

Survey, Collection and Identification of Jackfruit (*Artocarpus heterophyllus* L.) Germplasm in the Sagar Division of Madhya Pradesh

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Abstract

An intensive survey was conducted with the existing bearing trees of different jackfruit (*Artocarpus heterophyllus* L.) during 2021-2022 in Sagar, Damoh, Tikamgarh, Panna and Chhatarpur districts of Sagar division of Madhya Pradesh with aim to identify the superior local germplasm differ widely among themselves. The total fifteen farmers were selected from different districts. The germplasms of the jackfruit were collected during survey and seeds kept in paper bags. The seeds of collected germplasm were planted at COA, Tikamgarh. The observations were recorded on the age of plant, yield per tree, number of fruit per plant, average fruit weight, bulb size, seed size, number of bulb, number of seed per plant, total weight of bulb and flask TSS%, fruit skin colour, sweetness and taste and seed colour of jackfruit germplasms. Results revealed that great genetic diversity exists with regards to many desirable characters among collected fifteen germplasms.

Key word: Collection, evaluation, genetic diversity, germplasms, Jackfruit and survey

Introduction

Jackfruit (*Artocarpus heterophyllus* L.) is an ancient fruit belongs to the family Moraceae and is native to Western Ghats of India. It is one of the most important evergreen trees in tropical areas and is widely grown throughout Asia, including India. The jackfruit is indigenous to the rain forests of the Western Ghats of India and is cultivated throughout the tropical lowlands in South and Southeast Asia, parts of Central and Eastern Africa and Brazil.

India is the second biggest producer of the fruit in the world and is considered as the motherland of jackfruit. In India, it has wide distribution in Assam, Tripura, Bihar, Uttar Pradesh, the foothills of the Himalayas and South Indian States of Kerala, Tamil Nadu and Karnataka. In India, there is a total production of 1893 MT of jackfruit from an area 188 million hectares. In Madhya Pradesh, annual jackfruit production is 139.9 MT from an area 6.72 million hectares (2020-2021).

It is a hardy plant species that can be grown under a wide variety of well

drained soils of warm humid plains and hill slopes. The sub humid plateau region of eastern India enjoys the mild climate endowed with well drained light soil and sloppy topography which is best suited for jackfruit. The continuous propagation by seeds has resulted in rich genetic diversity and exhibits a wide range of variation in morpho- agronomic characteristics. Other workers also reported different types of jackfruit, which vary widely in size, shape, bearing habit and quality^[3,1]. Visualizing the potentiality for commercial cultivation of jackfruit in the region, the effort was made to collect and evaluate the genotypes for high yield and better quality fruits. It has a peculiar fruit bearing habit called cauliflorous *i.e.*, unlike other fruit crops it generally bears fruits on the trunk and branches^[2]. The fleshy carpel of this fruit which is botanically called perianth is the edible portion. The fruit is known for its unique taste, sweetness, crispness, colour, texture, aroma or unseasonal fruit bearing capacity, the versatility of the fruit and the tree growth is easy and enormous.

Jackfruit is the national fruit of Bangladesh. It is one of the most important and delicious fruit and contains vitamin-A and mineral nutrients. Every part of either the jackfruit tree or fruit has great economic importance. India is blessed with wide genetic diversity of jackfruit due to its seed propagation. It is a highly cross-

Material and Methods

The survey was conducted with the existing bearing trees of different jackfruit genotypes at Sagar division during the year 2021–2022. Fifteen local jackfruit growers in Sagar, Chhatarpur, Tikamgarh, Panna and Damoh dsitriacts were selected for the purpose to identify superior local germplasm differ widely among themselves. Twelve jackfruit germplasms viz., TKGJ-01, TKGJ -02, TKGJ -03 CHHJ-01, CHHJ-02, CHHJ-03, DHOJ-01, DHOJ-02, DHO-03, SAG 1, SAG 2, SAGJ-03 and PANJ-01, PANJ-02, PANJ-03 were selected for the study to identity superior ones. The trees under this study were fertilized according to the doses per plant *i.e.*, cow dung or compost 50–100 kg, urea 800–2000 g, Triple Super Phosphate (TSP) 1000–1500 g, Muriate of Potash (MOP) 600–1000 g and Gypsum 400-500 g. The entire amount of manures and chemical fertilizers were applied in two instalments *i.e.*, one in April- May and another in September- October. Intercultural operations such as weeding, irrigation and spraying of pesticides were

Result and Discussions

Quantitative character

Data on quantitative characters is given in Tables 1 & 2. Age of planting of fifteen jackfruit germplasm was varied significantly and age of plant ranged in between 6 to 25 years. The germplasm PANJ-2 and CHHJ-1 oldest aged plant (25 year) while PANJ-1 germplasm was the 6 year old plant. Highly significant variation

pollinated crop, with highly diverse local resources whose genetic base is being threatened. The plants produced from seeds are quite different from each other in respect of size, shape, quality and yield potentiality. Therefore, the purpose of the present study was to identify jackfruit genotypes for higher yield and quality.

