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Studies on preparation of guava nectar blended with *Anola* and *Tulsi* extract

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Abstract
The given investigation was conducted at post-harvest technology laboratory, College of Agriculture, Osmanabad to prepare value added products from guava nectar blended with *Aonla* and Tulsi extract during 2021-2022. The experiment comprised of 12 treatments of recipe (Varying juice 15%, 20% and 25% of different blending proportion with fixed TSS of 15 Brix and 0.3 per cent acidity) in Factorial Completely Randomized Design with three replications. The recipes were analyzed for chemical composition and sensory quality attributes at 90 days of storage in ambient conditions. Results depict that, there was slight increase in total soluble solids, pH, acidity, reducing sugars and total sugar but, slight decrease in non-reducing sugar and ascorbic acid upto the entire period of storage whereas, organoleptic score slightly decreased after three month of storage. In sensory evaluation, the nectar comprising of maximum score in blend using J2B2 (60% guava, 40% *Aonla*, 5ml tulsi extract) of 20% fruit juice level with TSS 15 Brix and 0.3 per cent acidity retained significantly highest score for colour, taste, Flavour, texture and overall acceptability up to 3 months of storage. During storage period of three months, no microbial counts were observed in all treatments of blended guava nectar. Overall findings of investigation revealed that blended guava nectar can successfully be stored for 3 months in glass bottles with minimum changes in chemical, sensory and microbial quality.

Keywords: Guava pulp, nectar, storage, low calorie beverage, nutritional quality, value addition

Introduction
India is the second largest producer of the fruits and vegetables in the world after China (Anon., 2015) [1]. India's share in world fruit production is 13.60%. Fruit beverages or health oriented drinks have been increasingly gaining popularity due to their health and nutritional benefits apart from providing pleasant taste and flavour. For preparation of health oriented drink, it is important to select. Suitable fruits, vegetable and medicinal herbs which possess certain health beneficial effect depending upon their nutritional characteristics. Such health oriented drinks can be one of the refreshing drinks having zero carbonation, relatively low or zero preservative and excellent sources of several important vitamins and minerals often prepared in the form of nectar. Food commodities like Guava, Aonla and medicinal herbs like Tulsi are known from centuries for beneficial effects and are being used to cure different degenerative diseases.

Guava (*Psidium guajava* L.) is one of the exquisite, nutritionally valuable remunerative and important commercial fruit crops of India and belongs to the family "Myrtaceae". Guava is a seasonal and highly perishable fruit. Fruit consist of 20% peel, 50% flesh and remaining portion as seed core. Guava is normally consumed fresh as dessert fruit that is pleasantly sweet and refreshing in flavour. Guava is one of the richest natural sources of vitamin-C and fair amount of calcium also; It contains 2-6 times more vitamin-C than oranges and it has lycopene twice than that of tomato. Fruits give the best jelly because of rich pectin content. Vitamin C of fresh ripe fruits amounts to 100-260 mg per 100g of pulp. Fruits content phosphorus, iron and small quantities of thiamine, riboflavin and niacin. Therefore, it has immense processing potential resulting into good export prospects.

Aonla (*Emblica officnalis* Gaertn.) fruit commonly known as Indian gooseberry, amla, nelli, amlaki in different parts of india. It belongs to the family Euphorbeaceae. Aonla fruit has high medicinal value among indigenous fruits of India. It has high value as an anti-ascorbiatic, diuretic, laxative, antibiotic and acidic cooling refrigerant. Gallic acid present in aonla fruits has antioxidant property. Aonla is rich source of vitamin C (600 mg/100 g of fruit pulp). Dehydrated aonla powder is also used as a food item by many poor communities. Aonla has highly acidic and astringent taste, low TSS (total soluble soilds), lack of flavour and poor

colour. It can be processed in various products such as juice, preserve, murrabba, pickles, squash, syrup, aonla RTS beverages, candy etc.

Tulsi (*Ocimum sanctum* Linn.), also known as Basil, 'Holy buil' in English is an aromatic plant in the family Lamiaceae. It has versatile role to play in traditional medicine. Its leaves are known for medicinal purposes and for its essential oil. Juice or infusion of the tulsi leaves used in the treatment of bronchitis, digestive complaints, arthritis, ringworms, hypertension, heart attack, cancer, viral hepatitis and diabetes. Daily consumption of tulsi is said to prevent disease, promote general health, well-being and longevity and assist in dealing with the stresses of daily life. Tulsi is also credited with giving hister to the complexion, sweetness to the voice and fostering beauty, intelligence, stamina and a calm emotional disposition.

Now a day's demand of nectar increasing at a high rate for consumption in all age of groups. Blended nectar beverage based on blends of guava, aonla and tulsi juice extracts receiving a considerable amount of attention reflecting a growing awareness of the potential of these products in the market place. Thus beverages have high nutritional quality and increased energy value especially therapeutic properties into the beverages. These could be particularly useful in place where there is lack of food and improper nutrition. Thus present study was carried out to investigate blending of seasonal juices together in combination of different sweeteners to biochemical and sensory acceptability of the juice product.

Materials and Methods

The experiment were conducted in the laboratories of the Department of Horticulture, College of Agriculture, Osmanabad (MH) during the year 2021-2022. The experimental materials, guava, *Aonla* were collected from local market of Latur and Osmanabad (MH). Tulsi leaves were procured from the Herbal Garden, Department of Horticulture, College of Agriculture Osmanabad (MH). Non-nutritive sweetener, Stevia was purchased from M/s Anshul Life Sciences Goregaon (East, Mumbai), India. Whereas, stevisoside was purchased from Unibourne Food Ingredients Llp, Mumbai. Completely Randomized Design with factorial concept (FCRD) was applied for analysis of experimental data and sensory evaluation of guava blended nectar. Fruits were used for preparation of nectar with three level of fruit juice i.e. J1 -15%, J2 -20%, and J3- 25% as well as four different blending concentrations of Guava, *Aonla* and tulsi extract i.e. B1 -80:20:5%, B2 -60:40:5%, B3 - 40:60:5% and B4 - 20:80:5% and 12 treatments in the combination of blend to fruit juice level i.e. J1B1, J1B2, J1B3, J1B4, J2B1, J2B2, J2B3, J2B4, J3B1, J3B2, J3B3 and J3B4 respectively.

