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Evaluation of Elite Jamun (*Syzygium cumini*) Germplasm Collections for Fruit Yield and Quality under High Density Planting System in the Northern Telangana Agro-climatic Zone

V. Murali[1], Sai Prasanna G.[2] and Syed Irfan Ali[3]

[1]Dept. of Agronomy, [2]Dept. of Fruit Science, Horticultural Research Station, Adilabad, Sri Konda Laxman Telangana Horticultural University, Telangana (504 001), India

[3]Dept. of Fruit Science, Post Graduate Institute for Horticultural Sciences, Mulugu, Sri Konda Laxman Telangana Horticultural University, Telangana (502 279), India

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Corresponding muralivuyyuru@gmail.com

0000-0002-2543-496X

ABSTRACT

In the present study, ten elite Jamun genotypes representing different agro climatic zones of India, were evaluated during 2023 fruiting season (February to July) under high density planting (4 m×4 m) established in 2016 at Horticultural Research Station, Adilabad, located in the Northern Telangana Agro climatic Zone. The objectives of the study were to evaluate the elite Jamun genotypes performance in terms of phenological and pomological attributes in the moderately saline clay loam soils. Among the elite genotypes, SRDJC-15 and SRDJC-04, with short stature, and sparse crowns were found to be suitable for high-density planting. Early flowering was observed in SRDJC-15 and ADBJC-01, while SRDJC-04, SRDJC-16, and RNRJC-01 flowered mid-season, and AJG-85 and RNRJC-03 were late bloomers. Significant genetic variability was recorded for fruit yield and quality attributes studied. The germplasm SRDJC-03 had produced the significantly highest fruit yield (22.83 kg tree^{-1}) and was 84.0% higher than Konkan Bahadoli. Whereas, SRDJC-15 excelled in terms of individual fruit weight, pulp content, and seed weight. Among the genotypes, SRDJC-04 recorded the highest Total Soluble Solids (TSS) value (20.76 °Brix), followed by SRDJC-16 (20.23°Brix), while the lowest was found in SRDJC-15 (10.13°Brix). The sweetness, measured as the TSS-to-acid ratio values was observed in SRDJC-16 (15.13), followed by ADBJC-01 (13.29) and SRDJC-04 (12.43). Despite the low yield of SRDJC-04 (14.35 kg tree^{-1}), it has been identified as a promising genotype for table purpose with high pulp content and total soluble solids. The superior performance of SRDJC-03 and other genotypes over the national check Konkan Bahadoli further require multi-location field trials to validate the performance.

KEYWORDS: High density planting, allometric characters, phenological adaptations, yield, quality

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1. INTRODUCTION

Jamun (*Syzygium cumini* Skeels), also known by its scientific synonyms *Syzygium jambolanum* and *Eugenia jambolana*, is commonly referred to as Java plum, Indian blackberry, Jambul, Black plum, Jamblang, and several other regional names (Shrikant et al., 2012). It is a native, lesser-known fruit tree from the Indian subcontinent, belonging to the Myrtaceae family, and is recognized for its rich nutritional profile and medicinal value (Sharma et al., 2012; Soundarya et al., 2024). Classified as an underutilized fruit crop in India, Jamun holds great potential for cultivation and commercialization. India ranks as the second-largest producer of Jamun, with Uttar Pradesh leading the production, followed by Maharashtra, Tamil Nadu, Gujarat, and Assam. This hardy, drought-tolerant fruit tree thrives in arid regions and is capable of growing with minimal care, even in waterlogged or marshy soils where other fruit crops struggle to survive (Shubham et al., 2021; Soundarya et al., 2024).

Jamun (Syzygium cumini) is widely used in traditional Indian medicine, with its fruits, seeds, leaves, and bark valued for therapeutic properties (Sarvade et al., 2016). The fruits and seeds exhibit strong anti-glycaemic and anti-hypercholesterolemic effects (Raza et al., 2017) and are rich in anthocyanins, flavonoids, polyphenols, and resveratrol, conferring antioxidant, chemoprotective, and nutraceutical benefits (Hameed et al., 2020; Kapoor et al., 2015; Shrikant et al., 2012). Jamun thrives on marginal lands and shows tolerance to salinity and drought (Sarvade et al., 2016; Tewari et al., 2017).

