

RESEARCH ARTICLE

Studies of physico-chemical characteristics of various cultivars of aonla (*Emblica officinalis* Gaertn) under semi-arid conditions of eastern Uttar Pradesh

■ VINOD SINGH, SAURABH VERMA, AKHILESH YADAV AND RAM GOPAL

SUMMARY

Studies on the physico-chemical characteristics of various cultivars of aonla viz., NA-6, NA-7, NA-10, Kanchan and Chakaiya were taken up under semi-arid condition of eastern Uttar Pradesh at Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad. Maximum fruit weight (43.64g) was recorded with the variety NA-10 followed by NA-7 and NA-6. The variety NA-6 recorded lowest content of fibre, higher content of pulp and total soluble solids with moderate fruit size and vitamin C content while NA-7 showed average physico-chemical composition with higher content of ascorbic acid. These varieties have also higher productivity and fruits are free from necrosis or internal browning, hence, they seem to be ideal varieties for processing.

Key Words : Aonla, Physico-chemical, Ascorbic acid, TSS, Acidity, Phenols, Acidity ratio

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Aonla, the Indian gooseberry (*Emblica officinalis* Gaertn) belongs to the family Euphobiaceae is one of the important fruits indigenous to India. Aonla is known to be commercially grown only in India since ancient time. In India, it is widely grown as commercial crop in Uttar Pradesh. The tree is productive, very hardy and can be successfully grown in variable

agro climatic and soil conditions such as dry regions of arid zone, salt affected soils, marginal soils and ravines. The Aonla fruit is valued high among indigenous medicines in India. Fruit is acrid, cooling, refrigerant, diuretic and laxative, hence, used for treating chronic dysentery, bronchitis, diabetes, fever, diarrhoea, jaundice, dyspepsia, cough etc. Being rich in gallic acid, the dried fruits of aonla are sure cure of blood dysentery, piles and the diseases associated with piles and blood.

The fruit is highly nutritive and is one of the richest sources of vitamin C. It contains 500-1500 mg of ascorbic acid per 100 g if pulp. This is much more than vitamin C content of guava, citrus and tomato fruits. The importance of this fruit is also due to its high content of

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tannin *i.e.*, gallic acid which on hydrolysis yields gallic acid. The gallic acid present in aonla fruit has antioxidant property. Aonla may be an important fruit of 21st century due to its high medicinal and nutritive value, high productivity per unit area, suitability to various kinds of waste lands and potentiality for processing into quality products which has tremendous potential for exporting to different countries. The excellent nutritive and therapeutic values of fruit have great potentiality for processing into number of quality products. Presently aonla has great significance in medicinal and cosmetic products but little attention has been paid towards the value added products as food items. The present investigation was undertaken to study the physico-chemical composition of aonla varieties for product suitability.

MATERIAL AND METHODS

The studies were carried out at main experimental station of Department of Horticulture, Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad during the year 2010-11. Trees of uniform size and age were selected and 5 kg fruits were harvested at random for analysis. Twenty fruits were chosen randomly and their size was measured with Vernier caliper and average fruit size was calculated. The ascorbic acid content was determined by the method of Ranganna (1986), whereas titrable acidity, crude fibre and total phenols were estimated by the method given in A.O.A.C. (1990). Total soluble solids were estimated

by an Erma Japan hand refractometer and readings were corrected at 20°C.

RESULTS AND DISCUSSION

Perusal of the data in Table 1 indicated that the average fruit weight varied from 30.12 to 43.64g. The aonla variety NA-10 has the maximum fruit weight followed by NA-7 and NA-6, however, the difference in fruit weight of these varieties was found not significant. Variety Kanchan recorded the lowest fruit weight. Little variation has been found in pulp content of aonla varieties under studies. However, NA-6 variety showed little higher content of pulp than other cultivars (Table 1). Similarly, NA-6 recorded the lowest percentage of fibre content, whereas Chakaiya has the highest. There is hardly any difference among the remaining varieties. The seed (stone) content varied from 4.46 to 6.24 per cent. Chakaiya recorded the lowest value followed by NA-6. Kanchan showed the highest content of seed. Reverse trends were found with seed pulp ratio, maximum ratio found with Chakaiya followed by NA-6 and the lowest ratio was found with the variety Kanchan. These variations within the cultivars are in conformity with those reported by Singh *et al.* (1987), Singh and Pathak (1987) and Mehta *et al.* (2002). Such variations in characters of different cultivars could be due to genetic make up.

The observations recorded on chemical composition (Table 2) have shown that total soluble solids content of aonla varieties ranged from 9.44 to 11.12 per cent. Chakaiya recorded the lowest value. The difference in

Table 1 : Physical composition of fruits of different aonla cultivars

Cultivars/Varieties	Fruit weight (g)	Pulp content (%)	Fibre (%)	Seed content (%)	Seed/pulp ratio
NA-6	40.60	94.15	0.87	4.98	1:19
NA-7	41.40	92.78	1.33	5.89	1:16
NA-10	43.64	93.62	1.30	5.08	1:18
Kanchan	30.12	92.28	1.40	6.32	1:15
Chakaiya	34.32	93.37	1.93	4.70	1:20
C.D. (P=0.05)	4.46	0.94	0.51	0.94	-

Table 2 : Chemical composition of different cultivars of aonla

Cultivars/Varieties	TSS (%)	Acidity (%)	TSS/Acid ratio	Ascorbic acid (mg/100 g)	Phenols (mg/100 g)
NA-6	11.12	1.80	6.18	638.27	174.76
NA-7	10.96	1.95	5.62	730.63	181.10
NA-10	10.14	1.82	5.57	629.82	184.93
Kanchan	10.86	1.72	6.31	613.64	187.97
Chakaiya	9.44	2.26	4.18	651.64	180.35
C.D. (P=0.05)	1.04	0.52	-	86.18	12.72

total soluble solids content of other cultivars is, however, not very great. Similarly, Singh and Pathak (1987) also reported the range for total soluble solids from 9.5 to 11.8 per cent. Fruits of cultivar NA-6 had maximum total soluble solids (11.12%). TSS/acid ratio (6.31) was maximum in cultivar Kanchan followed by variety NA-6 (6.18) and minimum (4.18) in cultivar Chakaiya. Per cent of total acidity varied from 1.72 to 2.26. Chakaiya showed the highest value whereas Kanchan has the lowest. There is hardly any difference in acid content among the remaining varieties. Data presented in Table 2 show that ascorbic acid content of pulp of aonla cultivars ranged from 613.64 to 730.63 mg/100 g. Variety NA-7 recorded the highest value whereas Kanchan has the lowest. Phenol content of NA-6 was found to be lowest among the various varieties. Bajpai and Shukla (1990) and Mehta *et al.* (2002) also reported higher chemical compositions of improved cultivars of aonla as compared to local and old cultivars.

The variable examined in physico-chemical composition of aonla varieties indicated the possibility of selecting a variety or varieties suitable for processing the aonla fruit. NA-6 recorded lowest content of fibre, higher content of pulp and total soluble solids with moderate fruit size and vitamin C content while NA-7 showed average physico-chemical composition with

higher content of ascorbic acid. These varieties have also higher productivity and fruits are free from necrosis or internal browning, hence, they seem to be ideal varieties for processing.

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