Studies on Flowering Characteristics and Floral Morphology of Some Jamun Genotypes (*Syzygium cuminii* Skeels) under Semi-arid Lateritic Belt of West Bengal, India

ABSTRACT

A study was conducted to find out the variability of flowering behaviour and floral morphology of randomly selected 10 jamun genotypes (*Syzygium cuminii* Skeels) from 3 diferent districts namely Bankura, Purulia and Paschim Bardhaman under semi-arid lateritic belt of West Bengal during the year 2022. Only a single plant was considered for a single accession which was taken under the study. The selection was done on random basis. Significant variation has been observed among the genotypes for the flowering behaviour as well as morphological characters of flowers. Month of panicle emergence among the selected genotypes ranged from 1st week of March to last week of March. Time taken for bud development was observed 21 (days from panicle emergence) from three accessions like JA 9 was shortest among 10 jamun accessions studied. Longest time for bud development was observed in JA 4 (38 days). Duration of flowering was highest of 39 days in genotype JA 6 followed by 35 days in JA 10and 34 days in JA 4. The length of panicle was recorded longest from JA 1 (13.08 cm) and shortest in JA 2 (6.73 cm). Highest flower length was measured from JA 2 (26.39 mm) and lowest from JA 8 (8.31). Maximum number of branchlets per panicle was recorded from accessions like JA 1 (15.02) and it was least in JA 8 (7.39). Maximum number of flowers per branchlets was observed from JA 7 (12.07) followed by JA 4 (11.09). Number of stamens per flower varied between 58.04 and 67.07. The flower colour of all accessions was light yellow except JA 3(pale green). On the basis of this significant findings it can be conclude that the genotype JA 1 has most earliest flowering and biggest size flower from JA 2.

Keywords: *Jamun, flowering, genotypes*

INTRODUCTION:

Among the lesser known important fruit crops Jamun (*Syzygium cuminii* Skeels) is one of the evergreen, multipurpose tree (Bose *et al.*, 2001). This is one tall growing, hardy tree among the minor fruit crops under the family Myrtaceae. Jamun is considered to be native of India and its diversity can be found in India, Bangladesh, Sri Lanka, Thiland, Malaysia, Indonesia, Vietnum, Pakistan etc. (Periyathambi, 2007). Due to presence of various nutraceutical components like anthocyanins, phenolic compounds and antioxidants in abundance, jamun is known for possessing immense nutritional importance (Singh and Srivastava, 2000). Medicinal value particularly anticancerous property and anti-diabetic property present in jamun, it is also a major conern due to which the crop has been recognized a mediciallly important fruit rather a table fruit. The fruits are good source of iron, minerals, sugars and proteins (Singh *et al.*, 1967). The fermented or fresh jamun juice is reported to have various medicinal values as stomachic, carminative and diuretic, apart from having cooling and digestive properties (Thaper, 1958). The pulp and juice of the fruit is commonly used in controlling diarrhoea. Seeds of contain jambosin (an alkaloid) and a glycoside, jambolin or antimellin. These secondary metabolites of the seeds can reduce or stop conversion of starch into sugars in human body (Devi *et al.*, 2020).

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A considerable wide navigation in the diversity of jamun genotypes with respect to their growing habits, flowering behavior, fruiting and fruit quality parameters can be observed in Western dry tract of West Bengal as a huge population of this crop can be find as wild plant. The crop improvement programme of this crop is also lacking behind due to the long pre-bearing period and very few superior genotypes as identified by the scientists (Kundu *et al.*, 2001). Some studies have been made by various group of scientists to identify superior germplasm of jamun in different parts of India (Bajpai and Ravishankar, 2012; Devi *et al.*, 2002; Misra and Bajpai, 1984). Studies on variation in flowering behaviour, floral morphology and fruit set etc. are very indispensible part to start any crop improvement programme. Jamun exhibits a wide variation in 3 diferent districts namely Bankura, Purulia and Paschim Burdwan under semi-arid lateritic belt of West Bengal with respect to flowering behaviour, morphology of flower, fruit set and fruit drop, the present study has been undertaken to evaluate some jamun genotypes of the mentioned

locality with respect to their flowering and bearing habits under semi-arid lateritic belt of West Bengal.

