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Assessment of sensory attributes of value-added products of karonda (*Carissa carandas*)

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Abstract

The study evaluated the sensory attributes of value-added products derived from Karonda (*Carissa carandas* L.) fruits focusing on the effect of fruit type and value added-product on overall organoleptic acceptance during (2022 and 2023) at S.K.N. Agriculture University, Jobner, Rajasthan. The Factorial Completely Randomized Design was used to analyse the data. Physiologically mature fruits were harvested, processed and evaluated by a panel of 15 members, using a 9-point hedonic scale for sensory attributes. The results indicated that maroon Karonda fruits consistently showed higher organoleptic acceptance scores compared to green fruits. Among value-added products, candy showed highest overall acceptance, while chutney the lowest. Significant variations in overall acceptance were observed, while candy made from maroon fruits showed the highest acceptance scores (8.40 and 8.47). The preserve prepared from green fruits showed lowest (7.28 and 7.43) acceptance during both the years. The study highlights the effect of fruit type and value-added products on sensory qualities, providing insights for optimizing karonda fruit-based products to enhance consumer preference.

Key words: Value-added products, Sensory qualities, Fruit type, Organoleptic acceptance

Karonda (*Carissa carandas* L.) belongs to the family Apocynaceae (Bhowmick *et al.*, 2023). It is an evergreen shrub, dichotomously branched with short stem and strong thorns (Tripathi *et al.*, 2023). It is a hardy, drought tolerant plant of dryland, growing in various parts of India, viz. Bihar, West Bengal, Rajasthan, Uttar Pradesh and South India (Banik *et al.* 2012; Singh *et al.*, 2024). Because of its soft flesh and high moisture content, the storage life of its fruits is very short (a week at 13 °C and 95% relative humidity) (Mitra *et al.* 2010). The ascorbic acid content (10.26 -17.94 mg/100 g) reducing sugars (0.93- 2.4%), non-reducing sugars (0.57 -1.33%) and total soluble solids (3 - 4.5%) enrich its fruits (Meti and Sunita, 2023).

Mature or ripe fruits are used in processing industry for preparation of value-added products (Srivastava *et al.* 2017). Owing to substantial pectin content in ripe fruits, it is also utilized in creation of jelly, jam, squash, sauces, pies, syrup, tarts and chutney, all of which are highly sought after global market (Wani *et al.*, 2013). The color, aroma, flavor, taste and texture, assist as critical indicators of quality and are integral to overall consumer experience (Kyriacou and Rouphael, 2018; Sharma *et al.*, 2023). Karonda is known for rich cultural heritage and nutritional benefits, embodies a range of organoleptic qualities that contribute to its distinctiveness in the culinary benefits (Maheshwari and Nirgude, 2021). This study explores and analyse the significance of organoleptic properties in determining consumer perceptions and acceptance of various value-added products of Karonda.

MATERIALS AND METHODS

The study consisted of two factors, *i.e.* factor A is type of fruits (green (G) and maroon (M)) and factor B, *i.e.* six value-added products. Factor B specifies the different value-added products, viz., jam (V_1), jelly (V_2), chutney (V_3), pickle (V_4), preserve (V_5) and candy (V_6). However, the data were analysed using a Factorial Completely Randomized Design because it is a robust experimental approach for the examination of multiple factors and their interactions under controlled condition. The fruits were procured from orchards of farmers near to region of Jobner, Jaipur, Rajasthan. Physiologically mature fruits of each type were harvested during August-September. They were immediately washed with water, dried and used for preparation of value-added products as per the standardized procedures.

Organoleptic acceptance scoring was done by a panel of 15 members using a scorecard for sensory acceptability of 9 points hedonic scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely', for appearance, colour, taste, texture, flavour and overall acceptability (Marek *et al.*, 2007). Score card was prepared keeping in view of the quality characteristics of value-added products.

All the products were replicated three times. Mean and standard deviation for the different parameters were computed. Analysis of Variance (ANOVA) at 5%

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significance level was calculated by using Statistical Analysis Tool Pack (Montgomery, 2017) and SPSS 16 (statistical package for social sciences) (IBM Corporation, 2019).

RESULTS AND DISCUSSION

The value-added products were analysed for overall organoleptic acceptance 0, 30, 60 and 90 DAS during both years (Tables 1 and 2). There was significant difference in overall organoleptic acceptance among value-added products during the storage period. The higher overall organoleptic acceptance was observed for products prepared from maroon (8.26 and 8.30) fruits as compared to green ones (8.10 and 8.17). Value-added products prepared from maroon fruits exhibited slightly higher overall organoleptic acceptance compared to green ones fruits during the storage (Fig. 1). However, significant difference was in overall organoleptic acceptance at 0, 30, 60 and 90 DAS for each value-added product. During 2022-23, mean overall organoleptic acceptance was in jam (8.35), jelly (8.21), chutney (7.93), pickle (8.17), preserve (8.00) and candy (8.45). Similarly during 2023-24, mean overall organoleptic acceptance for jam (8.36), jelly (8.28), chutney (8.01), pickle (8.21), preserve (8.05) and candy (8.50) were recorded. The candy exhibited highest overall organoleptic acceptance during all storage periods while the chutney had the least value. Whereas, the interaction between fruit type and value-added products showed the significant effect on overall organoleptic acceptance (Table 2). The candy prepared from maroon fruits showed highest organoleptic acceptance (8.40 - 8.47), whereas, preserve prepared from green fruits had lowest overall organoleptic acceptance of 7.28 and 7.43 among all products 90 DAS during 2022 and 2023, respectively.

