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AONLA, PHYSICO-CHEMICAL AND MICROBIAL QUALITY DURING STORAGE - A REVIEW

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ABSTRACT:

Aonla (*Emblica officinalis* Gaertn.), also known as Indian gooseberry, belongs to family Euphorbiaceae and is widely used in pharmaceutical and processing industries because of the presence of some useful nutraceuticals like ascorbic acid and polyphenols. The fruit is a good source of vitamin C. The fruit is having medicinal value. It has acrid, cooling, diuretic and laxative properties. Dried fruits are useful in haemorrhages, diarrhea, dysentery, anaemia, jaundice, dyspepsia and cough. Aonla is used in the indigenous medicines (Aurvedic system) viz. trifla and chavanprash. Fruits are commonly used for preserve (murabbas), pickles, candy, jelly and jam. Besides fruits, leaves, bark and even seeds are being used for various purposes. Fruit are large in size, light yellow at full maturity. Aonla are preferred for Muraba making average fruit weight 30g with light stone. An Aonla preserve, called aonla murabba is a processed product consumed in India, and is an important product in the indigenous system of medicine. The TSS of juice is 10%. It contains ascorbic acid 660 mg per 100 g. of pulp. Fruits have poor shelf life.

KEYWORDS: Nutritional Value, Medicinal Value, Production, Physico-Chemical Analysis, Microbial Analysis.

INTRODUCTION:

Aonla (*Emblica officinalis* Geartn), the king of arid fruits, popularly known as “Indian gooseberry”, is a small-sized minor subtropical fruit grown widely in North India. India ranks first in the world in aonla area and production volume. It is considered to be a “wonder fruit for health” because of its unique properties (**Kore et al. 2013**). Mature Aonla tree can tolerate freezing as well as high temperature of 46⁰C (**Goyal et al. 2008**). It also grows at a height of 4500 ft above MSL. (**Ravindra Kumar, 2010**) reported that Aonla fruit is an important indigenous fruit of India. It is highly nutritious and thereapeutically important. Five varieties (Banarasi, Chakaiya, Francis, Kanchan and Krishna) of aonla were evaluated for their productivity, physio-chemical characters and organoleptic quality of the products. The vairability studied indicated the possibility of selecting varieties suitable for processing of aonla fruit. Kanchan and Krishna were found suitable for candy and Jam and Banarasi for drying. Chakaiya variety showed desirable attributes and higher score for pickle, chutney and syrup. The chemical composition of aonla fruits is influenced by environmental factors. Aonla thrives well throughout tropical India and is met with wild or cultivated in the region extending from the base of the Himalaya to Sri Lanka and from Malacca to South China. It is more popular in India and is commercially cultivated in Uttar Pradesh. The vast tracts of user land widely spread in various parts of Sultanpur district of Uttar Pradesh offer ample scope of aonla cultivation. This is a fruit of sub-tropical region with distinct winter and summer. However, it is growing near the sea coast upto 1800 m altitude. NA-6, NA-7, NA-10, Kanchan and Chakaiya varities is very important according to processing.

NUTRITIONAL AND MEDICINAL VALUE OF AONLA

The chemical composition of fresh fruit in respect to energy 170/40 KJ/Kg, moisture (84.35%), protein (0.88%), Ascorbic acid (571.60 mg/100g), Total sugar (3.11%), Fibre (3.2 gm) Reducing sugars (2.37%), minerals has been reported by lot a of researchers (**Goyel et al. 2008**). Amalaki (*Emblica officinalis*) i.e. Aonla and its preparations can be used in any type of ill health. It is commonly used in piles, fracture, constipation, vomiting, nausea, diseases related to vision and eye, hick up, fever, jaundice, liver disease, skin disease, diabetes (**Kavita, 2013**).

(**Srivasuki, 2012**) also reported that Amla is highly nutritious and is one of the richest sources of vitamin-C, amino acids and minerals. It contains several chemical constituents like tannins, alkaloids and Phenols (**Zhang et al. 2003**). Among all hydrolysable tannins,

Emblicanin A and B; gallic acid, ellagic acid are reported to possess biological activity. Pharmacological research reports on amla reveals its analgesic (**Sharma *et al.* 2004**), anti-tussive (**Nosal *et al.* 2003**), anti-atherogenic, (**Santosh kumar *et al.* 2013**), adaptogenic, (**Muruganandam *et al.* 2002**), cardiovascular (**Baliga *et al.* 2013**). According to (**Swetha Dasaroju and Krishna Mohan Gottumukkala, 2014**) It help in regulating blood sugar and It is very powerful anti-inflammatory herb, a wonderful antioxidant and a natural Source of Vitamin C. Amla helps scavenge free radicals.

