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Studies on Variability of Morphological Characters of Fruit Habits on Jamun (*Syzygium cuminii* Skeels) Genotypes Growing in Northern Bastar Plateau Region of Chhattisgarh

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ABSTRACT

Surveys were undertaken for characterization and evaluation of genetic diversity of Jamun (*Syzygium cuminii* Skeels) of seedling origin for different morphological characters of flowering habits and fruit characters during 2016-17 and 2017-18 in the Jamun growing in Northern Bastar Plateau region of Chhattisgarh areas. The experiment was arranged in randomized block design with four replications and was carried out to assess the morphological characters of fruit habits on sixty jamun genotypes. Investigations were undertaken during the entire reproductive phase toassess the distribution, range and to record the range of genetic variability of different morphological traits on the selected sixty trees. Parameters like Month of flower initiation, flower colour and date of flower initiation were assessed during flowering time. Mature fruits were plucked and analyzed for different parameters such as fruit shape, fruit colour and fruit waxiness, duration of fruit, pulp colour, fruit taste, fruit astringency and Juiciness. Results of evaluated Jamun genotypes showed wide variability for studied characteristic and variation is thepre requisite for crop improvement.

Keywords: Flowering, Fruit, Variability, Genotypes, Jamun.

Introduction

Jamun (*Syzygium cuminii* Skeels.) is an evergreen multifarious tree. It is an important underutilized fruit. It belongs to the Myrtaceae family (2n = 40) and is a native of India. It is commonly known as humble fruit, Black Plum, Jambolan, *etc*. Trees are tall and distributed throughout India and valuable for its

edible fruits. It is highly adapted to diverse environmental conditions and grows successfully in all tropical and sub-tropical parts. It is hardy crop which can withstand drought conditions and appropriate for planting in marginal and wasteland. The fruit being highly nutritious and holds a great medicinal value which have gained immensely importance in recent times due to its role in diabetes management. The principle sugar present in the ripe fruit is sucrose and fructose. Seed contains a glycoside jambolin or antimallin alkaloid jambosin, which can decreased or stop the diastatic transformation of complex carbohydrates starch into simple sugars. The antioxidant activity of jamun fruit has been creditedto its total phenolic compounds. Ripe fruit are tremendously relished and have a significant demand in the season of availability. Jamun being highly valued for its fruits seeds and leaves and are recommended controlling diabetes, dysentery, diarrhea, edema, ringworm, fever, *etc*. The timber is used for making plywood and agricultural implements as it is durable. Jamun being an important minor fruit crop, organized culture in the form orchard is rarely noticed under the Indian conditions. However, it is planted in homelands, public compounds, along avenues, as windbreak and also grows as stray trees in large number. Besides India, it is also found growing in countries like Philippines, Thailand, West Indies, Madagascar, Indonesia, Malaysia, Myanmar, Bangladesh and many other tropical and sub-tropical climatic conditions (Morton, 1987). The production of jamun in world is estimated as 13.5 million tones out of which India contributed 15.4% (Singh, *et al*., 2011) and rank second for its highest production in the world. The largest producer of jamun in our country is the state Maharashtra accompanied by Uttar Pradesh, Tamil Nadu, Gujarat and Assam. The limitation in the availability of varieties is mainly due to meager research work and relatively long pre-bearing period hindrance the extent of area under this underutilized crop jamun. Recently, attempts have been made in determining the superior germplasm (Anon., 1976). The variations are important source for a tree breeder to improve a species. Variations can be successfully utilized for adaptability of a species e.g. drought resistance or selection of a suitable genotype for growth or fruit quality etc. (Sundaram, *et al.,* 2003). The genetic gain can be realized by making seed collections from phenotypically and genotypically superior trees or stands. Evaluation of seedling progeny with respect to high yielding elite trees irrespective of fruit quality is the global opportunity for escalating the research programme, thereby augmenting the fruit character in many parts. Widening the genetic base thereby, establishing the new alleles which are confined in introduced germplasm (Faenza *et al*., 1982) and orderly accomplishment of heterosis (Masawe, 1994) have being suggested as mean to incorporate the costly characters in breeding programme. Therefore, variability studies are a prerequisite for improvement of a species.

Materials and Methods

This study was carried out at the Northern Bastar Plateau Region of Chhattisgarh and the collected genotypes were analyzed in the quality laboratory of the Department of Horticulture, College of Horticulture and Research Station, Kanker, IGKV, Raipur, Chhattisgarh during February to July of

2016-17 and 2017-18. Sixty promising genotypes of8 to 15 year jamun tree were collected. Visual observation was initiated for the flowering and fruit characters which are described in Minimal descriptors of jamun in NBPGR, 2002. Fruit shape, fruit colour and fruit waxiness were visualized in fully mature fruits were determined by following standard procedures.

