

RESEARCH PAPER

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# Sensory quality and economics of preparation of karonda candy

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## SUMMARY :

The study on sensory quality and economics of preparation of karonda candy was carried out during the year 2012-2013 at Post Harvest Technology Laboratory, Department of Horticulture, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. An experiment was laid out in Factorial Completely Randomized Design with seven treatments and three replications with 14 treatment combinations. From the findings in sensory qualities of candy, the overall scores of taste and colour found to decrease in trend with the advancement of storage an interval of 30 days. The karonda candy recorded more acceptable score in cabinet drying than the solar drying. However, the treatment combination T<sub>1</sub>D<sub>1</sub> (Fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + cabinet drying) and T<sub>1</sub>D<sub>2</sub> (Fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + solar drying) recorded the maximum score at cabinet and solar drying, respectively. Considering the economics of the best acceptable recipe, the candy prepared with the combination of fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + solar drying was found economical as compared to the other treatment combinations (Recipes) dried in cabinet drying.

**KEY WORDS :** Sensory quality, Economics, Karonda candy

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Fruits are amongst the first food items known consumed prehistorically by human beings. Fruits, whether fresh or dried, have always formed a part of the staple diet of human beings because they are rich in nutrients and provide the essential minerals and vitamins. Apart from that, they also help in curing a number of diseases. The karonda fruits are astringent and slightly acidic in taste, it also contain maximum amount of pectin, vitamins and minerals. Due to astringent in taste of fruit, no one can eat this fruit without processing. Once the fruit processed, the availability of processed product is possible throughout the year. The value added products of karonda contain essential vitamins and minerals which are the

essential part of the human diet but its taste and colour is also importance. Cost of production of value added product is also importance from consumer point of view. The problems encountered during processing of karonda candy are stored under humid conditions, candy lose some of its sugar due to absorption of moisture from the air. To find out the scientific solution for this limitation encountered in karonda processing, there is need to explore the chemical properties and sensory qualities of candy during storage, and have a stabilizing effect on chemical constituents which affect the quality of final products and limits the scope for karonda processing. Hence, the present investigation on sensory quality and economics

of preparation of karonda candy was conducted to study the chemical changes in karonda candy at ambient storage condition, evaluate the karonda candy for its sensory qualities and its economics.

## EXPERIMENTAL METHODS

The study on sensory quality and economics of karonda candy was conducted in Post Harvest Technology and Analytical Laboratory, at University Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during the academic year 2012-2013. Matured unripe and uniform sized of local variety of karonda fruits were procured from AICRP on Citrus, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Unripe, diseased, damaged and off type fruits were strictly discarded. The 100 g sample were used for each treatment. The selected fruits were thoroughly washed with clean tap water to remove dirt and dusts particles adhered to the pericarp of the fruit and then allowed to dry for removal of excess moisture from the fruit surface. Before preparation of candy fruits were estimated for physico-chemical composition.

### Physico-chemical composition of fruits :

Matured unripe fruit of karonda recorded weight, length, width and volume, 5.71 g, 2.10 cm, 2.18 cm, 4.78 cm. Whereas, average moisture per cent were recorded as 78.50 per cent. As regards to chemical composition the unripe fruit recorded. 19.20 °Brix TSS, 1.45 per cent acidity, 19.85 mg / kg fruit ascorbic acid, 6.23 per cent total sugars, the reducing sugars and non reducing sugars were recorded 5.92 per cent, 0.30 per cent, respectively.

An experiment was laid out in Factorial Completely Randomized Design with seven treatments and three replications with 14 treatment combinations. The treatment details are given below :

### Treatment details :

#### Factor A (Recipes) :

- T<sub>1</sub>- Fruit pieces impregnated with cane sugar (TSS 60°Brix)+0.5% citric acid.
- T<sub>2</sub>- Whole fruit with seed impregnated with cane sugar (TSS65 °Brix)+0.6% citric acid.
- T<sub>3</sub>- Whole fruit without seed impregnated with cane sugar (TSS 70°Brix) +0.7% citric acid.
- T<sub>4</sub>- Fruit pieces impregnated with jaggery(TSS 60 °Brix) + 0.5 % citric acid.
- T<sub>5</sub>- Whole fruit with seed impregnated with jaggery (TSS 65 °Brix) +0.6% citric acid.
- T<sub>6</sub>- Whole fruit without seed impregnated with jaggery (TSS 70 °Brix)+0.7% citric acid.
- T<sub>7</sub>- Control (without citric acid).

