Original Research Article

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Identification and Evaluation of High Yielding Good Quality Jack Genotypes

R. Jayavalli*

(Horticulture), Tamil Nadu Agricultural University, Agricultural College and Research Institute, Kudumiyamalai, India

*Corresponding author

ABSTRACT

The experiment was conducted with the bearing trees of different Jackfruit genotypes at Pudukkottai District of Tamil Nadu during the year 2016-2019. Fifty five jackfruit genotypes viz., KDM-AhJ-01 to KDM-AhJ-55 were selected for the study to identify superior ones. The age of the selected trees ranged from 07 to 33 years. The selected superior genotypes differ widely among themselves. Great variability exists with regards to many growth characters viz., tree height 2.20 m to 10.30 m, trunk girth (cm) 45 to 158 cm, and canopy spread E-W direction 1.20-3.60 m, canopy spread N-S direction 1.12 to 3.80 m, month of flowering during November –December and January to February. Harvest during the month of January to March, April to June and July to September. Yield and quality characters viz., number of fruits per tree (10-50 nos.), individual fruit weight (7-18 kg), yield per tree (80-810 kg), fruit length (11.00 to 45.00 cm), fruit breadth (18.00 to 57.00 cm), TSS 6.00 to 29.00 (⁰brix), colour and appearance (4.00 to 9.00), flavor (4.00 to 9.00), texture/firmness (4.00 to 9.00), taste (3.00 to 9.00) and overall acceptability (5.00 to 9.30). Jackfruit trees are cross pollinated and are mostly seed propagated. As a result, morphological and agronomical characters of jackfruit showed a distinct range of variation. The quantitative data of jackfruit germplasm and their range, mean, standard deviation (SD), standard error (SE) and coefficient of variance (CV%) are presented. The highest morphological and agronomical characters was observed for trunk girth (CV 613.59%) followed by tree height (CV 3.92 %). Minimum variation was noticed in canopy spread E-W direction (CV 0.53%), canopy spread N-S direction (CV 0.51%). The highest yield variation was observed for yield per tree (CV 22577.38%). Total number of fruits per plant (CV 113.91%), fruit breadth (CV 72.70%), TSS (54.12⁰brix), fruit length (CV45.54%). Minimum variation was noticed in individual fruit weight (CV 5.37%). Organoleptic evaluation viz., colour and appearance (CV 1.08 %), flavor (CV 1.05%), texture/firmness CV value (1.34%), taste CV value (1.57%), overall acceptability (CV 1.33%). Among the fifty five jackfruit germplasms, three germplasm KDM-AhJ-08, KDM-AhJ-10, KDM-AhJ-46, showed good bearing and quality habit. So, the germplasm KDM-AhJ-08, KDM-AhJ-10, KDM-AhJ-46 were found to be suitable for jackfruit cultivation at dry tracts of Tamil Nadu.

Keywords

Jackfruit (J), KDM (Kudumiyamalai), *Artocarpus heterophyllus* (Ah) Collection, Evaluation, germplasm, genotypes

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Introduction

Jackfruit (*Artocarpus heterophyllus* Lam.) belongs to the family Moraceae, indigenous to the rainforests of the Western Ghats of India (Rowe-Dutton, 1985). It is cultivated widely at low elevations throughout India, in many parts of Southeast Asia (Rahman *et al.*, 1999),

in the evergreen forest zone of West Africa (Burkill, 1997), and in northern Australia as well (Azad *et al.*, 2007). In Bangladesh, it is commonly referred to as “poor man’s food” (Rahman *et al.*, 1995) as it is cheap and plentiful during the season. The nutritious seeds are boiled or roasted and eaten like chestnuts, added to flour for baking, or

cooked in dishes. The tree is also known for its durable timber, which ages to an orange or reddish brown color, with anti-termite properties. The leaves and fruit waste provide valuable fodder for cattle, pigs and goats. Jackfruit wood chips yield a dye, which is used to give the famous orange-red color to the robes of Buddhist priests (Craig and Harley, 2006). In addition, many parts of the plant, including the bark, roots, leaves and fruits have medicinal properties (Hakim *et al.*, 2005; Arung *et al.*, 2006).

Despite numerous advantages, the popularity of jackfruit as a commercial crop is very poor owing to wide variations in fruit quality, the long seed dormancy and the widespread belief that excessive consumption of jackfruit flakes leads to certain digestive ailments (Samaddar, 1985). Several studies have reported diversity in jackfruit, but they were based mainly on morphological characteristics (Hossain, 1996; Saha *et al.*, 1996, Jagadeesh *et al.*, 2007).

Although at least 30 strains have been described in the Indian subcontinent and 30 more types in Malaysia (Singh, 1986; Vinning and Moody, 1997), only two types are recognized on the basis of fruit characteristics (Odoemelam, 2005); one has fruits with small, fibrous, soft and spongy flakes with very sweet carpels, while the other variety is crunchy, though not as sweet, with crisp carpels. This latter is considered to be of high quality, called “Koozha chakka” or “Koozha pazham” in South India.

There are no well-defined varieties in specific localities; local varieties have different names based on their variability in yield, fruit shape, flake color, total sugars, and so on. Cultivar identification and estimation of genetic diversity using morphological data are limited, as they are environmentally influenced, and there are few distinctive characters (Cavagnaro *et al.*, 2006).

Tamil Nadu jackfruit cultivation are mainly concentrated in Cuddalore, Kanyakumari, Dindigul, Ariyalur, Thanjavur and Pudukkottai districts and they account for 73.21 per cent of area under jackfruit cultivation in Tamil Nadu. In Pudukkottai district of Tamil Nadu, Jack is planted as one of the border trees in agricultural and horticultural crop lands. It is one of the most drought tolerant, hardy fruit crop and traditionally it is a farmer's house hold fruit. Owing to it are various culinary uses and availability in plenty during the summer season.

The young fruit has great demand as vegetable whereas the ripe fruit is a good source of vitamins and minerals. Jack fruit is also gaining popularity in Mumbai market extends sweet welcome to (Vadakadu, Mangadu, Periyavadi, Vanakkankadu, Vandanviduthy, Pullanviduthy, Senthangudi, Kothamangalam, Keeramngalam, Panankulam, Maramadakki, Anavayal, Neduvasal and Karukakurichi of Pudukkottai district) In Pudukkottai district of Tamil Nadu due to emerging ethnic and mainstream marketing opportunities (The Hindu., 2015).