Extraction of Guava pulp

The ripened guava fruits were cut into small pieces and put into mixer containing 300 ml water per kg of fruit pieces. The pulp was strained through double layered muslin cloth or sieve further used for preparation of guava, aonla, tulsi blended nectar.

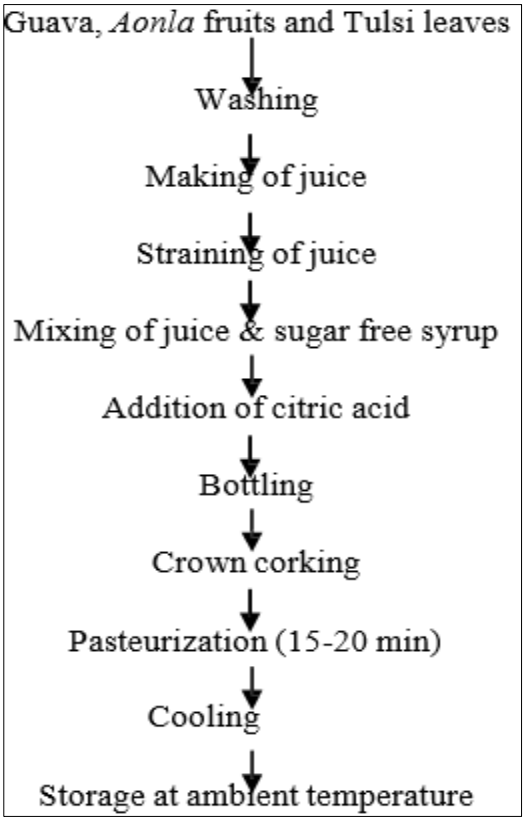
Extraction of Aonla juice

For the extraction of juice, mature and healthy aonla fruits that had been thoroughly cleaned were then cut into small pieces and seeds were manually removed. segments were put into mixer was added to fruits in 1:1 ratio and juice was extracted and strained through double layered muslin cloth further used for preparation of blended nectar.

Tulsi Extract

Fresh tulsi leaves leaves were washed in running water to remove attached dirt and dust particles. Then grinding of leaves in mixer containing water (1:0.5) ratio and juice extracted. The juice filter through double layered muslin cloth further used for preparation of nectar.

Flow sheet for preparation of Guava Nectar



Preparation of Nectar

Blended nectar was prepared from the juice/ pulp of guava, aonla and tulsi. A total 12 treatments were used for preparation of this nectar using different proportion of sugar with different fruit juice level (J) (Factor 1) and Blending proportion (B) (Factor 2) of guava pulp, aonla juice and tulsi extract. The acidity (as% citric acid) was kept constant (i.e. 0.3%) in all the treatments. No artificial colour was added. The best treatment combination was selected on the basis of sensory evaluation for further studies. The water was added as per treatment requirement.

Result and Discussion

Total Soluble Solid (%)

It is clear from the data that, total soluble solids content in nectar showed an increasing trend with increasing period of storage (0 to 90 days) in Table1. At the time of preparation, TSS was found maximum (11.17%) with the treatment J2B1 of 20% fruit juice level followed by J2B2 of 20% fruit juice level (11.13%). At 30, 60, 90 days of storage, the total soluble solids content was found to be significantly maximum (11.17%) under the treatment J2B2 of 20% fruit juice level

followed by J2B1 of 20% fruit juice level (11.13). While, significantly minimum TSS content was recorded with the treatment J2B3 of 20% fruit juice level. The increased TSS in nectar during storage was probably due to conversion of polysaccharides into soluble sugars. However, significant differences were observed in TSS of nectar during 90 days of storage when nectar was prepared using different level of fruit juice level and blending proportion. Similar results were reported that Das *et al*. (2009) [2], Gehlot *et al*. (2010) [4] in jamun RTS, Pandey *et al*. (2004) [18] in guava beverages and Meena *et al*. (2017) [15] in aonla RTS**.**

Ascorbic acid

It is apparent from the data that, ascorbic acid content in guava blended nectar of all the treatments showed a decreasing trend with increasing period of storage (0 to 90 days) in Table 2. At the time of preparation (0 days), though the data shows non-significant difference, however, it was recorded maximum (34.80 mg/100 ml) under the treatment J2B2 of 20% fruit juice level followed by J3B3 of 25% fruit juice level (34.14 mg/100 ml). While minimum ascorbic acid content (33.80 mg/100 ml) was recorded with the treatment J1B3 of 15% fruit juice level. At 30, 60, and 90 days of storage, significantly maximum ascorbic acid was recorded with the treatment J2B2 of 20% fruit juice level. While, significantly minimum ascorbic acid content was recorded with the treatment J2B3 of 20% fruit juice level.

The decrease in ascorbic acid in nectar during storage might be due to oxidation or irreversible conversion of L- ascorbic acid into dehydro ascorbic acid in the presence of enzyme ascorbinase (ascorbic acid oxidase) caused by trapped or residual oxygen in the glass bottles. Similar results were reported by Sharma *et al*. (2009) [21] who observed decrease in ascorbic acid content in guava-jamun ready-to-serve (RTS) drink and Bhardwaj and Mukherjee (2011) [25] on kinnow, Yadav *et al*. (2014) [24] on carrot and fruit juices blend and Meena *et al*.(2017) [15] in aonla RTS.

