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## Effect of stage of harvesting on various chemical properties of tender jack vegetable (*Artocarpus heterophyllus*)

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### Abstract

The present investigation entitled “Studies on harvesting stage of tender Jackfruit (*Artocarpus heterophyllus* L.) on its quality as vegetable.” was conducted at the Department of Fruit Science, College of Horticulture Dapoli, Dist. Ratnagiri during the year 2020-2021. The experiments under study were carried out in Randomized Block Design with seven treatments and three replications. The titratable acidity decreases with maturity from T<sub>1</sub> (0.42%) to T<sub>7</sub> (0.29%) similar, declined trend was also observed in ascorbic acid ranging from T<sub>1</sub> (9.43mg/100g) to T<sub>7</sub> (7.33mg/100g). Maximum protein content was recorded in treatment T<sub>4</sub> (2.92%). Highest crude fibre content (3.90%) and carbohydrate (7.56%) were recorded in treatment T<sub>7</sub>. On the basis of organoleptic evaluation the treatment T<sub>3</sub> recorded maximum score for colour (8.43) and texture (8.33) whereas, treatment T<sub>4</sub> recorded maximum score for flavour (8.34) and maximum average score (8.34) was recorded by treatment T<sub>3</sub>.

**Keywords:** Tender jackfruit, harvesting stage, chemical parameters

### Introduction

The jackfruit (*Artocarpus heterophyllus* Lam.) belongs to the family Moraceae along with other fruit bearing plants like Fig (*Ficus carica*) and Mulberry (*Morus indica*) (Samadder, 1990; Hammerschlag and Litz, 1992) [14, 8]. The common name ‘Jackfruit’ has come from the Indian name “jaka” or “tsjaka”. The genus ‘*Artocarpus*’ (n =14) comprises about fifty species all of which are monoecious. *A. heterophyllus* is a tetraploid species with (4n=56) and possibly an allotetraploid (Habib, 1965; Hammerschlag and Litz, 1992) [7, 8]. It is extremely heterogeneous. Tender jackfruit that has a very good taste as vegetable. We can make stir fry, sambar, biryani, spicy curry and many other preparations from the same. Chemical and nutritional properties of tender jackfruit of soft and hard variety at different stages will help in design and development of quality of jackfruit as vegetable. It is nutritious fruit rich in carbohydrate, potassium, iron and vitamin A, B, and C due to high levels of carbohydrate; jackfruit supplements other staple foods in times of scarcity in some region. The tender jackfruit has high nutritive value, but information about the exact stage of harvesting for vegetable purpose is limited. To understand the identification of suitable stage of harvesting and their chemical properties emphasis the need to investigate the harvesting stage of tender jackfruit for vegetable purpose.

### Material and Method

**Sample preparation:** Just after harvesting of tender jackfruit, the unedible parts were removed manually and the edible part was isolated and was stored in the freezing condition until the analysis.

**Determination of titratable acidity:** The method described in (A.O.A.C., 1995) for the determination of titratable acidity.  
Ascorbic acid (mg/ 100 g of fruit pulp)

**Determination of ascorbic acid:** It was done by 2, 6- dichlorophenolindophenol dye method of Johnson (1948) as described by Ranganna (1997).

$$\text{Ascorbic acid} = \frac{\text{Burette reading} \times \text{Dye factor} \times \text{Volume made}}{\text{Volume of filtrate taken} \times \text{Weight} \times \text{Weight of sample}} \times 100$$

Determination of Protein (%): The nitrogen content of the tender jackfruit was estimated by Kjeldahl method using Pelican kelplus equipment. Crude protein was calculated by multiplying with a factor 6.25 (AOAC, 1990) [4].

$$\text{Protein (\%)} = \frac{(\text{Titrant value-Blank}) \times \text{N. of H}_2\text{SO}_4 \times 0.14 \times 6.25 \times 100}{\text{Wt. of sample taken}}$$

Determination of Carbohydrate (%): The phenol sulphuric acid method (Dubois *et al.*, 1956) [6] was used to estimate total carbohydrates.

Determination of Crude Fibre (%): The fibre content of tender jackfruit was determined by method described in Anonymous, (1977) [3].

$$\% \text{ Crude fibre in ground sample} = \frac{\text{Loss in weight on ignition (W2-W1) - (W3-W1)}}{\text{Weight of the sample}} \times 100$$

**Organoleptic evaluation**

The organoleptic evaluation of the fruits was carried out by the panel of experts for assessing the colour, flavour and the texture. The panel evaluated the sample by 9-point hedonic scale (Amerine *et al.*, 1965) [2].

