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Study on standardization of recipe for betelvine beverage

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Abstract
The present study entitled **"**Study on standardization of recipe for betelvine beverage" was carried out during the year 2022-23 in the Horticulture Laboratory, RABL College of Agriculture and Research Station, Chhuikhadan KCG (C.G.). The experiment was laid out in Completely Randomized Design (CRD) with 03 replications, 08 treatments. Various chemical, nutritional and economics parameters were recorded under this investigation. The result revealed that the chemical and nutritional evaluation of pH, TSS acid ratio and non reducing sugar was significantly superior in the treatment FM1 (1%). While total sugar, reducing sugar**,** Total soluble solids and acidity was significantly superior in the treatment FM8 (8%). The quality and sensory evaluation like colour, appearance, taste, flavour and overall acceptability significantly superior in the treatment FM5 (5%). The economic parameters like cost of production, gross returns, net returns and B:C ratio (1.84) was superior in the treatment FM5 (5%). While the lowest B:C ratio (0.63) found in treatment FM1 (1%). Therefore, it may be conducted that treatment FM5 (5%) may be selected for making best quality betelvine beverage.

Keywords: Betelvine, flavoured milk (FM), B:C ratio

Introduction
The betelvine's scientific name is *Piper betle* L. It is a member of the piperaceae family, sometimes known as the black pepper family. The vine is a perennial root climber that prefers shade and is dioecious (male and female plants are distinct). Betelvines come in over 100 different types of which roughly 40 are indigenous to India and 30 to West Bengal (Guha and Jain, 1997) [4].

In India, betelvine leaves with a heart-shaped shape are referred to as paan. In various regions of the nation, it is also referred to as Nagaballi, Nagurvel, Saptaseera, Sompatra, Tamalapaku, Tambul, Tambuli, Vaksha Patra, Vettilai and Voojangalata (CSIR, 1969) [1]. It is also utilized as a particular item provided to the guests as a sign of respect. The betel leaf truly stands alone in Indian civilization for these traditional applications with no contemporary equivalents (Guha and Jain, 1997) [4].

In reality from the dawn of civilization this edible leaf has held a prestigious role in human society notably in nations like Bangladesh, Burma, China, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, South Africa, Sri Lanka and Thailand. Where leaves are typically chewed in their natural, uncooked state with a variety of other ingredients such as shaved arecanuts, slaked lime, coriander, clove, cardamom, sweetener, coconut scrapings, ashes of diamond, pearl, gold, silver (used in Ayurvedic preparations), jelly, pepper mint, flavouring agent and fruit pulp (CSIR, 1969) [1]. According to estimates 46% of milk is used as market milk and 54% of total milk is used to make different milk products. Market milk is defined as milk that is sold into the market and is consumed immediately by the consumer.

Benefits of Paan Beverage full of flavour for nourishment and freshness regulates body temperature in the summer which helps prevent heatstroke, strengthen bones with calcium from the drink, body agile and Vitamin-C obtained to improve digestion, relief from bad mouth odor and tooth decay.

Paan beverage (Paan flavored milk) is prepared from non-fermented fresh milk. Currently flavoured milk available in the market contain synthetic chemicals added for flavour and colour which is not good for children's health.

In this region processed products of betelvine like paan flavoured milk drink has a huge potential for growth and provide employment to marginal farmers with a high value income.

