J Krishi Vigyan 2022, 11 (1) : 198-205 DOI : 10.5958/2349-4433.2022.00129.5

Identification of Low TSS Content Jackfruit Genotypes Suitable For Diabetic Patients

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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 low total soluble solids(TSS) content Jackfruit genotypes suitable for diabetic patients. Jackfruit trees are cross pollinated and mostly seed propagated. As a result, morphological and agronomical characters of jackfruit showed a distinct range of variation. Among the fifty-five jackfruit germplasms, TSS ranged from 6.00 to 29.00 with mean value of 14.36 (Table 1). Meanwhile the genotype the minimum of (6^0brix) was found from the germplasm KDM-Ah-51 followed by the genotypes KDM-Ah-6, KDM-Ah-18, KDM-Ah-20, KDM-Ah-21, KDM-Ah-22, KDM-Ah-24, KDM-Ah-25 and KDM-Ah-26 ($7\ ^0$brix)was found to be suitable for diabetic patients.

Key Words : Collection, Evaluation, Germplasm, Genotypes, Jackfruit, Total soluble solids.

INTRODUCTION

Jackfruit is an enormous fruit which is large and bushy, found growing mainly in tropical areas. The jackfruit is a multipurpose species providing wood, timber, fuel and fodder with medicinal and industrial products. The primary economic part of jackfruit is the fruit which is used both when mature and immature. Jackfruit seeds can be roasted or boiled like chestnuts. Mitra and Mani (2000) reported jackfruit types with total soluble solutes (TSS) greater than 25° brix to be more suitable for preparing desserts.

The incidence of diabetes has recently increased in developing countries. Scientific data on glycemic index (GI) values of common meals is essential to modify the diets for diabetes mellitus patients. GI is an important tool for determine the sugar level of jackfruit. Glycemic index is defined as the incremental area under the blood glucose response curve elicited over a two-hour period by a 75g carbohydrate portion of a food, expressed as a percentage of the response to the same amount of carbohydrate from a standard food taken by the same subject (Selladurai *et al*, 2012). Degrees Brix or °Brix is a measure of the total soluble solids (TSS) present in the fruit. Brix is taken as a measure of sugar or sweetness of fruits or fruit juices (Maiti et al, 2002). Brix values are important because they can be measured objectively and they relate to a subjective criterion that buyers and eaters use to assess fruit or vegetable quality flavour or sweetness. When obtained and applied correctly, brix values can aid in variety selection, harvest scheduling, and other aspects of crop production including irrigation, fertility, and post harvest management.

In India, jackfruit production is mostly in Bihar, West Bengal, Uttar Pradesh, Assam, Orissa, Kerela and Tamil Nadu. In 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. Owing to its uses and ease of cultivation in

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

Acc. No.	Number of fruits /tree	Fruit weight (kg)	Yield /tree (kg)	Fruit Length (cm)	Fruit breadth (cm)	TSS (^{0}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	29.00
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	28.00
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	27.00
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
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

Tamil Nadu, identification of genotypes with high yield and low TSS is the need of the hour. With this background in this present study identification of low TSS content Jackfruit genotypes suitable for diabetic patients.

MATERIALS AND METHODS

The experiment was conducted with the existing bearing trees of different jackfruit genotypes at Pudukkottai District in Tamil Nadu region during the year 2016–2019. Fifty five jackfruit germplasm*viz.*, KDM-AhJ-01 to KDM-AhJ-55 were selected for the study to identify low TSS content Jackfruit genotypes. The recorded age of the selected tress ranged from 07 to 33 years. There are many methods to determine the maturity of fruits. Some methods need an external examination of fruits, while others require a more detailed analysis of the internal composition of fruits. Brix is a measure of internal components. Though it is not universally applicable as some other measures of maturity, Brix provides vital information of interest for the fruit industry and associated processing factories. Therefore, it is important to find out its strengths and limitations.

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 (^{0}brix),rind weight (kg), number of flakes per fruit, weight of flakes per fruit (kg), weight of individual flake without seed (g), seed weight (g) and Flakes: seed ratio, 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

Table 2. Score card for evaluation of Qualitative Characters of Jackfruit Germplasm KDM-AhJ-1to KDM-AhJ-55

Acc. No.	Colour and appearance	Flavour	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
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

variance (CV %) using Microsoft Office Excel package.

