



Research Article

EVALUATION OF DIFFERENT TREATMENT COMBINATION ON THE ORGANOLEPTIC ATTRIBUTES AND ECONOMICS OF GUAVA & PAPAYA LEATHER

SINGH RAJANI*, PANDEY C.S., JHADE R.K. AND PAL NAMITA

Department of Horticulture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, 482004 Madhya Pradesh, India

*Corresponding Author: Email- rajanis3886@gmail.com

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Abstract- The Present investigation was conducted with the objective to find out the suitable treatment combination of guava and papaya mixed fruit leather and its economic viability in market. Among the 18 treatment combinations, six pulp ratios of guava and papaya i.e. (80%, 70%, 60%, 50%, 40% and 30%) and three levels of sugar i.e. (15 gm, 30 gm, 45 gm per 100 gm) were used for preparation of mixed fruit leather. The organoleptic properties of the treatment combination were evaluated. The mixing of guava and papaya pulp in ratio of (80:20) with S2 (30 gm sugar/100 gm pulp) was recorded best. The organoleptic rating of mixed fruit leather showed that the values for flavor decreases while for colour, texture and overall acceptability increases with increase in sugar content. The economics of the treatments was calculated for 1 kg. of mixed fruit leather. The minimum cost was recorded with treatment combination T₁ (80%:20%, 15gm sugar/100gm) while the maximum cost was registered with treatment combination T₁₈ (30%:70%, 45gm sugar/100gm pulp). Different pulp ratio and level of sugar were the reason behind the cost difference. Highest B:C ratio was found in treatment combination T₄ (50%:50%, 15gm sugar/100gm pulp) whereas lowest B:C ratio was recorded with treatment combination T₁₅ (60%:40%, 45gm sugar/100gm pulp). Conclusively, it emerges that blending of papaya and guava pulp with different sugar level gave commercially acceptable product.

Keywords- Guava, Papaya, Mixed fruit leather, Pulp ratio, Colour, Flavour, Texture, Economy, B:C Ratio.

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Introduction

Guava (*Psidium guajava* L.) is most widely cultivated fruit crop with sweet aroma and a pleasant sour-sweet taste. Guava is member of Myrtaceae family and come in many varieties. The fruit is finest source of Vitamin C ranging from 70-350 mg/100g., pectin ranging from 0.52 to 2%, beta carotene and minerals like calcium, phosphorus, iron etc. The fruit contains substantial quantity of vitamin A, pantothenic acid, riboflavin, thiamin and niacin. It contains moisture (82%), protein (7%) and carbohydrate (11%) [11]. The fruit can be consumed cooked but mostly it is preferred to eat fresh. Papaya (*Carica papaya* L.) is another important and commercially cultivated fruit crop. It is very nutritious fruit with a pleasant sweet taste and flavor. Papaya occupies a key position among the fruits for vitamin A (2020 IU/100 gm), vitamin C, vitamin B, potassium, iron and fiber contents. It has a great application in the preparation of fruit salads and deserts. It is laxative, stimulates digestion and the production of bile which may lead to healthy liver and pancreas [2]. There has been a huge rise in the production rate of both fruits in last one decade. These fruits are produced every year in a considerable quantity and consumed locally, but rarely processed. Fruits exhibit relatively high metabolic activity thus highly perishable in nature. Hence, there is need to attempt multiplicity in commercial utilizations. There are many ways of processing fruits such as processing into juice, jams, jellies, dehydrated products and fruit leather. These value-added products have great possibilities for Indian as well as overseas markets. Though some work on preparation of fruit leather has been reported in the literature but very less work on blending of different fruits pulp has far been reported. Therefore, in the present study attempt was made to develop nutritious and palatable guava papaya mixed fruit leather.

Material and Methods

The freshly prepared guava and papaya pulp were used for preparation of mixed fruit leather. The experiment consisted of 18 treatment combinations, consisting of six levels of fruit pulp ratio (80%, 70%, 60%, 50%, 40%, 30%) and 3 levels of sugar concentration (15 gm, 30gm, 45 gm per 100 gm of pulp). Each recipe is homogenized in mixer for 1 minute. The sensory evaluation of Mixed fruit leather was carried out by a panel of 10 judges. The Mixed fruit leather of different combinations were evaluated for various sensory quality attributes like texture, colour, flavour, taste, and overall acceptability. Sensory method evaluation method was given [1] was adopted with a 9-point hedonic scale. The observations were recorded on the basis of texture, colour, flavour, taste, and overall acceptability of Mixed fruit leather as per hedonic rating given below:-

Like extremely	:	9
Like very much	:	8
Like moderately	:	7
Like slightly	:	6
Neither like nor dislike	:	5
Dislike	:	4
Dislike moderately	:	3
Dislike very much	:	2
Dislike extremely	:	1

The material, labour and other input cost was determined and cost of the product was calculated and economics of different combination of mixed fruit leather was compared.

