

## Jackfruit diversity of East Garo Hills, Meghalaya- an empirical study

Gaithoilu Phaomei • Binu Mathew\*

Department of Rural Development and Agricultural Production, North-Eastern Hill University, Tura Campus, Tura-794002, Meghalaya

### ARTICLE INFO

#### **Article history:**

Received: 21 November, 2022

Revision: 19 May, 2024

Accepted: 15 June, 2024

**Key words:** *Artocarpus heterophyllus*, Diversity, Characterization, East Garo Hills, Meghalaya

DOI: 10.56678/iahf-2024.37.01.22

### ABSTRACT

A study was carried out to assess the morphological variability of jackfruits grown in the East Garo Hills district of Meghalaya, India and to identify genotypes suitable for chips making and starch extraction. In Garo Hills, usually seeds are used to propagate jackfruit, which causes wide genetic variations among the different jackfruit trees. More than 50 homestead grown jackfruits were surveyed out of which 13 elite jackfruits of regular bearing habit were selected for further detailed characterization. Ninetyone quantitative, qualitative and biochemical parameters of each tree were studied to characterize the jackfruit accessions. Out of the 91 parameters studied, 29 qualitative characters, 11 qualitative characters and 5 biochemical parameters are presented in this paper. Considerable variations were observed among the selected trees with regard to fruit yield, fruit size, fruit shape, fruit weight, flake shape, flake thickness, seed shape, seed length, seed width, flake/seed ratio, seed coat colour, 100-seed weight etc. Different fruit shape viz. ellipsoid (46.15 %), clavate (23.08 %), oblong (23.08 %) and irregular (7.70 %) shapes were observed. The yield ranged from 60-200 nos. of fruits per tree weighing 346.2 to 1317.6 kg per tree per year. Considering all the morphological and biochemical parameters it was observed that of all the 13 jackfruit genotypes, two trees viz. EGHJ-3 and EGHJ-12 produced non juicy, firm flaked texture with reasonably good flake thickness, flake:fruit ratio and flake:seed ratio. This is a desirable character for preparation of jackfruit chips. The fruits of EGHJ-12 also produced largest seeds as compared to other genotypes, which qualifies it to be a potential genotype for starch extraction.

### 1. Introduction

Jackfruit (*Artocarpus heterophyllus* Lam.) is the largest fruit crop and is believed to be indigenous to the Western Ghats of India (Rowe-Dutton, 1985). India is the largest producer of jackfruit. It is widely distributed in Assam, Tripura, West Bengal, Bihar, Uttar Pradesh, Kerala, Tamil Nadu and Karnataka. In Meghalaya jackfruit is found in abundance in Garo Hills, the southern slopes of Khasi Hills, parts of West and South-West Khasi Hills, Jaintia hills and Ri-Bhoi district. The Garo Hills region of the state has tremendous potential to produce a huge number of jackfruits. It is a popular fruit among the Garos and is grown all over Garo Hills of Meghalaya. Jackfruit is commonly known as 'Tebrong' and is still an underutilized fruit crop of this region. Since jackfruit grown in this region are seedling

progeny, wide variations were observed in tree growth characters, leaf characters, inflorescence characters, fruit characters, yield characters, seed characters and fruit quality. Such variations provide suitable opportunities for the selection of jackfruit germplasm for crop improvement and breeding programmes. Hence an investigation was conducted during 2018-20 to study the morphological characteristics of jackfruit in the East Garo Hills District of Meghalaya.

### 2. Materials and Methods

A survey was conducted with the objective to study the morphological variation among jackfruit in Rongjeng and Samandablocks of East Garo Hills district of Meghalaya and to identify genotypes suitable for chips making and starch extraction. Since jackfruit is an underutilized crop it is grown

\*Corresponding author: drbmathew@gmail.com

in the backyard without any proper management practices and grown with other fruit crops. Fifty jackfruit trees aged between 15 to 40 years were surveyed, out of which 13 healthy trees were selected for a detailed study. Each tree was given an accession number and the GPS location was noted for future identification. The information was collected as prescribed by the descriptors of the International Plant Genetic Resources Institute (IPGRI), Rome, Italy. Growth characters (7), leaf characters (3), inflorescence characters (2), fruit characters (12), flake and seeds characters (16) and biochemical content (5) were recorded and tabulated. Statistical tools like mean, standard deviation, coefficient of variations etc. were used to analyze the data.

### 3. Results and Discussion

#### Tree growth characters

Tree height, trunk height and trunk circumferences ranged between 8.43 to 16.27 m, 0.76 to 7.49 m and 79.25 to 390 cm respectively. A similar range of tree heights was also recorded by Ali *et al.* (2015) and Dey and Baruah (2019) ranging between 12.0 to 15.8 m and 7 to 18 m respectively. These variations may be due to genetic differences among the accessions as well as the growing condition.

Medium to high tree vigour with smooth to rough trunk surfaces were observed. Trees showed spreading growth habit (23.08 %), semi-erect (15.38 %) and erect (61.54 %). Sparse to medium to high branching density with varied branching patterns such as erect (15.38 %), opposite (15.38 %) and irregular branching (69.23 %) were observed in the selected jackfruit tree. Intermediate to strong apical dominance was recorded. Similar variations were also observed by Khan *et al.* (2010) and Dey and Baruah (2019). These variations in growth characteristics may be due to growing conditions and soil nutrition of the area.

#### Leaf characters

Leaf length and leaf width ranged between 9.60 to 18.50 cm and 4.20 to 10.40 cm respectively. Petiole length ranged between 14 to 26 mm. Avani and Bauri (2018), Roy *et al.* (2018) and Dey and Baruah (2019) also reported a leaf length and width ranging between 7.5 to 13.4 cm and 4.1 to 7.6 cm; 9.20 to 14.69 cm and 5.50 to 9.56 cm; 10.34 to 17.94 cm and 5.20 to 10.36 cm respectively. These variations may occur due to varietal differences among jackfruit accessions.

