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## Study on microbiological quality and cost of production of mango flavoured channa shree

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### Abstract

In present study, mango-flavored channa shree was prepared using 50% channa and chakka each 60 (S<sub>1</sub>) and 70 (S<sub>2</sub>) % sugar and different levels of mango pulp viz., 15, 20, 25 and 30 percent and represented as M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub> and M<sub>4</sub> respectively. Among these levels, 25 percent level of addition of mango pulp was found to be most acceptable in case of both 60 and 70% addition of sugar. The most acceptable level of mango-flavored channa shree was analyzed for microbial qualities and shelf-life studies at atmospheric and refrigerated conditions and work out the production cost of mango-flavored channa shree.

**Keywords:** Milk, channa, chakka, mango

### Introduction

Almost 50–55% of milk in India is processed by various methods, including fermentation, desiccation, and coagulation, to create a range of milk products. A heat-acid coagulated milk product known as channa is created from whole or standardized milk from cows, buffalo, or their mixes. Legal requirements state that the moisture content cannot be higher than 70% and that the milk fat content cannot be lower than 50% of the dry matter (FSSAI, 2017) [2]. Many items, including chum-chum, channa murkhi, channa podo, rasogolla, rasomalai, sandesh, etc., are made from channa as a base material.

Chakka, also known as strained dahi, is an intermediate dairy product that undergoes fermentation. Specifically, it is the curd mass that remains after the whey is extracted from dahi using a muslin cloth or basket centrifuge. It is similar to the plain Greek yoghurt variety. In India, chakka is usually used as the base for making shrikhand, a sweet-flavored fermented dish, along with other delectable food-related products. Chakka has a sour taste because to its 0.7–1% lactic acid acidity.

The tropical tree *Mangifera indica* produces the mango, a stone fruit that is edible. India is the world's largest producer of mangoes, although it only makes up 1% of the global mango trade because it eats most of its own output. Mangoes are typically sweet, but different cultivars have different tastes and textures for the flesh; some, like Alphanso, have a soft, pulpy, juicy texture comparable to an overripe plum, while others, like Tommy Atkins, are tougher and have a fibrous feel (Melissa Clark, 2011) [5]. Mangoes are used to make the seasonal beverage known as aampannha. All over South Asia, people drink mango lassi, which is made by combining ripe mangos or mango pulp with buttermilk and sugar. Additionally, curries can be made with ripe mangoes. Mango is used to make fruit bars, ice cream, drinks, smoothies, pies, raspados, and sweet chili sauce.

Food technologists are now showing an interest in developing unique combinations of well-known milk products with fruits and fruit-related commodities. This is due to the development of new production, processing, packaging, shipping, and preservation processes. It has been proven that adding fruit or vegetable juices or pulp to several milk products greatly improves their flavour and acceptability.

### Materials and Methodology

Fresh buffalo milk from the College of Agriculture Dapoli's Instructional Dairy Farm was used to prepare Channa shree; sugar and mango pulp were bought from the nearby market and the university's PHM unit.

With a few minor adjustments, the channa and chakka were made in accordance with the methods described by Lande

(2021)<sup>[3]</sup> and Londhe (2019)<sup>[4]</sup>, respectively.

