Standardization of Amla Candy (*Emblica officinalis L.)* Cv. Kanchan

Article Type: *Orginal Research Article*

ABSTRACT

An experiment was carried out at the Post Harvest Technology, Department of Horticulture, SHUATS, Prayagraj (Uttar Pradesh) during the year 2021 - 2022. Amla is an indigenous fruit to the Indian subcontinent. It is a fruit that is now underutilized but has huge potential in the global market. It has got great potential in processed forms, such as candy. Attempts are being made to produce products that are not only nutritionally delicious but also acceptable among consumers. The medicinal, nutritional, and organoleptic quality of amla candy can be improved by the addition of different syrups in the amla candy like rose syrup, tulsi syrup, and ginger syrup. The experiment consisted of 6 different treatments comprising the different syrups (sugar syrup, rose syrup, tulsi syrup, ginger syrup) with the addition of the standard recommended dosage of citric acid and sodium benzoate. This investigation was laid out in a completely randomized design with three replications. After preparation, the amla candy samples were evaluated for Physico-chemical alterations, and sensory evaluation was done using a 9-point hedonic scale that was tested on a panel of 7 experts. These candies were stored for about 90 days at ambient temperature. From storage studies, it was revealed that total soluble solids and acidity increase gradually till the end of the experiment while pH and ascorbic acid are in decreasing order. On the basis of the organoleptic test concluded that the candy was prepared from cv. Kanchan and treatment with T_2 (Amla + 68% Sugar syrup + 10% Spices) are found to be the best amla candy.

Keywords: - Amla, citric acid, sodium benzoate, candy, and syrups.

INTRODUCTION

Amla or Indian Gooseberry (*Emblica officinalis*) is an indigenous fruit to the Indian subcontinent. Amla is thought to be a native of India, Sri Lanka, Malaysia, or China Kalra, et al., (1998). Amla fruit is a rich source of vitamin 'C', the vitamin C content in amla varies from 200-900 mg /100 g depending upon the variety and size of the fruit Barthakur and Arnold, (1991). Amla is highly valued among indigenous medicines. It has astringent, cooling, refrigerant, diuretic, and laxative properties. Dried fruits have been reported to be

useful in haemorrhages, diarrhoea, dysentery, anaemia, jaundice, dyspepsia, and cough. Amla is a fruit that is now underutilized but has huge potential in the global market. It has got great potential in processed forms, such as candy, pickles, preserve (murabba), sauce, jam, jelly, dried chips, tablets, etc. Candy is the most popular aonla product. A fruit, when impregnated with sugar free of syrup, drained and dried, is called candied fruit. It is plump, tender, and exceedingly sweet with a strong flavor and without sticking. Amla candy can be improved by the addition of different syrups in the amla candy like rose syrup, tulsi syrup, and ginger syrup. Rose or Queen of flowers (*Rosa* spp.) belongs to the family of Rosaceae. Rose is a highly nutritive flower with a high content of Vitamin C, carotenoids, phenolic components, and some minerals and essential oil. Tulsi (*Ocimum sanctum*) is known as Holy Basil in English and Tulasi in Sanskrit. The extricates acquired from the plant are widely brought to use for relieving different illnesses, for example, the basic cold, irritation, intestinal sickness, coronary illness, migraines, stomach issues, kidney stones, heart issues, and curing malaria. Ginger (*Zingiber officinalis L.)* belongs to the family of Zingiberaceae. Ginger contains gingerol and oleoresin, (a combination of volatile oils and resin) that accounts for the characteristic aroma and therapeutic properties. Components of gingerol possess beneficial properties for the treatment of poor digestion, heartburn vomiting, and preventing motion sickness.

MATERIAL AND METHODS

Raw material

Healthy uniform size amla, free from diseases, pests, and bruises were randomly selected and brought from our research field. Other ingredients like sugar, rose, tulsi, ginger, spices (jeera, fennel, black salt, asafoetida, lemon, black pepper, and chat masala), and citric acid were brought from the local shops in Prayagraj, Uttar Pradesh, India.

