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Divate SM
PG Scholar, Post Graduate Institute of Post-Harvest Management, Killa-Roha, Raigad, Maharashtra, India

Savale BG
Research Associate, Department of Farm structure, College of Agricultural Engineering and Technology, Dr. Balasaheb Sawant Konkan Krushi Vidyapeeth, Dapoli, Maharashtra, India

Patil NB
Scientist (Agriculture Engineering), AICRP on Plasticulture Engineering and Technology, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

Relekar PP
Assistant Professor, Post Graduate Institute of Post-Harvest Management, Killa-Roha, Raigad, Maharashtra, India

Corresponding Author:
Divate SM
PG Scholar, Post Graduate Institute of Post-Harvest Management, Killa-Roha, Raigad, Maharashtra, India

Study of preparation and standardization of Karonda (*Carissa congesta* L.) crush

Divate SM, Savale BG, Patil NB and Relekar PP

Abstract
Karonda crush was prepared by using karonda juice with different percentage of juice level such as 25, 30, 35, 40 per cent and maintain 55^0Brix T.S.S. & 0.8 per cent level of citric acid in each treatments. The physiochemical composition and sensory qualities of karonda crush were studied during 3 months of storage period to standardize optimum recipe for the preparation of karonda crush. An increasing trend in T.S.S., reducing and total sugars where as decreasing trend in titratable acidity and ascorbic acid was observed during storage period of 90 days. The crush recipes i.e. 35 and 40% juicewith 55^0 Brix T.S.S. and 0.8% acidity were found to be the best recipes for the preparation of karonda syrup with highest organoleptic score for colour, flavour and overall acceptability.

Keywords: Karonda juice, storage, crush, organoleptic score

1. Introduction
Karonda (*Carissa congesta* Linn.), a native fruit of India, belongs to the order Contorate and family Apocynaceae. It is a poor man's food. In Konkan region, it is lovingly called as "Dongarchi Kali Maina". Karonda is generally known as protective hedge plant due to presence of thorns and dense foliage that also yields fruits which have economic value. The karonda is a very hardy bush, growing on all types of soils, mostly on sandy or rock soils in wild state, in both tropical and subtropical climates.The karonda fruit is an astringent, antiscorbutic and as a remedy for biliousness and useful for cure of anaemia. Traditionally karonda has been used in the treatment of scabies, intestinal worms, pruritus, and biliousness and also used as anthelmintic (Maheshwari *et al*., 2012) [5]. The protein content in karonda fruit varied from 0.74 to 2.25 per cent in green and maroon karonda, respectively (Sanjeev kumar and Singh, 1993) [9]. The iron content of karonda fruits was noted to be 39.1 mg/100g by Ratna Rai and Misra (2005) [8]. Ripe fruits are sub-acidic too sweet in taste with peculiar aroma. The fruits may be eaten as a dessert when ripe or used in the preparation of value added products such as jelly, sauce, Carissa cream or jellied salad. The different beverages like nectar, squash and syrup can be prepared from the ripe karonda fruits. Among the beverages, the fruit crush is the product which is intermediate between syrup and squash, and ripe karonda fruits can possibly be utilized for the preparation of crush.

2. Materials and Methods
The fruits required for conducting research were procured from the local market. The fresh, fully ripe, mature fruits were selected, washed and juice was extracted with the help of basket press machine. The chemical preservative i.e. sodium benzoate was added @ 1000 ppm of fruit juice after extraction of karonda juice and it was stored for the settling of particles at ambient conditions for a period of 1 month and the clear juice thus collected was later on used for preparation of karonda crush. The experiment divided in four treatments.

The experiment divided in four treatments.

55^0 Brix T.S.S and 0.8% acidity maintain in all recepies	
T1- 25% juice	T3- 35% juice
T2- 30% juice.	T4- 40% juice

2.1 Treatment Details

Karonda crush was prepared by maintaining 55^0 Brix T.S.S adding and 0.8% acidity by adding sugar and citric acid, respectively in karonda juice as per the requirement. After mixing all the ingredients, the mixture was heated up to 72 ^{0}C till sugar dissolved completely. 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 karonda crush was evaluated immediately after preparation and at an interval of 30 days up to 90 days of storage. Total soluble solids were determined using Hand refractor meter (Erma Japan, 0-32^0 Brix). Titratable acidity, reducing and total sugars were estimated by methods suggested by Rangama (1997) [7]. The ascorbic acid content was determined by using 2, 6-dichlorophenol indophenol dye method of Johnson (1948) [3] as described by Ranganna (1997) [7]. The product was evaluated for their organoleptic qualities like colour, flavour and overall acceptability on a hedonic scale (Amerine *et al*., 1965) [1]. The observations on various parameters were recorded with three replications. The data collected were statistically analyses by the standard procedure given by Panse and Sukhatme (1985) [6] using Factorial Completely Randomized Design (FCRD).