Results and Discussions

The data pertaining to morphological characters on flowering and fruit characters of jamun genotypes showed significant difference and a high degree of variability for all the characters studied (Table 1, Table 2 and Table 3)

Table 1: Morphological characters of flowering habit of different jamun genotypes

Sl. No.	Treatments	Month of flower initiation	flower colour	Date of initiation		Duration
				Flowering	Harvesting	
1	CGJAM- 1	March	L. yellow	15th March	23rd June	100
2	CGJAM- 2	February	L. yellow	24th February	26th May	67
3	CGJAM- 3	February	G. white	15th February	12th May	86
4	CGJAM- 4	April	G. white	15th April	23rd June	69
5	CGJAM- 5	March	L. yellow	20th March	15th June	87
6	CGJAM- 6	April	L. yellow	20th April	10th July	81
7	CGJAM- 7	February	L. yellow	18th February	10th May	81
8	CGJAM- 8	March	L. yellow	16th March	10th June	86
9	CGJAM- 9	April	L. yellow	10th April	23rd June	74
10	CGJAM- 10	April	L. yellow	12th April	22nd June	71
11	CGJAM- 11	April	L. yellow	10th April	22nd June	73
12	CGJAM- 12	April	G. white	16th March	9th June	85
13	CGJAM- 13	February	G. white	15th February	14th May	88
14	CGJAM- 14	February	L. yellow	18th February	10th May	81
15	CGJAM- 15	March	G. white	15th April	5th July	81
16	CGJAM- 16	April	G. white	18th April	30th June	73
17	CGJAM- 17	April	L. yellow	12th April	5th July	84
18	CGJAM- 18	April	L. yellow	6th April	30th June	85
19	CGJAM- 19	March	L. yellow	20th March	12th June	84
20	CGJAM- 20	March	L. yellow	20th March	10th June	82
21	CGJAM- 21	April	L. yellow	12th April	5th July	84
22	CGJAM- 22	April	L. yellow	12th April	30th June	79
23	CGJAM- 23	April	L. yellow	18th April	5th July	78
24	CGJAM- 24	April	L. yellow	18th April	30th June	73
25	CGJAM- 25	March	L. yellow	18th March	10th June	84
26	CGJAM- 26	April	L. yellow	29th April	12th July	74
27	CGJAM- 27	February	L. yellow	18th February	18th May	89
28	CGJAM- 28	February	L. yellow	24th February	20th May	85
29	CGJAM- 29	February	G. white	28th February	26th May	87
30	CGJAM- 30	February	G. white	26th February	26th May	89

31	CGJAM- 31	March	L. yellow	15th March	06th June	83
32	CGJAM- 32	March	L. yellow	20th March	15TH June	87
33	CGJAM- 33	March	G. white	20th March	15th June	87
34	CGJAM- 34	March	G. white	20th March	10th June	82
35	CGJAM- 35	March	L. yellow	18th March	10th June	82
36	CGJAM- 36	April	L. yellow	24th April	05th July	72
37	CGJAM- 37	March	G. white	24th March	15th June	83
38	CGJAM- 38	April	G. white	28th April	05th July	68
39	CGJAM- 39	April	L. yellow	24th April	05th July	72
40	CGJAM- 40	April	L. yellow	25th April	10th July	76
41	CGJAM- 41	April	L. yellow	12th April	10th July	89
42	CGJAM- 42	April	L. yellow	12th April	05th July	84
43	CGJAM- 43	April	L. yellow	23rd April	05th July	73
44	CGJAM- 44	April	L. yellow	24th April	05th July	72
45	CGJAM- 45	April	L. yellow	10th April	05th July	86
46	CGJAM- 46	March	L. yellow	15th March	10th June	87
47	CGJAM- 47	February	G. white	15th February	20th May	94
48	CGJAM- 48	February	G. white	12th February	20th May	91
49	CGJAM- 49	April	L. yellow	18th April	30th June	73
50	CGJAM- 50	April	G. white	12th April	30th June	79
51	CGJAM- 51	April	G. white	16th April	30th June	75
52	CGJAM- 52	April	L. yellow	18th April	30th June	73
53	CGJAM- 53	April	L. yellow	24th April	30th June	67
54	CGJAM- 54	April	G. white	15th April	05th July	81
55	CGJAM- 55	February	G. white	20th February	20th May	89
56	CGJAM- 56	February	L. yellow	20th February	18th May	87
57	CGJAM- 57	April	L. yellow	22nd April	05th July	74
58	CGJAM- 58	April	G. white	18th April	05th July	78
59	CGJAM- 59	April	G. white	16th April	30th June	75
60	CGJAM- 60	April	G. white	16th April	30th June	75

Note: i. L. yellow- Light yellow ii. G. white- Greenish white

Table 2: Morphological characters of fruit habits and maturity of different jamungenotypes

Sl. No.	Treatments	Fruit Shape	Fruit Colour	Fruit skin waxiness	Fruit base	Fruit maturity
1	CGJAM- 1	Round	Bluish black	Less	Projected	Late
2	CGJAM- 2	Oblong	Bluish black	High	Flat	Mid
3	CGJAM- 3	Oblong	Deep purple	High	Depressed	Early
4	CGJAM- 4	Oval	Bluish Black	High	Projected	Late
5	CGJAM- 5	Oval	Deep purple	High	Depressed	Mid
6	CGJAM- 6	Oblong	Deep purple	High	Depressed	Late
7	CGJAM- 7	Oval	Deep purple	Less	Projected	Early

