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The morphological and yield attributes of jackfruit (*Artocarpus heterophyllus* L.) genotypes grown in Kolar, Chikkaballapur and Bengaluru districts of Karnataka, India

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Abstract
The study entitled "The morphological and yield attributes of jackfruit (*Artocarpus heterophyllus* Lam) genotypes grown in Kolar, Chikkaballapur and Bengaluru districts of Karnataka" was conducted during 2020-21. The survey was done in three districts and selected 25 jackfruit genotypes for characterization. Among them, six were old age (> 41 years), seven of medium age (21-40 years) and twelve were young age (< 20 years). The genotype BCR-4 recorded highest number of fruits per tree (465) and the genotype BCR-1 recorded highest yield (2774 kg per tree). The highest fruit weight (18.48 Kg), highest fake mass (6.55 kg), highest flake per cent (35.50%), highest number of bulbs (355), maximum bulb weight (680 g), maximum bulb mass (241.40 kg) and highest seed mass (12.60 kg) were recorded in COHB-1.

Keywords: Jackfruit, survey, morphological, yield, flake mass, bulb mass, seed mass

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 tree has been cultivated for centuries in South East Asia's lowland rain forests (Acedo, 1992) [1]. It is commonly grown in tropical countries such as Brazil, Thailand, Sri Lanka, Indonesia, India, the Philippines and Malaysia (Chawdhary, 1997) [7]. It is well adapted to the arid and warm regions of south-central India. It is one of the most remunerative and important native fruits that are underutilized in India.

Since Jackfruit trees are cross-pollinated, there is a high rate of heterozygosity and there is wide variation between populations in yield, size, shape, flake colour, quality and maturity period. Considering the importance of this crop, there is great need for the genetic improvement of jack genotypes which are suitable for cultivation under different agroclimatic conditions. The survey and selection are the best method to identify suitable genotypes for a particular area of its natural existence. A comprehensive understanding of genetic diversity is needed with morphological and yield attributing characterization of jackfruit genotypes. which also serve as mother plants for further mass multiplication.

In this context the current research was conducted to find out variation in the morphological and yield attributing characters of jackfruit trees and to identify promising genotypes of jackfruit in Kolar, Chikkaballapur and Bengaluru districts of Karnataka. The collected types were examined for their morphological and yield parameter.

Materials and Methods
The present investigation was carried out at the Department of Fruit Science, College of Horticulture, Bengaluru. The survey was conducted during the year 2020-21 to identify the elite promising genotypes of jackfruit in Kolar, Chikkaballapur and Bengaluru districts of Karnataka. Over 50 genotypes were selected from the survey among which 25 promising genotypes were shortlisted based on the morphological and yield attributing parameters. The data were collected as per the descriptors prescribed by IPGRI (International Plant Genetic Resources Institute, 2000).

Table 1: The morphological and yield attributes of jackfruit genotypes

Sl. No.	Genotypes	Age (Year)	Number of fruits per tree	Mean fruit weight(kg)	Yield(kg/tree)	Mean flake mass without seed (kg)	Flake per cent (%)
1	BCR-1	Old	380	7.30	2774	1.75	24.00 (29.31)*
2	BCR-2	Medium	56	8.00	336	1.68	21.00 (27.26)
3	BCR-4	Old	465	4.00	1953	0.79	19.90 (26.48)
4	BHG-1	Young	46	7.40	340.4	1.59	21.50 (27.61)
5	BHG-2	Young	21	6.00	180.6	1.17	19.60 (26.26)
6	BHR-1	Medium	86	5.80	447.2	1.09	18.80 (25.68)
7	BHR-2	Medium	65	7.40	377	1.39	18.90 (25.75)
8	BHH-1	Medium	74	8.60	636.4	1.66	19.30 (26.04)
9	BKN-2	Medium	84	8.12	520.8	1.85	22.90 (28.57)
10	BAS-1	Medium	56	4.16	257.6	0.61	14.90 (22.69)
11	BRS-1	Medium	76	3.60	273.6	0.61	17.00 (24.33)
12	BAR-1	Old	221	8.12	950.3	1.45	17.90 (25.01)
13	KJH-1	Old	82	8.40	688.8	1.83	21.90 (27.88)
14	KJH-2	Old	106	9.86	1038.8	2.03	20.60 (26.97)
15	KJH-3	Old	123	7.60	897.9	1.36	18.00 (25.09)
16	COHB-1	Young	3	18.48	55.44	6.55	35.50 (36.55)
17	COHB-2	Young	25	10.10	252.5	1.95	19.30 (26.04)
18	COHB-3	Young	27	6.40	172.8	1.35	16.10 (23.64)
19	COHB-4	Young	4	7.60	30.4	2.05	27.00 (31.29)
20	COHB-5	Young	8	10.70	85.6	1.71	16.00 (23.56)
21	COHB-6	Young	36	12.50	453.6	1.83	14.70 (22.53)
22	COHB-7	Young	27	9.64	260.28	1.11	11.50 (19.81)
23	COHB-8	Young	19	15.50	310	2.71	17.50 (24.72)
24	COHB-9	Young	3	14.50	43.5	3.91	27.00 (31.29)
25	COHB-10	Young	14	3.60	50.4	0.60	16.90 (24.26)
S.Em ±			2.671	0.109	15.787	0.030	0.149
C.D. @ 5%			7.617	0.313	45.029	0.086	0.424

