



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2019; 7(3): 3763-3768

© 2019 IJCS

Received: 04-03-2019

Accepted: 08-04-2019

Naik PR

Department of Post-Harvest
Technology, Navsari
Agricultural University, Navsari,
Gujarat, India

Patel NV

Assistant professor, Department
of Post-Harvest Technology,
Navsari Agricultural University,
Navsari, Gujarat, India.

Surela Vipul A

Department of horticultural
entomology, Navsari
Agricultural University, Navsari,
Gujarat, India

Desai Supal A

Department of Floriculture and
landscape architecture
Navsari Agricultural University,
Navsari, Gujarat, India

Sensory evaluation of osmotically dehydrated carrot (*Daucus carota* L.) candy

Naik PR, Patel NV, Surela Vipul A and Desai Supal A

Abstract

The study conducted at Department of Post Harvest Technology, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during year 2017. For preparation of carrot candy using different levels of sugar/syrup treatments (S₁- Mixing of 500 g sugar / kg pieces, S₂ - Mixing of 750 g sugar / kg pieces, S₃ - Mixing of 1000 g sugar / kg pieces, S₄- Mixing of 1 kg 50° Brix syrup / kg pieces and S₅- Mixing of 1 kg 60° Brix syrup / kg pieces, S₆- Mixing of 1 kg 70° Brix syrup / kg pieces) and KMS (K₁-0 ppm, K₂-1000 ppm and K₃-2000 ppm). The experiment was laid out using completely randomized design with factorial concepts. The yield of carrot was found maximum in candy prepared by using 1kg syrup (50°B) having 1000 ppm KMS per kg pieces (K₂S₄). Whereas, mass transfer-in and out for carrot candy were found minimum in candy prepared with same treatment. The acidity (%) of candy was decreasing with the advancement of storage period. The TSS of carrot candy was found maximum in candy prepared by using 1kg syrup (50°B) with 1000 ppm KMS per kg pieces (K₂S₄) and minimum TSS was found in candy prepared by using 1000 g sugar per kg pieces along with 2000 ppm KMS (K₃S₃). The maximum carotene and moisture content were found in candy prepared by using 1kg syrup (50°B) per kg pieces containing 1000 ppm KMS (K₂S₄). The maximum total and reducing sugars were found in candy prepared with same treatment while, they were minimum in candy prepared by using 1000 g sugar per kg pieces along with 2000 ppm KMS (K₃S₃). Overall findings of investigation revealed that carrot candy can be prepared by mixing of 1 kg syrup (50°B) per kg pieces along with 1000 ppm KMS followed by gradual rise (10°B) in the syrup strength up to 70°B was found better.

Keywords: carrot candy, osmotic dehydration.

Introduction

Carrot (*Daucus carota* L.) belonging to Apiaceae (previously Umbelliferae) family grown throughout the world. It is one of the most important and popular root vegetable grown extensively in various countries particularly during winter season. Among the various vegetables, carrot is the best source of carotene, which is precursors of vitamin A and also rich source of ascorbic acid and are known as vitaminized food with moisture, protein, fat, carbohydrates, sugars and fiber, respectively (Haq and Prasad 2015) [1] with essential nutrients for maintaining health. Due to the health and nutrition benefits of the carrot, its commercialization and industrialization in the form of different products is very important in fulfilling the nutrient requirements of the people particularly as a cheap source of vitamin A. Besides the carotene and carotenoids, vitamin A conversion from β-carotene is very fast as compared to other carotenoids (Van *et al.*, 1996) [6]. Carrots are being consumed in various forms *viz.*, salad, soup, stews, curries, pies and sweetmeats. They are cooked and processed into various value added products *viz.*, canned carrots, chips, candy, *kheer*, *halwa*, powder, juice, beverages, wine, preserve, intermediate moisture products and jams as blending agents as reported by Lingappa and Naik (1997).

Osmotic dehydration is divided into two steps, dipping of the fruits/vegetables in concentrated sugar syrup/ brine solution which is called osmosis while, drying of the products by means of dryers that is dehydration. Osmotic dehydration (OD) is a technique applied to fruit and vegetable products to reduce their moisture content and increase soluble solids content.

