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## Preservation of soft bulb type jackfruit pulp of Western Ghats

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**Abstract**

Soft bulb jack pulp treated by addition of 0.2 per cent potassium meta bisulphite followed by pasteurization at 93 °C for 15 minutes showed maximum shelf life of 150 days. The preserved jack pulp was found to contain 5.57 mg/100g ascorbic acid, 0.29 mg/100g total carotenoids and 8.37 per cent total sugars.

**Keywords:** Jackfruit pulp, pasteurization, storage life

**Introduction**

Jackfruit (*Artocarpus heterophyllus*) is a very common fruit crop found southern India. In Karnataka it is found in both plains and hilly region of Western ghats. Jackfruit with firm bulb after ripening is a common type used for table purpose. In western ghats of Karnataka a special type of jack with soft bulb in nature is available. This type of jack after ripening becomes soft and not fit for consumption. Nearly 70 per cent of the jack trees found in western ghats of Karnataka bears soft bulb fruits. This type of fruit will be thrown as a waste without any utilization. In view of this, a study was conducted to preserve a pulp of soft bulb jackfruit as an intermediate product for preparation of finished product. Utilization soft bulb type of jack pulp for preparation of various value added products and culinary items generates addition income and improves livelihood security.

**Materials and methods****Preparation of soft jackfruit pulp**

Mature unripe fruits of soft bulb type jack fruits were procured from horticultural farm, College of Horticulture, Sirsi. The fruits were ripened at ambient temperature in the post harvest technology laboratory. Ripened fruits were washed in clean water and surface dried. Fruits were cut into halves and bulbs were extracted. Seeds were separated from the bulb and converted into pulp. Every kilogram of pulp was added with 100 gram of cane sugar to preserve the color. The pulp was used for further study. The experiment was laid out in Completely Randomized Design (CRD) with four replications consisting of five treatments. The details of treatments are as follows:

T<sub>1</sub>: Pasteurization at 93 °C for 15 minutes

T<sub>2</sub>: Addition of 0.25% Citric acid + pasteurization at 93 °C for 15 minutes

T<sub>3</sub>: Addition of 0.2% Potassium meta bisulphite (KMS)

T<sub>4</sub>: Addition of 0.2% Potassium meta bisulphite (KMS) + Pasteurization at 93 °C for 15 minutes

T<sub>5</sub>: Addition of 0.2% Potassium meta bisulphite (KMS) + Refrigeration

The jack pulp was filled in to glass bottles with 200 gram capacity and pasteurised using water bath. After the treatment (T<sub>1</sub> to T<sub>4</sub>) pulp was stored in ambient temperature conditions. When 70 per cent of the pulp was spoiled, then the treatment was discarded from analysis.

**Physico-chemical analysis**

The physico-chemical parameters of fresh and processed pulp were analysed. Total soluble solids were analysed using digital hand refractrometer. Titratable acidity and ascorbic acid was estimated as per AOAC method (Anon, 1984) [1]. The carotenoid content, reducing sugar and total sugar was analysed as per the procedure given by Srivastava and Sanjeev Kumar (1998) [8]. The data has been analysed statistically and reported at 1% significance level (Panse and sukhatme, 1985) [9]

## Results and Discussion

The fresh pulp of soft bulb jack fruit was found to contain 23.8°Brix total soluble solids, 0.6% titratable acidity, 23 mg 100g<sup>-1</sup> ascorbic acid, 0.84 mg 100g<sup>-1</sup> carotenoids, 14.30% reducing sugar and 20.10% total sugars.

The results obtained from the present investigation are summarized as below;

Soft bulb jack fruit pulp added with 0.2 per cent potassium meta bisulphite followed by pasteurisation at 93 °C for 15 minutes and stored under ambient conditions (T<sub>4</sub>) or refrigeration (T<sub>5</sub>) have showed a good shelf life up to 150 days (Table 1). Similar results of extended shelf life have been reported by Kavya (2014) [5] in custard apple pulp and Sakahale *et al.* (2012) [7] in Mango pulp. The total soluble solid content of pulp was increased from 23.8°Brix to 27.5°Brix after addition of cane sugar. Significant increase in total soluble solid content of pulp was observed from 27.78°Brix to 28.50°Brix during five months of storage. The data showed slight increase in TSS in all the treatments. A slight increase in total soluble solids through storage might be due to conversion of polysaccharides into sugars during hydrolysis process. Similar findings were reported by Mahamud *et al.* (2011) [6] in apple pulp.

Among the treatments, highest titratable acidity was recorded in T<sub>2</sub> (0.64%), while the lowest titratable acidity was recorded in T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub> (0.51%) after one month of storage. Addition of citric acid to T<sub>2</sub> during preservation process has increased the acidity level. During storage of pulp, titratable acidity decreased significantly from 0.51 per cent to 0.26 percent at five months of storage. This may be due to conversion of part acidity into sugars. Similar findings were reported by Kavya (2014) [5] in custard apple pulp.

Significantly maximum ascorbic acid content was recorded in T<sub>1</sub> and T<sub>5</sub> (22.72 mg 100g<sup>-1</sup>) and minimum was recorded in T<sub>2</sub>

(16.32 mg 100g<sup>-1</sup>). During storage period of five months ascorbic acid content found to decrease significantly from (22.72 mg 100g<sup>-1</sup> to 16.32 mg 100g<sup>-1</sup>). The decrease was found to minimum in refrigerated sample as compared to ambient storage temperature (Table 1). The decrease in ascorbic acid might due to oxidation process during storage and refrigerated condition have minimized the oxidation process. Similar findings were reported by Kavya (2014) [5] in custard apple pulp and Durani *et al.* (2010) [3] in apple pulp.

