Formulation and stability analysis of pre-biotic carambola-guava blended nectar

Abstract:

The current experiment was designed to prepare a pre-biotic carambola-guava blended nectar with standardizing blending levels and fiber concentration using twenty different treatment combinations. These combinations comprised of five different levels of carambola and guava blends and four varying levels of fiber concentrations. The prepared blended nectar was packed in glass bottle and stored at ambient, for three months and were evaluated for physicochemical and organoleptic quality at an interval of one-month. The results indicated that the pre-biotic carambola-guava nectar prepared with 15 per cent guava pulp, 5 per cent carambola, and 0.20 per cent fibere, retained significantly highest overall acceptance up to three month of storage. The TSS (15.00 to 16.08 ^{o}Brix), acidity (0.300 to 0.348 %), total sugars (13.27 to 14.29 %), showed an increasing trend with increasing period of storage, while the protein (0.318 to 0.290 %) and ascorbic acid (23.79 to 18.74 %) content showed decreasing trend during storage period of three months. The overall acceptance score (8.00 to 7.22) was decreased during the storage period.Thus, prepared fibre enriched product can commercially be explored by food processing industry to ensure better returns to growers, processors and consumers as well.

Key word: Carambola, Fiber concentration, Guava, Nutritional quality, Pre-biotic nectar, Storage stability

Introduction:

India is also rich resource for the cultivation of wild or underutilized fruits *Averrhoa carambola* L. belonging to family Oxalidaceae is commonly known as ‘Kamrakh’, Carambola apple or ‘Star fruit’ and is one of important underutilized fruit. The star fruit is rich in almost all the essential amino acids with alanine, lysine and serine in good quantity. Guava has been aptly called the “Apple of Tropics” and “Poor man’s apple”. It is one of the most important subtropical and tropical fruit crops grown in the world. It is botanically named as *Psidiumguajava*L. and belongs to the family Myrtaceae. Guava is considered as one of the most delicious, exquisite, nutritionally valuable and remunerative crops, gifted with hardy nature, prolific bearing habit, high yielding capacity and excellent processing qualities.Fruits are rich in fibre but the juice extraction through the juice extractor generally reduces the fibre content of fruits. These fibres are known to cure several degenerative diseases. According to the traditional system of Indian Medicine, combinations of different foods are used to enhance the desired activity and to eliminate unwanted side effects.

Material and Methods

Guava and carambola fruits were purchased from farmers in the Bharuch district and brought to the Department of Post Harvest Technology

at ASPEE College of Horticulture and Forestry, NAU, Navsari. The ripe and healthy guava and carambola fruits were selected, sorted, graded, and washed. The guava fruits were then cut into pieces and passed through a pulper to extract the pulp.

Pre-biotic nectar is a fruit beverage to which fiber is added for health benefits. In this experiment, fiber was added to the prepared nectar. The fiber was extracted from the pomace of pineapple by washing it five times with RO water at a ratio of 1:10 (peel powder to water by weight). The extracted fiber was dried in a cabinet dryer at 60°C, milled into a fine powder, and used to prepare pre-biotic carambola-guava nectar.

Pre-biotic carambola-guava nectar was prepared by adding pineapple fiber to the nectar. The experiment was laid out on a factorial completely randomized design (FCRD) including 20 treatments with 3 repetitions each were conducted to prepare the pre-biotic carambola-guava nectar using different concentrations of fiber and carambola-guava blends, as detailed in Table 1. The nectar was prepared according to FPO specifications, containing 20% pulp, 15°Brix (TSS), and 0.30% acidity.

Sugar syrup was prepared by adding table sugar to boiling water, with its strength measured using a hand refractometer. Pre-biotic carambola-guava nectar was made by mixing blended carambola-guava pulp (20%) (as per treatment), pineapple fiber (as per treatment), and sugar syrup to achieve the desired TSS. The mixture was then boiled to 95±1°C, and the required quantity of citric acid was added to maintain 0.30% acidity. The prepared nectar was filled into pre-sterilized 200ml glass bottles and sealed airtight with crown caps. The product was pasteurized at 95±1°C in boiling water for 30 minutes, then cooled and stored at room temperature for three months. The total soluble solids (TSS) was determined with the help of hand refractometer and expressed as °Brix (Ranganna 1995). The titratable

acidity, sugars and ascorbic and were determined by the method as detailed by Ranganna (1995). Protein contents were estimated by Lowry method, developed by Lowry *et al.* (1951).

