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Effect of Harvesting Month and Pre-treatment on Sensory Properties of Frozen Jackfruit (*Artocarpus heterophyllus* Lam.) Bulbs

S. Chandana[1], B.S. Shivakumar[2]*, Y. Kantharaj[3], N. Sudharani[4], H.S. Yallesh Kumar[5] and B.S. Chandana[6]

[1]PG Scholar, Department of Fruit Science,
College of Horticulture, Mudigere (Karnataka), India.
[2]Professor and Head, Department of Fruit Science,
College of Horticulture, Mudigere (Karnataka), India.
[3]Assistant Professor, Department of Post-harvest technology,
College of Horticulture, Mudigere (Karnataka), India
[4]Assistant Professor and Scientist, ICAR-KVK,
Department of Home Science, Shivamogga (Karnataka), India
[5]Associate Professor and Head, Department of Fruit Science,
Kittur Rani Chennamma College of Horticulture, Arabhavi (Karnataka), India.
[6]PG Scholar, Department of Fruit Science,
College of Horticulture, Mudigere (Karnataka), India.

(Corresponding author: B.S. Shivakumar)*
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ABSTRACT: Jackfruit is the seasonal fruit all harvested fruits comes to market in large quantities and it reduces the market value, so it is beneficial if the bulbs are processed and converted into diversified products. Organoleptic evaluation is an important parameter, as it is used to know the consumer preferences and acceptance of products. Hence the experiment was carried out to know the effect of harvesting month and pre-treatment on sensory attributes of frozen jackfruit bulbs. The experiment was laid out in Factorial Completely Randomised Design with two factors, factor M with 5 level *i.e.*, jackfruit harvested during January (M_1), February (M_2), March (M_3), April (M_4) and May (M_5), factor P with 3 levels *i.e.*, bulbs pre-treated with ascorbic acid 2500ppm-AA(P_1), sodium benzoate 500ppm-SB(P_2) and potassium metabisulphite 500ppm-KMS(P_3) and their combinations (MxP) with 3 replications. Among different harvesting months, M_4 (April) recorded the maximum score for appearance, flavour, texture and overall acceptability. Among different pre-treatment SB recorded highest flavour and overall acceptability score and AA recorded the maximum score for appearance and texture. Among the combinations M_4P_1 (April+AA) recorded the maximum score for appearance (4.76) and texture (4.71), M_4P_2 (April+SB) recorded highest flavour (4.81) and overall acceptability (4.86) score. Considering all the sensory attributes M_4P_2 is significantly suitable for freezing method of preservation in jackfruit.

Keywords: Frozen jackfruit bulb, harvesting months, pre-treatment, sensory evaluation.

INTRODUCTION

Sensory evaluation is a valuable tool in product development and marketing, as it helps ensure that products meet consumer expectations and are of high quality. Itis a scientific discipline that involves the assessment and analysis of the sensory attributes of various products. This evaluation is typically performed panelists or judges, who use their senses to describe and quantify the characteristics of the product, including its appearance, aroma, taste, texture, overall consumer appeal *etc.* Sensory evaluation is a crucial tool in product development, quality control, and market research for various industries (Poornima *et al.*, 2022).

Jackfruit botanically called as *Artocarpus heterophyllus* L. is a tropical evergreen tree belongs to the family Moraceae originated from the rain forest of the Western Ghats of India. As jackfruit is the seasonal fruit, harvested fruits come to market in large quantities and it reduces the market value and we can see large quantity of post-harvest losses during peak season. Jackfruit has large demand during off-season due to the nutritional properties. It is beneficial if the bulbs are processed and converted into diversified products that it can reach to a larger section of our population. Extension of shelf life through post- harvest processing measures can augment the supply chain by reducing post-harvest losses.

Freezing is one of the oldest and most widely used methods of food preservation, which help to maintain taste, texture, and nutritional value in foods better than any other method. Hence it can be used as a viable method for preserving jackfruit throughout the year.

Nevertheless, there are limited comprehensive research and studies focusing on the freezing of jackfruit and evaluation of its sensory attributes. Hence with this view, the investigation was carried out to know the impact of harvesting month and pre-treatment on sensory quality of frozen jackfruit bulb stored for three months.

