

Original Research Article

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## Assessment of Biochemical Properties of Jackfruit (*Artocarpus heterophyllus* Lam.) Accessions of Assam

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### ABSTRACT

#### Keywords

1.1 g Fibre, 0.8 g  
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An investigation was undertaken during 2016-2018 to study the variations in biochemical properties among 24 jackfruit accessions of Assam. The biochemical parameters of the jackfruit pulp like TSS, reducing sugar, non-reducing sugar, total sugar, ascorbic acid and crude fibre showed significant variation among the accessions studied. The Total Soluble Solids (TSS) ranged from 14.66 to 29.70<sup>0</sup>Brix among the accessions whereas the highest TSS:acid ratio recorded was 229.57. The total sugar recorded among the accessions ranged from 14.34% to 26.87%. The ascorbic acid content recorded ranged from 5.06 to 14.29 mg/100g. The highest crude fibre content recorded was 3.17%.

### Introduction

The jackfruit (*Artocarpus heterophyllus* Lam.) belongs to the family Moraceae and is believed to have originated in the rain forests of Western Ghats of India (Rowe-Dutton, 1985). It is cultivated throughout the tropical lowlands in South and South East Asia, parts of Central and Eastern Africa and Brazil. In India it is widely distributed in the states of Assam, Bihar, Tripura, West Bengal, Uttar Pradesh, the foot hills of the Himalayas and South Indian states of Kerala, Tamil Nadu and Karnataka. The region comprising of Assam,

Tripura and West Bengal produces major share of jackfruit in India (APAARI, 2012). The pulp of ripe jackfruit is eaten fresh and used in fruit salads. It possess high nutritional value; every 100g of ripe fruit pulp contains 18.9g carbohydrate, 1.9 g protein, 0.1 g fat, 77% moisture, 1.1 g fibre, 0.8 g total mineral matter, 20 mg calcium, 30 mg phosphorus, 500 mg iron, 540 I.U. Vitamin A, 30 mg thiamine and 84 calories (Samaddar, 1985).

Among the chemical constituents jackfruit contains useful antioxidants which prevent many human diseases. Antioxidants are

substances that neutralize free radical or their action (Sies, 1996). Vitamin C is a water soluble free radical scavenger. In jackfruit 12 - 14 mg vitamin C is present per 100g. The jackfruit also contains many carotenoids including all-trans- $\beta$ carotene which is an important antioxidant for human health. Carotenoids found in jackfruit can prevent several chronic degenerative diseases such as cancer, inflammation, cardiovascular disease, cataract and age-related muscular degeneration (Swami *et al.*, 2012).

The present investigation was undertaken to assess the biochemical properties of the jackfruit accessions of Assam to identify superior genotypes with desirable biochemical attributes suitable for processing and table purpose.

### **Materials and Methods**

The investigation was carried out with an objective to study the biochemical variations among different jackfruit trees of Assam during the period from 2016 to 2018. The experiment was conducted in six districts, representing different agro-climatic zones of Assam.

The selected jackfruit trees were identified in the farmer's field in six different locations. However, this fruit being an underutilized crop were grown in backyard without any management practice, mixed with other forest or fruit trees. Four healthy jackfruit trees between 10 to 20 years of age were selected in each district comprising of twenty four (24) numbers of trees in six districts. Each tree (accession) was given an accession number for future identification. The accession number consisted of initials of the district e.g CAC for Cachar, GLP for Goalpara, NAG for Nagaon, SON for Sonitpur, KA for KarbiAnglong and JRT for Jorhat and the numerical 1 to 4 for tree number.

TSS of the pulp was measured with the help of A.O.A.C (1984). Reducing and total sugar were estimated (Usha *et al.*, 2015). The titratable acidity content was estimated following the methods of Sadasivam and Manickam (1996). Ascorbic acid was estimated according to the method described by Freed (1966). Total carotenoid content on dry basis was determined according to Rodriguez-Amaya (1999). Crude fibre was estimated by the method described by Maynard (1970).