#### Inflorescence characters

The first male inflorescence appears in the last week of November to first week December and 75% of male inflorescence appears in the month of December to January. First female inflorescence appears in the month of December to January and 75% of female inflorescence appears in the

month of January to February. Ali *et al.* (2015) also observed that 75% female flower appeared in the month of January to February. Rahman *et al.* (2016) also recorded similar observations on the appearance of the first male and female inflorescence. Variations may observe due to climatic conditions and genetic variations within different jackfruit accessions.

#### Fruiting behaviour and yield attributing characters

The number of fruits ranged between 60 to 200 fruits approximately. Trees bearing bigger size fruits bore lesser number of fruits while trees bearing small to medium-sized fruits bore higher number of fruits. The highest average fruit weight was recorded in EGHJ-6 (9.4 kg) followed by EGHJ-9 (7.32 kg) and EGHJ-3 (7.21 kg), lowest in EGHJ-8 (3.85 kg). EGHJ-9 exhibited highest yield per tree of 1317.6 kg followed by 1160 kg in EGHJ-7 and 1034 kg in EGHJ-1. Likewise, highest fruit productivity was recorded in EGHJ-9 followed by EGHJ-7 and EGHJ-1. Mitra and Mani (2000) recorded fruit weight ranging from 2.02 to 10.22 kg; Akter and Rehman (2017) recorded 2.57 to 11 kg fruit weight. Ali *et al.* (2015), Aseef *et al.* (2017) and Chandrasekhar *et al.* (2017) recorded similar readings on number of fruits and yield per tree in their respective studies. However, the average fruits of East Garo Hills were comparatively larger in size.

The fruiting season starts in the month of May to July and ends in the month of August with regular bearing habit. Fruit-bearing positions were in the trunk, primary branches and secondary branches with cluster-bearing habits. Medium to Heavy fruiting of early to intermediate maturity period was observed in selected jackfruit types. Heavy fruiting with early maturity was observed in EGHJ-9.

#### Fruit characters

Stalk length and diameter ranged between 25.75 to 62.66 mm and 2.60 to 38.00 mm respectively. Fruit length and diameter ranged between 24.40 to 48.60 and 15.40 to 31.50 cm respectively. The largest fruit was recorded in EGHJ-6 followed by EGHJ-7. Chandrasekhar *et al.* (2018) noted fruit length and diameter ranged between 23.50 to 56.75 cm and 15.50 to 31.00 cm.

Fruit rind weight ranges from 1.95 to 4.78 kg. The lowest fruit rind weight was recorded in EGHJ-8 (1.95 kg) and the highest in EGHJ-9 (4.78 kg). It is similar to the findings of Akter and Rehman (2017), which ranged between 1.15 to 4.70 kg. The Thickest rind was recorded in EGHJ-4 (12 mm) closely followed by EGHJ-11 (11.99 mm) and EGHJ-5 (11.96 mm).

The majority of the fruits were ellipsoid in shape (46.15 %) followed by clavate (23.08 %), oblong (23.08 %) and irregular (7.70 %). Fruit rind colours of greenish yellow

(61.54 %), green (7.70 %) and reddish yellow (15.38 %) with spiny fruit surfaces were observed. Ibrahim *et al.* (2013) also reported light yellow, yellowish, reddish yellow and greenish yellow. Akter and Rehman (2017) mention that maximum jackfruit germplasm was greenish-yellow in colour. Dense spine density exhibited a sharp pointed spine shape while sparse spine density showed an intermediate spine shape.

#### Flake Characters

The colour of the flakes was mostly deep yellow (38.46 %) and yellow (38.46 %) followed by light yellow pulp (15.39 %) and creamy white pulp (7.69 %). Jagadeesh *et al.* (2010), Dey and Baruah (2019) also observed flesh colour ranging from creamy white to deep yellow. Sweet pulp taste with a soft, slimy and medium consistency, which produces weak to intermediate to strong pulp flavour. Variation in flake shapes like irregular (30.77 %), obovate (7.70 %), rectangular (23.08 %), cordate (23.08 %), oblong with curve tip (7.70 %) and spheroid (7.70 %) were observed.

The highest number of flakes per kg fruit was recorded in EGHJ-7 (31.9) followed by EGHJ-4 (27.59) and EGHJ-13 (27.08) while the lowest was recorded in EGHJ-3 (13.18). The highest weight of flakes per kg fruit 0.56 kg was recorded in EGHJ-7 followed by EGHJ-11 (0.44 kg) and EGHJ-13 (0.43 kg), lowest in EGHJ-1 (0.29 kg). Mean weight of 0.39 with a coefficient variation of 17.39 %. The weight of seed fresh flakes with seeds and without seeds ranged between 1.52 to 3.9 kg and 0.55 to 2.6 kg respectively. EGHJ-6 recorded the highest followed by EGHJ-7 and EGHJ-9. The present reading falls under the results reported by Ningotet *et al.* (2018) and Jagadeesh *et al.* (2010). EGHJ-7 showed highest flake:fruit ratio of 0.56 followed by EGHJ-11 (0.44) and EGHJ-13 (0.43) while lowest was recorded in EGHJ-1 (0.29).

Flake length and width ranged between 3.4 to 6.5 cm and 2.1 to 4.4 cm respectively. The longest flake length was noted in EGHJ-9 followed by EGHJ-12 and EGHJ-4 while the lowest was observed in EGHJ-5. The widest flake width was observed in EGHJ-11 and EGHJ-12 followed by EGHJ-4 and EGHJ-13 while the narrowest was in EGHJ-7. Wangchuet *et al.* (2013) and Chandrasekhar *et al.* (2018) reported similar findings ranging between 3.60 to 8.30 cm in length and 2.13 to 6.80 cm in width; 3.72 to 10.08 cm in length and 2.29 to 5.27 cm width respectively.

The thickest flake of 9 mm thickness was recorded in EGHJ-3 followed by EGHJ-1 (8 mm) and EGHJ-3 (7 mm) while the thinnest flakes were recorded in EGHJ-5 (3.5 mm) thickness. Jagadeesh *et al.* (2007) also reported flakes of 0.17 to 0.60 cm thickness in their study. Flake thickness and flake length are important physical parameters while selecting genotypes for chips purpose. The fibrous texture was observed in the flakes of EGHJ-2 and EGHJ-10; firm texture

in EGHJ-3 and EGHJ-12; semi-firm and fibrous in EGHJ-9 and EGHJ-13 while the remaining types were soft flakes texture.

