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Analysis of Preservation Method with Fruit Yoghurt based on Physicochemical & Microbiological parameters

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Abstract
Processed foods are fastly gaining importance in developing countries. This century has witnessed the evolution of many modern techniques of food processing and packaging. The work presented an attempt that studied the importance of fermentation as preservation technique with fruit yoghurt. The fruit yoghurt mix was sufficiently acidic that prevents the growth of undesirable organisms at the initial stages itself. By adding selective organisms, the growth of other microorganisms has been controlled. Fermentation accompanied with aseptic packing and normal refrigerated storage has been found to provide improved nutritional value and keeping quality. A medium fat composition of 3.40 was calculated and presented 0.77 acidity values. The coliform and yeast and mould counts were found to be nil which revealed an effective preservation strategy. The consumer evaluation suggested 70% of acceptance for the product.

Keywords: fermentation, fruit yoghurt, preservation, consumer evaluation

Introduction
The modern consumers are aware of the nutritional requirements and aspects of foods we well as the challenges that may occur to food due to variations in food processing and storage. Even then the change in life style and environmental conditions has forced him to depend on processed foods. There are several types of processing techniques depends on the types of food, types of packing, period of storage etc. Whatever be the type of processing, the ultimate aim is to preserve the food, make it safe for consumption or further processing, to make suitable for packing and to make it more acceptable to the consumer. This field has become very competitive and attractive to entrepreneurs.
The application of fermentation for food preservation was used in the experimental study with fruit yoghurt. The sterilized product was allowed to ferment by the desired organisms. The multiplication of selected species of organisms and their metabolic activity were encouraged which may enhance the shelf life of the product. The preservative effect of fermentation is mainly due to lactic acid. A product of desired quality can be obtained under controlled fermentation conditions. A stage wise microbiological analysis, its quality in composition, shelf life studies and consumer openion were conducted.

Materials and Methods
Preparation of the product
64gms of skimmed milk powder was 210grams of sugar was mixed in a vessel which was mixed by further addition of milk. 56gms of pulp was added to the mixture and was heated. Cream was added at 40º C and was stirred until 80 º C which was hold at 80 º C for 15 minutes and cooled to 50 º C.The culture was added upon a temperature of 45-48 º C.The entire system was transferred to sterile cups with lids under aseptic conditions where the temperature of the last cup must be above 42 º C.The cups were incubated at 42-45 º C till the acidity reached between 0.7 & 0.8% L.A and was kept under refrigeration.

Analysis of Acidity
A known quantitiy of fruit yoghurt was taken in a beaker upon which phenophthalin indicator was added. These were titrated against 0.1N NAOH accompanied by vigorous shaking.A color change to pink was recorded.
% acidity of fruit yoghurt= (volume of NAOH utilized *0.9)/weight of the sample.

Analysis of Total Solids
weight of an SS dish was recorded(W1) after dried in an oven. The sample was added on to the vessel and weight was calculated (W2). The entire system were dried in an oven at 105 º C for 2 hours. The weight was calculated (W3)
total solids={(W3-W1)/(W2-W1)} *100

Analysis of the moisture content
% of moisture={(W2-W3)/(W2-W1)} *100

Determination of Fat
The fat content was determined based on Mojonnier method. (T.L.Lunder,1971)
Weight of fat =(M2-M1)/weight of product *100

Microbiology
Standard Plate count
The SPC was conducted for the approximate estimation of total number of bacteria in milk and milk products under standard conditions and with standard protocol.
Determination of Coli form count
The samples after serial dilution were aseptically transferred to Petri dishes. The violet red agar medium was added. The plates were distributed for the uniform distribution of the media and are then solidified. A second thin layer was added and allowed to solidify. The same was then incubated

at 37º C for 24 hours. The colonies were counted after incubation.

Determination of Yeast and mould

After the transfer of serially diluted media under aseptic conditions to Petri dishes, a few drops of sterile tartaric acid was added. The PDA medium was cooled to -45º C and poured on to the plates. After rotation, the plates were allowed for solidification and the same was incubated at 22º C for 4-5 days.

