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To study the effect *Tulsi* addition on chemical and textural property of *Shrikhand*

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Abstract

The present study was done for manufacturing of Herbal *Shrikhand* with incorporation of *Tulsi* extract to enhance the functional value, so as to value added dairy product could be offered to the consumers as a convenience food. Thus, investigation was conducted to develop a process for manufacture of herbal *Shrikhand*. During study different chemical parameters of *Shrikhand* were analyzed and results were compared with the controlled sample to study the effect of *Tulsi* extract. The amount of fat content show no significant increase with increase in the amount of *Tulsi* extract whereas protein showed significant increase with increase of *Tulsi* extract. The values range from 3.81 to 4.48%. The protein content of standardized sample is 4.15%. The results of present investigation show that the ash content increase significantly with increase in *Tulsi* extract content. The values range from 0.9 to 0.96%. The ash content of standardized sample was 0.94. Total Solid shows no significant change. During storage Total Solid slightly increased and the reason could be due to moisture loss. There is significant increase in the moisture content of Herbal *Shrikhand*. The highest moisture content was found in sample T₃ (43.19±0.03). Moisture content of standardized sample was 42.81. The textural profile parameters, namely firmness, consistency, cohesiveness and adhesiveness were measured using TPA. Superior acidity score obtained with increasing concentration of *Tulsi* extract. It was concluded from research that as the amount of Herbal extract increases in *Shrikhand*, it affects the Viability in *Shrikhand*. Therefore, addition of *Tulsi* extract in making of *Shrikhand* is recommended because *Tulsi* is a natural herbal product with a wide range of beneficial and nutritional properties, this makes this new *Shrikhand* a functional food.

Keywords: functional food, consistency, textural profile, significant

Introduction

The increasing demand from consumers for dairy products with 'functional' properties is a key factor driving value sales growth in developed markets. The *Shrikhand* word is derived from the Sanskrit root 'shrikha rani' meaning good nourishing food having high protein and calorific value. *Shrikhand* as a semi-soft, sweetish sour, whole milk product prepared from lactis fermented curd, the curd is partially strained through a muslin cloth to remove the whey and thus produce a solid mass called *Chakka* (the basic ingredient for *Shrikhand*). This *Chakka* is mixed with the required amount of sugar to yield *Shrikhand*. The dish is very popular in Gujarat, Maharashtra and Karnataka. *Shrikhand* originated in Persia.

PFA/BIS standards for *Shrikhand*

Constituents	BIS	PFA
Total Solids (% by mass), minimum	58.0	58.0
Milk fat (in dry matter % by mass) minimum	8.5	8.5
Milk protein (in dry matter, % by mass) Minimum	10.5	10.5
Titration acidity (% lactic acid) maximum	1.4	1.4
Sucrose (in dry matter, % mass) maximum	72.5	72.5
Total ash (in dry matter, % by mass) maximum	0.9	0.9
Coliform count, F.F.U./gm. Maximum		10.0
Yeast and mould count /gm maximum		50.0

Tulsi plants are considered as one of the most important source of medicine and drugs of today and many secondary metabolites and essential oils come from medicinal plants (Singh *et al.*, 2010) [3]. On one hand the use of medicinal plants proved to be economical and effective and on the other hand they are easily available and safe to use. *Tulsi* is very much important as medicinal plant as it help in many ways to improve our health like Cures fever, beats diabetes, protects the heart, beats stress, dissolves kidney stone, beats cancer, helps to quit smoking, keeps your skin healthy and glowing, heals respiratory condition etc.