Acidity (%)

It is evident from the data that, acidity of guava blended nectar showed an increasing trend with increasing period of storage (0 to 90 days) in Table 3. At the time of preparation (0 days), through the differences were non-significant, however, it was recorded maximum (0.31%) under the treatment J3B2 of 25% fruit juice level. At 30, 60 and 90 days of storage, significantly maximum acidity (0.45%) was recorded with the treatment J3B4 of 25% fruit juice level. While, significantly minimum acidity (0.38%) was observed with J2B1 of 20% fruit juice level. The increase in acidity of nectar during storage might be due to formation of organic acids by ascorbic acid degradation. Similar findings were Also, reported by Khurdiya and Roy (1985) [10] who reported a gradual increase in acidity of jamun beverage (1.37% to1.42%) during the storage of 90 days. Also, Rathod *et al.* (2014) [19] reported maximum increase in acidity (0.4% to 0.7%) during storage of RTS blended with bael-aonla juice and Meena *et al*. (2017) [15] in aonla RTS also reported increase in acidity of aonla beverage during 180 days of storage.

pH

It is evident from the data that, pH of guava blended nectar showed an trend with increasing period of storage (0 to 90 days) in Table 4. At the time of preparation (0 days), though the differences was non-significant however, it was recorded maximum (3.45) under the treatment J3B4 of 25% fruit juice level. At 30, 60 and 90 days of storage, significantly maximum pH (3.58) was noticed under the treatment J2B4 of 20% of fruit juice level and J3B3 of 25% of fruit juice level. It was significantly minimum (3.53%) under the treatment J1B1 of 15% fruit juice level. Similar results were also recorded by Hassan and Ahmed (1998) [6], Saravana *et al*. (2004) [20] and Kayshar *et al.* (2014) [9] reported that increase in pH of mixed fruit squash from 5.03 to 5.16 (2.58% increase) has been observed during 2 month storage at room temperature.

Reducing Sugar (%)

The reducing sugar was recorded to be significant effect from 0 to 90 days of storage. At the time of preparation, reducing sugar was found maximum (4.43%) with the treatment J2B2 of 20% of fruit juice level followed by J2B1 of 20% of fruit juice level (4.10%). While, minimum (3.13%) reducing sugar content was recorded with the J1B1 of 15% fruit juice level (Table 5). At the time of 30, 60 and 90 days of storage, significantly maximum (4.57%) reducing sugar was found with the treatment J2B2 of 20% fruit juice level followed by J2B1 of 20% of fruit juice level (4.33%). It was significantly minimum (3.43%) recorded with the treatment J1B1 of 15% of fruit juice level. Similar findings were reported by Mandal *et al*. (2013) [14] reported that, reducing sugar of aonla nectar increased continuously during the period of storage. Sharma *et al*., (2013) [22] reported that, there was gradual increase in reducing sugars of guava-jamun blended RTS and squash during three month storage.

Non-reducing sugar (%)

The reducing sugar in guava blended nectar showed a decreasing trend with increasing period of storage (0-90 days). At the time of preparation, maximum non reducing sugar (3.43%) was observed with the treatment J2B2 of 20% of fruit juice level followed by J2B2 (3.43%) of 20% fruit juice level and minimum non reducing sugar (2.83%) was recorded with the treatment J1B1 of 15% fruit juice level. After 30, 60 and 90 days of storage significantly maximum non-reducing sugar (3.37%) was observed with the treatment J2B2 of 20% fruit juice level followed by J2B1 of 20% fruit juice level (3.27%) and J3B2 of 25% fruit juice level (3.27%). Whereas, significantly minimum non-reducing sugar (2.70%) was recorded with the treatment J1B1 of 15% fruit juice level (Table 6). Similar results were found by Kumar *et al.* (2009) [12] and Karanjalker *et al.* (2013) [8].

Elbandy *et al.* (2014) [3] concluded that decrease in the non - reducing sugars during the storage of mango nectar with *Aloe vera* gel as preservative.

Total sugar (%)

The total sugar content of nectar was found to be significant from 0 to 90 days of storage. At the time of preparation, total sugar was found significantly maximum (7.87%) with the treatment J2B2 of 20% of fruit juice level followed by J2B1 of 20% of fruit juice level (7.44%). While, minimum (5.97%) total sugar content was recorded with the J1B1 of 15% fruit juice level (Table 7). At 30, 60 and 90 days of storage, significantly maximum (8.13%) total sugar was found with the treatment J2B2 of 20% fruit juice level followed by J3B1 of 25% of fruit juice level (7.73%). While, significantly

minimum (6.17%) total sugar content was recorded with the treatment J1B1 of 15% of fruit juice level. In the present investigation the reducing sugar as well as total sugar corresponded to the increase in total soluble solids (TSS) and ultimate decrease in non-reducing sugar in both the beverages during storage period. The variation in different fractions of sugar might be due to hydrolysis of polysaccharides like starch, pectin and inversion of non-reducing sugar into reducing sugar, as increase in reducing sugar was correlated with the decrease in non-reducing sugar. The increased level of total sugar was probably due to conversion of starch and pectin into simple sugars. Similar findings were reported by Gehlot *et al.* (2010) [4] in jamun nectar, Saravanan *et al.* (2004) [20] in papaya RTS and Sharma *et al.* (2009) [21] in guava jamun RTS.