done regularly. During December to May, irrigation was applied at 15 days intervals that reduced dropping of young jackfruit, increased yield and improved fruit quality. Jackfruit plant cannot tolerate waterlogging condition. So, in the rainy season, well drainage systems were ensured. Two to six fruits from each plant were randomly selected for evaluation. Fully mature fruits were harvested from the plant and quantitative characters viz., age of plant, total number of fruits per plant, weight of individual fruit, date of harvest, fruit length, fruit breadth, total number of bulbs/fruit, bulb length, bulb breadth, total number of seeds/fruit, seed length, seed breadth, and five qualitative characters viz., fruit colour, fruit shape, bulb colour, taste and seed colour were recorded and statistically analysed. The compiled data were analysed for measuring range, mean, standard deviation (SD), and standard error of mean (SE) and coefficient of variance (CV). The date of harvesting of entire jackfruits germplasms was July to August.

was also observed among the germplasm in terms of fruit characters. The maximum number of fruit per plant (79) was obtained from TKMJ-2 and the minimum fruit per plant (18) was from CHHJ-1 and DHOJ-2. The individual fruit weight was differed significantly. The maximum individual fruit weight was obtained from TKGJ-3 (8.52 kg) followed by SAGJ -1 (8.16 kg)

and TKMJ-1 (7.41 kg) and the minimum sized jackfruit is favourite due to small in TKGJ-2 (2.68). Now-a-days, small family size.

Table 1 Quantitative characters of jackfruit Germplasm

Acc No.	Age of plant	Weight of individual fruit (kg)	Total number of fruit/plant	Date of harvest	Stalk attachment
TKMJ-1	8.00	7.41	49.00	July-August	Depressed
TKMJ-2	20.33	2.68	79.00	July-August	Depressed
TKMJ-3	13.33	8.52	40.00	July-August	Depressed
CHHJ-1	23.67	5.52	18.00	July-August	Depressed
CHHJ-2	15.33	2.93	34.00	July-August	Depressed
CHHJ-3	16.33	4.36	40.00	July-August	Depressed
DHOJ-1	15.67	4.30	35.00	July-August	Depressed
DHOJ-2	13.00	5.42	18.33	July-August	Depressed
DHOJ-3	15.00	6.37	38.33	July-August	Depressed
SAGJ-1	9.67	8.16	36.00	July-August	Depressed
SAGJ-2	14.00	4.57	46.00	July-August	Depressed
SAGJ-3	17.00	4.52	56.33	July-August	Depressed
PANJ-1	6.00	5.00	43.00	July-August	Depressed
PANJ-2	25.00	2.72	71.00	July-August	Depressed
PANJ-3	19.67	6.25	24.33	July-August	Depressed
SE(±)	1.97	0.55	2.55		
SD	2.78	0.77	3.61		
CV%	22.05	18.01	10.51		

Fruit length and breadth among fifteen jackfruits were significantly varied. Fruit length and breadth ranged from 24.0 to 35.0 cm and 15.85 to 21.57cm, respectively. The longest fruit was obtained from SAGJ-1 (35.00cm) followed by the TKMJ-1 (33.88 cm). The germplasm SAGJ-1 produced the wider fruit (21.57cm) followed by TKMJ-1 (21.17cm) the variation in fruit length of jackfruits of different genotypes might be due to genetic makeup and environmental conditions of jackfruit trees grown in different locations.

Significant variation was found in case of number of bulbs per fruit and ranged from 60 to 202. Maximum number

of bulbs per fruit was obtained from TKM-1 (202) followed by the germplasm SAG-1 (172) and the minimum was from TKGJ-2 (60).

Bulb length and breadth varied significantly from 4.61 to 6.06 cm and 2.04 to 3.45 cm, respectively. Longer bulb was recorded in TKGJ-1 (6.06cm) followed by PANJ-3 (6.04cm). The germplasm fashioned wider bulb TKGJ-1 (3.45cm) followed by the SAG-2 (3.44 cm). The total number of seed per fruit was wide, ranged from 58 to 201. Maximum number of the seeds per fruit was obtain TKMJ-1 (201) followed by SAGJ-1 (173) and the minimum TKMG-2 (58).