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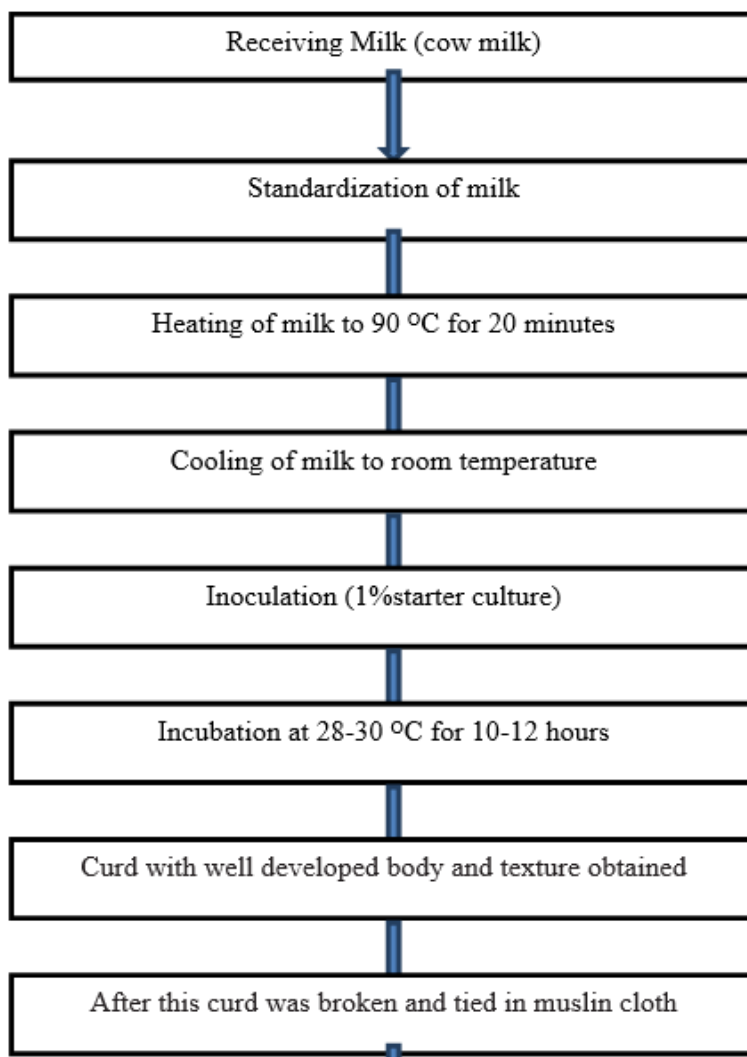
Materials and Methods: The experiment study was conducted in the Department Laboratory, Department of Animal Husbandry & Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (U.P.), India. The objective of the present study is to increase the functional value of *Shrikhand* by incorporation of *Tulsi* (medicinal herb) that makes it more useful which would help the organized sector to undertake commercial production and marketing of Herbal *Shrikhand*.

Method of *Tulsi* leaf Extraction: *Tulsi* leaves were boiled in water upto the 1/4th of the initial volume, then the remaining portion were dried in vacuum drier.

Preliminary trials

The preliminary trials were conducted with 6 levels of *Tulsi* extract viz., 0.5, 0.7, 0.9, 1.1, 1.3 and 1.5 per cent by weight of *Chakka*. Sugar percentage was kept constant at 40 per cent by weight of *Chakka*. Sugar was added after addition of *Tulsi* extract. It was observed that 0.5 per cent level of *Tulsi* extract did not give noticeable change in taste. The higher levels viz., 1.3 and 1.5 per cent gave much-pronounced *Tulsi* flavor i.e. undesirable flavour and taste. So these levels viz., 0.5, 1.3 and 1.5 per cent extract were rejected. It was observed that *Tulsi* extract with 0.7, 0.9 and 1.1% of *Chakka* was quite acceptable on the basis of sensory parameters. The levels of *Tulsi* 0.7, 0.9, and 1.1 per cent were selected for further investigation.

