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RESEARCH ARTICLE

DEVELOPMENT ON PROCESS &STANDARDIZATION OF INSTANT TENDER JACKFRUIT (DRIED)

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ABSTRACT

Jackfruit is consumed by most of the people in the world as it has abundance of health benefits. As it is a seasonal crop and economically available, proper preservation techniques have to be developed because a large amount of Jackfruit gets wasted every year. It is a common component homesteads in Pollachi and Kerala since not much work has been done, farmers are not aware of the value addition, processing and preservation of Tender Jackfruit. Therefore, hence the present study a suitable processing method is developed, it will be a boon to the farmers. The objectives of the present study is to prepare and standardize the dried (tender) jackfruit that could be incorporated as a value added products in some of the traditional recipes and RTE snack food. In the present study, we processed the tender jackfruit by Steam and Hot water Blanching and used two types of preservatives like Common Salt and KMS. Among the variations, Steam Blanched Jackfruit with KMS were found to be the best based on sensory evaluation viz., appearance, texture, taste, flavour and overall acceptability. Moisture of the dried jackfruit is found to be 10.85% .The best Microbial count is 7 and 28 for WB-OD-KMS with two serial dilutions. Hence, the present study developed value added blanched Jackfruit that can be eaten all-round the year as RTE Snack food.

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INTRODUCTION

Artocarpus heterophyllus Lam., which is commonly known as Jackfruit is a tropical climacteric fruit, belonging to Moraceae family, is native to Western Ghats of India and common in Asia, Africa, and some regions in South America. It is known to be the largest edible fruit in the world. Both the seeds and the flesh of jackfruit are consumed as curries and boiled forms, while the flesh in fully ripen stage can be eaten directly as a fruit. Several countries have developed different food products such as jam, jellies, marmalades, and ice creams using pureed jackfruit. The several parts of jack tree including fruits, leaves and bark been extensively used in traditional medicine due to it anti carcinogenic, antimicrobial, and antifungal. Due to anti-inflammatory, wound healing and hypoglycemic effects. Despite all these benefits, unfortunately, the fruit is underutilized in commercial scale processing in regions where it is grown. The aim of this research is to disseminate the knowledge on nutritional and health benefits of jackfruit, in order to promote utilization of jackfruit for commercial scale food production. Jackfruit is one of the commonly consumed foods in Sri Lanka from the ancient time. It is a non-seasonal fruit and had a major contribution to the food supply of the people and their livestock when there were short supplies of staple food grains. Therefore, it is referred to as *Poor man's food.*

JACK FRUIT CULTIVATION IN INDIA

Jackfruit is popular in southern and eastern India where it grows naturally. Kerala, Tamil Nadu, Andhra Pradesh, Goa, and Maharashtra in the south are known to grow Jackfruit in scattered pockets. Tamil Nadu is the only state in India which produces jackfruit as a mono-crop and commercially in India. The fruits are source from Panruti where it is cultivated and distributed throughout the country. The market ranges from Delhi, Mumbai, Rajasthan and more. Kerala is one of the largest consumers of jack fruits. For jackfruit farmers it's important to understand what weather is suitable for jackfruit farming. The market is the second most important thing or equally important. Jackfruits are not the preferred fruit in most cities in Gujarat or Rajasthan. Though the bigger cities may have a moderate market, the smaller ones are not a big market. This is due to the lack of knowledge of its benefits and the hassle of cleaning the fruit itself. Jackfruits have a sticky glue

that comes out when it is cut. The latex of the fruit, though not toxic to touch, is extremely annoying and could stick to anything it touches. This is not appealing and is hard to clean. Once cleaned though, the fruit is excellent and has a fruity aroma. Some consider the smell of a jackfruit pungent or too strong. The production of jackfruit in Tamil Nadu was reported at 152.334 Ton th in 2024, a decrease from the previous record of 152.521 Ton th for 2023. This data is updated yearly, averaging 64.266 Ton th from March 2012 (Median) to 2024, with 13 observations. The data reached an all-time high of 152.521 Ton th in 2023 and a record low of 16.120 Ton th in 2013. (Department of Agriculture & Farmers Welfare, New Delhi, India,2024).

WASTAGE OF JACK FRUIT

The consumption of fresh jackfruit as well as the processing of this fruit results in a high amount of non-edible wastes such as peel and central axis and edible by-products such as seeds and perianth.