In Pudukkottai district the area under Jackfruit is 1102 ha (Department of Statistical, Pudukkottai, 2018) with the productivity of 7.00 tonnes/ ha. The farmers are growing the local varieties without knowing its productivity. Sometimes unknowingly the farmers choose the poor yielding seedlings and unable to get good yield.

To overcome this, there is an urgent need to identify a best variety suitable for this region to improve the income of the jack farmers. Hence, Owing to its uses and ease of cultivation in dry districts of Tamil Nadu, identification of a variety with high yield and superior quality is the need of the hour.

With this background, the research on Identification of regular bearing, high yielding jackfruit genotypes with superior fruit quality is formulated. A study was therefore, carried out to find out a suitable jackfruit genotypes for further variety development programme at Pudukkottai District in Tamil Nadu.

Materials and Methods

Fifty five jackfruit germplasm *viz.*, KDM-AhJ-01 to KDM-AhJ-55 were selected for the study to identify superior ones. The recorded age of the selected tress ranged from 07 to 33 years. Morphological characters *viz.*, age of the plant, tree height (m), trunk girth (cm), canopy spread E- W direction (m), canopy spread N-S direction (m), month of flowering, month of harvest. Yield and quality quantitative characters *viz.*, number of fruits per tree, individual fruit weight (kg), yield per tree (kg), fruit length (cm), fruit breadth (cm) and TSS (⁰brix), colour and appearance, flavor, texture/firmness, taste, overall acceptability were recorded and statistically analyzed. The compiled data were analyzed for measuring range, mean, standard deviation (SD), standard error of mean (SE) and coefficient of variance (CV %) using Microsoft Office Excel package.

Results and Discussion

According to the International Plant Genetic Resources Institute [IPGRI, 2000] morphological variation among jackfruit trees was recorded using jackfruit descriptor. Growth, yield and qualitative measures of vegetative and reproductive characters of jackfruit were measured in the descriptors.

The growth and yield characters were measured by observation. The qualitative fruit characters were measured by eye observation and organoleptic test.

Growth characters

Growth, yield and qualitative were recorded and evaluated to know the genetic variability among the studied fifty five jackfruit germplasms. The jackfruit germplasm evaluated in the present study showed the variability for all the growth characters traits studied. Wide range of variation was observed among the germplasm in terms of age of the plant, tree height (m), trunk girth (cm), canopy spread E-W direction (m), canopy spread N-S direction (m), month of flowering and month of harvest (Table 1). Yield and quality characters *viz.*, numbers of fruits per tree, individual fruit weight, yield per tree, fruit length, fruit breadth and TSS were presented (Table 2). Quality characters *viz.*, colour and appearance, flavor, texture/firmness, taste, overall acceptability was presented (Table 3).

The age of plant of fifty five jackfruit genotypes was greatly significantly varied. Age of tree ranged from 07.00 to 33.00 years. The germplasm KDM-AhJ-31 and KDM-AhJ-32 was the oldest aged plant (33.00 years), while KDM-AhJ -16, KDM-AhJ-17, KDM-AhJ-18, and KDM-AhJ-19 germplasm was the 7.00 years old plant. The yield of jackfruit tree increases with the increase of age of the plant. Tree height of the fifty five jackfruit genotypes was greatly significantly varied. Tree height varied from 2.20 m to 10.30 m. The germplasm KDM-AhJ-19 was the lowest plant height 2.20 m, while the genotype KDM-AhJ-52 recorded the highest tree height 10.25 m. Trunk girth was differing significantly. The highest trunk girth was observed in KDM-AhJ-38 (158.00 cm). The genotype KDM-AhJ-04 was recorded for the lowest trunk girth of 55.00 cm. The yield of jackfruit tree increases with the increase of tree trunk girth of the plant (Table 1). Higher stem circumference gives better support for the main branches and reflects the vigour of

trees indirectly, bearing more number of fruits lead to higher yield. Lesser the trunk height with spreading nature, greater will be the number of fruits per tree due to more primary and secondary branches. Similar variability was reported by Muthulakshmi (2003), Murugan (2007) in jackfruit.

A diversity of canopy spread was observed among the genotypes. Significance variation was observed in case of canopy spread E-W direction of 1.20 m to 3.60 m. The genotypes KDM-AhJ-36 and KDM-AhJ-46 was observed the highest canopy spread of 3.60 m and the lowest of 1.15 m of KDM-AhJ-30. The yield of jackfruit plant increases with the increase of canopy spread of the plant. The highest canopy spread of 3.60 m was observed by the germplasm KDM-AhJ-01 and the lowest of 1.12 m by KDM-AhJ-30. The yield of jackfruit plant increases due to the highest canopy spread for the East-West and North –South direction. This may be due to genetic nature of the genotypes and growing environment.

Based on the fruiting season, the selected genotypes were grouped into early season (January-March), mid-season (April -June) and late season (July-August). Among the genotypes, majority of the genotypes showed early season bearing habit. Whereas KDM-AhJ-46 mid-season bearer. Meanwhile, KDM-AhJ-10 flowering was started by the month of January –February and harvest was extended to the month August to September. The genotype KDM-AhJ-10 was late season bearer (Table 1).

Yield characters

Highly significant variation was observed among the genotypes in terms of fruit characters. Highest number of fruits per plant (50.00) was obtained from KDM-AhJ-10 followed by KDM-AhJ-46 (45.00) and the

minimum of (10.00) was from KDM-AhJ-16. Yield is directly correlated with the number of fruits and weight of the individual fruit (Table 2). Individual fruit weight was differing significantly. Maximum individual fruit weight was gained from KDM-AhJ- 46 (18.00 kg) followed by KDM-AhJ-10 (16.00 kg) and minimum of (7.00 kg) was observe by the genotype KDM-AhJ-08. Nowadays small sized jackfruit is preferred due to small family size. Farmer's point of view medium and large sized fruits are economically viable and export market is more preferable (Table 2).