Simple staining

A simple staining was performed using methylene blue under standard protocol.

Shelf life study

The product was checked with in every 2 days and organoleptic tests such as smell, taste, flavor, and odour was tested at the time of opening the product.

Results

Physicochemical Parameters

Table 1: Analysis of the physicochemical parameters that affects the preservation

Sl no	Fat	Acidity	Total Solids	Moisture	Shelf life
1	5.84	0.79	33.00	67.00	Good for 14 days
2	4.68	0.80	35.10	64.90	Good for 14 days
3	2.40	0.75	34.50	65.45	Good for 14 days
4	3.40	0.78	30.75	69.75	Good for 14 days
5	3.49	0.77	30.75	69.25	Good for 14 days

Four types of compositional varieties were tried. Yoghurt with medium fat was preferred to low fat and high fat varities. Yoghurt with medium fat was preferred to low fat and high fat varieties.

Assay for Coliform count and yeast and mould counts in the food sample.

Table 2: Assay for coli forms as well as yeast and mould.

Sl no	Coli form count	SPC	Yeast and Mould
1	Nil	$405*10^6$	Nil
2	Nil	$808*10^6$	Nil
3	Nil	$865*10^6$	Nil
4	Nil	$759*10^6$	Nil
5	Nil	$934*10^6$	Nil

There was no chance of post processing contamination during handling except the non sssured sterility of the plastic cups. Even then the coliform count showed nil results in all cases that proved the asepticity of post processing handling of the product. The high count under SPC was due to development of sufficient level of active bacteria which was always higher than the lowest minimum number of active bacteria specified under PFA. The acidity level reached within the incubation period and also the development of desired characteristic flavor and texture also proved the growth of desired microorganisms.

The yeast and mould counts were proved to be nil in all the trials which presented a post processing handling of the product under aseptic conditions.

Table 3: Isolation of the type of microorganisms

Sl no	45ºC	37 ºC
1	Rod and Cocci	Cocci
2	Cocci	Cocci
3	Cocci	Cocci and Rod
4	Rod and Cocci	Cocci and Rod
5	Cocci	Cocci

The two strains of bacteria used where Lactobacillus bulgaricus and Streptococcus thermophilus.