Candy is a sweet product prepared from fruits or vegetables by impregnating them with sugar syrup followed by draining of excessive syrup and then drying the product to a shelf stable state (Mehta and Bajaj, 1984) [8]. The maintenance of colour, texture, taste and aroma are major problems in preparation of candy. So, there is urgent need to standardize the process for preparation of candy from carrots.

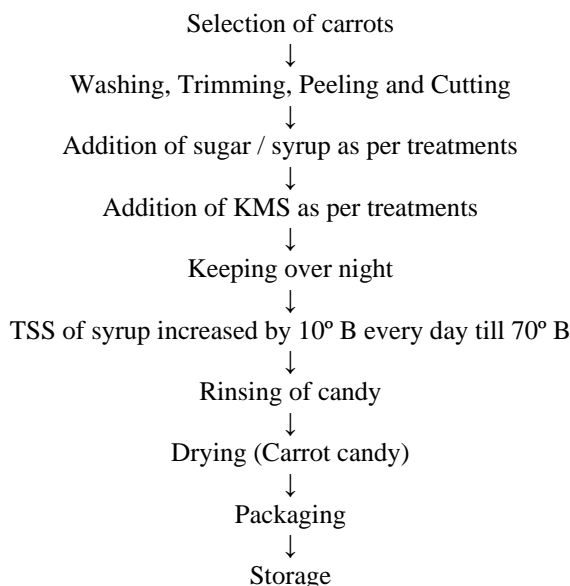
Correspondence**Naik PR**

Department of Post-Harvest
Technology, Navsari
Agricultural University, Navsari,
Gujarat, India

Materials and Methods

Experiment was carried out in Center of Excellence on Post Harvest Technology, Department of Post Harvest Technology, ASPEE College of Horticulture and forestry, N.A.U., Navsari. The carrots were weighed and washed thoroughly in clean water, trimmed and hand peeled by means of peeler and cut into cuboids ($15 \times 15 \text{ mm} \pm 1 \text{ mm}$) by means of hand operated diecer. Later on, the carrot pieces were blanched for 5 min. Simultaneously, sugar syrups of 50⁰ B, 60⁰ B and 70⁰ B were prepared by adding table sugar to hot water and strength of sugar syrup was measured using abbe refractometer. After that freshly prepared syrup/direct sugar (500 g, 750 g and 1000 g) were mixed with blanched carrot pieces as per treatments for osmosis. Then required quantities of citric acid (0.2 per cent) and potassium metabisulphite (0 ppm, 1000 ppm and 2000 ppm) were mixed in syrup containing pieces. The pieces were left overnight in syrup. After 24 hours, syrup was drained out, TSS and weight of syrup were recorded. The TSS of drained out syrup was raised 10⁰ Brix by adding table sugar and then pieces were again kept in syrup for overnight. The process was repeated till the TSS of syrup reached to 70⁰ Brix. Then pieces were rinsed in warm water for 10 seconds and dried in hot air tray drier at temperature of 60⁰C for 8 hours. After dehydration, samples of carrot candy were packed in the polyethylene bag which was sealed air tight and stored at room temperature for further observations. The same process was carried out with three repetition as per experimental design.

A total 18 treatment combinations were used for preparation of carrot candy with three different levels of potassium metabisulphite (factor 1) and six different levels of sugar/syrups (factor 2). The processed candy was stored at room temperature for periodical evaluation at 0, 2, 4 and 6 months for studying qualitative status of fresh product and changes during storage.



Result and Discussion

1) Colour (9 point hedonic scale)

Effect of KMS: The perusal of data pertaining to visual colour of carrot candy has been presented in Table 1. It was observed that grand mean colour score (K) of candy varied from 6.69 to 6.92 in carrot candy when hypertonic solution contains different concentrations of KMS, with maximum colour score in 1000 ppm KMS (K₂) and minimum in candy prepared using 2000 ppm KMS (K₃) in hypertonic solution.

