



E-ISSN: 2278-4136

P-ISSN: 2349-8234

[www.phytojournal.com](http://www.phytojournal.com)

JPP 2021; Sp 10(2): 173-176

Received: 16-02-2021

Accepted: 19-03-2021

**Alok Rai**

Department of AH & Dairying,  
C S Azad University of  
Agriculture & Technology  
Kanpur, Uttar Pradesh, India

**MPS Yadav**

Department of AH & Dairying,  
C S Azad University of  
Agriculture & Technology  
Kanpur, Uttar Pradesh, India

**Hari Shanker Samar Jeet Singh**

Department of AH & Dairying,  
C S Azad University of  
Agriculture & Technology  
Kanpur, Uttar Pradesh, India

## Flavour quality of chhana spread prepared with moringa leaves

**Alok Rai, MPS Yadav and Hari Shanker Samar Jeet Singh**

**Abstract**

The present investigation was an attempt to Development of Chhana spread prepared with moringa leaves extract was prepared by the using of cow milk with 0%, 5%, 10%, 15% and 20% moringa leaves extract, Lactic acid and calcium lactate were used as coagulants, three levels of salt 1%, 1.5%, and 2% . The prepared samples were stored at refrigeration temperature (5 °C) for 0, 10, 20 and 30 days. The fresh and stored samples were analysed for their sensory qualities. The superior flavour quality of Chhana Spread obtained when samples prepared with 15% moringa leaves extract, calcium lactate as coagulant and 1.5% salt, which can be stored up to 20 days at refrigeration temperature (5 °C). Considering the medicinal and nutritional importance of Chhana spread this technology can be used in commercial scale basis.

**Keywords:** moringa leaves extract, cow milk chhana , lactic acid, calcium lactate , salt, yield

**Introduction**

India has emerged as the largest milk producer in the world with a record production level of 188.00 million tons during 2019-20. and the importance of milk and milk product in India has been recognized since Vedic times (five thousand years ago).

The significant portion of milk produced in India is converted into a variety of indigenous milk products.

Among milk products, chhana is gaining momentum in its production and consumption. Chhana is heat and acid coagulated Indigenous milk products which forms the base of several popular Indian sweets like Rasogulla, Sandesh, Rasmalai and Chumchum etc. It is also used as base material for the preparation of large number dishes. It originated in eastern part of the country particularly from west Bengal, but now a day it is also popular in north western region of India.

Chhana means the product obtained from cow milk by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 65 per cent moisture and the milk fat content shall not be less than 50 per cent of the dry matter (Food safety and standard act).

Shelf-life of milk product is also one of the most important factors for its production on commercial scale. Shelf life of chhana has been reported to be about 12 days at 7 °C and 3 days at 24 °C respectively (De and Ray: 1953).

Every part of moringa is a storehouse of important nutrients. The leaf of moringa is a good source of vitamin A, Vitamin B, Vitamin C and minerals. They are an excellent source of protein and a very low source of fat and carbohydrates. Leaf extract is used in the treatment of diabetes, because it controls glucose level in diabetes within 3 hours of ingestion. Moringa leaves also have a low calorific value and can be used in the diet of the obese. The pods are fibrous and are valuable to treat digestive problems and thwart colon cancer. so, In Ayurvedic medicines moringa leaves are used to prevent about three hundred diseases. (Oduro *et al*, 2008).

**Materials And Methods****Materials**

Materials mainly included the ingredients required for optimization of compositional and processing parameters of Chhana spread. These were

**Whole Milk**

Requisite amount of cow milk was obtained from Experimental Dairy C.S. Azad University of Agriculture & Technology, Kanpur and was standardized at 3.5 per cent fat level for the preparation of chhana spread with moringa leaf extract.

**Corresponding Author:****Alok Rai**

Department of AH & Dairying,  
C S Azad University of  
Agriculture & Technology  
Kanpur, Uttar Pradesh, India

### Moringa oleifera leaves extract

Leaves extract was used as a raw material for the preparation of Moringa Paneer. The extract was prepared by following method.

