



Research Paper

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Studies on preparation of kokum (*Garcinia indica* Choisy) syrup from kokum rind juice

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ABSTRACT : Kokum syrup was prepared by using kokum rind juice in proportion of 1:5 and 1:6 (kokum rind juice: 75 °Brix sugar syrup) with different levels of citric acid treatments. The physico-chemical composition and sensory qualities of kokum syrup were studied during the 3 months of storage period to standardize optimum recipe for the preparation of kokum syrup from rind juice. An increasing trend in T.S.S., acidity, reducing and total sugars was observed during storage period of 90 days. Kokum syrup with 1 part rind juice : 6 parts 75 °B sugar syrup and 1 per cent citric acid was found to be the best recipe with respect to organoleptic qualities like colour, flavour and overall acceptability.

KEY WORDS : Kokum juice, Storage, Syrup, Organoleptic score, Recipe

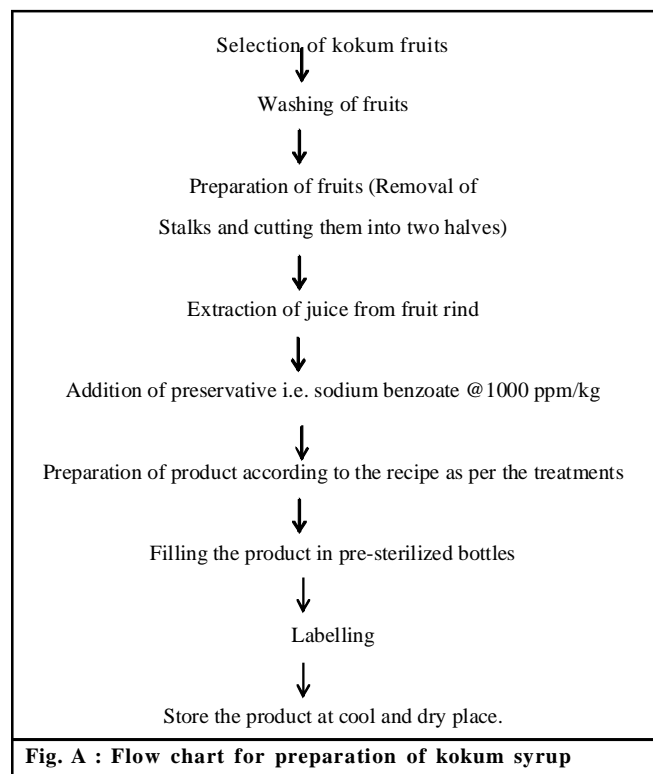
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Kokum (*Garcinia indica* Choisy), a member of the family Guttiferae is one of the important indigenous tree spice crops grown in South Konkan region of Maharashtra. It is also found in Goa, Belgaum, Southwards of Karnataka, Kerala, forests of Assam, Khasi jayanti hills, West Bengal, Surat districts of Gujarat, Mauritius Island, etc. (Muhammed *et al.*, 1994). Kokum fruit is cardiotoxic, antihelminthic, anti-acidic and useful in piles, dysentery, tumours and pains. Kokum butter is considered nutritive, demulcent, astringent and emollient (Sampatha and Krishnamurthy, 1982). Kokum rind is a rich source of 8-hydroxy citric acid (Verghese, 1996) which is an anti-obesity agent. It suppresses fatty acid synthesis, lipogenesis, food intake and induces weight loss. Garcinol, a polyisoprenylated benzophenone purified from *G. indica* fruit rind displays antioxidant, anti-cancer and anti-ulcer properties (Mishra *et al.*, 2006). Kokum syrup is one of the commercial products prepared from kokum rind in the konkan region of Maharashtra. Traditionally, kokum syrup is prepared by following osmotic technique. Earlier, Relekar *et al.* (2005) reported the method of preparation of kokum syrup from kokum rind juice. The present research was undertaken to standardize the recipe for kokum syrup prepared from rind juice and to study its storage behaviour at ambient conditions.