#### Seed characters

Various seed shapes like reniform, ellipsoid and irregular shapes were recorded with creamish to dull brown to brown colour seed coat. Similar variations were reported by Dey and Baruah (2019). 5 genotypes showed the presence of viviparous seeds.

Seed length and width ranges from 2.2 cm to 3.5 cm and 1.6 to 2.4 cm respectively. Akter and Rehman (2017) recorded seed length and width ranges from 2.33 to 3.17 cm and 1.24 to 1.77 cm. Highest number of seeds per kg fruit was recorded in EGHJ-7 (28.97) followed by EGHJ-4 (27.4) and EGHJ-13 (26.4). Maximum 100-seed weight of 700 g was recorded in EGHJ-6 closely followed by EGHJ-8 weighing 694.44 g while minimum in EGHJ-5 weighing 350 g. Wangchuet *et al.* (2013) and Dey and Baruah, (2019) also reported similar observations which ranges between 263.33 to 1133.33 and 375 to 900 g respectively. EGHJ-12 showed highest flake:seed ratio (5.58) followed by EGHJ-3 (5.49) and EGHJ-9 (5.42). Phaomei and Pereira (2016), Phaomei *et al.* (2018) and Dey and Baruah (2019) recorded similar readings ranged between 1.07 to 6.44 and 2.33 to 7.29 respectively. Higher flake/seed ratio can be considered for the identification of superior genotypes of jackfruit.

#### Biochemical content

Ascorbic acid and titrable acidity ranged between 1.41 to 5.19 % and 0.13 to 0.46 % respectively. Wangchuet *et al.* (2013) recorded similar ascorbic acid readings. Ningotet *et al.* (2018), Reddy *et al.* (2004) and Asefet *et al.* (2017) reported titrable acidity ranging between 0.21 to 1.05 % and 0.26 to 0.68 %, 0.07 to 0.37 % respectively. Reducing sugar and total sugars ranged between 1.47 to 11.56 % and 6.17 to 33.33 % respectively. Ibrahim *et al.* (2013) also recorded reducing sugars ranging between 3.43 to 4.59 %. The highest Total soluble solids (TSS) of 28° Brix was recorded in EGHJ-11 followed by 26° Brix in EGHJ-1 and 25° Brix in EGHJ-6 and EGHJ-9, lowest of 17° Brix each in EGHJ-12 and EGHJ-13. The finding was in conformity with Wangchuet *et al.* (2013) and Asefet *et al.* (2017).

#### 4. Conclusion

In the present study, it was observed that of all the 13 jackfruit genotypes, two trees viz. EGHJ-3 and EGHJ-12 produced non-juicy, firm flaked texture with reasonably good flake thickness, flake:fruit ratio and flake:seed ratio. This is a desirable characteristic for the preparation of jackfruit chips. The fruits of EGHJ-12 also produced largest seeds as compared to other genotypes, which qualifies it to be a

potential genotype for starch extraction. Therefore, it can be concluded that EGHJ-3 and EGHJ-12 accessions can be recommended for the commercial production of jackfruit at a largescale in the East Garo Hills district of Meghalaya.