Among the treatments, the carotenoid content jack fruit pulp treated with potassium meta bisulphite was found to decreased (from 0.84 mg 100g<sup>-1</sup> to 0.71 mg 100g<sup>-1</sup>) as compared to others. The decrease in carotenoid content was might due to bleaching effect of potassium meta bisulphite (Srivastava and Sanjeevkumar, 1998) [8]. During storage period of five months, slight decrease in carotenoids was observed in all the treatments (Table 2).

The reducing sugar content for overall treatment was found to differ significantly. Irrespective of treatments during storage period indicates that a slight decrease in reducing sugar content from 14.30 per cent to 13.40 per cent. These results are contradictory to the findings of Kavya (2014) [5] in custard apple (Table 2).

Significantly increase in total sugar content of jack pulp was observed during storage period. The highest total sugar content was recorded in T<sub>5</sub> (20.35%) whereas lowest in T<sub>2</sub> (19.98%) after one month of storage (Table 2). During five months of storage, total sugar content increased to 20.93 per cent in T<sub>4</sub> and T<sub>5</sub>. This might be due to conversion of part of acid in to sugars. Similar results of increase in total sugar content was noticed by Kavya (2014) [5] in custard apple, Hiremath and Rokhade (2012) [4] in Sapota and Chandan (2012) [3] in Aonla.

**Table 1:** Effect of treatments on Shelf life, TSS, Titratable acidity and ascorbic acid content of Soft bulb jack pulp during storage

Treatments	Shelf life (Days)	TSS (°Brix)					Titratable acidity (%)					Ascorbic acid content (mg/100g)				
		1 MAS	2 MAS	3 MAS	4 MAS	5 MAS	1 MAS	2 MAS	3 MAS	4 MAS	5 MAS	1 MAS	2 MAS	3 MAS	4 MAS	5 MAS
T <sub>1</sub>	90.00	28.15	28.18	28.30	0.00	0.00	0.51	0.38	0.32	0.00	0.00	22.72	19.68	16.96	0.00	0.00
T <sub>2</sub>	120.00	27.78	27.80	28.05	28.18	0.00	0.64	0.45	0.40	0.32	0.00	16.32	14.40	13.76	13.01	0.00
T <sub>3</sub>	25.00	28.13	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	22.08	0.00	0.00	0.00	0.00
T <sub>4</sub>	150.00	28.18	28.18	28.28	28.40	28.50	0.51	0.45	0.38	0.29	0.26	16.96	15.04	14.40	13.12	11.52
T <sub>5</sub>	150.00	28.05	28.03	28.08	28.13	28.23	0.54	0.45	0.45	0.35	0.32	22.72	21.76	19.84	18.24	16.32
Mean	-	28.06	22.44	22.54	16.94	11.35	0.54	0.35	0.31	0.19	0.12	20.16	14.18	12.99	8.87	5.57
S.Em±	-	0.13	0.12	0.05	0.04	0.03	0.08	0.06	0.05	0.02	0.02	1.04	1.15	1.06	0.56	0.63
C.D.@1%	-	NS	0.48	0.22	0.17	0.12	NS	0.25	0.22	0.10	0.07	4.34	4.78	4.42	2.34	2.64

NS: Non Significant ; MAS: Months After Storage

**Table 2:** Effect of treatments on carotenoid content, reducing sugar and total sugar content of Soft bulb jack pulp during storage

Treatments	Carotenoid content (mg/100g)					Reducing sugar content (%)					Total sugar content (%)				
	1 MAS	2 MAS	3 MAS	4 MAS	5 MAS	1 MAS	2 MAS	3 MAS	4 MAS	5 MAS	1 MAS	2 MAS	3 MAS	4 MAS	5 MAS
T <sub>1</sub>	0.77	0.77	0.77	0.00	0.00	14.05	13.90	13.70	0.00	0.00	20.08	20.23	20.38	0.00	0.00
T <sub>2</sub>	0.83	0.81	0.80	0.80	0.00	14.05	13.88	13.68	13.53	0.00	19.98	20.10	20.20	20.33	0.00
T <sub>3</sub>	0.71	0.00	0.00	0.00	0.00	13.98	0.00	0.00	0.00	0.00	20.08	0.00	0.00	0.00	0.00
T <sub>4</sub>	0.76	0.76	0.74	0.72	0.71	14.00	14.10	13.90	13.68	13.40	20.23	20.35	20.40	20.73	20.93
T <sub>5</sub>	0.84	0.79	0.77	0.76	0.74	14.15	14.28	14.13	13.88	13.55	20.35	20.50	20.53	20.68	20.93
Mean	0.78	0.63	0.62	0.46	0.29	14.05	11.23	11.08	8.22	5.39	20.14	16.24	16.30	12.35	8.37
S.Em±	0.02	0.01	0.01	0.01	-	0.07	0.06	0.06	0.05	0.04	0.06	0.06	0.05	0.04	0.03
C.D.@1%	0.07	0.04	0.04	0.04	0.02	NS	0.26	0.24	0.22	0.18	0.25	0.24	0.20	0.17	0.13

NS: Non Significant ; MAS: Months After Storage

## Conclusion

Soft bulb jack pulp treated by addition of 0.2 per cent potassium meta bisulphite followed by pasteurization at 93 °C for 15 minutes showed maximum shelf life of 150 days. Eventhough, preservation of jack pulp by addition of 0.2

percent potassium meta bisulphite followed by refrigeration gives shelf life of 150 days, it was found that economically not viable. Utilization soft bulb type of jack pulp as an intermediate product for preparation of various value added

products and culinary items generates addition income and improves livelihood security.

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