Fruit length and breadth of fifty five jackfruit were significantly varied (Table 2). Fruit length ranged from 11.00 to 45.00 cm and breadth 18.00 to 57.00 cm with the mean of 24.36 cm and 33.73 cm, respectively. The longest fruit was obtained from KDM-AhJ-46 (45.00 cm) followed by the KDM-AhJ-10 (40.00 cm) and shortest fruit in KDM-AhJ-25 (12.00 cm). The germplasm KDM-AhJ-46 produced the wider fruit breadth (57.00 cm) followed by KDM-AhJ-10 (50.00 cm) and narrower fruit in KDM-AhJ -06 (18.00 cm). TSS ranged from 6.00 to 29.00 with mean value of 14.36 (Table 2). Maximum TSS (29 °brix) was obtained from KDM-AhJ -10 and KDM-AhJ -46 and minimum (06 °brix) was found from the germplasm KDM-AhJ-51.

Quality characters

Significant variation was noticed among the fifty five jackfruit germplasms in terms of weight of rind (Table 3). Weight of rind ranged from 3.00 to 8.00 kg with an average value of 5.80 kg. The highest weight of rind was found from KDM-Ah9 and KDM-Ah11 (8.00 kg) and lowest in KDM-Ah04 and KDM-Ah08 (3.00 kg). Weight of rind is directly proportionate to edible portion of the fruit of jackfruit germplasm. Significant variation was found in case of number of flakes per fruit.

It ranged from 30.00 to 210.00 with mean value of 81.00 (Table 3). Maximum number of flakes per fruit was obtained from KDM-Ah 46 (210.00) followed by the germplasm KDM-Ah10 (150.00) and minimum was from AHJ-32, KDM-Ah33 (40.00).

Total flakes weight per fruit contrasted expressively among the fifty five jackfruit germplasms. Maximum total flakes weight per fruit was originated in KDM-Ah 46 (13.60 kg) and the minimum in KDM-Ah 17 (3.10 kg). Significant variation was found in case of weight of individual flake with seed.

Individual flake with seed ranged from 20.00 gm to 170.00 gm with mean value of 71.29 gm. Maximum weight of individual flake with seed was obtained from KDM-Ah 49 (110.00 gm) and minimum of 20.00 gm was found from the germplasm KDM-Ah07.

Individual seed weight ranged from 08.00 gm to 60.00 gm with mean value of 25.24g. Maximum weight of individual seed weight was obtained from KDM-Ah -32 (65.00 gm) and minimum of 09.00gm was found from the germplasm KDM-Ah-06.

Flakes: seed ranged from 0.42.00 to 7.00 with mean value of 2.28. Maximum Flakes: seed ratio was obtained from KDM-Ah -10 (5.30) and minimum of 0.42 was found from the germplasm KDM-Ah12. TSS ranged from 6.00 to 29.00 with mean value of 14.36. Maximum TSS (2⁰brix) was obtained from KDM-Ah -10 and KDM-Ah -46 and minimum of (6⁰brix) was found from the germplasm KDM-Ah-51. Colour and appearance ranged from 4.00 to 9.00 with mean value of 6.40. Maximum colour and appearance 9.00 was obtained from KDM-AhJ -10 and minimum 4.00 was found from the germplasm KDM-AhJ-43. Flavor ranged from 4.00 to 9.00 with mean value of 6.66. Maximum flavor 9.00 was obtained from

KDM-AhJ -10 and minimum 4.00 was found from the genotypes KDM-AhJ-36 and KDM-AhJ-48. Texture/Firmness ranged from 4.00 to 9.00 with mean value of 6.31. Maximum texture /firmness 9.00 were obtained from KDM-AhJ -10 and the minimum 4.00 was recorded by the genotypes KDM-Ah-37 and KDM-Ah-38.

Taste ranged from 3.00 to 9.00 with mean value of 6.21. Maximum taste 9.00 was obtained from KDM-Ah -10 followed by KDM-Ah -46 and minimum of 3.00 was found from the germplasm KDM-Ah-37. Overall acceptability ranged from 5.00 to 9.30 with mean value of 6.31. Maximum overall acceptability 9.30 was observed by the genotype KDM-AhJ -10 followed by KDM-Ah J-46 (9.20) and minimum 5.00 was observed by the germplasm KDM-AhJ-36 and KDM-AhJ-51.

The organoleptic test is the final judgment for acceptance of the fruit quality of the selected genotypes. The present study revealed that remarkable variation by organoleptic evaluation in all the characters of flakes. Genotypes namely KDM-AhJ-10 (9.30) followed by KDM-AhJ-46 (9.20) have higher score for overall quality of flakes. This may be due to genetic nature of the genotypes and growing environment. Similar findings were reported by Murugan (2007). Fruit shape varied from oval, oval, round and slender. The genotypes KDM-Ah -10 and KDM-Ah -46 record the slender shape of fruits. (Table 5).

Flakes colour varied distinctly among the fifty five jackfruit germplasms. Flakes colour varied from yellow, whitish yellow, light yellow, bright yellow. The genotype KDM-Ah -10 is bright yellow/Senthuram. Shelf life of flakes varied distinctly among the fifty five jackfruit germplasms. The genotypes KDM-Ah -10 and KDM-Ah -46 record for five days.

Table.1 Growth characters of jackfruit genotypes KDM-Ah-1to KDM-Ah-55

Acc. No.	Age of the tree	Tree height (m)	Trunk girth (cm)	Canopy spread E-W (m)	Canopy spread N-S (m)	Month of flowering	Month of harvest
KDM-AhJ-1	25.00	9.00	110.00	3.50	3.60	November-December	March-June
KDM-AhJ-2	20.00	5.60	105.00	2.50	2.90	November-December	March-June
KDM-AhJ-3	25.00	5.70	110.00	3.60	2.90	November-December	March-June
KDM-AhJ-4	22.00	3.60	55.00	2.60	2.70	November-December	March-June
KDM-AhJ-5	24.00	7.90	100.00	3.50	2.40	November-December	March-June
KDM-AhJ-6	20.00	5.60	65.00	1.90	2.50	November-December	March-June
KDM-AhJ-7	20.00	6.60	70.00	1.60	1.80	November-December	March-June
KDM-AhJ-8	27.00	8.10	75.00	3.00	3.20	November-December	March-June
KDM-Ah-9	30.00	8.50	76.00	2.70	2.90	November-December	March-June
KDM-AhJ-10	30.00	7.50	76.00	3.40	3.50	January - February	July–September
KDM-AhJ-11	30.00	6.50	68.00	1.90	2.50	November-December	March-June
KDM-AhJ-12	26.00	7.50	70.00	1.40	1.90	November-December	March-June
KDM-AhJ-13	25.00	5.40	72.00	2.20	2.40	November-December	March-June
KDM-AhJ-14	20.00	5.20	70.00	1.70	1.72	November-December	March-June
KDM-AhJ-15	24.00	5.42	72.00	1.50	1.60	November-December	March-June
KDM-AhJ-16	7.00	3.40	45.00	1.50	1.40	November-December	March-June
KDM-AhJ-17	7.00	5.40	105.00	2.50	3.50	November-December	March-June
KDM-AhJ-18	7.00	3.40	75.00	1.80	1.42	November-December	March-June
KDM-AhJ-19	7.00	2.20	72.00	1.40	1.50	November - December	March-June
KDM-AhJ-20	10.00	4.40	105.00	2.20	1.72	November-December	March-June
KDM-AhJ-21	10.00	6.40	110.00	1.72	1.80	November-December	March-June
KDM-AhJ-22	20.00	5.30	95.00	1.30	1.42	November-December	March-June

