



STUDIES ON THE COMPARATIVE PERFORMANCE OF AONLA (*Emblca officinalis* G.) CULTIVARS UNDER MARATHWADA CONDITION

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**ABSTRACT:** In all the cultivars of Aonla flowering started in third week of February and flowering completed before 23<sup>rd</sup> March. Extended flowering period was noticed in Kanchan (28 days), whereas, minimum was recorded in Krishna (19 days). Maximum fruit set per cyme was observed in Kanchan (53.28 fruit set/cyme). Maximum fruit retention at pea stages (17.63%) and full grown stage (1.80%) was recorded in Krishna. However, at half grown stage in Kanchan (2.25 %). The highest yield of fruits per tree was recorded in Kanchan (3459 fruits/tree and 99.79 kg fruits/tree). Higher size of fruits were observed in NA-7, whereas, small size fruits were observed in Krishna. Maximum weight of fruit was recorded in NA-7 (42.44 g). Maximum pulp percentage (96.74%) and minimum fibre percentage (0.66%) were recorded in Chakaiya.

**Keywords:** Aonla, Kanchan, Krishna, Chakaiya and NA-7

## INTRODUCTION

Aonla (*Emblca officinalis* G.) also known as Indian gooseberry belonging to family Euphorbiaceae. Fruit is highly nutritive with a great medicine use and the richest source of Vitamin C which helps in relieving symptoms of scurvy. It is also a rich source of antioxidants which are extremely effective in reducing stress and fighting aging and increases the resistance against pathogenic attacks. Aonla is also rich in fibers that are important for the smooth flow of ingested food in our elementary canal. Minerals like iron, calcium and magnesium, which are crucial for the variances metabolic reactions in a human body, are also present in ample quantities in Aonla.

The growing popularity for alternate medicines, health foods and herbal products are enhancing the requirement for Aonla fruit. The Aonla tree bears fruits up to 65 to 70 year. It is a dry land fruit crop tolerant to alkalinity and salinity. In last few years, its cultivation has increased significantly because of hardy nature of plant with low water requirement and also due to increases in awareness among the consumers about its high nutrition and medicinal value. There has been no standardization of varieties of Aonla and they are mostly known on the basis of size, colour or after the name of places. The varieties are mainly classified according to their colour are green tinged, red tinged, pink tinged, white streaked and Banarasi. However, no systematic work on the performance of the known varieties regarding growth yield and quality aspects has not been yet studied so far.

## MATERIALS AND METHODS

The orchard was established by procuring uniform Aonla budded of Kanchan, Krishna, Chakaiya and NA-7 at Department of Horticulture, MKV, Parbhani during 2009-10 and spacing 5 m x 5 m. The date of flowering was noted when the cyme (inflorscence) emerged on the tip of branches. The flowering period was recorded from the day of emergence of cyme till the formation of small fruit lets. Randomly seven cyme from all side were selected on each tree and average numbers of fruit sets per cyme were recorded. Fruit retention from the selected cyme were recorded at Pea size stage, half grown size stage and Full grown size stage of fruit growth. For calculating the period of maturity the number of days required form fruit set to the harvesting were counted. Weight of fruits (kg/tree) weighed with physical balance and expressed in kg/tree. Size of fruits the length and breadth of fruits were calculated by vernier caliper. Weight of fruit was recorded by laboratory balance.

Pulp: Stone ratio was calculated using following formula

$$\text{Pulp/ stone} = \frac{\text{Number of fruit (g)} - \text{weight of stone (g)}}{\text{Total weight of stone (g)}} \times 100$$

Per cent fibre content was calculated on the basis of fruit weight and weight of fibre content.

$$\text{Per cent fibre (\%)} = \frac{\text{Average weight of fibre (g)}}{\text{Total weight of fruit (g)}} \times 100$$