First the fresh and clean leaves of *Moringa oleifera* were dehydrated at room temperature in an incubator. For preparing 100 ml extract, weighed accurately 25 g of dehydrated leaves, then boiled them for 5 minutes in water and after cooling, finely ground them in grinder for obtaining a fine paste. This paste was collected in a muslin cloth and tied then gently pressed by applying a suitable pressure until whole juice was extracted. Thus a clear extract was obtained.

### Coagulants

In this study lactic acid and calcium lactate were used for the preparation of chhana spread.

**Common salt:** Tata salt

### Packaging material

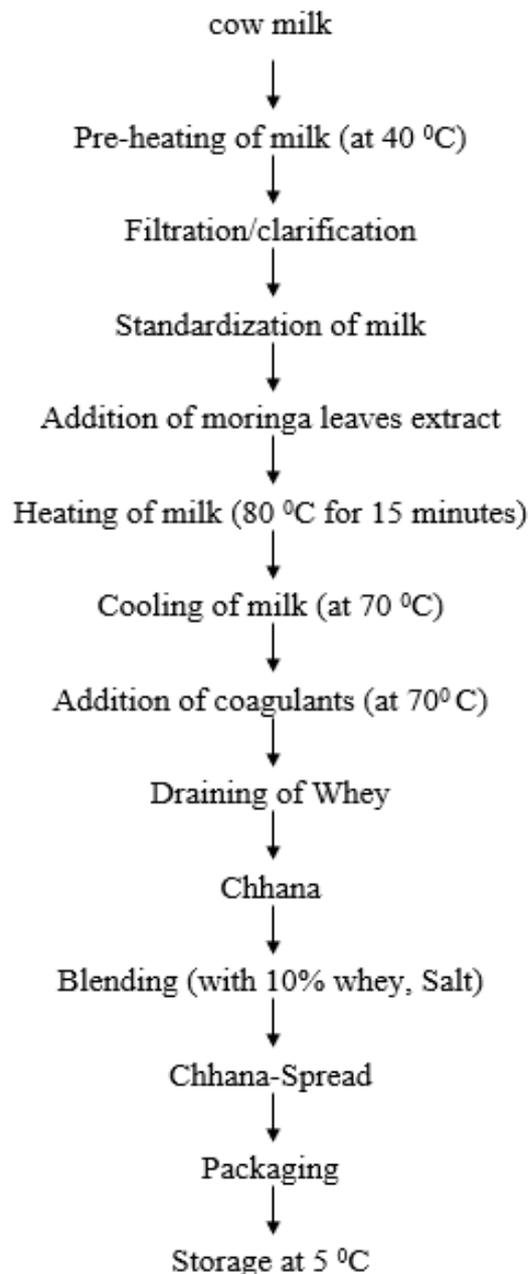
Polystyrene cups of 100g capacity were used for packing of chhana spread.

### Methods

#### Manufacturing Technology

The required amount of cow milk was standardized to 3.5% fat and 8.5% SNF as per method suggested by Ray and De (1953). Adding different amount of Moringa leaves extract e.g. 0%, 5%, 10%, 15%, and 20% cow milk respectively at 61-63 °C temperature. After addition of extract the cow milk was heated at 80 °C for 15 min. During heating proper stirring was maintained by a stainless steel ladle to avoid burning and to prevent skin formation. 1.5 per cent solution of lactic acid and calcium lactate was added to cow milk at 70 °C. The milk was gently stirred to obtain coagulated curd clear whey. After coagulation traditional method was used to drain the free whey from the coagulated mass. The curd along with whey was transferred on a muslin cloth and whey was allowed to drain by hanging technique till trickling of free whey was stopped. The curd sample obtained by this method was subjected for chhana spread making. The curd from traditional method was converted into chhana spread by using method suggested by Tiwari and Sachdeva (1991). In this case chhana was broken into pieces and blended in domestic blender along with 10 per cent whey and specified salt levels e.g. 1%, 1.5% and 2.0%. There after the samples were packed in plastic cups and stored at refrigeration temperature (5 °C).

