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## Standardize the process for preparation of buttermilk by incorporation of Indian prickly ash (*Zanthoxylum rhetsa*) extract and study their physico-chemical quality

**Ashutosh Ghonge, Sandip Ramod, Rushikesh Kore and Narendra Prasade**

### Abstract

Present investigation was carried out at Dairy Science Laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. BSKKV., Dapoli (M.S.) to standardize the process for preparation of buttermilk by incorporation of Indian Prickly Ash (*Zanthoxylum rhetsa*) extract. In present study, blend of Cow milk and Indian Prickly Ash extract was used in preparation of Buttermilk at five levels of extract *i.e.*, 0, 4, 6, 8, 10 and 0.5% common salt was added at the five-treatment combination. It was found that 6% extract treatment was best in present investigation and it may conclude that blend of Cow milk and Indian Prickly Ash extract can be successfully utilized for preparation of Buttermilk.

**Keywords:** Buttermilk, Indian prickly ash

### Introduction

Traditional names for buttermilk include "Chhash" in Gujarat and MP, "Mattha" in UP and Delhi, "Tak" in Maharashtra, and "Ghol" in Bengal. Chhash, a fermented milk product that is "ready to serve," has been used as a cooling beverage in India for ages, especially in the Western and Northern areas. As sour buttermilk, Chhash is also popular in many other countries of the world, including East Asia, Africa, Europe etc. Chhash's popularity is owing to its nutritional value, medicinal uses, thirst-quenching properties, as well as its refreshing and pleasant flavour. Fermented milk items like dahi (curd), lassi (a sweetened yoghurt beverage), Chhash (buttermilk), and Shrikhand (drained curd combined with sugar and flavouring) have been consumed on the Indian subcontinent for aeons.

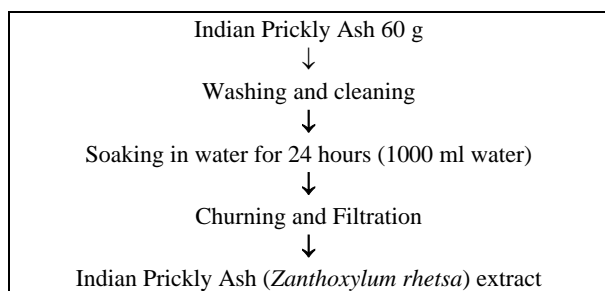
Sometimes Chhash and Lassi are used interchangeably in literary works. However, these two goods differ significantly from one another. While lassi is a white to creamy-white viscous liquid with a sweet-smelling, rich scent and a mild to strongly acidic flavour, Chhash is made by churning dahi and combining it with cold water. Buttermilk contains between 0.5 and 1.5 percent of milk fat and 4.5 and 5.5 percent of total solids, respectively. The milk fat and TMS in a typical lassi, however, can range from 3.0 to 3.5 percent milk fat and 6.0 to 18.0 percent TMS (Mathur, 2005) <sup>[1]</sup>.

Indian Prickly Ash can stimulate the immune system. It can help to reduce pain, it also boosts appetite. Indian Prickly Ash increase the blood circulation. It can strengthen bones and reduce inflammation. Its oil is used for cholera. The energy present in it is 172.4 KJ/100gm. Crude Protein is 1% and Crude fat is 4%. (Jadhav and Kuladip, 2018) <sup>[2]</sup>.

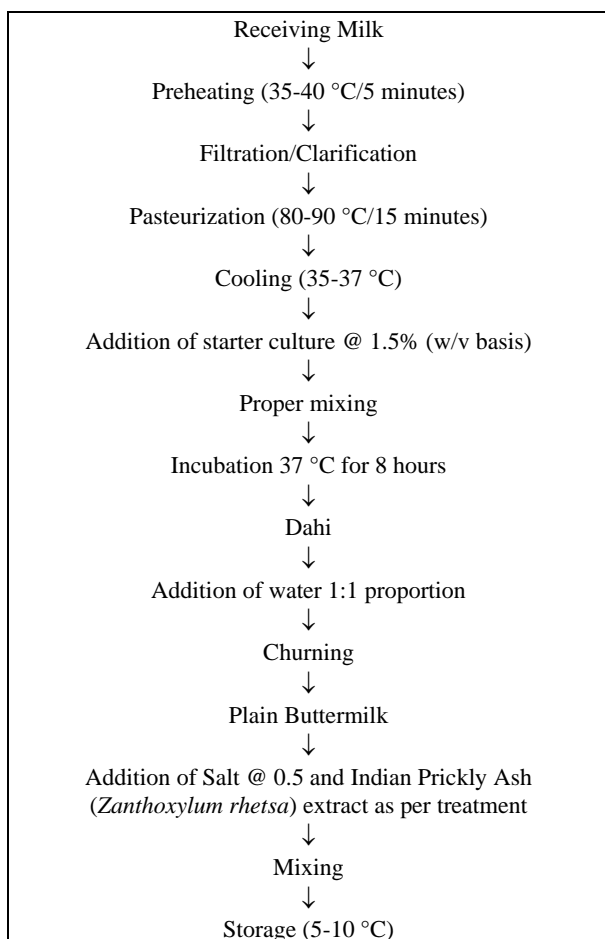
Henceforth, considering the nutritional properties and health benefits of Indian Prickly Ash (*Zanthoxylum rhetsa*) the present investigation was carried out at Dairy Science Laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. BSKKV., Dapoli (M.S.) to standardize the process for preparation of buttermilk by incorporation of Indian Prickly Ash (*Zanthoxylum rhetsa*) extract and study their physico-chemical quality.