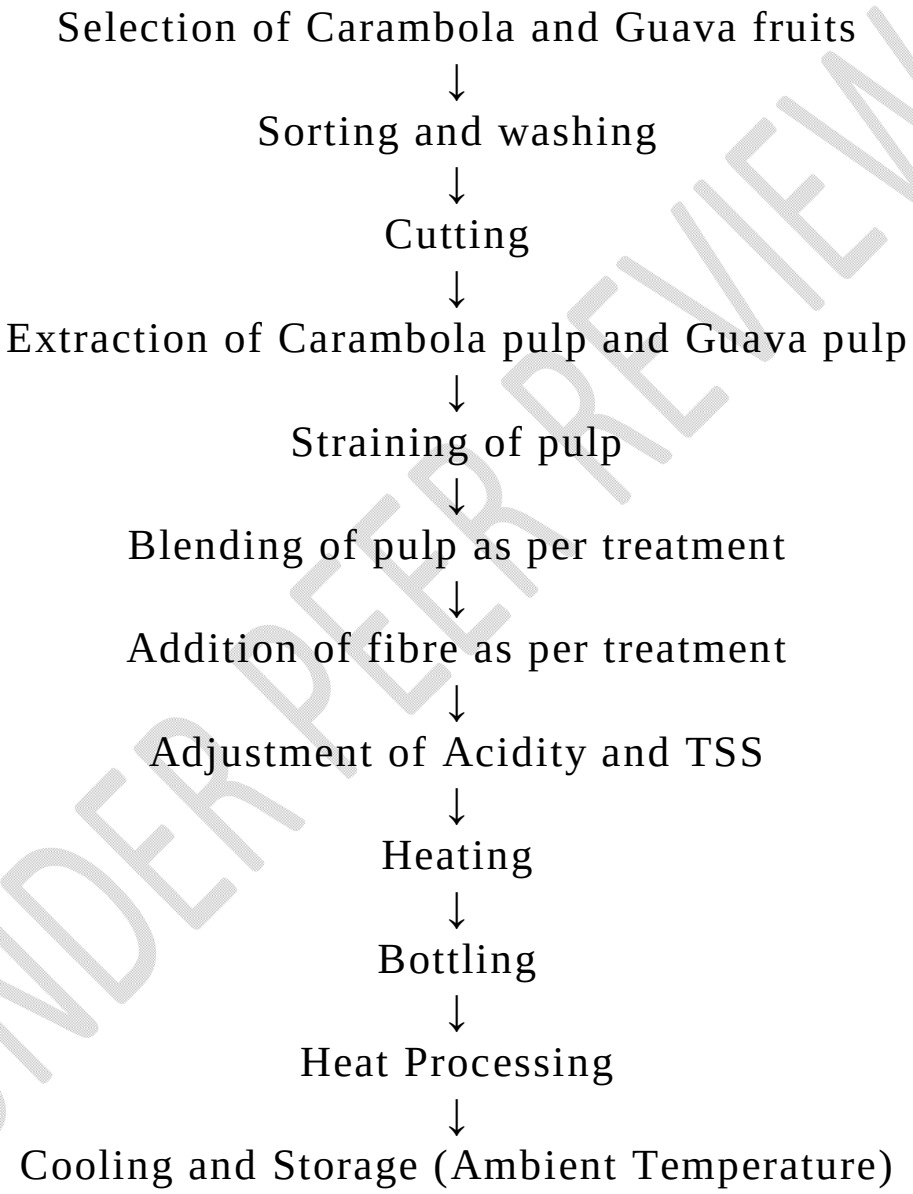

Fig 1: Principal steps for preparation of fiber enriched pre-biotic nectar

Factor 1: Blending levels

Blending level (I	Carambola (%	Guava (%)
B_1	20	0
B_2	15	5
B_3	10	10
B_4	5	15
B_5	0	20

Factor 2: Fibre levels

Fibre level (I	Concentrations (%
F_1	0.0
F_2	0.2
F_3	0.4
F_4	0.6

Table 1: Detail of treatments used to preparation of blended nectar

Treatment Combinations	Blends(B), %		Fibre level(F),%
	Carambo	Guava	
T_1-B_1F_1	20	0	0.0
T_2-B_1F_2	20	0	0.2
T_3-B_1F_3	20	0	0.4
T_4-B_1F_4	20	0	0.6
T_5-B_2F_1	15	5	0.0
T_6-B_2F_2	15	5	0.2
T_7-B_2F_3	15	5	0.4
T_8-B_2F_4	15	5	0.6
T_9-B_3F_1	10	10	0.0
T_{10}-B_3F_2	10	10	0.2
T_{11}-B_3F_3	10	10	0.4