Colour

The score for colour of different treatments were recorded at 0, 30, 60 and 90 days and observed that organoleptic score for colour continuously decreased with all the treatments up to 90 days of storage in Table 8. At the time of preparation, significantly maximum score (8.83) for colour was recorded with the treatment J2B2 of 20% fruit juice followed by J3B1 of 25% fruit juice. Whereas, significantly minimum (7.67) with the treatment J1B4 of 15% fruit juice. After 30, 60 and 90 days of storage, significantly maximum score (8.17) for colour was recorded with the treatment J2B2 of 20% fruit juice level and J3B1 of 25% fruit juice level. The significantly minimum score (7.17) with the treatment J1B4 of 15% fruit juice level. The decrease in colour score in storage might be due to chemical reactions which have led to the formation of brown pigments hence made the appearance of the product less acceptable by the panelists. Similar result of decrease in colour score during storage period was reported by Swaroop *et al*. (2012) [23] in stevia sweetened nectar. Mall and Tondon (2007) [13] for guava aonla blended beverage, Kumar *et al.* (2008) [11] for musambi RTS Beverage.

Flavour: The score for flavour of guava blended nectar influenced by different treatments were recorded at 0, 30, 60 and 90 days and observed that organoleptic score for flavour continuously decreased with all the treatments up to 90 days of storage in Table 9. At the time of preparation, maximum mean score for flavour (8.83) was recorded with the treatment J2B2 of 20% of fruit juice level. The minimum mean score (7.60) was recorded with the treatment J2B4 of 20% fruit juice level and J3B4 of 25% fruit juice level. After 30, 60 and 90 days of storage, significantly maximum score (8.30) for flavour was recorded with the treatment J2B2 of 20% of fruit juice followed by J2B1 of 20% fruit juice level (8.27). The significantly minimum score (7.27) was recorded with the treatment J2B4 of 20% fruit juice level and J3B4 of 25% fruit juice level. Though, the flavour acceptability score recorded a decrease during storage period of 90 days, but it remained well within the acceptable limit, thus indicating the acceptability of drink for flavour. However, there was a significant difference among treatments. Similar result of decrease in flavour score during storage period was reported by Gehlot *et al.* (2008) [5] who reported that, the flavour of jamun beverages decreased significantly with the advancement in storage period, however, their overall rating remained above the acceptable level even after three months storage.

Taste

The score for taste of different treatments were recorded at 0, 30, 60 and 90 days and observed that organoleptic score for taste continuously decreased with all the treatments up to 90 days of storage in Table 10. At the time of preparation, maximum score (8.80) for taste was recorded with the treatment J2B2 of 20% fruit juice followed by J3B2 of 25% fruit juice level (8.47). The significantly minimum score (7.43) with the treatment J1B4 of 15% fruit juice level. After 30, 60 and 90 significantly maximum score (8.47) for taste was recorded with the treatment J3B2 of 25% fruit juice level followed by J3B2 of 25% fruit juice level (8.13). While it was minimum score (7.07) with the treatment J1B4 of 15% fruit juice level. Similar result of decrease in taste score during storage period was reported by Nidhi *et al.* (2008) [16] and Elbandy *et al.* (2014) [3], Jain and Meena (2013) [7]. Also reported by Pandey and Singh (1998) [17] for guava squash in which there was a gradual decrease in the organoleptic quality and it was found acceptable upto six months.

Texture

The score for texture of different treatments were recorded at 0, 30, 60 and 90 days and observed that, organoleptic score for texture continuously decreased with all the treatments up to 90 days of storage in Table

11. At the time of preparation, maximum score (8.83) for texture was recorded with the treatment J2B2 of 20% fruit juice level followed by J2B3 of 20% fruit juice level (8.50). The significantly minimum score (7.03) with the treatment J3B4 of 25% fruit juice level. After 30, 60 and 90 days of storage, significantly maximum score (8.17) for texture was recorded with the treatment J2B2 and J2B3 of 20% fruit juice level also J3B1 of 25% fruit juice level. The significantly minimum score (6.50) with the treatment J3B4 of 25% fruit juice level. Similar result of decrease in texture score during storage period was reported by Nidhi *et al*., (2008) and Elbandy *et al.*, (2014), Jain and Meena *et al*., (2017) [15].

Overall acceptability

The score for overall acceptability of nectar affected by different treatments were recorded at 0, 30, 60 and 90 days and observed that organoleptic score for overall acceptability continuously decreased with increase in up to 90 days of storage in Table 12. At the time of preparation, maximum score (8.83) was recorded with the treatment J2B2 of 20% fruit juice level followed by J2B1 of 20% fruit juice level (8.37). The minimum score (7.00) was recorded with the treatment of J3B4 of 20% fruit juice level. After 30,60 and 90 days of storage, significantly maximum score (8.47) was recorded with the treatment J2B2 of 20% fruit juice level followed by J3B1 of 25% fruit juice level (7.87). The significantly minimum score (6.60) was recorded with the treatment J3B4 of 25% fruit juice level. There was a considerable decrease in sensory mean score for colour and appearance, taste, flavour, texture and overall acceptability during storage. The sensory score for each attribute was highest on the day of preparation, which decreased with increasing period of storage. There are many extrinsic factors which determine the storage stability of products and temperature plays an important role among them. The other possible reasons could be the loss of volatile aromatic substances responsible for flavour and taste which decreased acceptability in storage at ambient condition.

