International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(4): 744-749

Received: 06-05-2019
Accepted: 10-06-2019

Anupma Awadhiya
Mahatma Gandhi Chitrakoot, Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

NR Rangare
J.N.K.V.V, Jabalpur, Madhya Pradesh, India

Shubham Mangal
Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Rajesh Garg
Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Sant Kumar
Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Ratnesh Gour
Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Correspondence
Anupma Awadhiya
Mahatma Gandhi Chitrakoot, Gramodaya Vishwa Vidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Changes in chemical composition and maoisture percent of pomegranate toffee during storage

Anupma Awadhiya, NR Rangare, Shubham Mangal, Rajesh Garg, Sant Kumar and Ratnesh Gour

Abstract
The present investigation was carried out in Pos Harvest Technology Laboratory, M.G.C.V.V. Chitrakoot (M.P.) during 2013 to 2014. The Main objectives of the present investigation were to find out suitable treatment for batter quality and shelf life of pomegranate toffee. The minimum moisture (16.63%) increase was recorded in T_5 Sulphitation + cardamom followed by (16.68%) in T_1 hot water + cardamom and maximum (16.96%) was with T_0 Hot water +untreated and TSS (14.15^0Brix) in T_5 (*Sulphition + cardamom flavor*) followed by (14.05^0 Brix) in T_1 hot water + cardamom and minimum (12.00^0Brix) was with T_0, minimum pH (4.204) increase was recorded in T_6 (Sulphitation + minimum Vanilla flour) followed by (4.359)in T_2 hot water + vanilla and maximum (4.876)was with T_0, minimum acidity (0.452%) increase was recorded in T_6 (Sulphitation + Vanilla *flvour*) followed by (0.452%) in T_2 hot water + vanilla and maximum (4.876) was with T_0, maximum reducing sugar (3.19%) increase was recorded in T_0 (hot water untreated) followed by (3.08%) in T_1 hot water + cardamom and and (3.04%) was with T_5 and the maximum non – reducing sugar increase was recorded (5.90) in T_5 (Sulphitation + *Cardmom* flavor)followed by (5.83) in T_6 KMS + vanilla and minimum (5.43%) was with T_0 whereas the maximum total sugar (8.94%) increase was recorded in T_5 (Sulphitation + *Cardmom* flavour) followed by (8.94%) in T_1 hot water + *Cardmom* and minimum (8.62%) was with T_0.

Keywords: Pomegranate, TSS, acidity, pH, sugar

Introduction
Pomegranate (*Punica granatum* L.) belonging to the family Punicaceae is a favourite table fruits of tropical and subtropical regions. The fruit is native of iron, where it was first calculativated in about 2000 B.C. it now extensively cultivated in Baluchistan, Pakistan, Morocco, Iraq, *China*, India, Egypt, Iron, Spain, Afghanistan, Japan and Russia. The genus Punika Has two species viz. granatum and proto punika. Punika protopunica is found wild in Socotra Island and punika granatum is cultivated in tropical and subtropical parts. Punika granatum has been classified into 2 subspecies i.e. cholocarpa and porphyrocarpa. Holocarpa is found in Transcaucasian region and porphyrocarpa in central Asia. Pomegranate aril juice provides about 16% of an adult's daily vitamin C requirement per 100 ml serving, and is a good source of vitamin B_5 (pantothenic acid), potassium and polyphones, such as tannins and Pomegranates are listed as higher-fiber in some charts of nutritional value. That fiber, however, is entirely contained in the edible seeds which also supply unsaturated oils. People who choose to discard the seeds forfeit nutritional benefits conveyed by the seed fiber, oils and micronutrients. Due to glut, it has become important to make best use of surplus pomegranate into value added products which reduced the post s harvest losses. Pomegranate fruit having fabulous reputation for it healthy, dietetic, and many medical properties, can be processed and commercially exploited for national and international market. Pomegranate waste medical, industrial and cosmetic value. Production of Anardana from juicy arils of pomegranate proved to be one of the important methods of production and sensory quality which ultimately cause a great set back to pomegranate processing industry. Therefore, it was felt necessary, to standardize the process for production of Anardana to obtain a product of batter sensory, to standardize the process for production of Anardana to obtain a product of better quality which can be future used in Ayurvedic system of medicine and Churan preparation. (Sagar and Islam, 2006) [7].

