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Standardization of Pre-treatment for Dehydration of Tender Jack

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ABSTRACT: Tender jack is generally consumed as a vegetable and it is characterized by its meat-like texture hence it is called as vegetarian meat, availability of tender jack in the market throughout the year is a critical aspect related to its trade. However, several factors limit its year around availability which include seasonal nature, geographically limited growth due to climatic variations, high perishability and difficulties related to storage and transportation due to limited technologies, as jackfruit is seasonal fruit dehydration is one of the best and suitable method for storage of tender jack during offseason. Tender jack is more prone to browning hence, pre-treating fruits for storage is an important step in preserving the produce. Taking this into consideration, standardization of pre-treatment for dehydration of tender jack was studied. The experiment was laid out in Completely Randomized Design (CRD) with seven treatment and three replications. The various pretreatments such as Potassium Metabisulphite (KMS), Citric Acid (CA) and Potassium Sorbate (PS) were used at different concentrations. Among different pretreatments, KMS 0.3 per cent showed the maximum carbohydrates (13.18 %), crude fiber (3.28 %), protein (2.26 %), starch (1.36 %) sensory color score (4.97) and low phenol (32.07 mg GAE/g).

Keywords: Tender jack, potassium metabisulphite, dehydration, pretreatment.

INTRODUCTION

Jackfruit is popularly known as the “Poor man’s food” in the eastern and southern parts of India as it is cheap and plentiful during the season. People consume it mostly as a vegetable in the tender stage. The number of products has been developed from unripe tender jackfruit is used for salads, curries, pickles *etc*. Tender jack contains protein (2.6g), fiber (4.4g), calcium (50.1mg), phosphorous (97mg), iron (15mg), potassium (206mg), Vitamin C (11mg) per 100 g of edible portion and also have Thiamine and Riboflavin (Jagtap *et al.*, 2010).

Availability of tender jack throughout the year is a critical aspect related to its trade. However, several factors limit its year around availability which include seasonal nature, geographically limited growth due to climatic variations, high perishability and difficulties related to storage and transportation due to limited technologies (Poornima *et al.*, 2022). So, reduction in post-harvest losses by developing a suitable technology for preservation to increase their shelf life has become an urgent need in order to extend their availability round the year and helping a large section of jack fruit growers, traders and consumers.

Water is the dominant component in fruits and vegetables and its removal prevents harmful microbial and physico-chemical reactions leading to a longer storage time. Therefore, dehydration is one of the oldest methods used to remove moisture for food preservation as the lowest water potential (water activity) is achieved for food stability during storage. Dehydration technique allows to preserve the fruits by increasing their shelf-life while reducing their volume and weight, thus reducing the cost of packaging, storage and transport (Pateiro *et al*., 2022).

Fresh tender jackfruit has a shorter shelf life of about a week when stored even under low temperature condition and tender jack is more prone to browning hence, pre-treating fruits for storage is an important step in preserving the produce. It retains the natural

colour of the fruit and inactivates enzymes that can cause food spoilage. Blanching prior to drying of fruits and vegetables effected the prevention of discoloration (Liji *et al*., 2015).

MATERIALS AND METHODS

The experiment was conducted at Department of Post-Harvest Technology, College of Horticulture, Mudigere. The experiment was laid out in Completely Randomized Design (CRD) with seven treatment and three replications. Initially tender jack fruits were collected and outer rind was peeled off then cut into pieces of almost uniform size (1cm^3) and blanched at a temperature of 80°C for 10 min. Different pre-treatments *viz.*, Potassium Metabisulphite (KMS), Citric Acid (CA) and Potassium Sorbate (PS) solution was prepared according to the treatment's concentration, sliced fruits were dipped as per the treatments then treated slices were placed in tray dryer at temperature of 60°C to reduce the moisture level up to 7 to 8 per cent.

RESULTS AND DISCUSSION

Effect of pretreatment on biochemical parameters such as carbohydrates, crude fibre, protein, starch and sensory colour score are represented in Table 1.

Table 1: Effect of pretreatments on biochemical parameters and sensory colour score of dehydrated tender jack.

