

Preparation of *Kulfi* with incorporation of mango pulp

ROHINI DARADE, SEEMA CHAUDHARY AND V.G. ATKARE

The good quality *Kulfi* mix prepared with 37 per cent of milk (4.5% fat and 8.5 % SNF), 30 per cent cream (35.5 % fat and 5.5% SNF), 6 per cent skim milk powder, (0.5 % fat and 99 % SNF), 15 per cent sugar, 0.5 per cent stabilizer (gelatin). Overall acceptability of *Kulfi* prepared with 15 per cent mango pulp was significantly superior and more acceptable than other treatments. The chemical composition showed that in term of percentage fat, protein and total solids decreased while acidity increased with increasing mango pulp. In respect of physical properties, melting time of mango *Kulfi* increased and hardness of *Kulfi* decreased with increasing level of mango pulp.

Key Words : *Kulfi*, Mango pulp, Sensory attributes, Chemical analysis

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INTRODUCTION

India is the largest milk producing country in world today (120 MT). It is contributed 5.30 per cent GDP IN 2009- 2010. Nearly 46 per cent milk is used as liquid milk 50 per cent of milk used for preparation of indigenous milk products like *Khoa*, *Dahi*, *Makkhan* and *Ghee* and 4 per cent milk used for preparation western dairy products like ice cream and cheese. *Kulfi* is typical frozen dessert sold by small milk venders, sweet makers etc., in many parts of our country especially in summer season hence *Kulfi* call as poor man ice-cream. *Kulfi* manufacturing helps to develop small scale industry and generate sizeable employment and income. Mango (*Mangifera indica*) is most popular fruit of tropics due to it's high palatability, excellent taste, flavour, nutritional and therapeutic importance. Alphonso mango is not only delicious but also full of nutritional value. It is high in beta

carotene, a precursor of vitamin A, and rich source of vitamin B complex. Based on nutritional qualities of Alphonso mango the present study was undertaken on production of mango *Kulfi*.

METHODOLOGY

The fresh cow milk was collected from Dairy farm of College of Agriculture, Loni. The fat and SNF of milk was 4.5 per cent and 8.5 per cent, respectively. 1) Preparation of mix:- Milk was heated to reduce the moisture partially from the milk (75 % volume) calculated quantities of 15 per cent sugar, skim milk powder to adjust total solids and 0.5 per cent gelatin were added to milk to make the mix with 10 to 12 per cent of milk fat and 40 per cent of total solids. This *Kulfi* mix was pasteurized by LTLT method. The pasteurized mix was cooled to room temperature and add the sugar 2) Ageing of mix – the mix was kept at 0 to -5°C for six hours. Ageing improve consistency and whipping quality. 3) Addition of pulp–after ageing add the mago pulp mix properly and filled in moulds. 4) freezing- the filled moulds were kept for freezing about -8 to -10°C temperature. 5) Hardening- after freezing the moulds were kept in deep freeze at -18 to -20°C temperature for 24 hours (Fig. A and Table A).

MEMBERS OF RESEARCH FORUM

Author for correspondence :

ROHINI DARADE, Department of Animal Husbandry and Dairy Sciences, College of Agriculture (Dr. P.D.K.V.), NAGPUR (M.S.) INDIA
Email : darade.rohini@gmail.com

Associate Authors' :

SEEMA CHAUDHARY AND V.G. ATKARE, Department of Animal Husbandry and Dairy Sciences, College of Agriculture (Dr. P.D.K.V.), NAGPUR (M.S.) INDIA

Sr. No.	Ingredient	T ₀ Control	T ₁	T ₂	T ₃
1.	Milk with 4.5% fat and 8.5% SNF	510.76	419.18	371.55	320.81
2.	Cream with 35% fat and 5.5% SNF	275.42	281.72	282.32	295.65
3.	Skim milk powder with 0.5% fat and 99% SNF	58.82	58.10	60.13	60.04
4.	Sugar	150.00	136.00	128.00	118.50
5.	Stabilizer(gelatin)	5.00	5.00	5.00	5.00
6.	Mango pulp (fat (0.87% and SNF 30.73%)	Nil	100.00	150.00	200.00
	Total	1000.00	1000.00	1000.00	1000.00

Treatment detail – T₀ –Control T₁- Addition of 10% mango pulp in *Kulfi* mix T₂ -Addition of 15 % mango pulp in *Kulfi* mix
 T₃ -Addition of 20% mango pulp in *Kulfi* mix