Organoleptic score	Ratings
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like nor dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

The data obtained in the present investigation were statistically analysed by the method suggested by Panse and Sukhatme (1995) [11].

**Table 1:** Treatment details

T <sub>1</sub>	30 days after fruit set
T <sub>2</sub>	45 days after fruit set
T <sub>3</sub>	60 days after fruit set
T <sub>4</sub>	75 days after fruit set
T <sub>5</sub>	90 days after fruit set
T <sub>6</sub>	105 days after fruit set
T <sub>7</sub>	120 days after fruit set

**Table 2:** Titratable acidity (%), ascorbic acid, crude fibre, protein, carbohydrate of tender jackfruit as affected by various stages of harvesting

Treatments	Titratable acidity (%)	Ascorbic acid (mg/100g)	Protein (%)	Carbohydrate (%)	Crude fibre (%)
T <sub>1</sub> - 30 DAFS	0.42	9.43	2.73	6.10	2.33
T <sub>2</sub> - 45 DAFS	0.41	9.30	2.33	6.22	2.37
T <sub>3</sub> - 60 DAFS	0.39	8.83	2.57	6.30	2.60
T <sub>4</sub> - 75 DAFS	0.36	8.60	2.92	6.49	3.27
T <sub>5</sub> - 90 DAFS	0.34	8.53	2.22	6.70	3.20
T <sub>6</sub> - 105 DAFS	0.33	8.50	2.45	7.04	3.40
T <sub>7</sub> - 120 DAFS	0.29	7.33	2.67	7.56	3.90
Range	0.29-0.42	7.33-9.43	2.33-2.92	6.10-7.56	2.33-3.90
Mean	0.36	8.65	2.55	6.63	3.01
Result	Sig	Sig	Sig	Sig	SIG
S.Em±	0.01	0.11	0.11	0.04	0.12
CD@5%	0.03	0.33	0.34	0.11	0.38

**Table 3:** Organoleptic evaluation of tender jack vegetable

Treatments	Colour	Flavour	Texture	Average
T <sub>1</sub> - 30 DAFS	8.10	8.04	8.00	8.05
T <sub>2</sub> - 45 DAFS	8.14	8.12	8.17	8.14
T <sub>3</sub> - 60 DAFS	8.43	8.27	8.33	8.34
T <sub>4</sub> - 75 DAFS	8.27	8.34	8.31	8.31
T <sub>5</sub> - 90 DAFS	8.12	8.20	8.15	8.16
T <sub>6</sub> - 105 DAFS	8.16	8.10	8.10	8.12
T <sub>7</sub> - 120 DAFS	7.19	7.30	7.24	7.24
Range	8.10-8.43	8.04-8.34	8.00-8.33	8.05-8.34
Mean	8.05	8.05	8.04	8.05
Result	Sig	Sig	Sig	Sig
S.Em±	0.02	0.01	0.06	0.03
CD@5%	0.05	0.03	0.19	0.09

**Result and Discussion**

The titratable acidity decreased from 0.42% at T<sub>1</sub> (30 DAFS) to 0.29% at T<sub>7</sub> (120 DAFS). Decrease in acidity with increase in maturity stage may be due to conversion of organic acids into sugars or their utilization in respiration process. Results of the present findings are supported by Krishnamorthy *et al.*, (1960) [10] that titratable acidity decreases during ripening in mango fruit.

Ascorbic acid varied significantly at different stages of harvesting, it was decreased from 9.43 at T<sub>1</sub> (30 DAFS) to 7.33 at T<sub>7</sub> (120 DAFS). The results are consonance with the

work of Rana *et al.*, (2018) [12] as fruit maturity in hard variety of tender jackfruit increases from stage 1 to stage 4, there was decrease in Vitamin C and also with the work of Abu-Bakr A. *et al.*, (2005) [1] reported that ascorbic acid content progressively decreased with growth and development in mango fruits.

Highest protein content was recorded in treatment T<sub>4</sub> (2.92%) which was at par with treatment T<sub>1</sub> (2.73%) and T<sub>7</sub> (2.67%) and lowest content of protein was found in treatment T<sub>5</sub> (2.22%). Total protein content remained almost unchanged or slightly decreased up then increased afterwards to reach a

peak, which coincided with the climacteric peak of respiration and finally dropped.