MATERIAL AND METHODS:

Study Area

The study was conducted using 10 jamun genotypes (germplasm) which are available in the household gardens, foest area and other road side plantations from three (3) different districts namely; Bankura, Purulia and Paschim Bardhaman under semi-arid lateritic belt of West Bengal during the year 2022 to determine the degree of variation in flowering behavior, and floral morphology. Only a single plant was considered for a single accession which was taken under the study. The selection was done on random basis however the information regarding the age source of the plants etc. has been collected from the local people and the age group of the plant considered for the present experiment was 25 to 30 years. All plants were tagged and record of the GPS location has also been taken using handheld GPS (Garmin GPS 12H). The plans were visited frequently starting from January'2022 to April' 2022 to observe different flowering parameters, panicle characters along with the flower morphology of selected jamun genotypes. Observations on time of panicle emergence, time taken in bud development (days), flushing time, duration of flowering (days), length of panicle (cm), length of flowers (mm), number of branchlets/panicle, number of flowers /branchlets, number of stamens, number of sepals and flower colour have been taken during flowering season of all the jamun genotypes.

Data Analysis

All the numerical observations were subjected to simple mean analysis to compare all the jamun genotypes with respect to their flowering behavior and floral morphology using SPSS (George, 2011).

Table 1: Locations of Randomly Selected 10 Jamun Accessions from Various Blocks of Purulia, West Bardhaman and Bankura, West Bengal:

Sl. No.	Jamun Accessions	Location			GPS location	
		Village	Block	District	Latitude (^{o})	Longitude (^{o})
1	JA 1	Bishnupur	Kanksha	W. Bardhaman	23.616	87.409
2	JA 2	Jamdaha	Kanksha	W. Bardhaman	23.648	87.402
3	JA 3	Kataberia	Faridpur-Durgapur	W. Bardhaman	23.609	87.372
4	JA 4	Panchgachia	Barabani	W. Bardhaman	23.732	86.957
5	JA 5	Lagam	Jhalda II	Purulia	23.358	86.021
6	JA 6	Burda	Bagmundi	Purulia	23.236	85.983
7	JA 7	Puryara	Barabazar	Purulia	23.156	86.984
8	JA 8	Dhulai	Sonamukhi	Bankura	23.356	87.415
9	JA 9	Kakatia	Patrasayer	Bankura	23.204	87.455
10	JA 10	Bankisole	Patrasayer	Bankura	23.201	87.453

RESULTS AND DISCUSSION

The results regarding flowering parameters recorded, showed significant difference among different genotypes studied.The findings of present investigation summarized in table number 2.

Month of panicle emergence among the selected genotypes ranged from 1st week of March to last week of March (Table 2). It was recorded earliest from genotypes like JA 1, JA 2 and JA 4 much late in JA 10 (March end). Similar observations on flower initiation was reported by Mishra and Bajpai (1984); Bajpai *et al*. (2012) and Solomon *et al*. (2014).

Time taken for bud development was observed 21 (days from panicle emergence) from three accessions like JA 9 was shortest among 10 jamun accessions studied. Longest time for bud development was observed in JA 4 (38 days). Tarai and Kundu (2008) studied the flowering behavior of jamun and other minor fruits in the new alluvial zone of West Bengal and got similar results.

It is evident from the Table2 that peak period of flowering was earliest in genotype JA 1 (April 1st week) and in maximum genotypes it was in April mid (2nd and 3rd week). Tarai *et al.* (2006) reported that the flowering of jamun was started at the last week of March and ends at the last week of April which takes four week duration of flowering.

Duration of flowering was highest of 39 days in genotype JA 6 followed by 35 days in JA 10and 34 days in JA 4. It was recorded shortest fromJA 7 (24 days). The corresponding observation was recorded for 43 days in jamun by Misra and Bajpai (1984); Bajpai *et al.* (2012); Devi *et al.* (2016).