Process of *Shrikhand* preparation



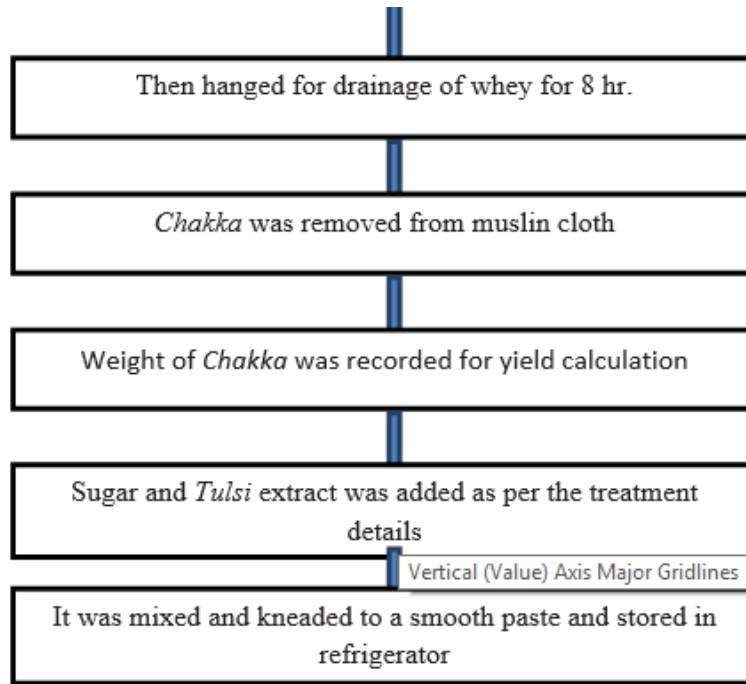
Details of treatment

Treatment	<i>Tulsi</i> extract
T ₀ (control)	0.0
T ₁	0.7
T ₂	0.9
T ₃	1.1

Manufacturing of *Shrikhand*

Shrikhand was manufactured by the standard procedure given by De (1980) with slight modification. The lot of standardized cow milk (4.5 % fat) was heated to 90 °C for 20 min and then cooled at 30 °C. It was inoculated with starter culture (LF 40) at the rate of 1 per cent and incubated at 30 °C for 12hr. Curd with well developed body and texture obtained after incubation was broken and tied in muslin cloth. It was then placed in hanging position for draining of whey for 8 hr. *Chakka* was removed from muslin cloth, weight of *Chakka* and whey was recorded for calculation of yield. *Chakka* was stored under refrigeration until taken for analysis and preparation of *Shrikhand*.

The *Chakka* was divided into 4 portions and *Shrikhand* was prepared by adding sugar and *Tulsi* extract as per the treatment details. It was mixed and kneaded to a smooth paste and stored in refrigerator for organoleptic, chemical and microbiological analysis. Separate samples were drawn for respective analysis. The flow diagram for preparation of herbal *Shrikhand* has been shown in figure below:

Flow diagram for Herbal *Shrikhand* preparation

Moisture: Moisture content of *Shrikhand* was estimated gravimetrically using Mojonnier test as the method outlined in the laboratory manual (1959).

Total solids: Total solids content of *Shrikhand* was determined as per procedure given in ICAR bulletin No. 20 for cheese (1951).

Determination of Fat: Fat content of *Shrikhand* was determined by Gerber's method as described in ISI, 1224 (Part-I, 1977) for the analysis of dairy product.

Determination of Protein: Protein content of *Shrikhand* was estimated according to the method recommended by ISI (1961) for the determination of milk protein.

Determination of Ash: Ash content of *Shrikhand* was determined as per method recommended by ICAR (1951) in bulletin No. 70.

Total Titrable Acidity: Samples (10g) were diluted with 30 ml of water and were titrated against 0.1N NaOH using phenolphthalein as an indicator. The acidity was calculated by using the following formula and expressed in per cent.

$$\% \text{ Total Acidity} = \frac{\text{Titre value} \times N \text{ of alkali} \times \text{volume made up} \times \text{equivalent wt. of acid} \times 100}{\text{volume of sample taken}} \times 100$$

Texture Profile Analysis: TPA measures parameters such as gumminess, cohesiveness, adhesiveness and firmness/hardness.

Test setting: A cylindrical probe was used to compare the sample. The instrument was operated at pre test speed = 1.0 mm/s; test speed = 1.0 mm/s; post test speed = 10 mm/s; distance = 10 mm, trigger force = 5.0 g. All measurement were carried out in a controlled room at 25°C.

Statistical Analysis: The data obtained was analyzed statistically. The significant results were further analyzed to find out critical difference between and within the treatment.

Results and Discussion

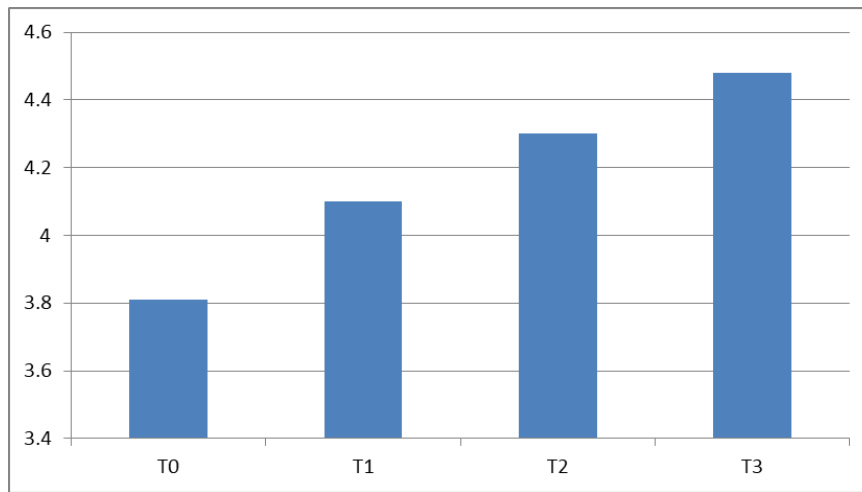
Effect of *Tulsi* extract on fat content