T_{12}-B_3F_4	10	10	0.6
T_{13}-B_4F_1	5	15	0.0
T_{14}-B_4F_2	5	15	0.2
T_{15}-B_4F_3	5	15	0.4
T_{16}-B_4F_4	5	15	0.6
T_{17}-B_5F_1	0	20	0.0
T_{18}-B_5F_2	0	20	0.2
T_{19}-B_5F_3	0	20	0.4
T_{20}-B_5F_4	0	20	0.6

Result and discussion

Total Soluble Solids: The perusal of data pertaining to effect of blending levels and fibre concentrations on TSS of carambola-guava blended pre-biotic nectar during three month storage period has been presented in Table 2. The storage of carambola-guava nectar resulted significant increase in mean TSS (M) from initial value of 15.01 °Brix to 16.08 °Brix during three month storage. The increase in TSS during storage in the present investigation are in line with the observation reported by Gautam*et al.*(2021) for custard apple blended nectar, Mingire (2010) for mango nectar, Patel (2011) for mango nectar. interaction of blending levels, fibre concentrations and storage depicted variations in TSS from 15.00 °Brix to 16.63 °Brix during three-month storage period, with minimum increase in TSS from 15.00 °Brix to 15.60 °Brix in nectar prepared with 20 per cent carambola juice and 0.6 per cent fibre ($B_1F_4M_1$ to $B_1F_4M_4$) and maximum increase from 15.03 °Brix to 16.63 °Brix in nectar prepared by using 20 per cent guava pulp added with 0.60 per cent fibre ($B_5F_1M_1$ to $B_5F_1M_4$). The increasement of TSS in nectar during storage wasprobably due to conversion of left-over polysaccharidesinto soluble sugars and formation of water-soluble

pectin from protopectin. (Poonam *et al*., 2022). Similar results were reported by Jakhar and Pathak (2012). The increase in TSS during storage in the present investigation are in line with the observation reported by Vaghasiya (2015) for *Aloe vera* based health drink, Tahsildar (2016) *Aloe vera,* guava and jamun blended nectar.

Table 2: Effect of blending levels and fibre concentrations on TSS (°Brix) of carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre Concentrations (F)	TSS (°Brix) Blending levels (B)					Mean (MF, M)	Mean (F)
		B_{1}- C:G::20:0	B_{2}- C:G::15:5	B_{3}- C:G::10:10	B_{4}- C:G::5:15	B_{5} - C:G::0:20		
M_1 - Initial	F_{1}- 0%	15.00	15.03	15.00	15.00	15.03	15.01	**15.65**
	F_{2}- 0.2%	15.00	15.00	15.00	15.00	15.00	15.00	**15.61**
	F_{3}- 0.4%	15.00	15.00	15.00	15.03	15.00	15.01	**15.57**
	F_{4}- 0.6%	15.00	15.00	15.00	15.00	15.00	15.00	**15.54**
	Mean (B of M_1)	**15.00**	**15.01**	**15.00**	**15.01**	**15.01**	**15.01**	
M_2 – 1 month	F_{1}- 0%	15.30	15.40	15.57	15.63	15.80	15.54	
	F_{2}- 0.2%	15.27	15.37	15.53	15.57	15.70	15.49	
	F_{3}- 0.4%	15.23	15.33	15.47	15.50	15.60	15.43	
	F_{4}- 0.6%	15.23	15.30	15.43	15.47	15.57	15.40	
	Mean (B of M_2)	**15.26**	**15.35**	**15.50**	**15.54**	**15.67**	**15.46**	
M_3 – 2 months	F_{1}- 0%	15.57	15.80	15.90	16.07	16.13	15.89	
	F_{2}- 0.2%	15.53	15.77	15.90	16.00	16.10	15.86	
	F_{3}- 0.4%	15.47	15.73	15.87	15.97	16.03	15.81	
	F_{4}- 0.6%	15.43	15.70	15.83	15.93	15.97	15.77	