The length of panicle was recorded longest from JA 1 (13.08 cm) followed by JA 5 (11.27 cm) and shortest from JA 2 (6.73 cm). Highest flower length was measured from JA 2 (26.39 mm) and lowest from JA 8 (8.31). Maximum number of branchlets per panicle was recorded from accessions like JA 1 (15.02) and it was least in JA 8 (7.39). Whereas, Singh *et al.* (2012) reported highest panicle length (15.5 cm) and minimum panicle length (15.12 cm) among sixteen genotypes were studied.

Maximum number of flowers per branchlets was observed from JA 7 (12.07) followed by JA 4 (11.09) and it was lower in JA 5 (7.08) and JA 8 (7.89). Number of stamens per flower varied between 58.04-67.07.The flowers with highest numbers of stamens was observed from JA 8 and minimum from JA 2. The total number of sepals were 5 in all the accessions. The flower colour of all accessions was light yellow except JA 3(pale green). Similar result was observed by Alam *et al*. (2020) studied 12 jamun germplasm from Nadia district of West Bengal.

CONCLUSION

The flowering behaviour of several genotypes has significant variation on the basis of the characters like time taken in bud development (Days), flushing time, duration of flowering (days), length of panicle, flower size, number of flowers /branchlet and flower colour.

Month of panicle emergence among the selected genotypes ranged from 1st week of March (JA 1, JA 2 and JA 4) to last week of March (JA 10). Time taken for bud development was observed 21 days (JA 9) to 38 days (JA 4) from panicle emergence. Duration of flowering was highest of 39 days in genotype JA 6 shortest in JA 7 (24 days). The length of panicle was recorded longest from JA 1 (13.08 cm) and shortest from JA 2 (6.73 cm). Highest flower length was measured from JA

2 (26.39 mm) and lowest from JA 8 (8.31). Maximum number of flowers per branchlets was observed from JA 7 (12.07). Number of stamens per flower varied between 58.04 and 67.07. The total numbers of sepals were 5 in all the accessions. The flower colour of most of all the accessions was light yellow.

It can be concluded that significant variation has been found with respect to flowering behavior of Jamun genotypes, out of all the genotypes the genotype JA 1 has most earliest flowering and biggest size flower observed from JA 2.

REFERENCES

Alam, M., Mani, A., Mitra, S., &Bauri, F. K. (2020). Flowering, Fruiting and Physio-chemical properties of Jamun (*Syzygium cumini* Skeels) grown in Nadia district of West Bengal. *Advances in Bioresearch*, 11(5): 1-5.

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

Bose, T.K., Mitra, S.K. and Sanyal, D., 2001. *In: Fruits: tropical and subtropical. Volume II* (No. Ed. 3). Naya Udyog. Pp. 645

Devi, C. A., Sharma, G. L., Singh, P., Panigrahi, H. K., Sharma, H. G., Nag, J. L., & Paikra, P. S. (2020). Studies on variability in fruit characters of jamun (Syzygium cumini Skeels) genotypes. The Pharma Innovation Journal, 8, 391-393.

Devi CA, Swamy GSK, Naik N. (2016) Studies on Flowering and Fruit Characters of Jamun Genotypes (*Syzygium cuminii* Skeels). *Biosciences Biotechnology Research Asia*.,13(4): 2085-2088.

Devi P. S., Thangam, S. M., Desai, A.R. and Adsule, P. G. (2002) Studies on variability in physico-chemical characters of different jamun (*Syzygium cuminii* Skeels) accessions from Goa. *Indian J. Hort.*; 59(2): 153-156.

George, D. (2011). *In:*SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e. Pearson Education India.: 2-119

Inamdar, R. (2000) Survey, evaluation of seedling progenies and standardization of clonal propagation of jamun. *M. Sc. (Hort.) Thesis*, Univ. Agric. Sci, Dharwad.

Kundu, S., Ghosh, D. K., and Maiti, S. C. 2001. Evaluation of some local types of jamun (Syzygium cuminii (L.) Skeels) of West Bengal. Env. Eco. 19: 872-874.

