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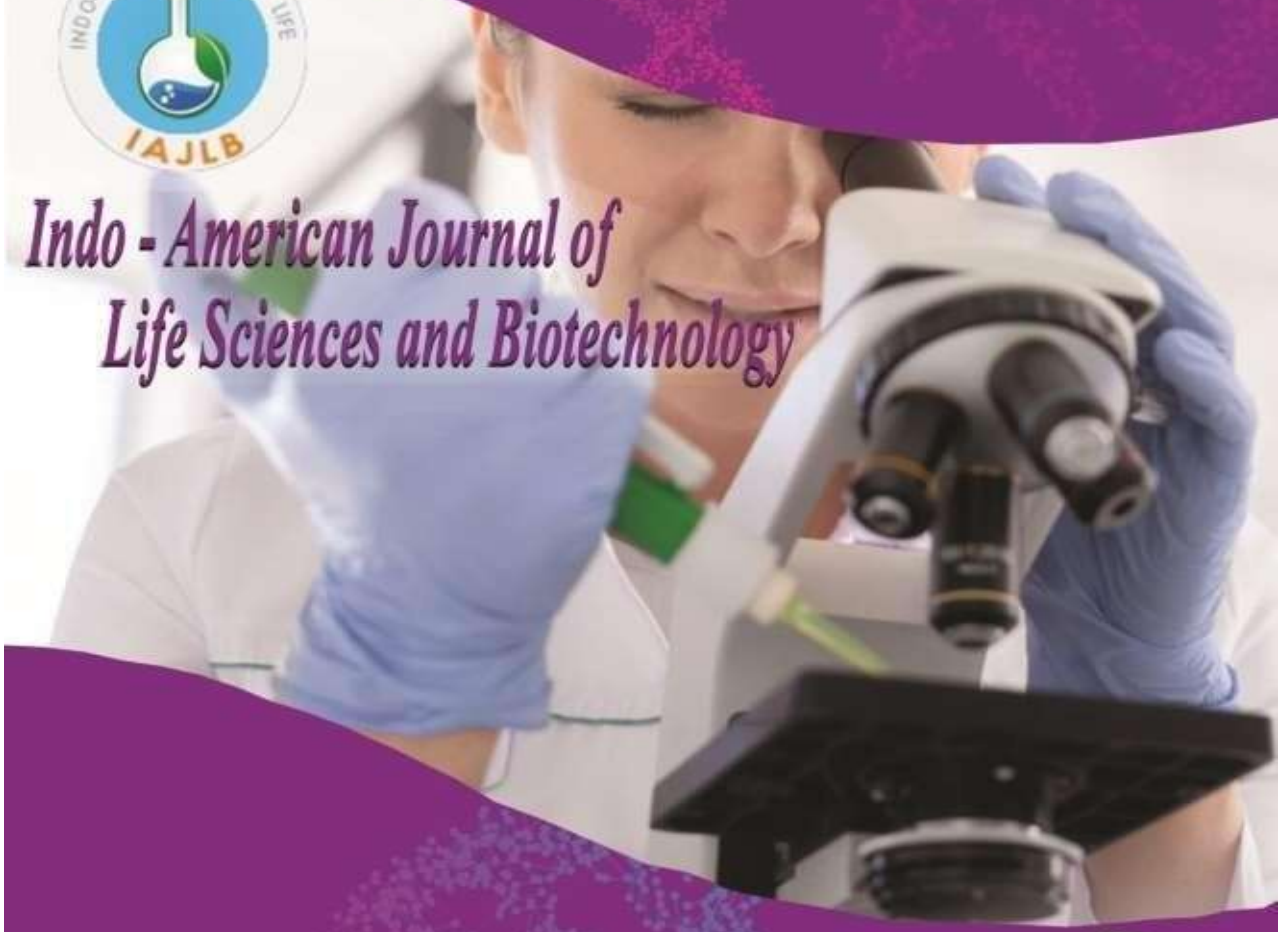

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A STUDY ON THE PROCESSING OF INDIVIDUALLY QUICK FROZEN FOOD OF THOTHAPURI MANGO DICES

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Abstract:

Totapuri mango dices are produced from fresh, sorted and ripened totapuri mangoes that are cultivated naturally. Totapuri mangoes are widely cultivated in South India and predominantly cultivated in Andhra Pradesh and Tamil Nadu. Totapuri mangoes are known for their peak-like structure and distinctive mango flavour. It is used as a Totapuri mango pulp and frozen mango chunks in food processing because of its flavour, and quality. Degradation can be controlled by using the Frozen Technology. Often they are sold at high prices during the unpeak season It is used for toppings in ready to eat foods. The freezing temperature was the most important factor while holding time had no significant effect on product quality. The main advantage of this method is freezing process takes only few minutes, the short freezing prevents formation of large ice crystals in the products cells, which destroys the membrane structure at the molecular level. IQF makes the products shape, colour, smell and taste after defrost for a far greater extend. For long shelf life -18°c is much acceptable. Thothapuri mangoes are a high acid food with a pH of 3.2-4.5depending on maturity and individual mango

Keywords: Frozen technology (IQF), individual quick frozen, Ice crystals.

