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## Optimization of the chemical properties of frozen yoghurt supplemented with different fruit pulp

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### Abstract

This study aimed to optimize the chemical properties of frozen yoghurt by incorporating fruit pulp. Apple, Banana, Grapes and Mango are popular fruits which have been used to improve the chemical quality of dairy frozen products. The yoghurt was prepared under standard procedure and the above mentioned fruits were incorporated in the frozen yoghurt in the quantity of 5%, 10%, 15% and 20% in the form of pulp in four individual treatments. The products were subjected to find the moisture, fat, total solids, acidity, protein, carbohydrate and ash. The sample incorporated with Mango having pulp quantity of 5% showed promising results in the chemical properties and was considered the best sample yoghurt among other samples.

**Keywords:** Chemical properties, Frozen Yoghurt, Apple, Banana, Grapes, Mango.

### 1. Introduction

Yoghurt is fermented milk that consumed in the entire world. It's one of the popular and oldest food stuff in Asia, Africa, Europe and USA and generally has Known as safe with taste and is liked by many of different people, due to the its therapeutic and nutritive value. The natural and usual yoghurt is produced by adding the certain lactic acid bacteria that increase the lactic acid content of yogurt [1]. Yogurt is a rich source of protein, carbohydrates, vitamins, fat, phosphorus and calcium. During production of yogurt from milk and its fermentation processes the lactose, fat and protein of milk partially destroyed therefore yogurt easily digested [8]. Addition of different fruit in yogurt manufacture has been attempted increasingly. The use of fruit in yogurt makes it more delicious. This product contains both the refreshing flavour of fruit and beneficial effect of yogurt. Fruit yogurt has more taste and pleasing flavour [1]. The different types of flavouring that used in the Fruit yoghurt manufacture are fruits, canned fruit, fruits preserves, miscellaneous fruit products and frozen fruits. The kind of flavourings and their concentration is usually regulated according to the international standard say by each country. According to the FAO/ WHO concentrations of fruit for fruit yoghurt are between 5 and 15% [8]. Frozen yoghurt is a popular dairy product in the world, but little study in Allahabad was done to investigate its quality. Hence the objectives of this study were to evaluate the chemical properties frozen yoghurts which flavourings with different type and percentage of fruits.

### 2. Materials and Methods

#### 2.1 Collections of Materials

Yoghurt Culture (*Streptococcus salivarius ssp. thermophilus* NCDC074 and *Lactobacillus delbrueckii ssp. Bulgaricus* NCDC009) was obtained from the National Collection of Dairy Culture, Dairy Microbiology Division at NDRI Karnal, Haryana. Milk, Skim Milk, Skimmed milk powder, Sugar and Fruit were collected from the local market of Allahabad. Stabilizer & Emulsifier (Carrageenan (RM 1516) & Monoglycerides) were obtained from scientific cooperation, Allahabad, India.

#### 2.2 Preparation of fruit pulp

Apple, Banana, Grapes & Mango were collected from the local market of Allahabad. Fruits were washed with clean water and skin was separated with the help of a knife aseptically. Fruit pulp was obtained from the crushed fruit and pasteurized at 95 °C for 15 min and filled into jars. This marmalade was stored at ambient temperature until added to yoghurt.

### 2.3 Preparation of Frozen Yoghurt Sample

Fruit flavoured frozen yoghurt mix was standardized to 4.5% fat, 12% milk solids not fat, 12% sugar, 0.4% of stabilizer and emulsifiers, the mix was subjected to pasteurisation at 85 °C for 5 mins and thereafter the mix was cooled to 42 °C to 43 °C. The mix was inoculated with 2.0% yoghurt culture. The fruit pulp of Apple, Banana, Grapes and Mango were added at 5%, 10%, 15% & 20% separately for various treatment combinations, which were followed by mixing, Batch freezing, Packaging and Harding.

### 3. Chemical Analysis

**3.1 Moisture:** The moisture percentage in frozen yoghurt was determined as per procedure laid down in IS.1165 (1957).

**3.2 Fat Percentage:** The fat percent in frozen yoghurt was determined as per I.S.2802 (1964).

**3.3 Total Solids:** Total solids in frozen yoghurt were determined gravimetrically as per the procedure laid down in dairy chemistry manual, ICAR publication and in IS:1479, Part: II, 1961 (20).

**3.4 Acidity:** Titratable acidity of frozen yoghurt samples (expressed as lactic acid) was determined as per the procedure

laid down in IS: 1479, Part: I.

**3.5 Protein percent:** The protein content of frozen yoghurt was determined by Kjeldahl method described in AOAC (1980).