## 5. References

- Akter A, Rehman H (2017). Evaluation of jackfruit (*Artocarpus heterophyllus* Lam.) germplasm. *Research & Reviews: Journal of Botany*, 7(1): 38-53.
- Ali ASMY, Reza MH, Samsuzzaman M, Rashid MH, Anwari A, Islam MZ (2015). Evaluation of existing jackfruit germplasm. *International Journal of Natural and Social Sciences*, 2(4): 108-112.
- Aseef RM, Manikandan K, Kavino M, Vijayakumar RM, Ganesan NM (2017). Biochemical evaluation of local genotypes of jackfruit (*Artocarpus heterophyllus* Lam.) in Pudukkottai District. *Journal of Pharmacognosy and Phytochemistry*, 6(5): 2533-2536.
- Avani P, Bauri FK (2018). Morphological variations among different jackfruit genotypes. *Int. J. Curr. Microbiol. App. Sci.*, 7(11): 3042-3048.
- Chandrasekhar V, Babu BR, Rajasekhar M (2018) Evaluation and genetic variability studies in germplasm of jackfruit available in certain districts of Andhra Pradesh. *Plant Archives*, 18(2): 2047-2052.
- Chandrashekar KG, Vijayakumar RM, Subramanian S, Kavino M, Joel AJ (2017). Biochemical evaluation of local genotypes of jackfruit (*Artocarpus heterophyllus* Lam.) under coffee ecosystem of lower pulney hills in Tamil Nadu, India. *Journal of Pharmacognosy and Phytochemistry*, 6(6): 2426-2429.
- Dey B, Baruah K (2019) Morphological Characterization of Jackfruit (*Artocarpus heterophyllus* Lam.) of Assam, India. *Int. J. Curr. Microbiol. App. Sci.*, 8(11): 1005-1016.
- Ibrahim M, Islam MS, Helali MOH, Alam AKMS, Shafique MZ (2013). Morphological fruit characters and nutritional food value of different jackfruit (*Artocarpus heterophyllus* Lam.) cultivars in Rajshahi region of Bangladesh. *Bangladesh J. Sci. Ind. Res.*, 48(4), 287-292.
- Jagadeesh SL, Gorbal K, Hedge L, Swami GSK, Reddy BS, Basavaraj N, Raghavan GSV (2007). Variability Studies in Physico-Chemical Parameters in Chips Purpose Jackfruit Selections of Hilly Zone in Karnataka. *Karnataka J. Agric. Sci.*, 20(2): 346-349.
- Jagadeesh SL, Reddy BS, Basavaraj N, Swami GSK, Hedge L (2010) Variability studies in physico-chemical qualities of jackfruit (*Artocarpus heterophyllus* Lam.) of coastal zone of Karnataka. *Karnataka J. Agric. Sci.*, 23(2): 293-297.
- Khan R, Zerega N, Hossain, S, Zuberi MI (2010). Jackfruit (*Artocarpus heterophyllus* Lam.) Diversity in Bangladesh: Land Use and artificial selection. *Economic Botany*, 64(2): 124-136.
- Mitra SK, Mani D (2000). Conservation and utilisation of genetic resources in jackfruit (*Artocarpus heterophyllus* Lam.)- a potential underutilised fruit. *Acta Hort.*, 523: 229-232.
- Ningot EP, Dahale MH, Uikay AC, Naitam PC (2018). Variability Studies on Physico-Chemical Characteristics of Jackfruit Genotypes from Eastern Maharashtra, India. *Int. J. Curr. Microbiol. App. Sci.*, 6: 2294-2298.
- Phaomei G, Pereira LS (2016). Evaluation of diversity in jackfruit (*Artocarpus heterophyllus*) in Tikrikilla block of West Garo Hills (Meghalaya). *Current Horticulture*, 4(2): 11-16.
- Phaomei G, Pareira LS, Mathew B (2018) Variability of fruit characters of jackfruit in Rongram Block of West Garo Hills of Meghalaya. *Environment and Ecology* 36(2A): 611-615.
- Rahman MH, Patwary MMA, Barua H, Nahar S, Ahmed ANF (2016). Evaluation of yield and quality of three Jackfruit (*Artocarpus heterophyllus* L.) genotypes. *The Agriculturists*, 14(1): 107-111.
- Reddy BMC, Patil P, Kumar SS, Govindaraju LR (2004) Studies on Physico-Chemical Characteristics of Jackfruit Clones of South Karnataka. *Karnataka J. Agri. Sci.*, 17(2): 279-282.
- Roy A, Pratibha, Chaudhry M, Dongariyal A (2018). Studies on morphological traits of jackfruit (*Artocarpus heterophyllus* Lam.) Germplasm under tarai Conditions of Uttarakhand, India. *Int. J. Curr. Microbiol. App. Sci.*, 7(1): 3119-3125.
- Rowe-Dutton P (1985). *Artocarpus heterophyllus* Jackfruit. In: Garner JR and Chaudhury SA (eds.). *The Propagation of Tropical Fruit Trees*. FAO/CAB, London: 269-290.
- Wangchu L, Singh D, Mitra SK (2013). Studies on the diversity and selection of superior types in jackfruit (*Artocarpus heterophyllus* Lam.). *Genet. Res. and Crop Evol.*, 60(5): 1749-1762.

**Table 1.** Tree Growth, leaf and inflorescence characters of jackfruit grown in East Garo Hills

Jackfruit Type	GPS coordinates	Tree height (m)	Trunk height (m)	Trunk circumferences (cm)	Leaf blade length (cm)	Leaf blade width (cm)	Petiole length (mm)	Tree growth habit	Branching pattern	Month of appearance of first male inflorescence	Month of a appearance of First Female Inflorescence
EGHJ-1	N25°34.133' E090°26.284'	16.27	3.66	164.94	16.7	7.8	23	Spreading	Irregular	November - December	December To January
EGHJ-2	N25°34.289' E090°26.415'	8.43	7.08	108.24	12.8	7	24	Erect	Irregular	December - January	January
EGHJ-3	N25°34.318' E090°26.420'	10.34	2.5	110.82	15.1	7.8	23	Erect	Erect	January	January
EGHJ-4	N25°34.317' E090°26.451'	12.67	5.27	91.18	15.7	10.4	15	Erect	Irregular	January	January
EGHJ-5	N25°38.898' E090°47.758'	14.63	2.5	250	11.7	7.1	15	Semi erect	Irregular	January	January
EGHJ-6	N25°39.146' E090°48.241'	13.74	1.88	390	15.8	8.9	20	Erect	Irregular	January	January
EGHJ-7	N25°39.080' E090°47.995'	15.29	2.26	260	13.4	7.2	16	Spreading	Irregular	January	January
EGHJ-8	N25°39.146' E090°48.241'	13.23	3.76	112	13.2	9.8	26	Erect	Irregular	December	January
EGHJ-9	N25°32.328' E090°35.510'	12.24	6.23	168.24	18.5	10.4	22	Erect	Opposite	November - December	December - January
EGHJ-10	N25°32.316' E090°35.514'	13.57	4.06	106.68	12.9	6.4	14	Spreading	Irregular	December	December -January
EGHJ-11	N25°32.538' E090°34.604'	16.25	7.49	280.34	9.6	5.6	15	Erect	Irregular	January	January
EGHJ-12	N25°31.053' E090°35.965'	11.87	0.76	79.248	13.6	5.7	23	Semi erect	Opposite	January	January
EGHJ-13	N25°30.987' E090°30.849'	12.62	5.83	116.24	11.2	4.2	18	Erect	Erect	January	January
Mean		13.17	4.1	172.15	13.86	7.56	19.54				

Ranged (Min to Max)		8.43- 16.27	0.76- 7.49	79.25-390.00	9.6 18.50	- 4.2- 10.40	14- 26.00						
Std Dev		2.23	2.12	94.46	2.43	1.91	4.2						
SEm±		0.62	0.59	26.2	0.67	0.53	1.16						
CV (%)		16.96	51.84	54.87	17.54	25.22	21.47						