Table 1: Effect of different recipe treatment on TSS of Guava blended Nectar

Tr. No.	Treatments Details		Treatment Combination (T)	TSS (%)			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B)%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	10.13	10.13	10.20	10.27
2		B2-60:40:5	J1B2	10.23	10.27	10.33	10.50
3		B3-40:60:5	J1B3	10.03	10.03	10.13	10.33
4		B4-20:80:5	J1B4	10.33	10.30	10.40	10.50
5	J2−20	B1-80:20:5	J2B1	11.17	11.13	11.20	11.33
6		B2-60:40:5	J2B2	11.13	11.17	11.27	11.43
7		B3-40:60:5	J2B3	9.83	9.87	10.00	10.20
8		B4-20:80:5	J2B4	10.93	10.93	11.00	11.00
9	J3−25	B1-80:20:5	J3B1	10.47	10.50	10.57	10.60
10		B2-60:40:5	J3B2	10.40	10.37	10.43	10.57
11		B3-40:60:5	J3B3	10.00	10.10	10.17	10.30
12		B4-20:80:5	J3B4	10.13	10.20	10.27	10.33
	SE ±		T	0.030	0.036	0.030	0.054
			S	0.035	0.041	0.035	0.063
			T×S	0.060	0.072	0.060	0.109
	CD at 5%		T	0.088	0.105	0.088	0.159
			S	0.102	0.121	0.102	0.184
			T×S	0.177	0.210	0.177	0.318
*Guava: *Aonla*: Tulsi							

Table 2: Effect of different recipe treatment on ascorbic acid (mg/100ml) of Guava blended Nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Ascorbic acid (mg/100ml)			
				Storage (S)			
	Fruit juice level (J)%	Blends* (B)%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	33.94	33.27	32.30	30.47
2		B2-60:40:5	J1B2	33.93	33.37	32.67	30.77
3		B3-40:60:5	J1B3	33.80	33.17	31.87	29.87
4		B4-20:80:5	J1B4	34.05	33.33	32.70	31.37
5	J2−20	B1-80:20:5	J2B1	34.05	33.66	32.07	31.00
6		B2-60:40:5	J2B2	34.80	33.97	32.33	31.07
7		B3-40:60:5	J2B3	33.70	33.60	32.27	29.40
8		B4-20:80:5	J2B4	34.03	33.95	32.86	31.20
9	J3−25	B1-80:20:5	J3B1	33.90	33.91	32.13	30.90
10		B2-60:40:5	J3B2	33.74	33.77	32.40	30.80
11		B3-40:60:5	J3B3	34.14	33.81	32.20	30.57
12		B4-20:80:5	J3B4	34.00	33.86	31.93	29.99
	SE ±		T	0.047	0.168	0.144	0.178
			S	0.054	0.194	0.166	0.206
			T×S	0.095	0.336	0.288	0.357
	CD at 5%		T	NS	NS	NS	NS
			S	NS	NS	NS	0.602
			T×S	NS	NS	NS	1.043
Guava: Aonla*: Tulsi							

Table 3: Effect of different recipe treatment on Acidity of Guava blended Nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Acidity (%)			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	0.30	0.34	0.37	0.43
2		B2-60:40:5	J1B2	0.30	0.32	0.39	0.41
3		B3-40:60:5	J1B3	0.30	0.33	0.42	0.44
4		B4-20:80:5	J1B4	0.30	0.34	0.41	0.43
5	J2−20	B1-80:20:5	J2B1	0.30	0.33	0.37	0.38
6		B2-60:40:5	J2B2	0.30	0.33	0.38	0.42
7		B3-40:60:5	J2B3	0.30	0.34	0.41	0.43
8		B4-20:80:5	J2B4	0.30	0.32	0.39	0.44
9	J3−25	B1-80:20:5	J3B1	0.30	0.33	0.39	0.44
10		B2-60:40:5	J3B2	0.31	0.32	0.38	0.42
11		B3-40:60:5	J3B3	0.30	0.34	0.40	0.44
12		B4-20:80:5	J3B4	0.30	0.34	0.39	0.45
	SE ±		T	0.001	0.003	0.007	0.009

		S	0.001	0.009	0.008	0.010
		T×S	0.002	0.006	0.014	0.018
	CD at 5%	T	NS	NS	NS	NS
		S	NS	NS	NS	NS
		T×S	NS	NS	NS	NS
*Guava: *Aonla*: Tulsi						

Table 4: Effect of different recipe treatment on pH of Guava blended Nectar

Tr. No.	Treatments Details		Treatment Combination (T)	pH			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	3.42	3.47	3.50	3.53
2		B2-60:40:5	J1B2	3.43	3.47	3.50	3.56
3		B3-40:60:5	J1B3	3.41	3.45	3.49	3.55
4		B4-20:80:5	J1B4	3.44	3.46	3.50	3.56
5	J2−20	B1-80:20:5	J2B1	3.43	3.47	3.50	3.56
6		B2-60:40:5	J2B2	3.42	3.46	3.49	3.57
7		B3-40:60:5	J2B3	3.43	3.48	3.50	3.55
8		B4-20:80:5	J2B4	3.42	3.46	3.49	3.58
9	J3−25	B1-80:20:5	J3B1	3.44	3.47	3.49	3.57
10		B2-60:40:5	J3B2	3.42	3.46	3.47	3.56
11		B3-40:60:5	J3B3	3.43	3.48	3.49	3.58
12		B4-20:80:5	J3B4	3.45	3.47	3.49	3.55
	SE ±		T	0.004	0.003	0.004	0.004
			S	0.005	0.003	0.005	0.005
			T×S	0.009	0.006	0.009	0.009
	CD at 5%		T	NS	NS	NS	0.013
			S	NS	NS	NS	NS
			T×S	NS	NS	NS	0.027
*Guava: *Aonla*: Tulsi							

