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Quality of guava products (squash, RTS and jam) prepared from preserved pulp

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Abstract

This study was carried out to utilize the preserved guava pulp for preparing squash, RTS and jam and evaluate its quality (at 3 months). For this the pulp of two guava varieties (L-49 and Lalit) preserved with nine different treatments viz., potassium meta bi-sulphite 0.1% (T_1), sodium benzoate 0.1% (T_2), potassium meta bi-sulphite + sodium benzoate 0.05% each, sodium benzoate + potassium sorbate 0.05% (T_4), potassium meta bi-sulphite + potassium sorbate 0.05% each (T_5), potassium sorbate 0.025% (T_6), potassium sorbate 0.05% (T_7), potassium sorbate 0.1% (T_8) and frozen storage -20^0 C (T_9) and replicated four times with two experimental sets under Factorial CRD. The results revealed that at the end of storage (90 days) analyzed good qualitative characters TSS, acidity, sugars, ascorbic acid, pH by in low temperature storage (-20 ^{0}C) followed by addition of potassium meta bi-sulphite 0.1% and sodium benzoate + potassium meta bi-sulphite 0.05% each. Prepared squash, RTS and jam from preserved guava pulp also have good quality.

Key words: Guava pulp, Squash, RTS, Jam, Preserved pulp products

Introduction

Guava *(Psidium guajava* L.) is one of the most exquisite, nutritionally valuable and remunerative fruit of the tropics and belongs to the family "Myrtaceae". Guava is also called the "Apple of Tropics" and "Poor man's apple". Guava is quite hardy, prolific bearer and highly remunerative even without much care. It is widely grown all over the tropics and sub-tropics including India. Fruit consist of 20 per cent peel, 50 per cent flesh and remaining portion as seed core (Wilson 1980; Agnihotri et al. 2016, Samadia 2016).

Guava fruit normally consumed as fresh as a dessert fruit due to excellent flavour, high

digestive and nutritive value, high palatability and availability in abundance of guava fruits show great potential for processing into valuable products, which have nutritional as well as health benefits. It's a better option for further use to make number of processed products such as nectar, squash, clarified juice, concentrates, canned, dehydrated powder, jam, RTS, cheese and blends with other juices. Surplus produce use in processing of fruit into various products is one of the best ways to reduce post-harvest losses (Bons et al. 2013).

Guava tree bears two crops during rainy and winter season in sub tropics. Guava tree has tendency to bear maximum crop during rainy season. This crop is poor in quality and the fruit are rough, insipid, watery and less nutritive. Rainy season fruits are also spoiled rapidly due to loss of glossy appearance with discoloration followed by blemishes, desiccation, loss of firmness and vitamin C after harvest. Rainy season fruits owing to high perishability, less storability (not more than 3 days) and poor taste restrict its consumption as a fresh fruit in this season and farmers' could not get reasonable price of their produce. The post-harvest losses occurs about 22 per cent (Bons & Dhawan 2006). Therefore, need of the hour to use this rainy season crop through stored in form of pulp to increase its availability over an extended period and to stabilize the price during glut season and can be further utilize for preparation of various value added products like squash, RTS and jam. Keeping this in view the present study had been conducted.

Materials and method

The experiment was carried out in the Fruit & Vegetable processing lab, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur (Raj.) during the year July, 2015 to November, 2015. Fully mature and ripe guava cv. Lalit and L-49 fruits were procured from horticulture farm. The pulp was exerted by hot method (90^0C). Obtained pulp was preserved with nine different treatments namely, potassium meta bi-sulphite 0.1% (T_1), sodium benzoate 0.1% (T_2), potassium meta bi-sulphite + sodium benzoate 0.05% each, sodium benzoate + potassium sorbate 0.05% (T_4), potassium meta bi-sulphite + potassium sorbate 0.05% each (T_5), potassium sorbate 0.025% (T_6), potassium sorbate 0.05% (T_7), potassium sorbate 0.1% (T_8) and frozen storage -20^0 C (T_9) and replicated four times with two units. After 3 months of storage physico-chemical parameters of preserved pulp was evaluate. Pulp that had good quality was further used to prepare Squash, RTS and jam.