*Values in parenthesis are arc sin transformed values
Approximate age: (a) Old (>41 years) (b) Medium (21-40 years) (c) Young (<20 years)

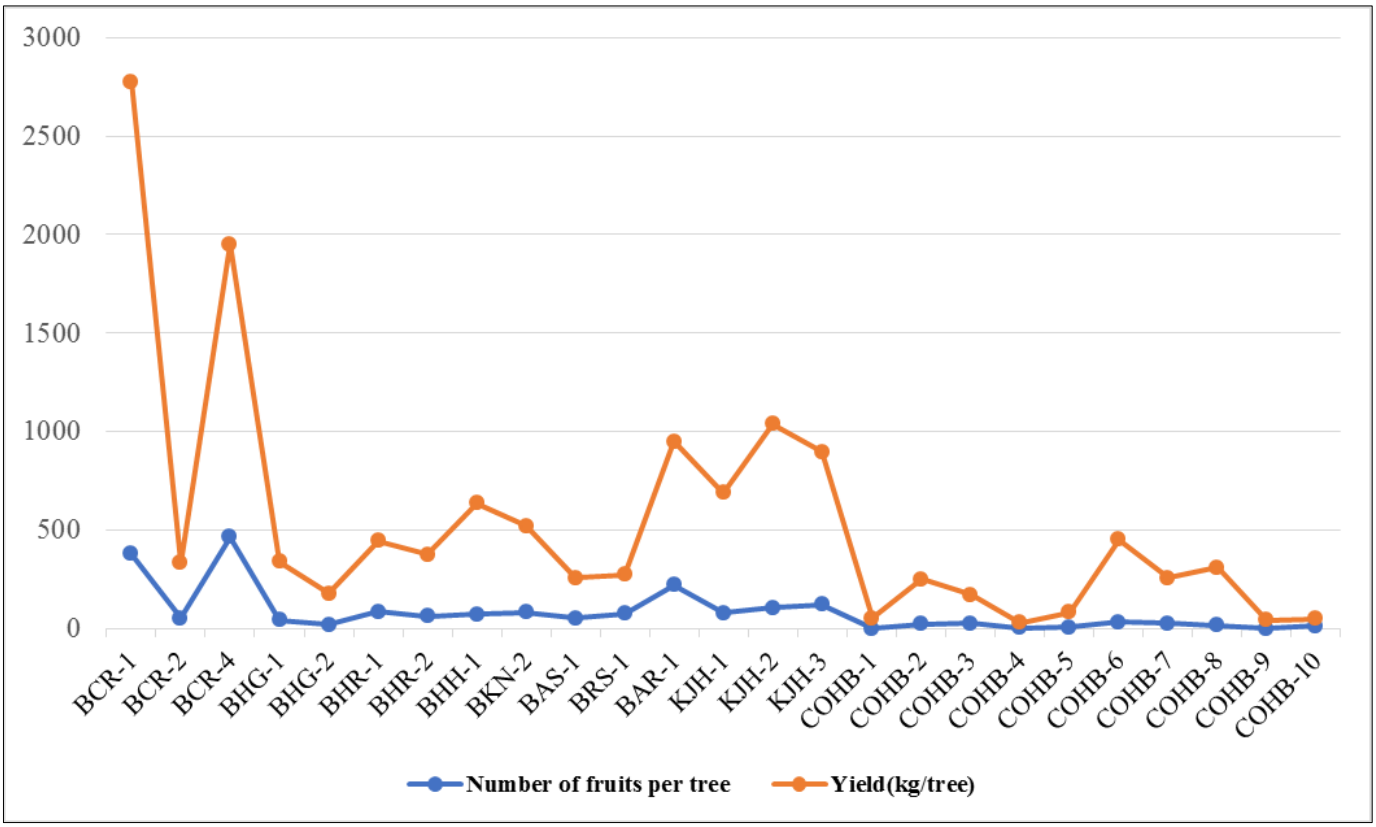

Fig 1: Yield attributes of jackfruit genotype

Table 2: Physical characters of jackfruit genotypes

Sl. No.	Genotypes	Mean number of bulbs per fruit	Mean bulb weight (g) (with seed)	Bulb mass (kg)	Mean Seed weight (g)	Seed mass (kg)
1	BCR-1	240	500.00	120.00	60.00	3.46
2	BCR-2	210	240.00	50.40	80.00	3.53
3	BCR-4	199	360.00	71.64	60.00	2.38
4	BHG-1	215	260.00	55.90	60.00	2.77
5	BHG-2	196	200.00	39.20	40.00	1.54
6	BHR-1	188	300.00	56.40	80.00	2.83
7	BHR-2	189	160.00	30.24	40.00	1.43
8	BHH-1	193	220.00	42.46	60.00	2.23
9	BKN-2	229	220.00	50.38	40.00	2.10
10	BAS-1	149	380.00	56.62	80.00	1.78
11	BRS-1	170	340.00	57.80	100.00	2.89
12	BAR-1	179	300.00	53.70	80.00	2.56
13	KJH-1	219	319.00	69.86	107.00	5.13
14	KJH-2	206	250.00	51.50	60.00	2.55
15	KJH-3	180	235.50	42.39	60.00	1.94
16	COHB-1	355	680.00	241.40	100.00	12.60
17	COHB-2	193	226.00	43.61	65.00	2.42
18	COHB-3	161	284.00	45.72	60.00	1.56
19	COHB-4	270	317.10	85.61	65.00	4.74
20	COHB-5	160	280.00	44.80	60.00	1.54
21	COHB-6	147	486.00	71.44	98.00	2.12
22	COHB-7	115	275.90	31.72	51.00	0.67
23	COHB-8	175	410.00	71.75	76.00	2.33
24	COHB-9	270	300.00	81.00	60.00	4.37
25	COHB-10	169	241.00	40.72	54.00	1.54
S.Em ±		2.247	3.718	1.072	0.805	0.057
C.D. @ 5%		6.410	10.604	3.057	2.295	0.163

Results and Discussion

The data pertaining to morphological and yield attributes of jackfruit genotypes is presented in (Table 1). Out of 25 genotypes observed, six found to be in the category of old age of more than 40 years, seven genotypes were of medium age (20-40 years) and twelve were found to be younger ones. The yield of jackfruit plant increases with the increase of age of the plant. The information was similar with the findings of (Akter and Rahman, 2017) [3] Sampath (2019) [12], Tanushree (2019) [13] and Jayavalli (2020) [10].

