



Physico- chemical status of different Aonla (*Emblica officinalis*) cultivars under tropical conditions of Central India

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Abstract : The physico - chemical characters of five aonla cultivars viz., Kanchan, Krishna, Chakaiya, NA-7 and Francis were studied. Kanchan had yielded maximum fruits (116.10 kg/tree). Significant variation in average weight of fruit length and diameter of fruit, per cent seed and pulp content was recorded. There was variation in ash per cent, polyphenols and crude fibre content during successive months. A downward trend was noted in the mineral content especially calcium, potassium, sodium at delayed harvesting. However, a remarkable increase in phosphorus content was observed in almost all the cultivars. TSS and acidity showed an increasing trend at delayed harvesting. Delay in harvesting period of fruit increased ascorbic acid of the fruit.

Key Words : Aonla, Physico-chemical characters

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INTRODUCTION

Aonla is one of the most important non-traditional indigenous fruits of India. It is a hardy tree and can be successfully grown in variable agro-climatic and soil conditions. It is highly nutritious and rich source of vitamin 'C'. It is known for its medicinal value and the fruits are used in one form or the other. The physico-chemical changes occurring toward maturity stages may serve as an important parameters (Teaotia *et al.*, 1968) for determination of proper harvesting stage.

Since, systematic work on physico - chemical studies have not been undertaken in Maharashtra, the studies on five aonla cultivars during 2008 to compare the characteristics were undertaken.

MATERIALS AND METHODS

Fruits of the five cultivars viz., Kanchan, Krishna,

Chakaiya, Francis and NA-7 of nine year old trees, free from attack of insect pest and diseases were taken for the present studies. All the experimental trees treated with uniform cultural practices. For physico-chemical analysis, ten randomly selected fully mature fruits of each cultivar were taken. The fruits were thoroughly washed. Pulp of fruits was separated and relative weight of pulp and seed was determined and expressed on percentage basis. The stones were cleaned so as to remove remaining pulp sticking to it. Total soluble solids content was determined by hand refractometer (0-32 ° Brix)

Acidity was determined by alkali titration method and expressed in terms of citric acid per 100 g of flesh. Reducing and non-reducing sugars were determined by the method of Lane and Eynon (1960) and vitamin 'C' was estimated in accordance with A.O.A.C. (1980) method using 2,6 dichlorophenol indophenol dye and expressed as mg per 100 g of pulp. The physico-chemical analysis of fruit was carried out at full maturity stage (25th Oct.) and after delayed

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harvesting (25th Nov.).

RESULTS AND DISCUSSION

The comparative estimates of physical and chemical parameters of five cultivars of aonla are presented in Table 1 and 2, respectively.

Physical characters:

The data on average yield per tree indicated that cv. Kanchan yielded maximum fruits (116 kg per tree) followed by Krishna (73.80 Kg per tree). Chakaiya recorded least yield (41.6 kg per tree). Higher yield in Kanchan and Krishna could be attributed to spreading habit of growth of these cultivars. Amongst the erect growing cultivar NA-7 recorded more yield 45.50 kg per tree than that of Chakaiya (41.61 kg per tree). Similar trend of results was also reported by Singh *et al.* (1993)

An average weight of fruit was observed to be maximum

in cv., Francis during both the stages of harvest followed by NA-7 at first stage (25th Oct) of harvest and Kanchan at second stage (25th Nov) of harvest. An increase in weight of fruit from first stage to second stage was most conspicuous in Kanchan (32.8 and 44.7 g) and Francis (49.0 and 57.3g), while in other cultivars increase in weight in two stages of harvest was not conspicuous. The data suggested the influence of harvesting stage on productivity. The fruit size (length and diameter) increased with the fruit growth from 25th Oct. to 25th Nov. The increase in fruit size was more pronounced in Francis followed by NA-7 and Kanchan. The increase in size and weight of fruit could be attributed to the cell enlargement and accumulation of food substances in intracellular spaces in fruit pulp (Bollard, 1970). As regard the seed and pulp percentage, although Kanchan recorded maximum pulp and minimum seed percentage, on the whole there was no much difference amongst the cultivars as well as the stages of harvest.