Non-edible wastes: Jackfruit peel, also known as rind or skin, is the outer protective layer of the fruit which consists around 57.17%, 46.45%, and 40.05% in Khaja, Gala and Durasha variety respectively . The unsystematic disposal of peel imposes a serious burden on the environment. However, proper utilization of the by-products not only increases the economic value but also reduces the cost of disposal. Jackfruit peel is reportedly rich in cellulose, pectin, protein, and starch comprising about 27.75%, 7.52%, 6.27%, and 4%, respectively.

Edible wastes: Jack fruit Seeds make up around 10 to 15% of a jackfruit *(Ocloo et al., 2010*). These seeds are indeed very rich in digestible starch, protein, and minerals. The jackfruit seeds contain 76.1% carbohydrate, 17.8% protein, and 2.1% lipid, on dry basis. *Sumathy et al.* (2007) quantified the significant amount of lignin, isoflavones, saponins, and many phytonutrients in jackfruit seeds. The health benefits of these nutrient components are wide-ranging from anticancer to antihypertensive, antioxidative and antiulcer effects .*Fernandes et al*., (2011) found the seeds are good sources of vitamin B1 and B2. Additionally, Odemelam (2005) found the satisfactory functional properties such as bulk density, oil absorption capacity, and gelation concentration of the seeds flour. Thevasanthi and Alagar (2011) proved the antibacterial effect of nano-sized particles of jackfruit seeds against *E. coli* and *B.megaterium.*

HEALTH BENEFITS OF JACKFRUIT

Jackfruit contains a high amount of vitamin C and anti-oxidants which helps boost the immune system and makes it stronger when fighting an infection. It rich in potassium and thereby helps in aiding the fitness of heart and circulatory system. The natural ways to lower blood pressure Jackfruit is rich in antioxidants, phytonutrients and flavonoids. The presence of these antioxidants eliminates the toxins produced by the body as well as the free radicals which are harmful for us. Both toxins and free radicals have been known to cause cancer in the body. Jackfruit contains a good amount of iron in it. A proper concentration of iron in our body helps prevents disorders like anemia. Iron also helps in aiding metabolism. Vitamin C, magnesium and copper also help in improving the quality of the blood. The jackfruit root is a remedy for skin diseases. Being rich in vitamin A (Beta-Carotene), jackfruit provides a healthy nutrition for our eyes. It protects the eyes from bacterial and viral infection and also rids them of free radicals which might be harmful. It also saves the eyes from intense and harmful light waves like ultraviolet rays. It helps in improving the eyesight. Jackfruit can help in weight loss because it's free of fat and low in calories that enable dieters to safely and comfortably consume Jackfruit contributes in improving the digestive system when eating it regularly due to its high content of fibers (3.6 g for every 100 g). It causes no stomach pain even if eaten in huge quantities and improves the bowel movement. It also protects the colon by removing carcinogenic chemicals out of the large intestine.

METHODOLOGY

Around 70% of the jackfruit in the country is being wasted; therefore the processing of Jackfruit can increase its value as well as improves the shelf life of the Jackfruit. We have adopted Blanching and Drying techniques to improve the shelf life and value addition (ready-to-eat) of Jackfruit in the present study Preparation and Standardization of Tender (Dried) Jackfruit. The methodology adopted for the present study were followed with the following treatments and phases:

Phase I - Selection and cleaning of Jackfruit: The Selection of healthy suitable green tender jackfruit of uniform size and maturity (80-85 days after spine development on fruits). Removal of outer spiny skin, latex, core, seeds and in-edible parts of the fruit (Leaving the fleshy Arils). Slicing of fleshy arils into horizontal pieces of equal size and thickness.

PHASE-II Value Addition Processing (Blanching with Preservatives): The sliced pieces are washed with water. Addition of preservatives (1g/kg KMS or 10g/kg Common Salt). Blanching done with Steam/boiling water at 100^0C for about 2-3 minutes.

PHASE-III - Drying process

The Blanched jackfruits are dried (Sun dry/oven dry at 60^0C). Cooling to room temperature, then packing (200 gauge thickness LDPE) and finally Storage.

PHASE-IV: ANALYSIS

Moisture Content: Take 2 gram of Jackfruit (Initially & On 0^{th}, 15^{th}, 30^{th} and 45^{th} days after drying), Keep it Hot Air Oven at 60^0 C. Take weight for every 2 hours (Till concurrence value is obtained).