Materials and Methods

The present investigation entitled "Changes IN Chemical Composition and Maoisture Percent of pomegranate Toffee during storage" was laid out in the Postharvest Laboratory of M.G.C.V.V. Chitrakoot (M.P.) during 2013- 14.

Table 1: Treatment details

Treatments	Treatment details
T_0	Hot water treatment+ dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_1	Hot water treatment + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_2	Hot water treatment + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_3	Hot water treatment + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_4	Sulphitation + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_5	Sulphitation + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour
T_6	Sulphitation + dehydration+ prepare of pomegranate toffee with sugar + chocolate flavour
T_7	Sulphitation + dehydration + prepare of pomegranate toffee with sugar + chocolate flavour

Pomegranate powder : 400g
Sugar : 500g
Water : 200ml.
Chocolate powder : 100g
Butter : 25g
Milk powder : 20g
Flavours : Cardamom powder, vanilla, citric acid
Wrapping paper : butter paper

Fresh fruit analysis

The fruit were analyzed initially for Moisture, T.S.S., Acidity, pH, Reducing sugar, Non-reducing sugar and total sugar.

Moisture

Moisture content in the samples was determined by hot air oven. 5g of sample in triplicate was weighted accurately and dried 60± 20C for 6 hrs. The loss in weight was determined to calculate moisture content.

Determination of TSS

Total soluble solids (T.S.S.) were determined by hand refract meter. A hand refract meter is based on the principle of total refraction. The refractometer is first checked for accuracy *Befor* used by placing a few drops of distilled water on the prism in the specimen chamber of the refractometer with the help of a glass rod after folding back the cover. For determining the TSS, the prepared paste of toffee is place on the prism and percentage of dry substance in it is read directly. The values were corrected at 200 C. TSS is expressed in 0Brix.

PH

The pH of the fruit as that of toffee was determined by using pH meter (Elico, India), which was standardized before use. The electrodes of the pH meter were washed with distilled water after each determination.

Acidity

Known quantify of blended sample was place in know volume of distilled water, placed aside for sum times and shook well and filtrated. Known volume of aliquot was taken and was titrated with 0.1 N NaOH using phenolphthalein as indicator. The end point was denoted by the appearance of pink color. The titration was repeated thrice and the average value was recorded. (Ranganna, 1986) [6].

$$\%\text{acidity} = \frac{\text{Titre value} \times 0.1 \times 0.064 \times 100}{\text{Wt. of sample taken}}$$

Reducing sugar

Reducing sugar was estimated by Fehling's solution method as given by Lane and Eyone, (1923). Take 25ml (w) of juice by means of pipette in a 250 ml (v) volumetric flask and dilute with distilled water to make up the volume shake well. Take 5ml of Fehling A+B solution in Sconical flask by means of pipette. Take diluted sugar in the burette and 10ml of solution in conical flask containing Fehling solution. Heat solution to boiling. Continue boiling flask on low flame and add rapidly further quantity of juice from burette till the light blue color persists. Add 5-8 drop of methyl lene blue indicator and complete the titration until the blue color of Supernated liquid disappears.

Reducing sugar is taken calculated by formula given below-

$$\text{Percentage of sugar or glucose} = \frac{a*v*100}{T*1000*w}$$

Where,
A = dye factor
V = volume to which to which the solution is made up in the volumetric flask
T = titer value
W = volume of juice initially fir the determination

Non – reducing sugars

Take 25ml of juice by means of pipette in a clean150ml conical flask. Add 10ml of dilute H cl 54% and heat 700 v fir 8 -10minutes over water bath. Cool it immediately under tap and allow it to stand for half an hour. Neutralize the excess of HCL by adding 25% NaOH in presence of litmus paper. Transfer the solution in a 100ml volumetric flask and make up the volume by adding distilled water. Shake well and titrate it as for reducing sugar (Lane and Eynon, 1923) [1].