	Mean (B of M_3)	**15.50**	**15.75**	**15.88**	**15.99**	**16.06**	**15.84**	
M_4 – 3 months	**$F_{1-0\%}$**	15.70	16.00	16.13	16.37	16.63	16.17	
	$F_{2-0.2\%}$	15.67	15.93	16.07	16.30	16.53	16.10	
	$F_{3-0.4\%}$	15.63	15.90	16.00	16.23	16.47	16.05	
	$F_{4-0.6\%}$	15.60	15.83	15.93	16.20	16.43	16.00	
	Mean (B of M_4)	**15.65**	**15.92**	**16.03**	**16.28**	**16.52**	**16.08**	
	Mean (B)	**15.35**	**15.51**	**15.60**	**15.70**	**15.81**		
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**	
S.Em.±	0.02	0.02	0.04	0.02	0.04	0.04	0.08	
$CD_{0.05}$	0.06	0.05	NS	0.05	0.11	NS	NS	
CV %	1.00			0.90				

Acidity: The data pertaining to effect of blending levels and fibre concentrations on acidity of carambola-guava blended pre-biotic nectar during three month storage period has been presented in Table 3. The storage of carambola-guava nectar resulted significant increase in mean acidity (M) from initial value of 0.330 per cent to 0.348 per cent during three month storage. The increase in acidity during storage might be attributed to chemical interactions between organic constituents of fruits induced by temperature and actions of enzymes as reported by Sonia *et al.* (2010)and . Interaction of blending levels, fibre concentrations and storage depicted variations in acidity from 0.300 per cent to 0.361 per cent during three month storage period, with minimum increase in acidity from 0.300 per cent to 0.335 per cent in nectar prepared using 20 per cent carambola juice and 0.6 per cent fibre ($B_1F_4M_1$ to $B_1F_4M_4$) and maximum increase from 0.300 per cent to 0.361 per cent in nectar prepared by using 20 per cent guava pulp ($B_5F_1M_1$ to $B_5F_1M_4$). The acidity increased during storage period of six month which might be due to ascorbic acid degradation or hydrolysis of pectin (Poonam *et al.* 2022). Similar results were observed by Karanjalker*et al.* (2013). The increase in acidity during storage in the present investigation are in line with the observation reported by Vaghasiya (2015) for *Aloe vera* based health drink, Tahsildar (2016) *Aloe vera*, guava and jamun blended nectar.

Table 3: Effect of blending levels and fibre concentrations on acidity (%) of carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre concentrations (F)	Acidity (%)						
		Blending levels (B)					Mean (MF, M)	Mean (F)
		B_1- C:G::20:0	B_2- C:G::15:5	B_3- C:G::10:10	B_4 - C:G::5:15	B_5 - C:G::0:20		
M_1 - Initial	F_1- 0%	0.300	0.300	0.300	0.300	0.300	0.300	**0.330**
	F_2- 0.2%	0.300	0.300	0.300	0.300	0.300	0.300	**0.327**
	F_3- 0.4%	0.300	0.300	0.300	0.301	0.300	0.300	**0.325**
	F_4- 0.6%	0.300	0.300	0.300	0.300	0.300	0.300	**0.323**
	Mean (B of M_1)	**0.300**	**0.300**	**0.300**	**0.300**	**0.300**	**0.300**	

M_2 – 1 month	**$F_{1-0\%}$**	0.320	0.325	0.330	0.333	0.336	0.329
	$F_{2-0.2\%}$	0.318	0.322	0.328	0.330	0.332	0.326
	$F_{3-0.4\%}$	0.316	0.320	0.324	0.326	0.329	0.323
	$F_{4-0.6\%}$	0.314	0.317	0.322	0.323	0.327	0.321
	Mean (B of M_2)	**0.317**	**0.321**	**0.326**	**0.328**	**0.331**	**0.325**
M_3 – 2 months	**$F_{1-0\%}$**	0.330	0.332	0.334	0.340	0.345	0.336
	$F_{2-0.2\%}$	0.326	0.329	0.332	0.336	0.342	0.333
	$F_{3-0.4\%}$	0.324	0.325	0.329	0.334	0.340	0.331
	$F_{4-0.6\%}$	0.320	0.322	0.328	0.332	0.337	0.328
	Mean (B of M_3)	**0.325**	**0.327**	**0.331**	**0.336**	**0.341**	**0.332**
M_4 – 3 months	**$F_{1-0\%}$**	0.343	0.352	0.354	0.357	0.361	0.354
	$F_{2-0.2\%}$	0.339	0.345	0.350	0.354	0.359	0.349
	$F_{3-0.4\%}$	0.339	0.338	0.345	0.351	0.355	0.346
	$F_{4-0.6\%}$	0.335	0.333	0.342	0.348	0.353	0.342
	Mean (B of M_4)	**0.339**	**0.342**	**0.348**	**0.353**	**0.357**	**0.348**
	Mean (B)	**0.320**	**0.323**	**0.326**	**0.329**	**0.332**	**0.326**
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**
S.Em.±	0.001	0.001	0.001	0.001	0.002	0.001	0.003
$CD_{0.05}$	0.002	0.001	NS	0.002	0.004	0.004	NS
CV %	0.97			1.55			