Materials and Methods

This chapter provides a brief overview of the materials utilised and the techniques employed throughout the research. The present experiment entitled **"**Study on standardization of recipe for betelvine beverage" was conducted during 2022-23 at Horticulture Laboratory, RABL College of Agriculture and Research Station, Chhuikhadan KCG (C.G.). The investigation employed a Completely Randomized Design (CRD). There were 8, FM1 10 g (1%), FM2 20 g (2%), FM3 30 g (3%), FM4 40 g (4%), FM5 50 g (5%), FM6 60 g (6%), FM7 70 g (7%) and FM8 80 g (8%)

Results and Discussion

Chemical and nutritional evaluation

Data related to outcome of various recipe treatments on total sugar value, reducing sugar value and non-reducing sugar value of betelvine beverage at room temperature preservation are displayed in Table 1. Although considerable variation have been observed in the reducing sugar value at different interval of preservation. The final observations were taken after 30th days of storage of betelvine beverage, highest value of 15.20 °Brix total soluble solids with the treatment FM8 (8%) obtained, which was found at par with treatment FM5 (5%), treatment FM6 (6%) and treatment FM7 (7%). In contrast, the lowest total soluble solids value was obtained 13.90 °Brix with the treatment FM1 (1%) The current research is in concurrent with Byanna and Gowda (2012) [2] on sweet orange RTS and Nectar. pH values after 30 days of the storage of betelvine beverage was seen with the treatment FM1 (1%) which was higher (5.73), whereas the treatment FM8 (8%) showed the lower pH value which was 4.67. Gupta *et al.* (2017) also reported the decrease in pH of functional dairy drinks during storage. After 30 days of storage betelvine beverage maximum TSS acid ratio (44.83) was recorded with the treatment FM1 (1%) followed by treatment FM2 (2%), FM3 (3%) and FM4 (4%), whereas the minimum TSS acid ratio (38.00) was observed with the treatment FM8 (8%). Similar findings are reported by Shrivastava *et al.* (2013) [9] on custard apple Nectar. After 30 days of storage of betelvine beverage acidity value increased to 0.40% in treatment FM8 (8%) being the highest in comparison, while treatment FM1 (1%) which was showed the lowest acidity value of 0.31%. The current findings are based on work on sweet orange RTS and Nectar by Byanna and Gowda (2012) [2], Yadav *et al.* (2012) [10] in Banana RTS.

After 30 days storage of betelvine beverage higher reducing sugar value was reported 3.85% with the treatment FM8 (8%). On other hand, the lower reducing sugar value was seen 2.96% with the treatment FM1 (1%). The similar results have also been reported by Chinwe *et al.* (2015) [11] in jamun products. After 30 days storage of betelvine beverage maximum total sugar value was seen 11.68% with the treatment FM8 (8%) but on the other hand the minimum total sugar value was noticed 10.92% with the treatment FM1 (1%). Similar findings are reported by Divyashree *et al.* (2018) [12] in sweet orange RTS. After 30 days storage of betelvine beverage maximum non reducing sugar value was detected 7.96% with the treatment FM1 (1%) followed by treatment FM2 (2%), FM3 (3%) and FM4 (4%) and the minimum non reducing sugar value was obtained 7.83% with the treatment FM8 (8%). Similar findings were presented by Byanna and Gowda (2012) [2] in sweet orange nectar.

Sensory evaluation

When observed on the 30 days of storage, the treatment FM5 (5%) had the highest colour score of 5.47, followed by FM4 (4%), FM6 (6%) and FM7 (7%), while the treatment FM1 (1%) had the lowest colour score of 3.00. After 30 days of storage, treatment FM5 (5%) scoring the maximum at 5.43, followed by FM4 (4%), FM6 (6%) and FM7 (7%), whereas FM1 (1%) minimum lowest score of 3.10. After 30 days of storage, the treatment FM5 (5%) had the maximum flavour score of 5.56, followed by FM6 (6%), FM4 (4%) and FM7 (7%). On the other hand, the treatment FM1 (1%) had the minimum flavour score of 2.75. Similar findings have also been reported by Rathnayake *et al.* (2017) [8], Manchekar *et al.* (2008) [7] and Ekeledo *et al.* (2013) [3]. After 30 days of storage, the treatment FM5 (5%) had the higher taste score of 5.17, followed by FM4 (4%), FM6 (6%) and FM7 (7%). On the other hand, the treatment FM1 (1%) had the lower taste score of 3.37. After 30 days of storage, the treatment FM5 (5%) had the maximum flavour score of 27.37, followed by FM4 (4%), FM6 (6%) and FM7 (7%). On the other hand, the treatment FM1 (1%) had the minimum flavour score of 17.87. Hassan *et al.* (2015) [6] recorded a decreased trend in overall acceptability score of milk during refrigerated storage.

