AREVIEW

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Development of fruit based yoghurt

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ABSTRACT : Yoghurt is a co-agulated milk product obtained by lactic acid fermentation through the action of starter organisms *i.e. Lactobacillus bulgaricus* and *Streptococcus thermophillus* from milk and milk products (Pasteurized or concentrated milk) with or without optional additions (Milk powder, skim milk powder, whey powder etc.) The micro-organism in the final product must be viable and abundant (10^{8-10}). In conclusion : Additions of fruits in yoghurt relish the product and add nutritional and therapeutic benefits to the consumers. The yoghurt with fruit juice/pulp combinations seems to hold good promises in the manufacture of value added nutritious beverages. Such beverages have been found to be highly acceptable as refreshing drink.

KEY WORDS : Milk, Yoghurt, Fruits

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INTRODUCTION

Yoghurt represents the most popular fermented milk product worldwide. Yoghurt originates from countries around the Balkan and the Eastern Mediterranean sea (Walstra *et al.*, 1999). Very few food items can claim to be over 4500 years old. One of these is yoghurt. It is one of the fermented milk products just like dahi in India.

FAO/WHO described, yoghurt is a co-agulated milk product obtained by lactic acid fermentation through the action of starter organisms *i.e. Lactobacillus bulgaricus* and *Streptococcus thermophillus* from milk and milk products (Pasteurized or concentrated milk) with or without optional additions (Milk powder, skim milk powder, whey powder etc.) The micro-organism in the final product must be viable and abundant (10^{8-10}).

Yoghurt has nutritional benefits beyond those of milk. It is nutritionally rich in protein, calcium, riboflavin, vitamin B_6 and vitamin B_{12}. People who are moderately lactose intolerant can enjoy yoghurt without any ill effects. Because the lactose converted to lactic acid by the bacterial action. It is more palatable and easily digested and assimilated than milk. It also has medicinal uses in particular for a variety of gastrointestinal disorders and in preventing antibiotic-associated with diarrhea. It is believed to promote good gum health, possibly because of the probiotic effect of lactic acid bacteria present in yoghurt.

For many years only plain yoghurt was available in the world market. Recently, popularity of yoghurt is increased due to its fortification with sugar and fruits. Now-a-day there is a good demand for fruit yoghurt (Rocksiessen, 1977). Sweet fruit based yoghurt is preferred by children, adolescents and the aged. Though we eat dahi, fruits are rarely added in to it. There is great scope to popularize yoghurt/dahi particularly fruit yoghurt/dahi in India.

Fruits (citrus, orange, mango, papaya, sapota, guava

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etc.) are good source of vitamin C, dietary fibre, caretionoids and minerals (Ca, Fe, and P). They are low in fat content and have low calorific value. The carbohydrate from fruits provides immediate energy on consumption of the fruits. Hence, supplementations of yoghurt with fruits will not only improves its acceptability

Table 1 : Nutritional status of yoghurt

Constituents	Content per 100 g of product
Carbohydrate (Sugar)	4.7 g
Fat	3.3 g
Saturated	2.1 g
Monounsaturated	0.9 g
Protein	3.5 g
Riboflavin	0.14 mg
Calcium	121 mg

(Anonymous, 2009)

Table 2 : Fruits based yoghurt

Fruits used	References
Berries, raspberries, pine apple and black currents (10 %)	Arnold, (1963)
Strawberry, apple, banana, apricot, pine apple and orange	Schulz *et al.* (1965)
Grape fruit (8-10 %)	Collier and Card Well (1988)
Orange juice (9 %)	Pawar (1990)
Sapota (10 %), pine apple juice (20 %), kokum juice, mango pulp (15 %) and concentrated grape juice (10 %)	Desai *et al.* (1994), Oztruck and Oner (1999)
Guava pulp (5 %)	Patil (2001)
Pomegranate juice (9 %)	Kale (2005)
Mango pulp (20 %) and papaya pulp (10 %)	Kulshrestha (2006)

