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Studies on variability in fruit characters of jamun

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ABSTRACT

The present investigation entitled "Studies on variability in fruit characters of jamun (*Syzygium cumini* skeels)" was carried out in the campus of Banaras Hindu University, Varanasi U.P. India, during the year 2000-01 and 2001-02 to select some promising selection of jamun. A very good jamun collection of eastern Uttar Pradesh is available in plenty at the campus of Banaras Hindu University, under department of Horticulture. A wide range of variability was observed in the phyisco-chemical composition of fruit among investigated genotypes. The 'Selection 1' was observed 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%). Therefore, Selection-1 is suitable for further perpetuation for commercial and systematic orcharding of *jamun*.

Kew words: Variability, selection, fruit characters and *jamun*

INTRODUCTION

The Indian black berry, commonly known as *jamun* (*Syzygium cumini* Skeels) is an important indigenous minor fruit of commercial value, belonging to the family Myrtaceae. They are also seen growing in parks, on roadsides as avenues and windbreak. The tasty, pleasant flavoured jamun fruit is mostly used for dessert purpose. Apart from eating as fresh, it can also be used for making delicious beverages, juices, jam, squash, wine, vinegar and pickles. Jamun squash is a very refreshing drink in the summer season. A little quantity of fruit syrup is much useful for curing diarrhea. The fruit is also used for preparation of wine, particularly in Goa. The vinegar prepared from the juice extracted from slightly unripe fruit is stomachic, carminative and diuretic, apart from having cooling and digestive properties. The seed can be used as a concentrate for animals because it is rich in protein, carbohydrates and calcium. The wood is hardy and used for railway sleepers. The timber is used in buildings, for making agricultural implements and wall work, as it resists the action of water (Anonymous, 1). The organized orcharding of this fruit is rare owing to absence of the established cultivars. Very meager information is available on improvement of jamun fruit crop. To initiate any crop improvement programme, selection and hybridization are the important methods. Because of allogamous in nature and pre-dominance of seed propagation, enormous variability exists in respect to morphology, floral and physio-chemical characteristics (Ashraf, 2). The success of an improvement programme depends mostly on the identification and selection of superior parents for hybridization. Therefore, the exploitation of existing variability for improvement of *jamun* crop in order to encourage commercial orcharding in India.

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MATERIALS AND METHODS

The present investigation entitled "Studies on variability in fruit characters of *jamun* (*Syzygium cumini* skeels)" was carried out in the campus of Banaras Hindu University, Varanasi U.P. India, during the year 2000-01 and 2001-02. Fifteen-year-old plants of uniform growth and vigour of ten genotypes of jamun viz. Selection-1, Selection-2, Selection-3, Selection-4, Selection-5, Selection-6, Selection-7, Selection-8, Selection-9 and Selection-10 were selected for the study. Four branches were tagged in four directions for observation of each genotype. The observations were recorded on shape, colour, weight, size of fruit and seed of *jamun*, physiochemical composition of fruit viz. pulp content (%), seed (%), pulp- seed ratio, moisture (%), total soluble solid, sugars, protein, pectin, acidity and ascorbic acid were annualized method as per given by Ranganna (12). The trial was laid out in randomized block design each plant was selected at 100 m distance. The data was analysed statistically as per method given by Panse and Sukhatme (9)

RESULTS AND DISCUSSION

The data presented in (Table 1 and 2) on morph-

physical and chemical composition of jamun fruits showed significant differences and wide range of variability. The data pertaining in table 1 revealed fruit weight varied 3.55 –14.55g and higher was recorded in 'Selection 1' while it was the lowest in 'Selection 6. It might be due to genetic make up of the genotypes. These results corroborate the findings of Keskar *et al.* (6), and Priya Devi *et al.* (10) in jamun. A wide variation in fruit size (length & breadth) was also observed among investigated genotypes of jamun. 'Selection 1' significantly produced the largest fruit followed by 'Selection 4' and 'Selection 9' whereas lowest length was recorded in 'Selection 6'. The variation in length of fruit may be due to genetic make up of the plant. The maximum fruit breadth observed in 'Selection 4' followed by 'Selection 5'. The minimum fruit breadth was measured in 'Selection 6'. Very minute variation was found during two years of observations and it may be due to weather condition during growth and development of fruits. The variation among genotypes attributed to the genetic make up of plant. Srivastava *et al.* (16) (Kundu *et al*. 8), Priya Devi *et al*. (10) and Patel *et a*l (11).