8	CGJAM- 8	Oblong	Pinkish	High	Flat	Mid
9	CGJAM- 9	Round	Bluish Black	Less	Projected	Late
10	CGJAM- 10	Oblong	Violet	High	Flat	Late
11	CGJAM- 11	Round	Deep purple	High	Depressed	Late
12	CGJAM- 12	Ellipsoid	Bluish black	Medium	Projected	Mid
13	CGJAM- 13	Oval	Bluish black	High	Flat	Early
14	CGJAM- 14	Oblong	Bluish black	High	Flat	Early
15	CGJAM- 15	Oblong	Pinkish	Medium	Flat	Late
16	CGJAM- 16	Ellipsoid	Deep purple	Less	Projected	Late
17	CGJAM- 17	Oblong	Bluish black	High	Flat	Late
18	CGJAM- 18	Oval	Pinkish	High	Flat	Late
19	CGJAM- 19	Oblong	Violet	High	Depressed	Mid
20	CGJAM- 20	Oblong	Violet	Medium	Depressed	Mid
21	CGJAM- 21	Ellipsoid	Bluish black	Less	Projected	Late
22	CGJAM- 22	Round	Deep purple	High	Flat	Late
23	CGJAM- 23	Oblong	Bluish black	Less	Projected	Late
24	CGJAM- 24	Oblong	Deep purple	High	Flat	Late
25	CGJAM- 25	Oblong	Deep purple	High	Depressed	Mid
26	CGJAM- 26	Oblong	Bluish black	High	Flat	Late
27	CGJAM- 27	Oblong	Bluish black	High	Flat	Early
28	CGJAM- 28	Round	Deep purple	Medium	Projected	Early
29	CGJAM- 29	Round	Violet	Medium	Flat	Mid
30	CGJAM- 30	Ellipsoid	Bluish black	Less	Projected	Mid
31	CGJAM- 31	Oblong	Bluish black	High	Flat	Mid
32	CGJAM- 32	Oblong	Pinkish	Medium	Flat	Mid
33	CGJAM- 33	Oblong	Bluish black	High	Flat	Mid
34	CGJAM- 34	Ellipsoid	Deep purple	Less	Projected	Mid
35	CGJAM- 35	Oval	Bluish Black	Medium	Projected	Mid
36	CGJAM- 36	Oval	Bluish Black	Medium	Flat	Late
37	CGJAM- 37	Ellipsoid	Bluish Black	Medium	Projected	Mid
38	CGJAM- 38	Round	Bluish Black	Less	Projected	Late
39	CGJAM- 39	Oval	Bluish Black	Medium	Projected	Late
40	CGJAM- 40	Oblong	Violet	High	Depressed	Late
41	CGJAM- 41	Oblong	Deep purple	High	Flat	Late
42	CGJAM- 42	Ellipsoid	Violet	Medium	Projected	Late
43	CGJAM- 43	Ellipsoid	Bluish black	Medium	Projected	Mid
44	CGJAM- 44	Oval	Bluish black	High	Depressed	Mid
45	CGJAM- 45	Round	Violet	High	Depressed	Late
46	CGJAM- 46	Round	Violet	Less	Projected	Mid
47	CGJAM- 47	Round	Deep purple	Less	Projected	Early
48	CGJAM- 48	Oblong	Deep purple	High	Flat	Early
49	CGJAM- 49	Round	Deep purple	High	Depressed	Late
50	CGJAM- 50	Oblong	Bluish black	High	Depressed	Late
51	CGJAM- 51	Oval	Violet	Medium	Projected	Late
52	CGJAM- 52	Oval	Deep purple	High	Depressed	Late
53	CGJAM- 53	Oblong	Deep purple	High	Depressed	Late
54	CGJAM- 54	Ellipsoid	Bluish black	Medium	Projected	Late

55	CGJAM- 55	Oblong	Deep purple	High	Flat	Early
56	CGJAM- 56	Oblong	Deep purple	High	Flat	Early
57	CGJAM- 57	Oblong	Deep purple	High	Flat	Late
58	CGJAM- 58	Oblong	Bluish black	Medium	Flat	Late
59	CGJAM- 59	Oblong	Bluish black	Medium	Flat	Late
60	CGJAM- 60	Oblong	Bluish black	High	Flat	Late

Table 3: Morphological characters of fruit habits and pulp colour of different jamun genotypes