Microbial Load: The Total Plate Count Method & Spread Plate Technique in which about 10 Samples were taken for analysis, Preparation of Media & Water Blank for TPC method. Sterilization of Media, Water Blanks, Petri plates, Pestle & Mortal in Autoclave at 121^0C 15psi for 15mins Media is then poured into Labelled Petri places in Laminar Air Flow Chamber. Finally the grinding of samples were done in Pestle & Mortar. Taken 1g of grinded sample and then added 99 ml water blank (10^{-2} Dilution). Then 1 ml of sample is taken from 10^{-2} dilution and it was added to the 9 ml water blank using micro-pipette (10^{-3} Dilution), similarly about 0.1 ml of 10^{-2} & 10^{-3} Dilution were then added to the respective petri plates.

Use L-shaped Rod to spread the dilutions in the Petrid plates. Cover the petri plates using Plastic films. Take c.f.u/ml count after 24 hours.

Shelf-life Study: The dried Jackfruit were stored in air tight LDPE packs and it is checked for the microbial spoilage. Further, the dried tender jackfruit were soaked for 10 Minutes in 250ml of water (Rehydration). Further, the rehydrated jackfruit is then cooked into fries (Poriyal) with addition of onion, salt & spices and finally tested for its Sensory Evaluation. The jackfruit contains outer hard spiny skin, rags, latex, core and edible part arils along with seeds in it. The fleshy arils can be further value added by adopting methods like Blanching and drying, for improving quality and shelf life of jackfruit. Fresh, healthy green tender jackfruit (80-85 days after spine development on fruits) of uniform size and maturity from same tree is selected for processing. The outer spiny skin, latex, core, seeds and other inedible parts of the fruit are removed using fat/oil coated sharp knife. The edible fleshy arils after removal of seeds in it are sliced into horizontal pieces of equal size and thickness.

VALUE ADDITION OF TENDER JACKFRUIT

(Blanching with Preservatives): In order to improve shelf life of jackfruit, Blanching along with Preservatives like KMS (Potassium Metabisulphite) and Common Salt was adopted. For each treatment ½kg of Jackfruit and 250ml of water was used

BLANCHING: Blanching is the process whereby food is briefly cooked in boiling water, steam or syrup, such that it destroys enzymes that catalyse the reactions of food spoilage. Usually temperature ranges from 80-100ºC.

Steam Blanching: Steam blanching results in higher nutrient retention and ability of quick heating allows for shorter processing times & more energy-efficient

Boiling Water Blanching: Boiling water blanching involves low capital cost and better energy efficiency but loss of water soluble constituents.

PRESERVATIVES

Preservatives are natural or chemical substances that are added to food to help preserve spoiling improve appearance and/or maintain the food's nutritional qualities

KMS (Potassium Metabisulphite): KMS is a white crystalline powder with a pungent odour. It is a potent antioxidant, protecting both the colour and delicate flavours of the food. It also inhibits the growth of wild bacteria and fungi.

Common salt: Common salt is effective as a preservative because it reduces the water activity of foods and dries food dehydration, thus inhibit the growth of microorganisms.

TRAIL-I - Steam Blanching with Potassium Metabisulphite (KMS): Take ½ kg of Jackfruit & 250 ml water. Dissolve 0.5g of KMS in water and soak ½ kg fruit for 2 minutes and finally, steam blanch fruits for 2 minutes.

TRAIL-II - Steam Blanching with Common Salt:

Take ½ kg of Jackfruit & 250 ml water. Dissolve 5g of common salt in water and soak the fruits for 2 minutes and finally & steam blanch the fruits.

TRAIL-III - Boiling Water Blanching with Potassium Metabisulphite (KMS):

Take ½ kg of Jackfruit and 250 ml water. Dissolve 0.5g KMS in that 250 ml water and hot water blanch fruits for 2 minutes.

TRAIL-IV - Boiling Water Blanching with Common salt: Take ½ kg of Jackfruit and 250 ml water. Dissolve 5g common salt in that 250 ml water and hot water blanch fruits for 2 minutes.

DRYING PROCESS: Food drying is a method of food preservation that removes enough moisture from the food (dehydrated or desiccated). Drying inhibits the growth of bacteria, yeasts and mold through the removal of water. The purpose drying is to retain the physico-chemical properties of materials & cheaper method with less requirement of equipments. The steam and boiling water blanched jackfruits with KMS/Common Salt is split into 2 equal parts and kept for sun drying and oven drying in trays

Sun drying: Sun drying is a traditional drying method for reducing the moisture content of food by spreading the fruit pieces under sun**.** The blanched jackfruit is dried under sun for about 7 days with 8 hours per day.