This evergreen tree is valued not only for its nutrient-dense fruit, rich in vitamins, minerals, and antioxidants, but also for its therapeutic uses in traditional ayurvedic medicine (Meena et al., 2022).Jamun is a cross-pollinated fruit crop, and due to its common propagation through seeds, it exhibits significant field variability in traits such as tree height, fruiting behaviour, yield, and quality. Flowering generally occurs between March and April, with fruit ripening during May to July. The demand for Jamun has been steadily increasing, owing to its nutritional value, therapeutic benefits, and its usefulness as a windbreak species (Soundarya et al., 2024).

Jamun demonstrates strong tolerance to both drought and heavy rainfall. Notably, it adapts well to diverse ecological conditions, including the semi-arid tropics, which are often marked by low and erratic rainfall, high temperatures, and poor soil fertility with minimal organic matter (Kalma and Franks, 2003). Cultivating fruit crops in such environments requires the identification and selection of germplasm with inherent resistance to these stresses. When evaluating Jamun germplasm for semi-arid regions, it is important to consider how well different genotypes perform under common cultivation practices. Propagation techniques whether through seeds or vegetative methods like grafting and cuttings must be effective in these challenging conditions. Considerable variation exists among Jamun types in terms of fruit size, shape, pulp content, total soluble solids (TSS), and acidity, making it possible to select elite genotypes (Shubham et al., 2021).

Growth habits, such as dwarf vs. tall and spreading vs. upright, should be assessed in relation to water use efficiency and ease of management in low-water settings. Semi-dwarf varieties that are suitable for high-density planting may offer advantages in areas with limited land or water availability. Moreover, adaptability to rainfed conditions, limited irrigation, and marginal soils is a key trait for selection. Jamun ability to grow in a variety of soils, including degraded and low-fertility lands, adds to its resilience. Crop improvement begins with identifying and selecting elite germplasm that shows promise for higher yields and superior quality traits, such as a greater edible portion, appealing fruit colour, shape, taste, and flavour (Sanjay et al., 2011; Ghojage et al., 2009). Varieties that can be propagated cost-effectively, especially through seed or grafting onto drought-tolerant rootstocks, are ideal for growers in semi-arid regions. Growth habits can significantly influence water use and management practices in semi-arid environments. For example, dwarf or semi-dwarf varieties might be more suitable for high-density planting and efficient irrigation, while upright varieties might be preferred for windbreaks in windy regions. Jamun fruit typically has a short shelf life of 2-3 days at room temperature, making the selection of genotypes with better storability or the development of post-harvest treatments important. To harness the potential of Jamun in semi-arid agriculture, it is crucial to identify superior genotypes that are well-adapted to these challenging conditions. This requires a comprehensive evaluation of existing germplasm collections based on a range of criteria relevant to the specific stresses and requirements of semi-arid environments. abiotic stress tolerance, phenological adaptations, fruit yield, and nutritional quality in the Northern Telangana Zone.

2. MATERIALS AND METHODS

The study was conducted during 2023 fruiting season (February to July) at Horticultural Research Station, Sri Konda Laxman Telangana Horticultural University, Adilabad district, Telangana, India (Latitude 19.6480'N, Longitude 78.5321'E, at an elevation of 257 meters above MSL) on eight years old germplasm block established at a spacing of 4 m×4 m. The soil type is clay loam with pH:

8.2, Electrical conductivity: 3.1 dS m^{-1}, Organic Carbon 0.4%, and available nitrogen, phosphorus and potassium were 200.6, 18.2 and 206.4 kg ha^{-1} respectively. The elite germplasm was established by grafting technique with the scion material extracted from candidate plus trees located in Fruit Research Station (Sangareddy), Herbal Garden (Rajendranagar), Karnataka (Arabhavi), Neradigonda (Adilabad) apart from standard national check 'Konkan Bahadoli' from Konkan Region of Maharastra state. The details of germplasm collected along with the source of collection and survival % are presented in Table 1.

Table 1: Details of Jamun Elite germplasm collections included in the study

Germ-plasm	Source	No of trees planted	No of the trees survived	Survival %
ADBJC-01	Adilabad, Telangana	2	1	50
AJG-85	Arabavi, Karnataka	6	6	100
RNRJC-01	Rajendranagar, Telangana	5	1	20
RNRJC-02	Rajendranagar, Telangana	5	5	100
RNRJC-03	Rajendranagar, Telangana	7	6	85.7
SRDJC-03	Sangareddy, Telangana	3	3	100
SRDJC-04	Sangareddy, Telangana	6	6	100
SRDJC-15	Sangareddy, Telangana	8	7	87.5
SRDJC-16	Sangareddy, Telangana	3	3	100
Konkan Bahadoli	Konkan, Maharashtra	3	3	100
Total		48	41	85.41%