Sl. No.	S. No.	Pulp colour	Fruit taste	Fruit astringency	Juiciness
1	CGJAM- 1	Purple pink	Sub acidic	Mild	Less
2	CGJAM- 2	Pinkish	Less sweet	Moderate	High
3	CGJAM- 3	Whitish	Sweet	Moderate	Medium
4	CGJAM- 4	Purple pink	Sub acidic	Mild	Less
5	CGJAM- 5	Purple pink	Sweet	Moderate	Medium
6	CGJAM- 6	Whitish	Less sweet	Strong	High
7	CGJAM- 7	Purple pink	Sub acidic	Mild	Less
8	CGJAM- 8	Purple pink	Sub acidic	Mild	Less
9	CGJAM- 9	Purple pink	Sub acidic	Strong	Less
10	CGJAM- 10	Purple pink	Sweet	Moderate	Medium
11	CGJAM- 11	Whitish	Less sweet	Mild	High
12	CGJAM- 12	Purple pink	Less sweet	Strong	Less
13	CGJAM- 13	Pinkish	Sweet	Mild	High
14	CGJAM- 14	Purple pink	Less sweet	Moderate	Medium
15	CGJAM- 15	Pinkish	Less sweet	Moderate	Medium
16	CGJAM- 16	Purple pink	Less sweet	Mild	Less
17	CGJAM- 17	Pinkish	Sweet	Mild	Medium
18	CGJAM- 18	Whitish	Sub acidic	Mild	Medium
19	CGJAM- 19	Pinkish	Less sweet	Moderate	Medium
20	CGJAM- 20	Whitish	Sweet	Moderate	Medium
21	CGJAM- 21	Purple pink	Sub acidic	Mild	Medium
22	CGJAM- 22	Pinkish	Sub acidic	Mild	Medium
23	CGJAM- 23	Purple pink	Less sweet	Moderate	Medium
24	CGJAM- 24	Purple pink	Sweet	Moderate	Medium
25	CGJAM- 25	Whitish	Sub acidic	Strong	High
26	CGJAM- 26	Purple pink	Sweet	Mild	High
27	CGJAM- 27	Pinkish	Sweet	Mild	High
28	CGJAM- 28	Whitish	Less sweet	Moderate	Medium
29	CGJAM- 29	Purple pink	Sub acidic	Strong	Medium
30	CGJAM- 30	Purple pink	Sub acidic	Strong	Medium
31	CGJAM- 31	Pinkish	Less sweet	Moderate	Medium
32	CGJAM- 32	Pinkish	Sub acidic	Mild	Medium
33	CGJAM- 33	Pinkish	Sweet	Mild	High
34	CGJAM- 34	Purple pink	Sub acidic	Moderate	Less
35	CGJAM- 35	Pinkish	Sub acidic	Strong	High

36	CGJAM- 36	Purple pink	Sub acidic	Moderate	Medium
37	CGJAM- 37	Purple pink	Sub acidic	Mild	Less
38	CGJAM- 38	Purple pink	Sub acidic	Moderate	Less
39	CGJAM- 39	Pinkish	Less sweet	Moderate	Medium
40	CGJAM- 40	Pinkish	Sub acidic	Strong	Medium
41	CGJAM- 41	Purple pink	Less sweet	Moderate	High
42	CGJAM- 42	Purple pink	Sub acidic	Moderate	Less
43	CGJAM- 43	Purple pink	Sub acidic	Mild	Medium
44	CGJAM- 44	Whitish	Less sweet	Mild	Medium
45	CGJAM- 45	Pinkish	Less sweet	Moderate	Medium
46	CGJAM- 46	Purple pink	Sub acidic	Mild	Less
47	CGJAM- 47	Purple pink	Sub acidic	Strong	Less
48	CGJAM- 48	Purple pink	Less sweet	Mild	Medium
49	CGJAM- 49	Pinkish	Sweet	Moderate	High
50	CGJAM- 50	Pinkish	Less sweet	Strong	High
51	CGJAM- 51	Whitish	Sub acidic	Mild	High
52	CGJAM- 52	Pinkish	Sweet	Moderate	Medium
53	CGJAM- 53	Pinkish	Sweet	Moderate	High
54	CGJAM- 54	Purple pink	Sub acidic	Strong	Less
55	CGJAM- 55	Pinkish	Less sweet	Mild	Medium
56	CGJAM- 56	Pinkish	Sweet	Mild	High
57	CGJAM- 57	Purple pink	Sub acidic	Mild	High
58	CGJAM- 58	Purple pink	Sweet	Moderate	Medium
59	CGJAM- 59	Pinkish	Sweet	Moderate	Medium
60	CGJAM- 60	Purple pink	Less sweet	Moderate	High

Results and Discussions

Morphological characters of flowering habits of different jamun genotypes

The results of the data pertaining to flowering characters of different jamun genotypes were recorded and presented in Table 1.

The collected data showed that flowering season of jamun was initiated from fortnight of February to last week of April. Out of the 60 genotypes, 13 genotypes namely CGJAM-2, CGJAM-3, CGJAM-7, CGJAM-13, CGJAM-14, CGJAM-27, CGJAM-28, CGJAM-29,
CGJAM-30, CGJAM-47, CGJAM-48, CGJAM-55 and CGJAM-56 had initiated flowering during February month while, 14 genotypes namely CGJAM-1, CGJAM-5, CGJAM-8, CGJAM-15, CGJAM-19, CGJAM-20, CGJAM-25, CGJAM-31, CGJAM-32, CGJAM-33, CGJAM-34,
CGJAM-35, CGJAM-37 and CGJAM-46 started flowering in March month and remaining 33 genotypes had initiated flowering in April month. Highly significant difference was noticed around the sixty genotypes concerning to the time of initiation of flowering. For flower colour, 60 genotypes were classified into two head that is light yellow and greenish white. Out of the 60 genotypes studied, 21

genotypes namely CGJAM-3, CGJAM-4, CGJAM-12, CGJAM-13, CGJAM-15, CGJAM-16, CGJAM-29, CGJAM-30, CGJAM-33, CGJAM-34, CGJAM-37, CGJAM-38, CGJAM-47, CGJAM-48, CGJAM-50, CGJAM-51, CGJAM-54, CGJAM-55,