Result and Discussion

The organoleptic attributes of guava and papaya mixed fruit leather were noted and presented in various tables. Sensory evaluation is usually the final guide of the quality from the consumer's point of view and it is an important parameter in determining the quality of mixed fruit leather.

Effect of different treatment combination on colour of mixed fruit leather

The data pertaining in [Table-1] shows that colour of mixed fruit leather was notably influenced by ratio of fruit. The highest colour rating value (8.66) was observed with P6 (30% guava + 70% papaya), whereas, lowest value (8.13) was observed with P1 (80% guava + 20% papaya). It appears that fruit leather having higher per cent of papaya pulp showed the better colour. Similarly, the data also revealed that colour of mixed fruit leather was improved with increase in quantity of sugar. S3 (45 gm sugar/100 gm pulp) received highest colour rating value of (8.63). There was a gradual decrease in colour rating value of mixed fruit leather with increase in storage period, affecting the attractiveness of leather. Similar

results were found by [4] who reported that colour of guava nectar deteriorated with increases in storage time. Similar results were found [7] with mango squash [10] also recited that in ber jam original colour disappeared at ambient temperature after 3 months of storage.

Effect of different treatment combination on flavour of mixed fruit leather

Data pertaining to evaluation of flavour have been given in [Table-2]. Data indicated that P1 (80% guava + 20% papaya) secured the highest score (8.73) While, the lowest score (7.93) was recorded with P6 (30% guava + 70% papaya). However, blending papaya with guava increased the score to an appreciable level. Further the significant effect of sugar level was also noticed on flavour rating value. S1 (15gm sugar) was found superior with flavour rating value of (8.38). The flavour of mixed fruit leather slightly decreased with increase in storage period under all treatment combination. Similar results were found by [9] with guava leather. [6] also reported a little downfall in each sensory parameter in case of blended papaya leather.

Table-1 Effect of different treatment combination on Colour of mixed fruit leather

Ratio of fruit pulp Factor A	0 days				40 days				80 days			
	Sugar (Factor B)			mean	Sugar (Factor B)			mean	Sugar (Factor B)			Mean
	S1	S2	S3		S1	S2	S3		S1	S2	S3	
P1	7.8	8.2	8.4	8.13	7.2	7.4	7.8	7.46	6.6	6.8	7.2	6.86
P2	7.8	8.2	8.4	8.13	7.4	7.6	7.8	7.60	7.0	7.2	7.4	7.20
P3	8.0	8.2	8.6	8.26	7.6	7.8	8	7.80	7.2	7.4	7.6	7.40
P4	8.2	8.4	8.6	8.4	7.6	8	8.2	7.93	7.2	7.6	7.8	7.53
P5	8.2	8.4	8.8	8.46	7.8	8	8.2	8.00	7.4	7.6	7.8	7.60
P6	8.4	8.6	9.0	8.66	7.8	8	8.4	8.06	7.4	7.6	8	7.66
MEAN	8.06	8.33	8.63		7.56	7.8	8.06		7.13	7.36	7.63	
Factor	A	B	AB		A	B	AB		A	B	AB	
SE _m ±	0.12	0.08	0.21		0.112	0.079	0.19		0.123	0.087	0.21	
CD at 5% level	0.344	0.24	NS		0.317	0.224	NS		0.348	0.246	NS	

Table-2 Effect of different treatment combination on Flavour of mixed fruit leather

Ratio of fruit pulp Factor A	0 days				40 days				80 days			
	Sugar (Factor B)			mean	Sugar (Factor B)			mean	Sugar (Factor B)			mean
	S1	S2	S3		S1	S2	S3		S1	S2	S3	
P1	9.00	8.60	8.60	8.73	8.40	8.20	8.00	8.20	7.60	7.40	7.20	7.40
P2	8.60	8.50	8.40	8.50	8.20	8.00	7.80	8.00	7.40	7.20	7.00	7.20
P3	8.40	8.20	8.20	8.27	8.00	7.80	7.60	7.80	7.20	7.00	6.80	7.00
P4	8.20	8.00	8.00	8.07	7.80	7.60	7.40	7.60	7.00	6.80	6.60	6.80
P5	8.10	8.00	7.80	7.97	7.60	7.40	7.20	7.40	6.80	6.60	6.60	6.67
P6	8.00	7.80	7.70	7.83	7.40	7.20	7.00	7.20	6.80	6.40	6.40	6.53
MEAN	8.38	8.18	8.12		7.90	7.70	7.50		7.13	6.90	6.77	
Factor	A	B	AB		A	B	AB		A	B	AB	
SE _m ±	0.1	0.07	0.18		0.11	0.08	0.19		0.11	0.08	0.20	
CD at 5% level	0.298	0.21	NS		0.32	0.22	NS		0.33	0.23	NS	