Table 3 : Nutritional quality of fruit yoghurt

Constituents	Type of fruit yoghurt				
	Guava (Patil, 2001)	Mango (Pawar,1990)	Pomegranate (Kale, 2005)	Papaya (Pawar,1990)	Orange juice (Pawar,1990)
Fat (%)	3.1	3.27	3.20	3.28	3.29
Total solids (%)	20.45	18.48	21.20	17.73	17.80
Protein (%)	-	3.84	-	3.85	3.95
Acidity (%)	1.11	0.83	1.09	0.76	0.81
pH	4.16	4.49	4.52	4.62	4.50
Reducing sugar (%)	5.69	-	5.76		
Non reducing sugar (%)	6.68	-	7.77	-	-
Total sugar (%)	12.37	-	13.53	-	-

Table 4(a) : Sensory quality of fruit yoghurt

Sensory parameter (100 point scale)	Type of fruit yoghurt	
	Guava	Pomegranate
Flavour (45)	41.20	42.30
Body and Texture (30)	25.90	27.40
Acidity (10)	7.50	8.40
Colour and appearance (10)	6.20	8.70
Container (5)	5.00	5.00
Total score (100)	85.80	91.80
	Patil (2001)	Kale (2005)

Table 4 (b) : sensory quality of fruit yoghurt

Type of fruit	Sensory parameter on 9 point hedonic scale						
	Colour	Appearance	Body and texture	Taste	Flavour	Overall acceptability	References
Mango	8.4	8.1	8.2	8.3	-	8.4	Kulshrestha *et*
Papaya	8.3	8.2	8.4	8.2	-	8.5	*al*. (2006)
Orange		8.4	8.6	-	8.05	8.35	Pawar (1990)

Table 5 : Techniques for development of fruit yoghurt

Pomegranate yoghurt (Kale, 2005)	Guava yoghurt (Patil, 2001)	Fruit yoghurt (Kulshrestha *et al.*, 2006)	Fruit yoghurt (Pawar, 1990)
Cow milk	↓	↓	↓
↓	Cow milk	Buffalo milk	Cow / Buffalo milk
Clarification	↓	↓	↓
↓	Clarification	Clarification	Standardization
Standardization (fat 3.5 %)	↓	↓	(fat 3.5 %)
↓	Standardization (fat 4 %)	Standardization (fat 3 %)	↓
Stirring	↓	↓	Addition of sugar (7 %) and
↓	Stirring	Addition of sugar (7 %) and	Stabilizer (0.2 %)
Homogenization	↓	Sodium alginate (0.4 %)	↓
(i). 2500 psi (ii) 500 psi)	Homogenization	↓	Stirring
↓	(i). 2500 psi (ii) 500 psi)	Stirring	↓
Addition of sugar (6 %)	↓	↓	Pasteurization
↓	Addition of sugar (9 %)	Pasteurization	(85 °C for 30 min)
Stirring	↓	(90 °C for 5 min)	↓
↓	Stirring	↓	Cooling (40 °C)
Pasteurization	↓	Cooling (38 °C)	↓
(85 °C / 30 min)	Pasteurization	↓	Inoculation with yoghurt
↓	(85 °C for 30 min)	Inoculation	culture (@ 3 % 50:50
Cooling (40^0C)	↓	↓	proportion)
↓	Cooling (40 °C)	Addition of pulp mango (20 %)	↓
Inoculation @ 2-3 %	↓	or Papaya (10 %)	Addition of fruits (mango pulp
(1:1 ratio)	Inoculation (@ 3%)	↓	10 %, papaya pulp 9 %, orange
↓	(1:1 ratio)	Mixing	juice 9 %)
Addition of pomegranate arils (10	↓	↓	↓
%)	Incubation (43 °C / 4 h)	Dispersing into 50 ml ice-cream	Incubation (42 °C for 3.5 h)
↓	↓	cups	↓
Incubation (43 °C for 4 h)	Addition of fruit pulp (5 %)	↓	Cooling and quality evaluation
↓	↓	Incubation (43 °C / 3.5 h)	(20 °C)
Cooling and quality evaluation (20	Stirring	↓	↓
°C)	↓	Ready to serve	Storage (5-7 °C)
↓	Cooling and quality evaluation (20 °C)	↓	
Storage (5-7 °C)	↓	Storage (5-7 °C)	
	Storage (5-7 °C)		

(flavour) but also it improve over all nutritional and therapeutic values.

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