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Studies on Physico-chemical properties of value Added guava toffee during storage (*Psidium guajava* L.)

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Abstract

The present investigation entitled 'Studies on physico-chemical properties of value added Guava toffee during storage (*Psidium guajava* L.)' was conducted in the laboratory of the Department of Horticulture, during the year 2014-2015 to evaluate the two pre-treatment (blanching and sulphitation) and different flavours (Cardamom powder, Vanilla, citric acid, Pineapple). Guava toffee stored ambient temperature and find out the economics of the different treatments. The experiment was laid out in the 2x4 factorial CRD with 10 treatments and 3 replications. The treatment T₉ Sulphitation + Pulp extraction + preparation of guava toffee with sugar + chocolate + Pineapple flavor was found superior in respect of all the parameters viz. T.S.S. (12.66⁰Brix), Ascorbic acid (47.45mg/100g) and organoleptic quality was also found superior in this treatment.

Keywords: Cardamom powder, vanilla, citric acid, pineapple flavours

Introduction

Guava (*Psidium guajava* L.) is one of the most important subtropical fruit crops. It belongs to family Myrtaceae. Guava is a native of tropical America perhaps from Mexico and Peru. It is widely distributed all over the equatorial regions of the tropical and subtropical climate.

The area under guava is about 219.7 million hectare producing 2571.5 Million tones of fruit and productivity 11.70 metric tonnes/ha. Uttar Pradesh is the leading state in guava production followed by Maharashtra and Bihar. Uttar Pradesh is a largest state in India and the largest total cultivation area is 39.9 million hectare, production 486.7 million tonnes and productivity 12.20 metric tonnes/ha. The popular varieties of guava grown in India are Sardar, Allahabad Safeda, Lalit, Pant Prabhat, Dhareedar, ArkaMridula, Khaja (Bengal Safeda), Chittidar, Harija etc. Hybrid varieties like Arka Amulya, Safed Jam and Kohir Safeda were also developed for cultivation (NHB Date base 2010) [5].

Guava is considered to be one of the exquisite, nutritionally valuable and remunerative crops, bears heavy crop every year and gives good economic returns. This has prompted several farmers to take up guava orcharding on a commercial scale. In recent years, guava is gaining popularity in the international trade due to its nutritional value and processed products. Guava is a rich source of Vitamins and minerals. Nutritive value of guava per 100 gm. Vitamin A, 250 I.U. and Vitamin B (Thiamine), 0.7 mg. Niacin 1.2 mg. Vitamin C, 302 mg. Calcium, 30 mg. Phosphorus, 29 mg. Carbohydrates, 17.1 gm. Protein, 1.0 gm. Calories, Dehydrated guava juice is also a good source of vitamin C (Sasi kumar, 2009) [6]. The ripe fruit is usually eaten as dessert. It can also be utilized in many ways for making jellies, jam, paste, juice, baby foods, syrup, wine and other processed products.

Guava is the most important fruit in India after mango, banana and citrus fruits, and has a high nutritive value. Guava fruit is rich source of ascorbic acid and pectin. Guava fruit are used for making jam, jelly, nectar, wine, toffee, sharbat, juice, sauce, flakes, RTS beverage, dehydrated slice, cheese and various culinary purposes.

Value-added food products are raw or pre-processed commodities whose value has been increased through the addition of ingredients or processes that make them more nutritive and attractive to the buyer and more readily usable by the consumer. It is a production strategy driven by customer needs and perceptions. Guava fruits may be utilized to make products like jam, jelly, cheese, juice. Canned segment, nectar, RTS beverage dehydrated slice, flakes, Toffee, sauce and guava lather, baby food puree, etc.

Fruit toffees are made from pulpy fruits like banana, mango, jackfruit, guava etc. Fruits are grown seasonally and are perishable in nature. Fruit preservation techniques enable the mankind to enjoy fruits even during off-season and fruit toffees one such product.

Fruit toffees are highly nutritious products compared to sugar boiled confectionaries. The prerequisite for this project is availability of fruits all- round the year. The state of Uttaranchal produces many fruits and thus availability round the year would not be a problem. The technology is easy and standardized and the capital cost of the project is also not very high.