**Table 2.** Yield attributing characters and fruit characters of jackfruit grown in East Garo Hills

Jackfruit Type	Start fruiting season	End fruiting season	Number of fruits	Avg. Fruit weight (kg)	Yield per tree (kg)	Fruit productivity MT/ha	Stalk length (mm)	Stalk diameter (mm)	Fruit length (cm)	Fruit diameter (cm)	Fruit rind weight (kg)	Rind thickness (mm)	Fruit shape	Spine density
EGHJ-1	June	August	200	5.17	1034	103.4	50	38	32.1	15.4	3.17	8	Clavate	Dense
EGHJ-2	June	August	80	5.5	440	44	35	27	36.9	16	3.46	10	Irregular	Dense
EGHJ-3	June-July	August	100	7.21	721	72.1	26	24	28.8	22.3	4.5	11	Ellipsoid	Sparse
EGHJ-4	June-July	August	80	5.22	417.6	41.76	28	25	27.7	19.7	3.29	12	Oblong	Dense
EGHJ-5	June	August	180	5.6	1008	100.8	43.51	29.15	32	15.8	3.1	11.96	Ellipsoid	Dense
EGHJ-6	June	August	60	9.4	564	56.4	44	26	48.6	31.5	4.5	9.87	Ellipsoid	Dense
EGHJ-7	June	August	200	5.8	1160	116	25.75	20.92	42	25	2.4	8.23	Clavate	Sparse
EGHJ-8	June	August	150	3.85	577.5	57.75	62.66	18.98	33.5	23.6	1.95	7.75	Ellipsoid	Sparse
EGHJ-9	May	August	180	7.32	1317.6	131.76	60	21	37	18.8	4.78	9.98	Oblong	Dense
EGHJ-10	June	August	60	6.18	370	37	58	2.6	29.2	19	3.78	8.6	Ellipsoid	Sparse
EGHJ-11	June	August	60	5.77	346.2	34.62	44	31	26.5	21.8	3.26	11.99	Clavate	Sparse
EGHJ-12	June	August	100	4.36	436	43.6	42	23	24.4	16.5	2.49	7.04	Ellipsoid	Dense
EGHJ-13	June	August	70	5.76	403.2	40.32	55	29	32	16.5	2.62	8.9	Oblong	Sparse
Mean			116.92	5.93	676.55	67.65	44.15	24.28	33.13	20.15	3.33	9.64		

Range (Min to Max)			60- 200.00	3.85- 9.40	346.2- 1317.60	34.62- 131.76	25.75- 62.66	2.6-38	24.4- 48.6	15.4-31.5	1.95-4.78	7.04-12		
Std Dev			56.33	1.41	337.32	33.73	12.76	8.23	6.68	4.66	0.87	1.71		
SEm±			15.62	0.39	93.56	9.36	3.54	2.28	1.85	1.29	0.24	0.48		
CV (%)			48.18	23.79	49.86	49.86	28.91	33.88	20.15	23.12	26.18	17.78		

**Table 3.** Flake and seed characters of jackfruit grown in East Garo Hills Meghalaya

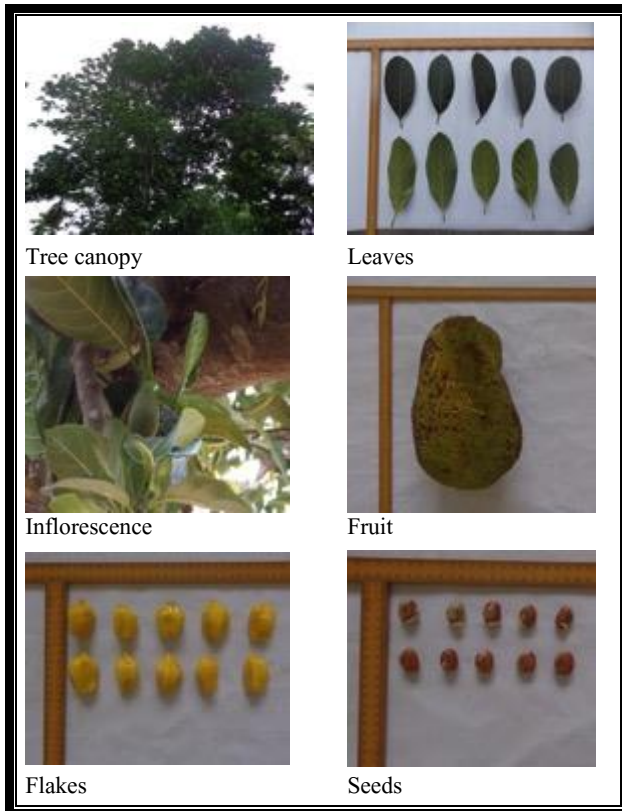
Jackfruit Type	Flake shape	Flake texture	Pulp juiciness	Number of flakes per kg fruit	Weight of flakes per kg fruit (kg)	Weight of fresh flakes with seeds (kg)	Weight of fresh flakes without seeds (kg)	Flake/fruit ratio	Flake length (cm)	Flake width (cm)	Flake thickness (mm)	Seed length (cm)	Seed width (cm)	Number of seeds per kg fruit	100 seed weight (g)	Flake/seed ratio
EGHJ-1	Irregular	Soft	Juicy	19.73	0.29	1.52	1.08	0.29	4.6	3.4	8	2.6	1.9	19.73	405	3.46
EGHJ-2	Obovate	Fibrous	Not juicy	14.73	0.31	1.69	1.25	0.31	5.2	3.6	7	3.1	2.1	14.55	525	4.02
EGHJ-3	Irregular	Firm	Not juicy	13.18	0.33	2.36	1.93	0.33	5.8	4.1	9	3.1	2.1	13.18	447.37	5.49
EGHJ-4	Rectangular	Soft	Juicy	27.59	0.4	2.07	1.61	0.4	6.1	3	4	2.8	1.8	27.4	360	4.4
EGHJ-5	Irregular	Soft	Very juicy	19.46	0.36	2	0.55	0.36	3.4	3.2	3.5	2.2	1.7	19.29	350	5
EGHJ-6	Spheroid	Soft	Juicy	19.68	0.42	3.9	2.6	0.42	5	3.4	4.87	3.5	2.4	18.19	700	3.12
EGHJ-7	Rectangular	Soft	Juicy	31.9	0.56	3.25	2.48	0.56	4	2.1	6.4	2.9	1.6	28.97	500	4.33
EGHJ-8	Irregular	Soft	Juicy	20.26	0.42	1.6	1.05	0.42	4.7	2.9	4	3.3	2.1	18.7	694.44	3.2
EGHJ-9	Oblong with curve tip	Semi-firm /fibrous	Not juicy	13.66	0.37	2.71	2.21	0.37	6.5	3.4	5.07	2.9	2.1	13.66	500	5.42
EGHJ-10	Cordate	Fibrous	Juicy	17.31	0.39	2.4	1.87	0.39	5.5	3.6	3.69	3	2.2	17.31	510	4.44