As the number of fruits and the average weight of those fruits are reflected in yield, it has a vastly different character. There are many factors to consider including age, cultural practices, climatic conditions (season) etc. The maximum number of fruits were recorded in BCR-4 (465) and minimum number of fruits recorded in COHB-1 and COHB-9 (3) (Fig.1). Agro-climatic conditions, age of the tree and position of female inflorescence all affected the number of fruits per tree. Fruit yield are directly affected by the number of fruits per tree and also fruit weight. The maximum fruit weight was recorded 18.48 kg in COHB-1 and minimum fruit weight was recorded 3.60 kg in BRS-1 and COHB-10. Highest yield was observed in BCR-1 (2774 kg/ tree) which was followed by BCR-4 (1953 kg/tree) and lowest was noted in COHB-4 (30.4 kg/tree) (Fig.1). The variation among genotypes may be due to genetic differences between them as well as environmental conditions where they are growing (Guruprasad, 1981). Tree age and good management practices also have impact on yield. The similar variations were also cited by Ali *et al.* (2015), Rahman *et al.* (2016), Chandrashekhar *et al.* (2018a) Chandrashekhar *et al.* (2018b), Sampath (2019) [12] and Tanushree (2019) [13] with respect to above characters.

Mean flake mass was recorded highest in COHB-1 (6.55 kg) and lowest in COHB-10 (0.607 kg). Flake per cent is one of the important parameter which gives out the amount of flakes present in whole fruit. In jackfruit, obtaining the higher flake content is remarkable one but an average of more than 45 per cent is less. Flake per cent was observed to be maximum in COHB-1 (35.50%) and minimum in COHB-7 (11.50%) (Table 1). The results are also corroborated by the results of Ajeesh *et al.* (2019) [2], who recorded highest flake per cent at 49.99% and lowest at 33.94%. The present finding is in consent with that of reported by Tanushree (2019) [13], who observed that flake per cent was highest in ABS-1 (44.63%) and lowest in BRH-1 (21.48%). There is a direct correlation between the number and weight of flakes and the edible portion of jackfruit. The number of flakes per fruit is strongly influenced by the size of the fruits and also the genetic characteristics of the plant (Rai *et al.*, 2003) [11].

