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Enhancing Fruit Yield and Quality in Jamun (*Syzygium cumini* L. Skeels) through Genetic Improvement

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ABSTRACT

Jamun or Indian blackberry (*Syzygium cumini* L. Skeels) is commonly grown in India and some other countries for its multifarious uses including fresh consumption and value-addition of fruits, and use of leaves, fruits and seeds as ingredients in traditional medicine. Jamun trees exhibit fairly high tolerance to adverse soil conditions including drought and salinity. Both jamun fruit pulp and seed are quite rich in bioactive compounds with remarkable chemo-preventive, antioxidant, and antiproliferative properties. Despite its numerous potential uses, jamun remains an underutilized crop in India. This reflects the need for a greater emphasis on the conservation of jamun genetic resources and their utilization in developing superior cultivars. Germplasm collection, characterization and conservation constitute a vital component of our efforts since availability of divergent accessions permits further selection for desired traits. A recent analysis of 123 jamun genotypes from different parts of the Uttar Pradesh state revealed remarkable variability in fruit weight (2.04-17.66 g), seed weight (0.39-2.39 g), pulp content (61.12-94.38%), and total soluble solids (10.64-19.66 °Brix). Characterization of selected genotypes also indicated rich genetic variability for ascorbic acid, total anthocyanins, total flavonoids, total phenols, and other biochemical constituents in the fruit pulp. Similarly, characterization of 15 jamun genotypes from Rajasthan state also indicated a great deal of morpho-biochemical variability in fruit quality attributes. These efforts have led to the identification of some promising genotypes with comparatively bigger fruits (≥15.0 g) and a higher pulp content (≥85.0%). Currently, 57 diverse jamun accessions are being conserved in the field gene bank. Assessing genetic variability in the field repository also aids in the identification of accessions with superior fruit quality attributes. Two accessions (J-15 and J-36), for instance, have consistently performed well in terms of fruit weight and pulp content. Development of transcriptome sequencing libraries to mine Simple Sequence Repeats for molecular analysis is also being pursued. Substantial differences in pulp bioactive compounds among improved jamun cultivars and accessions have been identified based on LCMS-MS profiling. Future breeding strategies will primarily focus on developing precocious, high-yielding cultivars with improved shelf-life of fruits, and size-controlling clonal rootstocks.

Keywords: breeding, characterization, Indian blackberry, improved cultivars

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