International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(5): 2605-2607

Received: 17-07-2020
Accepted: 20-08-2020

Shanthi K
Associate Professor, Department of Food Science and Nutrition, Community Science College and Research Institute, Madurai, Tamil Nadu, India

Malathi D
Retired Professor, PHTC, TNAU, Community Science College and Research Institute, Madurai, Tamil Nadu, India

Corresponding Author:
Shanthi K
Associate Professor, Department of Food Science and Nutrition, Community Science College and Research Institute, Madurai, Tamil Nadu, India

Physical and chemical characteristics of selected varieties of jack fruit grown in Tamil Nadu

Shanthi K and Malathi D

DOI: https://doi.org/10.22271/chemi.2020.v8.i5aj.10711

Abstract
The fruit and vegetables are the corner stone's of health, supplying us with a wealth of vitamins, minerals, fibres, carbohydrates and also phytochemicals. Jack fruit is one important fruit of India. It has high nutritive value and therapeutic properties. The aim of the study was to analyze the physical, chemical and nutritional of the fresh jack fruit bulbs Three varieties of ripened jack fruit with firm texture namely Palur 1, Panrutti and 'Vandiyoor (Kerala) Varukkai were selected for the study. The physico-chemical characteristics of selected varieties of jack fruit bulb and banana slices were analysed and it was found that slight variation in the physico-chemical characteristics was observed between varieties. The fruit bulb (carpel) of Palur 1 variety is large sized, pale yellow in colour, with firm texture and strong fruit flavour. The moisture content of the jack fruit were ranged from 76.4 to 78.00 per cent. The TSS of different jack fruit cultivars ranged between 18.50 and 19.00°Brix, while acidity and total sugar contents ranged from 0.336 to 0.382 g/100g and 20.00 to 20.95 g/100g of fruit. The Palur 1 variety had high acid, total sugar, β-carotene and vitamin C content than the other two varieties. Mineral contents were found to be higher in Panrutti bulbs than in Varukkai and Palur 1 varieties.

Keywords: Jack fruit, fruit bulbs, physical characters, chemical characteristics, mineral content

Introduction
Jack fruit (*Artocarpus heterophyllus* Lam.), of the family Moraceae is also called jak fruit, jaca and nangka in Malaysia and Philippines, khanum in Thailand, khnor in Cambodia, makmi or maymi in Laos, mit in Vietnam and palapazha, pala in India. It is believed to be indigenous to the rainforests of the Western Ghats. It is cultivated at low elevations throughout India, Burma, Ceylon, Southern China, Malaysia and in East Indies (Morton, 1987) [7]. In India, Assam, Bihar, Kerala and Tamil Nadu are the main jack fruit growing states. In Tamil Nadu, lower Palani hills of Dindugul and Cuddalore are known for their best quality jack fruit. In Tamil literature, jack fruit has been given the second position among the fruits viz., "Mukkani" Jack fruit is one of the most popular fruit crops in the tropical and sub-tropical regions of the world. Tender jack fruit appears in the market in spring and continues until summer as a popular vegetable. Since common vegetables are scarce and costly at that time of the year, jack fruit enjoys a high demand and premium price. Ripe fruit has high nutritive value. It is comparatively cheap and favoured by the poor people when price of staple food is very high. Jack fruit is known as the poor man's food in the Eastern and Southern parts of India (Samaddar, 1990) [11].

Jack fruit has a delicate, delicious taste, captivating flavour, attractive colour and excellent quality, besides being a good source of sugars, protein, minerals and vitamins. The ripe fruits are eaten as dessert or made into papads while unripe fruits are popular as vegetables and for making pickles. Jack fruits are generally consumed as fresh fruit. Attempts have been made to process the jack fruit and its seed into a variety of products like canned jack fruit bulbs in syrup, canned curried raw jack fruit, squash, papad, raw jack pickle (Chikkasubbanna and Nanjundappa, 1997) [1], preserve and halwa and jack fruit sherbat (Sethi and Maini, 1998) [12]. The commonly consumed varieties of jack fruits in Tamil Nadu were selected for the study

Materials and Methods
Selection of fruit
Jack fruit (*Artocarpus heterophyllus,* Lam.) varieties namely, 'Panrutti' and Vandiyoor

(Kerala) Varukkai and Palur 1 were purchased from the fruit market in Madurai, Tami Nadu Three varieties of ripened jack fruit with firm texture viz., 'Palur 1' 'Panrutti' and 'Vandiyoor (Kerala) Varukkai' were selected for the study

Physical parameters of the selected fruits
The physical parameters like external appearance, length, breadth and thickness of bulbs (perianth) of the selected jack varieties were measured out of ten bulbs selected at random in each variety.