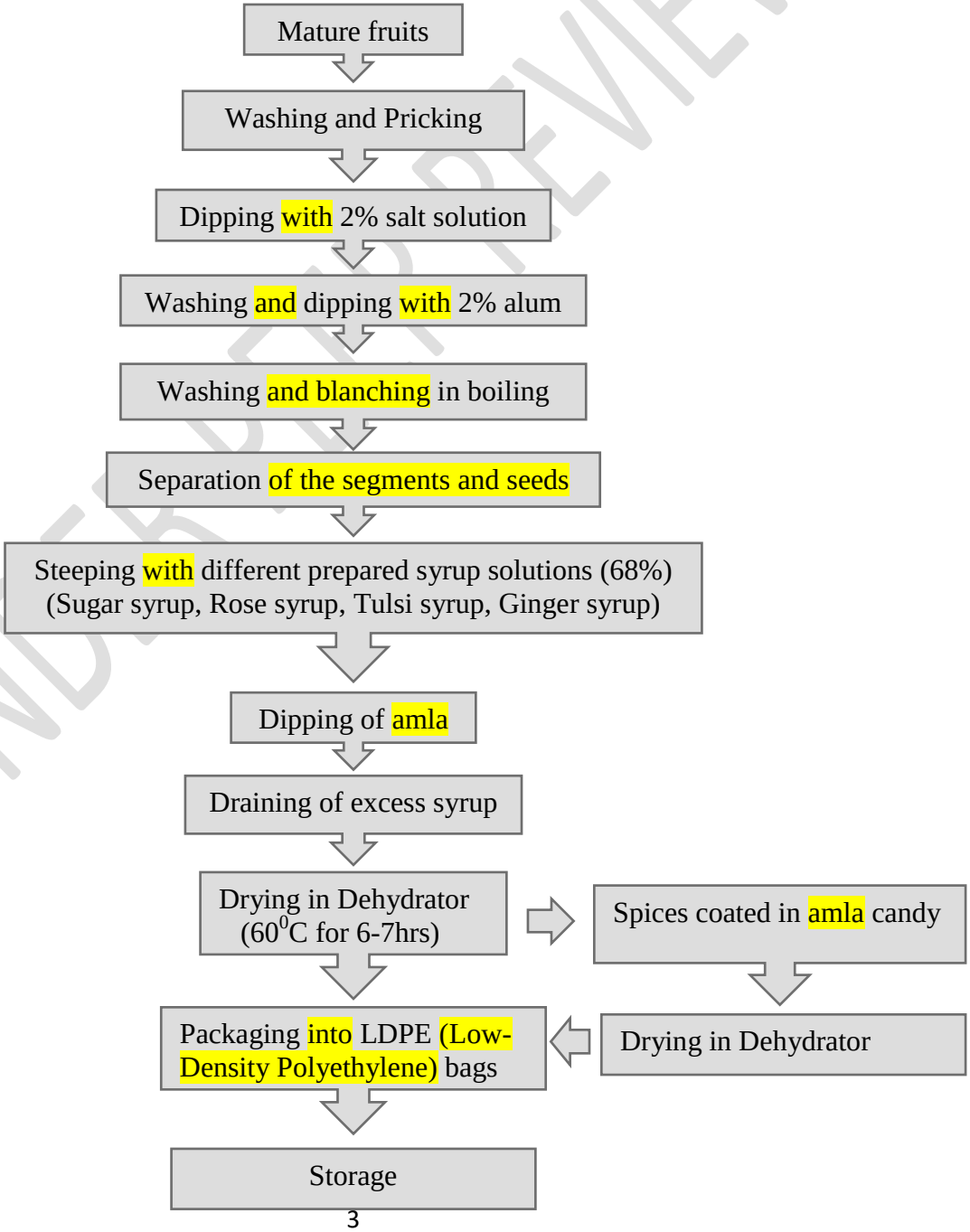
Preparation of Candy

Amla candy was prepared with different syrup solutions i.e., sugar syrup, rose syrup, tulsi syrup, and ginger syrup. After preparation of different syrup solutions (68%).

