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STANDARDIZATION OF RECIPE FOR PREPARATION OF VALUE ADDED AONLA BARFI (AN INDIAN SWEET DISH) AND PHYSICO-CHEMICAL CHANGES DURING STORAGE

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Abstract– Aonla, also known as Indian gooseberry (*Emblica officinalis* G.), is a member of the Euphorbiaceae family. It is a fruit that is now underutilized but has huge potential in the global market. It is nearly completely unknown in the international market and must be advertised. Since it is exceedingly acidic and astringent, fresh fruits are rarely ingested; as a result, it is not a popular table fruit. So, to find Standardization of recipe for preparation of value added aonla barfi (a common Indian sweet dish) and physico-chemical changes during storage; a laboratory experiment was conducted at the Post Harvest Laboratory, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) during the year 2021-22. The experiment comprised of 11 treatments replicated thrice in a Completely Randomized Design. The main objective of the experiment was to standardize the protocol and recipe for preparation of value added herbal aonla burfi and to analyze the physicochemical properties of different treatments include Safed Musli, Ashwagandha, Rose Syrup, Ginger, Tulsi, Coconut Powder, Chironji, Almond and Cashewnut at the level of 1% each. From the present investigation the treatment with 1 % coconut powder was found best with TSS (73.75 °Brix), Total sugar (30.64 %), Reducing sugar (4.45 %), non-Reducing sugar (26.19 %), Acidity (0.69 %), pH (3.07) and Vitamin C (113.51 mg/100g pulp).

INTRODUCTION

Aonla is a significant fruit crop that is native to the Indian subcontinent and may be successfully grown in arid and under developed areas. In recent years, the area under Aonla has been growing quickly. One of the oldest fruits in India, aonla is known as the "Wonder Fruit" for health due to its special characteristics. The highest source of nutrients, most medicinally useful, and loaded with vitamin C is the aonla fruit (Sonawane *et al.,* 2017). Compared to an apple, aonla's edible fruit tissues include 160 times as much vitamin C and nearly 3 times as much protein. The fruits have leucoanthocyanin or polyphenols, which prevent vitamin C from oxidising. Gallic acid, ellagic acid, and glucose found in tannins prevent vitamin C from oxidising, preserving its antiscorbutic properties in both fresh and dry conditions (Pareek and Kaushik, 2012). According to reports, aonla has expectorant, purgative, spasmolytic, antimicrobial, hypoglycemic, and hypolipidemic properties in addition to its hepatoprotective properties (Mishra *et al.,* 2010).

Despite the increase in productivity, poor post-harvest management practises such inappropriate storage, packing, and processing result in the loss of between 30 and 40 percent of the food. Fruits are increasingly recognised for their economic usefulness in the nation's economy, in addition to their nutritional value and social significance. For avoiding quality loss, regulating microbial development, and maintaining the convenience and safety of the product, post-harvest management is crucial (Gajanana *et al.,* 2002). Aonla is a fruit that is currently under utilised but has enormous market potential. It has to be advertised because it is almost completely unknown in the worldwide market

(Pareek and Kitinoja, 2011). It is not a common table fruit because fresh fruits are rarely consumed due to its extreme acidity and astringency (Chakraborty *et al.*, 2004). As a result, many people have been interested in the development of various Aonla value added goods. Aonla can be made into confections, barfi, pickles, sauces, jams, jellies, dry chips, tablets, preserves (murabba), and more.

One of the sweets on the market, barfi is often made with milk, flour, sugar, solid or liquid glucose, and essence. It could be possible to create a barfi with a balanced amount of fruit nutrients rather than concentrated calories. Such fruit barfies are naturally very nutritious as they contain most of the constituents of fruit (Kerawala and Sidappa, 1963). Here, in this experiment we have attempted to make barfi out of Aonla pulp. Aonla barfi can be enhanced in flavour by being combined with other items, which expands the market for the commodity or product and gives the manufacturer of the commodity or product access to a larger share of the proceeds from marketing, processing, or physical segregation (Dalal *et al.,* 2019).

According to reports, adding herbs to Aonla's value-added products provides the items a fresh flavour and enhances their medical properties (Nayak *et al.,* 2012).

Therefore, during 2021–2022, the following research project, titled "Standardization of recipe for preparation of value added aonla barfi and physio-chemical changes during storage" was carried out at the Horticulture Research Lab, Department of Horticulture, SHUATS, Prayagraj.

