

RESEARCH ARTICLE Variability in Genotypes of Jamun (*Syzygium cumini* Skeels) for Morphological and Yield Characters

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Abstract

			A survey was carried out during 2016-2017 in Pulney, Dindigul district, Tamil
			Nadu, India to identify elite genotypes of jamun. Morphological and yield
			characters of ten selected genotypes were studied. The study revealed that
Received	-	31 st July, 2018	there was a wide variation among the genotypes. Genotype, JAK-68 showed
Revised	:	31 st August, 2018	high variability among the genotypes in characters such as tree age (35
Accepted	:	10 th September, 2018	years), trunk girth (146.82 cm), trunk height (5.61m), crown diameter (11.96
			m), leaf length (16.9 cm), leaf width (8.2 cm) and yield (31.48 kg) followed
			by genotype, JAK-65. Genotypes, JAK-68 and JAK-65 showed high variation
			for morphological and yield characters.

Keywords: Jamun, variability, morphological, leaf and yield characters

Introduction

Syzygium cumini Skeels (Syn. Eugenia jambolana, Eugenia cumini and Syzygium jambolana) is a polyembryonic species belonging to family Myrtaceae, commonly known as Jambul, Black Plum, Java Plum, Indian Blackberry, Jamblang and Jamun. This under-utilized fruit crop is indigenous to India and shows wider adaptability to a range of ecological regions, tropics as well as subtropics. It is mainly grown throughout South East Asia, Malaya, Burma, Nepal, Bangladesh, Pakistan, Srilanka, Philippines and Indonesia. It is an emerging fruit crop of the twenty-first century as it yields fruit for table purpose that could play an important role in meeting demand for nutritious natural fruit of high medicinal value as well as different plant parts possess varied uses to mankind. The plant has various medicinaluses in various traditional systems of medicine. All parts of the tree and importantly, the seeds are used to treat a range of ailments, the most important being *Diabetes mellitus* (Sagrawat *et al.* 2006). Singh *et al.* (2005) found that seeds contained alkaloid, jambosin and glycoside, jambolin or antimellin which reduce the diastatic conversion of starch into sugars. Jamun is highly cross pollinated crop, hence, wide variability is common in the natural populations. Relatively, long pre-bearing period and lack of standard varieties are the main hurdles for commercial area expansion. Jamun fruit have always been the choice of masses suffering from diabetes as it is reported to have anti-diabetic properties and is traditionally used to cure, *Diabetes mellitus* (D Mello *et al.*, 2000).

Of late, jamun fruit demand is increasing day by day because of its nutritive value and awareness among public. It demands quality planting material with high yield potential. As majority of jamun trees are of seedling origin, they show tremendous variation in their morphology and physicochemical attributes and the phytochemical constituents which are highly used in pharmaceutical studies and industries. Lack of improved high yielding varieties with dwarf stature and good keeping quality are the major bottlenecks for the commercial cultivation of jamun in India. This fruit occurs largely on roadsides, avenues and marginal lands across Tamil Nadu. Hence, the present study was conducted to assess the variations in tree, leaf and fruit characters for different genotypes of Jamun (Syzygium cumini Skeels) collected from Pulney, Dindigul district, Tamil Nadu, India for further studies.

Material and Methods

An extensive survey was undertaken across Pulney, Dindigul district, Tamil Nadu, India during June, 2017 to May, 2018 to identify elite types of jamun among its native population. Trees of seedling origin were selected for the study. Observation on morphological characters such as tree and leaf characters were studied. Tree characters such as tree age, tree height, trunk girth, trunk height, crown diameter, tree canopy shape and tree growth habit were observed. Leaf characters such as shape, colour, length and width were observed.

Tree characters

The height of the tree was recorded from the base to the top most branching site and expressed in metre (m). Trunk girth was recorded at 25 cm above ground level and expressed in centimetres (cm). Trunk height was recorded from the base of the tree to the point of emergence of first branch and expressed in metre (m). Tree spread was measured as the mean canopy diameter using two directions (North-South and East-West) and expressed in metre (m). The growth habit of trees under survey was observed visually and classified into three groups namely erect, semi erect and spreading based on NBPGR descriptor, (Mahajan *et al.*2002).

Leaf characters

Leaf shape was recorded on mature leaves and classified as broadly ovate, elliptic oblong, elliptic and lanceolate based on NBPGR descriptor (Mahajan *et al.* 2002). Leaf colour was noted as per the Royal Horticultural Society Colour charts (Edition V). Leaf length was calculated by taking average length of ten fully expanded leaves from each tree from the base to the tip of the leaf blade were taken and expressed in centimetre (cm). Leaf width was calculated by average width of ten fully expanded leaves from each tree at the widest point weretaken and expressed in centimetre (cm).

Yield characters

The yield of fruits from each plant was assessed by weighing the fruits harvested separately and expressed as kg per tree.

Results and Discussion

The data pertaining to the morphological characters is depicted in the Table 1 and 2. The mean performance of the genotypes revealed a wide range of variability for all the traits. Diversity in canopy shape and leaf apex are showed in Plate 1 and 2.