Oven drying: Oven drying method is a thermo gravimetric method done with Hot Air Oven in which the sample is dried for a defined period of time at constant temperature. The blanched jackfruit is dried in hot air oven at 60ºC for about 5 days with 8 hours per day.

PACKING AND STORAGE: The dried fruits are split into 3 for each replica and packed in 200 gauge thickness LDPE and stored at room temperature.

ANALYSIS

MOISTURE CONTENT: About 2 grams of the sample is measured using weigh balance and kept in Hot Air Oven at 60^0C and the weight is measured for once in every 2 hours till the concurrent value is obtained. (Initially and On 0^{th}, 15^{th}, 30^{th} and 45^{th} days after drying)

MICROBIAL LOAD

TOTAL PLATE COUNT: The Total Plate Count Agar (TPC), also called Standard Methods Agar (SMA), is a microbiological growth medium commonly used to assess or to monitor "total" or viable bacterial growth of a sample. PCA is not a selective medium. The total number of living aerobic bacteria can be determined using a plate count agar (TPC) which is a substrate for bacteria to grow on. The medium contains casein which provides nitrogen, carbon, amino acids, vitamins and minerals to aid in the growth of the organism. Yeast extract is the source for vitamins, particularly of B-group. Glucose is the fermentable carbohydrate and agar is the solidifying agent. This is a non-selective medium and the bacteria is counted as colony forming units per gram (c.f.u/g) in solid samples and (c.f.u/ml) in liquid samples.

Media Composition

Tryptone – 0.5 g/ 100 ml
Yeast extract – 0.25 g/100 ml
Glucose - 0.1g/100 ml
Agar – 2.0g/ 100 ml

SPREAD PLATE TECHNIQUE: The spread plate technique involves using a sterilized spreader with a smooth surface made of metal or glass to apply a small amount of bacteria suspended in a solution over a plate. The plate needs to be dry and at room temperature so that the agar can absorb the bacteria more readily. A successful spread plate will have a countable number of isolated bacterial colonies evenly distributed on the plate.

Procedure: Totally 10 samples are taken for analysing of microbial load. Initially the media is prepared by adding 0.5g of tryptone, 0.25g of Yeast Extract and 0.1g of Glucose and mixed by shaking. Then, 2g of agar is added in 100ml distilled water. 400 ml of TPC media is prepared for analysis. Then, 10 numbers of 99 ml Water Blank & 9 ml Water Blank each, Pestel & Mortal, 20 Petri plates and Media is kept in Autoclave at 121^0C & 15psi for 15 minutes. In Laminar Air Flow Chamber**,** the sterilized media is added to the labelled petri plates approximately 20 ml/plate and allowed to solidify. The samples are grinded using pestle & mortal and about 1g of sample is taken for serial dilution. About 1g of sample is added to 99 ml water blank to get 10-2 dilution. It was noted that 1 ml of 10-2 dilution is added to 9 ml water blank to get 10-3 dilution. Then 0.1 ml of both the dilution are added to their petri plates respectively. Using L-Shaped rod the dilution is spread evenly in the media. The petri plates are wrapped with plastic film to avoid contamination. The same is followed for all the 10 samples. The c.f.u/ml count is taken after 12 hours.

SHELF-LIFE STUDY: The dried and stored Jackfruit is taken and weighed and soaked in 250 ml water for about 10 minutes. Then, the rehydrated fruit weight is taken and cooked with addition of oil, onion, tomato, salt and spice powder (Garam Masala). Then, Sensory Evaluation (texture, flavour, taste and appearance) for the final cooked product (Poriyal) is made.

CONTROL: We have maintained two control (Tender Jackfruit without any treatment), one for Sun drying and other for Oven drying. We have also tired Boiling water blanching method with common salt as a preservative in Tender Jackfruit and dried in two methods viz. Sun drying and Oven Drying.

RESULTS AND DISCUSSION

The present study entitled on **"**Preparation and standarization of tender (dried) jackfruit**"** is discussed as follows:

BLANCHING OF JACKFRUIT: Jackfruit is a seasonal crop and is not available all-round the year. In order to make the jackfruit available to people anytime, we should increase the shelf life of the jackfruit. So, Blanching is done as it preserves the flavor , colour, texture and nutritional value of the tender jackfruit. Blanching stops the enzyme action thus increasing its shelf life and making it available to the people as a Ready to serve food.