Table 2 Quantitative characters of jackfruit Germplasm

Acc No.	Fruit size (cm)		Total number of bulb /plant	Bulb size (cm)		Total number of seed	Seed size (cm)	
	Length	Breadth		Length	Breadth		Length	Breadth
TKGJ-1	33.88	21.17	202.67	6.06	3.45	201.56	2.31	1.65
TKMJ-2	24.03	15.85	60.33	4.86	2.57	58.11	2.22	1.45
TKMJ-3	32.93	18.20	114.67	5.68	2.38	113.22	2.62	1.70
CHHJ-1	25.63	17.70	86.00	5.56	3.05	84.67	2.27	1.54
CHHJ-2	28.43	19.43	89.00	5.57	3.04	87.67	2.90	1.70
CHHJ-3	30.51	20.99	117.00	5.46	3.11	114.67	2.32	1.49
DHOJ-1	31.38	20.50	137.67	6.09	3.15	136.56	3.04	1.77
DHOJ-2	30.05	18.03	151.67	5.54	3.40	148.89	2.32	1.83
DHOJ-3	31.65	20.43	168.33	5.67	2.73	167.78	2.67	1.25
SAGJ-1	35.20	21.57	172.00	5.79	3.44	173.00	2.27	1.51
SAGJ-2	32.52	18.30	120.33	5.41	3.20	119.00	2.18	1.41
SAGJ-3	33.10	18.82	128.33	5.29	3.08	128.00	2.70	1.78
PANJ-1	30.03	19.04	123.33	5.81	2.78	121.00	2.34	1.71
PANJ-2	25.80	17.42	64.33	4.61	2.04	64.00	1.97	1.40
PANJ-3	28.00	21.18	120.67	6.04	3.04	117.89	2.32	1.63
SE(±)	1.40	0.66	3.61	0.32	0.20	1.99	2.31	0.08
SD	1.99	0.93	5.11	0.45	0.29	2.8	2.22	0.11
CV %	8.05	5.90	5.05	9.83	12.01	2.81	7.69	8.65

Table 2 Qualitative characters of jackfruit germplams

Qualitative characters	Total Acc. No.	Acc. No.	% of germplam
Fruit skin colour			
Greenish yellow	5	TKMJ-1, DHOJ-2, SAG-1, SAG-3, PANJ-1	33.33%
Yellowish green	4	TKMJ-3, CHHJ-3, SAGJ-2, PANJ-2	26.66%
yellow	2	DHOJ-1, PANJ-3	13.33%
brown	4	TKMJ-2, CHHJ-1, CHHJ-2, DHOJ-3	26.66%
Fruit shape			
oval	6	TKMJ-2, DHOJ-2, CHHJ-3, DHOJ-3, SAGJ-2, PANJ-3	20%
Oblong	4	TKMJ-3, DHOJ-1, PANJ-1, SAGJ-4	26.66%
Elongate	3	PANJ-2, SAGJ-1, TKMJ-1	40%
Elliptical	2	CHHJ-1, CHHJ-2	13%
Bulb colour			
Yellow	8	TKMJ-3, DHOJ-1, SAGJ-1, TKMJ-1 PANJ-1, SAGJ-3, CHHJ-2, CHHJ-3	53.33%
Whitish yellow	5	CHHJ-1, DHOJ-3, SAGJ- 2, PANJ-2, PANJ-3	33.33%
Cream	2	TKMJ-2, DHOJ-2	13.33%
Taste			
Sweet	8	TKMJ-2, CHHJ-1, CHHJ-3, DHOJ-2, DHOJ-3, SAGJ-2, PANJ-2, PANJ-3,	53.33%
Very sweet	7	TKMJ-3, SAGJ-1, TKMJ-1 PANJ-1, SAGJ-3, CHHJ-2, DHOJ-1	46.66%
Seed colour			
Brownish patch	15	TKMJ-3, DHOJ-1, SAGJ-1, TKMJ-1 PANJ-1, SAGJ-3, CHHJ-2, CHHJ-3, CHHJ-1, DHOJ-3, SAGJ- 2, PANJ-2, PANJ-3, TKMJ-2, DHOJ-2	100%



Promising Jackfruit at farmer's field





Rather less variation was observed in seed length and seed width among the germplasm. Seed length and width varied 1.97 to 3.04 cm and 1.45 cm to 1.83 cm, respectively. The elongated seed was perceived from DHOJ-1 (3.04cm) followed by CHHJ-2 (2.90cm) and shortest seed PAN-2 (1.97cm).

Qualitative characters

Data on qualitative characters is given in Table 3. Fruit skin colour ranged from greenish yellow 33.33% to yellowish green 26.66%, yellow 13.33% and brown 26.66 %. Fruit shape varies from oval 40%, oblong 26.66%, elongate 20% and

elliptical 13%. Oval-shaped fruit (40.0%) was the majority among the jackfruit germplasm. Bulb colour ranged from yellow 53.33%, whitish yellow 33.33 % and cream 13.33%. Maximum jackfruit germplasm yellow 53.33% produce the yellow coloured bulb. Sweetness of fruit ranged from sweet (53.33%) to very sweet (46.66%). Taste, the most important trait, varied from good to very good. Sweetness and taste was measured through organoleptic test. Seed colour of fifteen jackfruit germplasms was brownish patch in colour.

Conclusion

The study concluded that the selected jackfruit genotypes varied significantly among themselves for various desirable characters. Great variability exists with regards to many desirable

characters *viz.*, age of plant, bearing (once a year), yield per plant, number of bulbs number of seed per fruit, average fruit weight, weight of individual.

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