Materials and Methods

The present investigation entitled 'Studies on physico-chemical properties of value added Guava toffee during storage (*Psidium guajava* L.)' was laid out in the Post-Harvest Laboratory of Horticulture Department, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad during the year 2014-2015, to find out the effect of pre-treatments on the quality of guava toffee at ambient temperature. The experiment was laid out in the 2×4 factorial CRD with 10 treatments and 3 replications

Material used for toffee preparation

Materials	Quanty
Guava pulp	500g
Sugar	750g/kg pulp
Chocolate powder	100g/kg pulp
Butter	25g/kg pulp
Milk powder	20g/kg pulp
Flavours	Cardamom powder, Vanilla, citric acid, Pineapple,
Preservative	MS or Sodium benzoate

Treatment details

Treatments	Treatment details
T ₀	Blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + No flavour
T ₁	Blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + chocolate + Cardamom flavour
T ₂	Blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + chocolate + Vanilla flavour
T ₃	Blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + chocolate + citric acid flavour
T ₄	Blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + chocolate + Pineapple flavour
T ₅	Sulphitation + pulp extraction + prepare of guava toffee with sugar + No flavour
T ₆	Sulphitation + pulp extraction + preparation of guava toffee with sugar +chocolate + Cardamom flavour
T ₇	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + Vanilla flavour
T ₈	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + citric acid flavour
T ₉	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + Pineapple flavour

Results and Discussion

The present investigation entitled 'Studies on physico-chemical properties of value added guava toffee during storage (*Psidium guajava* L.)' was conducted in the laboratory of the Department of horticulture, during the year 2014-2015 to evaluate the two pre-treatment (blanching and sulphitation) and different flavours (cardamom powder, vanilla, citric acid, pineapple). Guava toffee stored ambient temperature and find out the economics of the different treatments.

TSS showed an increasing trend in all the treatments at different intervals of storage. At 90 days of storage, the maximum TSS (12.66 °Brix) was recorded in T₉ sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + pineapple flavor followed by (12.65 °Brix) in T₇ sulphitation + pulp extraction + preparation of guava toffee with sugar + vanilla + chocolate + vanilla flavour and minimum (11.77 °Brix) was with T₀ blanching of fresh guava slices treatment + pulp extraction + prepare of guava toffee with sugar + no flavour.

An increasing trend in the pH of value added guava toffee was

Preparation of guava pulp

Selection of fruits (Ripe and firm) and Washing and cutting into pieces and Mixing with water (200ml) passing through pulper or boiling in water (30 minutes) and straining of pulp and cooling (30 minutes) and preparation for guava toffee

Process for toffee preparation

Take guava pulp in a container and add 750g/kg pulp sugar and boil it at 70° Brix, followed by addition of 100g/kg pulp of chocolate powder slowly stirring all mixture with the help of spatula up to 82-85°Brix for 10-15 minutes. Add 20g/kg pulp milk powder and followed by addition of 25g butter with treatment wise (Cardamom powder Vanilla, citric acid, Pineapple) for the 500g prepared mixture. Take all the mixture in a tray and spread it and leave it for 8 to 10 hours. After the proper cooling round shaped pieces measuring (5g) with uniform size where prepared and wrapped with butter paper and kept it at ambient temperature storage.

Factor A:

1. Blanching
2. Sulphitation

Factor B: Value addition

1. No flavor
2. Cardamom flavor
3. Vanilla flavor
4. citric acid flavor
5. Pineapple flavor

recorded till (90 days) of storage. At the 90 days of storage, the minimum (4.236) was recorded in T₇ Sulphitation + pulp extraction + prepare of guava toffee with sugar + chocolate + Vanilla flavour followed by (4.359) in T₄ Blanching of fresh guava slices treatment + pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor and maximum pH (4.832) was with T₀ blanching of fresh guava slices treatment + pulp extraction + prepare of guava toffee with sugar + no flavour.

A decreasing trend in the acidity of value added guava toffee was recorded till (90 days) of storage. At the 90 days of storage the maximum (0.497) was recorded in T₄ blanching of fresh guava slices treatment + pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor followed by (0.484) in T₉ sulphitation + pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor and minimum acidity (0.425) was with T₅ sulphitation + pulp extraction + prepare of guava toffee with sugar + no flavour.

Ascorbic acid showed a decreasing trend in all the treatments at different intervals of storage. At 90 days of storage the

maximum ascorbic acid (47.45) was recorded in T₉ sulphitation + pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor followed by (37.11) in T₄ blanching of fresh guava slices treatment + pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor and minimum (25.21) was with T₅ sulphitation + pulp extraction + prepare of guava toffee with sugar + No flavor.