MATERIALS AND METHODS

The present investigation entitled Standardization of recipe for preparation of value added aonla barfi and physio- chemical changes during storage was carried out under the horticulture post-harvest laboratory in the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2021 – 2022. For each of the 11 treatment combinations, there were replications in the trial set up in completely randomised design. The treatment details and treatment combinations are displayed in Table 1. The NA7 variety of aonla of uniform shape and size and free from pest and disease infestation were used in the current study. Aonla burfi was prepared with addition of herbs and other products to enhance its flavor. Details of the procedure of preparation of Aonla burfi has been shown in Fig 1. Physiochemical attributes like TSS (°Brix), Total sugar (%), Reducing sugar (%), non-Reducing sugar (%), Acidity (%), pH and Vitamin C (Ascorbic acid) mg/100g pulp were all successfully measured at 90 days after storage to determine the best treatment combination for recipe of aonla burfi.

Table 1. Treatment Details and Treatment combinations

Treatment	Treatment combination
T0	Control
T1	Aonla+Safed Musli (1%)
T2	Aonla+Ashwagandha (1 %)
T3	Aonla+RoseSyrup (1%)
T4	Aonla+Ginger (1%)
T5	Aonla+Tulsi (1 %)
T6	Aonla+Coconut Powder (1%)
T7	Aonla+Chironji (1%)
T8	Aonla+Almond (1%)
T9	Aonla+Cashewnut (1%)
T10	Aonla + Safed Musli + Ashwagandha + Rose Syrup + Ginger +Tulsi + Coconut Powder + Chironji + Almond + Cashew nut (1%) each.

RESULTS AND DISCUSSION

Physiochemical attributes

The observation of the physico-chemical properties of the Aonla burfi (*Emblica officinalis* L.) Cv. NA7 pulp in terms of TSS (°Brix), Total sugar (%), Reducing sugar (%), non- Reducing sugar (%), acidity (%), pH, and Vitamin C (Ascorbic acid) mg/100g pulp has been statistically analyzed and is shown in Table 2. The data showed that the Physiochemical parameters had significantly changed because the F Cal value was higher than the F Tab value.

TSS (°Brix)

The data pertaining to TSS (°Brix) (Table 2; Fig. 2) of Aonla burfi after 90 days of storage revealed that Treatment T6 was recorded significantly the highest TSS (°Brix) i.e., 78.58 whereas treatment T1 recorded significantly the lowest TSS (°Brix) i.e., 73.75. This could be as a result of polysaccharides hydrolysing into sugar during storage. Kumar and Deen (2017) reported seeing similar observations in mature wood apple fruits.

Total sugar (%), Reducing sugar (%) and non-Reducing sugar (%)

