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### Consistency of aonla candy for better immunity

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#### Abstract

Aonla (*Emblica officinalis* Gaertn) Aonla is indigenous to tropical south-eastern Asia, particularly in central and south India. In India, forests have been the traditional source of aonla fruit for medicinal uses with annual harvests estimated to be about 50,000 tonnes. Increasing demand from industry, especially for ayurvedic formulations, and appreciation of nutraceutical and medicinal properties for home consumption has resulted in the growing of this tree as a cultivated crop. In India, it is estimated that aonla is cultivated on about 91,000 ha, having a production of 9, 89,000 MT (Annon, 2017). The fruit is nutritious and is a rich source of Vitamin- "C". Ascorbic acid and other constituents are well retained in dried aonla fruits (Roy, 2000) [10]. The fruit is highly nutritious and is a rich source of pectin, polyphenols apart from ascorbic acid. The fruits are well known for their medicinal properties in curing chronic dysentery, bronchitis, and diabetes in the traditional Indian system of medicine. The fruits of aonla possess expectorant, purgative, spasmolytic, antibacterial, hypoglycaemic (Jamwal *et al.*, 1959) [4] Jayshri and Jolly, 1993) [5], hepatoprotective and hypolipidemic (Thakur and Mandal, 2004) [11] activity. The aqueous extract has been reported to have anti-pyretic laxative and tonic properties and also showed antibacterial activity (Vinaygamoorthy, 1982). Potassium and iron content are relatively high in the fruit. The fruit has a very high content of ascorbic acid and is analgesic, antiinflammatory, and antipyretic. Vitamin- "C" is also antihepatotoxic, antinephrotoxic, antioxidant, and promotes chromosomal stability. The fresh fruit contains as much as 4.45% tannin compounds of which ellagic acid, gallic acid, corilagin, etc. are important. Ellagic acid is antimutagenic and anticarcinogenic. Gallic acid scavenges free radicals generated by various metabolic processes. The fruit contains (-) epicatechin which is hypoglycemic, anti-inflammatory and its antiviral action is effective against Moloney murine leukaemia virus. The fruit contains an appreciable amount of linoleic acid, which promotes immunomodulation in the human body. Ingestion of linoleic acid by the patients having multiple sclerosis reduces the frequency and intensity of heart attacks. The fruit contains kaempferol, quercetin, and rutin. All these compounds are partially cardiogenic. It also contains phyllembin which regulates blood pressure and respiration (Pathak, 2003) [9]. The root bark is astringent and is useful in treating gastric ulcers. The stem bark is also astringent and is useful in treating jaundice, diarrhea, and myalgia. The flowers are cooling and aperient. The leaves are useful in alleviating conjunctivitis, inflammation, dyspepsia, diarrhea, and dysentery. Seeds are reported to be useful in treating asthma, bronchitis, and biliousness. The seeds contain a fixed oil, phosphatids, and a small quantity of an essential oil with a characteristic odour. The fixed oil (16%), is brownish yellow in colour and contains fatty acids in the following proportions: linolenic (8.78%), linoleic (44.0%), oleic (28.4%), stearic (2.15%), palmitic (2.99%), and myristic acids (0.95%). Aonla fruit is not palatable for direct human consumption because of its high acidity and astringent taste. Fruit is consumed mainly in the processed form. The excellent nutritive and therapeutic values of the fruit offer great potential for processing into several quality products. In general, aonla fruits are utilised for three purposes: (a) Food items: RTS, nectar, squash, jam, preserve, candy, pickle, sauce, chutney, dehydrated shreds, etc. (b) Ayurvedic preparations: Chavanprash, trifla, amlakai girth, trifla churan, and trifla prash tablets. (c) Cosmetic preparations: in face packs, hair oil, shampoos and tooth powder.

**Amla Candy and human health:** The health benefits of Aonla are limitless and the fruit is always revered as a wonder fruit that is a power source of various vitamins and nutrition. Many people hesitate to take Aonla raw, thereby ignoring all the health benefits that it has got to offer. In order to fill this gap, Aonla candy has been introduced which provides for a sweet taste and also brings along with all the health benefits that Amla has got to offer. It is a dried up form of Aonla that tastes great. There are many people who find it quite difficult to refrain from it, once they have it. The aonla candy is usually made out of sugar, Aonla and glucose.

**Vitamin- "C":** Amla is a rich source of Vitamin- "C" (600-800 mg/100g pulp), which is known to boost the immunity levels in the body. People who have aonla on a regular basis find themselves less prone to fall ill of a disease as they would have built up an effective immune system over the course of time. It is

also anti-inflammatory in nature and is known to bring down pain and discomfort to a great extent. The Vitamin- "C" rich fruit also contributes greatly for maintaining skin and hair.

**Skin and hair:** Amla works like a wonder when it comes to treating skin and hair problems. It is known to be packed with anti-oxidants that is known to fight the body against any sort of issues. It fights against the radical and provides for a naturally glowing and healthy skin. It is known to have anti-ageing properties and by taking aonla regularly, one can delay the aging process considerably. Aonla is extensively used for treating hair conditions and makes it look strong and beautiful. People who take Aonla juice on a regular basis can visibly see the difference that their skin is glowing and the hair fall has stopped.

