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Studies on variability in physico-chemical characters of different *aonla* accessions from Jorhat region of Assam

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ABSTRACT

***Aonla* is found scattered throughout Jorhat district of Assam. A survey was carried out to identify the elite genotypes among its natural population. The ripe fruit of 14 selected types were analyzed for physico-chemical traits like fruit weight, pulp weight, seed weight, volume, specific gravity, pulp:seed ratio, width of fruit and seed, TSS, acidity, ascorbic acid, reducing sugars and total sugars. The study reveals that there was a wide variation among its accessions. Individual fruit weight ranged from 3.24 to 10.18 g; pulp weight 2.83 to 9.41 g; seed weight 0.37 to 1.66 g; and pulp : seed ratio from 3.21 to 14.00. There was wide variation in chemical characters also. Total soluble solids varied from 12.0 to 19.0%; titrable acidity 2.29 to 4.61%; ascorbic acid 400 to 850 mg/100 g, reducing sugars 3.76 to 10.98%. Wide variation in physico-chemical analysis of genotypes indicated the scope of individual plant selection based on these characters for the genetic improvement of *aonla*.**

Key words: *Emblica officinalis*, physico-chemical analysis, variability.

INTRODUCTION

Aonla (*Emblica officinalis* Gaertn.) is one of the important fruit crop known for its medicinal and therapeutic properties from the ancient time in India. Due to its hardy nature, ability to produce remunerative crop even in wasteland, nutritive and therapeutic values and its suitability for various value-added products, *Aonla* is becoming an important fruit crop across the country. The *aonla* tree is native to tropical south-east asia and has been naturalized in great profusion in north-east India. A rich genetic diversity of *aonla* exist in north-east (Yadav *et al.*, 8; Pandey *et al.*, 3; Hore, 2) representing a large genepool. The natural population of *aonla* in Assam as well as other north-eastern states is so vast that it may even be declared as gene sanctuary for the species. It has been observed that a number of individual plants bear good quality fruit without any care in marginal land or in homestead gardens of Assam. As majority of *aonla* trees are of seedling origin. They show a tremendous variation in their morphology and physico-chemical traits among its population. The knowledge of genetic variability is of great importance for crop improvement programme. Greater the variability in a population, greater the chance of effective selection for desirable types. In fact, most of the present day commercial varieties of *aonla* are chance selection from natural seedlings. Therefore, identification of superior genotypes and their conservation are important in context of the present day scenario of rapid extinction of such useful material. However, no systematic efforts have so far been made to evaluate the germplasm available in the state. Hence, there lies an immense potential of locating superior genotype of *aonla* for collection, evaluation, conservation and utilization. In the present investigation, efforts were therefore made to find out variations in physico-chemical traits of some accessions identified from Jorhat region.

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MATERIALS AND METHODS

The *aonla* trees are found scattered throughout the state from homestead garden to forest areas. Considering its vast spread, survey was carried out in Jorhat district of upper Brahmaputra Valley zone of Assam during the fruiting season of 2005 to identify elite genotypes among nature population. The mature fruits from selected trees were collected to study the variation in physico-chemical characteristics. The data on physical parameters like fruit weight, fruit volume, seed weight, pulp weight, specific gravity, width of fruit and seed, pulp: seed ratio were recorded. The fruit weight and seed weight were taken through an electronic balance. The fruit volume was measured by dipping the fruit in water through water displacement method. Chemical parameters like moisture, TSS, acidity, ascorbic acid, reducing sugars, and total sugars were estimated. The TSS was recorded by placing a drop of juice on the platform and viewing through a hand refractometer. The standard AOAC (1) was followed to determine the titrable acidity of fruit juice. Ascorbic acid content was estimated as per the method of Sadasivam and Manickam (7). The total sugars were estimated by titration method using Fehling's solution and methylene blue indicator (Rangana, 6). The data were statistically analysed as per the method of Panse and Sukhatme (4).

RESULTS AND DISCUSSION

The analysis of variance of 14 *aonla* genotypes identified in this investigation revealed significant differences in fruit parameters (Table 1 and 2). The maximum fruit weight (10.18 g) was recorded by AA-10 followed by AA-2 (9.78 g). The minimum fruit weight of 3.24 g was observed in AA-8. The maximum seed weight (1.66 g) was recorded in AA-11 and the minimum seed weight (0.37 g) was recorded in AA-7. The maximum pulp weight 9.41 g was recorded in AA-10 followed by 8.80 g in AA-2 and the minimum pulp content of 2.83 g was recorded in AA-8. The highest pulp:seed ratio (14.00) was recorded in AA-7, while the lowest (3.21) was recorded in AA-11.

These observations did not reveal any correlation among pulp content, fruit weight and seed weight. Though AA-10 recorded highest fruit weight, the pulp seed ratio was highest in AA-7. This attributed to

Table 1. Physical characters of different *aonla* accessions.