2.1. Allometric characteristics

The tree height of different Jamun germplasm was measured with the help of a calibrated bamboo stick and expressed in meters. Tree crown spread and trunk girth were measured with the help of measuring tape. To get a mean canopy diameter two observations, on each of the east-west and north-south sides of the tree were recorded. The trunk girth was recorded at a height of 15 cm above the graft union. The sample fruit was measured with the help of a digital weighing scale. Ten fruits of Jamun were randomly taken as samples from each tree. Average fruit weight was calculated in grams/fruit. Fruit size length and diameter were recorded with the help of Vernier Caliper and their average was calculated in millimeters. These observations were taken at the optimum maturity of the fruit. Pulp weight was calculated by subtracting the peel and stone weight from the total weight of the fruit. Pulp content was expressed in %. To calculate the Pulp: Stone Ratio, the stone weight was subtracted from the total weight of the fruit and the value obtained was divided by stone weight. The yield of Jamun varies with the germplasm, periodicity of flowering, and growing conditions, influencing the size and productivity of plants, and also varies with the locality. Fruit yield $tree^{-1}$ was recorded at optimum maturity in kg $tree^{-1}$. The TSS content of pulp was determined using a handheld brix refractometer (RHB-32ATC, Erma Tokyo, Japan) at room temperature and represented in °Brix. The % of TSS was obtained from direct reading on the instrument multiplied by 100. Titratable acidity (TA) was estimated by the juice of white pulp and titrated against 0.1 N NaOH till a light pink colour as the endpoint (Horwitz, 2000).

2.2. Statistical analyses

Statistical analyses of the data collected on different quantitative parameters were performed using general GRAPES online statistical software (RBD) developed by Gopinath et al. (2020).The univariate procedure was used to test the normality and homogeneity of variance assumptions of ANOVA (Analysis of variance) with normal P-P and Q-Q plots. The General Linear Model (GLM) procedure was used to compare the genotypes on various parameters measured in the study. Post-hoc pair wise treatment means were compared using Tukey's HSD test at Alpha = 0.05 whenever ANOVA indicated significant differences ($p \leq 0.05$).

3. RESULTS AND DISCUSSION

The evaluation of fruit crop germplasm typically involves assessing a wide array of traits that can be broadly categorized into ease of propagation, field survival rate, morphological, physiological, biochemical, and molecular characteristics. For instance, in a semi-arid region, a slightly lower-yielding variety with superior drought tolerance might be preferred over a high-yielding but water-sensitive variety. The ADBJC-01 and RNRJC-01 have a lower survival rate than other germplasm lines (Table 1). All jamun germplasm lines had a high degree of soil salinity tolerance except SRDJC-16 variety with heavy leaf shedding after July 2024 rains. The biochemical characteristics related to stress response, such as the production of antioxidants, might be more critical in these environments. The evaluation process for Jamun germplasm in semi-arid regions must therefore place a strong emphasis on traits that contribute to survival, productivity, and nutritional quality under conditions of water scarcity and high temperatures.

Morphological characteristics encompass observable physical attributes of the plant, such as tree architecture (height, canopy spread, growth habit), leaf shape and size, flowering patterns (time of initiation, duration), and fruit characteristics (size, shape, colour, weight). These traits provide initial insights into the diversity within a germplasm collection and can be indicative of adaptation to specific environments.

Physiological characteristics relate to the functional aspects of the plant, including growth rate, yield potential (number of fruits tree^{-1}, fruit weight), stress tolerance (drought, heat, salinity), water use efficiency (amount of biomass produced per unit of water consumed), and photosynthetic efficiency (rate of carbon dioxide assimilation). These traits are crucial for determining the plant's ability to survive and produce under different environmental conditions.

Biochemical characteristics involve the chemical composition of various plant parts, particularly the fruit. This includes the content of sugars (total soluble solids, reducing and non-reducing sugars), acids (titratable acidity), vitamins (e.g., ascorbic acid), minerals (e.g., potassium, calcium, magnesium, iron), antioxidants (e.g., anthocyanins, phenolics), and other bioactive compounds that contribute to the nutritional value and health benefits of the fruit.