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.

RESULTS AND DISCUSSION

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 1). 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 nuclear family. Farmer's point of view medium and large sized fruits are economically viable and export market is more preferable. Fruit length and breadth of fifty five jackfruit were significantly varied. 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)

Fig. 1. Identification of Low TSS content Jackfruit genotypes suitable for diabetic patients

Fig. 6 KDM-AHJ-06 Jackfruit Germplasm

Fig. 18 KDM-AHJ-18 Jackfruit Germplasm

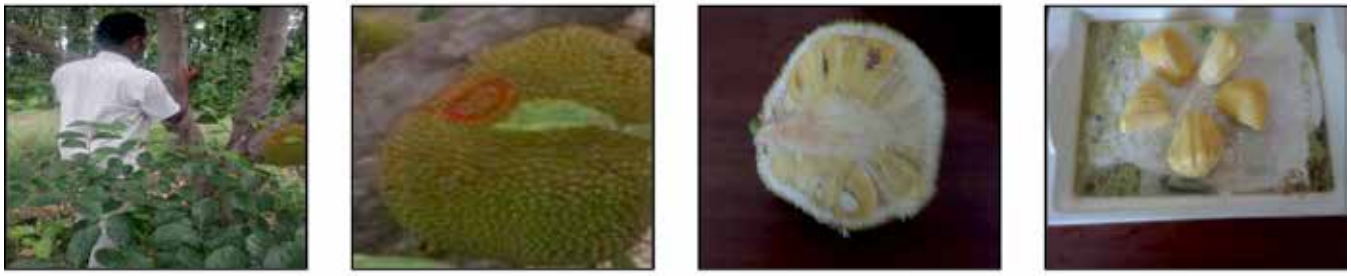

Fig. 20 KDM-AHJ-20 Jackfruit Germplasm

Fig. 21 KDM-AHJ-21 Jackfruit Germplasm

Fig. 22 KDM-AHJ-22 Jackfruit Germplasm

Fig. 2. Identification of Low TSS content Jackfruit genotypes suitable for diabetic patients

Fig. 24 KDM-AHJ-24 Jackfruit Germplasm

Fig. 25 KDM-AHJ-25 Jackfruit Germplasm

Fig. 26 KDM-AHJ-26 Jackfruit Germplasm

Fig. 51 KDM-AHJ-51 Jackfruit Germplasm

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).

Total Soluble Solids

TSS ranged from 6.00 to 29.00 with mean value of 14.36. Maximum TSS (29 ^{0}brix) was obtained from KDM-Ah -08 followed by KDM-Ah -10 (28 ^{0}brix) and minimum of (6^{0}brix) was found from the germplasm KDM-Ah-51 followed by the genotypes KDM-Ah-6, KDM-Ah-18, KDM-Ah-20, KDM-Ah-21, KDM-Ah-22, KDM-Ah-24, KDM-Ah-25 and KDM-Ah-26. Brix values are important because they can be measured objectively and they relate to a subjective criterion that buyers and eaters use to assess fruit or vegetable quality flavour or sweetness. (Kleinhenz and Bumgarner, 2013).

Colour and Appearance

Colour and appearance ranged from 4.00 to 9.00 with mean value of 6.40. Maximum colour and appearance 9.00 were 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 flavour 9.00 was obtained from KDM-AhJ -08 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 -08 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-AhJ -08 followed by KDM-AhJ -10 and minimum of 3.00 was found from the germplasm KDM-AhJ-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 -08 followed by KDM-Ah J-10 (9.20) and minimum 5.00 was observed by the germplasm KDM-AhJ-36 and KDM-AhJ-51(Table 2).

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-08 (9.30) followed by KDM-AhJ-10 (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).

CONCLUSION

The results suggest low TSS content Jackfruit genotypes suitable for diabetic patients. Among the fifty five genotypes *viz.,*KDM-AhJ-01 to KDM-AhJ-55 the minimum of (6^{0}brix) was found from the germplasm KDM-Ah-51 followed by the genotypes KDM-Ah-6, KDM-Ah-18, KDM-Ah-20, KDM-Ah-21, KDM-Ah-22, KDM-Ah-24, KDM-Ah-25 and KDM-Ah-26 (7 ^{0}brix).

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Received on 8/7/2022 *Accepted on 15/10/2022*