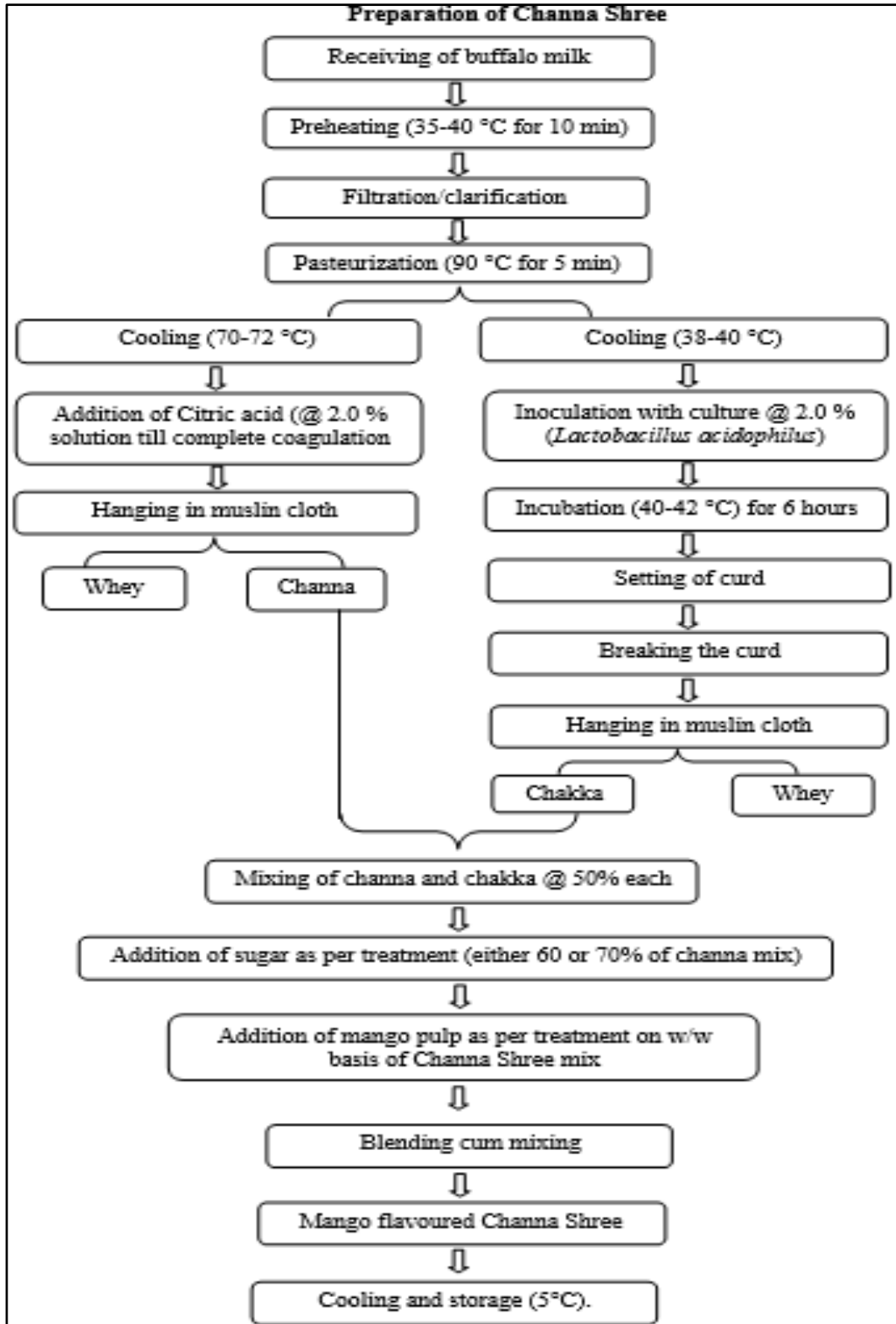


Fig 1: Flow chart for preparation of mango flavoured channa shree

**Results and Discussion**

**Microbial evaluation of mango flavoured channa shree at atmospheric and refrigerated conditions**

Shelf-life study was carried out on the most optimal level of mango-flavored channa Shree found during research. Channa Shree was kept both at room temperature and in a refrigerator (5-7 °C) until it was no longer suitable for human consumption. The study focused on four

microbiological parameters: Standard Plate Count (SPC), Coliform, Yeast and Mould Count (YMC), and *E. coli*. The sensory and microbiological qualities of this optimal level was conducted on days 0, 3, 6, 9, 12, 15, 18 and 21 after storage. Table 1 represents the findings from the microbiological assessment of the most acceptable level of mango-flavored channa shree at different time intervals.