### Material and Method

Fully ripened Indian Prickly Ash were selected. The Indian Prickly Ash was washed with running tap water to remove dirt and dust. 60g of Indian Prickly Ash was added in 1000 ml of clean fresh water and kept for soaking for 24 hours. Next day it was grinded and filtered and made the extract. Extract obtained used to mix at different level during buttermilk preparation.



Flow chart of making Indian Prickly Ash extract



Flow chart of making Indian prickly Ash extract Buttermilk

### Levels of Indian Prickly Ash extract

- T<sub>0</sub>- Control (without addition of extract) + 0.5 percent salt  
 T<sub>1</sub>- 4 ml/100 ml of buttermilk + 0.5 percent salt (w/v)  
 T<sub>2</sub>- 6 ml/100 ml of buttermilk + 0.5 percent salt (w/v)  
 T<sub>3</sub>- 8 ml/100 ml of buttermilk + 0.5 percent salt (w/v)  
 T<sub>4</sub>- 10 ml/100 ml of buttermilk + 0.5 percent salt (w/v)

### Chemical Analysis

The total solids content was determined by gravimetric method as per IS: 1479 (Part II), 1961<sup>[5]</sup>.

The fat content was determined by using standard Gerber method as described in IS: 1224 (Part I), 1977.

The protein content was determined by estimating the % Nitrogen by micro kjeldhal method as recommended in IS: 1479 (Part II), 1961<sup>[5]</sup>. The percent nitrogen will be multiplied by 6.38 to find out the protein percentage in milk.

The acidity of milk expressed as % lactic acid was determined by the method described in IS: 1479 (Part I), 1960<sup>[4]</sup>.

### Statistical Analysis

For present investigation, CRD i.e., Complete Randomized Design was employed using six replications.

### Results

#### Chemical analysis of Indian Prickly Ash flavoured Buttermilk

##### 1. Total solids of Indian Prickly Ash flavoured Buttermilk

Effect of different levels of Indian Prickly Ash extract on total solids (TS) content of Indian Prickly Ash flavoured Buttermilk (%)

	R-I	R-II	R-III	R-IV	R-V	R-VI	Mean
T <sub>0</sub>	7.0	7.2	6.9	7.3	7.1	6.8	7.05
T <sub>1</sub>	8.67	8.64	8.68	8.69	8.66	8.65	8.67
T <sub>2</sub>	9.46	9.42	9.45	9.47	9.49	9.43	9.45
T <sub>3</sub>	10.23	10.25	10.21	10.24	10.26	10.22	10.24
T <sub>4</sub>	10.96	10.98	10.99	10.97	10.94	10.93	10.96
Mean	9.264	9.298	9.246	9.334	9.29	9.206	9.273

The average total solids content of Indian Prickly Ash flavoured buttermilk was 7.05 (T<sub>0</sub>), 8.67 (T<sub>1</sub>), 9.45 (T<sub>2</sub>), 10.24 (T<sub>3</sub>), 10.96 (T<sub>4</sub>). It was observed that the total solids content showed gradual increase with the increase in level of Indian Prickly Ash extract. The highest total solids content was observed at T<sub>4</sub> (10.96%) i.e., buttermilk prepared with Indian Prickly Ash extract at 10 percent and while lowest total solids content was noticed at T<sub>0</sub> i.e. (7.05%) buttermilk prepared with Indian Prickly Ash extract at 0 percent.