Among different concentrations of KMS, minimum decrease in colour score from 7.97 to 5.68 was observed in carrot candy prepared by using 2000 ppm KMS (K₃), whereas, maximum decrease in colour score from 8.21 to 5.71 was observed in candy prepared by 1000 ppm KMS (K₂) after six months of storage.

Effect of sugar/syrup treatments: Data shows that among different sugar/syrup treatments the grand mean (S) colour score (9 point Hedonic scale) of carrot candy varied from 5.98 to 7.89, with maximum colour score in candy prepared by using 1kg syrup (50⁰B) per kg pieces (S₄) and minimum in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S₃).

Effect of storage period: Data depicts that storage of candy resulted decrease in grand mean colour score (P) from initial value of 8.08 to 5.47 after six months of storage. The decrease in colour score during six months storage was observed minimum (7.37 to 5.00) in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S₃) and maximum (7.93 to 5.07) in candy prepared by sugar treatment using 750g sugar per kg pieces (S₂).

Effect of interaction: Further, decrease of colour score in carrot candy during six month storage was found minimum (7.20 to 6.70) in candy prepared by using 1000 g of sugar per kg pieces with 2000 ppm KMS (K₃S₃) and maximum (8.90 to 5.00) in candy prepared by using 1kg syrup (60⁰Brix) kg pieces and 1000 ppm KMS (K₂S₅). However, during entire storage period, the sensory score for colour was found highest in candy prepared using 1kg syrup per kg pieces with 1000 ppm KMS (K₂S₄). Furthermore, the score of colour was decreasing with the advancement of storage up to 6 months at ambient temperature condition. The decrease in score during storage might be attributed due to certain enzymatic and non-enzymatic reactions leads to browning of candy (Babariya *et al.*, 2014)^[5].

2) Texture (9 point hedonic scale)

Effect of KMS: The perusal of data pertaining to visual texture of carrot candy has been presented in Table 2. It was observed that grand mean texture score (K) of candy varied from 6.72 to 7.10 in carrot candy when hypertonic solution contains different concentrations of KMS, with maximum texture score in without KMS (K₁) and minimum in candy prepared using 2000 ppm KMS (K₃) in hypertonic solution. Among different concentrations of KMS, minimum decrease in texture score from 8.08 to 6.18 was observed in carrot candy prepared without KMS (K₁), whereas maximum decrease in texture score from 8.22 to 5.85 was observed in candy prepared by 1000 ppm KMS (K₂) after six months of storage.

Effect of sugar/syrup treatments: Data shows that among different sugar/syrup treatments the grand mean (S) texture score (9 point Hedonic scale) of carrot candy varied from 5.89 to 8.28, with maximum texture score in candy prepared by using 1kg syrup (50⁰B) per kg pieces (S₄) and minimum in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S₃).

Effect of storage period: Data depicts that storage of candy resulted decrease in grand mean texture score (P) from initial value of 8.09 to 5.91 after six months of storage. The decrease

in texture score during six months storage was observed minimum (8.27 to 6.83) in candy prepared by sugar treatment using 500 g sugar per kg pieces (S_1) and maximum (7.93 to 5.00) in candy prepared by sugar treatment using 750g sugar per kg pieces (S_2).

Effect of interaction: Further, decrease of texture score in carrot candy during six month storage was found minimum (8.90 to 7.20) in candy prepared by using kg of syrup per kg pieces and 1000 ppm KMS (K_2S_4) and maximum (8.10 to 5.00) in candy prepared by using 750 g sugar per kg pieces and 1000 ppm KMS (K_2S_2), during entire storage period, the sensory score for texture was found highest in candy prepared using 1 kg syrup ($60^{\circ}B$) per 1kg pieces with 1000 ppm KMS (K_2S_4). Furthermore, the score of texture was decreasing with storage up to 6 months at ambient temperature condition. The general decline in score during storage might be due to fluctuations in moisture levels and increasing sugars content (Babariya *et al.*, 2014)^[5].