KDM-AhJ-23	20.00	5.50	70.00	1.50	1.60	November -December	March-June
KDM-AhJ-24	10.00	4.15	105.00	1.40	1.65	November -December	March-June
KDM-AhJ-25	15.00	5.25	100.00	1.20	1.30	November -December	March-June
KDM-AhJ-26	15.00	4.40	80.00	1.40	1.45	November -December	March-June
KDM-AhJ-27	15.00	4.32	75.00	1.42	1.65	November -December	March-June
KDM-AhJ-28	15.00	3.20	70.00	1.20	1.25	November -December	March-June
KDM-AhJ-29	12.00	3.40	58.00	1.30	1.70	November -December	March-June
KDM-AhJ-30	12.00	8.30	100.00	1.15	1.12	November -December	March-June
KDM-AhJ-31	33.00	9.20	110.00	2.90	1.90	November -December	March-June
KDM-AhJ-32	33.00	6.25	97.00	3.12	3.15	November -December	March-June
KDM-AhJ-33	26.00	4.30	110.00	1.40	1.30	November -December	March-June
KDM-AhJ-34	25.00	7.20	56.00	1.20	1.40	November -December	March-June
KDM-AhJ-35	25.00	5.20	70.00	2.20	2.65	November -December	March-June
KDM-AhJ-36	25.00	6.10	122.00	3.60	3.80	November -December	March-June
KDM-AhJ-37	25.00	5.10	145.00	2.25	2.20	November -December	March-June
KDM-AhJ-38	20.00	8.10	158.00	2.60	2.75	November -December	March-June
KDM-AhJ-39	15.00	10.20	135.00	2.15	2.30	November -December	March-June
KDM-AhJ-40	12.00	7.20	147.00	3.30	3.20	November -December	March-June
KDM-AhJ-41	20.00	5.20	65.00	1.65	1.85	November -December	March-June
KDM-AhJ-42	15.00	10.20	128.00	2.32	2.25	November -December	March-June
KDM-AhJ-43	20.00	5.15	95.00	2.30	2.10	November -December	March-June
KDM-AhJ-44	20.00	8.50	110.00	3.35	3.50	November -December	March-June
KDM-AhJ-45	15.00	7.20	75.00	2.30	2.40	November -December	March-June
KDM-AhJ-46	30.00	7.60	100.00	3.60	3.50	November -December	April-June
KDM-AhJ-47	20.00	7.20	80.00	1.70	1.85	November	March-June

						-December	
KDM-AhJ-48	22.00	9.10	80.00	2.20	2.30	November -December	March-June
KDM-AhJ-49	22.00	8.20	80.00	1.90	2.20	November -December	March-June
KDM-AhJ-50	25.00	10.20	65.00	1.40	1.30	November -December	March-June
KDM-AhJ-51	25.00	8.30	90.10	2.20	2.30	November -December	March-June
KDM-AhJ-52	30.00	10.25	120.00	2.30	2.40	November -December	March-June
KDM-AhJ-53	20.00	5.30	95.00	1.90	1.75	November -December	March-June
KDM-AhJ-54	27.00	6.20	115.00	2.30	2.20	November -December	March-June
KDM-AhJ- 55	25.00	7.30	105.00	2.20	1.70	November -December	March-June
Max.	33.00	10.30	158.00	3.60	3.80	-	-
Min.	7.00	2.20	45.00	1.20	1.12	-	-
Mean	20.50	6.40	91.13	2.20	2.20	-	-
SD	6.9	2.00	24.99	0.73	0.72	-	-
SE(±)	3.43	0.49	0.86	0.34	0.37	-	-
CV (%)	47.88	3.92	613.59	0.53	0.51	-	-

Table.2 Yield and quality characters of jackfruit genotypes KDM-Ah-1to KDM-Ah-55

Acc. No.	No.of fruits /tree	Individual fruit weight (kg)	Yield /tree (kg)	Fruit Length (cm)	Fruit breadth (cm)	TSS (°brix)
KDM-Ah-1	12.00	10.00	120.00	30.00	42.00	10.00
KDM-Ah-2	18.00	11.00	198.00	25.00	36.00	11.00
KDM-Ah-3	15.00	12.00	180.00	27.00	45.00	10.00
KDM-Ah-4	20.00	8.00	160.00	16.00	25.00	20.00
KDM-Ah-5	14.00	12.00	168.00	24.00	47.00	9.00
KDM-Ah-6	14.00	8.00	112.00	14.00	18.00	7.00
KDM-Ah-7	13.00	9.00	117.00	18.00	30.00	24.00
KDM-Ah-8	50.00	7.00	350.00	26.00	32.00	26.00
KDM-Ah-9	18.00	15.00	270.00	30.00	23.00	12.00
KDM-Ah-10	40.00	16.00	640.00	40.00	50.00	29.00
KDM-Ah-11	32.00	15.00	480.00	14.00	24.00	10.00
KDM-Ah-12	30.00	12.00	360.00	22.00	34.00	10.00
KDM-Ah-13	28.00	11.00	308.00	22.00	31.00	22.00
KDM-Ah-14	30.00	12.00	360.00	22.00	34.00	12.00
KDM-Ah-15	21.00	9.00	189.00	26.00	31.00	13.00
KDM-Ah-16	10.00	8.00	80.00	25.00	32.00	8.00
KDM-Ah-17	14.00	8.00	112.00	32.00	24.00	10.00
KDM-Ah-18	11.00	9.00	99.00	26.00	31.00	7.00

