

Morphological properties of s. cumini



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Review of literature

An attempt has been made to review the earlier work pertaining to the evaluation of Jamun (*Syzygium cumini* Skeels) accessions based on morphological characteristics. Majority of the citations correspond to the evaluation of genotypic characteristics and morphological variability of different accessions. There are large numbers of morphological attributes that are suitable to test genetic variability. There are only a few but important characteristics that have been evaluated for their greater applicability in assessing variability and acceptance to commercial use. The present study was therefore, undertaken with a view to determine the morphological properties of *S. cumini* and collect detailed information on these aspects. The citations have been presented in this chapter as per quantitative and qualitative characteristics of tree behavior, growth habit and fruit quality.

Morphological markers

Morphological markers have proved a reliable tool for estimating intra-specific variability arising from different provenances at least in a few species. It pertains to the traits which are identified by visual observations and their inheritance can be monitored by naked eye. The traits included in this group are qualitative and quantitative characteristics; they are generally scored quickly, simply and without laboratory equipment. Roy (1963) reported intra-organism variability which is governed genetically. Phenotypic variability of plant organs such as leaves, flowers, fruits and seeds are most commonly used traits. Morphological markers have been in usage ever since

taxonomic studies came into vogue. Their characterization powers are strong and are usually preferred for quick identification at the field level.

Morphological descriptors in *Syzygium cumini*

S. cumini is large evergreen and densely foliaceous tree with light greyish-brown thick bark and partially deciduous tree attaining medium to large size polyembryonic fruit species (Chase and Reveal, 2009). Leaves are 5 to 18 cm long, evergreen, oblong-oval or elliptic and opposite. The sessile whitish-yellow flowers with funnel-shaped calyx emerge in clusters containing 4 to 5 united petals. Flowers come in February-March and fruits in May to July. Fruit are berries, oblong to ovoid-oblong, dark purple colour with 1 or 2 to 5 white or green seeds. Rudimentary seeds are also found in *S. cumini* (Morton, 1987; Stephen, 2012). The seeds of Jamun are recalcitrant, multicotyledonous have multiple embryos (Swamy *et al.*, 1999, Thoke *et al.*, 2011).

- Qualitative characteristics

Mitra *et al.* (2008) reported that large numbers of underutilized fruit crops, which are being used by the local inhabitants. In fact for people living in villages, these underutilized fruits are the most common source of nutritious food, to meet their vitamin and mineral requirements. *Syzygium cumini* is a multipurpose large, evergreen native tree occurs in the tropical and sub-tropical climates under a wide range of environmental conditions (Singh *et al.*, 2004). The variability in existing germplasm of *S. cumini* for selection of desirable genotypes was recorded on fruit physical characteristics and much variability was observed (Singh *et al.*, 1999). As majority of jamun trees are

of seedling origin, they show tremendous variation in their morphology and Physico-Chemical attributes. The extent of variability increases when this highly cross-pollinated plant multiplies sexually (Singh and Singh, 2012). Among the locally available types of jamun (*S. cumini*) in West Bengal, India, 4 (types JS-1, JS-2, JS-3 and JS-4) were selected and studied for fruit shape and size. JS-1 (with 1 oval-shaped large fruit) and JS-2 (cylindrical-shaped, medium-sized fruit) showed high characteristics of fruit size. Fruits of JS-2 and JS-3 showed pear-shaped, medium-sized fruits (Kundu *et al.*, 2001). A survey was undertaken in Gokak taluk of Belgaum district, Karnataka, India to investigate the nature and extent of variability present in jamun seedling progenies for morphological characters of trees. High variability was observed for the characters *viz.* plant girth, leaf area, petiole length and leaf length to petiole length ratio (Prabhuraj *et al.*, 2002).

- Quantitative characteristic

The *S. cumini* showed enormous variability from big (2.5 – 5 cm long and 2.0 – 3.5 cm diameter) to small (2.5-2.5 cm long and 1.0 -1.5 cm diameter), fruit weight (3.5 to 16.5 g) and pulp content (54-85 %) is normally grown in North India (Keskar *et al.*, 1989). The blackish purple fruit showed the highest fruit length (2.1 cm), fruit breadth (1.3 cm), fresh weight (1.94 g) and seed fresh weight (0.38 g) (Srimathi *et al.*, 2001). The study revealed that there was a wide variation among *S. cumini* accessions *i. e.* fruit weight ranged from 3.42 to 13.67 g, length 3.31 to 5.26 cm, girth 5.21 to 9.82 cm, length: width ratio 1.44 to 2.3 and pulp percentage 58.57 to 84.55 (Devi *et al.*, 2002).