3) Flavour (9 point Hedonic Scale)

Effect of KMS: The perusal of data pertaining to visual flavour of carrot candy has been presented in Table 3. It was observed that grand mean flavour score (K) of candy varied from 6.54 to 6.90 in carrot candy when hypertonic solution contains different concentrations of KMS, with maximum flavour score in 1000 ppm KMS (K_2) and minimum in candy prepared using 2000 ppm KMS (K_3) in hypertonic solution. Among different concentrations of KMS, minimum decrease in flavour score from 8.40 to 5.50 was observed in carrot candy prepared without KMS (K_1), whereas maximum decrease in flavour score from 8.30 to 5.12 was observed in candy prepared by 2000 ppm KMS (K_3) after six months of storage.

Effect of sugar/syrup treatments: Data shows that among different sugar/syrup treatments the grand mean (S) flavour score (9 point Hedonic scale) of carrot candy varied from 5.75 to 7.83, with maximum flavour score in candy prepared by using 1kg syrup ($50^{\circ}B$) per kg pieces (S_4) and minimum in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S_3).

Effect of storage period

Data depicts that storage of candy resulted decrease in grand mean flavour score (P) from initial value of 8.41 to 5.38 after six months of storage. The decrease in flavour score during six months storage was observed minimum (8.90 to 6.60) in candy prepared by syrup treatment using 1 kg syrup per kg pieces (S_4) and maximum (8.87 to 5.10) in candy prepared by sugar treatment using 500g sugar per kg pieces (S_1).

Effect of interaction

Further, decrease of flavour score in carrot candy during six month storage was found minimum (8.90 to 6.80) in candy prepared by using 1kg syrup ($50^{\circ}B$) per 1kg pieces, without KMS and 1000 ppm KMS (K_1S_4) and (K_2S_4), respectively. While, maximum (8.90 to 5.10) in candy prepared by using 500 g sugar per kg pieces, without KMS and 1000 ppm KMS (K_1S_1) and (K_2S_1), respectively. However, during entire storage period, the sensory score for flavour was found highest in candy prepared using 1kg syrup ($50^{\circ}B$) per 1kg pieces along with 1000 ppm KMS. Furthermore, the score of flavour was decreasing with storage up to 6 months at ambient temperature condition. The general decline in score

during storage might be attributed to loss of moisture content and flavour compounds (Babariya *et al.*, 2014)^[5].

4) Taste (9 point hedonic scale)

Effect of KMS: The perusal of data pertaining to visual taste of carrot candy has been presented in Table 4. It was observed that grand mean taste score (K) of candy varied from 6.78 to 7.04 in carrot candy when hypertonic solution contains different concentrations of KMS, with maximum taste score in 1000 ppm KMS (K_2) and minimum in candy prepared using 2000 ppm KMS (K_3) in hypertonic solution. Among different concentrations of KMS, minimum decrease in taste score from 8.05 to 5.57 was observed in carrot candy prepared by using 2000 ppm KMS (K_3), whereas maximum decrease in taste score from 8.17 to 5.65 was observed in candy prepared without KMS (K_1) after six months of storage.

Effect of sugar/syrup treatments: Data shows that among different sugar/syrup treatments the grand mean (S) taste score (9 point Hedonic scale) of carrot candy varied from 5.00 to 6.90, with maximum taste score in candy prepared by using 1kg syrup ($50^{\circ}B$) per kg pieces (S_4) and minimum in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S_3).

Effect of storage period

Data depicts that storage of candy resulted decrease in grand mean taste score (P) from initial value of 8.17 to 5.66 after six months of storage. The decrease in taste score during six months storage was observed minimum (8.90 to 6.90) in candy prepared by syrup treatment using 1kg syrup ($50^{\circ}B$) per 1kg pieces and maximum (8.17 to 5.23) in candy prepared by sugar treatment using 750g sugar per kg pieces (S_2).

Effect of interaction: Further, decrease of taste score in carrot candy during six month storage was found minimum (8.90 to 7.00) in candy prepared by using 1kg syrup ($50^{\circ}B$) per 1kg pieces, without KMS and 1000 ppm KMS (K_1S_4) and (K_2S_4), respectively. While, maximum (8.10 to 5.00) in candy prepared by using 1kg syrup ($70^{\circ}Brix$) per kg pieces and 1000 ppm KMS (K_2S_6). However, during entire storage period, the sensory score for taste was found highest in candy prepared using 1kg syrup ($50^{\circ}B$) per 1kg pieces with 1000 ppm KMS (K_2S_4). Furthermore, the score of taste was decreasing with storage up to 6 months at ambient temperature condition. The decrease in score during storage might be attributed to loss of flavour during entire period of storage (Babariya *et al.*, 2014)^[5].