### Flow diagram of manufacture of Chhana spread prepared with Moringa Leaf Extract



### Results and Discussion

**Table 1(A):** The effect of moringa leaves extract(A), coagulants(B), level of salt(C) and storage period(D) on flavour score of Chhana Spread.

	B1	B2	C1	C2	C3	D1	D2	D3	D4	Mean
A1	6.467	6.567	6.525	6.650	6.375	7.750	7.550	6.067	4.700	6.517
A2	6.667	6.767	6.725	6.850	6.575	7.950	7.750	6.267	4.900	6.717
A3	6.925	6.975	6.988	6.063	6.800	8.233	7.950	6.483	5.133	6.950
A4	7.025	7.125	7.125	7.175	6.925	8.400	8.033	6.600	5.267	7.075
A5	6.550	6.658	6.600	6.737	6.475	7.850	7.617	6.167	4.783	6.604
B1			6.740	6.850	6.590	7.987	7.733	6.253	4.933	6.727
B2			6.845	6.940	6.670	8.087	7.827	6.380	4.980	6.818
C1						8.040	7.780	6.370	4.980	6.793
C2						8.140	7.870	6.490	5.080	6.895
C3						7.930	7.690	6.090	4.810	6.630
Mean	6.727	6.818	6.793	6.895	6.630	8.030	7.780	6.317	4.957	

**Table 1(B):** The mean effect of ABC on flavour score of Chhana Spread.

	A1B1	A1B2	A2B1	A2B2	A3B1	A3B2	A4B1	A4B2	A5B1	A5B2
C1D1	7.70	7.80	7.90	8.00	8.20	8.30	8.30	8.50	7.80	7.90
C1D2	7.50	7.60	7.70	7.80	8.00	8.00	8.00	8.10	7.40	7.70
C1D3	6.00	6.20	6.20	6.40	6.50	6.60	6.60	6.80	6.10	6.30
C1D4	4.70	4.70	4.90	4.90	5.20	5.10	5.30	5.40	4.70	4.80
C2D1	7.80	7.90	8.00	8.10	8.30	8.40	8.40	8.60	7.90	8.00
C2D2	7.60	7.70	7.80	7.90	8.00	8.00	8.10	8.10	7.70	7.80
C2D3	6.20	6.30	6.40	6.50	6.60	6.70	6.70	6.80	6.30	6.40
C2D4	4.80	4.90	5.00	5.10	5.20	5.30	5.30	5.40	4.90	4.90
C3D1	7.60	7.70	7.80	7.90	8.10	8.10	8.30	8.30	7.70	7.80
C3D2	7.40	7.50	7.60	7.70	7.80	7.90	7.90	8.00	7.50	7.60
C3D3	5.80	5.90	6.00	6.10	6.20	6.30	6.30	6.40	5.90	6.00
C3D4	4.50	4.60	4.70	4.80	5.00	5.00	5.10	5.10	4.60	4.70

**Table 1C: SE(m), SE(d) AND CD TABLE**

	A	B	C	D	AB	AC	AD	BC	BD	CD	ABC	ABD	ACD	BCD	ABCD
SE(m)	0.017	0.011	0.013	0.015	0.024	0.030	0.034	0.019	0.022	0.026	0.024	0.048	0.059	0.037	0.084
SE(d)	0.024	0.015	0.019	0.022	0.034	0.042	0.048	0.026	0.030	0.0378	0.034	0.068	0.084	0.053	0.118
CD	0.048	0.030	0.037	0.042	N.S.	N.S.	N.S.	N.S.0	N.S.	0.074	N.S.	N.S.	N.S.	0.104	0.233

The flavour of Chhana Spread is the most important quality attributes. A pleasant sweetish aroma and a sweetish taste are desirable characteristics of Chhana Spread. It should be free from any off flavour. The flavour of Chhana Spread as affected by different factors have been presented in Table 1.(A) & 1.(B).