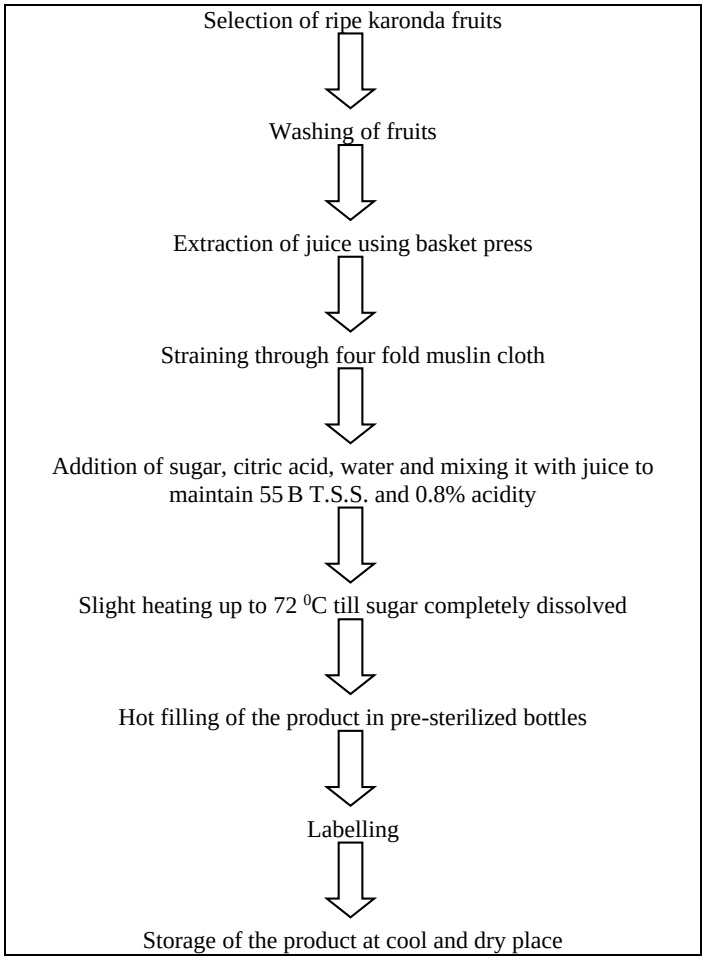

Fig 1: Flow chart for Preparation of karonda crushes

3. Results and Discussions

The data on the changes in TSS, acidity, reducing sugar, total sugar and ascorbic acid content of karonda crush during storage is presented in Table 1 to 3. 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 observations were observed by Jadhav *et al*. (2004) [2] in ripe karonda syrup. The titratable acidity during the storage period of 90 days showed a declining trend. Analogues observations were recorded by Pal and Sethi (1992) [11] in kagzi lime syrup and Lad *et al*. (2013) [12] in lime squash and Kalunkhe *et al*. (2014) [10] in lemon squash. 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 observed by Reddy and Chikka subbanna (2009) [10] in amla syrup and Kalunkhe *et al*. (2014) [10] in lemon squash. Total sugars of karonda 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. Similar results were observed by Reddy and Chikka subbanna (2009) [10] in amla syrup while Marimuthu and Thirumaran (2000) [13] in jamun syrup. The decline in ascorbic acid content of karonda crush during storage could be attributed to its degradation during storage at ambient condition. Identical observations were also observed by Tiwari *et al*. (2010) [14] in Chinese orange squash. Among the treatments, significantly highest sensory score for overall acceptability was recorded by the treatment T3 (35% juice + 55^0 T.S.S) and the treatment T4 (40% juice + 55^0 T.S.S) (Table 5). It was the best among all recipe treatments and also rated the best with respect to sensory attributes like colour and flavour of the karonda crush (Table 4).

Table 1: Changes in T.S.S. and Treatable acidity of Karonda crush during storage.