5) Overall acceptability (9 point hedonic scale)

Effect of KMS: The perusal of data pertaining to visual overall acceptability of carrot candy has been presented in Table 5. It was observed that grand mean overall acceptability score (K) of candy varied from 6.66 to 6.93 in carrot candy when hypertonic solution contains different concentrations of KMS, with maximum overall acceptability in 1000 ppm KMS (K_2) and minimum score in candy prepared using 2000 ppm KMS (K_3) in hypertonic solution. Among different concentrations of KMS, minimum decrease in overall acceptability score from 8.15 to 5.70 was observed in carrot candy prepared without KMS (K_1), whereas maximum decrease in overall acceptability score from 8.238 to 5.70 was observed in candy prepared by 1000 ppm KMS (K_2) after six months of storage.

Effect of sugar/syrup treatments: Data shows that among

different sugar/syrup treatments the grand mean (S) overall acceptability score (9 point Hedonic scale) of carrot candy varied from 5.83 to 8.05, with maximum overall acceptability score in candy prepared by using 1kg syrup (50⁰B) per kg pieces (S₄) and minimum in candy prepared by sugar treatment using 1000 g sugar per kg pieces (S₃).

Effect of storage period: Data depicts that storage of candy resulted decrease in grand mean overall acceptability score (P) from initial value of 8.15 to 5.63 after six months of storage. The decrease in overall acceptability score during six months storage was observed minimum (8.90 to 6.90) in candy prepared by syrup treatment using 1 kg syrup (50⁰B) per kg pieces (S₄) and maximum (8.07 to 5.00) in candy prepared by sugar treatment using 750g sugar per kg pieces (S₂).

Effect of interaction: Further, decrease of overall acceptability score in carrot candy during six month storage was found minimum (8.90 to 7.00) in candy prepared by using 1 kg syrup (50⁰B) per kg pieces without KMS (K₁S₄) and maximum (8.10 to 5.00) and (8.20 to 5.10) in candy prepared by using 750 g sugar per kg pieces, without KMS and 1000 ppm KMS, respectively. (K₂S₄). However, during entire storage period, the sensory score for overall

acceptability was found highest in candy prepared using 1 kg syrup (50⁰B) per kg pieces along with 1000 ppm KMS (K₂S₄). Furthermore, the score of overall acceptability was decreasing with storage up to 6 months at ambient temperature condition. The decrease in score of overall acceptability during storage could be correlated to change in colour, texture, taste and flavour of carrot candy. However, under room condition the quality was maintained to more than six months of storage (Nayak *et al.*, 2012, Pawar *et al.*, 2013, and Babariya *et al.*, 2014)^[5, 4].

Conclusion

From the foregoing discussion, it can be concluded that carrot candy can be prepared by mixing of 1 kg syrup (50⁰B) per kg pieces along with 1000 ppm (1g/lit) potassium metabisulphite (KMS) followed by gradual rise (10⁰ B) in the syrup strength up to 70⁰ B was found better during storage. The carrot candy can be successfully stored for a period of 6 months in polypropylene bags (400 gauge) without much changes in physico-chemical, sensory and microbial quality. Thus, the developed technology can commercially be adopted by food processing industry for the production of quality carrot candy. Therefore, profitable utilization of carrots grown in India for processing can ensure better returns to the growers and processors as well.