Total Sugars: Data depict that storage of carambola-guava blended nectar resulted significant increase in mean total sugars (M) from initial value of 13.27 per cent to 14.29 per cent during three month storage. The increase in total sugars during storage might be due to hydrolysis of polysaccharides into simple soluble sugars. Similar observation were reported by Vijayanand*et al.* (2010) for litchi juice, Sharma *et al.* (2013) for various fruits, Sherpa *et al.* (2014) for plum and Arsad*et al.* (2015) for sugar palm fruit juice. Interaction of blending levels, fibre concentrations and storage depicted variations in total sugars from 13.15 per cent to 14.64 per cent during three month storage period, with minimum increase in total sugars from 13.16 per cent to 13.90 per cent in nectar prepared using 20 per cent carambola juice and 0.6 per cent fibre ($B_1F_4M_1$ to $B_1F_4M_4$) and maximum increase from 13.42 per cent to 14.64 per cent in nectar prepared by using 20 per cent guava pulp ($B_5F_1M_1$ to $B_5F_1M_4$).This increase in total sugar might be attributed to thehydrolysis of polysaccharides like pectin, starch

etc.,into simple sugars as also reported byGautam*et al*.(2021). The increase in total sugars during storage in the present investigation are in line with the observation reported by Kumar *et al.* (2009) for aonla-pineapple nectar, Sonia *et al.* (2010) for jamun nectar, Ahmad (2012) for guava nectar and Choudhary*et al.* (2012) for aonla nectar.

Table 4: Effect of blending levels and fibre concentrations on total sugars (%) of carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre Concentrations (F)	Total sugars (%)					Mean (MF, M)	Mean (F)
		Blending levels (B)						
		B_{1}- C:G::20:0	B_{2}- C:G::15:5	B_{3}- C:G::10:10	B_{4}- C:G::5:15	B_{5} - C:G::0:20		
M_1 - Initial	F_{1}- 0%	13.15	13.17	13.25	13.33	13.42	13.26	**13.87**
	F_{2}- 0.2%	13.15	13.18	13.25	13.34	13.43	13.27	**13.83**
	F_{3}- 0.4%	13.16	13.20	13.26	13.34	13.42	13.27	**13.80**
	F_{4}- 0.6%	13.16	13.20	13.28	13.36	13.44	13.29	**13.76**
	Mean (B of M_1)	**13.15**	**13.19**	**13.26**	**13.34**	**13.43**	**13.27**	
M_2 – 1 month	F_{1}- 0%	13.58	13.67	13.74	13.88	14.00	13.77	
	F_{2}- 0.2%	13.55	13.66	13.71	13.84	13.90	13.73	
	F_{3}- 0.4%	13.51	13.60	13.66	13.81	13.89	13.69	
	F_{4}- 0.6%	13.47	13.53	13.60	13.77	13.83	13.64	
	Mean (B of M_2)	**13.53**	**13.62**	**13.68**	**13.82**	**13.91**	**13.71**	
M_3 – 2 months	F_{1}- 0%	13.87	13.95	14.04	14.16	14.30	14.06	
	F_{2}- 0.2%	13.82	13.90	13.99	14.12	14.20	14.01	
	F_{3}- 0.4%	13.77	13.84	13.95	14.07	14.14	13.95	
	F_{4}- 0.6%	13.75	13.80	13.91	14.04	14.08	13.92	
	Mean (B of M_3)	**13.80**	**13.87**	**13.97**	**14.10**	**14.18**	**13.99**	
M_4 – 3	F_{1}- 0%	14.12	14.24	14.37	14.50	14.64	14.37	

months	**$F_{2-0.2\%}$**	14.05	14.20	14.32	14.45	14.56	14.32	
	$F_{3-0.4\%}$	14.00	14.20	14.27	14.41	14.49	14.27	
	$F_{4-0.6\%}$	13.90	14.14	14.24	14.34	14.40	14.20	
	Mean (B of M_4)	**14.02**	**14.20**	**14.30**	**14.43**	**14.52**	**14.29**	
	Mean (B)	**13.63**	**13.72**	**13.80**	**13.92**	**14.01**	**13.82**	
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**	
S.Em.±	0.04	0.04	0.08	0.03	0.07	0.06	0.14	
$CD_{0.05}$	0.12	NS	NS	0.09	NS	NS	NS	
CV %	2.09			1.79				

