS, pH, total sugars, titrable acidity, ascorbic acid and overall acceptability were analyzed by the methods suggested by Ranganna (1986). Moisture content was determined on fresh weight basis (Saini, 2001).

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).

3. Results and Discussion

3.1 Moisture content (%)

The highest moisture content (16.82%) in fruit bar at 0 days of storage was recorded in T_1 (with 100% guava pulp). The lowest moisture content (%) was recorded in fruit bar T_7 (14.46 with 100 percent papaya pulp) at 0 days of storage furnished in Table 2. At 30 days of storage, highest moisture content (16.64%) was recorded in fruit bar with 100 percent guava pulp (T_1) and the lowest moisture content (14.25%) with 100 percent papaya pulp (T_7). The moisture content recorded were maximum (16.46%) at 60 days of storage in fruit bar with 100 percent guava pulp (T_1), whereas minimum (14.02%) in fruit bar with 100 percent papaya pulp (T_7). The moisture content recorded were maximum (16.18%) at 90 days of storage with 100 per cent guava pulp (T_1), whereas minimum (13.87%) in fruit bar with 100 percent papaya pulp (T_7). 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 1) There was a slight decrease in moisture content may be due to evaporation of water from bar during storage (Bhatt and Jha, 2015).

3.2 Titrable acidity (%)

The highest titrable acidity 1.06% was recorded in fruit bar with 100 per cent guava pulp (T_1) and low 0.62% in 60 percent guava pulp+ 40 percent papaya pulp (T_3) at 0 day of storage. The highest titrable acidity 1.01% was recorded in fruit bar with 100 percent guava pulp (T_1) and (0.66%) in 60 percent guava pulp+ 40 percent papaya pulp (T_3) at 30 days of storage, lowest titrable acidity. The highest titrable acidity 1.13% was recorded in fruit bar with 100 percent guava pulp (T_1) and 0.67% in 60 percent guava pulp+ 40 percent papaya pulp (T_3) at 60 days of storage, lowest titrable acidity. The highest titrable acidity (1.15%) was recorded in fruit bar with 100 percent guava pulp (T_1) and (0.75%) in 60 percent guava pulp+ 40 percent papaya pulp (T_3) at 90 days of storage.

3.3 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 76.55°Brix was recorded in fruit bar with 60 per cent guava pulp + 40 percent papaya pulp (T_3) and low in 71.66°Brix in 100 percent guava pulp (T_1) at 0 day of storage. At 30 days of storage the highest total soluble solids was recorded in fruit bar prepared with 60 percent guava pulp + 40 percent papaya pulp (T_3) was maximum (76.88 °Brix) and low in 71.86°Brix in 100 percent guava pulp (T_1) at 30 days of storage.At 60 days of storage the highest total soluble solids was recorded in fruit bar prepared with 60 percent guava pulp + 40 percent papaya pulp (T_3) was maximum (77.25 °Brix) and low in (72.30 °Brix) in 100 percent guava pulp (T_1) at 60 days of storage. At 90 days of storage the highest total soluble solids was recorded in fruit bar prepared with 60 per cent guava pulp + 40 percent papaya pulp (T_3) was maximum (77.66 °Brix) and low in

72.76°Brix in 100 percent guava pulp (T_1) at 90 days of storage (table 1). TSS content during storage corroborates with the investigations on guava leather by Sandhu *et al.,* (2001), blending ratios of papaya and guava pulp by Jain *et al.,* (2011) and guava jelly bar by Kuchi *et al*., (2014).

3.4 Ascorbic acid (mg/100mg)

At 0 day of storage, the highest ascorbic acid content (114.89 mg/ 100 g) was recorded in fruit bar (T_1). In contrast, the lowest ascorbic acid content 109.56 mg/100g was recorded in fruit bar with 100 percent papaya pulp (T_7) at 0 day of storage the highest ascorbic acid content (113.49mg/ 100 g) was recorded in fruit bar with 100 percent guava pulp (T_1). In contrast, the lowest ascorbic acid content 107.68 mg/100g was recorded in fruit bar with 100 percent papaya pulp (T_7) at 30 days of storage. the highest ascorbic acid content (112.94 mg/ 100 g) was recorded in fruit bar with 100 percent guava pulp (T_1). In contrast, the lowest ascorbic acid content 107.68 mg/100g was recorded in fruit bar with 100 percent papaya pulp (T_1) at 60 days of storage. the highest ascorbic acid content (111.49 mg/ 100 g) was recorded in fruit bar with 100 percent guava pulp (T_1). In contrast, the lowest ascorbic acid content 106.59 mg/100g was recorded in fruit bar with 100 percent papaya pulp (T_7) at 90 days of storage .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).There was a gradual decrease in the ascorbic content of papaya guava fruit bar with advancement of storage period .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).The results of decrease in ascorbic acid was also in conformity with report on guava nectar by Karanjalker *et al.*,(2013).