**3.6 Carbohydrate percent:** The total carbohydrate content of frozen yoghurt was determined by difference method.

**3.7 Ash percent:** Ash content in frozen yoghurt was determined according to the method described in AOAC (1980).

**3.8 Statistical Analysis:** The data obtained were statistically analyzed for its validity by using factorial design and critical difference (C.D) technique (Imran and coover, 1983).<sup>[5]</sup>

### 4. Results and Discussions

Those measured magnitudes of chemical properties such as moisture, fat, total solids, acidity, protein, carbohydrate and ash for the studied fruit pulp based frozen yoghurt prepared by different concentration of Apple, Banana, Grapes and Mango pulp in 5%, 10%, 15% and 20% respectively are included in Table-A. All properties were affected significantly by the formulation ( $P \leq 0.05$ ).

**Table A:** Table for Chemical Properties of fruit frozen yoghurt.

Treatment Combination	Fruit	Chemical Properties In Percentage						
		Moisture	Fat	Total Solids	Acidity	Protein	Carbohydrate	Ash
A <sub>1</sub> T	Apple	72.32	4.33	27.68	0.46	4.38	18.22	0.95
A <sub>2</sub> T		72.82	4.19	27.18	0.49	4.28	17.78	0.93
A <sub>3</sub> T		73.31	4.05	26.69	0.53	4.18	17.55	0.91
A <sub>4</sub> T		73.72	3.93	26.28	0.59	4.1	17.35	0.9
B <sub>1</sub> T	Banana	72.2	4.32	27.8	0.51	4.38	18.12	0.98
B <sub>2</sub> T		72.69	4.16	27.31	0.56	4.2	17.96	0.99
B <sub>3</sub> T		72.98	4.01	27.02	0.63	4.19	17.82	1
B <sub>4</sub> T		73.31	3.88	26.69	0.67	4.1	17.7	1.03
G <sub>1</sub> T	Grapes	72.22	4.3	27.78	0.72	4.31	18.21	0.96
G <sub>2</sub> T		72.69	4.11	27.31	0.76	4.13	18.13	0.94
G <sub>3</sub> T		73.09	3.95	26.91	0.78	3.97	18.06	0.93
G <sub>4</sub> T		73.46	3.8	26.54	0.8	3.83	18	0.91
M <sub>1</sub> T	Mango	72.21	4.3	27.79	0.45	4.32	18.22	0.95
M <sub>2</sub> T		72.65	4.12	27.35	0.47	4.14	18.17	0.92
M <sub>3</sub> T		73.04	3.96	26.96	0.49	3.99	18.11	0.90
M <sub>4</sub> T		73.4	3.81	26.6	0.51	3.85	18.06	0.88

The addition of fruit marmalade increased the acidity of fruit flavoured frozen yogurt and acidity was increased with the increase in the amount of fruit pulp added. The lowest acidity for the sample was 0.46% (A<sub>1</sub>T) and the maximum was 0.8% (G<sub>4</sub>T). The increase in acidity of fruit flavoured frozen yogurt might be due to the acidity of apple, banana, grapes and mango fruits. As shown in Table-A, the acidity of the grapes was higher than the other fruits therefore when grapes were added to the yogurt the acidity of yogurt significantly increased compared to other experimental fruit yogurts. Moisture content of frozen yogurts was recorded as the highest 73.72% (A<sub>4</sub>T). The addition of fruit pulp decreases the TS of frozen yogurt and therefore increases in the moisture content of frozen yogurt. Fat content of the frozen yoghurt lowest ranged from 3.8% (G<sub>4</sub>T) and highest ranged from 4.33%. (A<sub>1</sub>T) There were significant differences in the fat content of the frozen yoghurt contained fruit. The addition of fruit caused a decrease in carbohydrate content of frozen yogurt. According to the results

of this research there were significant differences in the protein and ash content ( $P < 0.05$ ) of different experimental frozen yogurts. Frozen yoghurt containing 5% apple and banana had significantly higher protein content (4.38%) and ash content of frozen yoghurt was recorded as the higher 1.03% (B<sub>4</sub>T), as shown Table-A.

### 5. Conclusion

The work provided a better understanding of desired chemical properties imparted by the fruit pulp to the frozen yoghurt. The frozen yoghurt prepared by standard procedure incorporated with different levels of selected fruit pulp. Chemical properties were analyzed in terms of moisture, fat, total solids, acidity, protein, carbohydrate and ash. The results of the present study revealed that the inclusion of fruit pulp in the frozen yoghurt with 5%, 10%, 15% and 20% level of Apple, Banana, Grapes and Mango fruit pulp, the best sample incorporated with the mango pulp at 5% pulp quantity showed exceptional results as

compared to other samples. The evidence from this study suggests that fruit additives to are frozen yoghurt increased acceptability of frozen yoghurt.

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