**Table 1:** Microbial evaluation of most acceptable level of mango flavoured channa shree at various time intervals

Parameters	Levels	Storage condition	Storage days								
			0	3	6	9	12	15	18	21	
Standard Plate count ( $10^5$ cfu/ g)	S <sub>1</sub> M <sub>3</sub>	AT	0.24	9.10	-	-	-	-	-	-	-
		RT	0.24	0.98	1.48	1.95	2.41	2.89	3.15	3.76	
	S <sub>2</sub> M <sub>3</sub>	AT	0.23	9.04	-	-	-	-	-	-	-
		RT	0.23	0.87	1.36	1.89	2.38	2.76	3.09	3.88	
Coliform count ( $10^1$ cfu/ g)	S <sub>1</sub> M <sub>3</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
	S <sub>2</sub> M <sub>3</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
Yeast &Mould count ( $10^1$ cfu/g)	S <sub>1</sub> M <sub>3</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	0.22	0.74	1.02	
	S <sub>2</sub> M <sub>3</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	0.37	0.89	1.28	
<i>Escherichia coli</i> count	S <sub>1</sub> M <sub>3s</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
	S <sub>2</sub> M <sub>3</sub>	AT	N.D	N.D	-	-	-	-	-	-	-
		RT	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
Overall acceptability	S <sub>1</sub> M <sub>3</sub>	AT	8.2	5.1	-	-	-	-	-	-	-
		RT	8.2	7.6	7.3	6.9	6.3	6.0	5.6	5.1	
	S <sub>2</sub> M <sub>3</sub>	AT	8	5.2	-	-	-	-	-	-	-
		RT	8	7.7	7.4	7.0	6.6	6.1	5.6	5.0	

**Note:** AT - Atmospheric Temperature  
RT - Refrigerated Temperature

The microbiological quality of the mango-flavored channa shree (best levels) samples was evaluated by counting the Standard Plate Count (SPC), Coliform, Yeast and Mould Count (YMC), and *E. coli*. The following are the results of the microbiological analysis of the channa shree with mango flavour:

#### Standard Plate Count (SPC)

According to results in Table 1, in sample S<sub>1</sub>M<sub>3</sub>, SPC count reached its highest at 21 days ( $3.76 \times 10^5$ cfu/g) and lowest was at 0 days ( $0.24 \times 10^5$ cfu/g) at refrigerated temperatures. On day 0 and day 3, respectively, the SPC count for treatment S<sub>1</sub>M<sub>3</sub> at the atmospheric sample was  $3.76 \times 10^5$ cfu/g and  $9.10 \times 10^5$ cfu/g. The product was no longer fit for human consumption after three days of storage at room temperature. For sample S<sub>2</sub>M<sub>3</sub> SPC count reached its maximum after 21 days ( $3.88 \times 10^5$ cfu/g) and lowest at 0 days ( $0.23 \times 10^5$ cfu/g) while it was stored in refrigerated condition. The SPC count for treatment S<sub>2</sub>M<sub>3</sub> at the atmospheric sample was  $0.23 \times 10^5$ cfu/g on day 0 and  $9.04 \times 10^5$ cfu/g on day 3, respectively. The longer the storage period, the higher the SPC count.

#### Coliform and *Escherichia coli* count

Any dairy product that has coliform and *Escherichia coli* in it suggests that unhygienic circumstances existed during production. All fresh and stored samples in the current investigation, whether they were kept at room temperature or in a refrigerator, tested negative for coliform. This shows that appropriate sanitary measures were implemented to prevent contamination throughout the manufacturing of mango-flavored channa shree and its storage. The longer the storage period, the higher the SPC count.

#### Yeast and Mould Count

According to results in Table 1, in sample S<sub>1</sub>M<sub>3</sub> the yeast and mould count was found highest at day 21 ( $1.02 \times 10^1$ cfu/g) and lowest at day 15 ( $0.22 \times 10^1$ cfu/g) when it was kept at a refrigerated temperature. For sample S<sub>2</sub>M<sub>3</sub>, the yeast and mould counts were highest at day 21 ( $1.28 \times 10^1$ cfu/g) and lowest at day 15 ( $0.37 \times 10^1$ cfu/g) when refrigerated. YMC was absent from both S<sub>1</sub>M<sub>3</sub> and S<sub>2</sub>M<sub>3</sub> samples after they were stored at room temperature.