The TSS content of by-products was directly measured by the "Digital Refractometer" (Brix: 0.0 to 53.0 %) at 20^0C temperature. Ascorbic acid content of by-products was determined by using volumetric method. Reducing sugar was measured by following "DNS Method" (Miller 1959). Total Sugar was estimated by using "Anthrone Method". The pH was directly measured on the pH meter. The acidity of by-products was determined by diluting the known volume of products with distilled water and titrating the same against standard N/10

sodium hydroxide solution, using phenolphthalein as an indicator (A.O.A.C., 1995). The non-enzymatic browning (NEB) was determined by measuring optical density (OD) of methanol extracts of samples at 440 nm in UV-VIS spectrophotometer (Labomed Inc., USA). The colour parameters was measured by using a Hunter Lab Colourimeter (model Hunter Colour Flex, Reston, USA), with reflectance mode (RSIN), CIE Lab scale (L^*, a^* and b^*) according to Nielsen (2010). The by-products were evaluated organoleptically by a panel of five judges by Headonic Rating Test (Amerine et al. 1965).

Result and discussion

Squash prepared from preserved pulp of guava cv. Lalit and cv. L-49

Data presented in table 1 shows that squash prepared from stored pulp have good quality. Squash from frozen storage at -20^{0}C pulp have best quality followed by potassium meta bi-sulphite 0.1% pulp and sodium benzoate + potassium meta bi-sulphite 0.05% each. Squash from pulp of cultivar Lalit has good overall acceptability than pulp of cv. L-49. The study also corroborated with the findings of Patil et al. (2009).

Table 1. Evaluation of squash prepared from preserved pulp of guava cv. Lalit and cv. L-49 at end of storage period (at 3 months)

Parameters	Stored pulp after 3 months							
	Guava squash cv. Lalit				Guava squash cv. L-49			
	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)
TSS (^{0}Brix)	50	49.8	49.7	48.7	50	49.9	49.8	49.3
Titratable acidity (%)	0.50	0.42	0.456	0.49	0.45	0.392	0.408	0.428
Ascorbic acid (mg 100g^{-1})	100	60	55	53	125	73	69	63
Reducing sugar (%)	31	25.9	24.8	23.9	35	29.9	29.3	28.9
Non-reducing sugar (%)	7.41	6.08	5.24	5.13	7.6	5.2	4.2	3.8
Total sugar (%)	38.5	32.3	30.32	29.3	43	35.4	33.8	32.9
NEB (440nm)	0.00	0.116	0.124	0.146	000	0.216	0.264	0.346
Colour value L	34.65	32.43	28.97	28.56	43.97	37.70	34.41	33.23
Colour value A	11.76	8.69	7.88	7.22	8.90	7.02	6.43	6.42
Colour value B	10.27	8.65	8.03	7.38	10.97	10.02	9.70	8.69
pH	4.0	3.8	3.8	3.7	4.2	4.02	3.9	3.8

Organoleptic rating, a. Colour	8.5	7.9	7.0	7.0	8.4	8.5	7.9	7.5
b. Flavour	8.4	8	8	7.5	8.3	8.2	8	7.6
c. Texture	9	9	8.5	8	9	8.3	7.9	7.4
d. Taste	9	9	8.5	8	8.7	8.2	8	7.6
e.Overall acceptability	8.72	8.47	8.0	7.6	8.6	8.3	7.9	7.5

RTS prepared from preserved pulp of guava cv. Lalit and cv. L-49

A perusal of data presented in table 2 reveals that RTS prepared from stored pulp have good quality. RTS from frozen stored at -20^{0}C pulp have best quality followed by potassium meta bi-sulphite 0.1% pulp. RTS from pulp of cultivar Lalit has good physico-chemical characters as compare to RTS of cv. L-49. Recorded NEB (nm) was higher from RTS prepared from pulp of cultivar L-49 than Lalit. The study also in agreement with the findings of Choudhary *et al.* (2008) for guava nectar.