Table 5: Effect of different recipe treatment on reducing sugars of guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Reducing sugars (%)			
				Storage (S)			
	Fruit juice level (J)%	Blends* (B)%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	3.13	3.20	3.30	3.43
2		B2-60:40:5	J1B2	3.80	3.97	4.10	4.23
3		B3-40:60:5	J1B3	4.00	4.03	4.13	4.20
4		B4-20:80:5	J1B4	3.27	3.27	3.37	3.43
5	J2−20	B1-80:20:5	J2B1	4.10	4.20	4.27	4.33
6		B2-60:40:5	J2B2	4.43	4.50	4.53	4.57
7		B3-40:60:5	J2B3	3.67	3.73	3.80	3.90
8		B4-20:80:5	J2B4	3.87	3.93	4.03	4.13
9	J3−25	B1-80:20:5	J3B1	3.97	4.10	4.17	4.27
10		B2-60:40:5	J3B2	3.80	3.83	3.90	4.07
11		B3-40:60:5	J3B3	4.03	4.00	4.03	4.03
12		B4-20:80:5	J3B4	3.97	4.03	4.07	4.17
	SE ±		T	0.030	0.031	0.032	0.029
			S	0.035	0.036	0.038	0.033
			T×S	0.061	0.063	0.065	0.058
	CD at 5%		T	0.089	0.092	0.096	0.085
			S	0.103	0.106	0.111	0.098
			T×S	0.179	0.184	0.192	0.170
*Guava: *Aonla*: Tulsi							

Table 6: Effect of different recipe treatment on non-reducing sugars of guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Non-reducing sugars (%)			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	2.83	2.77	2.73	2.70
2		B2-60:40:5	J1B2	3.27	3.20	3.17	3.13
3		B3-40:60:5	J1B3	3.20	3.17	3.13	3.10
4		B4-20:80:5	J1B4	3.03	3.00	2.97	2.93
5	J2−20	B1-80:20:5	J2B1	3.33	3.30	3.30	3.27
6		B2-60:40:5	J2B2	3.43	3.40	3.40	3.37

7		B3-40:60:5	J2B3	3.30	3.27	3.23	3.20
8		B4-20:80:5	J2B4	3.07	3.10	3.07	3.03
9	J3−25	B1-80:20:5	J3B1	3.23	3.20	3.17	3.13
10		B2-60:40:5	J3B2	3.33	3.30	3.30	3.27
11		B3-40:60:5	J3B3	3.00	3.03	3.03	3.00
12		B4-20:80:5	J3B4	3.10	3.07	3.07	3.10
	SE ±		T	0.018	0.018	0.016	0.015
			S	0.020	0.020	0.019	0.017
			T×S	0.036	0.036	0.033	0.030
	CD at 5%		T	0.052	0.052	0.048	0.044
			S	0.060	0.060	0.056	0.051
			T×S	0.105	0.105	0.097	0.088
*Guava: *Aonla*: Tulsi							

Table 7: Effect of different recipe treatment on total sugar of guava blended nectar

Tr. No.	Treatments Details		Treatment Combinations (T)	Total sugars (%)			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	5.97	5.98	6.00	6.17
2		B2-60:40:5	J1B2	7.08	7.21	7.26	7.33
3		B3-40:60:5	J1B3	7.30	7.41	7.47	7.53
4		B4-20:80:5	J1B4	6.43	6.57	6.72	6.83
5	J2−20	B1-80:20:5	J2B1	7.44	7.53	6.63	6.73
6		B2-60:40:5	J2B2	7.87	7.90	7.97	8.13
7		B3-40:60:5	J2B3	6.98	7.02	7.11	7.23
8		B4-20:80:5	J2B4	6.95	7.04	7.15	7.27
9	J3−25	B1-80:20:5	J3B1	7.33	7.43	7.61	7.73
10		B2-60:40:5	J3B2	7.12	7.17	7.26	7.33
11		B3-40:60:5	J3B3	7.05	7.09	7.26	7.45
12		B4-20:80:5	J3B4	7.08	7.18	7.23	7.27
	SE ±		T	0.031	0.018	0.031	0.024
			S	0.035	0.021	0.036	0.028
			T×S	0.062	0.037	0.063	0.049
	CD at 5%		T	0.090	0.054	0.092	0.071
			S	0.104	0.062	0.106	0.082
			T×S	0.181	0.108	0.184	0.143
*Guava: *Aonla*: Tulsi							

Table 8: Effect of different recipe treatment on Colour of Guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Colour			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	8.14	7.90	7.77	7.67
2		B2-60:40:5	J1B2	8.07	7.93	7.83	7.50
3		B3-40:60:5	J1B3	8.00	7.77	7.67	7.60
4		B4-20:80:5	J1B4	7.67	7.50	7.33	7.17
5	J2−20	B1-80:20:5	J2B1	8.33	8.10	8.00	7.77
6		B2-60:40:5	J2B2	8.83	8.60	8.47	8.17
7		B3-40:60:5	J2B3	8.33	8.10	8.00	7.60
8		B4-20:80:5	J2B4	8.00	7.77	7.67	7.57
9	J3−25	B1-80:20:5	J3B1	8.50	8.20	8.00	7.87
10		B2-60:40:5	J3B2	8.10	7.93	7.83	7.67
11		B3-40:60:5	J3B3	8.07	7.80	7.70	7.50
12		B4-20:80:5	J3B4	8.00	7.83	7.67	7.33
	SE ±		T	0.113	0.102	0.105	0.081
			S	0.130	0.118	0.121	0.094
			T×S	0.226	0.204	0.210	0.163
	CD at 5%		T	NS	NS	NS	NS
			S	NS	NS	NS	0.276
			T×S	NS	NS	NS	NS
*Guava: *Aonla*: Tulsi							

Table 9: Effect of different recipe treatment on flavour of guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Flavour			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	8.13	8.03	7.93	7.77
2		B2-60:40:5	J1B2	8.40	8.27	8.20	8.00
3		B3-40:60:5	J1B3	8.20	8.07	8.00	7.83
4		B4-20:80:5	J1B4	7.80	7.67	7.57	7.43
5	J2−20	B1-80:20:5	J2B1	8.77	8.67	8.33	8.27
6		B2-60:40:5	J2B2	8.83	8.77	8.50	8.30
7		B3-40:60:5	J2B3	8.53	8.30	8.23	8.07
8		B4-20:80:5	J2B4	7.60	7.50	7.43	7.27
9	J3−25	B1-80:20:5	J3B1	8.63	8.57	8.43	8.13
10		B2-60:40:5	J3B2	8.40	8.30	8.20	8.13
11		B3-40:60:5	J3B3	8.10	8.00	7.77	7.67
12		B4-20:80:5	J3B4	7.60	7.50	7.37	7.27
	SE ±		T	0.043	0.046	0.045	0.059
			S	0.050	0.053	0.052	0.068
			T×S	0.087	0.093	0.090	0.118
	CD at 5%		T	0.127	0.136	0.132	0.172
			S	0.147	0.157	0.152	0.199
			T×S	0.255	0.272	0.264	NS
*Guava: *Aonla*: Tulsi							

