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Variability in *jamun* (*Syzygium cuminii* Skeels) accessions from Uttar Pradesh and Jharkhand

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ABSTRACT

Survey was conducted in Uttar Pradesh (Lucknow, Varanasi and adjoining areas) and Jharkhand (Ranchi and adjoining areas) to find out the existing natural variability among the *jamun* seedling trees and to identify superior genotypes with good fruit qualities. Observations on the physico-chemical parameters of fruits were recorded on 32 genotypes. All the genotypes showed considerable variability with respect to the physico-chemical characters assessed. The genotypes, RNC-26 and RNC-11 were found promising and had higher fruit and pulp weight with sweet fruits. Highest pulp content (97.71%) was recorded in V-8 followed by V-6 (95.84 %) and V-7 (93.81%) genotypes collected from Varanasi region. Thin seed with almost negligible seed weight (0.12 g) was observed in V-8 followed by V-6 (0.16 g) and V-7 (0.31 g). Hence, these genotypes might be used as seedless *jamun*.

Key words: *Jamun*, elite seedlings, seedless *jamun*.

INTRODUCTION

Jamun of family Myrtaceae is an important but underutilized fruit crop of India. It is native to India and Myanmar, however, it has naturalized throughout the South East Asia and Pacific regions. Trees are evergreen, tends to develop umbrella like canopy, having dense foliage. It is a versatile fruit tree of both food and medicinal value. Fruits are small to large, dark-red-purple and ovaloid in shape, tasty and pleasantly flavoured, rich in carbohydrates, minerals and vitamins. The pulp ranges from dark red, purple to white, juicy with a sweet to astringent taste and flavour. Besides food value, it's fruits and seeds are known for several medicinal values like antidiabetic, astringent, stomatic, carminative, antiscorbatic and diuretic (Anon, 1). Seeds contain an alkaloid Jambosin and a glycoside, jambolin or antimellin, which reduce/stop the diastatic conversion of starch into sugars. In recent years, *jamun* fruits are becoming popular among people due to its rich medicinal values particularly for its anti-diabetic properties. The demand for this fruit has been increasing both in metropolitan and small cities. The fruits are being sold from Rs. 40 to 160 per kg depending upon fruit quality as well as location of the material. Looking at the importance of this fruits and high price value, the demand for its planting material is also increasing. However, except one or two, no specific recommended variety is available, although a wide variability exists throughout the length and width of

India. Attempts were also made to collect local available germplasm in Goa (Devi *et al.*, 4), Karnataka (Inamdar *et al.*, 7, Prabhuraj *et al.*, 10) and West Bengal (Kundu *et al.*, 8). Due to lack of any suitable/ recommended variety, the farmers have been planting trees of either seedling origin or grafted plants of unknown yield potential and fruit quality. These trees show wide variation in their fruiting, yield and fruit quality. Therefore, a study was conducted to find out variation in physico-chemical characteristics of *jamun* fruits and to identify superior clones and elite seedlings in Uttar Pradesh and Jharkhand states.

MATERIALS AND METHODS

Survey of *jamun* trees were conducted in Uttar Pradesh (Lucknow, Varanasi and adjoining areas) and Jharkhand (Ranchi and adjoining areas) during June and July 2002 and 2003. The survey was undertaken both in cultivated as well as in forest regions as per the method suggested by Gupta and Rai (6). The high yielding *jamun* trees were identified with the help of District Horticulture Officers and Horticulture Inspectors of the respective regions. While in forest areas, the survey was conducted with the help of officials from NBPGR Regional Station and Horticulture and Agroforestry Research Programme, Ranchi. The extent of variations in fruit physio-chemical traits from different locations were estimated. Ten fruits from selected trees were randomly taken for measuring physical attributes like weight, length, girth, width, pulp content, seed weight, seed content, pulp to seed ratio following standard procedures. Total soluble solids were estimated in term of per cent with the help of hand refractometer. Titrable acidity was estimated by titrating

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10 ml juice against 0.1 N NaOH using phenolphthalein as indicator (AOAC,1). Reducing and total sugars were determined by volumetric method as suggested by Lane and Eynon (7). Ascorbic acid content of fruits was determined using standardized 2,6-dichlorophenol indophenol dye and expressed as mg per 100 g of pulp. The data was analyzed as per the method suggested by Gomez and Gomez (4) using randomized block design.

