

BSR-1 - A high yielding, self-fruitful aonla variety from Tamil Nadu

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Abstract

BSR-1 aonla (*Emblia officinalis* Gaertn.) is a high yielding (155 kg /tree, 42952 kg/ha), self-fruitful selection and matures late in the season. Fruits are flattened at base and round at apex with an average weight of 27.30 g/ fruit. The fruits are with high TSS (18.1 ° Brix) and vitamin C (620 mg/100 g of flesh), less phenol content (29.75 mg/g of flesh) and high crude fibre content (4.31%) as compared to the country type.

Key words: Aonla, *Emblia officinalis* Gaertn., vitamin C, phenol content, crude fibre, fruit yield

Introduction

The aonla (*Emblia officinalis* Gaertn. syn. *Phyllanthus emblica* L.) is also known as Indian gooseberry, nelli etc. It is believed to be native of India and unique fruit crop with medicinal properties like cooling, refrigerant, diuretic and laxative qualities. Infusion taken out from dried powdered fruits is used to control hemorrhage, diabetes, diarrhoea, chronic cough, dyspepsia and dysentery. The fruits are highly nutritive, astringent and rich source of vitamin C. Ascorbic acid and other constituents are preserved by the presence of polyphenols in dried fruits. The tree is very hardy, prolific and economic bearer even under marginal lands. Owing to high productivity, medicinal (Ayurvedic, Unani and Siddha medicines) and nutritional values, it will have great demand in near future. At present, no improved selection or cultivar is available in Tamil Nadu. Hence, efforts were made to develop varieties through introduction and selection.

Materials and methods

A large number of germplasm were collected from forest of Thimpam and nearby areas of Erode district and planted at Agricultural Research Station, Bhavanisagar. The diversified genepool was evaluated after eight years of planting for yield and other attributes. Stabilization in yield and other traits were attained after four years of evaluation and five plus trees along with one country type (T6-3) from the germplasm were identified and selected for further evaluation. The evaluation was continued along with country type (T6-3) for further four more years. Biochemical constituents were estimated as per A.O.A.C. (1984).

Results and discussion

The yield recorded in the selection (T6-6) was high (Fig 1.) as compared to other accessions viz., T1-7, T4-1, T4-4, T5-1, T5-3 and T6-3 (country type). This selection (T6-6) registered a mean annual yield of 155.06 kg/tree (42952 kg/ha) when compared to 123.03 kg/tree (34079 kg/ha) produced by the country type (T6-3) and the increase in yield was 26.01 per cent over the country type (Table 1). The calculated per day production was 0.42 kg/ tree (117.68 kg/ha) whereas it was 0.34 kg/tree (93kg/ha) in the country type.

Table 1. Yield of aonla accessions at Agricultural Research Station, Bhavanisagar

Accessions	Mean yield (kg/tree)	Cumulative stabilized yield for last four years (kg/tree)	Stabilized mean yield (kg/tree)	Estimated yield (kg/ha)
BSR-1	117.84	620.30	155.06	42952
T1-7	88.93	506.30	126.57	35060
T4-1	70.61	387.30	97.83	26822
T4-4	69.46	383.60	95.90	26822
T5-1	75.60	426.00	106.50	29501
T5-3	80.00	439.40	109.85	30428
T6-3	94.08	492.10	123.03	34079

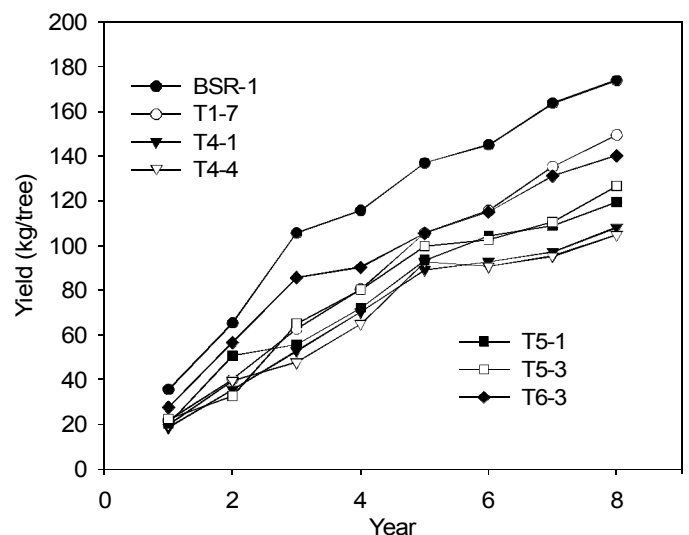


Fig. 1. Fruit yield of aonla accessions during different years

The fruits of the selection were flattened at base, round at the top, bigger in size and high in fruit weight (27.30 g/fruit). Fruits borne mostly in clusters of 2-3 /leaf axil. The size of the fruit was bigger as confirmed by 40.60 fruits weighed one kilogram and 100 fruits weighed 2.40 kg (Table 2). The quality of the fruit was quite acceptable with a TSS of 18.1°Brix and vitamin 'C' content of 620 mg /100 g of flesh (Table 3). Another significant feature was that