**Cures cough and cold:** Aonla candy brings down cough and cold condition in individuals. It is packed with rich nutrients and provides for an instant relief from cough. When Aonla juice is mixed with honey and consumed, it is known to be a perfect cure for cold. Apart from that, there are various other health benefits that this small yet powerful fruit has got to offer (Ref. <https://jasco.in/amla-candy-highly-beneficial-for-health/>).

The best thing about Vitamin- "C" in Aonla is the fact that this source of Vitamin is easily absorbed by the body when compared to Vitamins offered by supplements and hence this turns out to be an ideal choice by many. There are many ready made Aonla candy that are available in the market and one can buy them and take it on a regular basis. It would be possible to see effective results in a matter of just one month and once started to have it, one cannot refrain from it totally.

An investigation was conducted to study the "standardization of recipe and drying method for candy making of aonla (*Emblica officinalis* Gaertn.) cv. Gujarat Aonla-1". There were nine treatment combinations of different recipe and drying methods. The experiment was laid out in a Factorial Completely Randomized Design with three repetitions. The treatment R<sub>3</sub> (80 % sugar solution) showed the maximum TSS and total sugars, in aonla candy whereas, the maximum titrable acidity and ascorbic acid were observed in the R<sub>1</sub> (60 % sugar solution). The chemical characteristics like TSS, titrable acidity, ascorbic acid and total sugars were obtained maximum in the D<sub>1</sub> treatment (Sun drying) in the candies of aonla at all the storage periods. The treatment combination R<sub>3</sub>D<sub>1</sub> (80 % sugar solution and sun drying) was recorded the highest total sugars, whereas the titrable acidity in aonla candies were recorded in the R<sub>1</sub>D<sub>1</sub>.

**Keywords:** Aonla candy, recipe and drying methods

## Introduction

Aonla or Indian goose berry (*Emblica officinalis* Gaertn, syn. *Phyllanthus emblica* Linn.) is one of the most important indigenous fruit of Indian origin. Aonla is known since ancient time for medicinal and nutritional value. It is a rich source of ascorbic acid, pectin and polyphenols which impart acidic and astringent taste to fruit. Its composition makes it of good medicinal value as antisorbetic, diuretic, laxative and antibiotic. The fruit also possesses pronounced expectorant, antiviral, cardiotoxic and hypoglycaemic activity. It is widely used in the Unani and Aurvedic system of Medicine (Kalra, 1988) [7]. Aonla becomes ready for harvesting from mid November to first week of January. The produce remains in the market for a very short period. Since it is a perishable commodity, it needs quick disposal. Huge harvest of produce during peak harvesting season creates glut and the growers are compelled to sell their produce at distress prices. The post harvest losses in aonla vary from 30 to 40 per cent due to its perishable nature and glut during harvesting time, which reduce the market value of the fruit. Owing to restricted availability and high perishability of aonla fruits, value addition through processing into variety of products would be the only effective tool for economic utilization to boost production of aonla fruits.

The aonla fruits were dipped in water for discarding light and infested fruits. These fruits were then cleaned under running tap water to remove impurities and dust from the surface of fruits. The fruits were cut into pieces with uniform size, then blanched in boiling water at  $98 \pm 2$  °C for 2-3 min as per the method suggested by Kadam *et al.*, 1991 [6]. Then Sugar syrup was made with different recipe and dried with different drying methods then the packaging of candy of each treatment under study was done in polypropylene (pp) pouches

Moreover aonla fruit is acrid and bitter taste, hence utilized after processing. So many varieties have been released in our country viz. Krishna, Kanchan, Banarasi, Gujarat Aonla -1 and NA-7.

The fresh fruits are not consumed due to their high astringency; however it is known for its great medicinal as well as therapeutic properties and also has good processing quality. Hence, variety of products like aonla murabba, preserve, candy, squash, dried flecks, tablets, Jam, jelly, pickle, toffees, powder, Juice, pulp, mukhwas, chocolate, syrup, pan masala, amchoor, churan, chavanprash, mouth freshner, laddoo, chutney, supari, cold drinks, capsules and aonla pak etc. can be successfully prepared from aonla fruit. Thus, keeping in view the potentialities of the processed aonla product the experiment entitled, "Standardization of recipe and drying method for candy making of aonla (*Emblica officinalis* Gaertn.) cv. Gujarat Aonla-2 fruit".

## Materials and Methods

An investigation was carried out in the post graduate Laboratory, Department of Horticulture, Junagadh Agricultural University, Junagadh during 2011-12. Completely Randomized Design with Factorial concept was followed in the experiment

with two factor viz. Factor A: Different recipe, Factor B: drying method and their combinations. of 50 µ thickness of 100 g packets and was stored during February-April, 2012 at room temperature (18.2-38.2 °C and 17.2-79.3 % RH) for a period of 3 months & observations were recorded at an interval of 30 days.