### **Results and Discussion**

The observation of total soluble solids (Table 1) estimated on fresh basis revealed that the TSS of jackfruit pulp varied significantly among the accessions. The highest TSS was recorded in accession number NAG2 (29.70 °Brix) and the lowest was recorded in accession number in CAC4 (16.32 °Brix). The average TSS of jackfruit accession was recorded to be 21.83 °Brix. The total soluble solids (TSS) showed significant positive correlation of 0.914 with reducing sugar and total sugar and negative correlation (-0.266) with titratable acidity. The present finding is fairly consistent with the finding of Krishnan *et al.*, (2015) and Wangchu *et al.*, (2013) in jackfruits of Kerala and West Bengal, where they recorded a range of 12.60 to 31.80 °Brix and 13.00 to 26.67 °Brix respectively. Jagadeesh *et al.*, (2010) also reported variation in TSS of jackfruits of Coastal zone of Karnataka from 16.13°Brix to 35°Brix. Nimisha (2016) recorded significant positive correlation with reducing sugar and total sugar and negative correlation with titratable acidity.

The titratable acidity varied significantly among the jackfruit accessions selected from different location (Table 1). The highest value of titratable acidity of 0.38 per cent was recorded in accession numbers CAC1, GLP2,

NAG3, NAG4, KA2 and JRT 2. The lowest value of titratable acidity (0.13%) was recorded in accession numbers CAC3, GLP4, NAG2, SON4, KA1, KA3, KA4, JRT3 and JRT4. The average titratable acidity was recorded at 0.24 per cent. Avani and Bauri (2018) and Thimmarayappa (2014) also recorded similar variation in titratable acidity with a range of 0.13 to 0.55 per cent and 0.18 to 0.30 percent respectively. The variation in titratable acidity observed in the jackfruit accessions might be due the combined effect of genetic and edaphic factors.

The data on TSS acid ratio presented in Table 1 revealed the existence of significant variation in TSS acid ratio among the jackfruit accessions in the present study. The highest TSS acid ratio was recorded in accession number NAG2 (229.57) and the lowest TSS acid ratio (48.19) was recorded in accession number CAC1.

Similar variation in TSS acid ratio was recorded by Gomez *et al.*, (2015), Wangchu *et al.*, (2013) and Jagadeesh *et al.*, (2010). The TSS acid ratio is a vital quality parameter influencing the taste of the jackfruit pulp. Higher the TSS acid ratio sweeter is the jackfruit pulp.

Significant variation in reducing sugar was found among the jackfruit accessions (Table 1). The highest value of reducing sugar was recorded in accession number NAG 2 (9.71%) and the lowest was recorded in accession number SON3 (4.65%). The mean value of reducing sugar was 6.88%. The observation on total sugar presented in Table 1 revealed significant variation in total sugar among the jackfruit accessions. The highest value of total sugar was recorded in NAG2 (26.87%) and the SON3 (14.34%). The mean value of total sugar recorded was 19.58%. The present finding is fairly consistent with the findings of Nimisha (2016) and Jagadeesh *et al.*, (2007)

who recorded total sugar in the range of 14.14 to 25.60 per cent and 19.10 to 32.10 per cent respectively.

The highest ascorbic acid content of 14.29 mg/100g was recorded in accession number CAC1 and the lowest ascorbic acid content was recorded in accession number GLP4 (5.06 mg/100g). The mean ascorbic acid content among the accessions was 8.88 mg/100g.

The variation in ascorbic acid content of jackfruit accession is fairly comparable to the findings of Gomez *et al.*, (2015) and Aseef *et al.*, (2017) where the ascorbic acid content ranged from 4.0 to 12.5 mg/100g and 2.90 to 12.30 mg/100g respectively. The variation in ascorbic acid content among the accessions might be due to genetic factor, soil nutrient status and environmental conditions.

The data on total carotenoid presented in Table 1 revealed significant variation in total carotenoid present in jackfruit pulp among different accessions. The highest carotenoid content was recorded in jackfruit accession number SON3 (8.04 µg/g) and the lowest was recorded in accession number KA2 (1.17µg/g).