#### Cost of production of mango flavoured channa shree

**Table 2:** Cost of production of channa shree incorporated with different level of mango pulp (Rs) (based on cost of ingredients only)

Treatments	Channa		Chakka		Sugar		Mango pulp		Total		Price per 1000 g (Rs.)
	Qty. (g)	Rs.	Qty. (g)	Rs.	Qty. (g)	Rs.	Qty. (g)	Rs.	Qty. (g)	Rs.	
S <sub>1</sub> M <sub>1</sub>	100	35.73	100	16.78	120	4.8	30	8.12	350	65.43	186.94
S <sub>1</sub> M <sub>2</sub>	100	35.73	100	16.78	120	4.8	40	10.33	360	68.14	189.27
S <sub>1</sub> M <sub>3</sub>	100	35.73	100	16.78	120	4.8	50	13.54	370	70.85	191.48
S <sub>1</sub> M <sub>4</sub>	100	35.73	100	16.78	120	4.8	60	16.25	380	73.56	193.57
S <sub>2</sub> M <sub>1</sub>	100	35.73	100	16.78	140	5.6	30	8.12	370	66.23	179.00
S <sub>2</sub> M <sub>2</sub>	100	35.73	100	16.78	140	5.6	40	10.83	380	68.94	181.42
S <sub>2</sub> M <sub>3</sub>	100	35.73	100	16.78	140	5.6	50	13.54	390	71.65	183.71
S <sub>2</sub> M <sub>4</sub>	100	35.73	100	16.78	140	5.6	60	16.25	400	74.36	185.90

**Note:** Chakka- Rs 167.80 / Kilogram  
Channa- Rs 357.30 / Kilogram  
Sugar- 40 Rs / Kilogram  
Mango pulp- Rs 270.83 / Kilogram

The cost of manufacturing channa shree with a mango flavour was determined exclusively using the ingredients' current retail prices. The combination of channa shree with 60% sugar and 30% mango pulp had the highest price (Rs. 193.48 per kg) (S<sub>1</sub>M<sub>4</sub>). Conversely, the treatment S<sub>2</sub>M<sub>4</sub>, which contained 70% sugar and 30% mango pulp, had the

lowest price (Rs. 185.90 per kg). It was noted that when the amount of mango pulp increased, so did the price of mango flavoured channa shree. Cost of mango pulp was undoubtedly the cause of the hike. The most acceptable level S<sub>1</sub>M<sub>3</sub> had a manufacturing cost of Rs. 191.48 per kg, whereas treatment S<sub>2</sub>M<sub>3</sub> had a cost of Rs. 183.71 per kg.

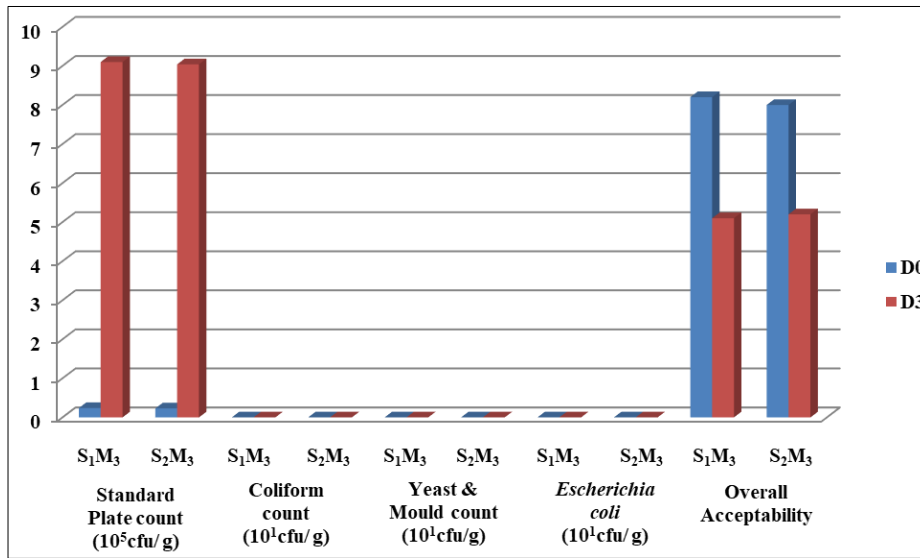


Fig 2(a): Microbial count of mango flavoured channa shree during storage at atmospheric condition