From Table 1.(A) the means of different levels of all the factors, the following facts were observed. The highest (7.08) flavour score was found in milk sample of A<sub>4</sub> (15% moringa leaves extract) followed by A<sub>3</sub> (10% moringa leaves extract) score (6.95). The flavour score showed an increasing trend as a content of moringa leaves increased up to 15% in Chhana Spread. The mean difference in scores between A<sub>1</sub> and A<sub>2</sub>, A<sub>2</sub> and A<sub>3</sub>, A<sub>3</sub> and A<sub>4</sub>, A<sub>4</sub> and A<sub>5</sub>, when compared with CD at 5% level (0.048), the flavour scores varied significantly from one another's.

On comparing average scores of flavour of Chhana Spread in case of different coagulants. It was observed that the best flavour score (6.82) was observed in case of Chhana Spread prepared with Calcium lactate. (B<sub>2</sub>), while lowest score (6.73) noted with lactic acid coagulant (B<sub>1</sub>).

The effect of levels of salt (C) on flavour score of Chhana Spread. It was observed that the highest average score (6.90) was in C<sub>2</sub> (1.5% salt) samples followed by C<sub>1</sub> (1% salt), while minimum score was noted in C<sub>3</sub> samples.

Effect of storage periods (D) on flavour score of Chhana Spread, it was observed that the highest score (8.03) obtained in fresh sample (D<sub>1</sub>) followed by D<sub>2</sub>. The lowest flavour score (4.96) observed in D<sub>4</sub> samples. The flavour score decreases with increasing of storage periods.

From Table 1.(A) denoting the mean interactions between levels of moringa leaves extract (A) and type of coagulants (B), it was observed that Chhana Spread prepared from 15% moringa leaves extract with calcium lactate coagulant (A<sub>4</sub>B<sub>2</sub>) showed maximum score (7.13) followed by A<sub>4</sub>B<sub>1</sub> flavour score (7.03), while minimum flavour score (6.47) was noted in A<sub>1</sub>B<sub>1</sub> samples.

Among the treatment combinations of levels of moringa leaves extract (A) and levels of salt (C), the maximum flavour score (7.18) observed when samples prepared with 15%

moringa leaves extract and 1.5% salt (A<sub>4</sub>C<sub>2</sub>) followed by A<sub>4</sub>C<sub>1</sub> score of (7.13), while minimum flavour score (6.38) was noted in A<sub>1</sub>C<sub>3</sub> samples.

From the interaction between A.D, it was observed that highest flavour score (8.40) was in case of fresh samples prepared with 15% moringa leaves extract (A<sub>4</sub>D<sub>1</sub>). The next maximum flavour score (8.23) was in case of A<sub>3</sub>D<sub>1</sub> combination. The mean differences between these two treatments were found to be non-significant.

From interactions between B.C, it was observed that maximum flavour score (6.94) in case of sample prepared with calcium lactate as coagulant and 1.5% salt (B<sub>2</sub>C<sub>2</sub>) followed by (B<sub>1</sub>C<sub>2</sub>) and minimum score (6.59) obtained in B<sub>1</sub>C<sub>3</sub> samples.

From the mean interactions of B.D, it was observed that the highest flavour score (8.09) was in the fresh samples prepared with calcium lactate (B<sub>2</sub>D<sub>1</sub>) followed by B<sub>1</sub>D<sub>1</sub>, while minimum flavour score (4.93) noted in B<sub>1</sub>D<sub>4</sub> samples.

From interactions C.D, it was observed that the maximum flavour score (8.14) in case of fresh sample prepared with 1.5% salt (C<sub>2</sub>D<sub>1</sub>) followed by C<sub>1</sub>D<sub>1</sub> score of (8.04) and minimum score (4.81) obtained from C<sub>3</sub>D<sub>4</sub> samples.

From Table 1(B), the effect of moringa leaves extract, types of coagulant, salt levels and storage periods (ABCD) on flavour score of Chhana Spread. It was observed that maximum score (8.60) was in case of fresh sample prepared from the combination of 15% moringa leaves extract, calcium lactate coagulant and 1.5% salt. (A<sub>4</sub>B<sub>2</sub>C<sub>2</sub>D<sub>1</sub>) followed by the combination of A<sub>4</sub>B<sub>2</sub>C<sub>1</sub>D<sub>1</sub> and A<sub>4</sub>B<sub>1</sub>C<sub>2</sub>D<sub>1</sub> which were statistically at par with respect to flavour of Chhana Spread and were graded excellent quality and liked extremely. The lowest score (4.50) was obtained from A<sub>1</sub>B<sub>1</sub>C<sub>3</sub>D<sub>4</sub> samples and were graded as poor quality.