Table 1 : Physical characters of aonla fruits

Cultivars	Yield /tree		Av. wt. of fruit (g)		Fruit size (cm)				Per cent seed		Per cent pulp	
	No.	Wt. (kg)			Length		Diameter					
			25 Oct.	25 Nov.	25 Oct.	25 Nov.	25 Oct.	25 Nov.	25 Oct.	25 Nov.	25 Oct.	25 Nov.
Kanchan	4359	116.10	32.8	44.7	4.01	4.29	3.56	3.79	1.92	1.70	98.3	98.1
Krishna	2105	73.80	32.9	37.9	3.94	4.11	3.74	3.89	2.50	2.70	97.5	97.5
Chakaiya	1118	41.61	35.2	38.8	4.02	4.23	3.36	3.68	2.10	1.90	97.9	98.1
NA-7	1111	45.50	40.9	43.5	4.19	4.38	3.77	4.00	2.30	2.20	97.8	97.8
Francis	1472	56.65	49.0	57.3	4.52	4.58	4.08	4.35	2.58	2.80	97.2	97.7
S.E. (m)+	-	-	1.1	1.13	0.06	0.06	0.04	0.06	0.06	0.06	0.08	0.08
C.D. (P=0.05)	-	-	3.1	3.25	0.16	0.18	0.13	0.18	0.18	0.17	0.22	0.23

Table 2 : Chemical characters of aonla fruits

Cultivars	Ash	Poly phenol	Crude fibre	Phosphorus	Sodium	Potassium	Calcium	Protein	Moisture in pulp	TSS	Acidity	Sugars (%)			Ascorbic acid
	(%)	(%)	(%)	(mg per 100 g)		mg per 100 g)	(%)	(%)	(%)	(%)	(%)	Red	NRS	Total	(mg/100g)
Kanchan															
25 th Oct	2.0	2.6	7.0	231.5	145	825	510	2.63	87.19	11.0	1.18	2.30	1.28	3.58	283.52
25 th Nov	3.0	2.3	7.2	238.5	105	750	680	1.93	85.96	11.8	2.37	1.29	0.12	1.41	309.96
Krishna															
25 th Oct	2.4	1.6	6.6	171.5	135	925	425	3.12	87.40	10.0	1.30	2.69	1.18	3.87	416.00
25 th Nov	2.4	1.8	7.0	1281.9	140	100	425	2.83	88.01	9.8	2.09	1.01	0.48	1.49	583.20
Chakaiya															
25 th Oct	2.2	2.3	7.0	1172.9	160	0.00	680	1.78	87.55	7.4	1.09	0.88	0.86	1.74	423.28
25 th Nov	2.4	2.3	8.8	342.9	195	800	680	1.49	88.38	9.6	1.89	1.02	0.32	1.34	464.40
NA-7															
25 th Oct	2.2	2.2	6.6	184.6	140	950	765	3.42	88.19	6.8	1.10	2.28	0.30	2.58	252.72
25 th Nov	2.2	2.0	6.9	303.0	155	800	595	3.27	88.71	8.0	1.99	0.77	0.25	1.02	331.56
Francis															
25 th Oct	2.6	2.1	7.6	1269.0	140	200	510	0.30	87.13	9.3	1.13	1.37	0.98	2.35	277.68
25 th Nov	2.0	2.4	7.4	1260.8	115	0.00	425	0.15	88.62	9.6	2.17	1.18	0.18	1.36	382.00

Percentage is worked out on dry weight basis

Chemical characters:

The data on ash percentage, polyphenol and crude fibre did not show any variation in their values at both the stages of harvest (25 th Oct. and 25 th Nov.). Some mineral elements showed decreasing trend especially of calcium, potassium and sodium as the period of harvesting was delayed for one month. However, a remarkable increase in phosphorus content was observed in all most all cultivars except Francis during delayed period of harvest. The maximum phosphorus content was observed in Chakaiya followed by NA-7 (342.9 and 303.0 mg per 100 g), respectively.

A downward trend was observed in protein content of fruit at delayed harvesting in all cultivars. Gupta *et al.* (1983) has reported similar decrease in the protein content in ber fruits.

The highest TSS percentage was recorded in Kanchan (11.0) closely followed by Krishna (10.0) and lowest in NA-7 (6.8). Total soluble solids content in the fruits increased with the delay in harvesting in cv., NA-7 and Chakaiya which might be due to the formation of more soluble sugars and other soluble compounds. However, in other cultivars, there was not any remarkable change in the TSS content at delayed harvesting. Acidity content in the fruit increased in all cultivars at delayed harvesting. The maximum acidity was observed in cv., Kanchan (2.37%). A distinct decrease in reducing, non-reducing and total sugars was observed at delayed harvesting in all the cultivars. Kanchan contained maximum reducing and total sugars (1.29 and 1.41%), respectively.

The highest ascorbic acid content was recorded in Krishna at both the stages of harvest (416.0 and 583.2 mg per 100 g of pulp). A gradual increase in ascorbic acid content was observed in almost all cultivar after prolonging the period of harvesting. Singh *et al.* (1989) observed a gradual increase

in ascorbic acid content up to 19th December which significantly decreased at later stage of maturity in Banarasi and Chakaiya cultivars.

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