The results regarding Total sugar (%)(Table 2),

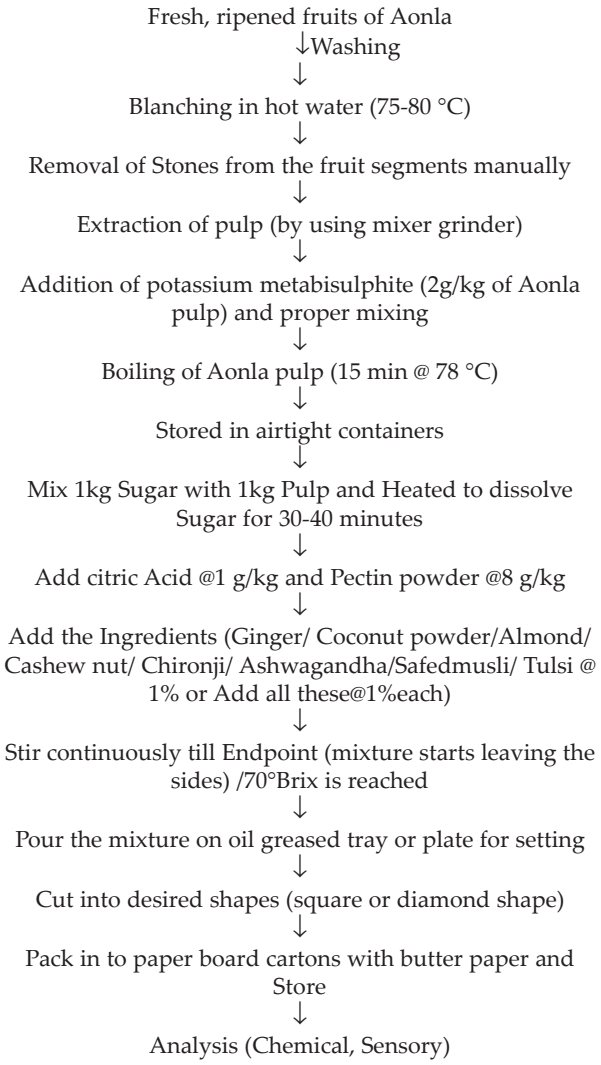

Fig. 1. Preparation of Aonla barfi

Reducing sugar (%)(Table 2) and non-Reducing sugar (%) (Table 3) of Aonla burfi after 90 days of storage revealed that Treatment T6 recorded significantly the highest Total sugar (%) i.e., 38.5 %, Reducing sugar (%) i.e., 4.86 % and non-Reducing sugar (%) i.e., 33.63 % whereas treatment T1 recorded significantly lowest Total sugar (%) i.e., 30.64 %, Reducing sugar (%) i.e., 4.45 % & non-Reducing sugar (%) i.e., 26.19 %. Non-reducing sugars (%) were higher in the T6 as compare to all other treatments. Aonla burfi's overall sugar content has been seen to steadily rise with storage time. Manjunath (2014) also reported similar outcomes. Additionally, coconut powder has more non-reducing sugars than any other material, which may account for the higher non- reducing sugar content added to coconut in aonla burfi (Nurhadi *et al.,* 2022). As compared to the other treatments, the T6 also had higher levels of reducing sugars (%). Increases in total soluble solid and reducing sugars are correlated (TSS). Therefore, it might be caused by moisture loss and the hydrolysis of non-reducing carbohydrates into reducing sugars. Rani and Bhatia (1986) also found findings that were comparable.

Acidity (%) and pH

The outcome regarding Acidity (%) (Table 3; Fig 6) and pH (Table 3) of Aonla burfi after 90 days of storage revealed that Treatment T4 and T6 recorded significantly the highest

Acidity (%) i.e., 0.69 % & Treatment T6 was found with lowest pH i.e., 3.07 where-as treatment T1 recorded significantly the lowest Acidity (%) i.e.,

Table 2. Effect of various treatments on TSS (°Brix), Total Sugar (%) and Reducing Sugar (%) of Value added Aonla burfi (*Emblica officinalis* L.) Cv. NA7.

Treatment	TSS (°Brix)				Total Sugar (%)				Reducing Sugar (%)			
	0 days	30 days	60 days	90 days	0 days	30 days	60 days	90 days	0 days	30 days	60 days	90 days
T0	72.63	73.97	75.96	77.83	27.67	31.56	33.54	37.52	4.30	4.45	4.58	4.82
T1	68.75	69.75	72.32	73.75	23.45	26.53	27.47	30.64	4.08	4.17	4.27	4.45
T2	71.09	72.45	75.32	77.03	26.13	29.75	31.29	34.83	4.23	4.36	4.48	4.70
T3	69.72	70.81	73.65	75.15	24.51	27.75	28.87	32.04	4.14	4.25	4.36	4.56
T4	73.34	74.50	76.61	78.47	28.19	32.08	34.06	38.04	4.34	4.49	4.62	4.86
T5	72.10	73.46	75.43	78.26	27.18	30.80	32.34	36.32	4.27	4.40	4.52	4.74
T6	73.44	74.64	76.68	78.58	28.65	32.54	34.52	38.50	4.34	4.49	4.62	4.86
T7	70.63	71.94	74.76	76.43	25.59	28.94	30.48	34.02	4.20	4.31	4.42	4.62
T8	69.25	70.27	72.94	74.47	23.96	26.84	27.78	30.95	4.11	4.20	4.30	4.48
T9	70.17	71.39	74.21	75.80	25.05	28.40	29.52	33.06	4.17	4.28	4.39	4.59
T10	71.62	72.97	74.85	77.65	26.66	30.28	31.82	35.36	4.25	4.38	4.50	4.72
C.D. @ 0.5	0.23	0.08	0.14	0.14	0.74	0.79	0.82	0.79	0.02	0.03	0.04	0.02
S.Ed.	0.079	0.028	0.048	0.048	0.255	0.269	0.281	0.27	0.006	0.013	0.014	0.009

0.69 %, and highest pH i.e., 4.05. As pH is inversely proportional to acidity (%), the increase in pH with gradual passage of storage time might be due to the oxidation of acid during storage resulting in decrease in acidity of the aonla burfi prepared. Similar observations were reported by Babalola *et al.,* (2002).