#### Factor B (Method of drying) :

- D<sub>1</sub> - Cabinet drying
- D<sub>2</sub>- Solar drying.

The prepared slices as well as whole fruit of karonda then blanched in 500 ppm potassium metabisulphite with hot water treatment to become the slices and whole fruit soft. Then these prepared slices and fruit were steeped in syrup of 60, 65, 70 °Brix with the addition of citric acid containing cane sugar and jaggery at different concentration. The sugar and jaggery solution initially prepared at concentration of 60 °Brix. After 24 hours of steeping in each treatment, the syrups were drained and their concentrations were increased by adding sugar and jaggery proportionately. Then slightly heating was done to dissolve the sugar and jaggery. The required quantity of sugar and jaggery were added subsequently to obtain the required 70°Brix strength of syrup. The syrup concentration was increased by 5°Brix every time until the concentration reached up to 70°Brix. Finally the slices and whole fruit was kept in 60, 65, 70°Brix syrup solution of sugar and jaggery according to the treatment for a period until the equilibrium was reached between slices and the syrup concentration. Finally, the slices and whole fruit as per treatment impregnated in each treatment was drained free of syrup and rinse immediately with the tap water and dried in shade for 24 hrs. After drying, the candy was packed in 250 gauge polythene bags and stored under ambient condition. Candy prepared from karonda fruits was evaluated for sensory qualities *viz.*, colour and taste, at an interval of 20 days. Each attribute was given a separate score of 9 point hedonic scale according to the method reported by Amerine *et al.* (1965). The mean values of score for sensory evaluation were calculated and reported. The prepared karonda candy was stored at ambient temperature. Sensory evaluation of the experimental sample was conducted at 30 days interval up to 120 days of storage. The data obtained was analysed for the statistical significant according to the procedure given by Panse and Sukhatme (1967).

## EXPERIMENTAL FINDINGS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

### Sensory evaluation of karonda candy (Colour and taste) :

The overall acceptability of the karonda candy were calculated in terms of colour and taste and recorded upon colour as per remarks of the evaluator. The scores recorded are presented in Table 1 and economics in Table 2. There were 10 judges or subject matter specialist for evaluating the candy for colour, taste and overall acceptability measured by Hedonic scale. The Hedonic scale has range in between 1 to 9. The score from 1 to 4 indicated poor in quality, 4 to 6 indicated

product is average in quality, from 6 to 8 indicated good quality of product and finally range from 8 to 9 indicates excellent quality of product.

On the 0 days of storage, T<sub>1</sub>D<sub>1</sub> secured highest overall acceptability score *i.e.* 8.5 for colour and taste in cabinet dried candy, while lowest score was registered in T<sub>5</sub>D<sub>2</sub> there was 5 under solar dried candy. On 30 days of storage, T<sub>1</sub>D<sub>1</sub> recorded highest overall acceptability score for sensory characteristics *i.e.* 8.15, while lowest overall acceptability score (4.65) was recorded in T<sub>5</sub>D<sub>2</sub>.

On the 60 day of storage, highest score was recorded in

T<sub>1</sub>D<sub>1</sub> (8.05), while least score of overall acceptability was recorded in T<sub>7</sub>D<sub>2</sub> (5.2) score. On 90 day of storage, highest score was recorded in T<sub>1</sub>D<sub>1</sub> (8.2), while least score of overall acceptability was recorded in T<sub>4</sub>D<sub>2</sub> (6.25) score.

On 120 day of storage, highest score was recorded in T<sub>1</sub>D<sub>1</sub> (8.1), while least score of overall acceptability was recorded in T<sub>4</sub>D<sub>2</sub> (6.2) score.

These results are in conformity with the results obtained by Hiremath and Rokhade (2012) in sapota candy, Kumar and Singh (2001) Nayak *et al.* (2011 and 2012) and Tandon *et al.* (2013) in aonla candy and Rani and Bhatia (1985) in pear candy.