RESULTS AND DISCUSSION

The data pertaining to physical and chemical quality attributes of *jamun* fruits showed significant differences and a high degree of variability for all the characters studied (Table 1 and 2). The fruit weight

varied from 2.20 g in RNC-29 to 13.80 g in RNC-26 genotypes. Higher fruit weight is a preferred character in *jamun*. The average weight per fruit of RNC-11, L-9 and V-3 genotypes were at par with RNC-26. Fruit length and diameter was found maximum in RNC-26 followed by V3 genotypes. The minimum fruit length and diameter was recorded in RNC-29 genotype. Fruit length: diameter ratio is a measure of fruit shape. Higher length: diameter ratio indicated the cylindrical shape, while lower ratio suggested the oblong and round shape of the fruits. Maximum length and diameter ratio (1.60) was recorded in RNC-17, which exhibited cylindrical fruits. Minimum fruit length: diameter ratio was measured in RNC-12, which exhibited fruits towards the round shape. Variation in *jamun* genotypes with

Table 1. Physical attributes of some superior *jamun* genotypes collected from Uttar Pradesh and Jharkhand.

Genotype	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Length: diameter ratio	Pulp weight (g)	Pulp content (%)	Seed weight (g)	Seed content (%)	Pulp: seed ratio
V-1	8.78	29.30	23.00	1.27	7.03	80.07	1.75	19.93	4.02
V-2	7.30	27.70	20.50	1.35	5.37	73.56	1.93	26.44	2.78
V-3	10.24	30.90	23.40	1.32	8.00	78.13	2.24	21.88	3.57
V-4	6.30	27.00	18.40	1.47	5.20	82.54	1.10	17.46	4.73
V-5	5.50	22.65	20.25	1.12	4.17	75.82	1.33	24.18	3.14
V-6	3.85	20.65	18.00	1.15	3.69	95.84	0.16	4.16	23.06
V-7	5.01	20.94	17.61	1.19	4.70	93.81	0.31	6.19	15.16
V-8	5.25	21.81	19.09	1.14	5.13	97.71	0.12	2.29	42.75
L-9	10.40	33.40	24.45	1.37	8.66	83.27	1.74	16.73	4.98
L-10	7.20	26.18	19.45	1.35	5.92	82.22	1.28	17.78	4.63
RNC-11	11.05	28.40	22.80	1.25	8.77	79.37	2.28	20.63	3.85
RNC-12	5.82	24.60	27.00	0.91	4.00	68.73	1.82	31.27	2.20
RNC-13	2.92	17.80	12.90	1.38	1.90	65.07	1.02	34.93	1.86
RNC-14	3.32	19.85	16.94	1.17	2.46	74.10	0.86	25.90	2.86
RNC-15	2.84	16.20	13.10	1.24	2.05	72.18	0.79	27.82	2.59
RNC-16	4.02	21.60	17.70	1.22	2.79	69.40	1.23	30.60	2.27
RNC-17	2.83	21.40	13.40	1.60	1.74	61.48	1.09	38.52	1.60
RNC-18	4.68	21.20	16.50	1.28	3.32	70.94	1.36	29.06	2.44
RNC-19	6.90	24.80	20.40	1.22	5.40	78.26	1.50	21.74	3.60
RNC-20	8.35	31.40	20.00	1.57	6.76	80.96	1.59	19.04	4.25
RNC-21	5.94	20.83	20.16	1.03	4.72	79.46	1.22	20.54	3.87
RNC-22	3.89	19.75	14.62	1.35	2.76	70.95	1.13	29.05	2.44
RNC-23	5.85	22.70	16.30	1.39	5.21	89.06	0.64	10.94	8.14
RNC-24	5.68	20.75	16.37	1.27	4.20	73.94	1.48	26.06	2.84
RNC-25	2.87	18.70	15.80	1.18	1.67	58.19	1.20	41.81	1.39
RNC-26	13.80	34.00	24.60	1.38	12.40	89.86	1.40	10.14	8.86
RNC-27	7.90	25.00	19.50	1.28	6.72	85.06	1.18	14.94	5.69
RNC-28	3.95	19.11	15.11	1.26	2.41	61.01	1.54	38.99	1.56
RNC-29	2.20	11.00	11.40	0.96	1.32	60.00	0.88	40.00	1.50
RNC-30	4.98	19.16	15.10	1.27	4.58	91.97	0.40	8.03	11.45
RNC-31	4.67	19.20	16.10	1.19	3.95	84.58	0.72	15.42	5.49
RNC-32	5.08	21.33	15.70	1.36	3.97	78.15	1.11	21.85	3.58
CD at 5%	5.13	7.22	6.25	0.18	1.03	12.67	0.25	17.25	7.56