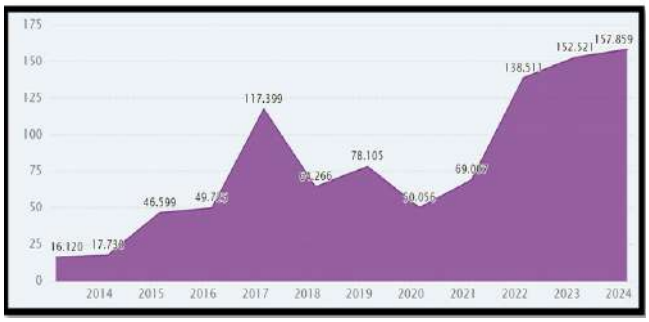

Figure 1. Statistical representation of Jackfruit production in Tamil Nadu from 2014 to 2024

Figure 2. Raw jackfruit

Figure 3. Slicing of jackfruit pieces

Figure 4. Blanching of jackfruit (steam blanching)

Figure 5. Steamed blanched jackfruit with KMS and dried

Figure 6. Steamed blanched jackfruit with common salt and dried

Figure 7. Boiling water blanched jackfruit with KMS and dried

Figure 8. Boiling water blanched jackfruit with common salt and dried

In the present study, tender jackfruit has been blanched because it stops enzyme actions, otherwise it cause the loss of flavour, colour and texture.

Figure 9. Sun dried and oven dried Boiling water blanched jackfruit

Figure 10. Shelf-life study

Figure 11. Dried Raw jackfruit without treatments

In addition, blanching removes some surface dirt and microorganisms, brightens colour and helps slow vitamin losses. In addition blanching serves other purposes like cleaning, reducing the microbial load, removing any entrapped gases and wilting the tissues of leafy vegetables so that they can be easily put into the containers. Blanching gently softens the outside of the food while keeping the interior crisp, sweetens the produce a little, and causes the product to hold its colour for a longer period of time.

PRESERVATIVES: Preservatives are added to food to fight spoilage. It can keep food fresher for longer periods of time, extending its shelf life. Food preservatives are used to slow or prevent changes in colour, flavour or texture.

SYNTHETIC PRESERVATIVES

Potassium Metabisulfite is a potent antioxidant, protecting both the colour and delicate flavours of the food. When the tender jackfruit is processed by drying, it tends to loss its colour so we have selected this synthetic preservative as it preserves the natural colour of food and protect against bacteria. Potassium metabisulfite acts as an antioxidant with anti-microbial properties.