It was revealed from the results that the total solids content of Indian Prickly Ash flavoured buttermilk was significantly affected by levels Indian Prickly Ash (1% level of significance).

Total solid content showed increasing trend with increase in proportion of Indian Prickly Ash extract.

##### 2. Protein of Indian Prickly Ash flavoured buttermilk

Effect of different levels of Indian Prickly Ash extract on protein content of Buttermilk (%)

	R-I	R-II	R-III	R-IV	R-V	R-VI	Mean
T <sub>0</sub>	1.61	1.62	1.60	1.65	1.59	1.58	1.61
T <sub>1</sub>	1.56	1.52	1.58	1.54	1.57	1.59	1.56
T <sub>2</sub>	1.54	1.50	1.56	1.52	1.57	1.55	1.54
T <sub>3</sub>	1.52	1.53	1.50	1.55	1.49	1.54	1.52
T <sub>4</sub>	1.50	1.52	1.54	1.49	1.48	1.53	1.51
Mean	1.546	1.538	1.556	1.55	1.54	1.558	1.548

The average protein content of Indian Prickly Ash flavoured buttermilk was 1.61 (T<sub>0</sub>), 1.56 (T<sub>1</sub>), 1.54 (T<sub>2</sub>), 1.52 (T<sub>3</sub>), 1.51 (T<sub>4</sub>). It was observed that the protein content showed gradual decrease with the increase in level of Indian Prickly Ash extract. The highest protein content was observed at T<sub>0</sub> (1.61%) i.e., buttermilk prepared with Indian Prickly Ash extract at 0 percent and while lowest protein content was noticed at T<sub>4</sub> i.e. (1.51%) buttermilk prepared with Indian Prickly Ash extract at 10 percent.

It was revealed from the results that the protein content of Indian Prickly Ash flavoured buttermilk was significantly affected by levels Indian Prickly Ash (1% level of significance).

Protein content showed decreasing trend with increase in proportion of Indian Prickly Ash extract.

### 3. Fat of Indian Prickly Ash flavoured Buttermilk

Effect of different levels of Indian Prickly Ash extract on fat content of Indian Prickly Ash flavoured Buttermilk (%)

	R-I	R-II	R-III	R-IV	R-V	R-VI	Mean
T <sub>0</sub>	2.21	2.18	2.23	2.19	2.20	2.22	2.21
T <sub>1</sub>	2.19	2.15	2.23	2.18	2.20	2.17	2.19
T <sub>2</sub>	2.17	2.18	2.19	2.15	2.16	2.14	2.17
T <sub>3</sub>	2.16	2.14	2.17	2.15	2.19	2.13	2.16
T <sub>4</sub>	2.15	2.14	2.13	2.16	2.17	2.17	2.15
Mean	2.176	2.158	2.190	2.166	2.184	2.166	2.173

The average fat content of Indian Prickly Ash flavoured buttermilk was 1.61 (T<sub>0</sub>), 1.56 (T<sub>1</sub>), 1.54 (T<sub>2</sub>), 1.52 (T<sub>3</sub>), 1.51 (T<sub>4</sub>). It was observed that the fat content showed gradual decrease with the increase in level of Indian Prickly Ash extract. The highest fat content was observed at T<sub>0</sub> (1.61%) i.e., buttermilk prepared with Indian Prickly Ash extract at 0 percent and, while lowest total solids content was noticed at T<sub>4</sub> i.e. (1.51%) buttermilk prepared with Indian Prickly Ash extract at 10 percent.

It was revealed from the results that the fat content of Indian Prickly Ash flavoured buttermilk was significantly affected by levels Indian Prickly Ash (1% level of significance). Fat content showed decreasing trend as proportion of Indian Prickly Ash extract increases.

### 4. Titratable acidity of Indian Prickly Ash flavoured Buttermilk

Effect of different levels of Indian Prickly Ash extract on titratable acidity of Indian Prickly Ash flavoured Buttermilk (%)

	R-I	R-II	R-III	R-IV	R-V	R-VI	Mean
T <sub>0</sub>	0.25	0.24	0.28	0.26	0.29	0.21	0.26
T <sub>1</sub>	0.36	0.38	0.34	0.35	0.39	0.37	0.37
T <sub>2</sub>	0.41	0.45	0.42	0.38	0.40	0.43	0.42
T <sub>3</sub>	0.46	0.48	0.49	0.42	0.44	0.41	0.45
T <sub>4</sub>	0.50	0.52	0.48	0.56	0.46	0.51	0.51
Mean	0.396	0.414	0.402	0.394	0.396	0.386	0.398