Reducing sugar showed a decreasing trend in all the treatments at different intervals of storage. At 90 days of storage the maximum reducing sugar (3.29%) was recorded in T₀ blanching of fresh guava slices treatment + pulp extraction + preparation of guava toffee with sugar + no flavour and minimum (3.10%) was with T₉ sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + pineapple flavor.

Non-reducing sugar showed a decreasing trend in all the treatments at different intervals of storage. At 90 days of storage the maximum non reducing sugar (5.76%) was recorded in T₉ sulphitation + pulp extraction + preparation of

guava toffee with sugar + chocolate + pineapple flavor and minimum (5.28%) was with T₀ blanching of fresh guava slices treatment + pulp extraction + preparation of guava toffee with sugar + no flavor.

An increasing trend in the overall acceptability of value added guava toffee was recorded till 90 days of storage. At the 90 days of storage the maximum overall acceptability score (7.91) was recorded in T₉ sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + pineapple flavor followed by (7.58) in T₄ blanching of fresh guava slices treatment+ pulp extraction + prepare of guava toffee with sugar + chocolate + pineapple flavor and minimum (6.58) was with T₀ blanching of fresh guava slices treatment+ pulp extraction + prepare of guava toffee with sugar + no flavour. Similar findings have been reported by Nidhi *et al.* (2011) [4] incorporation of guava in carrot cheese. Bhat and Singh (2014) [1] in guava pulp. Vinod *et al.* (2012) [3] in Allahabad Safeda + Cashew nut cheese.

Table 1: Effect of different treatments on physico-chemical property of value added guava toffee at different intervals during storage

Treatment No.	Treatment	Total soluble solids (°Brix)	pH	Acidity	Ascorbic acid (mg/100g)	Reducing sugar	Non reducing sugar	Overall acceptability
T ₀	Blanching of fresh guava slices treatment+ pulp extraction + preparation of guava toffee with sugar + No flavour	11.77	4.832	0.431	27.67	3.29	5.28	6.58
T ₁	Blanching of fresh guava slices treatment+ pulp extraction + preparation of guava toffee with sugar + chocolate + Cardamom flavour	12.47	4.596	0.449	35.44	3.20	5.55	7.03
T ₂	Blanching of fresh guava slices treatment+ pulp extraction + preparation of guava toffee with sugar +chocolate + Vanilla flavour	12.61	4.526	0.458	35.61	3.15	5.64	7.14
T ₃	Blanching of fresh guava slices treatment+ pulp extraction + preparation of guava toffee with sugar + vanilla +chocolate + citric acid flavour	12.48	4.606	0.441	30.56	3.21	5.53	6.83
T ₄	Blanching of fresh guava slices treatment+ pulp extraction + preparation of guava toffee with sugar + chocolate + Pineapple flavor	12.64	4.359	0.497	37.11	3.13	5.69	7.58
T ₅	Sulphitation + pulp extraction + preparation of guava toffee with sugar + No flavour	11.94	4.821	0.425	25.21	3.27	5.34	6.69
T ₆	Sulphitation + pulp extraction + preparation of guava toffee with sugar +chocolate + Cardamom flavour	12.40	4.485	0.446	34.31	3.17	5.58	7.20
T ₇	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + Vanilla flavour	12.65	4.455	0.447	36.23	3.19	5.70	7.25
T ₈	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + citric acid flavour	12.61	4.607	0.435	31.37	3.18	5.56	6.95
T ₉	Sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + Pineapple flavor	12.66	4.236	0.484	47.45	3.10	5.76	7.91
	F- test	S	S	S	S	S	S	S
	S. Ed. (±)	0.02	0.002	0.004	0.47	0.03	0.003	0.08
	C. D. (P = 0.05)	0.04	0.004	0.007	0.97	0.07	0.005	0.09

Conclusion

Based on findings of the present experiment it may be concluded that treatment T₉ sulphitation + pulp extraction + preparation of guava toffee with sugar + chocolate + pineapple flavor was found superior in respect of all the parameters viz. T.S.S. (12.66 °Brix), Ascorbic acid (47.45mg/100g) and organoleptic quality was also found superior with this treatment with higher benefit cost ratio (2.09) with this treatment and followed by benefit cost ratio (2.07) in T₄ blanching of fresh guava slices + pulp extraction + preparation of guava toffee with sugar + chocolate + pineapple flavor.

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