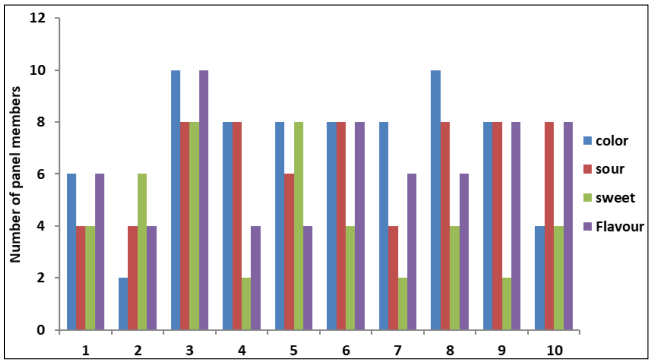

Fig 1: Sensory evaluation of Fruit Yoghurt –A

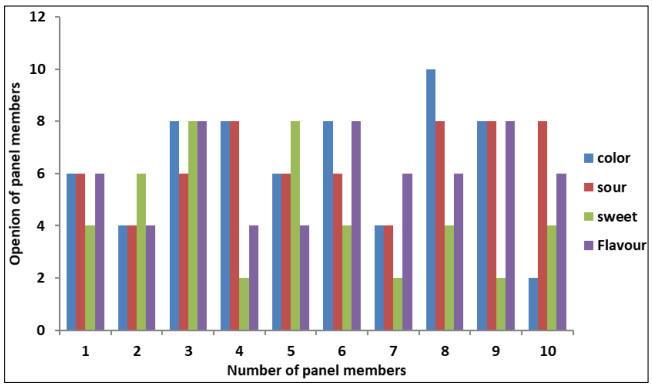

Fig 2: Sensory Evaluation of Fruit Yoghurt –B

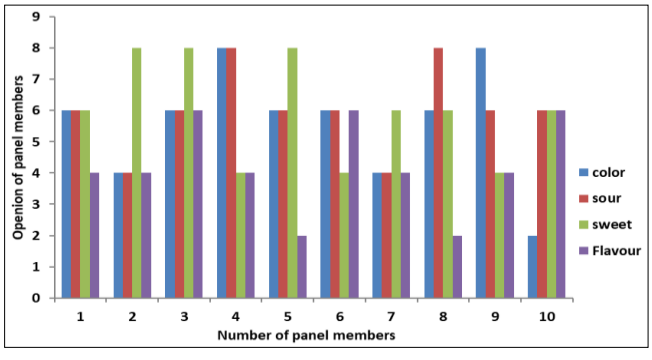

Fig 3: Sensory evaluation of Fruit yoghurt –C

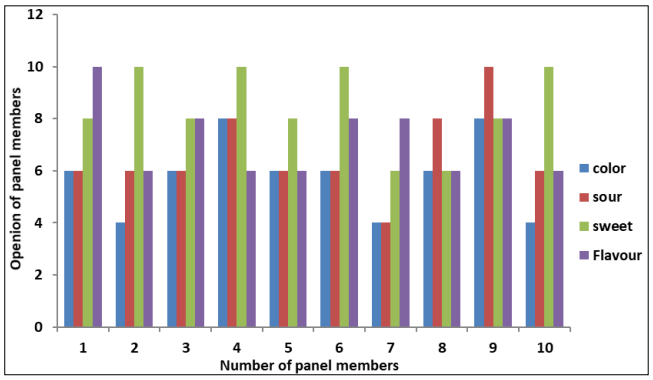

Fig 4: Sensory Evaluation of the fruit yoghurt -D

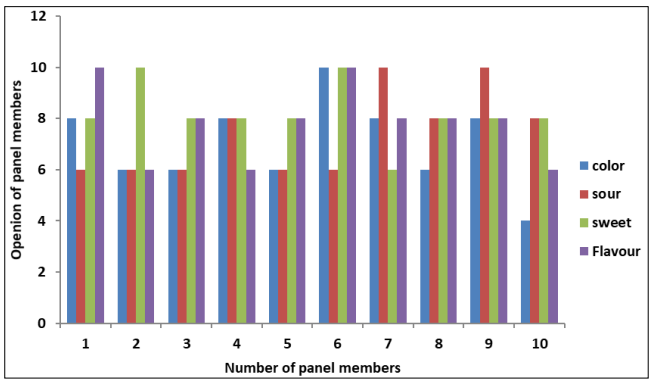

Fig 5: Sensory evaluation of the fruit Yoghurt –E

Discussion

Increase in non-fat milk solids could not impart much flavor changes. But the higher acidity was found to impart better keeping quality during our studies. The product showed no change in flavor or texture for about two weeks under normal refrigeration condition. The observation of organisms grown at 45ºC mainly showed the presence of cocci, may be because *streptococcus thermophilus* grows well than the associative species of *Lactobacillus bulgaricus* at higher temperatures. Cosumer Appraisel was performed upon distribution of fruit yoghurt among more than 100 employees of the institution. The level of sweetness, composition and taste was acceptable for more than 70% of consumers.

Conclusion

The present project aim at studies on effect of fermentation technique as a food preservation with fruit yoghurt. fermentaion technique is as old as human civilization Milk, the only nutritious and balanced food provided by nature, will get spoiled once it was drawn out from the udders. It can be preserved for long period of time without any undesirable change in its nutritive value by the method of selective fermentation. Fruit yoghurt mix is also perishable but the fermentation technique for this product has been proved to provide considerable shelf life under normal refrigeration temperatures. In addition, taste and palatability has been remarkably improved by the adoption of fermentation technique. Further the abundance of desired microorganisms in the finished product is capable of furnishing health improvement by creating low pH environments in the human gut. It was also expected to provide some neutraseuticals. The present work studied a food preservation strategy that can impart better shelf life to the particular type of dairy base products without addition of any preserved chemicals.

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