Figure 13. Treatments Of Raw Jackfruit

Figure 14. Jackfruit preserved with KMS

Figure 15. Jackfruit preserved with common salt

Figure 16. Preparation of RTS Jackfruit

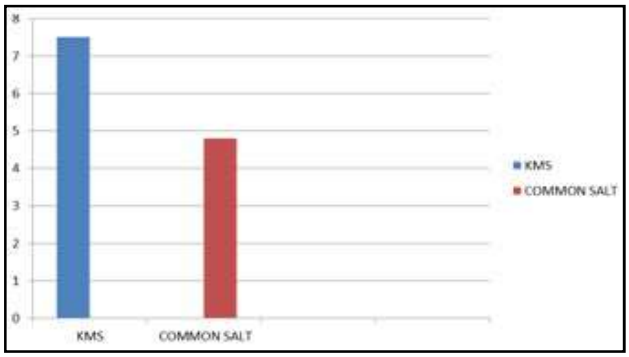

Figure 17. Appearance of processed tender jackfruit

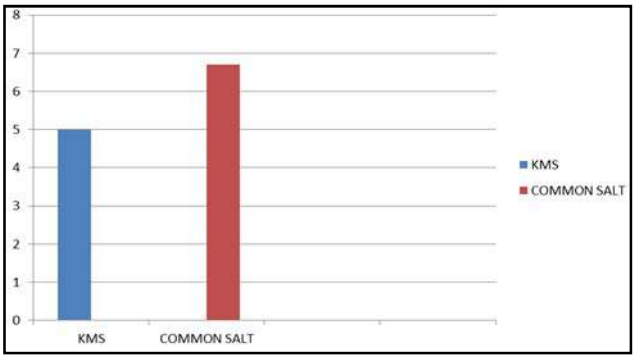

Figure 18. Texture of processed tender jackfruit

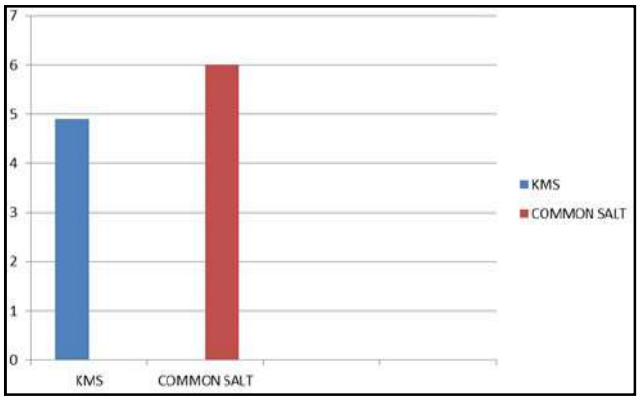

Figure 19 –Taste of processed tender jackfruit

NATURAL PRESERVATIVES

Common salt is effective as a preservative because it reduces the water activity of foods. The water activity of a food is the amount of unbound water available for microbial growth and chemical reactions. Adding salt to foods can also cause microbial cells to undergo osmotic shock, resulting in the loss of water from the cell and thereby causing cell death or retarded growth.

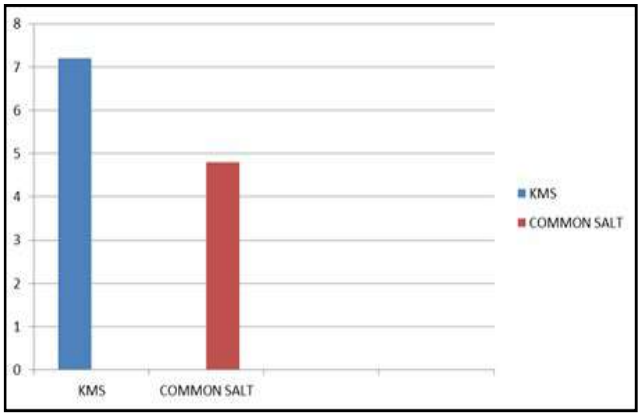

Figure 20. Flavour of processed tender jackfruit

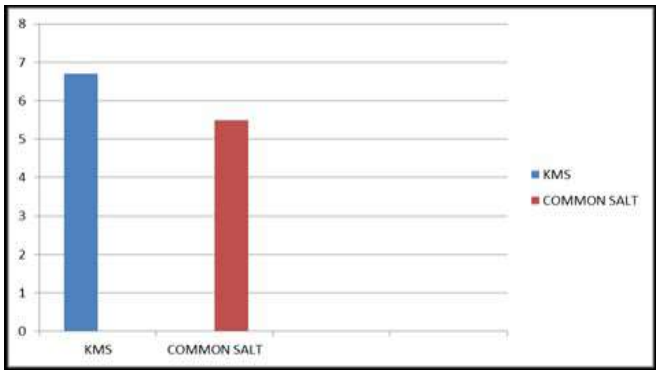

Figure 21. Overall acceptability of processed tender jackfruit

Figure 22. Microbial load analysis

This value added jackfruit has to available to the people all round the year so it must have longer shelf life .We used the natural preservative common salt as it prevents rapid spoilage (and thus extending product shelf life), creating an inhospitable environment for pathogens, and promoting the growth of desirable micro-organisms in various fermented foods and other products.

PREPARATION AND STANDARDISATION OF READY TO SERVE JACKFRUIT: RTS is done with raw jackfruit to make it available all throughout the year. Everyone know that jackfruit is very difficult to clean and cut so this RTS will be easier to use and handle. Raw Jackfruit is rich in Vitamin C and is a great source of carbohydrates. Due to its rich fibre content, it aids in digestion. Raw jackfruit is great for diabetes. Several studies have found that raw jackfruit has a much lower glycemic load than rice and wheat. So we decided to make a ready to serve snack (poriyal) with the tender jackfruit that can be enjoyed by the people when needed.

This RTS should be rehydrated by adding water to the dried product and can be made into poriyal by adding ingredients.

NUTRITIONAL CONTENT OF THE DRIED JACKFRUIT: The values were taken from Nutritional Book. Jackfruit contains 130 calories per 40 g serving. This serving contains 0 g of fat, 0 g of protein, 32 g of carbohydrate, 6.0 mg vitamin C, 0.72 mg of iron, 20.00 mg of calcium, 210 mg of potassium, 22 g sugar and 2 g of dietary fiber. From the below table 2 , the Boiling Water Blanching Sun Dried Common Salt have High Recovery Percentage (28.2%) and Steam Blanching Oven Dried KMS have Least Recovery Percentage (24.8%). The order of Recovery % as follows, T6>T1=T7>T2>T5>T4>T8>T3.