A wide variation in morphological characters of fruit was observed oblong, round, and pyriform were the three types recorded during studies where round and oblong were more common. The round type had flat base and apex whereas oblong types had mostly nacked base and pointed apex. However, oval type of fruit also had flat base and apex. Exceptionally there were fruits, which had both base and apex flat. The variation was also in the colour (Deep purple, purple pink, bluish black and black). The fruit colour did not follow any clear trend. These findings are in conformity with the results of Kumar *et al.* (7) in *jamun.* A wide variation was also observed in seed weight and size. For an ideal variety lower weight and small size of seed is desirable character. The minimum seed weight was noticed in 'Selection 6' followed by 'Selection 3' and 'Selection 1', whereas maximum seed weight was recorded in 'Selection 5'. In general, the oblong type fruit had more weight and relatively lesser seed weight, which may be a fact in above findings. Similarly, there was variation in seed length also. The minimum seed length was noticed in 'Selection 8' followed by 'Selection 10' and 'Selection 6' but not differed significantly. However, the minimum seed breadth was recorded in 'Selection 9' followed by 'Selection 2', 'Selection 4' and 'Selection 6'. Seed breadth was not in proportion to seed length, which may be attributed to seed weight. Bajpai, (3) and Patel *et al.* (11), in jamun, also reported similar findings.

The pulp content varied from 74 to 90 percent. The maximum pulp percent was noticed in 'Selection 1'

Table 1. Variability in physical and morphological characteristics of fruits among jamun genotypes.

Name of genotypes	Fruit weight (g)	Length (cm)	Breadth (cm)	Fruit shape	Fruit base	Fruit apex	Fruit colour	Seed weight (g)	Seed length (cm)	Seed breadth (cm)	Pulp (%)	Seed (%)	Pulp seedratio
Selection 1	14.55	5.26	2.55	Oblong	Nacked	Pointed	Purple pink	1.30	1.73	1.05	90.05	9.95	9.05
Selection 2	5.40	3.95	1.55	Oval	Flat	Flat	Deep purple	1.45	2.04	1.32	74.08	25.93	2.84
Selection 3	4.75	3.67	3.60	Round	Nacked	Pointed	Purple pink	1.15	1.86	1.09	75.80	24.23	3.14
Selection 4	9.07	4.66	3.10	Oblong	Flat	Flat	Bluish black	1.82	2.15	1.32	80.21	19.75	4.06
Selection 5	10.10	4.37	2.85	Oblong	Nacked	Flat	Deep purple	1.85	2.11	1.21	82.14	17.86	4.61
Selection 6	3.55	3.30	1.52	Oval	Flat	Flat	Bluish black	0.95	2.05	1.14	73.30	26.71	2.75
Selection 7	8.95	4.52	2.15	Round	Nacked	Flat	Deep purple	1.65	1.65	1.05	81.61	18.39	4.44
Selection 8	7.72	4.12	2.15	Pyriform	Flat	Pointed	Deep purple	1.5	1.90	1.12	81.68	18.32	4.48
Selection 9	9.45	4.40	2.25	Oblong	Flat	Pointed	Deep purple	1.55	1.43	0.86	83.65	16.35	5.12
Selection 10	7.19	3.92	2.40	Round	Flat	Flat	Black	1.35	1.55	1.50	81.21	18.76	4.34
Mean	8.08	4.21	2.21	—	—	—	——	1.43	1.84	1.16	80.37	19.60	4.48
CD at 5%	0.50	0.013	0.125	—	—	—	——	0.17	0.16	0.01	2.48	1.20	——

Table 2. Variability in chemical characters of fruits among jamun genotypes.

Name of genotypes	Moisture (%)	TSS (%)	Acidity (%)	Protein (%)	Pectin (%)	Ascorbic acid (mg/100g fruit)	Total sugar (%)	Non reducing sugar (%)	Reducing sugar (%)
Selection 1	85.50	21.23	1.9	0.81	2.02	38.90	20.24	0.018	20.22
Selection 2	82.67	15.28	2.2	0.63	2.24	32.61	14.00	0.012	13.61
Selection 3	82.40	14.78	2.1	0.60	2.25	30.89	13.25	0.065	13.24
Selection 4	81.38	12.86	2.3	0.54	3.03	33.29	12.05	0.045	12.09
Selection 5	81.50	11.20	2.3	0.51	2.71	32.73	9.48	0.085	9.43
Selection 6	85.38	18.61	2.1	0.72	3.37	31.08	17.60	0.019	17.58
Selection 7	80.00	9.88	2.3	0.50	2.73	35.84	8.21	0.012	8.20
Selection 8	81.63	12.06	2.0	0.57	2.44	36.13	10.35	0.014	10.33
Selection 9	81.70	16.40	2.3	0.66	2.84	36.73	16.20	0.018	16.18
Selection 10	80.13	12.71	2.1	0.53	2.67	35.33	10.47	0.012	10.45
Mean	82.28	14.50	2.14	0.60	2.63	34.35	13.19	0.013	13.18
CD at 5%	N.S.	4.13	N.S.	0.02	0.44	2.30	0.29	0.001	1.31

followed by 'Selection 9', 'Selection 8' and 'Selection 5', whereas the minimum pulp percent was recorded in 'Selection 6'. The genotypes produced higher pulp percent may be due to more fruit weight and less seed weight. This clearly indicated that, during selection of any genotypes based on fruit, the breeder should give emphasis on fruit pulp content rather than fruit weight alone. The seed percent was minimum in 'Selection 1' followed by 'Selection 9' and 'Selection 8'. The maximum seed percent was noticed in 'Selection 6'. The seed percent fully depends on fruit weight and pulp. If pulp is more definitely seed percent will be less and vice-versa. The range of pulp: seed ratio was 9.5 to 2.8, which showed the wide variability among genotypes. The pulp: seed ratio is an important aspect for selection of superior genotype to breeder. Similar results were also reported by Garnade *et al.* (5), and Kumar *et al.* (7) agreed with these findings.