External appearance
The colour, flavour, texture and taste of bulbs were noted.

Length
The length of the bulb was noted by keeping the bulb (after removing seed) horizontally between the jaws of the vernier caliper and expressed in centimeters (cm).

Breadth
The breadth of the bulb was noted by keeping it (after removing the seed) vertically between the jaws of the vernier caliper and expressed in terms of centimeter (cm).

Thickness
The thickness of the bulb was noted by keeping it (after removing the seed) vertically between the jaws of the screw gauge and expressed in terms of millimeter (mm).

Chemical analysis
The selected fruit bulb samples were analyzedz for moisture, acidity, total soluble solids (TSS), reducing and total sugars, protein, ascorbic acids as per the method described by Ranganna (1995) [9] and Beta-carotene by Raghuramulu *et al.* (1983) [8]. The initial total ash, fat and calcium were analysed as per the procedure of Ranganna (1995) [9]. Crude fibre was estimated by acid- alkali extraction method given by Sadasivam and Manickam (1995). The phosphorus content of sample was analyzed caloriemetrically (Fiske and Subbarow, 1925) [3]. Iron content of the samples was analyzed by the method given by Wong (1928) [13]. Microbial load (bacteria, yeast and fungi) was determined by the method described by Istavankiss (1985). Sensory evaluation was done by 10 untrained judges using 4-1 hedonic scale.

Result and Discussion
1. Recovery of edible portion (bulb)
Recovery percentage of edible portion, rind and seed is depicted in Table 1. Palur 1 variety recorded the highest bulb recovery (65%) while Varukkai scored the lowest (54.16%) recovery among the varieties. Peel and seed percentages were found to be the lowest in Palur 1 variety followed by Panrutti and Varukkai varieties.

Table 1: Percentage recovery of edible portion

Varieties	Weight of the fruit	Weight of the jack bulb / edible portion		Weight of the rind with centre pithy core		Weight of the seed with or white membrane	
	Kg	Kg	%	Kg	%	Kg	%
Palur –1	7.00	4.55	65.00	1.25	17.85	1.20	17.14
Panrutti	11.75	7.00	59.51	2.50	21.27	2.25	19.14
Varukkai	12.00	6.50	54.16	3.00	25.00	2.50	20.83

II. Physico- chemical characteristics of jack fruit
Jack fruit varieties viz., Palur 1, Panrutti and Varukkai were selected for the study. The physical parameters like size, shape of the whole fruit, weight, length, breadth and thickness of the carpel and their organopetic characteristics were noted. The chemical characteristics of the selected jack fruit varieties were estimated and furnished below (Table 2). The carpel of Palur 1 variety is large sized, pale yellow in colour, with firm texture and strong fruit flavour. The bulbs of Varukkai variety are medium sized, pale yellow in colour, with soft texture and mild fruity flavour. Panrutti variety has an attractive shiny firm texture, bright yellow colour bulbs with strong fruit flavour. The bulb of variety Palur 1 was found to have higher values for the physical parameters such as breadth (6.5 cm), thickness (5.00 cm) and weight (15g).

Table 2: Physical characteristics of selected varieties of jack fruit bulbs

S. No	Physico-chemical characteristics	Palur 1	Panrutti	Varukkai
I	**General characteristics**			
	Appearance, colour, flavour, texture and taste	Very attractive large size, pale yellow, strong fruit flavour, firm, sweet taste	Very attractive, medium size bright yellow, strong fruit flavour, firm, sweet taste	Very attractive medium size, pale yellow, mild fruity flavour, firm and soft, sweet taste
II	**Physical characteristics**			
	1.Weight of the bulb without seed (g)	15.00	10.00	9.50
	2. Length (cm)	7.0	8.0	7.0
	3. Breadth (cm)	6.5	5.0	5.5
	4. Thickness (mm)	5.0	4.78	4.23