## Result and Discussion

The experimental results revealed that the candy making significantly influenced due to different recipe and drying method of aonla.

### Different recipe and drying method

Among the different recipe significantly maximum TSS (81.67 Brix) and total sugars (76.05%) at 90th day was found in R<sub>3</sub> (80% sugar solution), whereas, significantly lowest TSS and total sugar was found in R<sub>1</sub> (60% sugar solution). While, significantly maximum acidity (1.07%) and ascorbic acid (331.82 mg/100g) at 90th day was found in R<sub>1</sub> (60% sugar solution), whereas, significantly lowest acidity and ascorbic acid was found in R<sub>3</sub> (80% sugar solution). In case of drying treatment, at 90th day significantly maximum TSS (71.890Brix) was found in D<sub>1</sub> (Sun drying) and D<sub>2</sub> (Oven drying). While, maximum acidity, ascorbic acid and total sugar (1.02%, 299.02 mg/100g and 71.55 %) was found in D<sub>1</sub> (Sun drying) respectively, whereas, lowest TSS, acidity, ascorbic acid and total sugar was found in D<sub>3</sub> (Try drying) in aonla candy (Table 1).

The decrease in ascorbic acid in candies during storage might be due to oxidation or irreversible conversion of L-ascorbic acid into dehydro ascorbic acid oxidase (ascorbimase). The decrease in ascorbic acid is also might be due to its oxidation

to dihydroxy-ascorbic acid during storage period and high temperature during tray drying. An in decrease in ascorbic acid during storage period was also reported by Gupta *et al.* (1980) [3] in ber candy, Kumar (1998) [8] in papaya candy, Antala (2010) [2] in guava slices.

#### Interaction effect of recipe and drying methods

It is evident from data that the interaction effect of recipe treatments and drying methods on titrable acidity content at 90th day of storage was found maximum in R<sub>1</sub>D<sub>1</sub> (1.10%) which was found at par with R<sub>1</sub>D<sub>2</sub> and R<sub>1</sub>D<sub>3</sub> whereas lower acidity (0.86 %) was found in R<sub>3</sub>D<sub>3</sub>. At 90th day of storage ascorbic acid content of aonla candy was found non-significant. Maximum total sugars was found in R<sub>3</sub>D<sub>1</sub>

(79.69%), at 90th day during storage while, significantly minimum total sugars was found in R<sub>1</sub>D<sub>3</sub> (Table 2).

#### Conclusion

Results have clearly indicated that the treatment R<sub>3</sub>D<sub>1</sub> (80 % sugar solution and sun drying) was best for the chemical characteristics of aonla and citrus peel candies because the sun drying regulates the process of osmosis and concentration of sugar in the candies. Different drying methods reduce the growth and development of microbes in the product during storage.

Hence, it is the best method for the value addition of the fruits like aonla for earning the more income.

**Table 1** Effect of recipe and drying methods on quality parameters of aonla candy at 90<sup>th</sup> days

Treatment	Treatment Details	TSS ( <sup>o</sup> Brix)	Acidity (%)	Ascorbic acid (mg/100 g)	Total sugars (%)
<b>A. Recipe</b>					
R <sub>1</sub>	60% sugar solution	61.44	1.07	331.82	60.54
R <sub>2</sub>	70% sugar solution	71.50	0.97	314.40	69.35
R <sub>3</sub>	80% sugar solution	81.67	0.93	231.00	76.05
S.Em.±		0.21	0.00	0.89	0.24
C.D. at 5%		0.62	0.02	2.50	0.71
<b>B. Drying method</b>					
D <sub>1</sub>	Sun drying	71.89	1.02	299.02	71.55
D <sub>2</sub>	Oven drying	71.89	0.99	293.83	68.08
D <sub>3</sub>	Tray drying	70.83	0.95	284.38	66.35
S.Em.±		0.21	0.00	0.89	0.24
C.D. at 5%		0.62	0.02	2.50	0.71
C.V. %		0.88	1.23	0.91	1.05
Interaction		NS	SIG.	NS	SIG.

**Table 2** Interaction effects of recipe and drying methods on quality parameters of aonla candy at 90<sup>th</sup> days

Treatment (R×D)	Acidity (%)	Ascorbic acid (mg/100 g)	Total sugars (%)
R <sub>1</sub> D <sub>1</sub>	1.10	335.77	63.70
R <sub>1</sub> D <sub>2</sub>	1.05	332.37	59.29
R <sub>1</sub> D <sub>3</sub>	1.05	327.33	58.63
R <sub>2</sub> D <sub>1</sub>	1.00	323.79	71.27
R <sub>2</sub> D <sub>2</sub>	0.98	314.62	69.26
R <sub>2</sub> D <sub>3</sub>	0.95	304.80	67.53
R <sub>3</sub> D <sub>1</sub>	0.97	237.50	79.69
R <sub>3</sub> D <sub>2</sub>	0.95	234.50	75.69
R <sub>3</sub> D <sub>3</sub>	0.86	221.00	72.88
S.Em.±		0.01	1.54
C.D. at 5%		0.03	NS
C.V. %		1.23	0.91

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