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STUDIES AND DEVELOPMENT OF YOGURT WITH WATERMELON JUICE

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ABSTRACT

Yogurt is an increasingly popular cultured dairy product in most of the countries. Fruity Yogurt was prepared by adding watermelon juice with skim milk powder, which increase the nutritional quality and improve the texture properties of yogurt. The physicochemical and microbiological properties were analyzed to assay the quality of the Yogurts. Physicochemical properties of yoghurt samples including moisture, protein, fat, carbohydrate and ash were determined at first days of storage. Acidity, pH, syneresis, water holding capacity (WHC) and sensory quality of Yogurt samples were determined on 14 days of storage. There were significant differences between Control Yogurt (CY) and Fruity Yogurt in the pH, moisture, ash, fats, proteins, carbohydrates and total solids. Highest values for WHC and lowest values for syneresis were found in Yogurt with watermelon juice. The Fruity Yogurt had higher acidity, viscosity than Control Yogurt. Sensory evaluation results showed that there were no significant differences among the Yogurt samples. The Fruity Yogurt had the highest overall acceptability scores compared to control Yogurt. The results of current study show that the addition of watermelon juice to the Yogurt significantly improved the quality of Yogurt.

KEYWORDS: - *Yogurt, Watermelon juice, lactic acid bacteria.*

INTRODUCTION

Yogurt is fermented milk and it is consumed worldwide due to its therapeutic and nutritive values. According to the Code of Federal Regulations of the Food and Drug Administration (1996c) (FDA) yogurt can defined as the "food produced by culturing one or more of the optional dairy ingredients (cream, milk, partially skimmed milk, and skim milk) with a characterizing bacterial culture that contains the lactic acid-producing bacteria. This "biotechnological" food is rich source of proteins, carbohydrates, vitamins, fats, phosphorous and calcium. The uniqueness of Yogurt is attributed to lactic acid fermentation during its production which makes Yogurt easily digestible and increase the bioavailability of calcium in intestine.Yogurt has some curative characters also, it has been reported that yogurt can lower the blood cholesterol level and helps to control some intestinal disorders like constipation, dysentery, decreases risk of cancer, improves digestion of lactose by mal digester. Fortification of Yogurt by addition of different fruit juices has been increasingly practicing worldwide. Introduction of various fruit-flavored yogurts has significantly contributed to the consumption of yogurt among all ages . There could be many reasons behind this. Incorporation of fruits endorses the healthy image of yogurt. Bardale, reported that the addition of fruit preparations, fruit flavors, fruit purees, and flavor extracts enhances versatility of taste, color, and texture for the consumer. However fruit-flavored yogurts require an appropriate balance of sweetness, sourness and therefore sufficient flavor intensity should be involved in the flavored yogurt to mask the plain yogurt base.The high water content (92%) of watermelon makes the juice an excellent diuretic. It is among the best dietary source of lycopene, an antioxidant

whose protective effects work wonder on the human body due to its cancer fighting ability. Watermelon juice is an excellent source of Vitamin A and C, chlorophyll, Vitamin B1 and B6, potassium, iodine, magnesium, zinc and citrulline but low in calories. Thus blending of Yogurt with watermelon juice would produce nutritionally balanced food. Watermelon is very popular and comparatively low cost seasonal fruit in India. A large amount of watermelon undergoes spoilage during its peak production time. Utilization of watermelon juice in production of fruity Yogurt may prevent the huge wastage.

The objective of this study was to evaluate the effect of Water melon additive on physical, chemical, sensory, and microbiological properties of the yogurt.

MATERIALS:

Research was conducted in the laboratory of the department of post-harvest and food technology

1. Skim milk powder: Amul's spray dried powder is used (contents per 100 g powder are milk fat 0.5g ,milk protein 35 g, carbohydrates 52 g and some added vitamins and minerals.

2. Honey and watermelon were collected from local market of Amravati.

Method:

Watermelon Juice Yogurt (WJY)	Control Yogurt (CY)
Skim Milk Powder	Pasteurized milk at 60^0C for 30 min
↓	↓
Prepare reconstituted milk	Sterilization for 5 min at 121^0C
↓	↓
Add CMC at 0.755	Add CMC at 0.755
↓	↓
Add watermelon juice at 15%	Inoculation of starter culture
↓	↓
Homogenization	Incubated at 37^0C for 6 hours
↓	↓
Inoculation of starter culture	Store at 4^0C for further analysis
↓	
Incubated at 37^0C for 6 hours	
↓	
Store at 4^0C for further analysis	

RESULTS:

Physical Properties:

A. pH determination: The pH of the Yogurt samples were measured directly using pH meter. The Yogurt samples were stirred with a small amount of distilled water before pH measurement.

B. Whey Drainage: Whey Drainage was removed from the Yogurt, using a syringe within 20 h after the Yogurt fermentation had completed. The relative amount of whey drained off (in ml per 100 ml of initial sample) was calculated as the whey Drainage.

C. Viscosity Measurement: Apparent viscosity was determined by using a RV Brookfield viscometer on 100 mL Yogurt samples at room temperature. Samples were stirred for 40 seconds before measurement. Readings were converted to centipoise units. Viscosity values were measured at 10 rpm with spindle.