2. Chemical characteristics of selected varieties of jack fruit bulbs
The chemical characteristics of selected varieties of jack fruit bulbs are furnished in the Table 3. A slight variation in the chemical constituents of the varieties was noted. From the Table 3, it was found that Varukkai variety had an initial moisture content of 78 per cent and 5.92 g/100g reducing sugar. The Palur 1 variety contained slightly higher acidity, total sugar, β-carotene and vitamin C content than the other two varieties. The TSS of different jack fruit cultivars ranged between 18.50 and 19.00°Brix, while acidity and total sugar contents ranged from 0.336 to 0.382 g/100g and 20.00 to 20.95 g/100g respectively. Mineral contents were found to be higher in Panrutti bulbs than in Varukkai and Palur 1 varieties. A slight variation in other chemical constituents was

observed between the varieties. Similar observations have been reported earlier in jack fruit pulp by Morton (1987) [7]. Guruprasad and Thimmaraju (1989) [4] identified three different jack fruit types - yellow, light yellow and orange pulp. The light yellow had the highest seed weight (17.66g), seed length (3.23 cm), seed breadth (2.10 cm) and average total weight of seeds per fruits (913.21 g). The yellow type had most seeds per fruits (124.60) and the highest pulp to seed ratio (4.24).

Table 2: Chemical characteristics of selected varieties of jack fruit bulbs

S. No	Chemical characteristics	Palur 1	Panrutti	Varukkai
1.	Moisture (g /100g)	77.20	76.40	78.00
2.	Acidity (g / 100 g)	0.382	0.345	0.336
3.	pH	5.11	5.25	5.30
4.	TSS (°B)	19.00	18.50	19.00
5.	Reducing sugar (g /100 g)	5.40	5.20	5.92
6.	Total sugar (g /100 g)	20.95	20.00	20.73
7.	β- carotene (µg/100g)	182.00	179.00	145.60
8.	Vitamin C (mg /100g)	12.00	11.00	10.00
9.	Crude fibre (g / 100g)	0.71	0.92	0.85
10.	Total ash (g / 100g)	0.67	0.83	0.81
11.	Calcium (mg / 100 g)	14.50	24.00	15.00
12.	Iron (mg / 100 g)	0.82	1.42	1.57
13.	Phosphorus (mg / 100g)	33	40	35

All values are reported on fresh weight basis, values are means of three replication

Conclusion

The present study concluded that slight variation in the physico-chemical characteristics was observed between varieties. The fruit bulb (carpel) of Palur 1 variety is large sized, pale yellow in colour, with firm texture, strong fruit flavour, .high acid total sugar, β-carotene and vitamin C content than the other two varieties. A slight variation in other chemical constituents was observed between the varieties.

References

1. Chikkasubbanna V, Nanjundappa G. Chemistry and technology of jack fruit. Food Tech 1997;4(1):4-9.
2. Hart A, Fischer HJ. Modern food analysis. Pringer varlay, Berlin Heidelbery, New York 1971;64-74, 3.
3. Fiske CH, Subbarow Y. The calorimetric determination of phosphorus J Biol. Chem 1925;66:375-377.
4. Guruprasad TR, Thimmaraju KR. Environment and Ecology 1989;7(2):511-512
5. Maynard AJ. Methods in Food Analysis. Academic Press. New York 1970,176.
6. McDonald EJ, BY Foley. J Assoc. Office. Agric. Chem 1960;43:645.
7. Morton J. Jackfruit. In: Fruits of warm climates (eds. Morton JF Miami FL) Creative Resources Systems Inc 1987,58-64.
8. Raghuramulu, Nair NKM. Kalyana Sundaram S. A manual of laboratory techniques. National Institute of Nutrition, ICMR, Hyderabad, India 1983,129-130.
9. Ranganna S. Manual of analysis of fruits and vegetables products, Tata McGraw Hill publishing Co., Ltd., New Delhi 1995;(1, 2):7-11-13.
10. Sadasivam B, Manickam A. Biochemical methods, Wiley's Eastern Limited and Tamil Nadu Agricultural University, Coimbatore 1996,184.
11. Samaddar HN. Jack fruit. In: Fruit of India- Tropical and Subtropical. (ed. Bose, T.K.) Naya Prakash, Calcutta 1990,487-497.
12. Sethi V, Maini SB. Health drinks from indigenous under –exploited fruits. Indian Horticulture. 1998,23-25.
13. Wong SY. Estimation of iron. J. Biol. Chem 1928;77:409-411.