**Table 1 : Effect of different recipes and drying methods on sensory evaluation of karonda candy**

Treatments combination	0 days			30 days			60 days			90 days			120 days		
	Colour	Taste	Overall accept.	Colour	Taste	Overall accept.	Colour	Taste	Overall accept.	Colour	Taste	Overall accept.	Colour	Taste	Overall accept.
T <sub>1</sub> D <sub>1</sub>	9	8	8.5	8	8.3	8.15	7.8	8.3	8.05	7.7	8.7	8.2	7.5	8.7	8.1
T <sub>1</sub> D <sub>2</sub>	8	8	8	7.8	8.1	7.95	7.5	8.1	7.8	7.2	8.2	7.7	7.1	8.2	7.65
T <sub>2</sub> D <sub>1</sub>	6	5	5.5	5.4	5.4	5.4	5.5	5.1	5.3	*	*	*	*	*	*
T <sub>2</sub> D <sub>2</sub>	6	5	5.5	5.5	5.4	5.45	5.4	5.1	5.25	*	*	*	*	*	*
T <sub>3</sub> D <sub>1</sub>	8	8	8	7.8	7.8	7.8	7.7	7.6	7.65	7.5	7.3	7.4	7.3	6.9	7.1
T <sub>3</sub> D <sub>2</sub>	8	7	7.5	7.7	7.3	7.5	7.6	7.5	7.55	7.4	7.5	7.45	7.3	7.5	7.4
T <sub>4</sub> D <sub>1</sub>	8	7	7.5	7.6	7.3	7.45	7.5	7.3	7.4	7.4	7.3	7.35	7.2	7.4	7.3
T <sub>4</sub> D <sub>2</sub>	7	6	6.5	6.5	6.4	6.45	6.3	6.3	6.3	6.3	6.2	6.25	6.2	6.2	6.2
T <sub>5</sub> D <sub>1</sub>	6	5	5.5	4.7	4.8	4.75	*	*	*	*	*	*	*	*	*
T <sub>5</sub> D <sub>2</sub>	5	5	5	4.9	4.4	4.65	*	*	*	*	*	*	*	*	*
T <sub>6</sub> D <sub>1</sub>	8	8	8	7.8	7.9	7.85	7.6	7.7	7.65	7.3	7.5	7.4	6.2	6.9	6.55
T <sub>6</sub> D <sub>2</sub>	7	7	7	6.9	6.7	6.8	6.7	6.5	6.6	6.6	6.5	6.55	6.3	6.4	6.35
T <sub>7</sub> D <sub>1</sub>	6	6	6	5.8	5.9	5.85	5.6	5.5	5.55	*	*	*	*	*	*
T <sub>7</sub> D <sub>2</sub>	6	5	5.5	5.8	4.9	5.35	5.6	4.8	5.2	*	*	*	*	*	*

\*Mould growth

**Table 2 : Economics of candy prepared from karonda fruits**

Treatment combination	Total losses in Rs.	Cost/day								Total cost in Rs.	Selling price (for 1 kg)	Profit %
		Karonda fruits	Sugar/jaggery	Citric acid	KMS	Packets	Labour	Electricity	Gas charge			
T <sub>1</sub> D <sub>1</sub>	2.5	20	51	10	2.00	20	10	15	0.50	131	200	69
T <sub>1</sub> D <sub>2</sub>	2.6	20	53	10	2.00	20	10	15	0.50	133.1	200	66.9
T <sub>2</sub> D <sub>1</sub>	20	20	55	10	2.00	20	7.7	15	0.50	150.2	200	49.8
T <sub>2</sub> D <sub>2</sub>	20	20	57	10	2.00	20	8.3	15	0.50	152.8	200	47.2
T <sub>3</sub> D <sub>1</sub>	3.3	20	63	10	2.00	20	10	15	0.50	143.8	200	56.2
T <sub>3</sub> D <sub>2</sub>	3.2	20	67	10	2.00	20	10.5	15	0.50	148.2	200	51.8
T <sub>4</sub> D <sub>1</sub>	3.6	20	53	10	2.00	20	10	15	0.50	134.1	200	65.9
T <sub>4</sub> D <sub>2</sub>	3.7	20	54	10	2.00	20	8.2	15	0.50	133.4	200	66.6
T <sub>5</sub> D <sub>1</sub>	20	20	52	10	2.00	20	10	15	0.50	149.5	200	50.5
T <sub>5</sub> D <sub>2</sub>	20	20	57	10	2.00	20	8.2	15	0.50	152.7	200	47.3
T <sub>6</sub> D <sub>1</sub>	4.1	20	62	10	2.00	20	10.5	15	0.50	144.1	200	55.9
T <sub>6</sub> D <sub>2</sub>	3.8	20	61	10	2.00	20	10	15	0.50	142.3	200	57.7
T <sub>7</sub> D <sub>1</sub>	15	20	55	-	2.00	20	10	15	0.50	137.5	200	62.5
T <sub>7</sub> D <sub>2</sub>	15	20	53	-	2.00	20	10.5	15	0.50	136	200	64