KDM-Ah-19	15.00	8.00	120.00	23.00	28.00	9.00
KDM-Ah-20	16.00	9.00	144.00	26.00	31.00	7.00
KDM-Ah-21	13.00	8.00	104.00	21.00	44.00	7.00
KDM-Ah-22	13.00	10.00	130.00	23.00	30.00	7.00
KDM-Ah-23	15.00	10.00	150.00	28.00	40.00	8.00
KDM-Ah-24	12.00	9.00	108.00	21.00	28.00	7.00
KDM-Ah-25	19.00	9.00	171.00	12.00	25.00	7.00
KDM-Ah-26	30.00	8.00	240.00	24.00	32.00	7.00
KDM-Ah-27	33.00	13.00	429.00	26.00	34.00	18.00
KDM-Ah-28	34.00	11.00	374.00	26.00	33.00	12.00
KDM-Ah-29	28.00	12.00	336.00	33.00	40.00	24.00
KDM-Ah-30	30.00	10.00	300.00	28.00	50.00	18.00
KDM-Ah31	42.00	8.00	336.00	11.00	44.00	27.00
KDM-Ah-32	25.00	11.00	275.00	22.00	27.00	23.00
KDM-Ah-33	32.00	8.00	256.00	12.00	27.00	12.00
KDM-Ah-34	38.00	9.00	342.00	33.00	42.00	21.00
KDM-Ah-35	34.00	12.00	408.00	30.00	47.00	9.00
KDM-Ah-36	18.00	10.00	180.00	32.00	47.00	10.00
KDM-Ah-37	14.00	8.00	112.00	27.00	36.00	7.00
KDM-Ah-38	12.00	10.00	120.00	17.00	26.00	20.00
KDM-Ah-39	13.00	12.00	156.00	20.00	30.00	10.00
KDM-Ah-40	17.00	8.00	136.00	22.00	26.00	20.00
KDM-Ah-41	19.00	9.00	171.00	30.00	42.00	26.00
KDM-Ah-42	40.00	10.00	400.00	18.00	30.00	24.00
KDM-Ah-43	22.00	9.00	198.00	30.00	45.00	9.00
KDM-Ah-44	40.00	13.00	520	32.00	34.00	28.00
KDM-Ah-45	32.00	11.00	352.00	27.00	38.00	20.00
KDM-Ah-46	45.00	18.00	810.00	45.00	57.00	29.00
KDM-Ah-47	18.00	14.00	252.00	25.00	32.00	17.00
KDM-Ah-48	22.00	10.00	220.00	32.00	36.00	10.00
KDM-Ah-49	24.00	14.00	336.00	27.00	34.00	10.00
KDM-Ah-50	22.00	12.00	264.00	17.00	23.00	7.00
KDM-Ah-51	20.00	9.00	180.00	19.00	23.00	6.00
KDM-Ah-52	38.00	12.00	456.00	17.00	26.00	7.00
KDM-Ah-53	32.00	9.00	288.00	15.00	20.00	8.00
KDM-Ah-54	43.00	12.00	516.00	22.00	26.00	25.00
KDM-Ah- 55	42.00	11.00	462.00	28.00	33.00	24.00
Max.	50.00	18.00	810.00	45.00	57.00	29.00
Min.	10.00	7.00	80.00	11.00	18.00	6.00
Mean	24.58	10.51	266.45	24.36	33.73	14.36
SD	10.77	2.34	151.64	6.81	8.60	7.42
SE(±)	0.80	0.59	3.44	0.81	0.62	0.67
CV (%)	113.91	5.37	22577.38	45.54	72.71	54.12

Table.3 Yield and quality characters of jackfruit genotypes KDM-Ah-1to KDM-Ah-55

Acc. No.	Fruit rind weight (kg)	Number of flakes per fruit	Total weight of flakes per fruit (kg)	Weight of individual flake with seed (g)	Weight of individual flake without seed (g)	Seed weight (g)	Flakes: seed ratio
KDM-AhJ-1	4.50	100.00	5.50	55.00	40.00	15.00	2.66
KDM-AhJ-2	5.00	75.00	6.00	80.00	55.00	25.00	2.20
KDM-AhJ-3	6.50	120.00	5.50	45.00	30.00	15.00	2.00
KDM-AhJ-4	3.00	100.00	5.00	50.00	40.00	10.00	4.00
KDM-AhJ-5	7.00	75.00	5.00	66.00	50.00	16.00	3.10
KDM-AhJ-6	4.50	105.00	3.50	33.00	25.00	9.00	2.70
KDM-AhJ-7	5.50	100.00	3.50	35.00	20.00	15.00	1.30
KDM-AhJ-8	3.00	75.00	5.00	53.00	43.00	10.00	4.30
KDM-Ah-9	8.00	101.00	7.00	69.00	40.00	29.00	1.40
KDM-AhJ-10	5.00	150.00	11.00	83.00	70.00	13.00	5.30
KDM-AhJ-11	8.00	100.00	7.00	70.00	45.00	25.00	1.80
KDM-AhJ-12	6.50	130.00	6.50	50.00	15.00	35.00	0.42
KDM-AhJ-13	5.50	80.00	5.50	69.00	50.00	19.00	2.60
KDM-AhJ-14	7.00	100.00	5.00	50.00	35.00	15.00	2.30
KDM-AhJ-15	5.00	120.00	4.00	33.00	20.00	13.00	1.50
KDM-AhJ-16	4.50	65.00	3.50	54.00	40.00	14.00	2.80
KDM-AhJ-17	5.00	50.00	3.10	60.00	45.00	15.00	3.00
KDM-AhJ-18	4.50	50.00	4.50	90.00	50.00	40.00	1.25
KDM-AhJ-19	5.00	60.00	3.10	50.00	35.00	15.00	2.30
KDM-AhJ-20	5.00	50.00	4.00	80.00	55.00	25.00	2.20
KDM-AhJ-21	5.00	105.00	3.00	28.00	18.00	10.00	1.80
KDM-AhJ-22	6.00	55.00	4.00	72.00	40.00	32.00	1.25
KDM-AhJ-23	5.50	45.00	5.50	122.00	62.00	60.00	1.03
KDM-AhJ-24	5.00	45.00	4.00	88.00	40.00	48.00	0.83
KDM-AhJ-25	6.00	30.00	3.10	100.00	55.00	45.00	1.22
KDM-AhJ-26	5.00	50.00	3.30	60.00	35.00	25.00	1.40
KDM-AhJ-27	7.00	60.00	6.00	100.00	45.00	55.00	0.81
KDM-AhJ-28	6.00	68.00	7.00	102.00	50.00	52.00	0.96
KDM-AhJ-29	7.00	75.00	5.00	67.00	37.00	30.00	1.23
KDM-AhJ-30	6.00	60.00	4.00	66.00	40.00	26.00	1.53
KDM-AhJ-31	3.20	72.00	4.80	67.00	40.00	27.00	1.48
KDM-AhJ-32	6.00	40.00	5.00	125.00	60.00	65.00	0.9
KDM-AhJ-33	4.00	40.00	4.00	100.00	60.00	40.00	1.50
KDM-AhJ-34	5.00	100.00	4.00	40.00	25.00	15.00	1.60
KDM-AhJ-35	6.00	150.00	6.00	40.00	30.00	10.00	3.00
KDM-AhJ-36	6.00	100.00	4.00	40.00	30.00	10.00	3.00
KDM-AhJ-37	5.00	150.00	3.20	20.00	12.00	8.00	1.50
KDM-AhJ-38	5.00	75.00	5.00	67.00	50.00	17.00	2.90
KDM-AhJ-39	4.50	150.00	8.00	55.00	30.00	25.00	1.20
KDM-AhJ-40	3.50	50.00	3.50	75.00	60.00	15.00	4.00