The process of analysing the sensory responses of blanched jackfruit is through the scale points and thereby testing the differences in average acceptability using parametric statistics. Eight different treatments were tried based on the two types of Blanching (Steam, Hot water) with Preservatives (KMS, Common salt) and Drying (Oven, Sun) to the tender jackfruit to increase the shelf life, retain colour, flavour and taste. But, based on microbial load & marketable colour and appearance Boiling Water Blanced both KMS & Common salt were taken for RTS Preparation. The prepared value-added product were analysed for microbial analysis and sensory evaluation with 40 members by using 9 point hedonic scale. Among the 8 different treatments, the best variation were selected based on sensory evaluation.

SENSORY EVALUATION OF PROCESSED JACKFRUIT

APPEARANCE: The appearance indicates goodness or the quality of the food. Among the eight treatments of the processed jackfruit, it was found that based on the sensory evaluation Boiling Water blanched Jackfruit oven dried preserved with KMS are selected, based on its appearance and are depicted in Figure 19.The statistical analysis was done for its standard deviation and its value is 1.

TEXTURE: The texture of the food indicates the hardness or softness of the food. Among the eight treatments, sensory evaluation of nine point hedonic scale sowed that the Boiling Water blanched Jackfruit with Common Salt was the best and selected based on its texture and are depicted in figure 20 .The Standard Deviation was found to be 1.7

TASTE: The taste of the food indicates the tongue tingling or poor taste. Among the eight treatments, it was found that the sensory evaluation of 9-point hedonic scale showed that among eight treatments, Boiling Water Blanched Jackfruit oven dried with Common Salt was the best based on its taste and are depicted in Figure 21. The statistical analysis was done and its standard deviation value is 1.7

FLAVOUR: The pleasant aroma of the food is analysed by sensory evaluation using 5 hedonic scale. Among the eight treatments of processed jackfruit, it was observed that the sensory evaluation revealed Boiling Water Blanched Jackfruit oven dried with KMS was the best based on its flavour and are depicted in figure 22. The statistical analysis was done and its standard deviation was 1.3

Table 1. Methods of Treatment for Jack Fruit

TREATMENTS			
Nos	**Blanching Method**	**Drying Method**	**Preservatives used**
T_1	Steam blanching	Sun dry	KMS
T_2	Steam blanching	Sun dry	Common Salt
T_3	Steam blanching	Oven dry	KMS
T_4	Steam blanching	Oven dry	Common salt
T_5	Boiling Water blanching	Sun dry	KMS
T_6	Boiling Water blanching	Sun dry	Common Salt
T_7	Boiling Water blanching	Oven dry	KMS
T_8	Boiling Water blanching	Oven dry	Common Salt
T_9 - Control 1	-	Sun Dry	-
T_{10} - Control 2	-	Oven Dry	-

Table 2. Recovery %

TREATMENTS	INITIAL FRESH WEIGHT (g)	AMOUNT OF KMS/COMMON SALT ADDED (g)	QUANTITY OF WATER ADDED (ml)	WEIGHT AFTER BLANCHING (g)	WEIGHT AFTER DRYING (Final Weight) (g)	Recovery %
T_1-Steam Blanching, Sun Dry, KMS	500	0.5	250	550	138	27.6
T_2-Steam Blanching, Sun Dry, Common salt	500	5	250	535	137	27.4
T_3 -Steam Blanching, Oven Dry, KMS	500	0.5	250	532	124	24.8
T_4-Steam Blanching, Oven Dry, Common salt	500	5	250	568	132	26.4
T_5-Boiling Water Blanching, Sun Dry, KMS	500	0.5	250	540	135	27
T_6-Boiling Water Blanching, Sun Dry, Common salt	500	5	250	537	141	28.2
T_7-Boiling Water Blanching, Oven Dry, KMS	500	0.5	250	564	138	27.6
T_8-Boiling Water Blanching, Oven Dry, Common salt	500	5	250	558	127	25.4
T_9 - Control 1 –Sun Dry	500	-	-	-	147	29.4
T_{10}- Control 2- Oven Dry	500	-	-	-	128	25.6