The average titratable acidity of Indian Prickly Ash flavoured buttermilk was 0.26 (T<sub>0</sub>), 0.37 (T<sub>1</sub>), 0.42 (T<sub>2</sub>), 0.45 (T<sub>3</sub>), 0.51 (T<sub>4</sub>). It was observed that the titratable acidity showed gradual increase with the increase in level of Indian Prickly Ash extract. The highest titratable acidity was observed at T<sub>4</sub> (0.51%) i.e., buttermilk prepared with Indian Prickly Ash extract at 10 percent and while lowest titratable acidity was noticed at T<sub>0</sub> i.e. (0.26%) buttermilk prepared with Indian Prickly Ash extract at 0 percent.

It was revealed from the results that the titratable acidity of Indian Prickly Ash flavoured buttermilk was significantly affected by levels Indian Prickly Ash (1% level of significance).

Acidity showed increasing trend with increase in proportion of Indian Prickly Ash extract.

### Summary and Conclusion

One of the most accessible sources of several nutrients, including proteins and vitamins, is milk. Those individuals can consume milk products while having a milk allergy. Milk products keep milk's nutritive qualities while being palatable to consumers.

The chemical qualities of total solids, fat, protein, and

titratable acidity of buttermilk were examined. The product's sensory qualities were evaluated based on its colour, look, body, texture, and flavour. The cost economics were calculated by accounting for the current market pricing of the materials. Six replications of the CRD were used for the statistical analysis. The following paragraphs provide a summary of the investigation's findings.

The investigation was carried out with following treatments.

The Indian Prickly Ash extract and salt were used to prepare buttermilk as follows:

Levels of Indian prickly ash extract and salt

Indian Prickly Ash extract	Salt
4% of buttermilk	0.5% of buttermilk
6% of buttermilk	-
8% of buttermilk	-
10% of buttermilk	-

Treatment Combinations

C	Indian Prickly Ash extract 0% and salt 0.5%
T <sub>1</sub>	Indian Prickly Ash extract 4% and salt 0.5%
T <sub>2</sub>	Indian Prickly Ash extract 6% and salt 0.5%
T <sub>3</sub>	Indian Prickly Ash extract 8% and salt 0.5%
T <sub>4</sub>	Indian Prickly Ash extract 10% and salt 0.5%

Buttermilk was analysed for its chemical quality attributes viz., total solids, fat, protein, and titratable acidity. Sensory quality of product was judged for colour and appearance, consistency, and flavour. Cost economics was worked out by considering the prevailing market prices of the ingredients. The statistical analysis was carried out using Complete Randomized Design with five treatments and six replications. The results of the present study are summarized in the following paragraphs.

### Chemical composition of Indian Prickly Ash flavoured Buttermilk

#### 1. Total Solids

Total solids content of gradually increases with increasing level of Indian Prickly Ash extract. The treatment T<sub>4</sub> (10.96%) with addition of Indian Prickly Ash extract @ 10% shows highest total solids content while treatment T<sub>0</sub> (7.05%) shows lowest total solids content.

#### 2. Protein

Protein content of gradually decreases with increasing level of Indian Prickly Ash extract. The treatment T<sub>0</sub> (1.61%) without adding Indian Prickly Ash extract shows highest protein content while treatment T<sub>4</sub> (1.51%) shows lowest protein content.

#### 3. Fat

Fat content of gradually decreases with increasing level of Indian Prickly Ash extract. The treatment T<sub>0</sub> (2.21%) without adding Indian Prickly Ash extract shows highest fat content while treatment T<sub>4</sub> (2.15%) shows lowest fat content.

#### 4. Acidity

Acidity content of gradually increases with increasing level of Indian Prickly Ash extract. The treatment T<sub>0</sub> (0.26%) without adding Indian Prickly Ash extract shows lowest acidity content while treatment T<sub>4</sub> (0.51%) shows highest acidity content.

**Based on results obtained from the present investigation, following conclusions are drawn**

In respect to physico-chemical properties of Indian Prickly Ash flavoured Buttermilk i.e., fat and protein were decreases in Indian Prickly Ash flavoured Buttermilk. While total solid was increases with increase in level of Indian Prickly Ash extract. While acidity was increases with increase in Indian Prickly Ash extract for preparation of Buttermilk. The cost of Buttermilk was increased with increase in level of Indian Prickly Ash extract.

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