Table 2. Fruit characters of BSR-1 Aonla (T6-6) at Agricultural Research Station, Bhavanisagar

Characters	BSR-1	T6-3*	T5-3	T5-1	T4-4	T4-1	T1-7
Sex ratio	182:1	250:1	195:1	199:1	201:1	220:1	214:1
Fruits /leaf axile	2-3	1	1-2	1-2	2-3	1-2	2-3
Number of fruits/kg	40.60	99.30	75.60	71.80	51.00	61.00	55.80
100 fruit weight(kg)	2.41	1.10	1.42	1.37	2.05	1.69	1.49
Single fruit weight(g)	27.30	10.70	15.50	16.20	22.70	17.60	19.40
Girth of the fruit (cm)	12.70	3.90	5.80	6.30	10.90	6.50	11.10
Flesh weight (g)	23.60	8.10	12.40	13.20	19.50	14.40	16.10
TSS(°brix)	18.10	15.20	16.80	17.00	16.60	14.60	16.30
Nut weight (g)	3.70	2.00	3.10	3.00	3.20	3.20	3.20
Flesh:nut ratio	6.38	4.05	4.00	4.40	6.09	4.50	5.03
Seeds /nut	5.70	5.60	5.70	6.00	5.70	5.90	5.80
Segments/fruit	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Colour of the fruit	GY	LG	GY	LG	GY	GY	GY
Moisture content(%)	81.15	80.80	82.15	80.65	83.17	82.92	80.75

*=country type, GY=greenish yellow, LG=light green

the selection is less in phenol (29.75 mg/g) while in the country type it was high (35.85 mg/g). The crude fibre content was also more in T6-6 Aonla (4.31 %) as compared to 1.33 per cent in the country type (T6-3). The present selection has recorded a lower sex ratio of 182:1 (250:1 in country type) which is an advantageous character in aonla. In contrast, Mathur and Baroda (1994) reported a higher sex ratio in Banarasi aonla. The flesh to nut ratio was found to be 6.38: 1 (flesh 23.60 g and nut 3.70 g) and girth of the fruit was 12.70 cm (Table 2). The data have clearly indicated the superiority of BSR-1 (T6-6) with better quality attributes combined with attractive consumer appeal and acceptability than country type (T6-3) (Table 3).

Another important attribute is that this selection matured late in the season that facilitates higher returns by late arrivals to the market. The important trait of the variety is highly self-compatible, whereas, Singh (1998) has reported that planting of two compatible varieties in alternate rows was essential in aonla to get higher yields. Apart from yield and quality of fruits, the shape of the tree is semi spreading with upright growth habit, which made it suitable for high density planting. Because of the several merits the plus tree T6-6 was released as BSR-1 Aonla as an improved variety. This selection is recommended for cultivation in plains and hills of Tamil Nadu under irrigated and rainfed conditions. It is gaining popularity from the farming community of Tamil Nadu and neighbouring states of India owing to its many positive traits.

Description of the variety: Plant height (m): 9.75. Plant spread

Table 3. Comparison of quality characters between BSR-1 and country type aonla

Particulars	BSR-1 (T6-6)	Country type (T6-3)
TSS(° Brix)	18.10	15.20
Acidity(%)	2.00	2.80
Succinic, citric and other acids(%)	35.00+0.50+	20.00+15.00
Ascorbic acid (mg/100g of flesh)	10.00(45.50)	+3.00(38.00)
Total sugars (%)*	620.00	530.00
Reducing sugars (%)*	15.00	10.42
Non reducing sugars (%)	10.44	10.16
Phenols**	0.56	0.26
Crude fibre (%)	29.75	35.80
Keeping quality (days)	4.31	1.33
Organoleptic scoring of candied fruits	7-10	5-7
Suitability for dehydration	Good	Satisfactory
	Suitable	Suitable

*-mg of glucose /g of sample (dry weight basis)

** - mg of catechol /g of sample (dry weight basis)

(m) North-South: 5.52, East-West: 6.73. Trunk girth (cm): 120.20. Branchlet length (cm): 88.40. Leaflet length minimum (cm): 8.32. Leaflet length maximum (cm): 27.60. Leaflet length average (cm): 17.65. Leaflet shape: Distichous. Leaflet colour: Green. Fruit colour: Greenish yellow (Dresden yellow 64/3). In the initial stage the fruit is red tinged on the exposed surface. Fruit shape: Flattened at the base and round at the apex. Fruit weight: 25.0-33.0g (mean 27.3 g). Fruit length (cm): 5.2. Fruit girth (cm): 12.7. Fruit volume (ml): 24.3. Pulp colour: Greenish. Number of seeds: 4-6 (mean 5.7). Flesh to nut ratio: 6.3:1. Number of fruits per kg: 40.6. Number of segments: 6.0. Maturity (range in number of days): Bearing starts at third year after planting of grafts. Economic yield could be obtained from 7th year on wards. Maturity group: Late (harvest starts from January to February). Reaction to major diseases and pests under field: Not seriously affected by any disease and pest. Agronomic features: The tree is semi spreading with phyllanthoid branching habit. Reaction to stress: The selection withstands moisture stress.

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