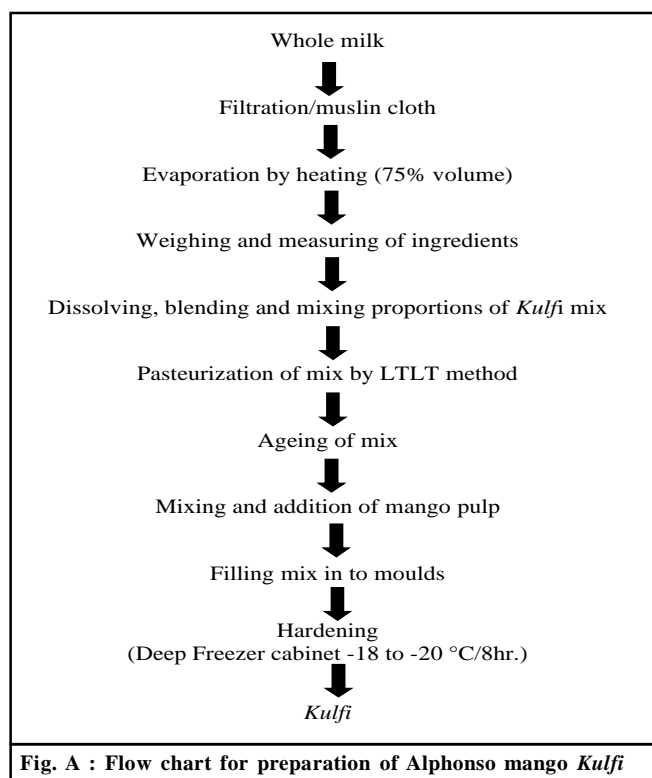


Fig. A : Flow chart for preparation of Alphonso mango *Kulfi*

The product was evaluated for sensory evaluation by using 9 point hedonic scale (Gupta, 1976 and BIS, 1971). Chemical composition *i.e.* fat, protein, acidity and total solids were estimated by adopting standard procedure and physical properties like melting time and hardness of *Kulfi* determined by method described by (Arbuckle, 1986). The obtained data were analyzed by Randomized Block Design with four treatments and five replication for statistical analysis method given by Panse and Sukhatme (1976).

OBSERVATIONS AND ASSESSMENT

The finished product from all treatments combination

were served to 6 semi trained judges. The value given in Table 1 of sensory attributes are average of 6 judges for each observation. The score given for sensory evaluation were compiled analyzed and results are presenter in Table 1.

Colour and appearance :

It was observed from Table 1, that mean score of colour and appearance for mango *Kulfi* were 7.31, 7.30, 7.83 and 7.61 for T₀, T₁, T₂ and T₃, respectively. The colour and appearance of mango *Kulfi* was significantly affected due to addition of mango pulp. Incorporation of 15 per cent mango pulp in *Kulfi* obtained highest score (T₂). The result of present investigation are contradictory to Gaikwad (2001). They reported that 15 per cent karonda pulp in to ice crem had highest score in respect of colour and appearance.

Body and texture:

The mean score of body and texture of mango *Kulfi* were 6.88, 7.17, 8.25 and 7.34 in treatments T₀, T₁, T₂ and T₃, respectively. The highest score was obtained by treatments T₂, while lowest score was obtained by treatments T₀. The body and texture of mango *Kulfi* was significantly affected due to addition of mango pulp. Similar results were reported by Bansode (1999). They observed that, ice- cream prepared by 15 per cent Taro powder scored higher in body and texture.

Flavour:

The mean flavour scores were 6.56, 7.56, 8.27 and 7.67 for mango *Kulfi* prepared in treatments T₀, T₁, T₂ and T₃, respectively (Table 1). The highest score was 8.27 was recorded by treatment T₂ with 15 per cent mango pulp thus, the treatments seems to be significantly superior overall treatments. The results of present

investigation are not exactly in agreement with Vesvikar (1999) but somewhat near to it. They reported that highest flavour score in case of 10 per cent jackfruit pulp ice-cream.

Overall acceptability :

The overall acceptability score was determined by the basis of average scores recorded for different sensory attributes viz., colour and appearances, body and texture and flavour. From the Table 1 it is evident that Overall acceptability score for *Kulfi* of treatments T₀, T₁, T₂ and T₃ were 6.92, 7.04, 8.11 and 7.53, respectively. The maximum score for overall acceptability was obtained from *Kulfi* having 15 per cent of mango pulp. Mango pulp had significant effect on overall acceptability of *Kulfi*. T₂ treatment was categorized as “like moderately” with over all score 8.11 while, remaining sample under various

treatments categorized as “like slightly”. T₂ treatment scored highest due to rich flavour, smooth and soft body and texture with slightly yellowish colour. The results obtained are in agreement with Gaikwad (2001). They observed that incorporation of mango pulp @15 in ice cream showed maximum score for overall acceptability.

Chemical composition mango *Kulfi* :

Mango *Kulfi* prepared under different treatments were analyzed for fat, protein, acidity and total solids (Table 2).

Fat :

It is revealed that mean fat constituents for mango *Kulfi* samples of different treatments were 9.32 per cent for T₀, 8.75 per cent for T₁, 8.60 per cent for T₂, 8.45 per cent for T₃ and differed significantly from each other.

Table 1 : Sensory quality of mango *Kulfi*

Treatments	Colour and appearance	Body and texture	Flavour	Overall acceptability
T ₀	7.31	6.88	6.56	6.92
T ₁	7.30	7.17	7.56	7.04
T ₂	7.83	8.25	8.27	8.11
T ₃	7.61	7.34	7.67	7.53
S.E. ±	0.210	0.147	0.184	0.269
C. D. (P=0.01)	0.620	0.358	0.580	0.647
Results	Sig.	Sig.	Sig.	Sig.