The amount of fat content show no significant increase with increase in the amount of *Tulsi* extract. The fat content of

standardized sample was 8.5%. Results for 100% sugar reported are 8.03%, 9.30% and 11.16% observed by Kumar *et al.* (2011)^[4]. The disparities may be due to the different milk used for curd production. Mahrotra *et al.* (2014) observed that the amount of fat content did not increased significantly ($p \leq 0.05$) with decrease in the amount of sugar and increase in the amount of *Stevia* Leaf Extract.

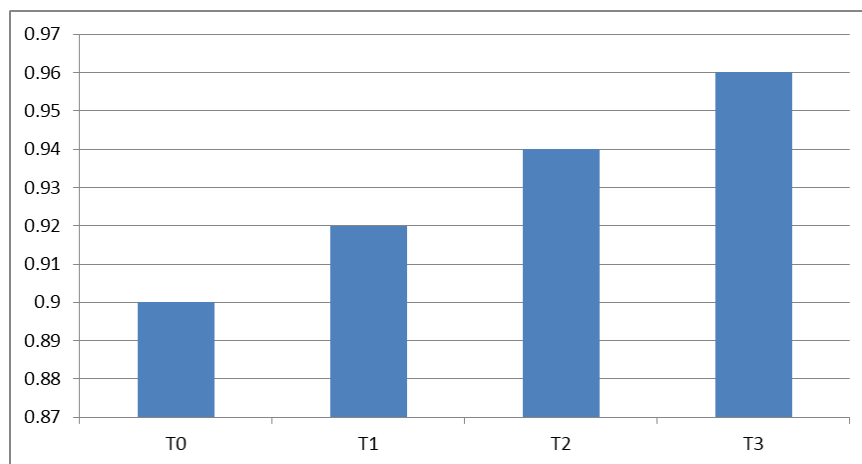
Effect of *Tulsi* extract on Protein content

The amount of protein showed significant increase with increase of *Tulsi* extract. The values range from 3.81 to 4.48%. The protein content of standardized sample is 4.15%. The increase in content is shown with the help of fig. given below. Mahrotra *et al.* (2014) observed significant change in the protein content of *Shrikhand* only due to increase in the proportion of *Stevia leaf extract*. (On X-axis: Protein content, Y-axis: Treatments)



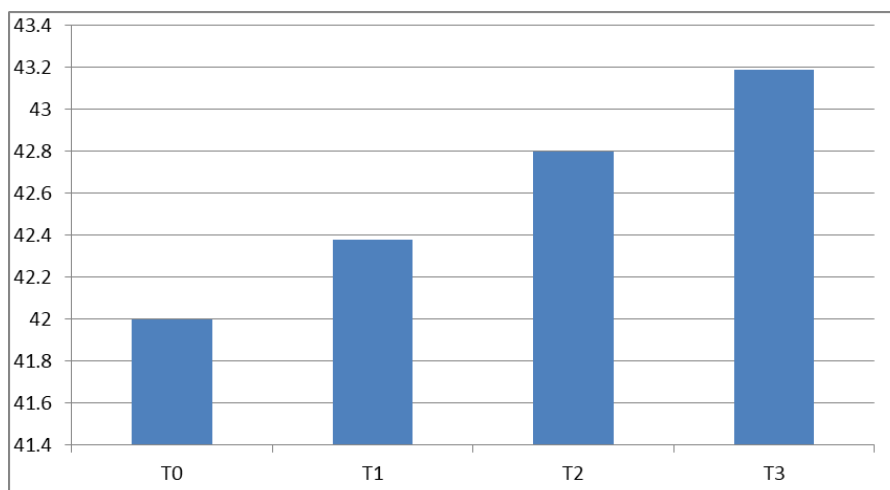
Effect of *Tulsi* extract on Ash content: The results of present investigation show that the ash content increase significantly with increase in *Tulsi* extract content. The values range from 0.9 to 0.96%. The ash content of standardized sample was 0.94. The increase in content is shown with the

help of fig. given below. Mahrotra *et al.* (2014) observed that the ash content increase significantly ($p \leq 0.05$) with decrease in sugar content. The values range from 0.59 to 0.66%. ((On X-axis: Ash content, Y-axis: Treatments))



Effect of *Tulsi* extract on Total solid content: Total Solid shows no significant change. During storage Total Solid slightly increased and the reason could be due to moisture loss. Similarly, Mutlag and Hassan (2008) [7] also reported that there were no observable differences in Total Solid of labneh produced by addition of three different essential oils.