Patel *et al.* (2005) collected different genotypes of jamun from Varanasi and recorded highest pulp content (97. 71 %) in V-8 followed by V-6 (95. 84 %) and V-7 (93. 81%) genotypes. However the genotypes RNC-26 and RNC-11 were found promising with regard to higher weight of pulp and fruit. The lowest or negligible seed weight (0. 12 g) was noticed in V-8 followed by V-6 (0. 16 g) and V-7 (0. 31 g) and these genotypes might be used as seedless jamun. Prakash *et al.* (2010) observed that ' Selection-1' was most promising for fruit weight (14. 55g), minimum seed weight (1. 73g), higher pulp percent (90. 05), higher total soluble solid (21. 23%) and total sugar (20. 24%). Shahnawaz and Sheikh, (2011) reported that weight, length, width of fruit of two improved cultivars of Jamun *i. e.* V₁ and V₂ were observed 9. 55 g, 3. 88 cm, 2. 98 cm and 6. 71 g, 2. 73 cm, 2. 10 cm respectively. The edible portion was 69. 10 and 39. 19 % whereas non-edible portion was 30. 90 and 60. 81 % in V₁ and V₂ , respectively. Singh *et al.* (2012) identified the accessions CISH J-37 has bold fruit, oblong, average weight of 24. 05 g, length 3. 90 cm, diameter 3. 03 cm and pulp (92. 26 per cent). The another accession CISH J - 42, which is seedless accession and the fruit is round shaped, average weight 6. 87 g, length 2. 57 cm, pulp 97. 9 per cent in the indigenous state.

Bakshi *et al.* (2013) carried out an investigation to evaluate the various mango genotypes on the basis of physico-chemical characteristics under rain fed areas of Jammu. Out of all the fifteen mango genotypes, the fruit weight was maximum in Mallika (182. 16 g) and lowest in Selection-4 (64. 83 g). The maximum fruit length (10. 52 cm) and fruit breadth (6. 98 cm) was observed in Mallika, whereas it was minimum in Selection-1 (5. 26 cm and 4. 22 cm, respectively). The pulp weight (117. 15 g) and stone weight (35. 60 g) was

highest in Mallika, while Dashehari showed maximum pulp: stone ratio (3.90), while the pulp percentage was maximum in Mallika (71.48 %). For organoleptic rating, Dashehari was rated best in terms of colour, flavour and taste over all the genotypes. Rahman *et al.*, (2014) carried out the study on fruit characteristics, yield contributing characters and yield of twenty one mango genotypes. A wide variation was observed among the genotypes in respect of different characteristics under the present study. The heaviest (237.0 g) fruits with length and diameter of 9.50 cm and 6.87 cm were recorded in the genotype MI-Jai 005, whereas the lightest (95.33 g) fruits with length and diameter of 2.2 cm and 2.7 cm were noted in MI Jai 004 per cent edible portion were the highest in MI Jai 001 (66.86 %), while the lowest edible portion in MI Jai 012 (38.59 %).

Several researches have been conducted to find the morphological characteristics of various fruit crops. Kher and Dorjay (2001) evaluated some low chilling peach cultivars for physical characteristics and observed fruit length and weight for Shan-e-Punjab and Flordsun as 5.80 and 4.74 cm and 56.95 and 80.86 g respectively. Prasad and Bankar (2000) evaluated pomegranate (*Punica granatum*) cultivars (Jodhpur Red, Ganesh, Basin Seedless, Dholka, GVK-1, G-137, P-23, P-26 and Jalore Seedless) for vegetative growth, yield and fruit quality and for their suitability to arid conditions of Rajasthan and Uttar Pradesh. The Jodhpur red variety of pomegranate fruit reported 6.10cm fruit length and 170.6 g fruit weight. Jalikop *et al.* (2002) reported 4.74 cm fruit length and 82.50 g fruit weight for amlidana pomegranate with noted dull pink colour. Patel *et al.* (2011) screened eleven guava genotypes of five years old *viz.*, RCG-1, RCG-2, RCG-

3, RCG-11, RCGH-1, RCGH-4, RCGH-7, Allahabad Safeda, L-49, Lalit and Sangam, showed wide range of variation with respect to quality traits of fruit. The genotype RCGH-1 was found superior in fruit weight (184.50 g) and fruit diameter (7.08 cm) whereas, the cultivar RCG-11 recorded least number of seed (53.29 No/100 g fruit weight) with highest pulp: seed ratio (94.25 %). El-Sisy (2013) investigated some morphological and productivity characteristics of fifteen genotypes of seedy guava trees with for morphological characteristics, flowering, yield and fruit quality. The genotypes were analyzed to select promising guava genotypes for fresh consumption and processing to take part in improvement and propagation programs. The highest fruit weight was recorded in genotypes No. 10 (277.37 g) in 2011 and No. 2 (253.23 g) in 2012. The longest fruit was in genotype No. 10 in both seasons. All genotypes gave similar results for fruit width except No. 2, which was the biggest one. The highest firmness was in genotype No. 14 in 2011 and genotype No. 2 in 2012. The low seeds (%) were the best character for fruit quality and associated with genotype No 2 (1.294 - 1.121 %). Mahmoud and Peter (2014) reported that physical fruit characters of guava fruits and tree no. 99 was found superior one over all genotypes in term of fruit weight (300.5 g), fruit diameter (7.36 cm), less number of seed per fruit, higher pulp thickness (3.2 cm), higher pulp weight (271.7 g), pulp to fruit weight ratio (88.7 %) and maximum peel weight (28.83 g).