RESEARCH METHODS

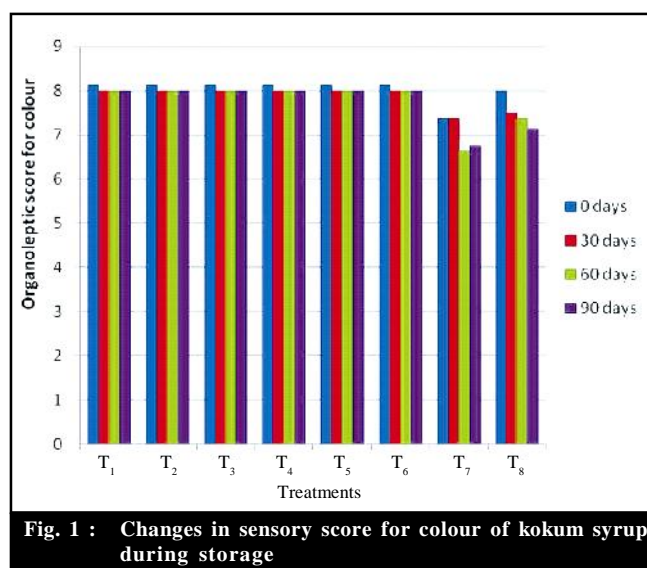
The fruits required for conducting research were procured from the kokum orchards of Dr. Balasaheb Sawant Kokan Krushi Vidyapeeth, Dapoli. The fresh, ripe, mature fruits were selected, washed, cut into two halves and the juice from fruit rind was extracted by pressing the kokum rind with the help of basket press. The chemical preservative *i.e.* sodium benzoate was added @ 1g/kg to the kokum juice and it was stored for the settling at ambient conditions for a period of 15 days and the clarified juice thus collected was later on used for preparation of kokum syrup. The experiment comprised of eight treatments. Kokum syrup was prepared by using kokum rind juice and 750 Brix sugar syrup in the proportion of 1:5 (T₁ to T₃) and 1:6 (T₄ to T₆) with different levels of citric acid (1%, 2% and without C. A.). In treatment T₇, the syrup was prepared by adding dry sugar in the proportion of 1: 2 whereas in T-8 (control), syrup was prepared by mixing kokum rind and dry sugar in 1:2 proportions for osmotic process. The product was then filled in pre-sterilized glass bottles, labelled and stored at a cool and dry place at ambient temperature conditions for further investigation (Fig. A). The kokum syrup was evaluated immediately after preparation and at an interval of 30 days up to 90 days of storage. Total soluble solids content was measured using Atago hand refractometer. Titratable acidity, reducing and total sugars were estimated by methods

suggested by Ranganna (1997). It was also evaluated during storage for sensory attributes like colour, flavour and overall acceptability by a panel of 10 judges on 9 point hedonic scale (Amerine *et al.*, 1975). The observations on various parameters were recorded with three replications. The data were statistically analysed by using factorial completely randomized design (FCRD) described by Panse and Sukhatme (1985).



RESEARCH FINDINGS AND DISCUSSION

The changes in chemical composition of kokum syrup during storage are presented in Table 1a and Table 1b. A significant increase in total soluble solids content of stored syrup was noticed during storage period of 90 days. An increase in total soluble solids of syrup during storage might be due to hydrolysis of polysaccharide like starch, cellulose and pectin substance into simpler substances. Similar results were recorded by Marimuthu and Thirumaran (2000) in jamun syrup. The titratable acidity of kokum syrup varied significantly with different recipe treatments as well as the storage period. It is noticed from the results that the acidity of the kokum syrup increased with increasing the levels of added citric acid



Treatments	TSS (^o Brix)					Titratable acidity (%)				
Storage period (Days)	0	30	60	90	Mean	0	30	60	90	Mean
T ₁	67.20	67.40	67.67	67.87	67.53	1.38	1.66	1.70	1.50	1.56
T ₂	67.20	67.30	67.37	67.40	67.32	2.22	2.38	2.41	2.13	2.29
T ₃	66.87	67.07	67.20	67.33	67.12	0.62	0.79	0.88	0.79	0.77
T ₄	68.40	68.63	68.80	68.87	68.68	1.13	1.33	1.43	1.30	1.30
T ₅	68.80	68.93	69.00	69.07	68.95	2.14	2.15	2.17	2.03	2.12
T ₆	68.13	68.30	68.40	68.47	68.33	0.60	0.75	0.75	0.72	0.71
T ₇	72.67	72.77	72.83	72.87	72.78	1.58	1.56	1.54	1.53	1.55
T ₈	71.00	71.00	71.00	71.00	71.00	1.51	1.49	1.48	1.41	1.47
Mean	68.78	68.93	69.03	69.11		1.40	1.51	1.54	1.43	
		S.E. ±		C.D. (P=0.05)		S.E. ±		C.D. (P=0.05)		
Treatment		0.089		0.250		0.011		0.032		
Storage		0.063		0.179		0.008		0.022		
T x S		0.179		N.S.		0.022		0.064		

T₁ : 1:5(75^o brix syrup)+1.0% C.A. T₂ : 1:5(75^o brix syrup)+2.0% C.A. T₃ : 1:5(75^o brix syrup) without C.A.
T₄ : 1:6(75^o brix syrup)+1.0% C.A. T₅ : 1:6(75^o brix syrup)+2.0% C.A. T₆ : 1:6(75^o brix syrup) without C.A.
T₇ : 1 part juice + 2 parts dry sugar T₈ : 1 part kokum rind + 2 parts dry sugar (control)