Effect of *Tulsi* extract on Moisture content: There is significant increase in the moisture content of Herbal *Shrikhand*. The highest moisture content was found in sample T₃ (43.19±0.03). Moisture content of standardized sample was 42.81. The increase in content is shown with the help of fig. given below. Similar type of observation was recorded by Kumar *et al.* (2011) [6] prepared *Shrikhand* using apple pulp. (On X-axis: Moisture content, Y-axis: Treatments)



Texture Profile Analysis of Herbal *Shrikhand*

Table 2: Value of textural property of Herbal *Shrikhand*

Proportion of <i>Tulsi</i> extract	Firmness	consistency	Cohesiveness	Adhesive force
0	66.1a	48.487a	36.67a	34.2a
0.7	65.1b	46.099b	34.73b	31.3b
0.9	64.1c	43.738c	32.7c	28.6c
1.1	63.2d	41.378d	30.65d	25.8d
CD at 5% Level	0.11	0.0012	0.073	0.08

Any two means, in a column not followed by same letters differ significantly at 5% level

The textural profile parameters, namely firmness, consistency, cohesiveness and adhesiveness were measured using TPA and are given in (Above Table). The decrease in firmness, consistency, cohesiveness and adhesiveness was due to an increase in compactness on microstructure of *Shrikhand* prepared using *Tulsi* extract. This may be due to the fact that *Tulsi* extract increased the moisture content and the less amount of sugar used decreased the consistency hence loosening the binding capacity of the *Shrikhand*. There was a significant ($p \leq 0.05$) difference in the textural properties of *Shrikhand* on increasing the amount of *Tulsi* extract. Mehrotra (2014)^[5] observed that *Shrikhand* prepared with 100% sugar was more firm (66.1g) and had a better adhesiveness than the treated *Stevia* sample. The decrease in hardness, adhesiveness and gumminess were correlated to an increase in compactness on microstructure of *Shrikhand* prepared using *Stevia*.

Effect on acidity of herbal *Shrikhand*

The acidity score varied from 7.41 to 7.67 on the day of production. Apparently acidity increased up to 7th day and decreasing trend observed thereafter in control T₀ and T₁ samples during storage. Treatment T₃ was superior over all the treatments in regard to acidity. This may be due to higher level of *Tulsi* (0.7 %).

Treatment	Storage period (in days)									
	00	07	15	22	30	37	45	52	60	
T ₀	7.41	7.48	7.36	6.36	5.29	4.97	-	-	-	
T ₁	7.59	7.69	7.68	7.47	6.21	5.84	5.13	0.0	-	
T ₂	7.65	7.83	7.77	7.56	7.16	7.08	6.46	6.21	-	
T ₃	7.67	7.97	7.81	7.61	7.21	7.11	6.63	6.30	-	
Mean	7.58	7.74	7.65	7.25	6.47	6.25	4.55	3.13	-	
SE+	0.05	0.08	0.04	0.06	0.02	0.05	0.07	0.05	-	
CD at 5%	0.17	0.24	0.13	0.18	0.06	0.16	0.21	0.16	-	

Conclusion

The present study was attempted to manufacture Herbal *Shrikhand*. The combination of 0.9 % *Tulsi* extract and 40 % sugar was considered to be most appropriate level for manufacturing of Herbal *Shrikhand*. The experiment study was conducted in the Department Laboratory, Animal Husbandry & Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (U.P.), India. The finding of present investigation is summarized as under:

Incorporation of *Tulsi* extract to *Shrikhand* formula was successfully achieved. Treatment T₂ (0.9% *Tulsi* extract) enhance the flavour and taste of *Shrikhand* and recorded as best in Overall Acceptability when compare to other sample. *Tulsi* extract addition significantly increase, protein, ash, moisture content and did not change the mass fraction of fat, total solid in *Shrikhand*. The decrease in hardness, adhesiveness and gumminess was recorded. Panelists gave the highest flavour, body and texture, and appearance and colour scores to the *Shrikhand* with 0.9 % of *Tulsi* extract and 40 % sugar among the other sample.

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