D. Water-Holding Capacity: A 20-g sample was centrifuged at 10,000 rpm for 30 minutes at 15^0C. The supernatant was removed within 10 minutes and the wet weight of the pellet was recorded. The Water Holding Capacity was expressed as percentage of pellet weight relative to the original weight of Yogurt.

E. Syneresis : An amount of 20 g of the Yogurt was spread in a thin layer to cover the surface of the What man filter paper No 1. The Yogurt was filtered under vacuum for 10 minutes. The liquid that passed through the filter paper was collected and recorded. The Percentage of Syneresis (PS) was calculated against the weight of the liquid collected to the weight of the initial sample.

F.Titratable Acidity: The acid content of Yogurt samples was determined according to AOAC technique. Twenty grams of well homogenized sample was placed in a beaker and was titrated against 0.1N NaOH with phenolphthalein as indicator. Titratable acidity was expressed as gram equivalent of lactic acid per 100g of sample.

MICROBIOLOGICAL ANALYSIS:

Microbiological analysis of prepared Yogurt samples included determination of total viable count, total coliform count, total yeast and mold count and Lactobacillus count in freshly prepared and in 7 and 14 days of cold storage at 4^0C according to the "Standard Methods for Examination of Dairy Products". Ten gram of Yogurt samples were homogenized using vortex stirrer with 90 ml sterile peptone water to obtain a 10-1 dilution. Further tenfold serial dilution was made using the same diluents till a dilution of 10-6 was obtained. 0.1 ml aliquot of suitable dilution was taken for the microbial examination. It was cultured onto prepared, sterile and dried Petri dishes of suitable media in triplicates for the enumeration of different organisms using spread plate technique. The total number of viable microbes per gram of Yogurts was obtained by multiplying the number of Colony Forming Units (CFU) on the plate with respective dilution factor and then was converted into logarithmic form. Plate Count Agar (PCA) was used for total viable count enumeration. MRS agar was used for assaying the starter culture of Lactobacillus bacteria. Potato Dextrose Agar (PDA) was used for determining yeasts and molds. All experiments were conducted in triplicate.

SENSORY EVALUATION OF YOGURT SAMPLE:

The Yogurt samples were kept at 4^0C until evaluation. 10 members were chosen from the Department of Post Harvest and Food Biotechnology, Shri Shivaji College of Agriculture Biotechnology, Amravati (India). They were assisted in developing a consensus evaluation for flavor attributes of fortified Yogurts. Evaluation was done at Nine Point Hedonic Scale. The quality properties that were evaluated were color, firmness, smoothness, taste, sweetness, sourness, flavor and overall acceptance. The information

contained on the sensory performance was indicated as 9=like extremely, 8=like very much, 7=like moderately, 6=like slightly, 5=neither like or dislike, 4=dislike slightly, 3=dislike, 2=dislike very much, 1=dislike extremely.

Table 1: Proximate composition of yogurt sample:

Sample	Protein (%)	Fat (%)	Ash (%)	Moisture (%)	Carbohydrates (%)	Total solids (g/100g)
CY	3.02	3.7	0.30	88.25	4.5	12.2
WJY	3.30	3.36	0.25	87.13	5.80	13.3

Table 2: Physical properties of yogurt:

Parameters	**CY**	**WJY**
PH	4.03	4.01
TTA (%)	1.06	1.15
Whey drainage (%)	0.18	0.00
Water Holding capacity (%)	49.2	55.69
PS (%)	34.79	26.42
Brookfield viscosity in centipoises (cp) at 25^0C	715	721

Table 3: Microbial analysis of yogurt during storage

Microbial properties	**CY**	**CY**	**CY**	**WJY**	**WJY**	**WJY**
	0 days	7 days	14 days	0 days	7 days	14 days
Coliform (MPN/g)	0.00	0.00	0.00	0.00	0.00	0.00
Yeast & mold (cfu/g)	0.00	0.00	0.00	0.00	0.00	0.00
Lactobacillus spp.	7.4×10^{-4}	6.7×10^{-4}	5.3×10^{-4}	7.5×10^{-4}	6.6×10^{-4}	5.4×10^{-4}

Table 4: sensory evaluation of the yogurt

Sample	**Color**	**firmness**	**smoothness**	**Taste**	**sweetness**	**Sourness**	**Flavor**	**Overall acceptance**
CY	8.5	7.4	8.1	8.4	5.4	6.6	7.5	7.6
WJY	8.6	7.5	8.7	8.4	5.8	5.4	7.8	8.4

CONCLUSION:

Yogurt fortified with watermelon is a new concept in India. This yogurt has good and more acceptable physicochemical, microbiological and organoleptic qualities as compared to the control yogurt. Moreover incorporation of watermelon juice could increase vitamin C content in fruit yogurt than control yogurt. This new product will help Yogurt industries to enrich the commercial Yogurt and also help to utilize the seasonal fruit. Fruit juice addition may increase the acceptability of Yogurt. Using watermelon, commercial Yogurt could also be enriched. Further work is needed for the improvement of texture of watermelon Yogurt possibly by using different stabilizers.

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