Treatments	TSS (^{0}B)					Treatable acidity (%)				
Days	0	30	60	90	Mean	0	30	60	90	Mean
T1	55.47	55.87	55.93	56.27	55.89	0.85	0.83	0.78	0.74	0.80
T2	55.07	55.47	55.87	56.13	55.64	0.84	0.82	0.76	0.71	0.78
T3	55.10	55.43	55.87	56.00	55.60	0.83	0.81	0.75	0.69	0.77
T4	55.07	55.27	55.67	56.07	55.52	0.82	0.79	0.75	0.68	0.76
Mean	55.18	55.51	55.83	56.12		0.84	0.81	0.76	0.71	
	S. E. m ±		C.D. at 5%			S. E. m ±		C.D. at 5%		
Treatment (T)	0.07		0.20			0.00		0.01		
Storage (S)	0.07		0.20			0.00		0.01		
Interaction (TXS)	0.14		N.S			0.01		N.S		

Table 2: Changes in Reducing sugar and total sugar of Karonda syrup during storage**.**

Treatments	Reducing sugars (%)					Total sugars (%)				
Days	0	30	60	90	Mean	0	30	60	90	Mean
T1	15.02	19.3	22.46	23.49	20.06	40.63	43.61	45.18	46.03	43.86
T2	13.68	17.13	20.00	22.65	18.36	40.83	44.00	45.30	46.13	44.07
T3	13.76	14.3	17.65	22.46	17.04	41.40	44.93	46.25	46.68	44.82
T4	13.05	14.16	18.09	21.74	16.76	41.90	45.18	46.42	46.95	45.11
Mean	13.88	16.22	19.55	22.59		41.19	44.43	45.79	46.45	
	S. E. m ±		C.D. at 5%			S. E. m ±		C.D. at 5%		
Treatment (T)	0.29		0.84			0.25		0.72		
Storage (S)	0.29		0.84			0.25		0.72		
Interaction (TXS)	0.58		1.68			0.50		N.S		

Table 3: Changes in ascorbic acid content of Karonda syrup during storage.

Treatments	Ascorbic acid (mg/100g)				
	Storage period (Days)				
	0	30	60	90	Mean
T1	8.63	5.91	4.65	2.75	5.48
T2	9.81	6.72	6.01	4.40	6.73
T3	10.74	7.53	6.83	5.39	8.45
T4	10.92	7.75	6.36	5.00	9.32
Mean	10.03	6.97	5.96	4.39	
		S. E. m ±		C.D. at 5%	
Treatment (T)		0.20		0.57	
Storage (S)		0.20		0.57	
Interaction (TXS)		0.40		N.S	

Table 4: Changes in Organoleptic score for colour and flavor of Koranda crush during storage.

Treatments	Colour					Flavor				
Days	0	30	60	90	Mean	0	30	60	90	Mean
T1	7.17	7.33	6.57	6.33	6.85	7.67	7.33	6.33	6.17	6.87
T2	7.23	7.00	6.83	6.63	6.92	7.67	7.20	6.90	7.00	7.19
T3	8.03	8.00	7.93	7.70	7.91	8.20	7.93	7.77	7.50	7.85
T4	7.93	7.87	7.77	7.43	7.75	8.67	7.50	7.00	6.75	7.48
Mean	7.59	7.55	7.28	7.02		8.05	7.49	7.00	6.85	
	S. E. m ±		C.D. at 5%			S. E. m ±		C.D. at 5%		
Treatment (T)	0.15		0.43			0.12		0.34		
Storage(S)	0.15		0.43			0.12		0.34		
Interaction (TXS)	0.15		N.S			0.23		N.S		

Table 5: Changes in Organoleptic score for overall acceptability of Karonda crush during storage.

Treatments	Overall acceptability				
	Storage period (Days)				
	0	30	60	90	Mean
T1	7.42	6.23	6.43	6.83	6.98
T2	7.50	7.08	6.93	6.63	7.03
T3	8.25	7.67	8.00	7.76	7.92
T4	7.75	7.15	7.93	7.60	7.60
Mean	7.73	7.28	7.32	7.20	
		S. E. m ±		C.D. at 5%	
Treatment (T)		0.13		0.37	
Storage (S)		0.13		0.37	
Interaction (TXS)		0.25		N.S	

4. Conclusions

From the present investigation, it is concluded that, all the recipes of karonda crush are acceptable throughout the storage period of 3 months at ambient conditions. The karonda crush with 25% juice and 30% juice have showed less overall acceptability because of low juice content. The karonda crush with 35% juice and 40% juice with 55^0 B T.S.S. and 0.8 per cent acidity was found to be the best recipe for karonda crush with highest organoleptic score for colour, flavour and overall acceptability. But 35% juice treatment was economical compared to 40% juice treatment.

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