KDM-AhJ-41	4.70	78.00	4.30	55.00	30.00	25.00	1.20
KDM-AhJ-42	4.00	100.00	6.00	60.00	40.00	20.00	2.00
KDM-AhJ-43	3.00	75.00	6.00	80.00	70.00	10.00	7.00
KDM-AhJ-44	5.40	100.00	7.60	75.00	60.00	15.00	4.00
KDM-AhJ-45	6.60	52.00	4.40	85.00	60.00	25.00	2.40
KDM-AhJ-46	4.40	210.00	13.60	80.00	67.00	13.00	5.20
KDM-AhJ-47	6.50	75.00	5.50	80.00	55.00	25.00	2.20
KDM-AhJ-48	5.20	50.00	6.80	110.00	60.00	50.00	1.20
KDM-AhJ-49	6.90	42.00	7.10	170.00	110.00	60.00	1.80
KDM-AhJ-50	7.00	50.00	5.00	100.00	60.00	40.00	1.50
KDM-AhJ-51	5.00	60.00	4.00	67.00	45.00	17.00	2.60
KDM-AhJ-52	6.50	50.00	5.50	110.00	65.00	45.00	1.40
KDM-AhJ-53	4.70	62.00	4.30	70.00	55.00	15.00	3.60
KDM-AhJ-54	6.00	75.00	6.00	80.00	65.00	15.00	4.30
KDM-AhJ- 55	5.50	50.00	4.50	90.00	75.00	25.00	3.00
Max.	8.00	210.00	13.60	170.00	110.00	65.00	7.00
Min.	3.00	30.00	3.00	20.00	12.00	8.00	0.42
Mean	5.38	81.00	5.20	71.29	46.16	25.24	2.28
SD	1.18	35.77	1.89	27.34	17.51	15.10	1.30
SE(±)	0.43	2.30	0.30	2.70	2.56	1.20	0.11
CV (%)	1.37	1256.36	3.52	734.09	301.08	223.96	1.66

Table.4 Score card for evaluation of Qualitative Characters of Jackfruit Germplasm

Acc. No.	Colour and appearance	Flavor	Texture/Firmness	Taste	Overall acceptability
KDM-AhJ-1	7.60	6.80	7.20	7.10	7.80
KDM-AhJ-2	7.20	6.20	6.20	5.00	5.20
KDM-AhJ-3	6.40	5.90	6.60	6.50	5.70
KDM-AhJ-4	6.70	5.70	5.90	5.80	7.80
KDM-AhJ-5	6.70	7.00	6.10	6.40	6.30
KDM-AhJ-6	6.30	6.00	6.00	4.90	5.30
KDM-AhJ-7	7.90	7.50	7.70	8.10	7.50
KDM-AhJ-8	6.90	7.00	8.60	7.60	9.10
KDM-Ah-9	8.00	8.00	8.00	8.00	7.50
KDM-AhJ-10	9.00	9.00	9.00	9.00	9.30
KDM-AhJ-11	7.30	6.60	6.80	8.30	8.10
KDM-AhJ-12	6.60	7.10	7.70	7.10	6.90
KDM-AhJ-13	7.60	7.40	7.10	8.00	8.10
KDM-AhJ-14	6.80	6.70	7.00	6.30	5.90
KDM-AhJ-15	7.00	7.30	6.90	7.20	7.40
KDM-AhJ-16	5.30	6.40	6.10	5.90	5.70
KDM-AhJ-17	7.10	6.80	6.60	6.40	5.90
KDM-AhJ-18	5.20	5.70	6.10	6.50	5.80
KDM-AhJ-19	6.00	5.40	5.70	6.20	5.60