3.1. Allometric characteristics

The allometric characteristics of elite Jamun germplasm are presented in Table 2. The growth habit of different genotypes (e.g., dwarf vs. tall, spreading vs. upright) should be evaluated in relation to water use efficiency and ease of management in water-scarce conditions. Semi-dwarf varieties suitable for high-density planting might be advantageous in regions with limited land or water resources. Adaptability to common cultivation practices in semi-arid regions, such as rainfed agriculture, limited irrigation, and the ability to grow on marginal lands, is also a crucial consideration. Jamun is known for its hardiness and ability to grow in various soil types, including degraded lands.

The maximum tree height was observed in AJG-85 (5.9 m), while the minimum was recorded in Konkan Bahadoli (4.2 m), with SRDJC-15 (4.6 m), SRDJC-04 (4.7 m), and ADBJC-01 (4.8 m) being the next shortest. The maximum girth was recorded in SRDJC-04 (49.3 cm), followed by SRDJC-03 (48.1 cm), whereas the minimum girth was observed in Konkan Bahadoli (43.6 cm) and SRDJC-16 (43.8 cm). The highest crown spread was recorded in RNRJC-02 (3.57 m) followed by AJG-85 (3.33 m) which had a semi-circular crown, while the lowest was observed in RNRJC-03 (2.09 m) and Konkan Bahadoli (2.76 m) which had circular and semi-circular crowns, respectively. The growth and spread of plants are significantly influenced by their genotypic differences, with variations largely attributed to the genetic composition of the plants

Table 2: Allometric characteristics of Elite Jamun germplasm collections after 7th year of planting

Germplasm	Average tree height (m)	Average girth (cm)	Primary branches	Secondary branches	Crown spread (m)	Crown characteristics
ADBJC-01	4.8	46.1	3	10	3.08	Circular
AJG-85	5.9	47.9	2	11	3.33	Semi circular
RNRJC-01	5.7	45.8	3	11	2.97	Semi circular
RNRJC-02	5.1	47.2	3	12	3.57	Semi Circular
RNRJC-03	5.2	45.5	2	9	2.09	Circular
SRDJC-03	5.3	48.1	2	15	3.13	Semi Circular (Dense)
SRDJC-04	4.7	49.3	3	16	3.02	Semi Circular
SRDJC-15	4.6	47.5	2	13	3.07	Semi Circular
SRDJC-16	5.1	43.8	2	14	3.06	Irregular
Konkan Bahadoli	4.2	43.6	3	12	2.76	Semi circular
Mean	5.06	46.48	2.5	12.3	3.008	
SEm±	0.16	0.58	0.16	0.70	0.12	
SD	0.51	1.86	0.53	2.21	0.38	
CV	10.08	4.00	21.08	17.99	12.88	

and prevailing climatic conditions (Mishra et al., 2021). Medium vigour, tall growing cultivars are suitable for high-density planting systems (Singh et al., 2018).

3.2. Phenological adaptations

The phenological behaviour observed during the germplasm evaluation is presented in Table 3. SRDJC-15 exhibited early flowering in February, whereas SRDJC-03 and ADBJC-01 showed flowering in late February and fruited in the second fortnight of April. SRDJC-04, SRDJC-16, and RNRJC-01 flowered in the first fortnight of March and fruited in the first fortnight of May. RNRJC-02 flowered in the last week of April and fruited in the second fortnight of May. It is a well-established fact that early-bearing genotypes generally fetch higher prices in the market and are preferred for commercial cultivation. Moreover, the bearing habit significantly influences yield performance (Kaur and Bal, 2015). Aligning the flowering and fruiting periods of Jamun varieties with specific rainfall patterns and temperature regimes in semi-arid regions is essential for maximizing yield and reducing stress. Therefore, phenological data should be a key component in germplasm evaluation. This includes recording the timing of flowering (early, mid, or late season), the duration of the flowering and fruiting phases, the timing of fruit maturity and harvesting, and the synchronization of these events with optimal environmental conditions to avoid periods of peak stress. Jamun typically flowers in spring and fruits in summer. Early-or Late-fruiting varieties may offer advantages in semi-arid environments by either avoiding periods of extreme heat or drought or by taking advantage of limited water availability during different times of the year.