Throughout the storage period, products derived from maroon fruits consistently exhibited slightly higher overall organoleptic acceptance scores compared to green fruits. The highest overall acceptability of products might be due to best acceptable colour, flavour, texture and taste. These findings are crucial for optimizing product formulations and enhancing consumer acceptance of fruit-based products in the market. Similar results have been reported by Hegde *et al.* (2020), Rafique *et al.* (2023) and Garg *et al.* (2024). This difference suggested that maroon fruits may possess superior sensory attributes that enhance the overall organoleptic acceptance.

These findings showed the influence of fruit type on sensory attributes of value-added products. Maroon fruits generally contributed to higher overall organoleptic acceptance scores, particularly evident in candy, jam and jelly, while product of green fruits had slightly lower scores as observed in preserve. The overall organoleptic acceptance quality of value-added products derived from green and maroon types of fruits.

The decreasing trend of overall acceptability of product might be due to decrease in colour and flavour of product during storage. The results underscored significant differences in sensory attributes between both fruit types. Similar results have been reported by Hegde *et al.* (2020) and Dinde *et al.* (2020).

CONCLUSION

The results consistently showed that products derived from maroon fruits generally exhibited higher overall organoleptic acceptance compared to those from green fruits. Candy consistently emerged as the most favoured product across all storage periods. Whereas, interaction between fruit type and value-added product

Table 1. Organoleptic acceptance of value - added products of karonda fruits

Treatment	Overall organoleptic acceptance									
	2022-23					2023-24				
	0 DAS	30 DAS	60 DAS	90 DAS	Mean	0 DAS	30 DAS	60 DAS	90 DAS	Mean
Factor A: fruit type										
F_1 Green	8.27	8.19	8.07	7.89	8.10	8.31	8.26	8.15	7.97	8.17
F_2 Maroon	8.39	8.34	8.25	8.07	8.26	8.43	8.37	8.27	8.13	8.30
SEm±	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	-
CD (5%)	0.02	0.02	0.02	0.03		0.03	0.02	0.02	0.02	-
Factor B: value- added products										
V_1 Jam	8.48	8.40	8.33	8.19	8.35	8.48	8.42	8.34	8.22	8.36
V_2 Jelly	8.39	8.28	8.16	8.01	8.21	8.45	8.35	8.23	8.08	8.28
V_3 Chutney	8.12	8.08	7.90	7.62	7.93	8.15	8.16	8.00	7.75	8.01
V_4 Pickle	8.30	8.22	8.14	8.01	8.17	8.34	8.27	8.18	8.05	8.21
V_5 Preserve	8.15	8.12	7.99	7.75	8.00	8.18	8.16	8.03	7.83	8.05
V_6 Candy	8.56	8.49	8.43	8.30	8.45	8.61	8.55	8.47	8.37	8.50
SEm±	0.01	0.01	0.01	0.02		0.02	0.01	0.01	0.01	-
CD (5%)	0.04	0.03	0.04	0.04		0.04	0.04	0.04	0.04	-

Table 2. Interactive effect of type of fruit and value-added products on overall organoleptic acceptance

	Overall organoleptic acceptance							
	0 DAS		30 DAS		60 DAS		90 DAS	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
				2022-23				
V_1	8.35	8.61	8.25	8.55	8.17	8.49	8.02	8.35
V_2	8.23	8.56	8.08	8.49	7.92	8.39	7.75	8.27
V_3	8.31	7.93	8.19	7.97	8.04	7.76	7.87	7.38
V_4	8.51	8.10	8.43	8.01	8.34	7.94	8.21	7.80
V_5	7.76	8.53	7.79	8.46	7.61	8.37	7.28	8.23
V_6	8.48	8.65	8.42	8.57	8.32	8.54	8.19	8.40
SEm±	0.02		0.02		0.02		0.02	
CD (5%)	0.05		0.05		0.06		0.06	
				2023-24				
V_1	8.35	8.62	8.31	8.53	8.22	8.46	8.07	8.36
V_2	8.27	8.64	8.14	8.55	8.01	8.46	7.82	8.34
V_3	8.32	7.98	8.29	8.02	8.15	7.85	7.96	7.53
V_4	8.55	8.13	8.48	8.06	8.40	7.96	8.28	7.82
V_5	7.85	8.52	7.88	8.44	7.71	8.35	7.43	8.22
V_6	8.53	8.70	8.46	8.63	8.39	8.56	8.27	8.47
SEm±	0.02		0.02		0.02		0.02	
CD (5%)	0.06		0.05		0.05		0.05	

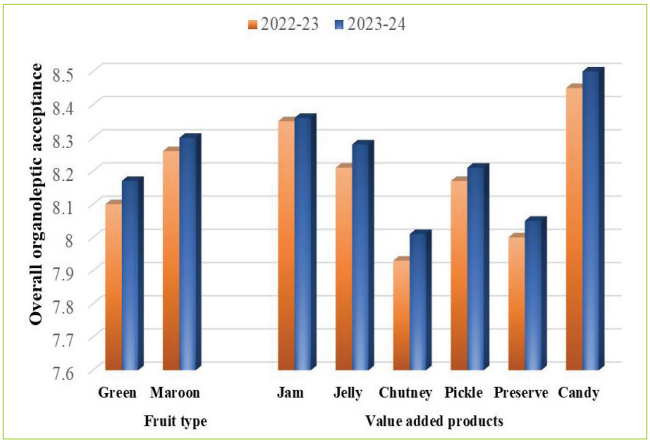

Fig. 1 Comparative analysis of overall organoleptic acceptance of value -added products

significantly influenced and revealed candy prepared from maroon fruits consistently showed the highest scores highlighting their superior sensory appeal.

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