3.5 Total sugars (%)

Total sugars in fruit bar made with different blending ratios of papaya and guava pulp at 0, 30 and 60,90 days of storage. among the treatments, the highest total sugars of 58.37 per cent was recorded in fruit bar made by 60 percent guava pulp + 40 percent papaya pulp (T_3) . In contrast, the lowest total sugar percent of 57.39 was recorded in fruit bar made by 100 percent guava pulp (T_1) at 0 days of storage. At 30 days of storage, highest percent of total sugars (58.29%) recorded in fruit bar made with by 60 percent guava pulp + 40 percent papaya pulp (T_3) and lowest (57.34%) was recorded with 100 percent guava pulp. The total sugars recorded were maximum (58.19%) at 60 days of storage in fruit bar with by 60 per cent guava pulp + 40 percent papaya pulp (T_3).AT 90 days the highest total sugars of 56.84 percent was recorded in fruit bar made by 60 percent guava pulp + 40 percent papaya pulp (T_3). In contrast, the lowest total sugar per cent of 56.84 was recorded in fruit bar made by 100 percent guava pulp (T_1) at 90 days of storage. The slight decrease in total sugars per cent

of the fruit bar samples were noted throughout the storage period (table 2). The slight decrease in total sugars per cent during storage might be due to of inversion of sugars to monosaccharide by acid hydrolysis (Murali krishna *et al.,*1969) These results are in conformity with the findings on apricot fruit bar by Sharma *et al*., (2013) and papaya toffee and papaya leather by Attri *et al.,*(2014).Ascorbic acid (mg/100g) There were significant differences among treatments for the ascorbic acid mg/100 g in papaya guava fruit bar at 0, 30 and 60 ,90 days of storage.

3.6 pH

There were significant differences among treatments for pH in papaya guava fruit bar at 0, 30 and 60 ,90 days of storage. Among the treatments highest pH of 4.68 was recorded in fruit bar with 60 percent guava pulp + 40 per cent papaya pulp (T_3), the lowest pH of 3.18 was recorded in fruit bar with 40 percent guava pulp + 60 percent papaya pulp (T_6) at 0 days of storage. At 30 days highest pH of 4.58 was recorded in fruit bar with 60 percent guava pulp + 40 percent papaya pulp (T_3), the lowest pH of 3.12 was recorded in fruit bar with 40 percent guava pulp + 60 percent papaya pulp (T_6) at 30days of storage. At 60 days highest pH of 4.48 was recorded in fruit bar with 60 percent guava pulp + 40 percent papaya pulp (T_3), the lowest pH of 3.08 was recorded in fruit bar with 40 percent guava pulp + 60 percent papaya pulp (T_6) at 60days of storage. At 90 days highest pH of 4.38 was recorded in fruit bar with 60 percent guava pulp + 40 percent papaya pulp (T_3), the lowest pH of 3.02 was recorded in fruit bar with 40 percent guava pulp + 60 percent papaya pulp(T_6) at 90 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) parallel results were obtained on mango pulp by Durrani *et al.,* (2010) and wood apple bar by Vidhya and Narain (2011).

3.7 Overall acceptability

Overall acceptability score (out of 9 points) of guava and papaya based fruit bar influenced by various treatments during the storage period. It is seen from the table 3 and figure that score for overall acceptability parameter had decreased with the increasing storage period. Overall acceptability score had decreased with the advancement of storage period. At initial stage, significantly higher overall acceptability score was obtained in treatment T_3 (60:40 guava : papaya) respectively .whereas, significantly lower overall acceptability score was obtained in treatment T_1 (100:0 guava: papaya).