Genotype	Fruit wt. (g)	Pulp wt. (g)	Seed wt. (g)	Volume (cc)	Specific gravity (g/cc)	Pulp : seed	Fruit width (cm)	Seed width (cm)
AA-1	9.41	8.60	0.80	8.20	1.14	10.67	3.55	1.06
AA-2	9.78	8.80	0.93	8.20	1.18	9.47	3.43	1.02
AA-3	3.81	3.23	0.58	2.20	1.75	5.56	2.00	1.05
AA-4	3.68	2.99	0.69	2.20	1.67	4.30	1.75	1.10
AA-5	6.38	5.75	0.62	5.20	1.22	9.16	2.15	1.00
AA-6	5.63	4.77	0.85	2.80	2.02	5.56	2.05	1.00
AA-7	5.61	5.23	0.37	3.80	1.48	14.00	1.98	0.90
AA-8	3.24	2.83	0.40	2.20	1.48	6.98	1.65	0.75
AA-9	5.18	4.70	0.47	4.00	1.29	9.84	2.05	0.90
AA-10	10.18	9.41	0.76	8.08	1.26	12.26	2.56	0.95
AA-11	7.03	5.36	1.66	7.02	1.00	3.21	2.55	1.00
AA-12	7.06	6.04	1.02	2.20	3.22	5.92	2.00	1.10
AA-13	4.61	3.96	0.65	2.00	2.31	6.09	2.10	0.90
AA-14	7.22	6.63	0.59	4.04	1.78	11.40	2.10	0.90
CD at 5%	0.059	0.036	0.051	0.314	0.207	0.792	0.210	0.080

Table 2. Chemical characters of different *aonla* accessions.

Genotype	Moisture content (%)	TSS (%)	Acidity (%)	Ascorbic acid (mg/100 g)	Reducing sugars (%)	Total sugars (%)
AA-1	81.80	16.00	3.07	735.00	4.90	6.50
AA-2	82.43	15.03	2.30	570.00	7.81	9.43
AA-3	83.67	14.00	2.29	850.00	7.04	8.20
AA-4	80.60	13.00	4.09	400.00	7.93	10.00
AA-5	84.29	14.00	3.32	450.00	5.85	7.04
AA-6	84.22	12.00	2.82	480.00	3.76	5.57
AA-7	82.66	13.00	3.32	566.66	10.98	11.80
AA-8	82.92	13.00	3.07	480.00	8.01	10.56
AA-9	82.99	13.00	3.58	560.00	7.57	9.09
AA-10	81.58	12.00	2.68	390.00	6.09	7.06
AA-11	81.37	17.05	4.35	610.00	8.92	10.75
AA-12	78.51	19.00	4.61	510.00	9.61	10.86
AA-13	79.02	15.30	3.84	590.00	11.36	12.15
AA-14	82.00	14.3	3.84	610.00	5.55	6.85
CD at 5%	18.83	0.20	0.02	10.35	0.03	1.77

proportionate highest seed weight in AA-10 as against AA-7, where seed weight is minimum. This clearly indicates that, during selection of any genotypes based on fruit weight, the breeder should give emphasis on fruit pulp content than fruit weight alone. The range of pulp; peel ratio was from 3.21 to 14.00 among accessions which showed considerable variability.

The TSS content of *aonla* accessions varied from 12.00 to 19.00% (Table 2). The maximum TSS of 19.00% was recorded in AA-12, while minimum was in AA-10 (12.00%). The maximum titrable acidity (4.61%) was found in AA-12 and minimum was in AA-3 (2.29%).

Aonla is the second richest fruit in vitamic C, i.e. ascorbic acid content, just after Barbados cherry. Hence, ascorbic acid content is the most important criterion in determining the superiority of an *aonla* accession. Among the evaluated accessions, AA-3 showed its superiority in terms of ascorbic acid content (850.00 mg/100 g) followed by AA-1 (735.00 mg/100 g). The lowest ascorbic acid content was found in AA-4 (400.00 mg/100 g). Pathak *et al.* (5) reported 385 – 881 mg/100 g pulp of vitamin C content in *aonla*.

Reducing sugars maximum (11.36%) recorded in AA-13 followed by AA-7 (10.98%) and the minimum of 3.76% in AA-6 (Table 2). Similarly, the highest total sugars was observed in AA-13 (12.15%) and the lowest in AA-6 (5.57%).

Preference of consumers depend on pulp:seed ratio of *aonla*. More the pulp content more is the acceptability by the consumer. Further, ascorbic acid content is another important criterion to be considered for selection of suitable *aonla* types. Such observations on physico-chemical parameters coupled with information on biochemical constituents would help in identifying *aonla* accessions to decide their suitability for uses in various purposes.

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