



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 3733-3735
Received: 13-01-2018
Accepted: 14-02-2018

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Evaluation of physical and nutritional properties of Aonla

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Abstract

Aonla (*Emblica officinalis*) is important fruit crop commonly grown in India in dry and minimum management input. It is rich source of protein, fat, carbohydrate, dietary fiber, vitamin C, iron, calcium and phosphorus. The fruit aonla is richest source of Vitamin C. The present investigation was carried out to study the physical properties such as length, diameter, whole fruit, pulp weight, % pulp and % seed of aonla fruit mainly 3.434cm, 3.567cm, 28.391gm, 26.231gm, 92.3% and 7.60% respectively. Nutritional properties of aonla such as moisture content (85.6%), fat (0.5%), protein (2.187%), carbohydrate (7.11%) and ascorbic acid (552.6 mg/100gm) of aonla fruit.

Keywords: aonla, physical properties, nutritional properties, ascorbic acid content

Introduction

Fruits, whether fresh or dried, have always formed a part of the staple diet of human beings because these are rich in nutrients and provide some of the essential minerals, vitamins, and apart from this, fruits also help in curing a number of diseases. Aonla (*Emblica officinalis*) also known as Indian gooseberry is one of the traditional fruits indigenous to India and is considered as "Wonder fruit for health" (Ganachari *et al.*, 2010) [4].

Indian gooseberry (*Emblica officinalis Gaertn. Syn. Phyllanthus emblica L.*) Fruit commonly known as aonla, is the oldest minor fruit of India. It belongs to the family Euphorbeaceae and is native of India, Srilanka, Malaysia, and China. Nearly 30 varieties of aonla are grown in India like Banarasi, Chakaiya, NA-6, NA-10, L.S.-1, L.S.-6, Anand Aonla – II, Kanchan, Krishna, Narendra 4, etc. (Athawale and akbari, 2017) [2].

Aonla, a member of family *Euphorbiaceae* and sub family *Phyllanthioidae*, is native to India, Ceylon, Malaya and China. Aonla is quite hardy, a prolific bearer and highly remunerative even without much care. It can be grown easily on calcareous and slightly saline as well as alkaline soils, where common fruit crops do not thrive (Pareek and Kitinoja, 2011) [8].

Aonla fruit is currently grown over 49.60 thousand hectares, with production of 150.5 thousand metric tons. Aonla due to less water requirement, least crop protection measures and high market demand has become one of most sought over crop among the farmers of dry land region. The demand for industry is due to its, high processing potential and medicinal properties (Raut *et al.*, 2016) [11].

The aonla is highly perishable in nature and is available for short period from October to January. Moreover, because of its highly acidic and astringent nature, consumers do not relish this fruit in fresh form. India ranks first in the World in area and production of aonla crop (Priya and Khatkar, 2013) [9].

It is one of the richest sources of vitamin C among cultivated fruits except Barbados cherry. The pulp of fresh fruit contains 200–900 mg/100 g of vitamin C and as dehydrated aonla pulp retains as much as 1,699.09 mg/100 g of vitamin C on dry weight basis. The fruit is highly perishable in nature and is available for short period from October to January (Ghorai and Sethi, 1996) [5].

Aonla fruit is having, antiscorbutic, diuretic, laxative, and alternative antibiotic properties used in treating jaundice and cough. Aonla is one of the richest sources of vitamin C and of polyphenols, and these polyphenols are considered to have a high medicinal value. As a result, the fruit has acquired an important therapeutic role in the Ayurvedic and Unani systems of medicine. Aonla fruit having sour and astringent taste, generally utilised raw, cooked or in the form of pickle. Murrabas, juice, jam, cheese, candy, powder, beverage, chutney are the different types of aonla products available in the market and preferred by the consumer being the rich source of vitamin C and antioxidants (Goyal *et al.*, 2008) [6].

Determination of physico-chemical properties of the fruit may play an important role in design and development of various food processing equipment.

Materials and Methods

Indian gooseberry were purchased from Parbhani local market and were analysed for the nutrients namely moisture, protein, fat, ash, crude fiber and minerals like calcium, phosphorous, iron and zinc (AOAC, 2005) [1]. Carbohydrate content of samples was computed by difference method (Ranganna, 1986) [10]. Nutrients were analyzed in duplicate and results were expressed on dry weight basis.

Physical Properties

The physical properties of aonla were measure the length and breadth, length and breadth by using vernier caliper. Ten randomly selected aonla from lot were selected and individually weighed on electronic 4 digit weighing balance.

Proximate Analysis

Different chemical properties of samples were analyzed for moisture content, ash, fat, protein and total carbohydrate. All the determinations were done in triplicate and the results were expressed as the average value.