Introduction:

Quick freezing is at present the only process whereby virtually all the properties of most food stuffs can be preserved .the important feature of this process is ultra-rapid freezing to very low temperatures(-30 c to -40 designed to halt the activities of the microorganisms that cause decay and deteriorate food stuffs. Individual Quick Freezing (IQF) is the latest technology available in freezing and with the advent of the same, it is now possible to preserve and store raw fruit and vegetables in the same farm-fresh condition for more than a year, with the colour, flavour and texture of produce remaining as good as fresh from the farm. In IQF, each piece is frozen individually using technique of fluidization resulting in freezing of fruit and vegetables only in 10 to 12 minutes which otherwise takes at least 3 to 4 hours or even more

in the blast freezer. This results into better texture and there is no lump/ block formation and the product is free flowing. One does not have to thaw or defrost the whole packet to take out only a portion, and the rest will remain frozen till required freezing...a technology known as the individually quick-frozen (IQF) method. IQF is a method that does not allow large ice crystals to form in vegetable cells. Also, since each piece is individually frozen, particles do not cohere, and the final product is not frozen into a solid block.

Mechanical IQF freezers work on the principle of cold air circulation, which flow a from underneath the bed plate or transport belt with the help of fans. The cold airflow passes through the pieces of product in circular motions while the product is also advancing through the freezer towards the exit.

ADVANTAGE OF IQF FOOD:-

- IQF frozen foods have the following advantage over other preserved foods.
- Best freshness, closed to natural freshness.
- Better taste.
- Better flavor / aroma
- Higher nutritive value.
- Required less timing in cooking.
- Greater convenience in handling and preparation.
- Less fuel required.
- Greater value for money, notably during off-season.
- Ready to eat and serve frozen meals possible.
- More hygienic than fresh or dried foods.
- Malpractice and chances of adulteration reduced to the minimum.
- Cent per cent edible portion of food available in each package(no brine, no syrup and no gravy) a notable features.
- See thought pouches /container help the purchaser/ consumer in prompt evolution /selection purchase (unlike in canned foods which are hermetically sealed in opaque tin containers).
- Freezing provides a great variety of seasonal food all the year round in almost fresh condition and at a reasonable cost too.

RAW MATERIAL ANALYSIS

Raw Material Acceptance & Storage Criteria;

PROCUREMENT OF MANGOES:

Source of Purchase includes the direct farm procurement and Traders from Agricultural markets who fulfill the major demand.□ Primary Vehicle inspection is carried out, aim is to protect the product from rain and sunlight.□ Determination of Maturity Indices based on Colour, Size and Refractometer reading is carried out.□ Sample from across the vehicle are collected and inspected thoroughly.□ The procured mangoes are sorted and send to the production process

Storage Criteria. ;

Products are stored in ripening chamber with the primary details of supplier viz. Location of Origin, Supplier Name, Receiving date. The Controlled Atmospheric storage is maintained for the product to avoid any damage. Primary Size Sorting is carried out during the storage period where over ripe, small sized, improper shaped mangoes are discarded while sound semi ripened good fruits are selected for processing.

Processing of the Thothapuri mango dices

Receiving Of Fruit
↓
Weighing
↓
Quality Checking
↓
Sorting and Grading In Ripening Chamber
↓
Storage In Ripening Chamber For Optimum Ripening
↓
Quality Checking
↓
Grading Sorting
↓
Transfer of Fruits Washing Area
↓
Weighing
↓
Fruit Washing
↓
Peeling Are Slicing
↓
Slicing Are Scooping And Seed Removed
↓
Slice Inspection
↓
Slice Washing
↓
De Watering
↓
Feeded To Dicing
↓
Dicing
↓
Vibrator
↓
IQF

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Acidity Citric Acid Monohydrate):

To layout the procedure for calculating the acidity in the given fruit. Hydrolysis of sample dissociates hydrogen ions from the solute. These hydrogen ions react with the sodium hydroxide and increase the pH to 8.3 which corresponds the stoichiometric neutralization of carbonic acid to bicarbonates. This neutralization end point is indicated by the colour change from colourless to pink.