Table 2. Chemical attributes of some superior *jamun* genotypes collected from Uttar Pradesh and Jharkhand.

Genotype	TSS (%)	Acidity (%)	TSS: acid ratio	Reducing sugars (%)	Total sugars (%)	Sugar : acid ratio	Ascorbic acid (mg/100g)
V-1	10.0	0.50	20.00	4.37	5.84	11.68	35.30
V-2	16.0	0.49	32.65	5.26	8.33	17.00	46.88
V-3	13.0	0.32	40.63	6.94	8.35	26.09	42.50
V-4	14.5	0.60	24.17	9.09	9.93	16.55	36.25
V-5	17.0	0.56	30.36	6.41	8.06	14.39	45.63
V-6	13.0	0.38	34.21	6.25	7.84	20.63	39.38
V-7	13.0	0.39	33.33	5.88	7.26	18.62	40.63
V-8	15.5	0.37	41.89	8.62	9.75	26.35	38.75
L -9	17.0	0.36	47.22	10.00	10.57	29.36	37.50
L-10	16.0	0.48	33.33	6.66	6.94	14.46	36.25
RNC-11	15.0	0.57	26.32	7.35	8.35	14.65	46.88
RNC-12	16.0	0.49	32.65	7.69	7.81	15.94	39.38
RNC-13	15.5	0.69	22.46	5.81	6.09	8.83	51.25
RNC-14	16.0	0.57	28.07	8.92	9.25	16.23	34.38
RNC-15	18.5	0.49	37.76	10.20	10.85	22.14	42.50
RNC-16	20.5	0.77	26.62	8.92	9.95	12.92	46.88
RNC-17	12.0	0.43	27.91	6.09	7.41	17.23	40.63
RNC-18	14.0	0.39	35.90	6.94	7.69	19.72	55.00
RNC-19	16.0	0.39	41.03	9.09	10.24	26.26	56.25
RNC-20	15.0	0.42	35.71	6.94	8.33	19.83	50.00
RNC-21	18.0	0.56	32.14	6.57	7.35	13.13	61.88
RNC-22	19.0	0.46	41.30	9.09	5.68	12.35	46.88
RNC-23	20.0	0.49	40.82	10.00	11.00	22.45	65.63
RNC-24	22.5	0.68	33.09	9.88	11.03	16.22	50.00
RNC-25	21.0	0.37	56.76	7.25	9.10	24.59	40.63
RNC-26	17.0	0.50	34.00	7.14	9.92	19.84	59.38
RNC-27	20.5	0.46	44.57	8.06	8.19	17.80	65.63
RNC-28	22.5	0.57	39.47	8.37	10.00	17.54	51.25
RNC-29	20.0	0.50	40.00	7.85	9.09	18.18	38.75
RNC-30	23.0	0.56	41.07	9.09	9.43	16.84	76.25
RNC-31	19.0	0.58	32.76	9.93	12.50	21.55	71.88
RNC-32	21.0	0.53	39.62	6.75	7.69	14.51	53.13
CD at 5%	5.87	0.11	11.63	1.33	1.03	4.67	13.27