Misra, R.S. and P.N. Bajpai(1984). Studies on pollination, fruit set, and fruit development in Jamun (*Syzygium cuminii* Skeels). *Progressive Hort.*;16: 1–5.

Periyathambi, R. 2007. *In: Jamun – The Potential Untapped*. Kerala Callin, , pp 30-32.

Prakash, J., & Singh, S. P. (2007). Mode of Pollination, Fruit Set and Fruit Drop in Jamun (*Syzygium cumini* Skeels). *Environment and Ecology*, *25*(4), 1151.

Singh, S., & Singh, A. K. (2012). Studies on variability in jamun (*Syzygium cuminii* Skeels) from Gujarat. *Asian J. Hort.*, 7(1): 186-189.

Singh, E.S. and Srivastava, A.K., (2000). Genetic diversity - Jamun (*Syzygium cumini* Skeels). *Indian J. Hort.*; 45(3): 2-7.

Singh, Y.S., Shira, V.D. and Swamy, G.S.K. (2016). Genetic variation for morphological and physico-chemical traits in jamun (*Syzygium cuminii* Skeels). *Asian J. Hort*., 11(1): 163-167.

Singh, S.K., Krishnamurty, S. and Katyal, S.I. 1967 *Fruit Culture in India*, ICAR, New Delhi, pp. 255-259

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.

Tarai, R. K. and Kundu, S. (2008). Flowering behaviour of eight minor fruit crops in the newalluvial zone of West Bengal. *J. of Interacademicia*. 12(3): 292-296.

Tarai, R. K., Kundu, S., Ghosh, B., and Mitra, S. (2006). Performance of some minor fruits in west Bengal. In: Ghosh, S. N., Mitra, S. K., Banik, B. C., Hasan, M. A., Sarkar, S. K., Dhua, R. S., Kabir, J., and Hore, J. K.(eds), *Proceedings of national symposium on production , utilization and export of underutilized fruits with commercial potentialities*, 22-24 November 2006, Bibhan Chandra Krishi Viswavidyalaya, West Bengal.: 79-82.

Thaper, A. R. (1958) Farm Bulletin, No. 42, ICAR, New Delhi.

Table 2:Flowering Behaviour of Randomly Selected 12 Jamun Accessions From Various Blocks of Bankura

Sl. No.	Jamun Genotypes	Time of Panicle Emergence	Time taken in bud development (Days)	Flushing Time	Duration of Flowering (Days)	Length of panicle (cm)	Flower Size (mm)	No. of Branchlets/ panicle	No. of Flowers /Branchlet	No. of stamens	No. of sepals	Flower Colour
1	JA1	March 1st week	31	April 1st week	28	13.08	22.17	15.02	10.05	62.37	5	Light yellow
2	JA2	March 1st week	37	April mid	31	6.74	26.39	11.46	9.32	58.04	5	Light yellow
3	JA 3	March 3rd week	27	April 4th week	25	9.12	15.34	7.94	8.47	65.21	5	Pale green
4	JA 4	March 1st week	38	April mid	34	11.27	21.48	14.34	11.09	59.47	5	Light yellow
5	JA5	March 3rd week	32	April 4th week	27	12.91	19.36	9.73	9.81	66.91	5	Light yellow
6	JA6	March 2nd week	29	April 3rd week	39	8.09	14.87	14.28	7.08	63.07	5	Light yellow
7	JA7	March 3rd week	23	April 2nd week	24	7.51	25.48	10.49	12.07	59.17	5	Light yellow
8	JA8	March 3rd week	30	April 4th week	29	9.61	8.31	7.39	7.89	67.07	5	Light yellow
9	JA9	March 3rd week	21	April 2nd week	31	10.73	14.27	8.07	8.01	62.74	5	Light yellow
10	JA10	March last week	35	May 1st week	35	7.16	11.49	11.48	9.47	64.47	5	Light yellow
	Mean		30.3		30.3	9.62	17.91	11.02	9.32	62.85	5	