(**Chauhan *et al.* 2005**) reported that Aonla fruit is highly nutritive with a great medicinal use and the richest source of vitamin C. It contains 500-1500 mg of ascorbic acid per 100 g of pulp. This is much more than the vitamin C content of guava, citrus and tomato fruits. The fruit juice contains nearly 20 times as much vitamin C as in orange juice. Its other constituents are phenols and tannins containing gallic acid, elegiac acid and glucose which prevent oxidation of vitamin C. The fruits are used for curing chronic dysentery, bronchitis, and diabetes. The storage of Aonla depends on maturity at harvest. The fruit keeps well in cool chamber for 17-18 days compared to 8-9 days at ambient temperature. Aonla fruit is seldom consumed fresh but the fruit is valued highly in the Ayurvedic system of medicine. In Ayurvedic preparation like 'Chyavanprash' and triphala, Aonla is one of the main ingredient. Aonla fruits are highly perishable in nature and hence its storage in atmospheric conditions after harvesting is very limited, which is accompanied by browning of the skin, loss of glossiness and vitamin C content (**Kumar and Nath, 1993; Singh *et al.* 2003**). Aonla fruit is helpful in the treatment of haemorrhage, dysentery, diarrhoea, gastric disorders, constipation, headache, jaundice and enlargement of liver (**Parrotta, 2001; Goyal *et al.* 2007**). Aonla is one of the main constituent of many ayurvedic preparations like Triphla and Chyawanprash (**Pant *et al.* 2004; Goyal *et al.* 2007; Mishra *et al.* 2009**). Various research studies show that aonla has prominent antibiotic, antiulcerogenic, diuretic, laxative, adaptogenic, antitumor, antiscorbutic, hepatoprotective, cardio tonic, antiviral, and hypoglycaemic properties (**Rege *et al.* 1999; Jose and Kutton, 2000; Dahiya and Dhawan 2001; Pragati *et al.* 2003; Mishra *et al.* 2009**). Hypolipidaemic effect of fruit juice of aonla was reported in a study by (**Mathur *et al.* 1996**).

PRODUCTION

Aonla is mostly cultivated in the states of Uttar Pradesh, Maharashtra, Gujarat, Rajasthan, Andhra Pradesh, Karnataka, Tamil Nadu, Himachal Pradesh etc. The overall production of Aonla in India in 2014-15 was 1173.33 tonnes. Uttar Pradesh is the highest production of

Aonla followed by Madhya Pradesh, Tamilnadu, Gujarat, Chhattisgarh, Jharkhand, Bihar, Assam, Rajasthan, Andhra Pradesh, Haryana, Nagaland, Mizoram, Uttrakhand, Kerala, Karnataka, Orissa, Himachal Pradesh. The State wise production of Aonla in Indian given below in Table

STATE WISE PRODUCTION AND SHARE OF AONLA IN INDIA IN 2014-15

S.No.	Production (000' Tonnes)	Share (%)
Uttar Pradesh	374.28	31.90
Madhya Pradesh	373.00	31.79
Tamilnadu	173.74	14.81
Gujarat	95.63	8.15
Chhattisgarh	36.20	3.09
Jharkhand	33.82	2.88
Bihar	16.27	1.28
Assam	15.00	1.39
Rajasthan	12.89	1.10
Haryana	11.02	0.94
Andhra Pradesh	9.17	0.78
Punjab	6.06	0.52
Maharashtra	3.44	0.20
Nagaland	2.91	0.25
Jammu Kashmir	2.60	0.22
Himachal Pradesh	2.05	0.17
Uttrakhand	2.04	0.17
Mizoram	1.32	0.11
Karnataka	1.02	0.09
Orissa	0.71	0.06
Kerala	0.16	0.01
Total	1173.33	99.91

Source: (National Horticulture Board, 2014)

PHYSICO-CHEMICAL CHARACTERISTICS OF AONLA

The Physico-Chemical Characteristics for processes product of Aonla are TSS, Acidity, P^H, Ascorbic Acid, weight, Texture etc. Ascorbic Acid is the main physico-chemical parameter of Aonla. Physiological loss in weight (PLW) of fruits increased gradually with the advancement of storage period. It was significantly high in the fruits stored for 12 days (11.59%) as compared to 0 days stored fruits (4.87%). Increase in PLW of fruits might be due to the loss of moisture through evapo-transpiration and respiration. (Singh *et al.* 2005) and (Pathak *et al.* 2009) have also reported that physiological loss in weight increased gradually when aonla fruits were stored up to 16 days under ambient conditions. The total soluble solids (TSS) content increased from 10.15 to 12.11 °B during storage of fruits. (Kumar *et al.* 2005) and (Hiwale and Singh, 2006) have also recorded an increase

in TSS of aonla fruits during storage. The titrable acidity continuously decreases during storage in Aonla. The Initial value of titrable acidity was recorded 1.53 % in fresh sample at 0 days whereas final value was recorded 0.36% after 12 days similar results have been reported by **(Gupta and Mukherjee, 1981; Neeraj et al. 2002; Singh et al. 2005)** in Aonla fruits. In case of ascorbic acid the data was continuously decreased. The initial value of ascorbic acid was found (299 mg/100g) whereas final value was recorded (33 mg/100g). Similar results have been reported by **(Bhattacharjee et al. 2013)**. In case of pH the value was continuously decreased. The initial value of pH was 5.11 whereas final value of pH was found 4.11. Similar result were found by **(Bhattacharjee et al. 2013)**. Texture of the Aonla is also continuously decrease during storage. The initial value of texture was recorded 7.89 whereas final value was found 6.68. Similar result were found by **(Nayak et al. 2011)**.

MICROBIAL ANALYSIS OF AONLA DURING STORAGE

Acidic fruit products like aonla ladoo and spread are the most susceptible to yeast and mold spoilage owing to its low pH and high contents of sugars **(Kimball, 1999; Rivas et al. 2006)**. Herbal aonla containing mulethi and satavari powder showed no microbial growth at first month storage. During storage, yeast and mold count was detected maximum in low calorie aonla ladoo and spread, and it might be due to high moisture content and water activity in these low calorie products, which favoured microbial growth. Similar results were reported by **(Ayhan et al. 2001; Min et al. 2003; Mehmood et al. 2008)**. Herbal aonla ladoo containing mulethi and satavari powder showed no microbial growth at first month storage. This might be possible due to anti microbial effect of herbal ingredients. **(Priya et al. 2013)** also reported that increase in fungal count during storage of Aonla.

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