above characters was earlier reported from Goa (Devi *et al.*, 4), Karnataka (Inamdar *et al.*, 7; Prabhuraj *et al.*, 10) and West Bengal (Kundu *et al.*, 8).

Pulp weight, pulp content, seed weight, seed content and pulp:seed ratio also varied significantly (Table 1). The maximum pulp weight was recorded in RNC-26 followed by RNC-11 and V-3 genotypes. Highest pulp content was recorded in V-8, followed by V-6 and V-7 genotypes collected from Varanasi region. Lowest pulp content was recorded in RNC-25. In all the 32 genotypes, no relation was observed with respect to pulp content, fruit weight and length to diameter ratio, which may be attributed due to the variable weight of the seed. Though the maximum weight of the fruit was recorded in RNC-26 with 89.86%

pulp content, the maximum pulp content was observed in V-8, which weighed only 5.25 g. This may be because of the rudimentary seed with almost negligible seed weight in V-8 followed by V-6 and V-7. Seeds of these three genotypes were very thin and hollow. This may be due embryo abortion (stenospermocarpy) during early stages of fruit development. The abortion of embryo in *S. cuminii* may be mediated by chemical(s) produced by the developing embryo (Arathi *et al.*, 3). The maximum seed weight was recorded in RNC-11 followed by V-3 and V-2 genotypes. Seed content in various genotypes ranged from 2.29 % in V-8 to 41.81% in RNC-25. Lower seed content is a preferred character for table purpose *jamun*. The above observations revealed that while selecting a superior *jamun*

genotype, pulp content should be given more importance rather than the fruit weight (Devi *et al.*, 4). The pulp to seed ratio in various genotypes ranged from 1.39 in RNC-25 to 42.75 in V-8 and showed wide range of variability. Similar results were also reported from Goa (Devi *et al.*, 4) and Karnataka (Prabhuraj *et al.*, 7, Inamdar *et al.*, 10). Higher pulp to seed ratio is a desirable character for table purpose *jamun* and for breeding quality fruits. Therefore, one should select pollen parent as genotype having high fruit pulp to seed ratio.

The data presented in table 2 reveal wide variation in chemical composition of the fruits of all the 32 genotypes. TSS content varied from 10% in V-1 to 23% in RNC-30. The genotypes RNC-24 and RNC-28 also showed high TSS contents. Titrable acidity was found to be minimum in V-3 and maximum in RNC-16. The TSS: acid ratio ranged from 20.0 to 47.22 in the selected genotypes. The maximum ratio was noted in L-9 and minimum in V-1. Reducing sugars were found to be maximum in RNC-15 followed by RNC-25 and L-9 genotypes and minimum was in V-1 genotype. Total sugars were estimated to be highest in RNC-24 followed by RNC-23 and RNC-15, while lowest was in V-1. The sugar: acid ratio also showed considerable variability in the genotypes and was ranged from 8.83 in RNC-13 to 26.26 in RNC-19. Ascorbic acid content was estimated to be the highest in RNC-30 followed by RNC-31 and lowest was recorded in RNC-14.

Based on the physio-chemical studies conducted for the consecutive two years, it may be inferred that the genotypes RNC-26 and RNC-11 were promising. These genotypes had higher fruit weight and pulp weight. Genotypes V8, V6 and V7 had rudimentary seed or negligible seed content. Hence, these may be used as seedless *jamun*. The scion sticks of the identified genotypes have been collected for establishing the evaluation block at IARI, New Delhi.

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