Ascorbic acid: The effect of blending levels and fibre concentrations period on ascorbic acid of carambola-guava blended pre-biotic nectar during three month storage has been presented in Table 5.Thestorage of carambola-guava nectar resulted significant decrease in mean ascorbic acid (M) from initial value of 23.79 mg/100g to 18.74 mg/100g during three month storage. Interaction of blending levels, fibre concentrations and storage depicted variation in ascorbic acid from 3.92 mg/100g to 41.44 mg/100g during three month storage period with minimum decrease in ascorbic acid from 5.42 mg/100g to 3.92 mg/100g in nectar prepared with 20 per cent carambola juice ($B_1F_1M_1$ to $B_1F_1M_4$) and maximum from 41.44 mg/100g to 32.68 mg/100g in nectar prepared by 20 per cent guava pulp added with 0.60 per cent fibre ($B_5F_4M_1$ to $B_5F_4M_4$). The decline in ascorbic acid could also be associated with oxidation of ascorbic acid (Patel and Naik, 2014). The decrease in ascorbic acid during storage in present investigation are in line with the observation reported by Gaikwad *et al.* (2021) in guava blended nectar.

Table 5: Effect of blending levels and fibre concentrations on ascorbic acid (mg/100g)of carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre concentrations (F)	Ascorbic acid (mg/100g) Blending levels (B)					Mean (MF, M)	Mean (F)
		B_1- C:G::20:0	B_2- C:G::15:5	B_3- C:G::10:10	B_4 - C:G::5:15	B_5 - C:G::0:20		
M_1 - Initial	$F_{1-0\%}$	5.42	14.34	23.38	34.29	41.26	23.74	**21.15**
	$F_{2-0.2\%}$	5.43	14.36	23.42	34.31	41.33	23.77	**21.23**
	$F_{3-0.4\%}$	5.42	14.36	23.47	34.43	41.38	23.81	**21.29**
	$F_{4-0.6\%}$	5.43	14.30	23.55	34.50	41.44	23.84	**21.36**
	Mean (B of M_1)	**5.43**	**14.34**	**23.46**	**34.38**	**41.35**	**23.79**	
M_2 – 1 month	$F_{1-0\%}$	4.72	12.20	21.71	32.68	39.59	22.18	
	$F_{2-0.2\%}$	4.80	12.23	21.85	32.72	39.63	22.25	
	$F_{3-0.4\%}$	4.82	12.27	21.91	32.80	39.67	22.30	
	$F_{4-0.6\%}$	4.86	12.32	21.98	32.90	39.75	22.36	
	Mean (B of M_2)	**4.80**	**12.26**	**21.86**	**32.78**	**39.66**	**22.27**	
M_3 – 2 months	$F_{1-0\%}$	4.48	10.97	19.25	29.45	36.23	20.08	
	$F_{2-0.2\%}$	4.50	11.15	19.45	29.52	36.35	20.19	
	$F_{3-0.4\%}$	4.57	11.27	19.49	29.58	36.49	20.28	
	$F_{4-0.6\%}$	4.62	11.32	19.61	29.65	36.60	20.36	
	Mean (B of M_3)	**4.54**	**11.18**	**19.45**	**29.55**	**36.42**	**20.23**	
M_4 – 3 months	$F_{1-0\%}$	3.92	9.70	18.68	28.12	32.68	18.62	
	$F_{2-0.2\%}$	3.92	9.81	18.75	28.27	32.74	18.70	
	$F_{3-0.4\%}$	3.96	9.86	18.82	28.38	32.82	18.77	
	$F_{4-0.6\%}$	4.00	9.92	19.00	28.46	32.95	18.87	
	Mean (B of M_4)	**3.95**	**9.82**	**18.81**	**28.31**	**32.80**	**18.74**	
	Mean (B)	**4.68**	**11.90**	**20.90**	**31.25**	**37.56**	**21.26**	
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**	
S.Em.±	0.07	0.06	0.14	0.06	0.14	0.12	0.28	
$CD_{0.05}$	0.20	NS	NS	0.17	0.39	NS	NS	
CV %	2.24			2.26				