KDM-AhJ-20	7.00	7.20	7.50	7.10	6.90
KDM-AhJ-21	7.10	7.30	7.00	6.90	6.70
KDM-AhJ-22	5.90	5.70	6.10	6.10	5.60
KDM-AhJ-23	6.10	6.50	6.20	5.70	6.80
KDM-AhJ-24	6.20	5.40	6.10	5.30	5.80
KDM-AhJ-25	5.80	6.10	6.20	5.70	5.80
KDM-AhJ-26	6.10	5.70	5.50	5.80	6.20
KDM-AhJ-27	7.20	6.90	5.90	6.30	6.40
KDM-AhJ-28	6.40	6.80	7.10	7.30	6.70
KDM-AhJ-29	7.30	7.80	7.10	6.90	6.00
KDM-AhJ-30	5.30	5.70	6.20	5.40	5.50
KDM-AhJ-31	6.30	6.50	6.10	6.80	8.50
KDM-AhJ-32	6.20	6.40	5.30	6.10	9.00
KDM-AhJ-33	7.40	7.60	7.10	7.50	6.20
KDM-AhJ-34	6.90	5.90	6.10	7.10	8.10
KDM-AhJ-35	7.80	7.10	7.90	7.70	8.50
KDM-AhJ-36	6.00	4.00	6.00	4.00	5.00
KDM-AhJ-37	5.00	5.00	4.00	3.00	6.00
KDM-AhJ-38	6.00	5.00	4.00	4.00	7.00
KDM-AhJ-39	5.00	4.00	5.00	6.00	5.20
KDM-AhJ-40	6.00	5.00	4.00	6.00	7.00
KDM-AhJ-41	6.00	6.00	7.00	6.00	8.00
KDM-AhJ-42	5.00	5.00	6.00	5.00	8.00
KDM-AhJ-43	4.00	5.00	5.00	5.00	6.00
KDM-AhJ-44	5.00	5.00	6.00	6.00	6.00
KDM-AhJ-45	6.00	5.00	7.00	6.00	7.00
KDM-AhJ-46	9.00	8.50	8.50	9.00	9.20
KDM-AhJ-47	5.00	6.00	5.00	5.00	6.00
KDM-AhJ-48	4.00	5.00	4.00	5.00	5.30
KDM-AhJ-49	5.00	6.00	5.00	4.00	5.70
KDM-AhJ-50	5.00	6.00	7.00	5.00	5.30
KDM-AhJ-51	5.00	7.00	5.00	6.00	5.00
KDM-AhJ-52	6.00	5.00	4.00	5.00	6.00
KDM-AhJ-53	6.00	5.00	6.00	5.00	6.00
KDM-AhJ-54	5.00	5.00	6.00	7.00	6.00
KDM-AhJ- 55	6.00	6.00	7.00	5.00	7.00
Max.	9.00	9.00	9.00	9.00	9.30
Min.	4.00	4.00	4.00	3.00	5.00
Mean	6.30	6.21	6.31	6.21	6.66
SD	1.09	1.06	1.2	1.29	1.18
SE(±)	0.31	0.24	0.25	0.23	0.27
CV (%)	1.08	1.05	1.34	1.57	1.33

The above classifications were based on the descriptor developed for *Artocarpus heterophyllus* Lam. (Jackfruit) compiled by International Plant Genetic Resources Institute (IPGRI, 2000) and the scores were derived from the average of twenty participants

Table.5 Quality characters of jackfruit genotypes KDM Ah1 – KDM Ah55 (2018-2019)

Acc. No.	Fruit shape	Flakes colour	Shelf life of flakes
KDM-AhJ-1	slender	Yellow	One day
KDM-AhJ-2	slender	Light yellow	One day
KDM-AhJ-3	Round/oval	Light yellow	One day
KDM-AhJ-4	slender	yellow	One day
KDM-AhJ-5	oval	Light yellow	One day
KDM-AhJ-6	round	white	One day
KDM-AhJ-7	Oval	Bright yellow	One day
KDM-AhJ-8	Slender	Light yellow	Three days
KDM-AhJ-9	Slender	Yellow	One day
KDM-AhJ-10	Slender	Bright Yellow	Five days
KDM-AhJ-11	Round	Yellow	One day
KDM-AhJ-12	Round	yellow	One day
KDM-AhJ-13	Round	yellow	one day
KDM-AhJ-14	Round	Light yellow	One day
KDM-AhJ-15	Slender	Yellow	One day
KDM-AhJ-16	Slender	Pure white	One day
KDM-AhJ-17	Slender	Yellow	One day
KDM-AhJ-18	Slender	Pure White	One day
KDM-AhJ-19	Slender	Pure white	One day
KDM-AhJ-20	Round	White	One day
KDM-AhJ-21	Round	Light yellow	Half day
KDM-AhJ-22	Round	Light yellow	One day
KDM-AhJ-23	Slender	White	Half day
KDM-AhJ-24	Slender	White	One day
KDM-AhJ-25	Round	Light Yellow	One day
KDM-AhJ-26	Round	Light yellow	One day
KDM-AhJ-27	Round	Yellow	Two days
KDM-AhJ-28	Round	Yellow	Two days
KDM-AhJ-29	Slender	yellow	Two days
KDM-AhJ-30	Round	Light yellow	two days
KDM-AhJ-31	Slender	Light Yellow	One day
KDM-AhJ-32	Slender	Bright yellow	Two days
KDM-AhJ-33	Round	Yellow	One day
KDM-AhJ-34	Slender	Yellow	One day
KDM-AhJ-35	Slender	Bright yellow	Three days
KDM-AhJ-36	Oval	Light yellow	One day
KDM-AhJ-37	Slender	Light yellow	One day
KDM-AhJ-38	Slender	Yellow	One day
KDM-AhJ-39	Round	yellow	one day

KDM-AhJ-40	Round	Yellow	One day
KDM-AhJ-41	Slender	yellow	One day
KDM-AhJ-42	Slender	yellow	One day
KDM-AhJ-43	Slender	Light yellow	One day
KDM-AhJ-44	Round	Light yellow	One day
KDM-AhJ-45	Round	Light yellow	One day
KDM-AhJ-46	Slender	Bright Yellow	Five days
KDM-AhJ-47	Round	Light yellow	One day
KDM-AhJ-48	Oval	Light yellow	One day
KDM-AhJ-49	Oval	Light yellow	One day
KDM-AhJ-50	Round	yellow	One day
KDM-AhJ-51	Round	yellow	One day
KDM-AhJ-52	Round	Bright yellow	One day
KDM-AhJ-53	Round	yellow	One day
KDM-AhJ-54	Round	yellow	Two days
KDM-AhJ-55	Slender	Light yellow	Two days

Table.6 Rainfall (mm) of Pudukkottai District (Alangudi and Thiruvankulam Taluk) of Tamil Nadu (2016-2019)

Months	2016	2017	2018	2019
January	0.00	36.71	0.00	-
February	0.00	1.45	0.00	-
March	0.00	37.04	0.00	-
April	2.96	0.00	0.00	31.20
May	78.27	0.00	10.50	5.80
June	30.48	15.12	10.60	41.60
July	55.23	20.45	8.10	79.00
August	75.78	15.23	10.50	13.40
September	75.35	20.27	69.20	301.00
October	79.27	17.25	115.80	205.80
November	26.05	15.10	243.00	-
December	73.23	10.25	29.40	
Average annual rainfall (mm)	496.62	188.87	497.10	677.80