MATERIAL AND METHODS

The experiment was conducted at an industry named NG Fruits, Sakharayapatna, Chikkamagaluru district during January 2022 to August 2023, in Factorial Completely Randomised Design with two factors. Factor M *i.e*., harvesting month with 5 levels viz., M_1 - Fruit harvested in January, M_2 - Fruit harvested in February, M_3 - Fruit harvested in March, M_4 - Fruit harvested in April and M_5 - Fruit harvested in May, factor P with 3 levels viz., P_1 – bulb pre-treated with ascorbic acid 2500ppm, P_2 – bulb pre-treated with sodium benzoate 500ppm and P_3 – bulb pre-treated with potassium metabisulphite 500ppm and their combinations (MxP) with 3 replications. Organoleptic evaluation of thawed frozen jack bulb was doneat initial days and after 90 days of storage, with respect to characters like appearance, flavour, texture and overall acceptability. These were adjudged using five point hedonic scale by 21 untrained panalists. Where 5: Like extremely; 4: Like moderately; 3: Neither like nor dislike; 2: Dislike moderately and 1: Dislike extremely.

RESULTS AND DISCUSSION

The scores recorded with respect to appearance, flavour, texture and overall acceptability are represented in Table 1.

Table 1: Effect of harvesting month and pre-treatment on sensory score of frozen jackfruit bulb during storage.

Treatments	Appearance		Flavour		Texture		Overall acceptability	
	Initial	90 DAS	Initial	90 DAS	Initial	90 DAS	Initial	90 DAS
Harvesting month (M)								
M_1	4.29	4.11	4.37	3.36	4.42	4.19	3.62	3.40
M_2	4.41	4.24	4.46	3.50	4.48	4.25	3.68	3.46
M_3	4.49	4.33	4.59	3.66	4.54	4.32	3.78	3.59
M_4	4.69	4.51	4.76	3.97	4.60	4.42	4.01	3.83
M_5	4.50	4.35	4.55	3.82	4.51	4.35	3.89	3.69
SEm±	**0.041**	**0.034**	**0.030**	**0.041**	**0.033**	**0.039**	**0.030**	**0.033**
CD @ 1%	**0.161**	**0.133**	**0.120**	**0.159**	**0.129**	**0.150**	**0.118**	**0.127**
Pre-treatment (P)								
P_1	4.59	4.55	2.88	2.19	4.63	4.56	2.74	2.46
P_2	4.51	4.41	4.59	4.53	4.53	4.42	4.68	4.65
P_3	4.32	3.96	4.47	4.22	4.38	3.91	3.99	3.70
SEm±	**0.032**	**0.026**	**0.029**	**0.032**	**0.026**	**0.030**	**0.023**	**0.025**
CD @ 1%	**0.125**	**0.113**	**0.113**	**0.123**	**0.100**	**0.116**	**0.091**	**0.099**
Interaction (MxP)								
M_1 P_1	4.42	4.37	2.56	1.78	4.52	4.44	2.56	2.24
M_2 P_1	4.51	4.46	2.75	1.98	4.58	4.51	2.53	2.23
M_3 P_1	4.63	4.59	2.93	2.17	4.67	4.60	2.64	2.37
M_4 P_1	4.81	4.76	3.12	2.39	4.77	4.71	3.02	2.77
M_5 P_1	4.59	4.55	3.04	2.29	4.60	4.53	2.97	2.71
M_1 P_2	4.32	4.21	4.32	4.24	4.43	4.31	4.45	4.40
M_2 P_2	4.46	4.35	4.45	4.38	4.51	4.37	4.56	4.51
M_3 P_2	4.49	4.39	4.57	4.50	4.56	4.43	4.72	4.69
M_4 P_2	4.73	4.65	4.87	4.81	4.69	4.57	4.88	4.86
M_5 P_2	4.53	4.44	4.71	4.64	4.53	4.40	4.81	4.78
M_1 P_3	4.13	3.75	4.27	4.01	4.32	3.82	3.86	3.55
M_2 P_3	4.25	3.90	4.41	4.15	4.35	3.87	3.94	3.64
M_3 P_3	4.34	4.00	4.52	4.27	4.39	3.92	3.98	3.70
M_4 P_3	4.52	4.11	4.81	4.57	4.43	3.98	4.13	3.87
M_5 P_3	4.38	4.05	4.67	4.42	4.41	3.95	4.02	3.75
SEm±	**0.071**	**0.059**	**0.065**	**0.071**	**0.064**	**0.067**	**0.052**	**0.057**
CD @1%	**NS**	**0.230**	**NS**	**0.275**	**NS**	**0.260**	**0.204**	**0.212**

