

DIVERSITY OF JACKFRUIT (*Artocarpus heterophyllus* Lam.) IN RONGRAM BLOCK OF WEST GARO HILLS, MEGHALAYA

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Abstract: Jackfruit (*Artocarpus heterophyllus* Lam.) locally known as ‘Tebrong’ is grown extensively in West Garo Hills and most of these trees are of seedling progeny. Jackfruit is a cross pollinated plant and propagation through seeds exhibit considerable variation in tree growth habit, canopy structure, leaf characters, fruit characters, productivity etc. A survey was conducted in Rongram block of West Garo Hills district of Meghalaya to evaluate the diversity of jackfruit. The information was collected as per the descriptors prescribed by IPGRI (International Plant Genetic Resources Institute), Rome, Italy. Out of the 20 jackfruit trees observed, the highest yield per tree and productivity per hectare were recorded in Type 1. The highest number of fruits per tree was noted in Type 2 followed by Type 1. Type 16 produced fruits of highest weight followed by Type 1. These germplasm may be considered for breeding and crop improvement purpose.

Keywords: Jackfruit, Biodiversity, Morphological characters, yield attributing characters, Garo Hills.

Introduction

The jackfruit tree (*Artocarpus heterophyllus* Lam.) is a tropical evergreen tree belonging to family Moraceae. It thrives very well in West Garo Hills of Meghalaya owing to sub-tropical climatic conditions. Jackfruit is a very popular fruit among the Garo tribe and is commonly known as ‘Tebrong’. The fruits are a good source of vitamin A, B, C, potassium, calcium, iron, proteins, minerals and carbohydrate (Chadha, 2009). The fruits are also rich in pectin, carotene, ascorbic acid and contain substantial amount of fibre (Sharma *et al.*, 2009).

Jackfruit is an under exploited fruit crop in West Garo Hills inspite of its various uses as food and medicine. Jackfruit trees are cross pollinated and propagation is done mostly through seeds. As a result, considerable variation is observed in growth habit, canopy structure, leaf size, fruit shape, fruit size, colour, fruit bearing age, fruiting season and fruit maturity. Such variations provide suitable platform for further crop improvement (Sharma *et al.*, 2009). A survey was conducted in Rongram block of West Garo Hills district of Meghalaya to observe the morphological and yield attributing characters of jackfruit trees, to examine the

possibilities of selecting superior jackfruit germplasm for developing varieties from the untapped biological diversity of jackfruit.

Materials and Methods

The survey was carried out in Rongram Development block of West Garo Hills district of Meghalaya during 2014-2015. The West Garo Hills district lies approximately between 90° 30' and 89° 40' E longitudes and 26° and 25° 20'N latitudes. Twenty trees were randomly selected for recording the morphological and yield attributing parameters. The data were collected as per the descriptors prescribed by IPGRI (International Plant Genetic Resources Institute, 2000). Statistical tools such as mean, standard deviation, standard error mean were used to analyse the data statistically. The variations among the different types of trees were determined by calculating the coefficient of variation.

Results and Discussion

Among the twenty jackfruit trees observed in Rongram block, wide variations were observed among tree, leaf and yield attributing characters. The tree height varied between 6.5 m to 16 m, trunk height 0.6m-5.2 m, trunk circumference 80cm- 200 cm, crown diameter in East-West direction from 2.7m-12.5 m and crown diameter in North-South direction 3.1m-10.78 m. Among the 20 trees observed, Type 1 exhibited the maximum tree height (16 m), trunk circumference (200 cm) and crown diameter in East-West direction (12.5 cm) while maximum crown diameter in North south direction (10.78 m) was observed in Type 3 and maximum trunk height (5.2 m) was recorded in Type 13 (Table 1). It was observed that Type 1 showed highly vigorous growth with an oblong canopy shape, very rough trunk surface, spreading growth habit, opposite branching pattern and medium branching density. Type 4 exhibited broadly pyramidal canopy shape while Type 12 exhibited spherical canopy shape. Rest of the types showed irregular shaped canopy (Table 2).

Among the leaf characters, leaf length varied between 8.2-17.7 cm, leaf width ranged from 5.0-13.2 cm and petiole length varied between 9.0-31.0 mm (Table 3). The longest leaf blade (17.7 cm) was observed in Type 8, widest leaf blade (13.2 cm) in Type 17 and longest petiole length (31.0 mm) in Type 19. Varied leaf shapes like elliptic, narrowly elliptic, broadly elliptic, obovate, oblong and lyrate were observed with acute, obtuse or acuminate leaf apex; rounded, cuneate, oblique or shortly attenuate leaf base; entire or undulate leaf margin; varying from green to dark green colour with varying intensity of leaf and midrib pubescence (Table 4).

