

## Preservation of Jackfruit (*Artocarpus heterophyllus*) by Sun Drying and Dehydration

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### ABSTRACT

Preservation of jackfruit (*Artocarpus heterophyllus*) by sun drying and dehydration methods has been standardized. Four treatments of sugar concentration viz. 35<sup>o</sup>, 40<sup>o</sup>, 45<sup>o</sup>, and 50<sup>o</sup> Brix were used for osmotic dehydration. After osmosis of the jackfruit slices in the sugar solutions these were laid on the cabinet drier for dehydration and open sun drying. After osmotic dehydration and sun drying, the products were packed in high density polyethylene bags and stored in ambient temperature for a period of 10 months. The physico-chemical properties and the microbiological changes of the products were evaluated and a taste panel evaluated the organoleptic quality of the products during the storage period. Minimum microbial count was recorded for osmosis in 50<sup>o</sup> Brix sugar solution followed by 45<sup>o</sup> Brix sugar solution with dehydration and maximum microbial count was observed in osmosis in 35<sup>o</sup> Brix sugar solution followed by 40<sup>o</sup> Brix sugar solution with sun drying. The retention of vitamin A ( $\beta$ - carotene), vitamin C and total acid and total sugar was better for osmosis in 45<sup>o</sup> Brix sugar solution followed by 50<sup>o</sup> Brix sugar solution with sun drying. The product of 45<sup>o</sup> Brix solution when stored 10 months at room temperature secured highest score in organoleptic evaluation and was ranked “like moderately” followed by the product of 50<sup>o</sup> Brix solution. Considering the overall acceptance of sensory evaluations, retention of nutritional quality and quantity of sugar needed, the osmotic dehydrated jackfruit prepared by 45<sup>o</sup> Brix sugar solution with dehydration could be selected for commercial processing.

**Keywords:** Jackfruit preservation, Sun drying, Osmotic dehydration.

### INTRODUCTION

The jackfruit (*Artocarpus heterophyllus*) has rich source of nutrients, it is full of carbohydrates, proteins, vitamins and minerals. Its medicinal properties include strengthening of immune system and its anti-cancer and anti-ulcer and anti-hypertension

action. It also has diverse biological properties, like protection against HIV-AIDS. Mouth-watering delicacies that jackfruit can be turned into, include beverages, nectar, clarified juice, wine, vinegar, canned products, candied fruit, dehydrated flakes and biscuits pickle, sweets and jackfruit bulbs and leather.

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Many people use jackfruit in unripe stage for their curries and other cuisine. It could be made into a variety of different products, such as canned fruit, dried fruit and pulp. Postharvest losses of this fruit are very high due to lack of storage facilities and mishandling operations. Most of the fruits and vegetables are seasonal. During the peak season they appear in the market and form glut to abundant supply at a time and the price comes down causing economic loss to the growers. All these factors discourage the growers from producing more. So reduction of postharvest losses and increases of their shelf life has become an urgent need in order to extend their availability round the year. Processing and preservation can play a vital role in reducing postharvest losses of fruits and vegetable and make them available during off-season.

Sun drying and osmotic dehydration methods of preservation have the advantage of

T<sub>1</sub> = 35<sup>o</sup> Brix sugar syrup + Sun drying

T<sub>2</sub> = 40<sup>o</sup> Brix sugar syrup + Sun drying

T<sub>3</sub> = 45<sup>o</sup> Brix sugar syrup + Sun drying

T<sub>4</sub> = 50<sup>o</sup> Brix sugar syrup + Sun drying

Slices of the jackfruits were divided into eight groups and dipped into the sugar syrup concentrations and kept 30 minutes for soaking. Then, the slices were heated at 80<sup>o</sup>C for 45 minutes. Finally, the slices were kept for 3 hrs again for soaking and 2000 ppm potassium metabisulphite (KMS) were added according to FPO specification (Ranganna, 2007). The slices (four groups) were transferred to drying trays and dehydrated at 50<sup>o</sup> C for 24hrs, 55<sup>o</sup> C for 24hrs and finally 60<sup>o</sup> C for 8hrs. The time and temperature of drying of the jackfruit slices in the mechanical dryer was fixed up after several trials. Similarly remain four groups were open sun dried for eight days. After sun drying and dehydration, the slices were packed in high density polyethylene packet and stored at ambient temperature. The stored samples were analyzed at monthly intervals for moisture, acidity, total and reducing sugars as per

being very easy to perform for home and small scale processing. Now a day, there is a huge demand for dried fruits both in domestic as well as in foreign markets. Sun drying and osmotic dehydration if optimized will reduce losses, improve availability and allow diversification of processed product. It also will add value to the most abundant fruit of Andhra Pradesh, Kerala and Karnataka.

## MATERIALS AND METHODS

This study was made at Dept. of Horticulture, Agricultural College, Aswaraopet, Khammam district, Andhra Pradesh to standardize the sun drying and dehydration of jackfruit slices. The jackfruits were washed, peeled, removed the seed from bulb and sliced length wise. There were eight treatments comprising of four concentrations of sugar syrups with sun drying and dehydration as follows:

T<sub>5</sub> = 35<sup>o</sup> Brix sugar syrup + Dehydration

T<sub>6</sub> = 40<sup>o</sup> Brix sugar syrup + Dehydration

T<sub>7</sub> = 45<sup>o</sup> Brix sugar syrup + Dehydration

T<sub>8</sub> = 50<sup>o</sup> Brix sugar syrup + Dehydration

method described by Ranganna (2007),  $\beta$ -carotene by NIN procedure and ascorbic acid by the procedure described by Mahadevan and Sridhar (1982). Microbial load (bacteria, fungi and yeast) was estimated in the stored osmotic dehydrated jackfruit by the method described by Istavan Kiss (1984) at monthly intervals by adopting pour plate method using serial dilution technique.