Calculated amount of reducing sugar by given formula

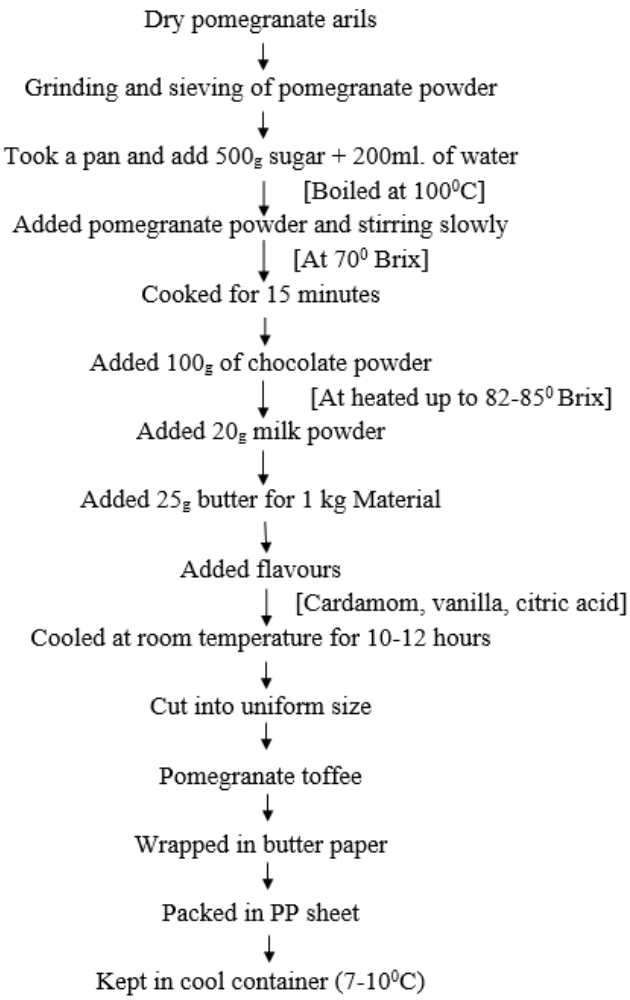
Percentage of sucrose as glucose = % of glucose after inversion % of glucose before inversion.

Total sugar

Total sugar is calculated by given formula

% total sugar = % of non-reducing sugar + 0.95 (% reducing sugar)

Flow chart for toffee preparation



Result and Discussion

Moisture percentage showed an increasing trend in all the Treatment at different intervals of storage. At 100 days of storage minimum moisture (16.63%) was recorded in t5 KMS+ cardamom followed by (16.68%) in T1 hot water + cardamom and maximum (16.96%) was with T0. Maximum increase in the moisture content 40 to60 day of storage. In Crese of moisture Content during storage period could be due to variation in findings have reported by Thakur, 1999 and Sagar and Islam, 2006.

Total soluble solids (0Brix)

TSS showed an increasing trend in all the treatments at different at intervals of storage.At100 Days of storage, the maximum TSS (14.150Brix) was recorded in T5KMS+cardmom followed by (14.05%) in T1hot water +cardamom and minimum (120.00 0Brix) was with T0.Maximum increase in the total soluble solids was recorded between 40 to 60 days old storage an minimum was between 80 to 100 days of storage. An increasing in total soluble solids content of pomegranate toffee during storage may possibly Br due to conversion of polysaccharides toffee during storage may possible be due to conversion of polysaccharides and etc. Sinto simple sugars. Similar finding have been reported by *Manivassagan et al*., 2006 & Sadhna *et al*., 2009.

pH

An increasing trend in the pH of value added pomegranate toffee was recorded till (60days) of storage, thereafter pH value declined at 80 & 100 days. At the 60 days of storage, the minimum (4.237) was recorded in T0KMS +vanilla followed by (4.367) in T1hot water + vanilla and maximum pH (4.886) was with to.

At the 100 days of storage, the minimum (4.204) was recorded in T6 KMS + vanilla followed by (4.359) in T3 hot water + vanilla and maximum pH(4.876)was with T0 Maximum increase pH was recorded between 20 to 40 days of storage and minimum was between 80 to 100 days. Similar findings have been reported by storage by Sadhna *et al*., 2009, Manivasagan *et al*., 2006.