Highest number of fruits per plant (78) was noted in Type 2 followed by Type 1 bearing 72 fruits (Table 5). Type 16 exhibited the highest average fruit weight of 12.1 kg followed by 11.9 kg in Type 1. The highest yield per tree was recorded in Type 1 (856.8 kg) followed by Type 2 (253.5 kg) and Type 6 (205.2 kg). The highest productivity was recorded in Type 1 with 85,600 kg/ha followed by Type 2 with 25,350 kg/ha and Type 6 with 20,520 kg/ha.

In the present study, a wide range of variation was observed with respect to tree, leaf and yield attributing characters. Characterization studies on jackfruit have also been conducted in other parts of the country by several researchers. Mitra and Mani 2000; Sharma *et al.*, 2009 and Chadda 2009 observed wide variations among seedling progeny of jackfruit with regard to growth habit, canopy structure, leaf size, fruit bearing, fruit shape, fruit size and fruit quality. Mitra and Maity (2002) carried out collection and evaluation of over 1460 jackfruit trees in West Bengal and identified 35 types as superior clones. Muthulakshmi (2003) studied the genetic diversity of jackfruit in four different topographical regions of Thrissur district of Kerala namely plains, hills, coastal and riverside during 1998-2002, and observed wide variations with respect to tree, leaf, fruit characters and yield per tree. Reddy *et al.* (2004) conducted characterization studies on jackfruit in South Karnataka and observed enormous variability in the qualitative and quantitative traits of fruits.

Out of the 20 jackfruit trees observed, the highest yield per tree and productivity per hectare were recorded in Type 1. The highest number of fruits per tree was noted in Type 2 followed by Type 1. Type 16 produced fruits of highest weight followed by Type 1. These germplasm may be considered for breeding and crop improvement purpose.

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Table 1: Tree characters (quantitative) of different types of jackfruit

Tree Type	Tree height (m)	Trunk height (m)	Trunk circumference (cm)	Crown diameter	
				East-West (m)	North-South (m)
Type 1	16	2.13	200	12.5	10.3
Type 2	9.62	0.88	82	6.7	8.6
Type 3	14.85	3.4	155.4	7.04	10.78
Type 4	11.1	1.7	100	7.8	6.9
Type 5	9.2	3.4	120	9.2	8.5
Type 6	14.8	2.2	120	7.6	7.4
Type 7	12.7	4.8	130	4.7	10.2
Type 8	7.9	1.6	140	8.3	7.5
Type 9	12.7	2.75	135	6.3	6.1
Type 10	9.1	3.6	87	6.51	4.8
Type 11	10.9	2.3	91.4	4.8	6.1
Type 12	8.4	2.6	88.4	5.62	8.9
Type 13	11.75	5.2	83	2.7	3.21
Type 14	15.7	4	105	4.8	3.1
Type 15	14	1.6	170	8.3	9.9
Type 16	11	4.6	110	4.7	8.5
Type 17	12.1	0.6	140	8.2	7.3
Type 18	6.5	1.7	120	7.5	5.2
Type 19	12.7	2.6	160	11.7	10.3
Type 20	9.25	2.2	80	6.4	5.5
Mean	11.51	2.69	120.86	7.07	7.45
SD	2.70	1.28	33.17	2.35	2.33
SEM±	0.60	0.29	7.42	0.53	0.52
CV (%)	23.49	47.35	27.45	33.26	31.28

Table 2: Tree characters (qualitative) of different types of jackfruit

Tree Type	Crown shape	Trunk surface	Tree vigour	Tree growth habit	Branching pattern
Type 1	Oblong	Very rough	high	Spreading	Opposite
Type 2	Irregular	Smooth	Medium	Spreading	Verticillate
Type 3	Irregular	Very rough	Medium	Spreading	Irregular
Type 4	Broadly pyramidal	Rough	Medium	Semi-erect	Erect
Type 5	Irregular	Smooth	Medium	Erect	Erect
Type 6	Irregular	Smooth	Medium	Semi-erect	Erect
Type 7	Irregular	Rough	Medium	Erect	Erect
Type 8	Irregular	Smooth	Medium	Semi-erect	Erect
Type 9	irregular	Smooth	Medium	Erect	Irregular
Type 10	Irregular	Smooth	Medium	Semi-erect	Irregular
Type 11	Irregular	Smooth	Medium	Semi-erect	erect
Type 12	Spherical	Smooth	Medium	Erect	verticillate
Type 13	Irregular	Smooth	Low	Erect	erect
Type 14	Irregular	Rough	Low	Semi-erect	opposite
Type 15	Irregular	Very rough	Low	Semi-erect	erect
Type 16	Irregular	Smooth	Medium	Semi-erect	erect
Type 17	Irregular	Smooth	Medium	Erect	erect
Type 18	Irregular	Very rough	Medium	Semi-erect	irregular
Type 19	Irregular	Very rough	Low	Erect	irregular
Type 20	Irregular	Smooth	Low	Erect	irregular