Economics

The highest production cost for 100 bottles (1764.5 Rs.) was recorded in treatment FM8 (8%) and the least cost of production in the treatment FM1 (1%) (Rs.1589.5). The highest gross return for 100 bottles (4800 Rs.) was recorded in treatment FM5 (5%), followed by treatment FM4 (4%), FM6 (6%) and FM7 (7%). However, the lowest gross return for 100 bottles (2600 Rs.) was recorded in the treatment FM1 (1%). The highest net return for 100 bottles (3110.5 Rs.) was recorded in treatment FM5 (5%), followed by treatment FM4 (4%), FM6 (6%) and FM7 (7%), while the lowest net return for 100 bottles (1010.5 Rs.) was recorded in the treatment FM1 (1%). The highest benefit cost ratio (1.84) was recorded in treatment FM5 (5%), followed by treatment FM4 (4%)), whereas the lowest benefit cost ratio (0.63) was recorded in the treatment FM1 (1%).

Table 1: Economics

Treatment details	Total production cost for 100 bottles (Rs.)	Gross return for 100 bottles (Rs.)	Net return for 100 bottles (Rs.)	B:C Ratio
10 g (1%)	1589.5	2600	1010.5	0.63
20 g (2%)	1614.5	3000	1385.5	0.85
30 g (3%)	1639.5	3800	2163.5	1.13
40 g (4%)	1664.5	4500	2835.5	1.70
50 g (5%)	1689.5	4800	3110.5	1.84
60 g (6%)	1714.5	4300	2585.5	1.50
70 g (7%)	1739.5	4000	2260.5	1.29
80 g (8%)	1764.5	3300	1535.5	0.87

	TSS (°Brix)				pH				TSS acid ratio				Acidity (%)			
	Storage period (in days)				Storage period (in days)				Storage period (in days)				Storage period (in days)			
	0	10	20	30	0	10	20	30	0	10	20	30	0	10	20	30
10 g (1%)	12.70	13.27	13.60	13.90	6.92	6.43	5.93	5.73	79.37	63.19	52.30	44.83	0.16	0.21	0.26	0.31
20 g (2%)	12.80	13.30	13.73	13.95	6.90	5.84	5.34	5.14	75.29	60.45	50.85	43.59	0.17	0.22	0.27	0.32
30 g (3%)	12.83	13.38	13.80	14.00	6.88	5.81	5.31	5.11	71.27	58.17	49.28	42.42	0.18	0.23	0.28	0.33
40 g (4%)	13.00	13.50	14.13	14.20	6.34	5.75	5.25	5.05	68.42	56.25	48.72	41.76	0.19	0.24	0.29	0.34
50 g (5%)	13.60	14.10	14.50	14.80	6.31	5.58	5.08	4.88	68.00	56.04	48.33	41.28	0.20	0.25	0.30	0.35
60 g (6%)	13.70	14.23	14.70	14.90	6.25	5.51	5.04	4.72	65.04	54.73	47.41	40.38	0.21	0.26	0.31	0.36
70 g (7%)	13.80	14.30	14.80	15.00	6.08	5.42	4.92	4.68	57.08	49.31	43.52	38.46	0.24	0.29	0.34	0.39
80 g (8%)	14.00	14.50	15.00	15.20	6.01	5.38	4.88	4.67	55.20	48.33	42.85	38.00	0.25	0.30	0.36	0.40
SEm (±)	0.28	0.29	0.30	0.29	0.17	0.16	0.14	0.13	1.75	1.44	1.23	1.06	0.01	0.01	0.01	0.01
CD (1%) =	0.84	0.86	0.91	0.87	0.50	0.47	0.42	0.39	5.24	4.31	3.69	3.18	0.02	0.02	0.02	0.02
CV (%) =	3.65	3.60	3.66	3.48	4.47	4.72	4.64	4.50	4.49	4.46	4.45	4.44	5.00	4.00	4.59	2.86