Table.7 Temperature of Pudukkottai District (Alangudi and Thiruvarankulam Taluk) of Tamil Nadu (2016-2019)

Months	2016	2017	2018	2019
January	30	32	32	32
February	29	33	32	34
March	32	32	32	36
April	33	34	34	38
May	34	35	35	39
June	33	34	30	32
July	30	32	32	34
August	28	30	28	32
September	28	32	29	30
October	26	32	32	32
November	26	30	30	28
December	26	28	25	-

Fig.1 KDM-AhJ-01 Jackfruit Germplasm

Fig.2 KDM-AhJ-02 Jackfruit Germplasm

Fig.3 KDM-AhJ-03 Jackfruit Germplasm

Fig.4 KDM-AhJ-04 Jackfruit Germplasm

Fig.5 KDM-AhJ-05 Jackfruit Germplasm

Fig.6 KDM-AhJ-06 Jackfruit Germplasm

Fig.7 KDM-AhJ-07 Jackfruit Germplasm

Fig.8 KDM-AhJ-08 Jackfruit Germplasm

Fig.9 KDM-AhJ-09 Jackfruit Germplasm

Fig.10 KDM-AhJ-10 Jackfruit Germplasm

Fig.11 KDM-AhJ-11 Jackfruit Germplasm

Fig.12 KDM-AhJ-12 Jackfruit Germplasm

Fig.13 KDM-AhJ-13 Jackfruit Germplasm

Fig.14 KDM-AhJ-14 Jackfruit Germplasm

Fig.15 KDM-AhJ-15 Jackfruit Germplasm

Fig.16 KDM-AhJ-16 Jackfruit Germplasm

Fig.17 KDM-AhJ-17 Jackfruit Germplasm

Fig.18 KDM-AhJ-18 Jackfruit Germplasm

Fig.19 KDM-AhJ-19 Jackfruit Germplasm

Fig.20 KDM-AhJ-20 Jackfruit Germplasm

Fig.21 KDM-AhJ-21 Jackfruit Germplasm

Fig.22 KDM-AhJ-22 Jackfruit Germplasm

Fig.23 KDM-AhJ-23 Jackfruit Germplasm

Fig.24 KDM-AhJ-24 Jackfruit Germplasm

Fig.25 KDM-AhJ-25 Jackfruit Germplasm

Fig.26 KDM-AhJ-26 Jackfruit Germplasm

Fig.27 KDM-AhJ-27 Jackfruit Germplasm

Fig.28 KDM-AhJ-28 Jackfruit Germplasm

Fig.29 KDM-AhJ-29 Jackfruit Germplasm

Fig.30 KDM-AhJ-30 Jackfruit Germplasm

Fig.31 KDM-AhJ-31 Jackfruit Germplasm

Fig.32 KDM-AhJ-32 Jackfruit Germplasm

Fig.33 KDM-AhJ-33 Jackfruit Germplasm

Fig.34 KDM-AhJ-34 Jackfruit Germplasm

Fig.35 KDM-AhJ-35 Jackfruit Germplasm

Fig.36 KDM-AhJ-36 Jackfruit Germplasm

Fig.37 KDM-AhJ-37 Jackfruit Germplasm

Fig.38 KDM-AhJ-38 Jackfruit Germplasm

Fig.39 KDM-AhJ-39 Jackfruit Germplasm

Fig.40 KDM-AhJ-40 Jackfruit Germplasm

Fig.41 KDM-AhJ-41 Jackfruit Germplasm

Fig.42 KDM-AhJ-42 Jackfruit Germplasm

Fig.43 KDM-AhJ-43 Jackfruit Germplasm

Fig.44 KDM-AhJ-44 Jackfruit Germplasm

Fig.45 KDM-AhJ-45 Jackfruit Germplasm

Fig.46 KDM-AhJ-46 Jackfruit Germplasm

Fig.47 KDM-AhJ-47 Jackfruit Germplasm

Fig.48 KDM-AhJ-48 Jackfruit Germplasm

Fig.49 KDM-AhJ-49 Jackfruit Germplasm

Fig.50 KDM-AhJ-50 Jackfruit Germplasm

Fig.51 KDM-AhJ-51 Jackfruit Germplasm

Fig.52 KDM-AhJ-52 Jackfruit Germplasm

Fig.53 KDM-AhJ-53 Jackfruit Germplasm

Fig.54 KDM-AhJ-54 Jackfruit Germplasm

Fig.55 KDM-AhJ-55 Jackfruit Germplasm

Weather parameter

Average rainfall during the year 2016 to 2019 was recorded on 465.10 mm under Pudukkottai District and Alangudi and Thiruvarankulam Taluk of Tamil Nadu (Table 6.).

Maximum temperature of 39⁰C was recorded on during the period of May 2019 and minimum temperature of 25⁰ C was recorded on during the December 2018 under Pudukkottai District of Alangudi and Thiruvarankulam Taluk of Tamil Nadu (Table 7.) Jackfruit is a tropical and subtropical fruit. Rainfall and temperature is important factors for initiation flowering and fruiting of jackfruit. Dry tract jackfruits are mostly more sweet compare to irrigated areas. This may be due to the climatic conditions.

Crop improvement is a complex process and these results from the interaction of a combination of factors. Such improvement can be achieved genetically, by developing resistant types, high yield, good quality, fruit characters, (early season, mid-season and late season bearer), by devising improved agronomic practices, by adapting to diverse environments (drought tolerant) and by correcting soil nutrient levels. It can be a major part of any crop improvement programme by the utilization of available genetic resources. An overall improvement strategy of jackfruit (*Artocarpus heterophyllus*) was taken up by considering the above mentioned justification. Fifty five

superior genotypes were selected for environmental adaptation (dry tracts) and high yield, good quality of Jackfruit genotypes. Considering growth, yield and quality characteristics the genotypes KDM-AhJ -08, KDM-AhJ -10 and KDM-AhJ -46 were found to be suitable for jackfruit cultivation at dry tracts of Tamil Nadu.

The present finding shows the great genetic potential of the studied germplasm. It can be used in future breeding programmes for getting productive and quality traits. Moreover, the variability observed in the current study could be used in jackfruit improvement programme. Finally, the plant breeders and horticulturists can choose germplasm according to their needs. Therefore, these jackfruit germplasms can be included in the variety development programme in future.

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