Moisture content

Moisture content was determined adopting method as following:

$$\% \text{ Moisture content} = \frac{\text{Loss in weight}}{\text{Weight of sample}} \times 100$$

Fat

(AOAC, 2005) [1] Method using soxhlet apparatus was used to determined crude fat content of the sample. The percent of crude fat was expressed as follows:

$$\% \text{ Crude Fat} = \frac{\text{Weight of dried ether soluble material}}{\text{Weight of sample}} \times 100$$

Protein

Protein content was determined using (AOAC, 2005) [1] method. Percentage of nitrogen and protein calculated by the following equation:

$$\% \text{ Nitrogen} = \frac{T_S - T_B \times \text{Normality of acid} \times 0.014}{\text{Weight of sample}} \times 100$$

Where, T_S = Titre volume of the sample (ml), T_B = Titre volume of Blank (ml), 0.014= M eq. of N_2 .

$\% \text{ Protein} = \text{Nitrogen} \times 6.25$

Total carbohydrate

Total carbohydrate content of the samples were determine as total carbohydrate by difference, that is by subtracting the measured protein, fat, ash and moisture from 100 phenol sulphuric acid method as given by (AOAC, 2005) [1].

Ash

Drying the sample at 100°C and churned over an electric heater. It was then ashes in muffle furnace at 550°C for 5 hrs. It was calculated using the following formula:

$$\% \text{ Ash content} = \frac{\text{AW}}{\text{IW}} \times 100$$

Where, AW = Weight of Ash and IW= Initial weight of dry matter

Results and Discussion

Physical properties of aonla fruit

Various physical properties of aonla fruit were determined and results are obtained are presented in Table 1.

Table 1: Physical properties of aonla fruit

Parameters	Aonla
Color	Light green with yellowish
Fruit weight (gm)	28.391
Diameter (cm)	3.567
Length (cm)	3.434
Pulp weight (gm)	26.231
Pulp (%)	92.3
Seed weight (gm)	2.16
Seed (%)	7.60

*Each value represents the average of three determinations

The data given in Table 1. concluded various physical characteristics of aonla fruit. Color is important characteristics for determining the visual acceptance. The color of aonla fruit was light green to yellowish. The fruit weight was reported to 28.391(g), diameter 3.567(cm), length 3.434 (cm), pulp weight 26.231 (%), pulp 92.30 (%), seed weight 2.16 (gm) and % seed 7.60 (%). The results are more or less similar with results given by Raut *et al.*, (2016) [11].

Chemical Properties of aonla

The data containing various chemical and nutritional compositions such as Titrable acidity, total soluble solids, reducing sugar, total sugar, pH and ascorbic acid content, protein, ash, moisture, fat, fiber content and carbohydrate and results obtained are illustrated in Table 2. and 3.

Table 2: Chemical composition of aonla fruit

Parameters	Aonla
Titration Acidity (%)	2.34
Total Soluble Solid	8.62
Reducing Sugar (%)	1.42
Total Sugar (%)	7.32
pH	2.976
Ascorbic Acid (Vit-C) (mg/100gm)	552.6
Moisture (%)	85.6
Ash (%)	0.9
Fat (%)	0.5
Fiber content (%)	3.7
Protein (%)	2.187
Carbohydrate (%)	7.113

*Each value represents the average of three determinations

The data given in Table 2. revealed various chemical composition of aonla fruit. The titrable acidity was reported to 2.34, total soluble solid 8.62, reducing sugar 1.42 (%), total sugar 7.32 (%), pH 2.976 and ascorbic acid 552.6 (mg/100gm). The results obtained are more or less similar with results given by Barthakur and arnold, (1991) [3] and Kulkarni *et al.*, (2017). The moisture content of aonla fruit 85.6 (%), ash 0.9 (%), fat 0.5 (%), fiber content 3.7 (%), protein 2.187 (%) and carbohydrate was 7.113 (%).

Mineral composition of aonla fruit

The mineral content of aonla fruit are calcium, phosphorous, iron, zinc, copper, manganese were determined and results obtained are illustrated in Table 3.

Table 3: Mineral composition of aonla fruit

Minerals	Available quantity (mg/100gm)
Calcium	27.6
Phosphorus	28.2
Iron	16.6
Copper	1.8
Zinc	0.28
Manganese	1.1

*Each values represents the average of the three determinations

The results reported for mineral composition indicated that calcium content was 27.6 (mg/100gm), phosphorus 28.2 (mg/100gm), iron 16.6 (mg/100gm), copper 1.8 (mg/100gm), zinc 0.28 (mg/100gm), manganese 1.1 (mg/100gm). The results are more or less similar to Barthakur and arnold, (1991)^[3].

Conclusion

It could be concluded that aonla ginger is rich source of protein, ascorbic acid and calcium and various essential mineral content. The high nutritional value of aonla fruit indicates good potential for exploration and value addition in different food products.

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