Table 3: Leaf characters (quantitative) of different types of jackfruit

Tree Type	Leaf blade length (cm)	Leaf blade width (cm)	Petiole length (mm)
Type 1	16.9	8.9	14
Type 2	16	8.3	20
Type 3	14.1	7.7	25
Type 4	16	6.5	25
Type 5	15	5.9	15
Type 6	9.1	6	12
Type 7	12.2	5	9
Type 8	17.7	8.6	24
Type 9	12.2	7.6	26
Type 10	16	8.9	18
Type 11	15.2	7.8	21
Type 12	13.8	6.1	25
Type 13	16.9	10.3	19
Type 14	15.9	7.9	18
Type 15	12.5	6.3	12
Type 16	17.1	10.1	19
Type 17	17.4	13.2	18
Type 18	8.2	5.8	19
Type 19	13.1	6.3	31
Type 20	16.1	9	12
Mean	14.57	7.81	19.10
SD	2.66	1.96	5.72
SEM±	0.60	0.44	1.28
CV (%)	18.29	25.15	29.95

Table 4: Leaf characters (qualitative) of different types of jackfruit

Tree type	Leaf blade shape	Leaf apex shape	Leaf base shape	Leaf blade margin	Leaf colour	leaf upper surface pubescence	Leaf lower surface pubescence	Leaf midrib pubescence	Petiole shape	Grooves on petiole	Crotch angle of petiole
Type 1	Obovate	Acute	Cuneate	Entire	Dark green	Glabrous	Sparse	Sparsely puberulent	Rounded	Present	Acute
Type 2	Elliptic	Acute	Oblique	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 3	Obovate	Acuminate	Oblique	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 4	Narrowly elliptic	Acute	Cuneate	Entire	Green	Glabrous	Intermediate	Sparsely puberulent	Rounded	Present	Acute
Type 5	Elliptic	Acute	Oblique	Entire	Green	Sparse	Intermediate	Sparsely puberulent	Rounded	Present	Acute
Type 6	Elliptic	Acuminate	Cuneate	Entire	Green	Glabrous	Intermediate	Sparsely puberulent	Rounded	Present	Acute
Type 7	Narrowly elliptic	Acute	Shortly attenuate	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 8	Lyrate(wavy)	Acute	Oblique	Undulate	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 9	Elliptic	Acuminate	Cuneate	Entire	Dark green	Sparse	Sparse	Sparsely puberulent	Rounded	Present	Acute
Type 10	Elliptic	Acute	Shortly attenuate	Entire	Dark green	Glabrous	Sparse	Sparsely puberulent	Rounded	Present	Acute
Type 11	Obovate	Obtuse	Oblique	Entire	Dark green	Sparse	Intermediate	Sparsely puberulent	Rounded	Present	Acute
Type 12	Obovate	Acuminate	Cuneate	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 13	Elliptic	Acute	Oblique	Entire	Green	Glabrous	Sparse	Sparsely puberulent	Rounded	Present	Acute
Type 14	Obovate	Acuminate	Rounded	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 15	Lyrate	Acuminate	Cuneate	Undulate	Dark green	Sparse	Dense	Sparsely puberulent	Rounded	Present	Acute
Type 16	Elliptic	Acuminate	Cuneate	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 17	Broadly elliptic	Acuminate	Rounded	Entire	Green	Sparse	Intermediate	Sparsely puberulent	Rounded	Present	Acute
Type 18	Oblong	Obtuse	Cuneate	Entire	Dark green	Intermediate	Dense	Sparsely puberulent	Rounded	Present	Acute
Type 19	Obovate	Obtuse	Cuneate	Entire	Dark green	Glabrous	Glabrous	Glabrous	Rounded	Present	Acute
Type 20	Narrowly elliptic	Acute	Shortly attenuate	Entire	Dark green	Glabrous	Sparse	Sparsely puberulent	Rounded	Present	Acute

Table 5: Yield attributing parameters of different types of jackfruit

Tree type	Number of fruits per tree	Average fruit weight (kg)	Yield per tree (kg)	Fruit productivity (kg/ha)
Type 1	72	11.9	856.8	85680
Type 2	78	3.25	253.5	25350
Type 3	20	3	60	6000
Type 4	7	6.55	45.85	4585
Type 5	32	3.5	112	11200
Type 6	24	8.55	205.2	20520
Type 7	32	2.3	73.6	7360
Type 8	20	2.5	50	5000
Type 9	14	3.9	54.6	5460
Type 10	30	3.8	114	11400
Type 11	26	5.7	148.2	14820
Type 12	7	4.2	29.4	2940
Type 13	4	2.95	11.8	1180
Type 14	12	9.85	118.2	11820
Type 15	8	6.1	48.8	4880
Type 16	7	12.1	84.4	6440
Type 17	1	10.1	10.1	1010
Type 18	32	3.4	108.8	10880
Type 19	8	2	16	1600
Type 20	1	4.5	4.5	450
Mean	21.75	5.51	120.29	11924.75
SD	21.11	3.25	185.23	18532.03
SEM±	4.72	0.73	41.42	4143.89
CV (%)	97.04	59.03	153.99	155.41