Table 2 : Chemical composition of mango *Kulfi*

Treatments	Constituent (%)			
	Fat	TSS	Acidity	Protein
T ₀	9.32 ^c	38.63	0.27	4.46
T ₁	8.75 ^b	38.20	0.29	4.40
T ₂	8.60 ^{ab}	37.43	0.30	4.37
T ₃	8.45 ^a	37.20	0.31	4.30
S.E. ±	0.054	0.730	0.015	0.036
C.D. (P=0.01)	0.218	NS	NS	NS

NS=Non-significant

Table 3 : Melting time and hardness of mango *Kulfi*

Replication	Melting time (min)	Hardness (mm/5 sec)
Treatments		
T ₀	35.43 ^c	39.09 ^a
T ₁	34.14 ^b	42.20 ^c
T ₂	32.40 ^b	41.72 ^c
T ₃	28.66 ^a	40.76 ^b
S.E.±	0.240	0.204
C.D. (P=0.01)	0.968	0.821
Result	Sig.	Sig.

Fat content of the *Kulfi* decreased with the increase of fruit pulp level in the mix. The present findings illustrated that control sample (T₀), had the highest (9.32%) fat than remaining three *Kulfi* mixes incorporated with mango pulp. The above results are in somewhat near with Ghosh and Rajorhia (1992). They revealed that for the industrial production of *Kulfi*, the mix should contain minimum 11.00 per cent fat.

Protein :

The average values of protein content in *Kulfi* with different levels of mango are tabulated in Table 2, the average protein constituent in *Kulfi* samples under T₀, T₁, T₂, and T₃ treatments were 4.46 per cent, 4.40 per cent, 4.37 per cent, and 4.30 per cent, respectively. The protein content of mango *Kulfi* in all treatments with mango pulp was lower than control (4.45 %). Irrespective of treatments, the type of pulp appears to have non-significant difference in protein content of fruit pulp *Kulfi*. The decrease in protein content of *Kulfi* with increasing levels of fruit pulp may be ascribed to very low protein content of mango where it varied from 0.65 to 0.68 per cent (Chauhan *et al.*, 1998).

Total solids :

Effect of different levels of mango pulp on total solids content of *Kulfi* are presented in Table 2, that the mean values of total solids content in *Kulfi* samples under different treatments were 38.63 per cent, 38.20 per cent, 37.43 per cent, 37.20 per cent for T₀, T₁, T₂ and T₃, respectively. However, the variation in total solids content due to different treatments was non-significant, although decrease in total solids content with an increase in mango pulp was noticed. Similar results were observed by Yerriswamy *et al.* (1985). They observed that *Kulfi* mix with 39 per cent total solids produced the highest organoleptic scores.

Acidity :

The mean acidity values for *Kulfi* samples under different treatments were 0.27 per cent, 0.29 per cent, 0.30 per cent and 0.31 per cent for T₀, T₁, T₂ and T₃, respectively. The results of present study are agree with Pawar (2001). They observed that the titratable acidity in the ice cream increased with an increase in the level of Jamun juice and it was the highest (0.36 %) in 15 per cent Jamun juice ice-cream. The lowest acidity (0.17

%) was recorded with control.

Physical properties of mango *Kulfi* :

Melting time :

The observations on melt-down time were recorded at 26° C. The melt-down time for *Kulfi* samples under different treatments were 35.43 min, 34.14 min, 32.40 min and 28.66 min. for T₀, T₁, T₂, and T₃, respectively. It is noted that melt-down time of *Kulfi* decreased significantly with the increasing pulp levels in the mix.

The differences for melt-down time between treatments, having 10 and 15, per cent levels of mango pulp did not vary significantly. Only 20 per cent fruit pulp added *Kulfi* samples registered significantly lower melt down time than other treatments.

Hardness of *Kulfi* :

The hardness of mango *Kulfi* samples was mainly dependent on composition of the *Kulfi* mix and its melting time.

The hardness for *Kulfi* having 10, 15 and 20 per cent mango pulp was significantly higher than control. Similarly, the difference in hardness of 10 and 15 per cent mango pulp *Kulfi* was not significant. The treatment T₃ (20% mango pulp *Kulfi*) also differed significantly from all other treatments. The decrease in hardness with increasing level of pulp may be due to decrease in total solids and fat content of *Kulfi* with increasing pulp levels. Total solids content of the *Kulfi* plays an important role in affecting the hardness of *Kulfi*. Higher the total solid, higher is the hardness and *vice-versa*, indicating a direct and positive relation between total solids content of *Kulfi* and hardness.

Conclusion :

Overall acceptability of *Kulfi* prepared with 15 per cent mango pulp was significantly superior and more acceptable than other treatments. The chemical composition showed that in term of percentage fat, protein and total solids decreased while acidity increased with increasing mango pulp. In respect of physical properties, melting time of mango *Kulfi* increased and hardness of *Kulfi* decreased with increasing level of mango pulp.

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