EGHJ-11	Rectangular	Soft	Very juicy	16.46	0.44	2.54	2.03	0.44	5.3	4.4	5.56	2.8	2.1	15.95	543.48	4.98
EGHJ-12	Cordate	Firm	Not juicy	13.53	0.42	1.84	1.51	0.42	6.2	4.4	6.89	2.8	1.9	11.47	660	5.58
EGHJ-13	Cordate	Semi-firm / fibrous	Not juicy	27.08	0.43	2.48	1.67	0.43	4.7	3.7	5.33	2.7	2	26.04	460	3.7
Mean				19.58	0.39	2.33	1.68	0.39	5.15	3.48	5.64	2.9	2	18.8	511.94	4.39
Range (Min-Max)				13.18-31.9	0.29-0.56	1.52-3.9	0.55-2.6	0.29-0.56	3.4-6.5	2.1-4.4	3.5-9	2.2-3.5	1.6-2.4	11.47-28.97	350-700	3.12-5.58
Std. Dev.				5.94	0.07	0.67	0.59	0.7	0.89	0.62	1.72	0.32	0.22	5.56	115.35	0.86
SEm±				1.65	0.02	0.19	0.16	0.02	0.25	0.17	0.48	0.09	0.06	1.54	31.99	0.24
CV (%)				30.34	17.39	29.1	35.38	17.39	17.27	18.04	30.56	11.17	10.8	29.59	22.53	19.62

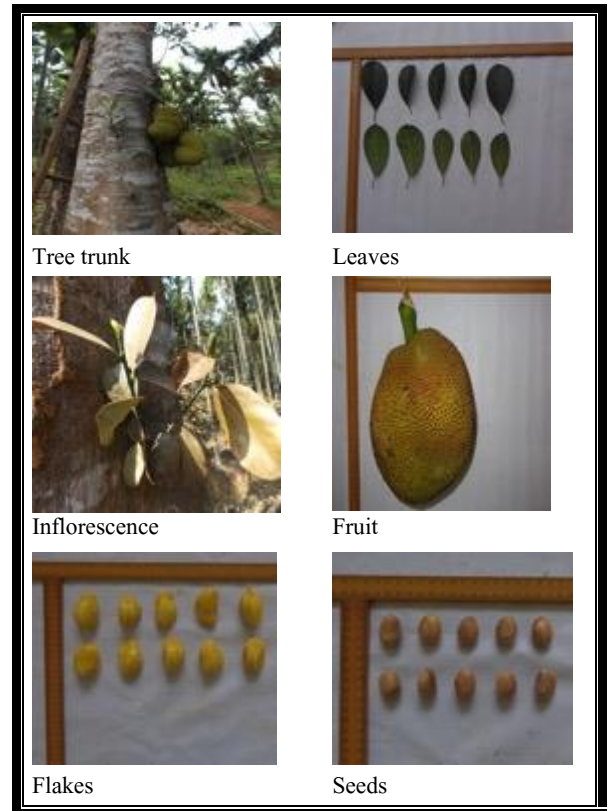


**Table 4.** Biochemical compositions of jackfruit grown in East Garo Hills, Meghalaya

<b>Jackfruit Types</b>	<b>Ascorbic acid (mg/100g)</b>	<b>Titration acidity (%)</b>	<b>Reducing sugars (%)</b>	<b>Total sugars (%)</b>	<b>TSS (° Brix)</b>
EGHJ-1	3.28	0.26	5.44	12.1	26
EGHJ-2	2.82	0.29	4.29	7.46	23
EGHJ-3	1.41	0.16	2.78	6.17	21
EGHJ-4	2.07	0.19	5.5	6.58	21
EGHJ-5	4.48	0.26	11.56	12.94	19.5
EGHJ-6	4.02	0.46	8.41	17.11	25
EGHJ-7	2.07	0.36	8.27	8.12	19
EGHJ-8	3.74	0.36	4.26	15.38	22
EGHJ-9	3.52	0.32	3.64	17.54	25
EGHJ-10	5.19	0.29	4.59	13.64	24
EGHJ-11	3.33	0.36	5.5	13.33	28
EGHJ-12	4.07	0.13	4.84	8.67	17
EGHJ-13	2.16	0.14	1.47	8.72	17
Mean	3.24	0.28	5.42	11.37	22.12
Range (Min-Max)	1.41-5.19	0.13-0.46	1.47-11.56	6.17-17.54	17.00-28.00
Std. Dev.	1.1	0.1	2.65	3.97	3.44
SEm±	0.3	0.03	0.73	1.1	0.95
CV (%)	21.12	21.82	22.91	22.63	12.29