CGJAM-58, CGJAM-59 and CGJAM-60 had greenish white and remaining 39 genotypes had light yellow flower colour. The observations revealed that the genotypes showed significant variations in the date of flower initiation and harvesting. Out of the 60 genotypes studied, CGJAM-48 genotype showed early initiation of flowering (12th Feb.) and followed by 15th Feb. which was recorded in CGJAM-3, CGJAM-13 and CGJAM-47 genotypes. Late flowering was showed in genotypes CGJAM-26 (29th April) followed by CGJAM-38 (28th April) which on par with CGJAM-40 (25th April) and 24th April which was recorded in CGJAM-39 and CGJAM-53 genotypes. Early harvesting of fruit was recorded at 10th May which was noted in genotypes CGJAM-7 and CGJAM-14 and late was observed at 12th July showed in CGJAM-26. The highest frequency for initiation of flowering was noted in late category (> 26th March) 55% while, minimum genotypes were recorded in early flowering (10th Feb. to 10th March) with 21.67%. Maximum frequency for initiation of harvesting was noted in mid to late June category while, minimum was notified in mid to late May month. For duration the days taken from flower initiation to harvesting is calculated and all the 60 genotypes were found significant differences among the different genotypes. Out of the 60 genotypes studied, CGJAM-1 had maximum duration (100 days) and minimum was recorded in CGJAM-2 and CGJAM-53 (67 days and 67 days, respectively) followed by CGJAM-38 (68 days). The observations revealed that the highest frequency of genotypes had found to had medium-(76 to 85 days) duration category with 41.67% whereas, minimum genotypes were noted as long- (>86 days) with 28.33%. Jamun flowers show a wide variation during flowering and it flowers once in a year. It is mass-flowering semi-evergreen tree species flowers usually during dry season. The floral traits suggest a mixed pollination existing both entomophily and anemophily together namely as ambophily. The flowers have many-ovule (embryonic and nucellar) but only single ovule shaped into seed hence, fruit and seed set rates are equal (Solomon *et al*, 2014). Orwa, *et al*., (2009) recorded white flower clusters on old twigs similarly, light yellow colour of flower were recorded in 39 genotypes and greenish white colour in 21 genotypes (Table 1). Evaluating the flowering attributes are the main principal for the plant breeder. Bajpai *et al.* (2012) and Solomon *et al.* (2014) during a study on reproductive ecology revealed that flower bud initiation of jamun recorded from 3rdweek of February and continued till mid-May. In the present study also month of flower initiation was observed from 12th February in CGJAM-48 followed by 15th February in three genotypes *viz.* CGJAM- 3. CGJAM-13 and CGJAM-47 lasting to 29th April which was

recorded in CGJAM- 26 genotype followed by 28th April which was noted in CGJAM-38 (Table 1). Results revealed that different genotypes significantly influenced the duration *i.e.* days required from flowering to harvesting. The highest was recorded in CGJAM- 1 (100 days) followed by CGJAM 47 (94 days) and lowest was recorded in CGJAM-2 (67 days) and CGJAM-53 (67 days), respectively (Table 1). Similar findings with respect to variability in duration were reported by Bajpai *et al.* (2012) and Solomon

et al. (2014).

Morphological characters of fruit habits and maturity of different jamun genotypes

Observations on the fruit habits and maturity characters of sixty jamun genotypes arepresented in Table 2 described below:

The data pertaining to fruit shape in different genotypes of jamun are presented in Table 2. All the 60 genotypes were categorized into 4 group's *viz*. round, oblong, oval and ellipsoid. Among 60 genotypes, 11 genotypes namely CGJAM-1, CGJAM-9, CGJAM-11, CGJAM-22, CGJAM-28, CGJAM-29, CGJAM-38, CGJAM-45, CGJAM-46, CGJAM-47 and CGJAM-49 round shape while, 11 genotypes namely CGJAM-4, CGJAM-5, CGJAM-7, CGJAM-13, CGJAM-18, CGJAM-35, CGJAM-36, CGJAM-39, CGJAM-44, CGJAM-51 and CGJAM-52 had showed oval in shape whereas, 9 genotypes namely CGJAM-12, CGJAM-16, CGJAM-21, CGJAM-30, CGJAM-34, CGJAM-37, CGJAM-42, CGJAM-43 and CGJAM-54 had found ellipsoid and remaining 29 genotypes had oblong fruit shape. The highest frequency of fruit shape was recorded in oblong shape category 48.33 % whereas, lowest was observed in ellipsoid 15%. The data pertaining on fruit skin colour showed variation (Table 2) among different genotypes. All the 60 genotypes were categorized into 4 group's *viz*. bluish black, deep purple, pinkish and violet. Out of the 60 genotypes under research, 20 genotypes namely CGJAM-3, CGJAM-5, CGJAM-6, CGJAM-7, CGJAM-11, CGJAM-16, CGJAM-22, CGJAM-24, CGJAM- 25, CGJAM-28, CGJAM-34, CGJAM-41, CGJAM-47, CGJAM-48, CGJAM-49, CGJAM-53, CGJAM-55, CGJAM-56 and CGJAM-57 had deep purple colour fruits while, 9 genotypes namely CGJAM-10, CGJAM-19, CGJAM-20, CGJAM-29, CGJAM-40, CGJAM-42, CGJAM- 45, CGJAM-46 and CGJAM-51 had violet whereas, 4 genotypes namely CGJAM-8, CGJAM- 15, CGJAM-18 and CGJAM- 32 had pinkish colour of fruit skin and remaining 27 genotypes had bluish black fruit colour. Maximum frequency of fruit skin colour was recorded in bluish black category with 45% and minimum was noted in pinkish with 6.67 %. The data pertaining on

fruit skin waxiness observed noteworthy distinction within the 60 genotypes under investigation (Table 2) and was categorized into high, medium and less. Out of the 60 genotypes, 16 genotypes namely CGJAM-12, CGJAM-15, CGJAM-20, CGJAM-28, CGJAM-29, CGJAM-32, CGJAM-35, CGJAM-36, CGJAM-37, CGJAM-39, CGJAM-42, CGJAM-43, CGJAM-51,