Acidity (%)

An increasing trend in the acidity of value added pomegranate toffee was recorded till (60 days) of storage, thereafter acidity value declined at 80 & 100 days. At the 60 days of storage, the minimum (0.451) was recorded in T6KMS+vanilla followed by (0.459) in T2 hot water + vanilla and maximum pH (0.530) was with T0.

At the 100 days of storage, the minimum (0.442) was recorded in T6 KMS + vanilla followed by (0.452) in T2 hot water + vanilla and maximum pH (0.523)was with T0.Maximum increasing trend in the acidity was recorded between 40 to 60 days of storage and minimum was betwIslam,2006.een 80 to 100 days of storage. The decreased of acidity during storage may be due to absorption of water Vapouround thereafter its conversion into simple sugars. *Simillar* findings have been reported by Puruthi and Saxena, 1984 & Sagar and Islam, 2006.

Reducing sugar

Reducing sugar showed an increasing trend in all the treatments at different intervals of storage. At 100 Days of storage, the minimum reducing sugar (3.04%) was recorded in T5 followed by (3.08%) in T1 hot water + cardamom and maximum (3.19%)was with T0 (KMS + cardamom) maximum increase in the reducing sugar was recorded between 0 to 20 days of storage and minimum was between 80 to 100 days of storage.

The increase in reducing sugar was slightly higher in storage condition that could be attribute to more rapid hydrolysis of polysaccharides and their subsequent conversion to sugar. Similar finding have been reported by Mehta *et al*., 2005 for peel candy and Sagar and Islam, 2006 for pomegranate powder.

Non-reducing sugar

An increasing trend in the non-reducing sugar of value added pomegranate toffee was recorded till (80 days) of storage, thereafter total sugar value declined at 100 days. At the 80 days of storage, the maximum non-reducing sugar (5.94%) was recorded in T5 KMS+ cardamom followed by (5.86%) in T6 KMS + vanilla and minimum (5.46%) was with T0. At the 100 days of storage the maximum non-reducing sugar (5.90%) was recorded in T5 KMS+ cardamom followed by (5.84%) in T1 hot water +cardamom and minimum (5.43%) was with T0. Maximum increase in the non-reducing sugar was recorded between 40 to 60 days and 60 to 80 days of storage and minimum was between 80 to 100 days of storage. Similar trend has been reported by Tripathi *et al.*, 1998 for Aonla candy.

Total sugar

In increasing trend in the total sugar of value added pomegranate toffee was recorded till (80 days) of strange, thereafter total sugar value declined at100 days.

Table 2: *Effact* of different treatments on Total Suitable solids ("Brix) of value added Pomegranate Toffee at Different intervals during storage

Process (p)			0 Days					20 Days				40 Days		Mean (P)
		Flavour(F)					Flavour(F)				Flavour(F)			
	F_0 (No flavour)	F_1 (Carda-mom)	F_2 (Vanilla)	F_3 (Citric acid)	Mean (P)	F_0 (No flavour)	F_1 (Carda-mom)	F_2 (Vanilla)	F_3 (Citric acid)	Mean (P)	F_0 (No flavour)	F_1 (Carda-mom)	F_2 (Vanilla)	F_3 (Citric acid)	
P1 (Hot water treatment)	11.52	13.26	12.72	12.25	12.51	13.63	13.64	12.76	12.31	12.59	11.74	13.73	12.26	12.40	12.68
P2 (Sulphitation)	12.13	13.67	12.85	12.36	12.76	12.30	13.73	12.96	12.35	12.86	12.26	13.87	13.12	12.47	12.92
Mean(F)	11.52	13.62	12.79	12.28		11.92	13.69	12.83	12.33		12.50	12.80	12.99	12.43	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		NS	-	-			S	0.01	0.02			S	0.03	0.07	
Flavour(F)		NS		-			S	0.01	0.03			S	0.05	0.10	
Interaction(P×F)		NS	-	-			S	0.02	0.04			S	0.07	0.14	
		60 Days						80 Days					100 Days		
		Flavour(F)					Flavour(F)					Flavour(F)			
process (p)	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	11.87	13.86	12.93	12.52	12.79	11.94	13.96	13.02	12.62	12.89	12.00	14.05	13.15	12.55	12.94
P2 (Sulphitation)	12.37	13.96	13.23	12.57	13.03	12.45	14.07	13.30	12.65	13.12	12.51	14.15	13.39	12.70	13.19
Mean(F)	12.12	13.91	13.08	12.554		12.20	14.02	13.16	12.64		12.26	14.10	13.27	12.63	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		S	0.02	0.05			S	0.04	0.08			S	0.02	0.05	
Flavour(F)		S	0.03	0.07			S	0.05	0.11			S	0.00	0.07	
Interaction(P×F)		S	0.04	0.10			S	0.07	0.18			S	0.007	0.016	