Table 2: Chemical and nutritional evaluation of betevine beverage

	Reducing sugar (%)				Total sugar (%)				Non reducing sugar (%)			
	Storage period (in days)				Storage period (in days)				Storage period (in days)			
	0	10	20	30	0	10	20	30	0	10	20	30
10 g (1%)	3.24	3.13	3.03	2.96	11.04	10.97	10.94	10.92	7.80	7.84	7.91	7.96
20 g (2%)	3.35	3.27	3.17	3.09	11.15	11.10	11.07	11.03	7.80	7.83	7.90	7.94
30 g (3%)	3.51	3.38	3.27	3.19	11.23	11.19	11.15	11.12	7.72	7.81	7.88	7.93
40 g (4%)	3.61	3.48	3.37	3.27	11.31	11.26	11.22	11.20	7.70	7.78	7.85	7.92
50 g (5%)	3.72	3.58	3.46	3.36	11.40	11.35	11.29	11.27	7.68	7.77	7.83	7.91
60 g (6%)	3.87	3.71	3.62	3.53	11.49	11.45	11.41	11.39	7.62	7.74	7.79	7.86
70 g (7%)	4.03	3.87	3.77	3.68	11.63	11.59	11.55	11.53	7.60	7.72	7.78	7.85
80 g (8%)	4.20	4.04	3.94	3.85	11.78	11.74	11.70	11.68	7.58	7.70	7.76	7.83
SEm (±)	0.02	0.02	0.02	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.02	0.02
CD (1%) =	0.05	0.06	0.06	0.09	0.14	0.10	0.10	0.09	0.09	0.08	0.05	0.05
CV (%) =	0.80	0.93	0.93	1.48	0.72	0.51	0.51	0.45	0.70	0.56	0.36	0.46

Table 3: Sensory evaluation of betelvine beverage

	Colour	Appearance	Flavour	Taste	Overall Acceptability	Rating
10 g (1%)	5.43	5.30	5.57	4.95	5.31	Like lightly
20 g (2%)	5.83	5.70	5.80	5.50	5.70	Like slightly
30 g (3%)	6.70	6.00	6.37	5.65	6.18	Like slightly
40 g (4%)	7.32	7.23	7.27	6.65	7.11	Like moderate
50 g (5%)	8.00	7.63	8.00	7.76	7.84	Like very much
60 g (6%)	6.44	6.82	6.87	7.53	6.91	Like slightly
70 g (7%)	6.15	6.40	6.83	6.60	6.49	Like slightly
80 g (8%)	5.97	6.02	6.73	6.33	6.26	Like slightly

Conclusion

The chemical and nutritional evaluation of pH, TSS acid ratio and non reducing sugar was significantly superior in the treatment FM1 (1%), while total sugar, reducing sugar**,** total soluble solids and acidity were significantly superior in the treatment FM8 (8%). The quality and sensory evaluation like colour, appearance, taste, flavour and overall acceptability are significantly superior in the treatment FM5 (5%). The economic parameters like cost of production, gross returns, net returns and B:C ratio (1.84) was superior in the treatment FM5 (5%), while the lowest B:C ratio (0.63) was found in treatment FM1 (1%). On the basis of above findings, treatment FM5 (5%) stands first in position and FM4 (4%) stands in second order of preference. However, treatment FM6 (6%) comes in next in order. Therefore, it may be concluded that treatment FM5 (5%) will be preferable for the best quality betelvine beverage.

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