Washed amla fruits were soaked in water with 2% salt for 24 hours and after washing, soaked again in water with 2% alum for 24 hours. After washing, blanched amla fruits till they become soft and then allowed to cool, remove seeds and separate blanched fruits into pieces. Steeped amla pieces in different syrup. After completion of steeping time, the syrup was drained and amla pieces were spread on trays.

Then amla pieces in the tray were kept for drying in the dehydrator for 60^0C for 6 to7 hours. After drying samples were collected and packed in Low-Density Polyethylene (LDPE) bags for storage purposes. Candies were stored at room temperature for 3 months and evaluated at 30 days intervals for storage studies.

Chart 1: FLOW CHART OF AMLA CANDY PREPARATION:



Treatment details

T_1 - Amla + 68% Sugar Syrup

T_2 - Amla + 68% Sugar Syrup + 10% Spices

T_3 - Amla + 68% Rose Syrup

T_4 - Amla + 68% Tulsi Syrup

T_5 - Amla + 68% Ginger Syrup

T_6 - Amla + 48% Sugar Syrup + 10% Rose Syrup + 10% Tulsi Syrup

Physico-chemical and organoleptic quality of amla candy

Titrable acidity (%)

Titratable acidity was determined by titrating a known quantity of sample (10ml) of the homogenized sample was taken and made up to 100 ml volume in a volumetric flask. The contents were filtered through Whatman No. 1 filter paper. Titration against 0.1N NaOH was performed with a 10 ml aliquot using phenolphthalein as an indicator. The turn of the aliquot to light pink color which persists for 15 seconds was considered an endpoint. The titratable acidity was estimated in terms of percent citric acid analyzed as per the Ranganna, (1986).

pH

The sample was soaked in distilled water till it soften and ground along with the little amount of distilled water. Then the pH was noted with the help of an electronic pH meter.

Total soluble solids (%)

The percentage of total soluble solids was determined by using a hand refractometer (Erma, Japan) by placing a drop of the filtered juice on the prism of the refractometer and observing the coincidence of the shadow of the sample with the reading on the scale and expressed as ^{0}Brix to standard procedure as given in Ranganna, (2003).

Ascorbic acid (mg/100g)

Determination of ascorbic acid was done by the 2, 6 – dichlorophenol indophenols dye method as described by Ranganna, (1997). A known quantity of sample was blended with 3 percent metaphosphoric acid (HPO3) to make the final volume of 100 ml and then filtered. A known quantity of aliquot was titrated against 0.025 percent 2, 6 - dichlorophenol indophenols dye to a pink color endpoint. The ascorbic acid content of the sample was

calculated taking into consideration the dye factor and expressed as mg of Ascorbic acid per 100g.

Organoleptic evaluation

To assess consumer preference, the sensory evaluation of the experimental sample was conducted at different intervals by a panel of 7-8 judges. The sample was evaluated for color and appearance, taste, aroma, and overall acceptability. Samples were served on coded plates. The judges scored the quality characteristics of each sample on the nine-point hedonic rating scale described by Srilakshmi, (2003).