Table 1: Effect of different treatments on colour of carrot candy during storage period of 6 months

Storage Period (P)	KMS Concentration (K) ppm	Colour score (9 point hedonic scale)							Grand Mean (K)
		Sugar /Syrup Treatments, (S)						Mean	
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆		
0 Month (P ₁)	K ₁ - 0	8.30	8.00	7.40	8.90	8.40	7.50	8.08	6.78 6.92 6.69
	K ₂ – 1000	8.40	8.10	7.50	8.90	8.90	7.50	8.21	
	K ₃ – 2000	8.10	7.70	7.20	8.90	8.40	7.50	7.97	
	Mean	8.27	7.93	7.37	8.90	8.57	7.50	8.08	
2 Month (P ₂)	K ₁ - 0	7.50	7.20	6.20	7.90	8.10	6.30	7.20	
	K ₂ - 1000	8.00	7.50	6.20	7.90	8.50	6.50	7.43	
	K ₃ - 2000	7.50	6.50	6.10	8.50	8.00	6.30	7.15	
	Mean	7.67	7.06	6.17	8.10	8.20	6.37	7.26	
4 Month (P ₃)	K ₁ - 0	6.60	5.20	5.00	8.20	7.50	5.00	6.25	
	K ₂ - 1000	6.90	5.20	6.80	8.20	7.70	5.10	6.65	
	K ₃ - 2000	5.70	5.20	6.70	7.80	7.30	5.00	6.28	
	Mean	6.40	5.20	6.17	8.07	7.50	5.07	6.39	
6 Month (P ₄)	K ₁ - 0	5.20	5.10	5.00	7.00	6.30	5.00	5.60	
	K ₂ - 1000	6.00	5.10	5.00	6.30	5.00	5.10	5.42	
	K ₃ - 2000	5.00	5.00	5.00	6.20	6.20	5.00	5.40	
	Mean	5.40	5.07	5.00	6.50	5.83	5.03	5.47	
	Grand Mean (S)	7.01	6.31	6.17	7.89	7.52	5.98		

Table 2: Effect of different treatments on texture of carrot candy during storage period of 6 months

Storage Period (P)	KMS Concentration (K) ppm	Texture score (9 point hedonic scale)							Grand Mean (K)
		Sugar /Syrup Treatments, (S)						Mean	
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆		
0 Month (P ₁)	K ₁ - 0	8.30	8.00	7.40	8.90	8.40	7.50	8.08	7.10 6.96 6.72
	K ₂ – 1000	8.40	8.10	7.50	8.90	8.90	7.50	8.22	
	K ₃ – 2000	8.10	7.70	7.20	8.90	8.40	7.50	7.97	
	Mean	8.27	7.93	7.37	8.90	8.57	7.50	8.09	
2 Month (P ₂)	K ₁ - 0	8.30	7.00	6.20	8.90	8.10	6.20	7.45	
	K ₂ - 1000	7.50	7.10	6.20	8.90	8.70	6.20	7.43	
	K ₃ - 2000	7.30	6.40	6.20	8.77	8.00	6.20	7.15	
	Mean	7.70	6.83	6.20	8.86	8.27	6.20	7.34	
4 Month (P ₃)	K ₁ - 0	8.30	5.20	5.00	8.50	8.00	5.00	6.67	
	K ₂ - 1000	6.60	5.20	5.00	8.10	8.10	5.00	6.33	
	K ₃ - 2000	5.80	5.10	5.00	8.10	7.20	5.00	6.03	

	Mean	6.90	5.17	5.00	8.23	7.77	5.00	6.34	
6 Month (P ₄)	K ₁ - 0	6.30	5.00	5.00	7.20	6.60	5.00	6.18	
	K ₂ - 1000	6.20	5.00	5.00	7.10	6.80	5.00	5.85	
	K ₃ - 2000	6.00	5.00	5.00	7.10	6.20	5.00	5.72	
	Mean	6.67	5.00	5.00	7.13	6.53	5.00	5.91	
	Grand Mean (S)	7.38	6.23	5.89	8.28	7.79	5.93		

Table 3: Effect of different treatments on flavour of carrot candy during storage period of 6 months