Table 3. Results of Sensory Evaluation

Characteristics	Appearance		Texture		Taste		Flavour		Overall Acceptibility	
Preservative	KMS	CS	KMS	CS	KMS	CS	KMS	CS	KMS	CS
Mean	7.35	4.75	5.84	5.9	6.4	6.13	7.45	4.83	6.50	6.37
SD	1.52	0.86	2.19	1.77	2.08	1.76	1.32	1.19	1.80	1.86
CV%	20.68	18.11	37.5	30	32.5	28.71	17.71	24.63	27.65	29.25
t calculated value	6.84		0.09		0.41		6.01		0.31	
t table value	2.03		2.03		2.03		2.06		1.99	
Significance at 5%	Significant		Non-significant		Non-significant		Significant		Non-Significant	
Better Preservative	KMS		NA		NA		KMS		NA	

NA = Not Applicable

Table 4. Microbial Load Analysis Data

TREATMENTS	10^{-2} DILUTION	10^{-3} DILUTION
T_1-Steam Blanching, Sun Dry, KMS	85	90
T_2-Steam Blanching, Sun Dry, Common salt	85	75
T_3 -Steam Blanching, Oven Dry, KMS	96	100
T_4-Steam Blanching, Oven Dry, Common salt	95	89
T_5-Boiling Water Blanching, Sun Dry, KMS	20	39
T_6-Boiling Water Blanching, Sun Dry, Common salt	59	50
T_7-Boiling Water Blanching, Oven Dry, KMS	28	10
T_8-Boiling Water Blanching, Oven Dry, Common salt	30	32
T_9Control 1 –Sun Dry	95	58
T_{10}Control 2- Oven Dry	89	75

OVERALL ACCEPTABILITY: The overall acceptability indicates the degree of acceptance of the product. Among the eight treatments, it was found that the sensory evaluation showed that Boiling Water Blanched Jackfruit oven dried with KMS was found to be best based on its overall acceptability and is depicted in Figure 23. The statistical analysis was done and standard deviation was 6.7 We have done microbial analysis in the total sample with 10 treatments using 10^{-2}dilution and 10^{-3} dilution. Total microbial count was enumerated on plate count agar medium. We have done analysis to assure the quality, shelf life of the product.

The interpretation of sample was based on our data is the boiling water blanched oven dried KMS added with 10^{-3} dilution has lower microbial count and the steam blanching oven dried common salt added with 10^{-3} dilution has highest microbial count. According to this water blanching oven dried KMS was lowest microbial count it is safe to consume.

MOISTURE CONTENT: (PACKING MATERIAL BASIS): We have kept eight treatment and three replications of dried jackfruit. The moisture content was assessed at 15 days interval over a period of 48 days (At 0, 15, 30 and 45th

day). The moisture percentage of dried jackfruit at 0th day was 10.85 percentage and the moisture percentage at 45th day was also 10.85 percentage. As it was stored in LDPE pack, no change in moisture percentage was observed and the constant value was found to be 10.85 percentage.

CONCLUSION

Jackfruit is mostly preferred in Kerala and Tamilnadu border .Hence we initiated to study the Preparation and Standardization of tender jackfruit and its shelf life. From the present study the development of value addition in jackfruit is essential to increase their shelf life. In the present study jackfruit has been introduced for steam and water blanching. Water blanching is best as it involves low capital cost and better energy efficiency whereas steam blanching has higher nutrient retention and ability of quick heating allows for shorter processing time and requires more cost. For preservation we used KMS and common salt. The common salt reduces the water activity of food and dries food dehydration thus inhibits the growth of microorganisms. We stated that KMS is best as its a potent antioxidant protecting both the colour and delicate flavour of jackfruit. Next for drying we chose Sun and Oven Drying. Sun drying is traditional method for reducing moisture content of food it took about 7 days for drying whereas Oven drying is best because its a thermo gravimetric method done with Hot air oven. The sample is dried for defined period of about 5 days which is comparatively faster and effective than sun drying method. For packaging we used LDPE packs because it can withstand stretching before it breaks so its fantastically useful for application of plastic bags. It also holds onto retention of moisture because of its air tight nature. For sensory evaluation we selected water blanching- KMS – Oven dried and water blanching – Common salt -Oven dried out of which WB-KMS-OD is preferred by most of the people as it has very bright appearance and it retained the jackfruit flavour. The overall acceptability is 6.7 for KMS. The moisture content that is present in the LDPE package is constantly same as we took reading on the first day as 10.85 and it was maintained until our next observation on 45th day which proves that the moisture was not affected and resulted nil. For microbial analysis we analyzed 20 plates with two serial dilution 10^{-2} and 10^{-3} out of which boiling water blanched oven dried kms (WB-OD–KMS) was the best because of its total microbial count was less as 7 and 28 respectively, when compared to other plate count.

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