RESULTS AND DISCUSSION

Titrable Acidity (%)

During the storage term (90 days) at ambient room temperature, a gradual increase was reported in the titrable acidity of amla candy (Table 1). The maximum value (0.68) was observed in the combined treatment of amla candy with T_2 (Amla + 68% Sugar syrup + 10% Spices) and the minimum value (0.53) in treatment T_1 (Amla + 68% Sugar syrup). Hence pectic substances might have hydrolyzed and yielded acids that contributed to an increase in acidity of the products reported by Kumar *et al.*, (2020) in amla candy and the increase in acidity during storage may be caused due to conversion of sulphurous acid in products reported by Mahato *et al.*, (2020) in unripe mango candy.

pH

The gradual decrease in pH during the storage period (90 days) was reported from amla candy (Table 1). The maximum value (3.54) was observed in the combined treatment of amla candy with T_2 (Amla + 68% Sugar Syrup + 10% Spices) and the minimum value (3.22) in the treatment of T_3 (Amla + 68% Rose syrup). The pH has great importance to maintain shelf stability; pH can also influence the flavor and processing reported by Navitha and Mishra, (2018) in ber candy, and the decrease in pH might be due to the overall increase in acidity of stored candy reported by Dinde *et al.*, (2021) in karonda candy.

Total Soluble Solids

This gradual increase in total soluble solids during the storage period (90 days) of amla candy (Table 1) might be due to the conversion of polysaccharides into sugars during the hydrolysis process. Similar observations of gradual increase in total soluble solids were reported by Dwivedi S. and Pandey A., (2017) studied amla preserves of ginger flavored for nutritional

and biochemical evaluation, and Balaji *et al*., (2014) in the honey coating of amla candy. The maximum value (71.12) was observed in the combined treatment of amla candy with T_2 (Amla + 68% Sugar Syrup + 10%Spices) and minimum value (70.03) in T_1 (Amla + 68% Sugar syrup).

Ascorbic Acid

This gradual reduction in ascorbic acid during the storage period (90 days) of amla candy (Table 2)might be due to oxidation by trapped oxygen in the packaging container, which results in the formation of dehydroascorbic acid. Similar observations of the gradual reduction in ascorbic were reported by Kumar and Singh., (2001) in amla products and Deepika *et al*., (2016) to maintain the quality of enriched fruit bars during storage. The maximum value (108.33) was observed in the combined treatment of amla candy with T_2 (Amla + 68% Sugar Syrup + 10% Spices) and the minimum value (89.73) in T_1 (Amla + 68% Sugar syrup).

Organoleptic evaluation

In the organoleptic evaluation such as color and appearance, taste, aroma, and overall acceptability initially, T_2 (Amla + 68% Sugar Syrup + 10% Spices) was given the highest sensory score of 8.66, 8.14, 8.22, and 8.38. At the end of 90 days storage period, treatment T_2 (Amla + 68% Sugar Syrup + 10% Spices) was found to be the highest sensory score of 8.36, 7.96, 7.97, and 8.13 (Tables 2 and 3) in all parameters of organoleptic attributes, it indicated that it was well-received by the judges.

Shelf life of amla candy

From the shelf life point of view during the storage period (90 days), the highest was recorded in T_2 (Amla + 68% Sugar syrup + 10% Spices) at 89.23 and minimum (87.93) in treatment T_3 (Amla + 68% Rose syrup) respectively.

Table 1: Changes in acidity, pH, and TSS in the amla candy during storage.

Treatments	Acidity (%)				pH				TSS (ºBrix)			
	Storage period (days)				Storage period (days)				Storage period (days)			
	0	30	60	90	0	30	60	90	0	30	60	90
T_1	0.40	0.45	0.49	0.51	3.63	3.56	3.52	3.47	69.47	69.62	69.83	70.03

T_2	0.62	0.64	0.66	0.68	3.69	3.64	3.58	3.54	70.23	70.47	70.68	71.12
T_3	0.43	0.47	0.51	0.55	3.36	3.32	3.27	3.22	69.75	69.98	70.22	70.42
T_4	0.51	0.53	0.56	0.58	3.58	3.54	3.49	3.44	69.58	69.85	70.04	70.23
T_5	0.53	0.56	0.60	0.62	3.56	3.52	3.48	3.43	69.96	70.26	70.49	70.67
T_6	0.56	0.60	0.62	0.64	3.45	3.41	3.38	3.34	70.05	70.31	70.66	71.01
F-test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
S.Ed(±)	0.050	0.045	0.035	0.042	0.041	0.038	0.034	0.041	0.026	0.039	0.042	0.052
CD @ 5%	0.110	0.098	0.077	0.093	0.091	0.084	0.076	0.090	0.056	0.085	0.093	0.114

Table2: Changes in ascorbic acid, color and appearance, and taste in the amla candy during storage.