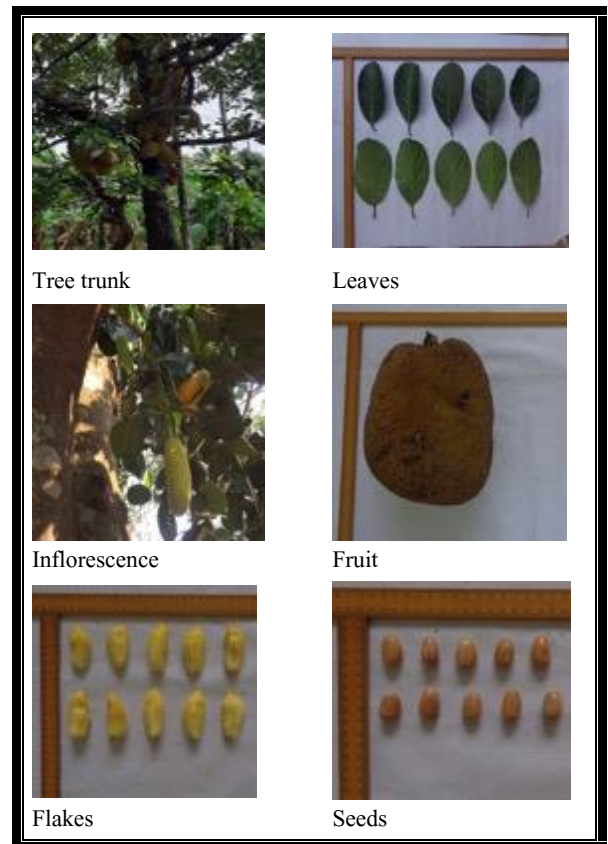
**Plate 1:** Jackfruit type EGHJ-1



**Plate 2:** Jackfruit type EGHJ-2



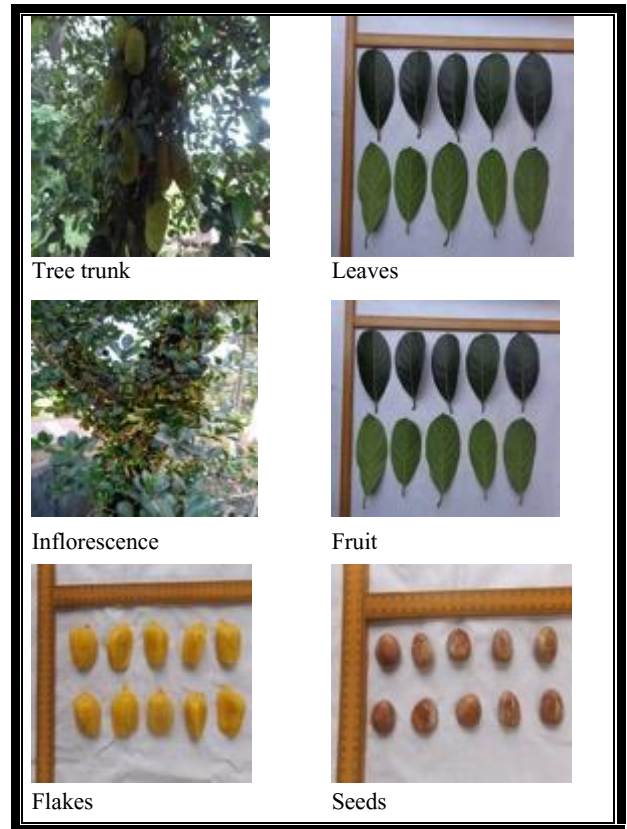
**Plate 3:** Jackfruit type EGHJ-3



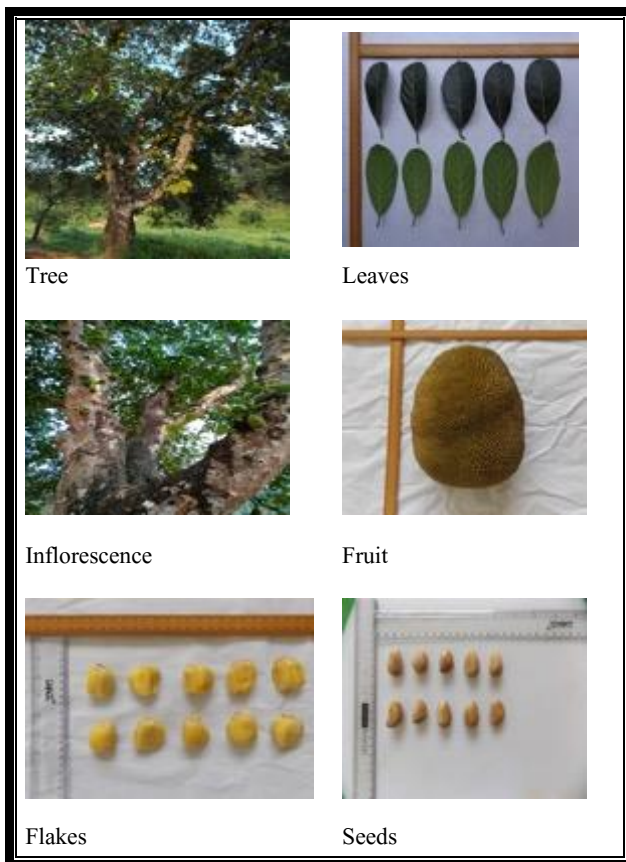
**Plate 4:** Jackfruit type EGHJ-4



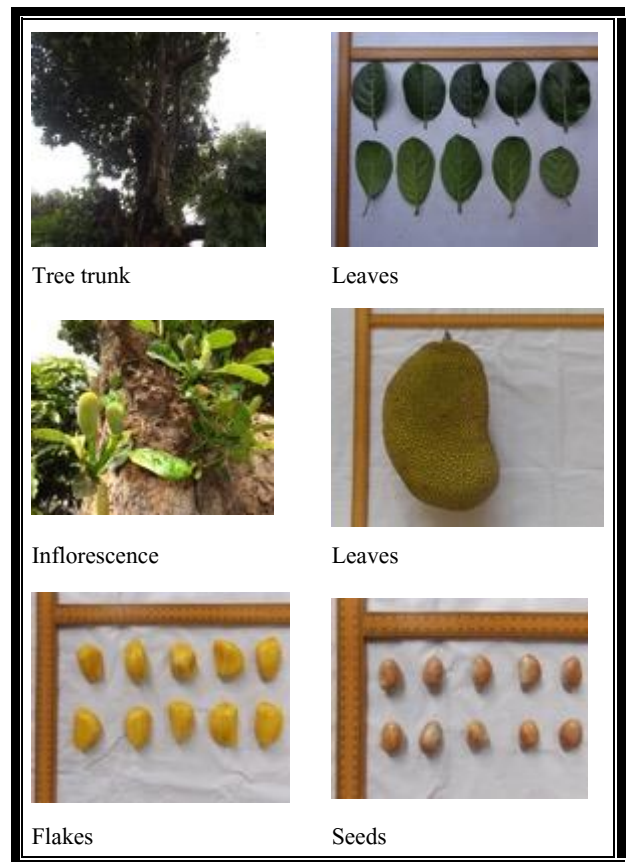
**Plate 5:** Jackfruit type EGHJ-5



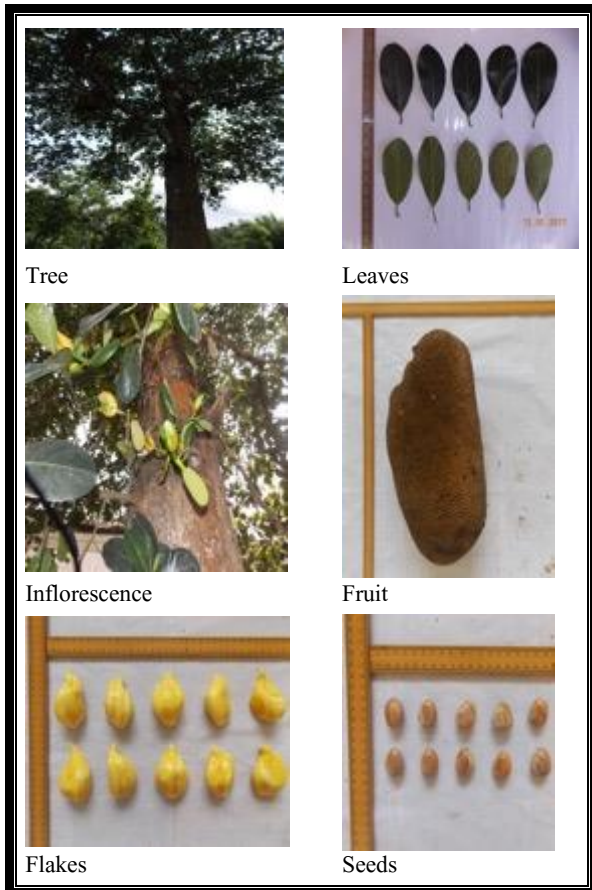