4.Conclusion

According to the sensory evaluation guava and papaya fruit leather, the treatment (T_3) with (60 percent guava pulp + 40 percent papaya pulp) noticed as best blending ratio and during storage period T_3 have all the desirable qualities and having most overall acceptability

throughout the storage period. The best value added product is (T_3) (60 percent guava pulp + 40 percent papaya pulp).

Table 1.Influence of different blending ratios of guava and papaya fruit leather on moisture content (%),acidity (%), total soluble solids (˚Brix) at different storage days.

Treatments	Moisture content (%)				Acidity (%)				TSS(˚Brix)			
	Days after storage				Days after storage				Days after storage			
	0	30	60	90	0	30	60	90	0	30	60	90
T_1	16.82	16.64	16.46	16.18	1.06	1.11	1.13	1.15	71.66	71.86	72.30	72.76
T_2	15.89	15.67	15.45	15.21	0.70	0.75	0.76	0.83	75.81	76.22	76.61	76.98
T_3	15.57	15.56	15.32	15.14	0.62	0.66	0.67	0.75	76.55	76.88	77.25	77.66
T_4	15.69	15.47	15.25	15.01	0.92	0.92	0.95	0.97	75.41	75.86	76.46	76.93
T_5	15.00	14.99	14.97	14.95	0.88	0.93	0.96	0.98	75.28	75.64	75.97	76.37
T_6	14.59	14.38	14.12	13.89	0.91	0.94	0.99	1.02	74.36	74.65	75.18	75.66
T_7	14.46	14.25	14.02	13.87	0.82	0.77	0.82	0.86	73.58	73.95	74.33	74.72
Result	S	S	S	S	S	S	S	S	S	S	S	S
S. Ed $\pm$	0.034	0.023	0.020	0.056	0.016	0.021	0.018	0.022	0.538	0.514	0.527	0.559
CD@5%	0.073	0.049	0.043	0.040	0.035	0.045	0.040	0.047	1.166	1.113	1.142	1.211

Table 2. .Influence of different blending ratios of guava and papaya fruit leather on Ascorbic acid(mg /100g), Total sugar (%),PH during storage

Treatments	Ascorbic acid (mg /100g)				Total sugar (%)				PH			
	Days after storage				Days after storage				Days after storage			
	0	30	60	90	0	30	60	90	0	30	60	90
T_1	114.89	113.49	112.94	111.49	57.39	57.34	56.22	56.84	3.72	3.66	3.58	3.51
T_2	112.56	111.64	110.59	109.64	58.19	58.12	58.01	57.65	4.26	4.17	4.05	3.96
T_3	111.89	110.78	109.67	108.49	58.37	58.29	58.19	57.83	4.68	4.58	4.48	4.38
T_4	110.75	109.79	108.85	107.82	58.00	57.92	57.79	57.45	3.59	3.53	3.45	3.35
T_5	110.49	109.64	108.47	107.36	57.87	57.79	57.68	57.33	3.88	3.78	3.72	3.63
T_6	109.78	108.62	107.89	106.92	57.72	57.67	57.55	57.21	3.18	3.12	3.08	3.02
T_7	109.56	108.46	107.68	106.59	57.58	57.53	57.41	57.05	3.37	3.34	3.27	3.19
Result	S	S	S	S	S	S	S	S	S	S	S	S
S. Ed $\pm$	0.123	0.106	0.132	0.136	0.209	0.204	0.195	0.202	0.082	0.086	0.080	0.077
CD@5%	0.266	0.230	0.286	0.294	0.61	0.60	0.57	0.59	0.178	0.187	0.173	0.167

Table 3. Influence of different blending ratios of guava and papaya fruit leather on overall acceptability score at different days of storage.

Treatments	Overall Acceptability 0	Overall Acceptability 30	Overall Acceptability 60	Overall Acceptability 90
	Days after storage	Days after storage	Days after storage	Days after storage
T_1	6.58	6.47	6.32	6.24
T_2	8.34	8.20	8.10	7.92
T_3	8.72	8.62	8.52	8.34
T_4	7.44	7.30	7.20	7.06
T_5	7.71	7.58	7.50	7.36
T_6	7.64	7.54	7.44	7.31
T_7	6.84	6.76	6.67	6.49
Result	S	S	S	S
S. Ed $\pm$	0.170	0.154	0.145	0.118
CD@5%	0.369	0.334	0.315	0.256

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