Treatments	Carbohydrates (%)	Crude fiber (%)	Protein (%)	Starch (%)	Sensory color score
T_1 (control)	12.54	2.87	1.84	0.99	2.11
T_2 (KMS (0.2%)	12.86	3.13	2.18	1.28	4.84
T_3 (KMS (0.3 %)	13.18	3.28	2.26	1.36	4.97
T_4 (CA (0.2%)	12.37	2.93	2.02	1.08	3.73
T_5 (CA (0.3%)	12.51	3.11	2.10	1.12	4.21
T_6 (PS (0.1%)	12.29	3.07	1.90	1.03	3.22
T_7 (PS (0.2%)	12.13	2.94	1.94	1.09	3.31
S. Em ±	**0.16**	**0.03**	**0.04**	**0.01**	**0.08**
C.D @ 1%	**0.68**	**0.14**	**0.15**	**0.04**	**0.32**

Effect of pretreatments on carbohydrate content of dehydrated tender jack. Data obtained on carbohydrate was differed significantly. The maximum carbohydrate was found in T_3 (KMS 0.3 %) 13.18 per cent, which was on with the treatment T_2 (KMS0.2 %) (12.86 %) while, minimum was noticed in T_1(control) (12.54 %). This result could be explained by the fact that, after dehydration, fruit's carbohydrate content tends to rise or remain stable due to the removal of a significant amount of water and also KMS preservative properties can help to maintain the overall quality of the carbohydrates in the dehydrated product. Comparable outcome was noticed in Liji *et al*. (2015); Khan *et al*. (2021).

Effect of pretreatments on crude fibre and protein content of dehydrated tender jack. Crude fibre, which is crucial for many aspects of health, can be found in large quantities in fruits. Thus, crude fibre was reported significantly maximum in T_3(KMS 0.3%) (3.28 %), followed by T_2 (3.13 %) (KMS0.2 %). While the minimum crude fibre (2.19 %) was recorded in T_1 (control). These findings could be due to the fact that dehydration causes the fruit to loss the moisture, which concentrates the solids and increases the amount of fibre per unit of weight. Dehydration also changes the physical makeup of fiber, making it more brittle and less flexible. These findings align with Siriwattananon and Maneerate (2016).

Tender jack is an excellent source of protein, especially for those who follow a vegetarian or vegan diet, the higher protein content was noticed in T_3(KMS 0.3 %) (2.26 %) which is on par with the treatment T_9(KMS 0.2 %) (2.18 %) on the other hand the minimum protein content was noticed in T_1 (control) (1.62 %).

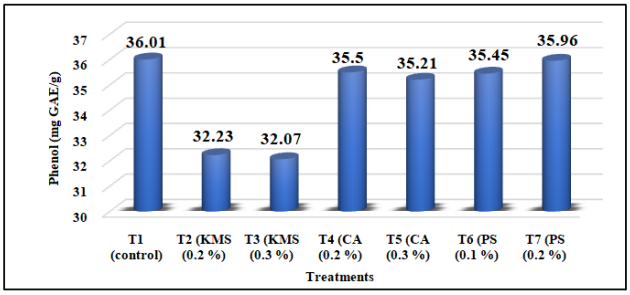

Fig. 1. Effect of pretreatments on phenol content of dehydrated tender jack.

The higher phenol content in the fruits induces browning of the dried product, the minimum total phenol content (32.07 mg GAE/g) was recorded in T_3 (KMS 0.3%) treatment, which was followed by T_2 (KMS 0.2 %) (32.23 mg GAE/g). While, the maximum (36.01 mg GAE/g) total phenolic content was obtained in T_1 (control). This may be due to KMS can inhibit enzymatic browning, causing oxidation of phenol compounds and can result in a loss of color and flavor, by preventing this browning, these findings concur with the research by Sultana *et al*. (2020).

Effect of pretreatments on starch content of dehydrated tender jack. Increased starch content can extend the shelf life of dehydrated foods while protecting the other nutrients from oxidation during the drying process. The study discovered a substantial difference among pretreatments. The treatment T_3 (KMS 0.3%) included the most starch (1.36 %), followed by the treatment T_2 (KMS 0.2%) (1.28 %), and the treatment T_1 (control) contained the least starch (0.99%).

Effect of pretreatments on sensory colour score of dehydrated tender jack. Color plays a multifaceted role in the sensory quality of dehydrated products, it not only influences consumer perceptions of freshness and flavor but also affects purchasing decision and overall product quality. Significant variation was observed among different pretreatments, colour score was obtained significantly maximum (4.97) in T_3(KMS 0.3 %), which was on par with T_2 (KMS 0.2 %) (4.84). While the minimum colour score (2.11) was recorded in T_1 (control). It is possible to conclude that KMS retains fruit's original color by preventing oxidation and neutralizes the chemicals that cause browning and prevent the color loss by binding to them which justifies the comparable findings by Sultana *et al*. (2020); Sumayya *et al*. (2017).

CONCLUSIONS

Among all the pretreatments KMS 0.3 per cent showed the maximum carbohydrates, crude fiber, protein, starch, sensory color score and low phenol followed by KMS 0.2 per cent. Based on the findings about the biochemical and sensory characteristics (colour score) of fruits, it was determined that tender jack dehydration could be successfully accomplished by pre-treating the fruits with 0.3 per cent KMS.

FUTURE SCOPE

Investigation into innovative preservation methods and sustainable packaging for tender jackfruit could be an area of interest for future research

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Conflict of Interest. None.

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