Mean number of bulbs per fruit, mean bulb weight, bulb mass, mean seed weight and seed mass were depicted in Table 2. Among 25 genotypes studied, COHB-1 has recorded highest (355) number of bulbs per fruit followed by COHB-4 (270), COHB-9 (270) and lowest number of bulbs were found in COHB-7 (115). Maximum bulb weight was recorded in the genotype COHB-1 (680.00 g) followed by BCR-1 (500.00 g) and minimum bulb weight was recorded in BHR-2 (160.00 g). An expression of bulb mass is bulb weight and bulb number expressed as the total amount of bulbs in a kilogram of fruit. Bulb mass ranged from 30.24 kg (BHR-2) to 241.40 kg (COHB-1).

The weight of seeds showed significant difference among the genotypes. There was a lower seed weight of 40.00 g in BHG-2, BHR-2 and BNK-2 and significantly higher seed weight of 107.00 g was recorded in KJH-1. Seed mass was significantly maximum in COHB-1 (12.60 kg) which was on par with

KJH-1 (5.13 kg) and recorded minimum (0.67 kg) in COHB-7. The seed mass reflects on the bulb weight and in turn fruit weight. Similar findings were also cited by Jagadeesh *et al.* (2010 and Tanushree (2019) [9, 13].

Fig 2: Morphological characters of elite jackfruit genotype -COHB-1

Fig 3: Morphological characters of elite jackfruit genotype – COHB-3

Fig 4: Morphological characters of elite jackfruit genotype – COHB-8

Fig 5: Morphological characters of elite jackfruit genotype – BCR-1

Fig 6: Morphological characters of elite jackfruit genotype – BCR -4

Fig 7: Morphological characters of elite jackfruit genotype – KJH-2

Conclusion

Based on the morphological and yield characteristics six genotypes have been identified for conservation and further crop improvement programme. The best six promising genotypes were COHB-1, COHB-3, COHB-8, BCR-1, BCR-4 and KJH-2 (Fig.2, Fig.3, Fig.4, Fig.5, Fig.6 and Fig.7). Each genotype exhibited different characteristics in terms of quantity and quality of fruit. These superior genotypes can be multiplied and given for growers.

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References

1. Acedo AL. Jackfruit biology, production, use and Philippines research. Forestry/Fuel Wood Research and Development Project (F/FRED). Arlington, VA., USA, 1992.
2. Ajeesh BR, Nimisha C, Madala A, Rajagopalan A, Giridharan MP. Variability in fruit characters of jackfruit types in Kasargod district of Kerala. J Pharmacogn. Phytochemi. 2019;2:541-542.
3. Akter A, Rahman H. Evaluation of jackfruit (*Artocarpus heterophyllus* Lam.) germplasm. R. R. Jo. B., 2017;7(1):38-53.
4. Ali ASMY, Reza MH, Samsuzzaman M, Rashid MH, Anwari A, Islam MZ. Evaluation of existing jackfruit germplasm. Int. J Nat. Social Sci. 2015;2(4):108-112.
5. Chandrasekhar V, Ramesh BB, Rajasekhar M. Evaluation and genetic variability studies in germplasm of jackfruit available in certain districts of Andhra Pradesh. Plant Archives. 2018;2(18):2047-2052.
6. Chandrashekar KG, Vijayakumar RM, Subramanian S, Kavino M, Joel AJ. Morphological characterization of jackfruit (*Artocarpus heterophyllus* Lam.) local genotypes under coffee ecosystem of lower Pulney hills. Int. J. Curr. Microbiol. App. Sci. 2018a;7(3):2210-2224.
7. Chawdhary FA, Raman MA. Food Chem. 1997;60(1):25-28.
8. Guruprasad TR. Studies on systematic selection of jackfruit (*Artocarpus heterophyllus* Lam.) types. *M.Sc. (Hort.) Thesis*, Univ. Agric. Sci., Bangalore (India) 1981.
9. Jagadeesh SL, Reddy BS, Swamy GSK, Hegde L. Variability studies in physical parameters of fruit in jackfruit (*Artocarpus heterophyllus* Lam.) clones of coastal zone of Karnataka. Journal of Maharashtra Agricultural Universities. 2010;35(3):388-92.
10. Jayavalli R. Identification and Evaluation of High Yielding Good Quality Jack Genotypes. Int. J Curr. Microbiol. App. Sci. 2020;9(6):2429-2456.
11. Rai M, Nath V, Das B, Ravi A, Kumar M. Evaluation of jackfruit genotypes for yield and quality attributes under eastern Indian condition. Orissa J. Hort. 2003;31(1):1-6.
12. Sampath PM. Prospecting of jackfruit (*Artocarpus heterophyllus* Lam.) genotypes in southern parts of Karnataka. *Ph.D. (Hort.) Thesis* Univ. Horti. Sci., Bagalkot (India) 2019.
13. Tanushree S. Survey, evaluation, collection and multiplication of red jackfruit (*Artocarpus heterophyllus* L.) types grown under southern districts of Karnataka. M.Sc. (Hort.). Thesis Univ. Horti. Sci., Bagalkot (India) 2019.