## RESULTS AND DISCUSSION

Data presented in Table 1 regarding dates of initiation of flowering indicated that earliest flowering was initiated in Krishna followed by Chakaiya whereas, late flowering was noticed in Kanchan followed by NA-7 variety. End of flowering is firstly completed in Krishna and NA-7. Maximum extended flowering period (28 days) was noticed in Kanchan followed by in Chakaiya (27 days). Whereas, minimum extended flowering period was noticed in Krishna (19 day) followed by NA-7 (22 days). As regard to fruit set maximum fruit set was observed in Kanchan (53.28 %) followed by Krishna (49.98 %). Whereas, minimum fruits was recorded in NA-7 (45.73%) followed by Chakaiya (48.45%).

**Table 1. Flowering behavior of Aonla varieties**

Varieties		Dates of flowering			Fruit set per cyme	No. of days required from fruit set to maturity
		Start (Feb.)	End (March)	Duration (days)		
T1	Kanchan	22	22	28	53.28	193
T2	Krishna	14	4	19	49.98	163
T3	Chakaiya	16	14	27	48.45	198
T4	NA-7	19	13	22	45.72	186
	Mean	18	13	24	49.36	185
	S.E. +	0.77	1.06	1.17	0.67	2.59
	CD at 5%	2.36	3.27	3.61	2.06	7.98

Data regarding to the number of days required from fruit set to maturity of fruits indicated that maximum days were taken for maturity in Chakaiya (198 days) followed by Kanchan (193 days). Whereas, minimum days were taken for maturity in Krishna (164 days) followed by NA-7 (186 days). One month late flowering in Marathwada region is in confirmity with [5] who observed that flowering in Banarasi and Chakaiya cultivars under North Indian condition finished by the first half of March.

Evaluation of flowering behaviour reveals that Krishna is a early variety while, Chakaiya is mid season variety. However, NA-7, Kanchan are late season varieties under Parbhani condition. [1] who reported 188 days required for full maturity to harvesting in Banarasi cultivar in Aonla under north Indian condition.

**Table 2. Fruit set and retention in different varieties at various stages of fruit growth**

Varieties		Fruit set (%)	Retention at different stages of fruit growth (%)		
			Pea stage (%)	Half grown stage (%)	Full grown stage (%)
T1	Kanchan	54.05	14.24	2.25	1.59
T2	Krishna	49.73	17.63	1.84	1.80
T3	Chakaiya	50.02	10.69	2.07	1.28
T4	NA-7	47.01	11.59	1.96	1.11
	Mean	50.20	13.54	2.03	1.44
	S.E. +	0.78	0.84	0.046	0.045
	CD at 5%	2.41	2.60	0.143	0.138

### Fruit retention in different Aonla varieties at various stages of fruit growth

The data presented in Table 2 indicated that significantly maximum pea size fruits per cyme were retained in variety Krishna (17.63%) followed by Kanchan (14.24%). Whereas, lowest number of fruits per cyme were retained in chakaiya (10.69%) and NA-7 (11.59%). At half grown stage maximum fruits retained were observed in Kanchan (2.25%) followed by Chakaiya (2.07%). The other varieties namely Krishna (1.84%) and NA-7 (1.96%) have retained least number of fruits per cyme. Data regarding fruit retention at full grown stage indicated that the maximum number of fruits were observed in Krishna (1.80%) followed by Kanchan (1.59%). Whereas, lowest number of fruits were retained in NA-7 (1.11%) followed by Chakaiya (1.28 %). The fruit drop is maximum from pea size to half grown size. Whereas, there is minimum fruit drop from half grown stage onwards. [2] Reported very low initial fruit set in Aonla (1.85 per cent) per shoot in shy bearing varieties. While in ease of prolific bearer varieties produce high initial fruit set (8.25 per cent).

### Physical and yield characters of fruits in different Aonla varieties

Data on yield is presented in Table 3 indicated that among four varieties screened the highest yield in terms of number of fruits per tree was observed in Kanchan (3459 fruit/tree) followed by Krishna (2468 fruit/tree). Whereas, lowest number of fruits per tree were recorded in NA-7 (1135 fruits/tree) and Chakaiya (1436 fruits/tree).