Table 1b : Changes in chemical composition of kokum syrup during storage

Treatments	Reducing sugars (%)					Total sugars (%)					
	Storage period (Days)	0	30	60	90	Mean	0	30	60	90	Mean
T ₁		23.12	42.38	51.06	50.91	41.87	58.70	60.54	61.83	61.34	60.60
T ₂		24.14	41.25	51.03	50.97	41.85	58.31	60.17	61.35	60.80	60.16
T ₃		23.68	41.36	50.49	50.46	41.50	58.97	60.49	61.78	61.27	60.63
T ₄		25.48	41.68	52.35	52.29	42.95	61.02	63.01	63.51	63.29	62.71
T ₅		26.12	42.33	52.29	52.15	43.22	60.77	62.49	63.60	63.30	62.54
T ₆		25.83	41.83	51.90	51.88	42.86	61.18	62.94	63.79	63.43	62.84
T ₇		40.67	49.67	52.99	52.94	49.07	65.94	67.68	68.70	68.66	67.75
T ₈		40.43	50.15	53.90	54.01	49.62	65.65	67.89	68.54	68.60	67.67
Mean		28.68	43.83	52.00	51.95		61.32	63.15	64.14	63.84	
			S.E. ±		C.D. (P=0.05)			S.E. ±		C.D. (P=0.05)	
Treatment			0.167		0.474			0.194		0.550	
Storage			0.118		0.335			0.137		0.388	
T x S			0.335		0.948			0.389		NS	

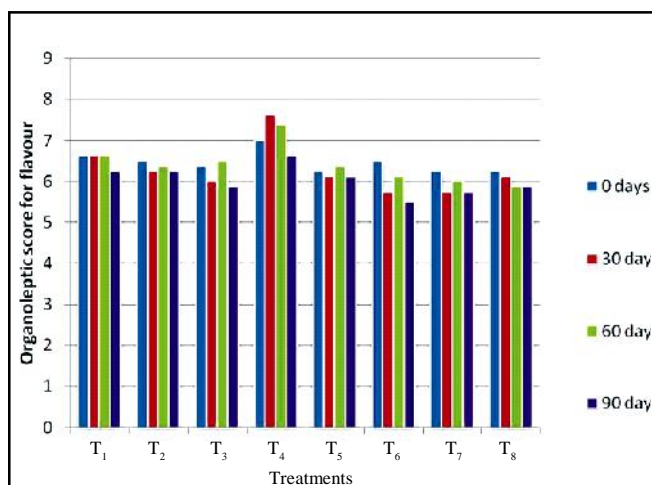
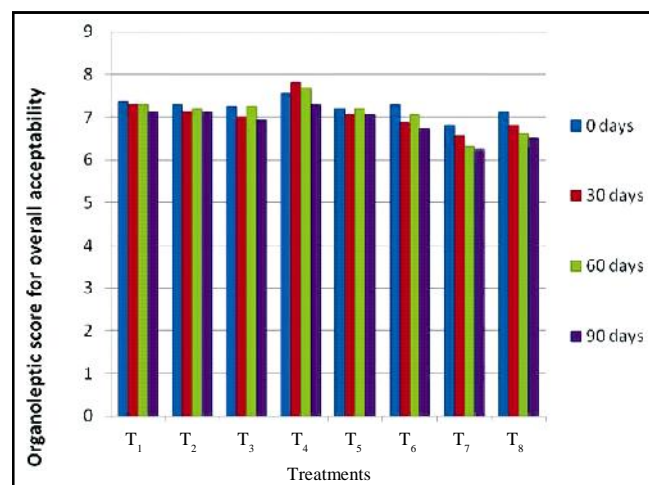
T₁ : 1:5(75⁰ brix syrup)+1.0% C.A.T₄ : 1:6(75⁰ brix syrup)+1.0% C.A.T₇ : 1 part juice + 2 parts dry sugarT₂ : 1:5(75⁰ brix syrup)+2.0% C.A.T₅ : 1:6(75⁰ brix syrup)+2.0% C.A.T₈ : 1 part kokum rind + 2 parts dry sugar (control)T₃ : 1:5(75⁰ brix syrup)without C.A.T₆ : 1:6(75⁰ brix syrup)without C.A.