A. Appearance

The appearance score of frozen jackfruit bulb from 0 to 90 days of storage was recorded in the decreasing trend irrespective of treatments. The reason for decreasing trend may be due to loss of colour during freezing. The minimum decreasing trend in appearance value with respect to the harvesting month was obtained in M_4 which is ranged from 4.69 to 4.51, followed by M_5 (4.50 to 4.35) and the maximum decreasing trend was observed in M_1 (4.29 to 4.11). Data obtained showed the decreasing trend in the pre-treatment, the minimum decreasing trend was obtained in P_1 which is ranged from 4.59 to 4.55, followed by P_2 ranged 4.51 to 4.55 and the maximum decreasing trend was observed in P_3 (4.32 to 3.96). With respect to interaction of harvesting month and pre-treatment, the minimum decreasing

trend was obtained in M_4P_1 which is ranged from 4.81 to 4.76, and these values are on par with M_4P_2 which ranged from 4.73 to 4.65 and the maximum decreasing trend was observed in M_1P_3 (4.13 to 3.75).

At 90 days after storage significantly higher appearance score was observed in M_4P_1 (4.76), which was followed by M_4P_2 (4.65) whereas, the lowest appearance score was obtained in M_1P_3 (3.75). This might be due to the property of ascorbic acid and sodium benzoate which maintains the colour, hence maintains the appearance and potassium metabi-sulphite causes leaching of colour. The results are in agreement with Shampa *et al.* (2015); Akhtar *et al.* (2010).

B. Flavour

The decreasing trend was observed in flavour score obtained from sensory evaluation of frozen jackfruit bulb irrespective of treatment during storage. The minimum decreasing trend in the harvesting months was obtained in M_4 (4.27 to 3.97), followed by M_5 (4.12 to 3.82) and the maximum decreasing trend was observed in M_1 (3.72 to 3.36). Among pre-treatment the minimum decreasing trend was obtained in P_2 which is ranged from 4.59 to 4.53, followed by P_3 (4.47 to 4.22) and the maximum decreasing trend was observed in P_1 (2.88 to 2.19). In relation to the treatment combinations, the minimum decreasing trend was obtained in M_4P_2 which is ranged from 4.87 to 4.81, which was on par with M_4P_3 (4.81 to 4.57) and M_5P_2 (4.71 to 4.64) and the maximum decreasing trend from 0 to 90 days was observed in M_1P_1 (2.56 to 1.78).

Flavour values (sensory) after 90 days showed significantly higher in M_4P_2 (4.81), which was on par with M_5P_2 (4.64) and M_4P_3 (4.57) whereas, the lowest flavour score was recorded in M_1P_1 (1.78). Sodium benzoate pre-treated fruits has maintained better flavour, this could be due to the property of chemical. The low flavour score in ascorbic pre-treated jackfruit bulb could be due to, ascorbic acid might lead to a slightly tart or sour or metallic or bitterness in the fruit, especially if used in excess. Additionally, the interaction between ascorbic acid and other compounds in a food product can sometimes lead to changes in flavor or sensory characteristics. The similar results were reported by Akhtar *et al.* (2010); Xin *et al.* (2022).

C. Texture

The texture score of frozen jackfruit bulb showed decreasing trend from 0 to 90 days of storage irrespective of treatments. The minimum decreasing trend in the harvesting stage was obtained in M_4 which ranged from 4.60 to 4.42, followed by M_5 (4.51 to 4.4.35) and the maximum decreasing trend was observed in M_1 (4.42 to 4.19). Among different pre-treatment the minimum decreasing trend was obtained in P_1 which is ranged from 4.63 to 4.56, followed by P_2 (4.53 to 4.42) and the maximum decreasing trend was observed in P_3 (4.38 to3.91). In relation to the interaction of harvesting months and pre-treatment, the minimum decreasing trend was obtained in M_4P_1 (4.77 to 4.71), which was on par with M_4P_2 (4.69 to 4.57) and the maximum decreasing trend was observed in M_1P_3 (4.32 to 3.82).