Yield of fruits in terms of kg/tree was observed that maximum yield of fruit per tree was recorded in Kanchan (99.79 kg/tree) followed by Krishna (76.55 kg/tree). Whereas, in NA-7 (46.32 kg/tree) recorded less yield among all the cultivars. Higher yield in Kanchan and Krishna could be attributed maximum spreading habit of growth of these cultivars. NA-7 recorded lowest yield because it is only erect growing having less number of primary branches. Similar trend of results work also reported by [5] and [6] that Kanchan yielded maximum fruit followed by Krishna. Whereas, Chakaiya and NA-7 were least yielder. Significantly maximum length as well as breadth of the fruit was observed in NA-7 (4.26 cm and 3.81 cm) followed by Chakaiya (4.03 cm and 3.76 cm). Whereas, small size of fruits were noticed in Krishna (3.92 cm length and 3.46 cm breadth) and Kanchan (3.98 cm length and 3.62 breadth). Similar results were observed by [6], they observed fruits of Krishna were small. Whereas, fruits of Chakaiya were medium in size cultivar NA-7 fruits were attained maximum length and breadth. Maximum fruit weight was recorded in NA-7 (42.44 gm) followed by Krishna (37.77 gm). Significantly minimum fruit weight was observed in Kanchan (35.46 gm) and Chakaiya (37.20 gm).

**Table 3: Physical and yield characters of fruits in different Aonla varieties**

Varieties	Physical characters of fruit					Yield per tree		
	Size of fruit (cm)		Weight of fruit (g)	Per cent pulp	Per cent seed/stone	Per cent fibre	Number of fruits	Weight of fruits (kg/tree)
	Length	Breadth						
Kanchan	3.98	3.62	35.46	93.96	5.22	0.82	3459	99.79
Krishna	3.92	3.46	38.77	94.40	4.92	0.68	2468	76.55
Chakaiya	4.03	3.76	37.20	96.74	4.60	0.66	1436	55.16
NA-7	4.25	3.81	42.44	94.14	4.98	0.88	1135	46.32
Mean	4.05	3.66	38.47	34.81	4.93	0.76	21.25	69.45
S.E. +	0.07	0.06	1.08	0.36	0.09	0.03	143.79	1.85
CD at 5%	0.02	0.20	3.33	1.12	0.29	0.11	442.39	5.70

Maximum pulp percentage was observed in Chakaiya (96.74%), followed by Krishna (94.40%). Whereas, minimum pulp percentage was observed in Kanchan (93.96 per cent) and NA-7 (94.14%). [3] also recorded maximum pulp percentage in NA-9 (94.90 per cent). Whereas, minimum pulp percentage recorded in Francis (92.85 per cent).

Significantly least seed (stone) percentage was noticed in Chakaiya (4.60%), followed by Krishna (4.92%). Maximum seed percentage was observed in Kanchan (5.22%) followed by NA-7 (4.98%). [3] Also recorded minimum seed percentage in NA-9 and NA-10 cultivars at ND University of Agri. and Tech. Faizabad (UP). Maximum fiber percentage was observed in NA7 (0.88 %) followed by Kanchan (0.82%). Whereas minimum fiber percentage was observed in Chakaiya (0.66%) followed by Krishna (0.68%). [6] also reported maximum crude fiber per cent found in Francis followed by Kanchan. They also be reported minimum crude fiber per cent found in Krishna.

### CONCLUSION

The present investigation was undertaken to perform the different aonla varieties for flowering behaviour, yield and physico-chemical characters under agroclimatic conditions of Parbhani. On the basis of flowering behavior, fruit retention and physico-chemical characters of fruits, it can be concluded that Kanchan is superior variety under agroclimatic conditions of Parbhani. Kanchan is a highest yielder and good quality fruit under Parbhani condition.

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