CD Table 1.(C) for flavour scores of Chhana Spread, it was revealed that the main effect of factors A, B, C, and D was found to be highly significant. The first order interactions CD, and second order interactions BCD and ABCD were also found to be significant, while all the interactions were found to be non-significant.

**Table 1(B):** The mean effect of ABC on flavour score of Chhana Spread.

	A1B1	A1B2	A2B1	A2B2	A3B1	A3B2	A4B1	A4B2	A5B1	A5B2
C1D1	7.70	7.80	7.90	8.00	8.20	8.30	8.30	8.50	7.80	7.90
C1D2	7.50	7.60	7.70	7.80	8.00	8.00	8.00	8.10	7.40	7.70
C1D3	6.00	6.20	6.20	6.40	6.50	6.60	6.60	6.80	6.10	6.30
C1D4	4.70	4.70	4.90	4.90	5.20	5.10	5.30	5.40	4.70	4.80
C2D1	7.80	7.90	8.00	8.10	8.30	8.40	8.40	8.60	7.90	8.00
C2D2	7.60	7.70	7.80	7.90	8.00	8.00	8.10	8.10	7.70	7.80
C2D3	6.20	6.30	6.40	6.50	6.60	6.70	6.70	6.80	6.30	6.40
C2D4	4.80	4.90	5.00	5.10	5.20	5.30	5.30	5.40	4.90	4.90
C3D1	7.60	7.70	7.80	7.90	8.10	8.10	8.30	8.30	7.70	7.80
C3D2	7.40	7.50	7.60	7.70	7.80	7.90	7.90	8.00	7.50	7.60
C3D3	5.80	5.90	6.00	6.10	6.20	6.30	6.30	6.40	5.90	6.00
C3D4	4.50	4.60	4.70	4.80	5.00	5.00	5.10	5.10	4.60	4.70

**Table 1.C:** SE(m), SE(d) And CD Table

	A	B	C	AB	AC	BC	ABC
SE(m)	0.086	0.054	0.0676	0.122	0.149	0.094	0.221
SE(d)	0.122	0.077	0.094	0.172	0.211	0.133	0.298
CD	0.243	0.154	0.188	N.S.	N.S.	N.S.	N.S.

### Conclusion

The data obtained on the basis of flavour qualities of Chhana Spread prepared from different levels of moringa leaves extract, different coagulants and different levels of salt with storage periods have been concluded as: The overall flavour of Chhana Spread was found in samples prepared from 15% moringa leaves extract, calcium lactate coagulant and 1.5% salt, which can be stored up to 20 days at refrigeration temperature (5 °C).

### References

1. De S, Ray SC. Studies on the indigenous method of chhana making. Indian J Dairy Science 1954;7(3):113-115.
2. Kailappan R, Varadharaju N, Karunanithy C. Studies on development of kneader and ball former for chhana in rasogolla production. J of Food Engineering 2007;81(2):298-305.
3. Khan Shahnawaz Umer, Mohammad Ashraf. paneer production: A review Journal of Food Science and Technology 2011;48(6):645-660.
4. Shughanya R, Lalitha. Preparation of Paneer from Coconut milk, its Quality, Characteristics and shelf life. International J of Recent Scientific Research 2017; 8(3):16053-16057.
5. Sandeep G, Anitha T, Vijayalath KR, Sadasakthi A. Moringa for nutritional security (*Moringa oleifera* Lam.). International J of Botony studies 2019;4(1):21-24.
6. Saravanakumaran R, Sekhar C, Murugesan S. Value Addition, Nutritional Parameters and Quality Certifications in Exportable Organic Moringa Produce. International J of current Microbiology and Applied sciences 2019;8(1):813-828.