CGJAM-54, CGJAM-58 and CGJAM-59 conferred to had medium skin fruit waxiness whereas, 11 genotypes namely CGJAM-1, CGJAM-7, CGJAM-9, CGJAM-16, CGJAM-21, CGJAM-23,

CGJAM-30, CGJAM-34, CGJAM-38, CGJAM-46 and CGJAM-47 had less and remaining 33 genotypes had noted as high fruit skin waxiness. The maximum frequency of fruit skin waxiness was observed in high category with 55% and minimum was noted in less with 18.33%. Fruit base also showed variation among different jamun genotypes (Table 2) and was categorized into 3 groups such as flat, projected and depressed. Out of the 60 genotypes under study for base of fruits, 21 genotypes namely CGJAM-1,

CGJAM-4, CGJAM-7, CGJAM-9, CGJAM-12, CGJAM-16, CGJAM-21, CGJAM-23, CGJAM-28, CGJAM-30, CGJAM-34, CGJAM-35, CGJAM-37, CGJAM-38, CGJAM-39, CGJAM-42, CGJAM-43, CGJAM-46, CGJAM-47,

CGJAM-51 and CGJAM-54 had noted as projected whereas, 14 genotypes *viz*., CGJAM-3, CGJAM-5, CGJAM-6, CGJAM-11, CGJAM-19, CGJAM-20, CGJAM-25, CGJAM-40, CGJAM-44, CGJAM-45, CGJAM-49, CGJAM-50, CGJAM-52 and CGJAM-53 had recorded as

depressed and remaining 25 genotypes had noted as flat fruit base. The highest frequency of fruitbase was recorded in flat fruit base category with 41.67% and lowest was showed in depressed with 23.33%. Maturity of fruit showed significant variation among the jamun genotypes (Table 2) and was categorized into early, mid and late maturation. Out of the 60 genotypes under study for fruit maturity, 18 genotypes namely CGJAM-2, CGJAM-5, CGJAM-8, CGJAM-12, CGJAM-19, CGJAM-20, CGJAM-25, CGJAM-29, CGJAM-30, CGJAM-31, CGJAM-32, CGJAM-33, CGJAM-34, CGJAM-35, CGJAM-37, CGJAM-43, CGJAM-44 and CGJAM-46

had recorded as mid whereas, 10 genotypes *viz*., CGJAM-3, CGJAM-7, CGJAM-14, CGJAM- 13, CGJAM-28, CGJAM-27, CGJAM-47, CGJAM-48, CGJAM-55 and CGJAM-56 had

recorded as early and remaining 32 genotypes had showed late fruit maturity. The highest frequency of fruit maturity was observed in late category (> 85) with 53.33% and lowest was recorded in early category (<75) with 16.67%. Asraf (1987) reported that the shape of jamun fruit varies from round to oblong and the base of the fruit exhibit as flat to projected. Similar results were obtained in study taken by Kundu *et al*., 2001 in West Bengal. The variation in

shape, base and fruit maturity of jamun fruit might be due to the genetic influence and climatic factors. Similar research were revealed in same family fruit by Sharma *et al.* (2010), Meena *et al.* (2013) and Pandey *et al.* (2016) in guava. Difference appearance of skin colour of jamun fruits might be due to their genetic makeup and phenotypic expressions which are influenced by micro climatic conditions as well as climatic conditions. Similar variations in colour of fruits were also revealed by Gohil *et al.* (2006) Sharma *et al*. (2010), Meena *et al.* (2013) and Pandey *et al.* (2016) in guava. Presence of natural skin waxiness helps fruit to resist the moisture loss and enhanced the fruit firmness which slows down the process of degradation. Minerals presence inside the fruit helps in translocation of photosynthates, protein synthesis, balancing of ionic and opening of plant stomata often called as quality nutrient because of their major effects on fruit quality factor such as size, shape and colour. Likewise outcome were justified by Khandaker, *et al*., 2013 in apple crop. In the current analysis, presence of fruit skin waxiness appears the fruit of jamun shine.