The data presented in table 2 showed wide variation in chemical characters of fruits. Moisture content varied 79.75 percent to 85.50 percent with non-significant difference. However, the maximum moisture content was observed in 'Selection 1' followed by 'Selection 6' and 'Selection 2', whereas the least moisture content was noticed in 'Selection 7'. The maximum moisture percent in 'Selection 1' might be due to high pulp moisture percentage and low seed percentage. Roy *et al*. (13) in jamun also reported similar results. However variation in moisture content among various genotypes may be due to genetic constitution of plants. The highest total soluble solids were recorded in the pulp of 'Selection 1' followed by 'Selection 6', 'Selection 9' and 'Selection 2', whereas the lowest TSS was in 'Selection 7'. The variation in total soluble solids may be due to genetic make up of plant. These findings were in conformity with the work of Kumar *et al.* (7), Roy *et al.* (13), Priya Devi *et al.* (10) and Singh *et al.* (14) in jamun. The breeders during selection of superior genotypes should emphasize total soluble solids content of the fruit. Titratable acidity content of the fruit ranged from 1.9 percent to 2.4 percent among genotypes of jamun with non-significant differences. The maximum titrable acidity was recorded in 'Selection 7' followed by 'Selection 3' and 'Selection 9' whereas it was the lowest in 'Selection 1'. This is a fact in many fruits that, if total soluble solids are increasing definitely acidity will be decreased. This may be major factor for minimum acid content in 'Selection 1' whereas variation among genotypes for acidity percent might be due to total soluble solids content and genetic make of plant. These findings were partially supplemented by Singh *et al.* (14) in jamun and Chauhan and Dhaliwal, (4) in guava.

Table 2 further exhibits the protein percent in *jamun* pulp also varied from 0.48 percent to 0.81 percent. The maximum protein percent was recorded in 'Selection 1' followed by 'Selection 6' and 'Selection 9' and differed significantly, whereas the least percent protein was noticed in 'Selection 7'. The variation among genotypes may be due to their genetic make up and weather conditions during maturity of fruit. It is a fact that if total soluble solids are high then protein content will also be more. A similar finding was reported by Kumar *et al.* (7). Pectin percent in various genotypes also varied from 2.02 percent to 3.38 percent. The maximum pectin content was observed in 'Selection 6' followed by 'Selection 4' and 'Selection 9', whereas it was the minimum in 'Selection 1'. High percentage of pectin makes fruit more suited for jelly making. Therefore, during the selection of superior genotypes the breeder should also consider the pectin content of the fruit. Seasonal variation was also observed among genotypes instead of genetic

constituents of plant due to change in weather conditions during growth and development of fruits. These results are also in conformity with findings of Kumar *et al.* (7) and Roy *et al.* (13). There was a considerable variability in ascorbic acid content of fruit, which ranged from 31.20 (mg/100 g) to 39.20 (mg/100 g) among genotypes. The maximum ascorbic acid content was noticed in 'Selection 1' followed by 'Selection 9' and differed significantly, while, it was minimum in 'Selection 3'. It is a fact that, if total soluble solids content increase, the ascorbic acid contents of fruit also increases because the precursor of ascorbic acid is glucose-6-phosphate. There was a little bit reduction in ascorbic acid content of fruit pulp during 2002, which might be due to early rainfall in the year boosting earlier ripening in fruits. These findings are in accordance with findings of Bajpai (3).

A wide range of variability was also recorded in total sugar content among genotypes during both the years. The sugar content ranged from 7.92 percent to 10.22 percent. The highest total sugar percent was recorded in 'Selection 1' followed by 'Selection 6' and 'Selection 2'. The minimum total sugar percent was noticed in 'Selection 7'. The variation in total sugar content among genotypes differed significantly and it may be due to genetic makeup of plant. Here total sugar content in jamun was similar to total soluble solids content of fruit pulp. Variation was also noticed in reducing sugar and non-reducing sugar. The maximum reducing sugar was in 'Selection 1' followed by 'Selection 6' and 'Selection 9', whereas the minimum was in 'Selection 7'. There was a trace amount of non-reducing sugar recorded among investigated genotypes in contrast to report of Roy *et al.* (13). However, these findings are conformity with results of Patel *et al.* (11) and Priya Devi *et al.* (10). Shakya *et al* (15) narrow genetic difference evident by molecular markers among various genotypes jamun belongs to Lucknow.

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