Vitamin C (Ascorbic acid) mg/100 g pulp

The data pertaining to Vitamin C (Ascorbic acid) mg/100g pulp (Table 4; Fig 8) of Aonla burfi after 90 days of storage revealed that Treatment T6 was recorded significantly the highest Vitamin C (Ascorbic acid) mg/100g pulp of Aonla burfi i.e., 113.51 mg/100g pulp whereas treatment T1 recorded significantly the lowest Vitamin C (Ascorbic acid) mg/100g pulp i.e., 101.17 mg/100g pulp. Ascorbic acid gradually decreases throughout the course of storage, possibly as a result of its sensitivity to heat and fast oxidation in the presence of oxygen. Saini *et al.,* (1995) observed similar findings and discovered that the ascorbic acid concentration of wood apples decreased with sugar content and storage time.

Table 3. Effect of various treatments on non-Reducing Sugar (%), Acidity (%) and pH of Value added Aonla burfi (*Emblica officinalis* L.) Cv. NA7

Treatment	non-Reducing Sugar (%)				Acidity (%)				pH			
	0 days	30 days	60 days	90 days	0 days	30 days	60 days	90 days	0 days	30 days	60 days	90 days
T0	23.37	27.11	28.96	32.70	0.81	0.75	0.73	0.66	2.85	2.93	3.11	3.17
T1	19.37	22.36	23.20	26.19	0.56	0.51	0.47	0.42	3.65	3.76	3.98	4.05
T2	21.90	25.39	26.81	30.13	0.74	0.68	0.65	0.56	3.14	3.22	3.43	3.48
T3	20.37	23.50	24.51	27.48	0.64	0.59	0.55	0.48	3.43	3.54	3.76	3.79
T4	23.85	27.59	29.44	33.18	0.84	0.78	0.76	0.69	2.74	2.82	3.00	3.07
T5	22.91	26.40	27.82	31.58	0.80	0.74	0.71	0.62	2.95	3.03	3.22	3.27
T6	24.30	28.04	29.89	33.63	0.84	0.78	0.76	0.69	2.69	2.77	2.96	3.02
T7	21.39	24.63	26.06	29.40	0.71	0.66	0.63	0.54	3.23	3.34	3.54	3.57
T8	19.85	22.64	23.48	26.47	0.60	0.55	0.51	0.46	3.51	3.62	3.87	3.92
T9	20.88	24.12	25.13	28.47	0.68	0.63	0.59	0.50	3.33	3.44	3.65	3.68
T10	22.41	25.90	27.32	30.64	0.77	0.71	0.68	0.59	3.06	3.14	3.31	3.36
C.D. @ 0.5	0.73	0.76	0.79	0.79	0.01	0.01	0.012	0.01	0.06	0.06	0.06	0.05
S.Ed.	0.251	0.26	0.272	0.269	0.006	0.006	0.004	0.003	0.021	0.021	0.021	0.017

Table 4. Effect of various treatments on Vitamin C (Ascorbic acid) mg/100g pulp of Value added Aonla burfi (*Emblica officinalis* L.) Cv. NA7

			Vitamin C (Ascorbic acid) mg/100g pulp			
S. No.	Treatment symbols	Treatment combinations	0 days	30 days	60 days	90 days
1	T0	Control	140.50	131.03	121.45	111.35
2	T1	Aonla+ Safed Musli (1%)	128.54	119.30	109.48	101.17
3	T2	Aonla + Ashwagandha (1%)	136.02	127.00	117.03	107.56
4	T3	Aonla + Rose Syrup (1 %)	131.62	122.69	112.40	103.92
5	T4	Aonla + Ginger (1%)	142.90	132.33	123.02	113.16
6	T5	Aonla + Tulsi (1 %)	138.97	129.69	120.03	110.15
7	T6	Aonla + Coconut Powder (1%)	143.11	132.41	123.44	113.51
8	T7	Aonla + Chironji (1%)	134.53	125.57	115.37	106.44
9	T8	Aonla + Almond (1%)	130.16	120.84	111.00	102.53
10	T9	Aonla + Cashewnut (1%)	133.09	124.17	114.02	105.17
11	T10	Aonla + Safed Musli + Ashwagandha + Rose Syrup + Ginger + Tulsi + Coconut Powder + Chironji+ Almond + Cashewnut (1%) each.	137.49	128.36	118.47	108.98
		F-Test	S	S	S	S
		S.EM=	0.080	0.210	0.160	0.170
		CD(5%)=	0.23	0.62	0.49	0.51