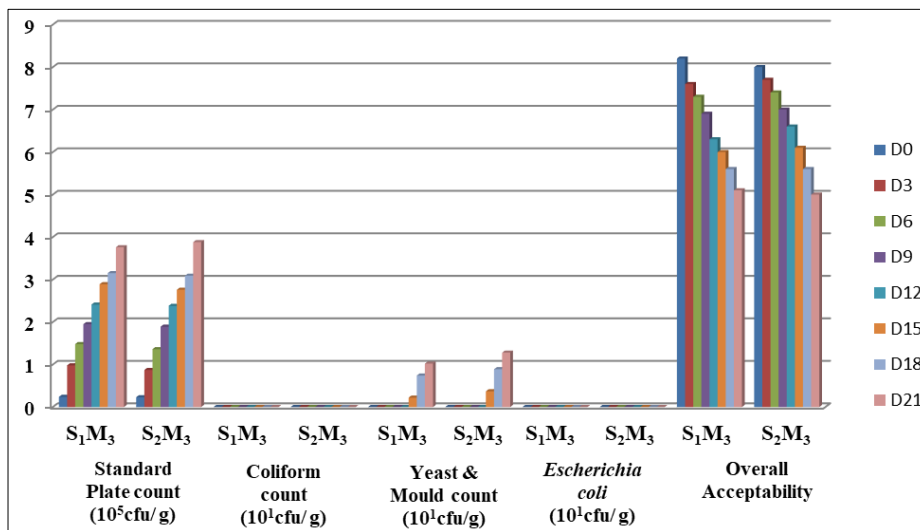


Fig 2(b): Microbial count of mango flavoured channa shree during storage at refrigerated condition

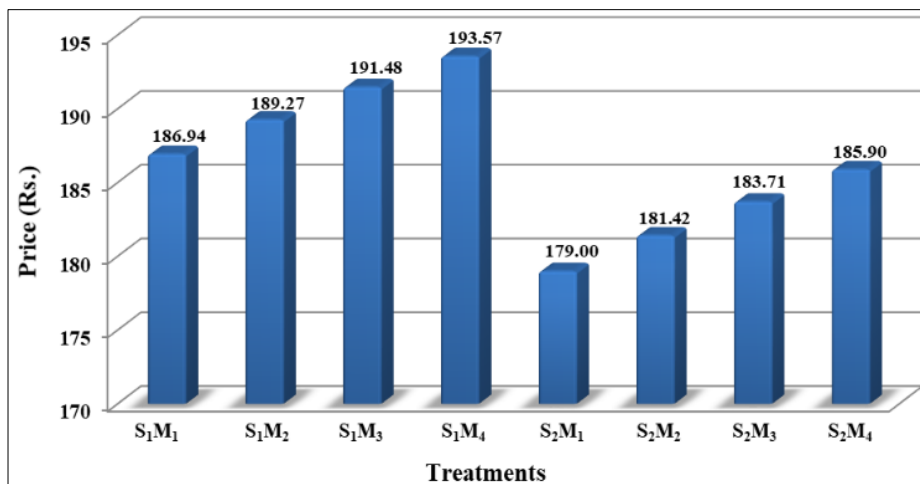


Fig 3: Cost of production of mango flavoured channa shree

### Conclusion

The research found that by blending mango pulp with channa and chakka, one may create high-quality product mango-flavoured channa shree. Most acceptable quality of channa shree can be prepared by addition of sugar @ 60 or 70% and mango pulp @ 25 of channa and chakka mix. Mango-flavoured channa shree can be stored for 3 day at atmospheric condition and 21 days at refrigerated condition.

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