Storage Period (P)	KMS Concentration (K) ppm	Flavour score (9 point hedonic scale)							Mean	Grand Mean (K)
		Sugar /Syrup Treatments, (S)								
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆			
0 Month (P ₁)	K ₁ - 0	8.90	8.40	7.40	8.90	8.90	7.90	8.40	6.82 6.90 6.54	
	K ₂ - 1000	8.90	8.50	7.80	8.90	8.90	8.20	8.53		
	K ₃ - 2000	8.80	8.20	7.20	8.90	8.90	7.80	8.30		
	Mean	8.87	8.37	7.47	8.90	8.90	7.97	8.41		
2 Month (P ₂)	K ₁ - 0	7.30	7.20	6.10	8.90	8.10	6.30	7.32		
	K ₂ - 1000	8.00	7.20	6.30	8.50	8.27	6.40	7.45		
	K ₃ - 2000	7.20	6.70	5.20	8.30	8.10	6.30	6.97		
	Mean	7.50	7.03	5.87	8.57	8.16	6.33	7.24		
4 Month (P ₃)	K ₁ - 0	6.30	6.10	5.00	7.60	6.40	5.10	6.08		
	K ₂ - 1000	6.30	6.10	5.00	7.20	6.70	5.20	6.08		
	K ₃ - 2000	6.30	5.20	5.00	6.90	6.30	5.00	5.78		
	Mean	6.30	5.80	5.00	7.23	6.47	5.10	5.98		
6 Month (P ₄)	K ₁ - 0	5.10	5.30	4.80	6.80	6.00	5.00	5.50		
	K ₂ - 1000	5.10	5.10	5.00	6.80	6.20	5.00	5.53		
	K ₃ - 2000	5.10	5.00	4.20	6.20	5.20	5.00	5.12		
	Mean	5.10	5.13	4.67	6.60	5.80	5.00	5.38		
	Grand Mean (S)	6.94	6.58	5.75	7.83	7.33	6.10			

Table 4: Effect of different treatments on taste of carrot candy during storage period of 6 months

Storage Period (P)	KMS Concentration (K) ppm	Taste score (9 point hedonic scale)							Mean	Grand Mean (K)
		Sugar /Syrup Treatments, (S)								
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆			
0 Month (P ₁)	K ₁ - 0	8.20	8.20	7.20	8.90	8.50	8.00	8.17	6.91 7.04 6.78	
	K ₂ - 1000	8.50	8.20	7.20	8.90	8.80	8.10	8.28		
	K ₃ - 2000	8.20	8.10	7.10	8.90	8.50	7.50	8.05		
	Mean	8.30	8.17	7.17	8.90	8.60	7.87	8.17		
2 Month (P ₂)	K ₁ - 0	8.10	7.80	6.20	8.90	8.50	7.30	7.80		
	K ₂ - 1000	8.20	7.80	6.40	8.90	8.80	7.40	7.92		
	K ₃ - 2000	8.00	7.50	6.20	8.80	8.40	6.90	7.63		
	Mean	8.10	7.70	6.27	8.87	8.57	7.20	7.78		
4 Month (P ₃)	K ₁ - 0	6.10	5.70	5.20	7.20	6.50	5.30	6.00		
	K ₂ - 1000	6.60	6.00	5.30	7.20	6.70	5.30	6.18		
	K ₃ - 2000	6.10	5.40	5.00	7.10	6.30	5.30	5.87		
	Mean	6.27	5.70	5.17	7.17	6.50	5.30	6.02		
6 Month (P ₄)	K ₁ - 0	5.40	5.20	5.00	7.00	6.20	5.10	5.65		
	K ₂ - 1000	6.00	5.30	5.00	7.00	6.30	5.00	5.77		
	K ₃ - 2000	5.30	5.20	5.00	6.70	6.10	5.10	5.57		
	Mean	5.57	5.23	5.00	6.90	6.20	5.07	5.66		
	Grand Mean (S)	7.06	6.70	5.90	7.96	7.47	6.36			

Table 5: Effect of different treatments on overall acceptability of carrot candy during storage period of 6 months