Table 3: Influence of different treatments on pH of value added Pomegranate Toffee at Different intervals during storage

Process (p)		Flavour(F)					Flavour(F)					Flavour(F)			Mean
	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	4.853	4.492	4.325	4.571	4.560	4.863	4.503	4.336	4.583	4.571	4.575	4.533	4.356	4.588	4.588
P2 (Sulphitation)	4.725	4.421	4.281	4.562	4.477	4.738	4.433	4.313	4.575	4.499	4.745	4.443	4.225	4.546	4.499
Mean(F)	4.789	4.457	4.263	4.567		4.800	4.468	4.275	4.579		4.310	4.487	4.291	4.587	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		NS	-	-			S	0.002	0.004			S	0.012	0.026	
Flavour(F)		NS		-			S	0.003	0.005			S	0.017	0.036	
Interaction(P×F)		NS	-	-			S	0.004	0.008			S	0.024	0.052	
		60 Days						80 Days					100 Days		
		Flavour(F)					Flavour(F)					Flavour(F)			
process (p)	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	4.586	4.544	4.367	4.603	4.600	4.880	4.540	4.362	4.599	4.595	4.876	4.523	4.399	4.597	4.589
P2 (Sulphitation)	4.755	4.455	4.237	4.595	4.511	4.749	4.449	4.230	4.590	4.505	4.748	4.443	4.204	4.587	4.497
Mean(F)	4.821	4.499	4.302	4.599		4.815	4.495	4.296	4.594		4.812	4.486	4.282	4.592	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		S	0.012	0.025			S	0.012	0.025			S	0.015	0.032	
Flavour(F)		S	0.017	0.036			S	0.017	0.036			S	0.021	0.046	
Interaction(P×F)		S	0.024	0.051			S	0.024	0.050			S	0.030	0.064	

Table 4: Influence of different treatments on acidity (%) of value added Pomegranate Toffee at different intervals during storage

		Flavour(F)					Flavour(F)					Flavour(F)			
Process (p)	**F_0**	**F_1**	**F_2**	**F_3**	**Mean**	**F_0**	**F_1**	**F_2**	**F_3**	**Mean**	**F_0**	**F_1**	**F_2**	**F_3**	**Mean**
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	0.490	0.450	0.430	0.455	0.456	0.495	0.453	0.435	0.459	0.461	0.510	0.462	0.448	0.465	0.471
P2 (Sulphitation)	0.480	0.445	0.425	0.450	0.450	0.484	0.449	0.430	0.455	0.455	0.498	0.462	0.441	0.462	0.466
Mean(F)	0.485	0.447	0.427	0.452		0.490	0.451	0.433	0.457		0.504	0.462	0.445	0.464	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		NS	-	-			S	0.001	0.002			S	0.001	0.002	
Flavour(F)		NS		-			S	0.001	0.003			S	0.001	0.002	
Interaction(P×F)		NS	-	-			S	0.002	0.004			S	0.002	0.003	
		60 Days						80 Days					100 Days		
		Flavour (F)					Flavour (F)					Flavour (F)			
process (p)	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	0.530	0.472	0.459	0.475	0.484	0.225	0.468	0.453	0.472	0.480	0.523	0.465	0.452	0.469	0.477
P2 (Sulphitation)	0.511	0.469	0.451	0.473	0.476	0.507	0.465	0.447	0.470	0.472	0.504	0.462	0.442	0.467	0.469
Mean(F)	0.520	0.471	0.455	0.474		0.516	0.466	0.450	0.471		0.513	0.464	0.447	0.468	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		S	0.001	0.002			S	0.001	0.002			S	0.001	0.002	
Flavour(F)		S	0.001	0.002			S	0.001	0.003			S	0.001	0.003	
Interaction(P×F)		S	0.002	0.003			S	0.002	0.004			S	0.002	0.004	