Name of the genotypes	Tree age (years)	Tree height (m)	Trunk girth (cm)	Trunk height (m)	Crown diameter (m)	Tree canopy shape	Tree growth habit
JAK-61	35	21.36	136.25	4.21	11.55	Pyramidal	Spreading
JAK-62	30	21.59	137.05	4.20	11.28	Irregular	Erect
JAK-63	30	17.85	138.75	4.28	8.59	Broadly pyramidal	Semi Spreading
JAK-64	35	18.41	132.32	5.05	11.18	Pyramidal	Semi spreading
JAK-65	35	19.37	146.57	5.23	11.69	Broadly pyramidal	Erect
JAK-66	30	16.21	139.45	5.05	11.01	Broadly pyramidal	Spreading
JAK-67	35	17.99	140.14	5.22	11.29	Broadly pyramidal	Erect
JAK-68	35	19.75	146.82	5.61	11.96	Pyramidal	Spreading
JAK-69	35	17.44	136.62	4.97	7.66	Pyramidal	Semi spreading
JAK-70	35	16.32	143.12	5.21	10.65	Irregular	Spreading
Mean	33	18.52	139.50	4.90	10.79	-	-
SD	2.58	1.84	4.24	0.50	1.53	-	-
CV (%)	7.82	9.91	3.04	10.11	14.19	-	-

 Table 1. Tree characters of selected jamun genotypes

Tree characters

In the present study, tree characters like tree age, tree height, trunk girth, trunk height and crown diameter showed remarkable variation in the genotypes studied which may be due to seedlings of heterozygous nature besides environmental influence. Tree age ranged from 30 to 35 years with the mean age of 33. Age of the tree is an important criteria which influences the fruit size, fruit weight and yield due to its fully developed canopy. Tree height ranged from 16.21 to 21.59 m with the mean of 18.52 m. Among the genotypes, JAK-62 exhibited observed highest tree height (21.59 m) among the genotypes. Variability for height of the tree is also high. It is an important criterion for selection of superior plus trees as higher tree height makes harvesting and inter-cultural operation. The trunk girth varied from 132.32 to 146.82 cm with a mean of 139.50 cm. The trunk girth was significantly higher in the genotype, JAK-68 (146.82 cm). Prabhuraj et al. (2002) observed that high degree of variability in plant girth of jamun. Similar observation was noticed by Patil et al. (2009).



Plate 1. Diversity in jamun tree canopy shape

Courtesy: Abdul Latheef. A

Mahajan *et al.*, 2002

Plate 2. Diversity in leaf apex shape of selected jamun genotypes



JAK-63

Acute





Acuminate

JAK-68

Courtesy: Abdul Latheef. A

Mahajan *et al.*, 2002

The tree characters viz., height and girth are influenced by the age of the tree, nutritional and climatic factors. The trunk height varied from 4.20 to 5.61m with a mean of 4.90 m. The trunk height was significantly higher in the genotype, JAK-68 (5.61m). The crown diameter ranged from 7.66 to 11.96 m with mean of 10.79 m. The crown diameter was significantly higher in the genotype, JAK-68 (11.96 m). The crown shape of the tree is influenced by shade, environmental parameters and genetic make-up of the tree. A diversity of canopy shapes was observed among the genotypes. Irregular, broadly pyramidal and pyramidal canopy shapes were observed. Tree growth habit is an important trait which decides whether the genotype is suitable for normal planting or high density planting. Semi erect growth habit is suitable for high density planting. Growth habits like erect, spreading and semi-spreading growth habit were also observed among the genotypes (Table 1).

Leaf characters

Wide variations were observed with respect to leaf characters like leaf length, width and leafshape among the genotypes studied. Among the selected genotypes, broadly ovate and lanceolate leaf shapes were observed with dark coloured leaves. Increase in leaf length and width increases the leaf area of plant which facilitates better harvesting of available solar energy by the canopy resulting in more photosynthates production and accumulation. Leaf length ranged from 14.6 to 16.9 cm with the mean of 15.37 cm. The leaf length was significantly higher in the genotype, JAK-68 (16.9 cm). Leaf width of the selected genotypes ranged from 7.1 to 8.2 cm with a mean of 7.75 cm. The leaf width was significantly higher in the genotypic elements have an important role in determining various leaf characters.

Name of the genotypes	Leaf shape	Leaf colour	Leaf length (cm)	Leaf width (cm)	Yield/ tree (kg)
JAK-61	Broadly ovate	Dark green	14.6	7.9	26.87
JAK-62	Broadly ovate	Dark green	15.2	8.0	25.94
JAK-63	Lanceolate	Dark green	15.3	6.4	26.45
JAK-64	Broadly ovate	Dark green	16.4	8.0	30.38
JAK-65	Lanceolate	Dark green	16.7	8.1	31.03
JAK-66	Broadly ovate	Dark green	15.0	7.5	29.09
JAK-67	Broadly ovate	Dark green	14.7	8.0	25.97
JAK-68	Lanceolate	Dark green	16.9	8.2	31.48
JAK-69	Lanceolate	Dark green	14.8	7.1	30.41
JAK-70	Broadly ovate	Dark green	14.7	7.8	30.43
Mean	-	-	15.37	7.75	28.80
SD	-	-	0.84	0.60	2.25
CV (%)	-	-	5.44	7.72	7.80

Table 2. Leaf and yield	I characters of	of selected	jamun	genotypes
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Yield characters

The yield of the selected genotypes varied from 25.94 to 31.48 kg with a mean of 28.80 kg. The highest yield was registered in the genotype JAK-68(31.48 kg) (Table 2). Wide variation in yield with different collections is due to the genetic makeup of plant and environmental factors such as location, maximum and minimum temperature, frequency of rainfall and relative humidity (Singh and Singh, 2012).

In the light of forgoing, genotypes, JAK-68 and JAK-65 showed high variation for morphological and yield characters and these promising genotypes will be vegetatively propagated for further studies.

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