The mean value of total carotenoid among the accessions was recorded at 3.59µg/g. The present finding is fairly consistent with the findings of Jagadeesh *et al.*, (2010) and Chandrashekhar (2014) where the range of total carotenoids recorded was 2.51 to 7.01µg/g and 4.40 to 5.07µg/g respectively. These variations in total carotenoid content could be influenced by the growing conditions, genotypes, geographical location, ripeness and soil conditions.

The observations on crude fibre in jackfruit pulp presented in Table 1 revealed that there is significant variation in crude fibre percentage among different jackfruit accession.

**Table.1** Biochemical constituents in pulp of twenty four jackfruit accessions of Assam

Location/ District	Accession No.	TSS (°Brix)	Titrateable acidity (%)	TSS/Acid Ratio	Reducing sugar (%)	Total sugar (%)	Ascorbic acid (mg/100g)	Crude fibre (%)
<b>Cachar (L1)</b>	CAC1	18.30	0.38	48.19	5.21	16.45	14.29	2.38
	CAC2	24.22	0.26	93.27	8.06	22.68	5.62	1.90
	CAC3	20.30	0.13	156.90	6.09	18.01	7.59	2.67
	CAC4	16.32	0.26	62.85	5.21	15.42	6.49	2.72
<b>Goalpara (L2)</b>	GLP1	19.10	0.26	73.55	5.43	17.14	7.06	2.75
	GLP2	23.74	0.38	62.51	7.81	21.98	6.10	2.31
	GLP3	23.10	0.26	88.95	7.46	20.73	6.33	2.09
	GLP4	27.22	0.13	213.52	9.01	24.40	5.06	2.58
<b>Nagaon (L3)</b>	NAG1	28.60	0.26	110.14	9.26	25.25	10.13	1.89
	NAG2	29.70	0.13	229.57	9.71	26.87	10.98	2.34
	NAG3	21.60	0.38	56.97	7.09	19.23	9.41	2.21
	NAG4	20.08	0.38	52.87	5.81	17.78	7.32	2.50
<b>Sonitpur (L4)</b>	SON1	26.50	0.26	102.04	8.55	23.79	11.63	2.07
	SON2	17.32	0.26	66.93	5.49	15.76	8.64	2.67
	SON3	14.66	0.26	56.46	4.65	14.34	8.15	3.17
	SON4	22.30	0.13	172.33	7.35	19.62	12.84	3.03
<b>Karbi Anglong (L5)</b>	KA1	20.60	0.13	161.49	6.45	18.25	12.35	2.21
	KA2	23.24	0.38	61.28	7.41	21.02	13.79	2.53
	KA3	21.08	0.13	162.95	6.62	18.37	7.27	2.13
	KA4	23.50	0.13	180.67	6.99	18.86	10.29	2.34
<b>Jorhat (L6)</b>	JRT1	18.40	0.26	70.85	7.63	21.49	4.92	1.40
	JRT2	19.10	0.38	50.29	5.32	16.55	5.17	1.99
	JRT3	21.50	0.13	166.15	5.49	17.04	10.34	2.18
	JRT4	23.50	0.13	184.19	6.99	18.86	11.32	2.34
<b>Mean</b>		21.83	0.24	111.87	6.88	19.58	8.88	2.35
<b>SEd±</b>		0.05	0.008	8.45	0.007	0.88	0.44	0.08
<b>CD<sub>(0.05)</sub></b>		0.11	0.016	16.74	0.015	1.74	0.88	0.17

The highest crude fibre content of 3.17 % was recorded in SON3 and the lowest was recorded in accession number JRT1 (1.40%). The mean value of crude fibre content in jackfruit pulp was found to be 2.35%. However, Baruah (2015) recorded mean crude fibre content in five different types of jackfruit of Assam as 1.30 %. Gopalan *et al.*, (1989) reported that the crude fibre content of jackfruit pulp to be 1.1 per cent. This difference in mean for crude fibre from the present study might be due to collection of fruits from different agroclimatic zones indicating the influence of genetic and microclimatic factors on crude fibre content of jackfruit pulp.

From the present investigation, it can be concluded that the jackfruit types selected under different agro-climatic zones of Assam exhibit wide variations in terms of biochemical characters. The variations in biochemical characters of the jackfruit accessions can be utilized in crop improvement programme of jackfruit in future.

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