Sodium hydroxide solution (0.1N): Dissolve 4g NaOH in distilled water and dilute to 1000 ml with it. Phenolphthalein indicator (1%) Dissolve 1 g phenolphthalein in 100 ml distilled water (or) Use readymade solution.

PROCEDURE

Bring down the temperature of the sample to room temperature without thawing. Fill the burette with0.1 N-NaOH solution and note down the initial reading. Measure I g of sample. Take it in a clean conical flask. Dilute to 100 ml with distilled water. Add 2-3 drops phenolphthalein indicator solution. Titrate against the 0.1 N NaOH solution till the pink colour persists for 30 seconds. Note down the final reading, take down the volume of 0.1 N NaOH consumed as V. Repeat the procedure for three trials. Obtain the average. volume from three trials. Substitute the values in the formula and calculate the acidity.

FORMULA

(v1-v2) *c/s

V1-initial reading of burette

V2-final reading after the colour change
C-critical acid equivalent (0.64)
S-weight of the sample

Brix:

To determine the concentration of sugar in given sample using brix refractometer . Refractometer is the instrument works by the principle of light refraction. Light refraction is the "bending" effect that liquid has on light passing through it. As the concentration of dissolved sugars increases, the "bending" effect also increases. Using carefully aligned prisms and mirrors; the refractometer measures the refracted angle of light as it passes through the sample. This refracted angle equates to a sugar concentration in Degrees Brix ("Brix). One "Brix represents 1gram of sugar in 100 grams of solution.

PROCEDURE

Hand Refractometer OP. Bring down the temperature of sample to the room temperature if the sample is frozen. Clean the prism of refractometer with tissue paper. Calibrate the refractometer as per SOP. Grind the required amount of sample using Mixer or mortar & pestle .Place 1 or 2 drops of sample on the prism. Close the day light plates. Observe the reading through the eye piece. Note down the brix value. Clean the prism with distilled

water and wipe it with tissue paper.

DIGITAL PACKET REFRACTOMETER

Bring down the temperature of sample to the roost temperature if the sample is frozen clean the prism of tribemates with those paper. Calibrate the refractometeras per SOP. Grind the required amount of sample using Mixer or mortar & pestle.1 or 2 drops of sample on the prism Swachh on the button. Observe the reading. Note down the bris Valar. Clean the prism with distilled water.

pH:

To determine the pH of given sample, pH denotes the measurement of total hydrogen ion concentration. When the pH electrode is inserted into the given sample, the hydrogen ions present in it moves towards the glass electrode thereby replacing some metal ions in glass electrode. This in turn produces the tiny voltage which is carried through the silver wire to the amplifier. This amplifier converts the voltage measurements into pH value. Greater the hydrogen ion concentration, lesser will be the pH.

Pure:
Switch "ON" the pH meter 20 minutes before of using. Wipe the electrode with tissue paper. Calibrate the pH meter as per calibration SOP. Bring down the temperature of the sample to room temperature without thawing Grind the required amount of sample using blender or mortar & pestle. Transfer the contentinto the beaker. Then insert the electrode into the sample. Wait for 2-3 mins till the word "Ready" is notified on the display. Note down the pH value. Clean the electrode with distilled water and wipe it with tissue paper.

MICROBIAL ANALYSIS

Total Plate Count:
Enumeration of coil form count of samples was performed by the standard procedure given in the Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2001. The Coliform count involves three tests
Presumptive test
Confirmed test and
Completed test

Presumptive test:
E.coli is one of the few bacteria which is able to ferment lactose with the production of acid and gas. If acid and gas are produced in lactose broth inoculated with the sample being tested, this becomes a "Presumptive" evidence of Coliform pollution. Several non-intestinal bacterial will also produce the result. Therefore, a presumptive test must be "confirmed". These various tests have been developed as "Standard Methods"

Procedure:
Using a 10 ml pipette, transfer 10 ml portions of the diluted sample being tested to each of the tubes containing double strength lactose broth. Into the two single strength lactose broth tubes, place 0.1 and 1 ml of sample respectively. Incubate at 37°C and examine after 24 and 48 hours. Report as positive any tubes in which 10% or more of the volume of the Durhum

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tube is occupied by gas. Record the results in the sample

Confirmed test:

Confirmed test is done by using EMB agar media

Procedure:

Select a positive presumptive tube, preferably the highest dilution showing gas or a tube showing gas in 24 Air in preference. Using a straight inoculating needle, flame and then insert into the positive tube holding it in slanted position to avoid picking up any scum or surface membrane. Streak on the EMB agar plate. Flame the inoculating needle again and streak a second time to ensure a distribution giving discrete colonies. Incubate at 37°C and examine at the end of 24 hrs typical E.coli colonies will have dark to black centers, butten like in appearance, and will often be surrounded by a greenish metallic shine. Report the presence of typical colonies.