Table 4.5: Influence of different treatments on reducing Suger (%) of value added Pomegranate Toffee at different intervals during storage

Process (p)		**Flavour(F)**					**Flavour(F)**					**Flavour(F)**			**Mean (P)**
	F_0	**F_1**	**F_2**	**F_3**	**Mean**	**F_0**	**F_1**	**F_2**	**F_3**	**Mean**	**F_0**	**F_1**	**F_2**	**F_3**	
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	
P1 (Hot water treatment)	3.05	2.87	2.99	3.02	2.98	3.09	2.93	3.02	3.06	3.02	3.12	2.95	4.05	3.06	3.04
P2 (Sulphitation)	3.03	2.85	2.95	3.00	2.96	3.06	2.93	2.99	3.02	3.00	3.09	2.94	3.04	3.06	3.03
Mean(F)	3.04	2.86	2.97	3.01		3.07	2.93	3.00	3.04		3.10	2.94	3.05	3.06	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		NS	-	-			S	0.004	0.008			S	0.003	0.007	
Flavour(F)		NS		-			S	0.005	0.011			S	0.005	0.010	
Interaction(P×F)		NS	-	-			S	0.007	0.016			S	0.007	0.015	
		60 Days						80 Days					100 Days		
		Flavour (F)					Flavour (F)					Flavour (F)			
process (p)	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean	F_0	F_1	F_2	F_3	Mean
	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)	(No flavour)	(Carda-mom)	(Vanilla)	(Citric acid)	(P)
P1 (Hot water treatment)	3.15	3.02	3.08	3.11	3.09	3.18	3.06	3.12	3.13	3.12	3.19	3.08	1.13	3.15	3.14
P2 (Sulphitation)	3.13	2.98	3.08	3.09	3.07	3.13	3.00	3.10	3.13	3.09	3.16	3.04	3.11	3.14	3.11
Mean(F)	3.14	3.00	3.08	3.10		3.15	3.03	3.11	3.13		3.17	3.06	3.12	3.15	
		F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%			F-test	S.Ed. (±)	C.D.at 5%	
Process (P)		S	0.004	0.009			S	0.006	0.013			S	0.003	0.006	
Flavour(F)		S	0.006	0.012			S	0.009	0.019			S	0.004	0.009	
Interaction(P×F)		S	0.008	0.017			S	0.012	0.026			S	0.006	0.013	

At the 80 days of storage, the maximum total sugar (8.96%) was recorded in T5 KMS + cardamom followed by (5.84%) in T1 hot water + cardamom and minimum (5.43%) was with To. Maximum increase in the non-reducing sugar was recorded between 40 to 60 days and 60to 60 days of storage and minimum was between 80 to100 days of storage. Similar trend been reported by Tripathi *et al*., 1998 for Anola candy.

References

1. Lane JH, Eynon. Determination of reducing sugar by Fehling solution with methylene blue as indicator. J Soc. Chem. Ind. 1923; 42:327.
2. Manivassagan S, Rana GS, Kumar S, Joon MS. Qualitative changes in karonda (*Carissa carandas* Linn.) candy during storage at room temperature. Haryana J Hort. Sci. 2006; 35(1&2):19-21.
3. Mehta A, Ranote PS, Ranawat AS. Processing of kandi lemon (Galgal) peel waste for candy making. Indian Food Packer. 2005; 54:67-74.
4. Products. Ilnd (Ed.) Tata mc grow hill publishing Co. Ltd. New Delhi.
5. Pruthi JS, Saxena AK. Studies on Anardana. J food. tech. 1984; 21:296-99.
6. Ranganna S. handbook of analysis and quality control for fruit &vegetable, 1986.
7. Sagar VR, Islam. Preparation and Stonges studies on pomegranate powder India J hort. 2006; 63(4):386-389.
8. Sandhan VS. Stonges storage studies of carbonated beverage frame pomegranate juice international J Ag. sci. 2009; 5(1):217-220.
9. Tripathi VK, Singh MB, Singh. In different preserved product of Amla (*Emblica officinalis* Gaertn) var. Banarasi. Indian food packer. 1998; 41(4):60-66.