CONCLUSION

On the basis of results obtained during the present investigation it is concluded that T6 (Aonla + Coconut powder @ 1 %) was found best in terms of aonla burfi and recorded significantly the best in terms of physio-chemical attributes i.e., TSS (73.75 °Brix), Total sugar (30.64 %), Reducing sugar (4.45 %), non-Reducing sugar (26.19 %), Acidity (0.69 %), pH (3.07) & Vitamin C (113.51 mg/100g pulp).

REFERENCES

Abdel-Hady, M.M, Gamila,Y.A. and Afaf, M. and Ali, A.M. 2014. Colour stability of strawberry jam fortified by purple carrot puree. *Egyptian Journal of Agriculture Research.* 92(1): 323-336.

Babalola, S.O, Ashaye, O.A, Babalola, A.O. and Aina, J.O. 2002. Effect of cold temperature storage on the quality attributes of pawpaw and guava leathers. *African Journal of Biotechnology*. 1(2): 61–63.

Chakraborty, I., Mitra, S. K. and Pathak, P. K. 2004. Potential underutilized tropical fruits of India. In *III International Symposium on Tropical and Subtropical Fruits,* 864: 61-68.

Dalal, N., Neeraj and Bisht, V. 2019. Value Added Products from Ber. *Int. J. Curr. Microbiol. App. Sci. 8*(1): 1603-1615.

Gajanana, T. M. 2002. Marketing practices and post-harvest loss assessment of banana var. Poovan in Tamil Nadu. *Agricultural Economics Research Review*. 15(1): 56-65.

Kerawala, D. N. and Sidappa, G. S. 1963. Studies on fruit toffees Part I: Effect of addition of glucose on texture and of processing temperature on retention of ascorbic acid and carotene in mango toffees. *J. Food Sci.* 12 (8): 221-224.

Kumar, A. and Deen, B. 2017. Studies on Bio-Chemical Changes in Wood Apple (*Limonia acidissima* L.) Fruits during Growth and Development. *Int. J. Curr. Microbiol. App. Sci.* 6(8): 2552-2560.

Manjunath, T. 2014. Development of value added products from sapota (*Manilkara achrus)* blended with jackfruit and avocado. *International Journal of Processing and Post harvest Technology.* 5(1): 48-53.

Mishra, V., Mishra, P. and Rai, G. K. 2010. Process and product standardization for the development of amla bar. *Beverage & Food World.* 34(6): 58-60.

Nayak, P., Tandon, D. K. and Bhatt, D. K. 2012. Study on changes of nutritional and organoleptic quality of flavored candy prepared from aonla (*Emblica officinalis* G.) during storage. *International Journal of Nutrition and Metabolism*. 4(7): 100-106.

Nurhadi, B., Maidannyk, V. A., Djali, M., Herlina Dwiyanti, E., Putrinda Editha, N., Pandey, S. and Poonia, A. 2022. Studies on the preparation of antioxidant rich ber (*Zizyphus mauritiana* Lamk.) powder burfi with coconut sugar as natural sweetener. *Indian J Dairy Sci.* 73(1) : 32-39.

Pareek, S. and Kaushik, R. A. 2012. Effect of drying methods on quality of Indian gooseberry (*Emblica officinalis* Gaertn.) powder during storage. *Journal of Scientific and Industrial Research*. 71: 727-732.

Pareek, S. and Kitinoja, L. 2011. Aonla (*Emblica officinalis* Gaertn.). In: *Postharvest biology and technology of tropical and subtropical fruits* (pp. 65-99e). Woodhead Publishing.

Rani, U. and Bhatia, B. S. 1986. Studies on baggu gosha pear for preserve and ready to eat products. *Indian Food Packer*. 40: 25-31.

Saini, S.P.S. and S. Jain, 1995. Effect of seasonal maturity and treatment on the storage stability of patharnakh pear juice concentrates. *Research and Industry, India.* 40(4): 289-292.

Sonawane, K. G., Pokharkar, V. G. and Nirgude, R. R. 2017. An Economic Evaluation of Aonla Candy Processing Unit. *Indian Journal of Economics and Development.* 13 (2a): 523-526.