Protein: The perusal of data pertaining to effect of blending levels and fibre concentrations on protein of carambola-guava

blended pre-biotic nectar during three month storage period has been presented in Table 6. The storage of carambola-guava nectar resulted significant decrease in mean protein (M) from initial value of 0.318 per cent to 0.290 per cent during three monthstorage. The decrease in protein content during storage might be due to breakdown of protein to free amino acids and their utilization in NEB caused by Maillard's reactions (Raj, 2004). Interaction of blending levels, fibre concentrations and storage depicted variations in protein from 0.179 per cent to 0.412 per cent during three month storage period, with maximum decrease in protein from 0.217 per cent to 0.179 per cent in nectar prepared with 20 per cent carambola juice ($B_1F_1M_1$ to $B_1F_1M_4$) and minimum from 0.370 per cent to 0.348 per cent in nectar prepared by 5 per cent carambola juice and 15 per cent guava pulp added with 0.20 per cent fibre ($B_4F_2M_1$ to $B_4F_2M_4$).Similar decrease in protein content were reported by Deshmukh*et al.* (2019) in blended aonla and *Aloe vera* nectar with stevia as a sugar substitute and Brunda*et al.* (2022) in blended banana squash

Table 6: Effect of blending levels and fibre concentrations on protein (%)of carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre concentrations (F)	Protein (%)					Mean (MF, M)	Mean (F)
		Blending levels (B)						
		B_{1}-C:G::20:0	B_{2}-C:G::15:5	B_{3}- C:G::10:10	B_{4} - C:G::5:15	B_{5} - C:G::0:20		
M_1 - Initial	F_{1}- 0%	0.217	0.270	0.317	0.373	0.410	0.317	**0.301**
	F_{2}- 0.2%	0.219	0.273	0.315	0.370	0.407	0.317	**0.303**
	F_{3}- 0.4%	0.220	0.273	0.317	0.370	0.407	0.317	**0.304**
	F_{4}- 0.6%	0.223	0.275	0.320	0.374	0.412	0.321	**0.307**
	Mean (B of M_1)	**0.220**	**0.273**	**0.317**	**0.372**	**0.409**	**0.318**	
M_2 - 1 month	F_{1}- 0%	0.203	0.259	0.305	0.359	0.400	0.305	
	F_{2}- 0.2%	0.203	0.264	0.306	0.362	0.400	0.307	
	F_{3}- 0.4%	0.207	0.266	0.308	0.365	0.402	0.310	
	F_{4}- 0.6%	0.210	0.268	0.310	0.366	0.404	0.312	
	Mean (B of M_2)	**0.206**	**0.264**	**0.307**	**0.363**	**0.401**	**0.308**	
M_3 - 2 months	F_{1}- 0%	0.190	0.247	0.295	0.350	0.390	0.294	
	F_{2}- 0.2%	0.193	0.253	0.295	0.353	0.391	0.297	
	F_{3}- 0.4%	0.195	0.257	0.296	0.355	0.391	0.299	
	F_{4}- 0.6%	0.195	0.260	0.298	0.357	0.393	0.301	
	Mean (B of M_3)	**0.193**	**0.254**	**0.296**	**0.354**	**0.391**	**0.298**	
M_4 - 3 months	F_{1}- 0%	0.179	0.240	0.286	0.342	0.382	0.286	
	F_{2}- 0.2%	0.182	0.247	0.288	0.348	0.382	0.289	
	F_{3}- 0.4%	0.182	0.252	0.288	0.349	0.384	0.291	
	F_{4}- 0.6%	0.187	0.255	0.290	0.351	0.385	0.294	
	Mean (B of M_4)	**0.183**	**0.249**	**0.288**	**0.347**	**0.383**	**0.290**	
	Mean (B)	**0.200**	**0.260**	**0.302**	**0.359**	**0.396**	**0.304**	
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**	
S.Em.±	0.001	0.001	0.002	0.001	0.002	0.002	0.005	
$CD_{0.05}$	0.003	0.003	NS	0.003	NS	NS	NS	
CV %	1.04			2.62				