Table 3: Phenological adaptations: flowering and fruiting months, and bearing characteristics of the Elite Jamun germplasm collections

Sl. No.	Germplasm	Flowering months	Fruiting months	Bunch characteristics
1.	ADBJC-01	Late February	Last week of April	Bunch
2.	AJG-85	1st week of April	1st week of June	Solitary
3.	RNRJC-01	1st week of March	1st week of May	Bunch
4.	RNRJC-02	Last week of April	Last week of May	Bunch
5.	RNRJC-03	Mid-April	Last week of June	Bunch
6.	SRDJC-03	Late February	Last week of April	Bunch
7.	SRDJC-04	1st week of March	1st week of May	Solitary
8.	SRDJC-15	Early February	Last week of April	Bunch
9.	SRDJC-16	1st week of March	1st week of May	Solitary
10.	Konkan Bahadoli	1st week of March	1st week of May	Bunch

3.3. Fruit quality characteristics

The fruit quality characteristics of different Jamun germplasm are presented in Table 4. Significant variations in yield have been reported among different Jamun genotypes. Fruit size and weight, measured as fruit weight (g), fruit length (cm), and fruit breadth (cm), are also important quality parameters. Wide variability in these traits exists within Jamun germplasm. The pulp-stone ratio, which indicates the proportion of edible fruit, should be high. Taste and flavour, assessed through sensory evaluation, determine consumer acceptance; these can vary from sweet to sour and astringent.

The highest fruit yield was recorded in SRDJC-03 (22.83 kg tree^{-1}), while the lowest was observed in AJG-85 (11.84 kg tree^{-1} year^{-1}). Bearing potential, which reflects the inherent genetic makeup of a plant, plays a crucial role in ensuring profitable returns for farmers and should therefore be a key consideration when identifying superior genotypes. Fruit size is another important trait in genotype selection, as it is closely associated with several yield-related factors such as the length, diameter, and weight of both fruit and seed. The majority of the evaluated genotypes produced medium-sized fruits (Kaur and Bal, 2015). Significant differences were observed in fruit length, with the highest recorded in AJG-85 (3.16 cm), followed by RNRJC-03 (3.10 cm) and SRDJC-03 (3.00 cm). The minimum fruit length was observed in SRDJC-15 (2.63 cm). Maximum fruit diameter was recorded in SRDJC-03 (24.36 mm), which was on par with RNRJC-03 (24.16 mm), followed by RNRJC-02 (23.16 mm). The minimum diameter was observed in ADBJC-01 (20.33 mm). Fruit weight was highest in SRDJC-15 (13.66 g), which was on par with Konkan Bahadoli (13.63 g), followed by AJG-85 (12.33 g). The minimum fruit weight was recorded in SRDJC-04 (8.43 g). The variation observed in fruit length is likely influenced by climatic factors such as the frequency of rainfall, the bearing pattern of the tree, and its genetic characteristics. These results are consistent with the findings of Singh and Swamy (2021), Kaur and Bal (2015) and Soundarya et al. (2024).

The highest pulp weight was recorded in SRDJC-15 (11.63 g), followed by AJG-85 (10.46 g), with the lowest was observed in RNRJC-02 (7.10 g). The highest pulp % was observed in SRDJC-04 (85.52%), which was on par

Table 4. Fruit quality attributes of different Jamun genotypes

Germplasm	Yield tree^{-1} (kg)	Fruit length (cm)	Fruit diameter (mm)	Fruit wt (g)	Pulp wt (g)	Pulp %	Seed wt (g)
ADBJC-01	12.50	2.96	20.33	9.40	8.03	85.48	1.50
AJG-85	11.84	3.16	21.06	12.33	10.46	84.88	1.80
RNRJC-01	12.92	2.60	21.03	9.87	8.50	71.95	1.95
RNRJC-02	13.50	2.83	23.16	11.06	7.10	76.80	1.94
RNRJC-03	12.05	3.10	24.16	11.93	9.56	80.18	2.06
SRDJC-03	22.83	3.00	24.36	12.06	8.30	70.01	1.40
SRDJC-04	14.35	2.83	22.16	8.43	7.20	85.52	1.65
SRDJC-15	16.01	2.63	21.96	13.66	11.63	85.34	2.00
SRDJC-16	13.70	2.70	21.96	11.36	9.66	85.04	1.70
Konkan Bahadoli	12.41	2.83	23.20	13.63	10.50	76.85	1.60
CD (p=0.05)	0.93	0.235	0.55	2.53	1.56	5.41	0.16
SEm±	0.31	0.08	0.18	0.84	0.52	1.81	0.05
SEd	0.44	0.11	0.26	1.19	0.74	2.56	0.07
CV %	3.54	4.73	1.42	12.85	9.93	3.90	5.23

Table 4: Continue...

