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## Studies of Physico-chemical properties of date pulp added *Shrikhand*

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**Abstract**

On the present study, the attempt have been made to prepared *shrikhand* by using buffalo milk and date pulp at particular treatments T<sub>2</sub> (90% *chakka* + 10% date pulp), T<sub>3</sub> (80% *chakka* + 20% date pulp), T<sub>4</sub> (70% *chakka* + 30% date pulp) and T<sub>1</sub> (control). The physico-chemical properties of date pulp added *shrikhand* range of acidity for *shrikhand* samples was 0.90 to 1.07 for treatments T<sub>1</sub> to T<sub>4</sub>, respectively and pH range for *shrikhand* samples was 4.55 to 4.33 per cent, respectively. The range of fat contain for *shrikhand* samples was 8.02 to 7.78 and the range of protein content for *shrikhand* samples was 9.07 to 8.80. The range of fiber content in *shrikhand* samples was found 0.00 to 0.48 per cent and the range of moisture content of *shrikhand* samples was 40.98 to 45.17 per cent. The range of total solids content for *shrikhand* samples was found to be 59.02 to 54.83 per cent. The mean ash content in the *shrikhand* samples was found to be 0.85 to 1.05 per cent. Lastly the average mean score of colour index for date pulp added *shrikhand* in control and developed samples, the corresponding values for L\*, a\* and b\* were varies from 84.32 to 75.42, 1.37 to 4.41 and 14.26 to 18.72 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. From the present result it was observed that, the addition of date pulp levels raised the acidity, moisture, ash, fiber and decreased the pH, fat, protein, total solids percentage.

**Keywords:** Buffalo Milk, *Chakka*, date pulp, Physico-chemical, *Shrikhand*

**Introduction**

*Shrikhand* is semi solid soft, sweetish sour fermented dairy product. It is a popular delicacy in Gujarat, Maharashtra and Karnataka. It is consumed as a desert. It is prepared from cow, buffalo or mixed milk. Lactic fermented curd is obtained by the associative action of microorganisms on the milk constituents. Health benefits of milk include good bone health, robust skin, good immune system, prevention of illness such as hypertension, dental decay, dehydration, respiratory problems, obesity, osteoporosis and even some forms of cancer. Many animals do provide us with this vital health substances but cow's milk is considered the best wholesome supplements for children as well as adults. It is prepared from lactic acid fermentation. It is made with *Chakka* (strained yoghurt/curd) which is finely mixed with sugar and flavoring agents. It has the nutritive goodness of fermented milk products. Like *Dahi* (curd), it is very refreshing particularly during summer months. It is popular because of its characteristic flavor, taste, palatable nature and possible therapeutic value. (Yadav and Rai, 2018) [9].

Date Palm fruit pulp is used extensively as fruit ingredients in various dairy products, jams and jellies, *burfi*, etc. Till today, there are no scientific events observed for the use of date palm in *shrikhand* preparation. Dates have therapeutic effects of date fruits in prevention of diseases via modulation by various medicinal properties such as date fruit has anti-microbial, anti-oxidant, nephro-protective, anti-diabetic, anti-inflammatory, anti-tumor, hepto-protective and sex hormone modulator. In female diseases problem it have labor and delivery relaxation characters. (Rahmani *et al.* (2014) [6]. Date fruit is also a good source of important phytochemicals, including carotenoids, phenolics, and flavonoids. Date fruit can not only provide antioxidant, antimutagenic, and immunomodulatory benefits to health but also has diverse medicinal values, including antihyperlipidemic, anticancer, gastroprotective, hepatoprotective, and nephroprotective properties. (Raina *et al.* 2014) [7].

**Materials and Methods****Methods Buffalo milk and Date pulp**

Standardized fresh buffalo milk was collected from local market of Latur city, of Natural Milk Pvt., Ltd., Latur having 6.0 per cent fat and 9 per cent SNF.

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The Date fruit (Kimia Variety) was purchased from local market of Latur city. Date pulp was prepared in laboratory.

### Packaging Material

The prepared product was packed in plastic container (Glass) and kept at refrigerator temp  $5 \pm 1^{\circ} \text{C}$  for storage.

### Equipment and Accessories

Equipment's and accessories include stainless steel vessels of requisite capacity, knives, incubator, fruit extractor/mixture, muslin cloth, standard weight balance, thermometer, gas shagdi etc. for preparation of date pulp added *shrikhand*. Before using this material, it was properly cleaned and washed with detergent solution and all the precautionary measures was considered during the conduct of trials to avoid contamination.

### Preparation of Date Pulp

For preparation date pulp fresh dates was used. Firstly removed the seeds of dates. The dates were grinded in a mixer for few minutes to obtain pulp. The pulp was stored in refrigerator for further use. The date pulp obtained from 100 gm date pulp was 75 gm.