**Plate 6:** Jackfruit type EGHJ-6



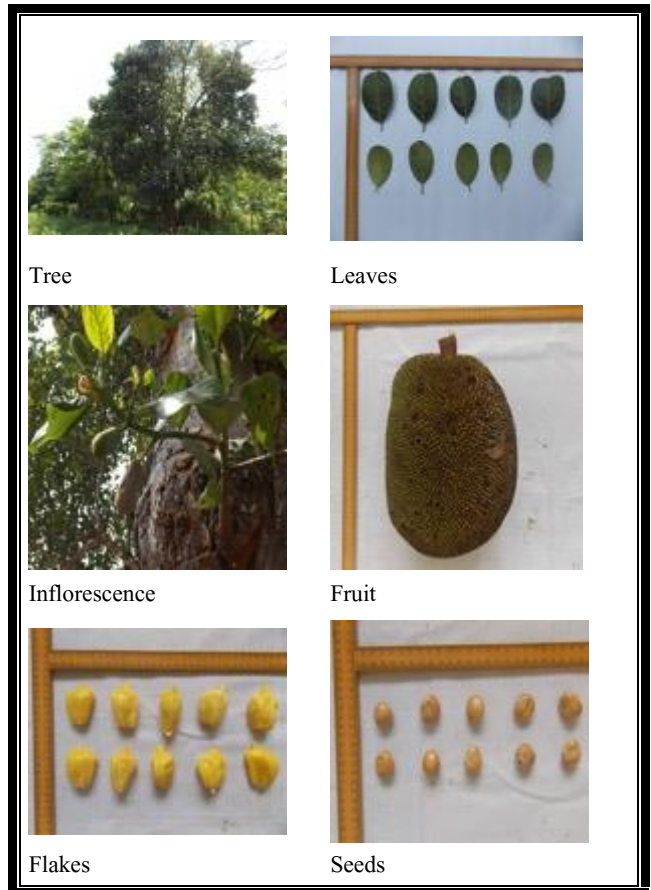
**Plate 7:** Jackfruit type EGHJ-7



**Plate 8:** Jackfruit type EGHJ-8



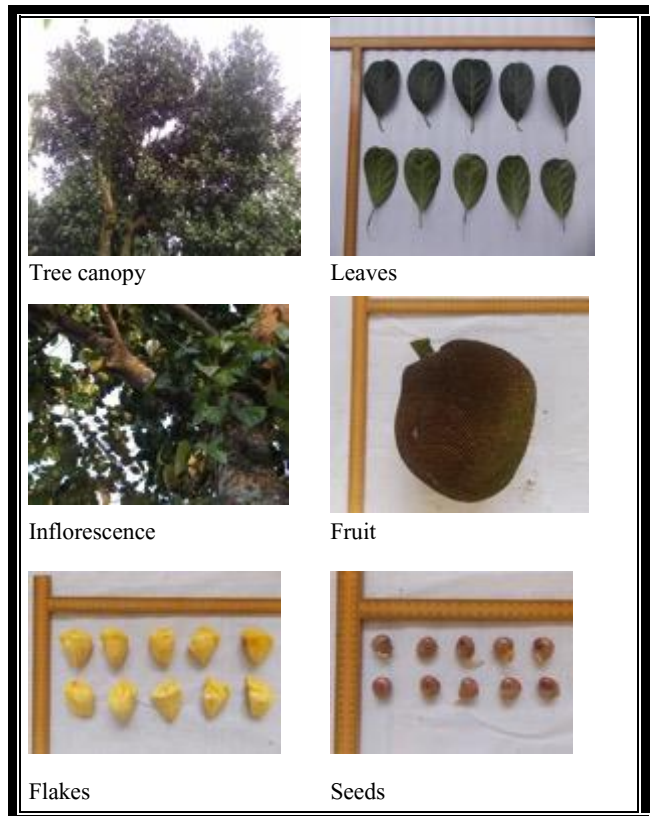
**Plate 9:** Jackfruit type EGHJ-9



**Plate 10:** Jackfruit type EGHJ-10



**Plate 11:** Jackfruit type EGHJ-11



**Plate 12:** Jackfruit type EGHJ-12