Over all acceptability: Over all acceptability score of blended nectar significantly decreased with increased the storage period (Table-7). Mean overall acceptability score decreased from initial value of 8.00 to 7.22 during three months storage. Interaction of blending levels, fibre concentrations and storage depicted variation in overall acceptability from 6.77 to 8.22 during three months storage period with maximum decrease in overall acceptability from 7.72 to 6.77 in nectar prepared using 20 per cent carambola juice with 0.60 per cent fibre ($B_1F_4M_1$ to $B_1F_4M_4$) and minimum from 8.20 to 7.56 in nectar prepared by 15 per cent guava pulp with 5 per cent carambola and 0.20 per cent fibre (B4F2M1 to B4F2M4). The decrease in overall sensory score of pre-biotic blended nectar during storage could be correlated to changes in colour, flavour and body of pre-biotic blended nectar. There are many extrinsic factorswhich determine the storage stability of products andtemperature plays an important role among them. The otherpossible reasons could be the loss of volatile aromaticsubstances responsible for flavour and taste which decreasedacceptability in storage at ambient condition(Gaikwad *et al* 2022).The values of present investigation are almost in conformed to that reported by Vaghasiya (2016) for *Aloe vera* based health drink and Ahmad (2017) in fibre enriched mango nectar.

Table7: Effect of blending levels and fibre concentrations on over all acceptabilityof carambola-guava blended pre-biotic nectar during storage period of three months

Storage period (M)	Fibre concentrations (F)	Overall acceptability (9 point Hedonic scale)					Mean	Mean (F)
		Blending levels (B)						
		B_{1}-C:G::20:0	B_{2}-C:G::15:5	B_{3}-C:G::10:10	B_{4}-C:G::5:15	B_{5}-C:G::0:20		
M_1 - Initial	F_{1}- 0%	7.89	7.99	8.06	8.18	8.22	8.07	**7.67**
	F_{2}- 0.2%	7.86	7.97	8.05	8.20	8.19	8.05	**7.68**
	F_{3}- 0.4%	7.78	7.91	7.96	8.11	8.13	7.98	**7.58**
	F_{4}- 0.6%	7.72	7.87	7.90	8.02	8.07	7.92	**7.51**
	Mean (B of M_1)	**7.81**	**7.94**	**7.99**	**8.13**	**8.15**	**8.00**	
M_2 – 1 month	F_{1}- 0%	7.53	7.66	7.86	7.95	7.96	7.79	
	F_{2}- 0.2%	7.56	7.68	7.84	7.97	7.95	7.80	
	F_{3}- 0.4%	7.45	7.60	7.74	7.82	7.85	7.69	
	F_{4}- 0.6%	7.41	7.54	7.68	7.76	7.79	7.63	
	Mean (B of M_2)	**7.49**	**7.62**	**7.78**	**7.87**	**7.89**	**7.73**	
M_3 – 2 months	F_{1}- 0%	7.24	7.43	7.57	7.78	7.77	7.56	
	F_{2}- 0.2%	7.23	7.46	7.59	7.80	7.76	7.57	
	F_{3}- 0.4%	7.11	7.36	7.47	7.71	7.67	7.46	
	F_{4}- 0.6%	7.03	7.25	7.39	7.64	7.56	7.37	
	Mean (B of M_3)	**7.15**	**7.38**	**7.50**	**7.73**	**7.69**	**7.49**	
M_4 – 3 months	F_{1}- 0%	6.96	7.10	7.29	7.53	7.51	7.28	
	F_{2}- 0.2%	6.92	7.16	7.30	7.56	7.52	7.29	
	F_{3}- 0.4%	6.83	7.03	7.20	7.44	7.41	7.18	
	F_{4}- 0.6%	6.77	6.96	7.14	7.37	7.35	7.12	
	Mean (B of M_4)	**6.87**	**7.06**	**7.23**	**7.47**	**7.45**	**7.22**	
	Mean (B)	**7.33**	**7.50**	**7.63**	**7.80**	**7.79**	**7.61**	
	B	**F**	**B×F**	**M**	**B×M**	**F×M**	**B×F×M**	
S.Em.±	0.03	0.02	0.05	0.02	0.05	0.05	0.10	
$CD_{0.05}$	0.07	0.07	NS	0.06	NS	NS	NS	
CV %	2.31			2.32				

Conclusion: The findings summarized above indicate that the pre-biotic carambola-guava blended nectar prepared by using different pulp ratio and fibre concentration was accepted up to three months of storage period. The chemical parameters like TSS, acidity and total sugars increased while protein ascorbic

acid content was decreased during storage period of three months. Among different blend levels and fibere concentration the nectar prepared with 15 per cent guava pulp with 5 per cent carambola, 0.20 per cent fibre, recorded highest overall acceptability score afterthree month storage.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT,COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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