Texture values after 90 days of storage showed significantly the higher in M_4P_1 (4.71), which was on par with M_4P_2 (4.57) and the lowest texture value (3.64) was recorded in M_1P_3. This might be due to the property of ascorbic acid, which helps to maintain the firmness of fruits by stabilizing the cell structure. Saxena *et al.* (2009) in jackfruit and Akhtar *et al.* (2010) in mango observed the similar trend.

D. Overall acceptability

In storage of 90 days the overall acceptability score of frozen jackfruit bulb was recorded in the decreasing trend irrespective of treatments. The minimum decreasing trend in the harvesting month was obtained in M_4 which is ranged from 4.01 to 3.83, followed by M_5 (3.89 to 3.69) and the maximum decreasing trend from 0 to 90 days was observed in M_1 (3.62 to 3.40). The minimum decreasing trend among pre-treatment was obtained in P_2 (4.68 to 4.65), followed by P_3 (3.99 to 3.70) and the maximum decreasing trend was observed in P_1 (2.74 to 2.46). With respect to interaction of factors, the minimum decreasing trend was obtained M_4P_2 (4.88 to 4.86), which was on par with M_5P_2 (4.81 to 4.78) and M_3P_2 (4.72 to 4.69), the maximum decreasing trend was observed in M_1P_1 (2.56 to 2.24).

After 90 days significantly higher over acceptability score was observed in M_4P_2 (4.86), which was on par with M_5P_2 (4.78) and M_3P_2 (4.69), whereas the lowest over acceptability score 2.24 was recorded in M_1P_1 (2.24). The sodium benzoate pre-treatment helps to retain appearance, texture and flavor upto 90 days of storage, keeps the overall acceptability score high. The presence of off flavour due to ascorbic acid reduced the overall acceptability even though the texture and appearance are good. Results are in line with Akhtar *et al.* (2010).

CONCLUSIONS

Considering the obtained results with respect to the sensory qualities of frozen jackfruit bulb. Among the different treatment combinations M_4P_2(jackfruit harvested in April and pre-treated with sodium benzoate at 500 ppm) showed better score for all sensory attributes like appearance, flavour, texture and overall acceptability. Even though H_4P_1 showed maximum texture and appearance score the flavour and overall acceptability scores were very low, because it imparted off flavour. Hence, based on obtained results jackfruit harvested in April and pre-treated with sodium benzoate at 500 ppm can be considered suitable for freezing.

FUTURE SCOPE

Future studies with respect to different jack varieties in order to evaluate the suitable varieties for freezing.

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Conflict of Interest. None.

REFERENCES

Akhtar, S., Muhammad, R., Anwaar, A. and Atif, N. (2010). Physico-chemical, Microbiological and Sensory

Stability of Chemically Preserved Mango Pulp. *Pakistan Journal Botany*, *42*(2), 853-862.

Poornima, K. R., Kantharaj, Y., Shivakumar, B. S., Sudharani, N. and Devaraj (2022). Effect of Harvesting Stages and Brine Concentrations on Sensory Qualities of Canned Tender Jack (*Artocarpus heterophyllus* Lam.). *Biological Forum – An International Journal*, *14*(4), 62-64.

Saxena, A., Bawa, A. S. and Raju, P. S. (2009). Phytochemical Changes in Fresh-cut Jackfruit (*Artocarpus Heterophyllus* L.) Bulbs During Modified Atmosphere Storage. *Food Chemistry*, *115*, 1443-1449.

Shampa, S., Debashis, K. D. R., Alomoni, Siddik, M. A, B., Kothika, D. and Jiaur, R. M. (2015). Effect of Chemical Preservatives and Storage Conditions on The Nutritional Quality of Tomato Pulp. *American Journal of Food Nutriti*on, *3*(4), 90-100.

Xin, Y., Chen, K., Xing, C., Feng, S., Song, Y. and Li, L. (2022). Chemical Stability of Ascorbic Acid Integrated into Commercial Products: A Review on Bioactivity and Delivery Technology. *Antioxidants*, *11*(1), 153-161.

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