Carbohydrate varied significantly at different stages of harvesting, it was increased from 6.10% at T<sub>1</sub> (30 DAFS) to 7.56% at T<sub>7</sub> (120 DAFS).

Crude fibre among tender jackfruit as affected by various stage of harvesting and it was the range of 2.33 to 3.90. Maximum crude fibre content was observed in treatment T<sub>7</sub> (3.90%) which is followed by treatment T<sub>6</sub> which was at par with treatment T<sub>4</sub> (3.27%) and T<sub>5</sub> (3.20) whereas, minimum content of crude fibre was found in treatment T<sub>1</sub> (2.33%). Similar results were recorded by Rana *et al.*, (2018)<sup>[12]</sup>.

The result in Table 3, clearly showed the sensory score for colour (8.43) was recorded maximum by treatment T<sub>3</sub> (60 DAFS). Texture of tender jack vegetable at different stages of harvesting and clearly shows the score for good texture (8.33) was recorded maximum by treatment T<sub>3</sub> (60 DAFS). More average score was recorded by treatment T<sub>3</sub> (8.34) which was at par with treatment T<sub>4</sub> (8.31) whereas, less average score was recorded in treatment T<sub>1</sub> (8.05). The flavour score, from the table it was observed that strong flavour (8.34) was recorded by treatment T<sub>4</sub> (75 DAFS) Treatment T<sub>1</sub> to T<sub>6</sub> showed better score *i.e* above mean level in all the aspects under organoleptic evaluation. The results are consonance with the work of Khandekar *et al.*, (2020)<sup>[9]</sup> in tender jack vegetable.

### Conclusion

Considering the performance in respect of various chemical properties, titratable acidity, ascorbic acid, protein, carbohydrate, crude fibre of tender jackfruit, it can be concluded that all the treatments *i.e* from 30 DAFS to 105 DAFS are suitable for harvesting of tender jackfruit for vegetable purpose.

### References

1. Abu-Bakr A, Abu Goukh, Haithem E, Garry HENB. Physico-chemical changes during growth and development of Mango Fruit. U. of K. J Agric. Sci. 2005, 13(2). Publication no-6.
2. Amerine MA, Pangborn RM, Rocssler EB. Principal of sensory evaluation of food. Academic press, London. 1965.
3. Anonymous. A manual of laboratory techniques, National Institute of Nutrition, Hyderabad. 1977, 2-9.
4. AOAC. Official method of analysis. Association of official analytical chemists, Washington, D.C., 15<sup>th</sup> Edn. 1990.
5. AOAC. Official method of analysis. Association of official analytical chemists, Washington, D.C., 11<sup>th</sup> Edn. 1995.
6. Dubois M, Gilles K, Hamilton J, Rebers P, Smith F. Colorimetric method for determination of sugars and related substances. Analytical Chemistry. 1956;28(3):350-356.
7. Habib AF. In Samaddar HN. Jackfruit, Fruits: Tropical and subtropical (Ed.by T. K. Bose and S. K. Mitra), pp. 638-648. Deapartment of horticulture, Bidan Chandra Krishi Viswavidyalaya, India 1965, 1990.
8. Hammerschlag FA, Litz RE. Biotechnology of perennial fruit crops. C.A.B International. 1992, 425-429.
9. Khandekar RG, Parulekar YR., Thorat SB, Salvi BR. Studies on stage of harvesting of jackfruit for vegetable purpose. The Experiment presented in RRC (Hort.) report

of Dr. B.S.K.K.V Dapoli. 2020.

10. Krishnamoorthy GV, Jain NL, Bhatia BS. Changes in the physio-chemical composition of mangoes during ripening after packaging. J Food. Sci. 1960;9:277.
11. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. ICAR Rev. Ed. By Sukhatme, P. V. and Amble, V. N. 1995, 145-156.
12. Rana SS, Pradhan RC, Mishra S. Variation in properties of tender jackfruit during different stages of maturity. J Food Sci Technol. 2018;55(6):2122-2129.
13. Rangana S. Handbook of Analysis and Quality Control for Fruit and Vegetable products. Second edition. Tata-Mc. Graw-Hill Publishing Company Ltd. New Delhi, India. 1997.
14. Samaddar HN. Jackfruit, Fruits: Tropical and subtropical (Ed.by T. K. Bose and S. K. Mitra). Department of Horticulture, Bidan Chandra Krishi Viswavidyalaya, India. 1990, 638-648.