Morphological characters of fruit habits and pulp colour of different jamun genotypes

Observations on the fruit habits and pulp characters of sixty jamun genotypes areillustrated in table 3 outline underneath:

The data pertaining on pulp colour of different jamun genotypes was categorized into three groups *viz*., purple pink, pinkish and whitish (Table 3). Out of the 60 genotypes under study for fruit maturity, 21 genotypes namely CGJAM-2, CGJAM-13, CGJAM-15, CGJAM-17, CGJAM-19, CGJAM-22, CGJAM-27, CGJAM-31, CGJAM-32, CGJAM-33, CGJAM-35, CGJAM-39, CGJAM-40, CGJAM-45, CGJAM-49, CGJAM-50, CGJAM-52, CGJAM-53,

CGJAM-55, CGJAM-56 and CGJAM-59 had recorded with pinkish pulp colour whereas, 9 genotypes *viz*., CGJAM-3, CGJAM-6, CGJAM-11, CGJAM-18, CGJAM-20, CGJAM-25,

CGJAM-28, CGJAM-44 and CGJAM-51 had found with whitish and remaining 30 genotypes had purple pink pulp colour. The maximum frequency of pulp colour was observed in purple pink category with 50% and minimum was noted in whitish pulp colour with 15%. The data pertaining on fruit taste of different jamun genotypes are presented in (Table 3) and observed a noteworthy difference within the 60 genotypes under research. Out of the 60 genotypes for fruit taste, 19 genotypes namely CGJAM-2, CGJAM-6, CGJAM-11, CGJAM-12, CGJAM-14, CGJAM-15, CGJAM-16, CGJAM-19, CGJAM-23, CGJAM-28, CGJAM-31, CGJAM-39,

CGJAM-41, CGJAM-44, CGJAM-45, CGJAM-48, CGJAM-50, CGJAM-55 and CGJAM-60 had less sweet taste whereas, 16 genotypes *viz*., CGJAM-3, CGJAM-5, CGJAM-10, CGJAM-13,CGJAM-17, CGJAM-20, CGJAM-24, CGJAM-26, CGJAM-27, CGJAM-33, CGJAM-49,

CGJAM-52, CGJAM-53, CGJAM-56, CGJAM-58 and CGJAM-59 had noted as sweet and remaining 25 genotypes had showed sub acidic taste. The highest frequency of fruit taste was observed in sub acidic category with 41.66% and lowest was recorded in sweet taste with 26.66%. Astringency of fruit showed wide variation among different jamun genotypes (Table 3). Out of the 60 genotypes under study for fruit astringency, 11 genotypes namely CGJAM-6, CGJAM-9, CGJAM-12, CGJAM-25, CGJAM-30, CGJAM-29, CGJAM-35, CGJAM-40,

CGJAM-47, CGJAM-50 and CGJAM-54 had recorded with strong astringent whereas, 24 genotypes *viz*., CGJAM-1, CGJAM-4, CGJAM-7, CGJAM-8, CGJAM-11, CGJAM-13, CGJAM-16, CGJAM-17, CGJAM-18, CGJAM-21, CGJAM-22, CGJAM-26, CGJAM-27, CGJAM-32, CGJAM-33, CGJAM-37, CGJAM-43, CGJAM-44, CGJAM-46, CGJAM-48,

CGJAM-51, CGJAM-55, CGJAM-56 and CGJAM-57 had noted as mild and remaining 25 genotypes had recorded with moderate fruit astringent. Maximum frequency of fruit astringent was observed in moderate category with 41.66% followed by mild 40% and minimum was noticed in strong with 18.33%. Juiciness of fruit showed wide variation among different jamun genotypes (Table 3). Out of the 60 genotypes under study for fruit juiciness, 17 genotypes namely CGJAM-2, CGJAM-6, CGJAM-11, CGJAM-13, CGJAM-25, CGJAM-26, CGJAM-27, CGJAM-33, CGJAM-35, CGJAM-41, CGJAM-49, CGJAM-50, CGJAM-51, CGJAM-53,

CGJAM-56, CGJAM-57 and CGJAM-60 had recorded with high juice content whereas, 14 genotypes namely CGJAM-1, CGJAM-4, CGJAM-7, CGJAM-8, CGJAM-9, CGJAM-12, CGJAM-16, CGJAM-34,

CGJAM-38, CGJAM-37, CGJAM-42, CGJAM-46, CGJAM-47 and CGJAM-54 had noted with less and remaining 29 genotypes had showed medium juiciness. Maximum frequency of fruit juiciness was observed in medium category with 48.33% while, minimum was noticed in less with 23.33%. The variation among the genotypes with respect to quality factors such as pulp colour, fruit taste, astringency, juiciness might be due to inherent characters, genetic variation, climatic adaptability and soil condition of a particular region, which might prove an important concerned character for carefully choosing of genotypes for land races. The quality nutrients presence in fruits also affects the fruit quality factors. Similar results were obtained in study by Khandekar, *et al.*, 2013 in jamun. Occurring of definite magnitude of difference among the confined inhabitants furnish best opportunity for plant breeding in selecting the ideal genotype with higher yield and quality. Production of jamun in a specific location showed a wide variation and is more concerned to climatic condition as compare to genetic characters. However it is necessary to distinguish the attributes which might be utilized for tree improvement programme (Zobel and Jalbert, 1984). Improvement of tree through selection based on phenotype (what the tree look like) will decrease the sum of dissimilarity (Bagachi, 1995). Presence of morphological variation needs to be exploited for crop improvement programme and the extant of dissimilaritys in morphological attributes of jamun has been noticed by several researchers (Daware (1981), Inamdar *et al*. (2002) and Laxmikanth (2004)) and mango (Iyer *et al.*, 1988). Similar research has been also reported in other crops *viz*., sweet orange by Dubey (2004) and in guava by Singh (2003) and Athani *et al*. (2007).