Table 10: Effect of different recipe treatment on taste of guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Taste			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	7.70	7.50	7.40	7.33
2		B2-60:40:5	J1B2	8.30	8.23	8.10	8.03
3		B3-40:60:5	J1B3	8.13	8.07	7.97	7.83
4		B4-20:80:5	J1B4	7.43	7.30	7.20	7.07
5	J2−20	B1-80:20:5	J2B1	8.33	8.20	8.10	8.00
6		B2-60:40:5	J2B2	8.80	8.73	8.60	8.47
7		B3-40:60:5	J2B3	8.17	8.13	8.00	7.93
8		B4-20:80:5	J2B4	7.47	7.40	7.27	7.17
9	J3−25	B1-80:20:5	J3B1	8.20	8.13	7.93	7.83
10		B2-60:40:5	J3B2	8.47	8.40	8.23	8.13
11		B3-40:60:5	J3B3	7.60	7.50	7.37	7.23
12		B4-20:80:5	J3B4	7.50	7.37	7.23	7.13
	SE ±		T	0.044	0.036	0.026	0.025
			S	0.050	0.041	0.030	0.029
			T×S	0.088	0.072	0.052	0.051
	CD at 5%		T	0.128	0.106	0.076	0.075
			S	0.148	0.122	0.088	0.087
			T×S	0.257	0.212	0.153	0.151
*Guava: *Aonla*: Tulsi							

Table 11: Effect of different recipe treatment on texture guava blended nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Texture			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	7.67	7.50	7.33	7.17
2		B2-60:40:5	J1B2	7.83	7.67	7.50	7.33
3		B3-40:60:5	J1B3	8.00	7.83	8.00	7.83
4		B4-20:80:5	J1B4	7.17	7.00	7.17	7.00
5	J2−20	B1-80:20:5	J2B1	8.33	8.17	8.33	8.00
6		B2-60:40:5	J2B2	8.83	8.67	8.33	8.17
7		B3-40:60:5	J2B3	8.50	8.33	8.17	8.17
8		B4-20:80:5	J2B4	7.17	7.00	6.83	6.67
9	J3−25	B1-80:20:5	J3B1	8.67	8.50	8.33	8.17
10		B2-60:40:5	J3B2	8.33	8.17	8.00	7.83
11		B3-40:60:5	J3B3	8.00	7.83	7.67	7.50
12		B4-20:80:5	J3B4	7.03	6.83	6.67	6.50
	SE ±		T	0.079	0.068	0.083	0.068

		S	0.092	0.078	0.096	0.078
		T×S	0.159	0.136	0.166	0.136
	CD at 5%	T	0.233	0.198	0.243	0.198
		S	0.269	0.229	0.280	0.229
		T×S	0.466	0.397	0.486	0.397
*****Guava: *Aonla*: Tulsi						

Table 12: Effect of different recipe treatment on Overall acceptability of guava blended Nectar

Tr. No.	Treatments Details		Treatment Combination (T)	Overall acceptability			
				Storage (S)			
	Fruit juice level (J),%	Blends* (B),%		0 Days	30 Days	60 Days	90 Days
1	J1−15	B1-80:20:5	J1B1	7.70	7.53	7.37	7.17
2		B2-60:40:5	J1B2	7.77	7.63	7.47	7.33
3		B3-40:60:5	J1B3	7.50	7.33	7.17	7.00
4		B4-20:80:5	J1B4	7.17	7.07	6.83	6.67
5	J2−20	B1-80:20:5	J2B1	8.37	8.23	8.13	7.83
6		B2-60:40:5	J2B2	8.83	8.73	8.60	8.47
7		B3-40:60:5	J2B3	8.23	8.07	7.93	7.77
8		B4-20:80:5	J2B4	7.60	7.43	7.27	7.10
9	J3−25	B1-80:20:5	J3B1	8.27	8.10	7.93	7.87
10		B2-60:40:5	J3B2	8.33	8.17	8.00	7.83
11		B3-40:60:5	J3B3	7.67	7.50	7.33	7.20
12		B4-20:80:5	J3B4	7.00	6.87	6.70	6.60
	SE ±		T	0.064	0.047	0.056	0.061
			S	0.074	0.054	0.065	0.070
			T×S	0.128	0.094	0.113	0.122
	CD at 5%		T	0.187	0.138	0.164	0.178
			S	0.216	0.159	0.190	0.205
			T×S	NS	0.276	0.329	0.356
*Guava: *Aonla*: Tulsi							

Conclusion

Results of the investigation revealed that treatment J2B2 was statically at par with J3B2 compared to the other treatment combinations during storage and experienced the least changes in the biochemical parameters of guava blended nectar, including TSS, pH, titrable acidity, ascorbic acid, reducing sugars, non- reducing sugars, and total sugars. It was discovered that the guava blended nectar had greater levels of treatment J2B4 is statically at par with during storage in terms of colour, flavour, taste, texture, and overall acceptability. From given result, it can be concluded that among different treatment combinations, treatment J2B2 of 20% fruit juice level (60% Guava pulp + 40% *Aonla* juice + 5ml tulsi extract) recorded highest organoleptic score and hence best suited for commercial scale.