Effect of different treatment combination on texture of mixed fruit leather

The texture is one of the principal characteristic to assess the quality of mixed fruit leather. The variety of the fruit and consistency of the pulp affects the texture of leather. The data related to texture of mixed fruit leather presented in [Table-3] showed that the highest the texture rating values (8.46) was recorded for P1 (80% guava + 20% papaya). The data also revealed that the texture of leather was improved considerably with increased sugar content. Similar conclusions were drawn by Babalola, et al., (2002) [5] with jack fruit leather and [3] with pawpaw and guava leather. In addition to it, the higher quantity of sugar gave better texture of leather. This result is in conformity with result in guava and papaya leather [9].

Effect of different treatment combination on taste of mixed fruit leather

Taste is generally considered as the key characteristic to determine the acceptability of leather. The data regarding taste of leather have been presented in [Table-4]. The sensory evaluation indicated that P4 (50% guava + 50% papaya) was highly acceptable than all other fruit pulp ratio throughout the entire storage period. Highest score of 8.40 was recorded for P4 (50% guava + 50% papaya). Furthermore, S2 (30 gm sugar) gave highest score (8.43) for taste. It could be

seen that mixed fruit leather had a gradual loss in taste appraisal as days of storage were increased. It reported that blended leather was superior in most of the quality parameter [6]. This result was in conformity with [4] who found that taste reduced significantly with increased storage period.

Effect of different treatment combination on overall acceptability of mixed fruit leather

The data associated with overall acceptability have been given in [Table-5]. When the overall acceptability of mixed fruit leather was computed based on the scores of various qualities, P1 (50% guava + 50% papaya) showed the maximum acceptance by the judges with score of (8.47) followed by P4 (60% guava + 40% papaya) with score of (8.33). Further, it was noticed overall acceptability was significantly high with rating value of (8.33) in S2 (30 gm sugar). Similar results were found by Aravind, et al., (2013) [4] with guava nectar and by Cherian and Cherian, (2003) [8] with guava fruit bar. Corresponding with the storage changes in sensory parameters, there was a little down fall in overall acceptability with increase in storage period. Combined effect of pulp ratio and different quantity of sugar was found non significant throughout the storage period of 100 days. The

product was appreciated by evaluators as well as other consumers due to its novelty, superior quality, low cost technology and wide acceptability.

Effect of different treatment combination on Economy of mixed fruit leather

Indicated data regarding B:C ratio value of different treatments [Table-6]. The data presented in connection with economics of various treatment combination showed

that quantity of sugar contributed a major part on economics of guava papaya fruit leather. Recipes with higher sugar quantity have more cost price i.e., Less B:C ratio. In the same manner, all recipes containing higher papaya percentage showed less B:C value because of its market price was a bit more than of Guava's. Highest B:C ratio 2.98:1 was obtained with treatment T4 (50%:50%, 15gm sugar/100 gm pulp).

Table-3 Effect of different treatment combination on Texture of mixed fruit leather

Ratio of fruit pulp Factor A	0 days				40 days				80 days			
	Sugar (Factor B)			mean	Sugar (Factor B)			mean	Sugar (Factor B)			mean
	S1	S2	S3		S1	S2	S3		S1	S2	S3	
P1	8.20	8.40	8.80	8.47	8.00	8.20	8.30	8.17	7.60	7.80	8.00	7.80
P2	8.20	8.40	8.60	8.40	8.00	8.20	8.30	8.17	7.60	7.80	8.00	7.80
P3	8.20	8.40	8.60	8.40	7.80	8.00	8.20	8.00	7.40	7.60	7.80	7.60
P4	8.00	8.20	8.40	8.20	7.80	8.00	8.20	8.00	7.40	7.60	7.80	7.60
P5	7.80	8.00	8.20	8.00	7.60	7.80	8.10	7.83	7.20	7.40	7.80	7.47
P6	7.80	8.00	8.20	8.00	7.40	7.60	7.80	7.60	7.00	7.40	7.50	7.30
MEAN	8.03	8.23	8.47		7.77	7.97	8.15		7.37	7.60	7.82	
Factor	A	B	AB		A	B	AB		A	B	AB	
SE _m ±	0.11	0.08	0.17		0.20	0.07	0.18		0.11	0.08	0.20	
CD at 5% level	0.32	0.23	NS		0.29	0.20	NS		0.33	0.23	NS	

Table-4 Effect of different treatment combination on taste of mixed fruit leather