Storage Period (P)	KMS Concentration (K) ppm	Overall acceptability score (9 point hedonic scale)							Mean	Grand Mean (K)
		Sugar /Syrup Treatments, (S)								
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆			
0 Month (P ₁)	K ₁ - 0	8.40	8.10	7.30	8.90	8.50	7.70	8.15	6.89 6.93 6.66	
	K ₂ - 1000	8.50	8.20	7.50	8.90	8.80	7.80	8.28		
	K ₃ - 2000	8.30	7.90	7.10	8.90	8.50	7.50	8.03		
	Mean	8.40	8.07	7.30	8.90	8.60	7.67	8.15		
2 Month (P ₂)	K ₁ - 0	7.80	7.30	6.20	8.90	8.20	6.50	7.48		
	K ₂ - 1000	7.90	7.40	6.20	8.80	8.50	6.60	7.57		
	K ₃ - 2000	7.50	6.70	5.90	8.60	8.10	6.40	7.20		
	Mean	7.73	7.13	6.10	8.77	8.27	6.50	7.42		

4 Month (P ₃)	K ₁ - 0	6.80	5.50	5.00	7.80	7.10	5.10	6.22
	K ₂ - 1000	6.50	5.60	5.00	7.60	7.30	5.10	6.18
	K ₃ - 2000	5.90	5.20	5.00	7.50	6.80	5.00	5.90
	Mean	6.40	5.43	5.00	7.63	7.07	5.07	6.10
6 Month (P ₄)	K ₁ - 0	6.00	5.00	4.90	7.00	6.20	5.00	5.70
	K ₂ - 1000	5.80	5.10	5.00	6.90	6.40	5.00	5.70
	K ₃ - 2000	5.30	5.00	4.80	6.70	5.90	5.00	5.50
	Mean	5.70	5.00	4.90	6.90	6.20	5.00	5.63
	Grand Mean (S)	7.06	6.41	5.83	8.05	7.53	6.06	

References

1. Haq R, Prasad K. Nutritional and processing aspects of carrot (*Daucus carota*) - A review. South Asian J. Food Technol. Environ. 2015; 1(1):1-14.
2. Phisut N, Rattanawedee M, Aekkasak K. Effect of osmotic dehydration process on the physical, chemical and sensory properties of osmo-dried cantaloupe. Int. Fd. Res. J. 2013; 20(1):189-196.
3. Priya MD, Khatkar BS. Effect of processing methods on keeping quality of aonla preserve. Int. Fd. Res. J. 2013; 20(2):617-622.
4. Pawar MB, Patil DR, Naik AG. Evaluation of different aonla varieties for osmodehydrated candy product processing. Int. J. Processing and Post Harvest Technol. 2013; 4:26-29.
5. Babariya VJ, Makwana AN, Hadwani M, Panjiar N. Standardization of recipe for preparation of candy (Tuti fruiti) from unripe papaya. Asian J. Hort. 2014; 9(1):94-99.
6. Van VT, Van SF, Schreurs WH, Van DH. In vitro measurement of beta-carotene cleavage activity: methodological considerations and the effect of other cleavage. Int. J. Vitamin and Nutrition Res. 1996; 66:77-85.
7. Rodriguez-Amaya DB. A guide to carotenoid analysis in foods. *ILSI Press*, Washington, 2011.
Lingappa K, Naik C. Wine preparation from carrot. Indian Food Packer. 1997; 51(5):11-13.
8. Mehta U, Bajaj S. Changes in the chemical composition and organoleptic quality of citrus peel candy during preparation and storage. J. Food Sci. Technol. 1984; 21:422-424.
9. Hasanuzzaman MD, Kamruzzaman M, Islam MM, Khanoom SA, Rahman MM, Lisa LA, Paul DK. A study on tomato candy prepared by dehydration technique using different sugar solutions. Food and Nutrition Sci. 2014; 5:1261-1271.
10. Nayak P, Tondon DK, Bhatt DK, Study on changes of nutritional and organoleptic quality of flavored candy prepared from aonla (*Embllica officinalis* G.) during storage. Inter. J. Nutrition and Metabolism. 2012; 4(7):100-106.
11. Madan S, Dhawan SS. Development of value added product candy from carrots. Process Food Ind. 2005; 8(3):26-29.
12. Tripathi VK, Singh MB, Singh S. Studies on comparative compositional changes in different preserved products of aonla. (*Embllica officinalis*) var. Banarasi. Indian Food Packer. 1988; 42(4):60-66.