Future scope

The short shelf life of fresh fruits backbone for value addition and thus it could minimize post-harvest losses. In this research trial a method developed to support utilization of another seasonal fruits for doubling the farmers and small scale processor income at their farm level. Development of such method found important for two reasons, first is ever increasing competition, diversification of product and high level of service. Second, this paper support to design process of sugar frees fruit juice blending and packaging plant. The growing awareness about guava, aonla medicinal and nutritional value may be prove an alternative medicine, health food sand herbal products in future. As guava, aonla fruit highly rich in vitamin C and tannins it has immense scope for processing industry. Small scale orchardists or processors may benefit from the value addition of this fruit in the form of blended beverages. However development of such beverages still needs to develop with another seasonal fruits and medicinal crop to improve its quality aspects.

References

1. Anonymous. Indian Horticultural Database. National Horticulture Board, Gurgaon; c2014-2015.
2. Das JN. Studies on storage stability of jamun beverages. Indian Journal of Horticulture. 2009;66(4):508-510.
3. Elbandy MA, Abed SM, Gad SSA, Abdel-Fadeel MG. *Aloe vera* gel as a functional ingredient and natural preservative in mango nectar. World Journal Dairy Food Science. 2014;9(2):191-203.
4. Gehlot SR, Singh R, Yadav BS. Changes in chemical constituents and overall acceptability of jamun ready-to-serve (RTS) drink and nectar during storage. Haryana Journal Horticultural Science. 2010;39(1/2):142-144.
5. Gehlot SR, Singh R, Yadav BS. Studies on development and quality evaluation of jamun (*Syzygium cumini* L.) ready-to-serve (RTS) drink and nectar during storage. Haryana Journal Horticultural Science. 2008;37(1/2):73-75.
6. Hassan M, Ahmed J. Physico-chemical properties of kiwi fruit. Indian Food Packer. 1998;22(3);32-37.
7. Jain SK, Meena P. Studies on the standardization of blended Aonla-Kinnow mandarin RTS beverage. Asian Journal Horticulture. 2013;8(2):605-608.
8. Karanjalker GR, Singh DB, Rajwade VB. Development and evaluation of protein enriched guava nectar blended with soymilk. International Quarterly Journal of Life Sciences. 2013;8(2):631-634.
9. Kayshar MS, Rahman A, Sultana MS, Fatema K, Kabir MF. Formulation, preparation and storage potentiality study of mixed squashes from papaya, banana and carrot.

Journal of Agriculture and Veterinary Science. 2014;7(2):47-51.
10. Khurdiya DS, Roy SK. Processing of jamun (*Syzygium cumini*) fruits into ready-to-serve beverages. Journal of Food Science Technology. 1985;22(3):27-30.
11. Kumar K, Sharma A, Barmanray A. Storage storability of musambi (Citrus sinensis) RTS in different storage conditions. Beverage and Food World. 2008;35(2):47-48.
12. Kumar S, Godara RK, Singh D. Preparation of nectar from aonla- pineapple blend and its storage studies. Haryana Journal Horicultural. Science. 2009;38(3-4):213-215.
13. Mall P, Tandon DK. Development of Guava-Aonla blended beverage. Acta Horticulture. 2007;735(735):555
14. Mandal P, Sahoo BB, Das BC, Katiyar D. Studies on processing and storage stability of Aonla (*Emblica officinalis* Gaertn) Nectar. Horticulture Floral Research Spectrum. 2013;2(3):259-261.
15. Meena VS, Sharma PC, Yadav VS, Meena RS, Mahawar MK, Bhushan B, *et al*. Development and storage studies of Aonla (*Emblica officinalis* Gaertn.) based ready to serve (RTS) using different sweeteners. International journal of bio-resource and stress management. 2017;8(6):790-795.
16. Nidhi Gehlot R, Singh R, Rana MK. Change in chemical composition of ready-to–serve bael guava blended beverage during storage. Journal of Food Science and Technology. 2008;45(4):378-380.
17. Pandey AK, Singh IS. Studies on preparation and preservation of guava squash. Progressive Horticulture. 1998;30(3-4):190-193.
18. Pandey AK. Study about the storage stability of guava beverages. Progressive Horticulture. 2004;36(1):142-145.
19. Rathod AS, Shakya BR, Ade KD. Studies on effect of thermal processing on preparation of bael fruit RTS blended with aonla. International Journal Research Engineering Advance Technology. 2014;2(3):1-6.
20. Saravanan K, Godara RK, Goyal RK, Sharma RK. Processing of papaya fruit for the preparation of ready-to-serve beverage and its quality. Indian Journal Hill Farming. 2004;17(1/2):49-55.
21. Sharma M, Gehlot R, Singh R, Siddiqui S. Studies on physico-chemical composition fresh guava and jamun fruits. Haryana Journal of Horticultural Sciences. 2009;38(1-2):68-69.
22. Sharma M, Gehlot R, Singh R, Siddiqui S. Development and evaluation of guava-jamun RTS drink and squash. Beverage Food World. 2013;40(2):42-44.
23. Swaroop J, Pathak S, Jakhar MS, Kumar S. Studies on preparation and preservation of low calorie guava (*Psidium guajava* L.) nectar using stevia as low calorie sweetener. International Journal Processing and Post-Harvest Technology. 2012;3(2):283-285.
24. Yadav S, Gehlot R, Siddiqui S, Grewal RB. Changes in chemical constituents and overall acceptability of guava-mango ready-to-serve (RTS) drink and squash. Beverage and Food World. 2014;41(4):30-33.
25. Bhardwaj RL, Mukherjee S. Effects of fruit juice blending ratios on kinnow juice preservation at ambient storage condition. African Journal of Food Science. 2011 May;5(5):281-6.