Completed test:

Under some conditions a completed test may be made, particularly if the positive confirmatory test does not give clear cut results.

Procedure:

Transfer a well isolated, typical E.coli colony from the EMB agar plate to a nutrient slant and a tube of lactose broth. Incubate broth for 24 hr at 37°C. a completed test should show a pure culture of Gram negative short rods and gas should be produced in the lactose broth tube. If it shows a positive test, count the number of colonies and substitute in the formula and reported as log cfu/ml.

Calculation:

$$\text{Cfu/ml} = \frac{(no\ of\ colonies \times 1)}{(ml\ plated \times dilution\ factor)}$$

Test for the detection of E. coli

E. coli can be detected isolated by the plate count method the E.coli can be cultured by using Mac Konkey agar by preparing the media the sample can be diluted and the sample is drawn over the plate, then the plate is incubated for 24hours at 37 degree Celsius since E.coli is gram negative bacteria this will form as blue colour this will confirm the presence E.coli

Test for detection of fungus

For the detection of yeast or mould plate count method is used for that rose Bengal agar medium is prepared in that the dilution of the Sample is made then the sample is drawn on the plate and incubated for 24 hours. Air is combined of many microorganisms this might cause react with the product and get spoiled since the plant is fully equipped with the air curtains so the possibilities will be low the detection included for yeast and mould

RESULTS & DISCUSSION:

PROXIMATE ANALYSIS RESULTS

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Brix:

The Brix value confirmed that the product had the right level of sweetness, making it palatable making it palatable. This balance is important to appeal to health-conscious consumers without compromising on taste.

ACIDITY

To determine product acidity acid- base titration is used. The standard value is 1.6 to 1.7theresult which I got is

pH: To determine the ph of the product the ph meter is used. The standard value is 3.2 4.5 the result which Igot is in standard value .So, my product is acceptable

Proximate analysis results

S.NO	Parameters	values
1	Brix	9.6
2	Acidity	1.6
3	PH	3.3

SENSORY ANALYSIS

The sensory evaluation is done according to hedonic scale reading which is judged by 6panel members based on their opinion the values are given for appearance ,colour, taste,texture, flavour,

For the sensorial analysis the samples were placed in disposable cups and given with random numbers. Each assessor received nachos formulations and a sheet of paper with a questionnaire and a hedonic scale to assess the appearance, colour, flavour and texture ranging from nine to one (9 - I liked it very much, 8 - I enjoyedit, 7 I - liked it regularly, 6 - I liked it a little, 5 –indifferent- I didn't like or dislikeit, 4 - I disliked a little, 3 - I regularly disliked it to moderately disliked it, 2 – I disliked it, and 1 – I extremely disliked it). The results are as follows:

S.NO	**Sensory attributes**	**Treatment 1**	**Treatment 2**	**Treatment 3**
1	Colour	8	8	8
2	Taste	7	7	9
3	Flavour/odour	7	8	8
4	Texture	8	8	8
5	Acceptance	8	8	8

MICROBIAL ANALYSIS RESULTS

Finished product is sent to microbial analysis to check microbial growth by using different methods such as total plate count, yeast and mould, coli form, heat resistant mould, thermophilicand acido philic bacteria.TPC plates are incubated at 35 for 3days, Y&M plates are incubated at 25 for 5 days, Coliform plates are incubated at 35 for 1 day E.coli plates are incubated at 35 for 15 days, , TAB plates are incubated at 45 for5 days enrichment and

incubated for 5days. After the incubation period the plates are subjected to digital colony counter and the colonies formed are taken record.

S.N0	MICROBIOLOGICAL PARAMETERS	VALUES
1	Total plate count (cfg/g)	<15,000
2	Yeast and mould (cfg/g)	<1500
3	Coliforms (cfg/g)	<100
4	Ecoil (cfg/g)	<10
5	Salmonella	Absent
6	Staphylococci	Negative
7	Listeria monocytogenes	Absent

Conclusion

The procured raw material (thothapuri mango dices) has checked all the quality parameters and after it meets all the required specifications it is approved for processing. During processing critical control point (ccp) and quality parameters are continuously are continuously monitored. After processing samples are sent to quality and microbial tests and product meets all the quality and microbial parameters.

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