Table 2. Evaluation of RTS prepared from preserved pulp of guava cv. Lalit and cv. L-49 at end of storage period (at 3 months)

Parameters	Stored pulp after 3 months							
	Guava RTS cv. Lalit				Guava RTS cv. L-49			
	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)
TSS (^{0}Brix)	10	9.6	9.7	9.2	11	9.9	9.8	9.6
Titratable acidity (%)	0.30	0.356	0.392	0.428	0.25	0.206	0.222	0.302
Ascorbic acid (mg 100g^{-1})	93	45	42	40	107	58	53	49
Reducing sugar (%)	8	6.5	6.2	5.8	8.5	7.3	7.1	6.9
Non-reducing sugar (%)	2.85	2.75	2.66	2.47	3.04	2.95	2.85	2.5
Total sugar (%)	11	9.4	9.0	8.4	11.7	10.4	10.1	9.4
NEB (440nm)	000	0.146	0.154	0.268	000	0.246	0.251	0.275
Colour value L	39.67	33.29	32.55	32.17	40.37	35.57	34.43	33.23

Colour value A	9.45	6.76	6.15	5.17	8.45	4.91	4.75	4.12
Colour value B	6.62	5.39	5.33	5.16	7.87	5.97	5.76	5.63
pH	3.7	3.6	3.5	3.4	3.9	3.8	3.7	3.6
Organoleptic rating, a. Colour	8.4	7.9	7.8	7.5	8.4	8	7.9	7.4
b. Flavour	8.6	8.5	8.1	7.5	8.3	8.1	7.9	7.4
c. Texture	8.2	7.9	7.8	7.7	8.2	8	7.8	7.5
d. Taste	8.6	8.5	7.5	7.5	8.3	8.1	7.5	7.4
e.overall acceptability	8.45	8.2	7.8	7.55	8.3	8.05	7.7	7.4

Jam prepared from preserved pulp of guava cv. Lalit and cv. L-49

It is evident from the data (Table 3) that jam prepared from stored pulp of cv. Lalit has good quality over L-49. Jam from frozen storage at -20^{0}C pulp has best quality followed by potassium meta bi-sulphite 0.1% pulp. Jam from pulp of cultivar Lalit has good overall acceptability over L-49. Recorded sugar content was higher from jam prepared from pulp of cultivar L-49 than Lalit.

Table 3. Evaluation of jam prepared from preserved pulp of guava cv. Lalit and cv. L-49 at end of storage period (at 3 months)

Parameters	Stored pulp after 3 months							
	Guava jam cv. Lalit				Guava jam cv. L-49			
	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)	Fresh pulp	T_9 = Frozen storage (-20^{0}C)	T_1 = Pulp preserved with potassium meta bi-sulphite (0.1%)	T_3=Pulp preserved with SB+KMS (0.05%)
TSS (^{0}Brix)	65	60	58	57	67	63	60	59
Titratable acidity (%)	0.40	0.444	0.450	0.480	0.38	0.326	0.334	0.342
Ascorbic acid (mg 100g^{-1})	90	60	57	54	105	70	68	65
Reducing sugar (%)	35	33.2	32.5	32.2	36	34.2	33.7	33.5
Non-reducing sugar (%)	6.65	5.32	4.75	4.65	7.6	5.79	5.51	5.32
Total sugar	42	38.8	37.5	37.1	44	40.3	39.5	39.1

(%)								
NEB (440nm)	000	0.253	0.265	0.272	000	0.261	0.269	0.278
Colour value L	38.47	34.31	33.61	32.30	41.17	38.31	38.11	37.90
Colour value A	13.93	11.87	11.01	10.85	12.34	10.47	10.26	10.00
Colour value B	10.02	9.31	8.69	8.04	11.84	10.81	10.09	10.09
pH	4.1	3.9	3.8	3.7	4.2	4.1	4.0	3.9
Organoleptic rating, a. Colour	8.7	8.5	8.3	8.3	8.6	8.4	8.1	8.0
b. Flavour	8.6	8.5	8.2	8	8.5	8.4	8.0	8.0
c. Texture	8.5	8.2	8.1	8	8.2	8.1	8.0	8.0
d. Taste	8.9	8.7	8.5	8.3	8.8	8.6	8.4	8.3
e.Overall acceptability	8.67	8.47	8.27	8.15	8.52	8.37	8.12	8.07

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