Germplasm	Pulp-to-seed ratio	Seed length (cm)	Seed diameter (mm)	Total soluble solids (°Brix)	Titrable acidity %	TSS: acid ratio
ADBJC-01	5.36	1.93	9.63	18.96	1.42	13.29
AJG-85	5.82	1.13	10.60	14.80	1.76	8.39
RNRJC-01	3.64	1.98	11.00	14.93	1.95	7.63
RNRJC-02	4.37	1.25	10.73	15.70	1.82	8.61
RNRJC-03	4.65	2.20	11.06	13.73	1.86	7.35
SRDJC-03	6.27	1.88	10.06	14.60	1.64	8.88
SRDJC-04	4.34	1.50	10.03	20.76	1.67	12.43
SRDJC-15	5.82	2.36	13.83	10.13	1.23	8.19
SRDJC-16	5.69	2.03	9.50	20.23	1.33	15.13
Konkan Bahadoli	6.56	2.09	9.10	15.50	1.35	11.45
CD (p=0.05)	1.59	0.15	1.19	0.81	0.03	0.54
SEm±	0.53	0.05	0.40	0.27	0.01	0.18
SEd	0.75	0.07	0.56	0.38	0.02	0.25
CV %	17.49	4.70	6.57	2.96	1.33	3.05

with ADBJC-01 (85.48%) and SRDJC-15 (85.34%). The lowest pulp % was recorded in SRDJC-03 (70.01%). The highest pulp-to-seed ratio was recorded in Konkan Bahadoli (6.56), which was on par with SRDJC-03 (6.27), followed by AJG-85 and SRDJC-15 (5.82). The lowest pulp-to-seed ratio was recorded in RNRJC-01 (3.64). Higher pulp weight and pulp-to-seed ratio are considered desirable traits for table-purpose Jamun, as they contribute to better fruit quality. Hence, genotypes with a higher fruit-to-pulp ratio can be effectively selected as pollen parents (Patel et al., 2005). These observations align with the reports of Singh and Swamy (2021) and Soundarya et al. (2024).

The highest seed length was observed in SRDJC-15 (2.36 cm), followed by RNRJC-03 (2.20 cm), while the lowest was in AJG-85 (1.13 cm). Seed diameter was highest in SRDJC-15 (13.83 mm), followed by RNRJC-03 (11.06 mm), which was on par with RNRJC-01 (11.00 mm). The minimum seed diameter was observed in Konkan

Bahadoli (9.10 mm). The highest seed weight was noted in RNRJC-03 (2.06 g), followed by SRDJC-15 (2.00 g). The lowest seed weight was recorded in SRDJC-03 (1.40 g). These results are consistent with the observations made by Singh and Swamy (2021) and Soundarya et al. (2024).

Taste is a complex trait influenced by factors such as total soluble solids (TSS), acidity, and the TSS-to-acid ratio. Among the genotypes, SRDJC-04 recorded the highest TSS value (20.76°Brix), followed by SRDJC-16 (20.23°Brix), while the lowest was found in SRDJC-15 (10.13°Brix). These variations could be attributed to differences in genetic composition and local environmental conditions. Similar findings have been reported by Ghojage et al. (2009), Prakash et al. (2010) and Srivastava et al. (2012). The astringent taste of jamun fruit is primarily attributed to its high acidity. In many fruits, an increase in total soluble solids (TSS) is often accompanied by a reduction in acidity (Devi et al., 2002). Among the genotypes, the highest titratable acidity was observed in RNRJC-03 (1.86%) and RNRJC-02 (1.82%), whereas SRDJC-15 recorded the lowest (1.23%). These findings are in agreement with those reported by Srivastava et al. (2010), Shahnawaz and Sheikh (2011), and Kumar et al. (2013). The highest TSS to acid ratio, which contributes to a sweeter taste, was reported in SRDJC-16 (15.13), followed by ADBJC-01 (13.29) and SRDJC-04 (12.43), while the lowest was recorded in RNRJC-03 (7.35).

4. CONCLUSION

Jamun germplasm lines showed wide variability in phenology, yield, and quality traits. SRDJC-15 and ADBJC-01 flowered early (February) with ripe fruits in April-May, ideal for high market prices. AJG-85, SRDJC-04, and RNRJC-02 had superior phenological traits for high-density planting. SRDJC-03 yielded the highest, outperforming Konkan Bahadoli. Despite lower yields, SRDJC-15, SRDJC-16, SRDJC-04, and ADBJC-01 had superior pulp and TSS, suitable for fresh consumption. All lines showed salinity tolerance, except SRDJC-16, which exhibited heavy monsoon leaf drop.

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