NS=Non-significant

in the syrup. Moreover, increased levels of sugar syrup resulted into decrease in the titratable acidity of the syrup prepared from kokum rind juice. The mean titratable acidity was significantly increased during storage. This could be due to the degradation of pectic substances into soluble solids might have contributed towards increase in the acidity of jamun beverages. Analogous observation was recorded by Das (2009) in jamun syrup. During storage, the reducing sugars were found to increase irrespective of treatments and storage period. This increase might be due to hydrolysis of non-reducing sugars into reducing sugars. Similar results were obtained by Kannan and Thirumaran (2004) in jamun syrup while Reddy and Chikkasubbanna (2009) in amla syrup. Total sugars of kokum syrup increased significantly during storage

period of 90 days. This could be attributed to the fact that the hydrolysis of polysaccharides during storage resulted into increase in the soluble sugars. It is also reported by Reddy and Chikkasubbanna (2009) in amla syrup.

The data pertaining to organoleptic qualities related to the colour, flavour and overall acceptability of kokum syrup are graphically illustrated in Fig. 1 to 3. The treatments T₁ to T₆ recorded higher sensory score for colour than the treatments T₇ and T₈ and were at par with each other. The highest score for flavour was obtained by the treatment T₄ (1:6 rind juice to 75⁰B sugar syrup ratio +1% citric acid). Among all recipes, kokum syrup with 1 part rind juice and 6 parts 75⁰Brix sugar syrup + 1 per cent citric acid recorded highest sensory score for colour, flavour and overall acceptability. Organoleptic score

**Fig. 2 : Changes in sensory score for flavour of kokum syrup during storage****Fig. 3 : Changes in sensory score for overall acceptability of kokum syrup during storage**

of kokum syrup was decreased throughout the storage period of 90 days. Analogous observations in conformity to these finding were also reported by Marimuthu and Thirumaran (2000) and Das (2009) in jamun syrup and Jadhav *et al.* (2004) in ripe karonda syrup.

Conclusion:

From the present investigation, it could be concluded that the syrup prepared from kokum rind juice was acceptable throughout the storage period of 90 days at ambient conditions. The syrup recipe *i.e.* 1 part rind juice : 6 parts 75 °Brix sugar syrup + 1 per cent citric acid was found to be the best recipe for kokum syrup with highest score for organoleptic qualities.

REFERENCES

- Amerine, M.A., Pangborn, R.M. and Rocssler, E.B. (1975).** *Principle of sensory evaluation of food.* Academic Press, London, UNITED KINGDOM.
- Das, J.N. (2009).** Studies on storage stability of jamun beverages. *Indian J. Hort.*, **66**(4) : 508-510.
- Jadhav, S.B., Joshi, G.D. and Garande, V.K. (2004).** Studies on the preparation and storage of karonda (*Carissa carandas* Linn.) fruit products. *Beverage and Food World*, **31**(5) 46-47.
- Kannan, S. and Thirumaran, A.S. (2004).** Studies on storage life of jamun (*Syzygium cuminni* Rom) fruit products. *J. Food Sci. Technol.*, **41**(2) : 186-188.
- Marimuthu, M. and Thirumaran, A.S. (2000).** Utilization of jamun-juice, squash and syrup. *Beverage & Food World*, **27**(8) : 42&46.
- Mishra, A., Bapat, M.M. and Tilak, J.C. (2006).** Antioxident activity of *Garcinia indica* (kokum) and its syrup. *Curr. Sci.*, **91** : 90-93.
- Muhammed, M., Rosen, R., Carty, M.Mc, Conte, A., Patil, D. and Butrynm, E. (1994).** Citrin – *A revolutionary herbal approach to weight managment.* New Editions Publishing, Burlingame C A.
- Panse, V.G. and Sukhantme, P.V. (1985).** *Statistical method of agricultural.* Indian Council of Agricultural Research, New Delhi, INDIA.
- Ranganna, S. (1997).** *Handbook of analysis and quality control for fruits and vegetable products.* 2nd Ed. Tata McGraw Hill Publishing Company Ltd., New Delhi, INDIA.
- Reddy, A. H. and Chikkasubbanna, V. (2009).** Studies on the storage behaviour of amla syrup. *Asian J. Hort.*, **3**(2) : 203-207.
- Relekar, P.P. (2005).** Preparation of kokum syrup from kokum rind juice. A research work presented to RRC, Dr. B.S. Konkan Krishi Vidyapeeth., Dapoli, Ratnagiri, M.S. (INDIA).
- Sampatha, S.R. and Krishnamurthy, M. (1982).** Processing and cultivation of Kokum (*Garcinia indica*). *Indian Cocoa, Arecanut & Spices J.*, **6**(1) : 12-13.
- Verghese, J. (1996).** The world of spices and herbs. *Indian Spices*, **34**(1 & 2): 11-12.

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