References

Anonymous. 1976. The Wealth of India, Raw materials. Publication and Information Directorate, CSIR, New Delhi, Vol. **X**(S-W), p. 100-102.

Ashraf, S. M. 1987. Studies on postharvest technology of Jamun (*Syzgium cumuni* skeels) fruit. Ph.D. Thesis, N.D.U. & T, Faizabad. (U.P).

Athani, S.I., Patil, P.B., Swamy, G.S.K., Sabarad, A.I. and Gorabal, K.R. 2007. Studies on growth parameters and fruit characters in guava cultivars. Acta Hort., **735**(1): 271- 275.

Bagachi, S. K., 1995, Selection differential and predicted genetic gain in *Tectona grandis.* IndianFor., 482-490.

Bajpai, A. and Ravishankar, H., 2012. Studies on reproductive phenology, flower biology and pollination in jamun (*Syzygium cumini* L.). Indian J. Hort., **69** (3): 416-419.

Daware, S.G. 1981. Survey for selection of superior jamun (*Syzygium jambolanum*) and ber (*Zizyphus mauritiana*) strains in the Marathwada region. M.Sc. (Agri.) Thesis, M.K.V, Parbhani.

Dubey, A.K., Mishra, M. and Yadav, D.S., 2004, Softwood grafting in Khasi mandarin (*Citrus reticulate*Blanco). Indian J. Hort., **61**(3):263-264.

Faenza, V., Conticoini L. and Partel, L. 1982. The Collezioni national and international Anacardio in Tanzania. Riv. Agric. Subtrop. Trop., **76**: 191-219.

Gohil, S.N., Garad, B.V., Shirsath, H.K. and Desai, U.T. 2006. Study on physicochemical constituents in guava (*Psidium guajava* L.) under sub-arid zone of Maharashtra. Hort.Sci., 10: 139-147.

Inamdar, S., Swamy, G. S. K., Patil, P. B. and Athani, S. I., 2002, Correlation and path analysis studies in jamun for fruit characters. J. Maharashtra Agric. Univ., **27**: 212-213.

Iyer, C.P.A., Subbaiah, M.C., Subramanyam, M.D. and Prasadrao, G.S, 1988, Screening of germplasm and correlation among certain characters in mango. Acta Hort., **231**: 83-88.

Khandaker, M. M., Boyce, A. N., Osman, N., Golam, F., Rahman, M. M., and Sofian, A.M. 2013. Fruit development pigmentation and biochemical properties of wax apple affected by localized application of GA_3 under field conditions. Braz. Arch. Biol. Technol, **56**(1): 11-20.

Kundu, S., Ghosh, D.K. and Maiti, S.C. 2001. Evaluation of some local types of jamun (Syzyhium cuminii Skeels) of West Bengal. Environ. Ecol. **19**: 872-874.

Laxmikanth, 2004, Investigation of elite jamun (*Syzigium cuminii*) selects. M.Sc. (Hort) thesis, Univ. of Agril. Sci., Dharwad.

Masawe, P.A.L. 1994. Aspect of breeding and selecting improved cashew genotypes (*Anacardium occidentale* L.) Thesis, Univ. Read., UK.

Meena, R., Waghmare, G.M., Diwan, K. and Vadak, Y. 2013. Variability studies in red fleshed guava (*Psidium guajava* L.) genotypes for growth yield and quality attributes. AsianJ. Hort., **8** (2): 609-611.

Morton, J. 1987. Fruits of Warm Climates. Julia Morton; Winterville, NC.

Orwa, C., Mutua, A., Kindt, R., Jamnadass, R., and Simon, A. 2009. Agroforestree database Version 4: a tree reference and selection guide. Pp. 1-5.

Pandey, D., Pandey, A.K. and Yadav, S.K. 2016. Evaluation of newly developed guava cultivars & selections under Lucknow conditions. Indian J. Hort., **73** (3): 334-338.

Sharma, A., Sehrawat, S.K., Singhrot, R.S. and Tele, A. 2010. Morphological and chemical characterization of *Psidium* species. Not., Bot. Hort. Agrobot. Cluj., **38** (1): 28-32.

Singh, I.P. 2003. Performance of different guava (*Psidium guajava* L.) cultivars under Tripura climatic conditions. Prog. Hort., **35**(1): 55-58.

Singh, R., Singh, N., Patidar, R., Gurjar, P.S. and Tripathi, S. 2011. Performance of guava (*Psidium guajava* L.) varieties under Vindhya region of Madhya Pradesh. Life Sci. Bull., **8** (1): 61-62.

Solomon, R., Radhakrishna, J. and Hareesh, C., 2014. Reproductive ecology of *Syzygium alternifolium* (Myrtaceae), an endemic and endangered tropical tree species in the southern Eastern Ghats of India. J. Threatened Taxa, **6**(9): 6153-6171.

Sundaram, C., Sehgal, R.N. and Paramathma, M. 2003. Forest Tree Breeding. ICAR, New Delhi,p. 247.

Zobel, B. and Jalbert, J., 1984, Applied Forest Tree Improvement. John Wiley and Sons, New York.