Treatments	Ascorbic acid (mg/100g)				color and appearance				taste			
	Storage period (days)				Storage period (days)				Storage period (days)			
	0	30	60	90	0	30	60	90	0	30	60	90
T_1	98.77	97.53	94.00	89.73	6.37	6.23	6.12	6.02	6.46	6.37	6.28	6.18
T_2	125.87	120.06	114.76	108.33	8.66	8.55	8.46	8.36	8.14	8.09	8.01	7.96
T_3	116.47	113.19	108.46	102.67	7.52	7.41	7.32	7.19	6.04	6.01	5.96	5.92
T_4	102.67	98.77	95.15	90.72	7.81	7.72	7.63	7.54	7.39	7.35	7.26	7.16
T_5	108.33	105.44	104.35	97.53	7.96	7.84	7.74	7.61	7.44	7.38	7.33	7.25
T_6	109.90	107.01	102.78	98.86	6.57	6.43	6.33	6.19	6.29	6.22	6.17	6.03
F-test	S	S	S	S	S	S	S	S	S	S	S	S
S.Ed(±)	2.078	2.934	3.605	2.177	0.190	0.194	0.196	0.191	0.110	0.103	0.107	0.109
CD @ 5%	4.578	6.463	7.941	4.796	0.418	0.427	0.432	0.422	0.242	0.226	0.235	0.239

Table3: Changes in aroma, overall acceptability, and shelf life in the amla candy during storage.

Treatments	aroma				overall acceptability				Shelf life
	Storage period (days)				Storage period (days)				Storage period (days)
	0	30	60	90	0	30	60	90	90
T_1	6.34	6.27	6.16	5.98	6.62	6.54	6.47	6.38	88.63
T_2	8.22	8.12	8.06	7.97	8.38	8.30	8.24	8.13	89.23
T_3	6.81	6.77	6.7	6.63	6.39	6.33	6.27	6.17	87.93
T_4	6.98	6.91	6.82	6.74	7.27	7.19	7.10	6.97	88.10
T_5	7.54	7.45	7.35	7.26	7.54	7.46	7.40	7.33	89.09
T_6	6.68	6.60	6.50	6.42	6.44	6.38	6.30	6.19	88.41
F-test	S	S	S	S	S	S	S	S	S
S.Ed(±)	0.266	0.269	0.270	0.276	0.110	0.112	0.115	0.141	0.178
CD @ 5%	0.586	0.592	0.595	0.608	0.242	0.247	0.254	0.310	0.393

CONCLUSION

In this investigation, the treatment T_2 (Amla + 68% Sugar syrup + 10% Spices) was found most suitable treatment in terms of Physico-chemical properties i.e., total soluble solids (71.12), titrable acidity (0.68), pH (3.54) and ascorbic acid (108.33) and organoleptic test i.e., color and appearance (8.36), taste (7.96), aroma (7.96) and overall acceptability (8.13) As a result, one of the forthcoming value added food products could be the produced Amla candies. They might have a healthy commercial market and be able to draw in consumers of all ages. The maximum shelf life (89.23) was recorded in T_2 (Amla + 68% Sugar syrup + 10% Spices). Similarly, the treatment T_2 (Amla + 68% Sugar syrup + 10% Spices) showed the highest BC ratio (1:2.02). Thus, it is ultimately determined that the processing method created for making amla candy is technologically and economically viable and may therefore be used commercially.

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