**Economics :**

From the Table 2 it indicates that, economics of the best acceptable recipe, the candy prepared with the combination of T<sub>1</sub>D<sub>1</sub> was found economical as compared to the other treatment combinations (Recipes) dried in cabinet drying. Similar work related to the topic was also done by Mehta *et al.* (2005) worked on the processing of kandi lemon peel waste for candy making. Manivasagan *et al.* (2006) and Pawar (1988).

**Conclusion :**

The overall scores of taste and colour found to decrease in trend with the advancement of storage. However the

treatment combination T<sub>1</sub>D<sub>1</sub> (Fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + cabinet drying) and T<sub>1</sub>D<sub>2</sub> (Fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + solar drying) recorded the maximum score at cabinet and solar drying, respectively. The karonda candy recorded more acceptable score in cabinet drying than the solar drying. Considering the economics of the best acceptable recipe, the candy prepared with the combination of fruit pieces impregnated with cane sugar (TSS 60 °Brix)+0.5% citric acid + solar drying was found economical as compared to the other treatment combinations (Recipes) dried in cabinet drying.

**LITERATURE CITED**

- Amerine, M.A., Pangborn, R.M. and Roessler, E.B. (1965).** Principles of sensory evaluation of food. Academic Press, New York and London. pp. 459-465.
- Hiremath, J.B. and Rokhade, A.K. (2012).** Preparation of sapota candy. *Internat. J. Food Agric. & Veterinary Sci.*, **2**(1) : 107-112.
- Kumar, Sanjeev and Singh, I.S. (2001).** Storage studies of aonla fruit products at ambient temperature. *Prog. Hort.*, **33**(2):169-173.
- Manivasagan, S., Rana, G.S., Kumar, S. and Joon, M.S. (2006).** Qualitative changes in karonda (*Carissa carandas* Linn.) candy during storage at room temperature. *Haryana J. Hort. Sci.*, **35**(1&2): 19-21.
- Mehta, A., Ranote, P.S. and Bawa, A.S. (2005).** Processing of kandi lemon (Galgal) peel waste candy making. *Indian Food Pack.*, **54** (1&2): 67-74.
- Nayak, P., Bhatt, D.K., Shukla, D.K. and Tandon, D.K. (2011).** Evaluation of aonla (*Emblica officinalis* G.) segments-in-syrup prepared from stored fruits. *Res. J Agric. Sci.*, **43**(2):252-257.
- Nayak, P., Shukla, D.K., Bhatt, D.K. and Tandon, D.K. (2012).** Quality evaluation of segments-in-syrup as affected by steeping preservation of aonla fruits. *J. Stored Prod. & Postharvest Res.*, **3** (12): 160 – 166.
- Panse, V.G. and Sukhatme, P.V. (1967).** Statistical methods for agricultural workers. Indian Council of Agricultural Research, NEW DELHI (INDIA).
- Pawar, C.D. (1988).** Studies of post-harvest handling and preparation of different products of karonda (*Carissa carandas* L.) fruits, M.Sc. (Ag.) Thesis, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Ratnagiri, M.S. (INDIA).
- Rani, Upasana and Bhatia, B.S. (1985).** Studies on pear candy processing. *Indian. Fd. Pack.*, **29** : 40-46.
- Tandon, D.K., Yadav, R.C., Sood, S., Kumar, S. and Dixit, A. (2003).** Effect of blanching and lye peeling on the quality of aonla candy. *Indian Food Packer*, **57** (6): 147-152.

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