## Sensory evaluation

Stored sun dried and osmotic dehydrated jackfruits were examined by a panel of 12 judges comprising of Assistant professors, students and casual labour for their color, flavor/taste, texture/stickiness and overall acceptance. Hedonic scale was used to make the different parameters. In this scale 'like extremely', is given the highest score of 9 and 'dislike extremely' is given the lowest score 1. Others are given intermediate scores. The data were analyzed for ANOVA in completely

randomized design (CRD) under computerized statistical methods of M-stat and Duncan's Multiple Range Test (DMRT) was used to compare the means.

### RESULTS AND DISCUSSION

The prepared osmotic dehydrated jackfruit is not suitable for consumption immediately after drying due to its stickiness and hardness. The stickiness of the product that is assumed to be the critical sensory attributes remains high at the beginning of preparation. It was observed that storage time is essential for seasoning for the improvement of stickiness and hardness of the sun dried and osmotic dehydrated jackfruit slices. The data for each chemical change was collected at each month but for convenience the initial, 2, 4, 6 and 8 months of storage have been considered for discussion. The results indicate that the moisture content of the sun dried and osmotic dehydrated jackfruit increased in all treatments. This increase could be due to the higher relative humidity (85-95% in the rainy season) during the storage period of the products.

The higher moisture content was observed in the sun dried jackfruit prepared from 50<sup>o</sup> Brix sugar syrup i.e. T<sub>8</sub> (15.08%) and from 45<sup>o</sup> Brix sugar syrup T<sub>7</sub> (14.05) followed by osmotic dehydrated jackfruit prepared from 50<sup>o</sup> Brix sugar syrup i.e. T<sub>4</sub> (14.06%) and from 45<sup>o</sup> Brix sugar syrup T<sub>3</sub> (13.35) after a period of 10 months storage. Because of increase in moisture content of the sun dried and osmotic dehydrated jackfruit the change in acidity is vary small. A remarkable reduction was noted in ascorbic acid (vitamin C) and β-carotene (vitamin A) contents of the samples during storage. The reduction could be due to both oxidative and non-oxidative changes as described by Eskin (1979) and Land (1962). Such changes altered the color of the product and lowered the flavor and nutritive value of the product. The maximum retention of vitamin C and β-carotene were observed in Solar dried jackfruit prepared from 50<sup>o</sup> Brix sugar syrup i.e. T<sub>8</sub> (3.56 mg/100g and 53.02 μgm/gm) and 45<sup>o</sup> Brix sugar syrup i.e. T<sub>7</sub> (3.12 mg/100g and 48.02 μgm/gm) followed

by osmotic dehydrated jackfruit prepared from 50<sup>o</sup> Brix sugar syrup i.e. T<sub>4</sub> (3.42 mg/100g and 51.02 μgm/gm) and 45<sup>o</sup> Brix sugar syrup i.e. T<sub>3</sub> (3.02 mg/100g and 46.43 μgm/gm) after 10 months of storage.

The total sugar content was decreased and reducing sugar was increased in all the treatments of the sundried and osmotic dehydrated jackfruit after a storage period of 10 months. Decrease in total sugars in sun dried and osmotic dehydrated jackfruit might be due to the significant increase in reducing sugars (Mir & Nath 1993) by acid hydrolysis of total and non-reducing sugars and thereby inversion of total (Rao & Roy 1980) and non-reducing sugars to reducing sugars (Meyer 1966 & Roy & Singh 1979). The microbial counts of the sun dried and osmotic dehydrated jackfruits of various sugar concentrations was nil initially and increased slightly during storage. No microorganism was traceable initially due to the higher dilution used for the enumeration. Sun dried and osmotic dehydrated jackfruit prepared by 50<sup>o</sup> Brix sugar solution and 45<sup>o</sup> Brix sugar solution showed low number of microbial counts than that prepared by 35<sup>o</sup> and 40<sup>o</sup> Brix sugar solution during storage in high density polyethylene packet at ambient condition. Sun dried and osmotic dehydrated jackfruit slices prepared by 35<sup>o</sup> Brix sugar solution exhibited slightly higher microbial population than the rest of the slices. In general, the microbial population of the jackfruit slices prepared for the experiment was quite low even at the end of 10 month of storage though there was a significant increase in moisture content over the period. The higher concentration of sugar in the syrup and the preservative (KMS) added, while preparing the jackfruit slices coupled with still low moisture content following storage (maximum 13%), might have prevented the growth of microbes.

The osmotic dehydrated jackfruit was organoleptically evaluated after every 2 months of storage period. But for the discussion, the 8 months and 10 months storage data have been taken. After 8 and 10 months of storage the highest overall

acceptance score was obtained for treatment T<sub>3</sub> (7.7 and 7.5) followed by treatment T<sub>7</sub> (6.9 and 6.8), respectively. It is noticed that nobody disliked the products even after 10 months of storage at ambient temperature.

So, we can conclude that considering the physico-chemical changes, overall acceptance of sensory evaluations and sugar quantity needed for the syrup, the treatment T<sub>3</sub> i.e. 45<sup>o</sup> Brix sugar syrup could be selected for commercial processing of osmotic dehydrated jackfruit and the treatment T<sub>7</sub> i.e. 45<sup>o</sup> Brix sugar syrup could be selected for farmer/family level processing of sun dried jackfruit.

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