Ratio of fruit pulp Factor A	0 days				40 days				80 days			
	Sugar (Factor B)			mean	Sugar (Factor B)			mean	Sugar (Factor B)			mean
	S1	S2	S3		S1	S2	S3		S1	S2	S3	
P1	8.00	7.80	7.80	7.87	7.60	7.40	7.20	7.40	7.20	6.60	6.40	6.73
P2	7.80	8.20	8.20	8.07	7.60	7.60	7.40	7.53	7.00	7.20	6.60	6.93
P3	8.20	8.60	8.20	8.33	7.60	8.40	7.60	7.87	6.80	7.80	6.80	7.13
P4	8.20	8.80	8.20	8.40	7.60	8.60	7.60	7.93	6.60	8.00	7.20	7.27
P5	8.00	8.60	8.40	8.33	7.40	8.20	8.00	7.87	6.60	7.60	7.40	7.20
P6	8.00	8.60	8.40	8.33	7.60	8.00	8.20	7.93	6.40	7.60	7.60	7.20
MEAN	8.03	8.43	8.20		7.57	8.03	7.67		6.77	7.47	7.00	
Factor	A	B	AB		A	B	AB		A	B	AB	
SE _m ±	0.11	0.08	0.19		0.12	0.09	0.22		0.12	0.08	0.21	
CD at 5% level	0.32	0.22	NS		0.36	0.25	NS		0.34	0.24	NS	

Table-5 Effect of different treatment combination on overall acceptability of mixed fruit leather

Ratio of fruit pulp Factor A	0 days				40 days				80 days			
	Sugar (Factor B)			mean	Sugar (Factor B)			mean	Sugar (Factor B)			Mean
	S1	S2	S3		S1	S2	S3		S1	S2	S3	
P1	8.20	8.80	8.40	8.47	7.80	8.60	8.00	8.13	7.20	8.00	7.40	7.53
P2	7.80	8.20	8.20	8.07	7.40	7.80	7.80	7.67	6.80	7.20	7.20	7.07
P3	7.80	8.20	8.40	8.13	7.40	8.00	8.00	7.80	6.80	7.40	7.40	7.20
P4	8.20	8.60	8.20	8.33	7.80	8.20	7.80	7.93	7.20	7.60	7.20	7.33
P5	8.00	7.80	7.80	7.87	7.60	7.40	7.40	7.47	7.00	6.80	6.80	6.87
P6	7.80	8.40	8.60	8.27	7.40	8.00	8.40	7.93	7.00	7.40	7.80	7.40
MEAN	7.97	8.33	8.27		7.57	8.00	7.90		7.00	7.40	7.30	
Factor	A	B	AB		A	B	AB		A	B	AB	
SE _m ±	0.12	0.08	0.21		0.11	0.08	0.20		0.11	0.08	0.19	
CD at 5% level	0.34	0.24	NS		0.32	0.23	NS		0.32	0.22	NS	

Table-6 Effect of different treatment combination on economics of mixed fruit leather

Treatments	Cost of fruit pulp (Rs)	Cost of sugar (Rs)	Processing cost (Rs)	Total cost (Rs)	Product Value *	B:C Ratio
T1	20.4	4.5	8	32.9	90	2.73:1
T2	20.6	4.5	8	33.1	90	2.71:1
T3	20.8	4.5	8	33.3	90	2.70:1
T4	21	4.5	8	33.5	100	2.98:1
T5	21.2	4.5	8	33.7	100	2.96:1
T6	21.4	4.5	8	33.9	100	2.94:1
T7	20.4	9	8	37.4	80	2.13:1
T8	20.6	9	8	37.6	100	2.65:1
T9	20.8	9	8	37.8	100	2.63:1
T10	21	9	8	38	100	2.61:1
T11	21.2	9	8	38.2	100	2.59:1
T12	21.4	9	8	38.4	100	2.57:1
T13	20.4	13.5	8	41.9	80	1.90:1
T14	20.6	13.5	8	42.1	80	1.90:1
T15	20.8	13.5	8	42.3	80	1.89:1
T16	21	13.5	8	42.5	90	2.11:1
T17	21.2	13.5	8	42.7	100	2.34:1
T18	21.4	13.5	8	42.9	100	2.33:1

Conclusion

Preparing mixed fruit leather will help to increase the shelf life and commercial utilization of perishable fruits. The organoleptic attributes examined showed that the mixing of guava and papaya pulp in ratio of (80:20) with S2 (30 gm sugar/100 gm pulp) was found best. Hence, it is clear that both the fruits are suitable for the preparation of mixed fruit leather of good quality. The cost involved in the preparation is also very less. So, this recipe can be recommended for making of commercially accepted guava and papaya mixed fruit leather.

Application of research: The research can be applied in processing industry in order to increase the shelf life of fruits. The recipe can be recommended for blending of different fruit pulps to prepare a commercially accepted product.

Research Category: Agriculture Economics

Abbreviations:

B:C ratio – Benefit Cost ratio

IU- International Unit.

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***Research Guide or Chairperson of research: Dr C.S. Pandey**

University: Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, 482004 Madhya Pradesh, India

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