### Preparation of Shrikhand by using Date Pulp

For preparation of *shrikhand* by using buffalo milk and date pulp. The buffalo milk was heated at  $80 - 85^{\circ} \text{C}$  for 15 minute and cooled to room temperature ( $37^{\circ} \text{C}$ ). After cooling 2 per cent standard *dahi* culture NCDC - 167 was added in the milk and incubated at  $37^{\circ} \text{C}$  for 8 hours. The curd was obtained after incubation was tied in muslin cloth. Then it was hanged in double folded muslin cloths to drain out of whey for 6-8 hours. The *chakka* was used as base material for preparation of *shrikhand*. Then *chakka* was weighted and divided into four portions. In each parts of *chakka* were considered as treatments and powdered sugar were added T<sub>1</sub> 35 per cent, T<sub>2</sub> 30 per cent, T<sub>3</sub> 25 per cent and T<sub>4</sub> 20 per cent and date pulp also added in three treatments as per treatment combinations to maintain the desire sweetness of final product. The proportion of sugar was reduced as the proportion of date pulp increased. Finally proper mixing was done and packed the *shrikhand* was kept at refrigerator condition for further study.

### Physico-Chemical Analysis of Date Pulp Added Shrikhand

The samples of *shrikhand* prepared by using date pulp were subjected for physico-chemical analysis viz. acidity, pH, fat, protein, moisture, total solids, ash, colour index, fiber with control sample. The results for all parameter are present in forthcoming tables.

#### 1. Acidity Percentage of Date Pulp Added Shrikhand

Titration acidity of a food system is indicative of the total acid concentration within a food and estimated by titration method. The average scores observed for prepared *shrikhand* are denoted in table. 1.

**Table 1:** Acidity of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	0.89	0.91	0.90	0.91	0.90 <sup>a</sup>
T <sub>2</sub>	0.92	0.98	0.95	0.95	0.95 <sup>b</sup>
T <sub>3</sub>	0.99	1.04	1.02	1.01	1.02 <sup>c</sup>
T <sub>4</sub>	1.04	1.07	1.10	1.06	1.07 <sup>d</sup>
S.E.± 0.0527 C.D. at 5% 0.0322					

The values with different superscript row wise differ significantly at 5 and level of significance.

From table, 1, it observed that, the average mean score of developed product i.e. date pulp added *shrikhand* were as 0.90, 0.95, 1.02 and 1.07 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. It specified that the average value of *shrikhand* went on increasing due to the addition of date pulp, might be due to the date pulp ingredients, because the date pulp was added in final stage at the time of mixing sugar later on no fermentation allowed. The highest and lowest mean average values were observed in T<sub>4</sub> and T<sub>1</sub> treatments i.e. 1.07 and 0.90, respectively. The acidity percentage of developed product was pump up due to some acidic nature of date pulp. All the treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were significantly different from each other. From the above research observed that if acidity of any fermented product increased similarly pH of product decreased. The result for acidity of developed product comparable to following research workers. Shinde *et al.* (2018)<sup>[8]</sup>, observed that, the average mean score for acidity of date pulp added milkshake were 0.18, 0.24, 0.27, 0.30 and 0.32 for treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. The mean value of acidity increased with increased in the level of date pulp. From the above discussion and present result it is observed that, addition of date pulp in milk products responsible for increased acidity according to treatments supported by Shinde *et al.* (2018)<sup>[8]</sup>.

### pH of Date Pulp Added Shrikhand

The pH of any product determines basic or acidic nature of the product. pH of prepared product measured by using digital pH meter at room temperature. The present average score is reported in table. 2.

**Table 2:** pH of date pulp added *shrikhand*

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	4.60	4.54	4.50	4.57	4.55 <sup>a</sup>
T <sub>2</sub>	4.51	4.47	4.44	4.50	4.48 <sup>b</sup>
T <sub>3</sub>	4.43	4.39	4.37	4.43	4.41 <sup>c</sup>
T <sub>4</sub>	4.35	4.31	4.30	4.36	4.33 <sup>d</sup>
S.E.± 0.0169 C.D. at 5% 0.0521					

The values with different superscript row wise differ significantly at 5 and level of significance.

Table. 2, indicated that, the average scores for pH content of treatments were declined and agreement with the inversely proportion of acidity and pH. The scores for pH content were 4.55, 4.48, 4.41 and 4.33 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. The highest pH observed in control T<sub>1</sub> (4.55) and lowest pH T<sub>4</sub> (4.33) this was due to increased in the acidity of *shrikhand* as compared to decreased in the pH content due to addition of date pulp. In present investigation all treatments were significantly different from each other at 5 per cent level of significance. The results for pH of date pulp added *shrikhand* were similar to some following research work. Hashim and Shamsi (2016)<sup>[3]</sup>, revealed the study on physico-chemical and sensory properties of ice-cream sweetened with date syrup in that investigation the pH of ice-cream decreased by increased the date syrup. The mean score of pH were  $5.71 \pm 0.01$  (control),  $5.67 \pm 0.04$  (25 per cent date syrup),  $5.67 \pm 0.01$  (50 per cent date syrup) and  $5.56 \pm 0.04$  (100 per cent date syrup), respectively. From the above discussion it is observed that, different workers used different non dairy ingredients to developed milk products and observed change in acidity and pH having inversely propositional to each other. It may be due that the acidic nature of those ingredients along with contribution of its components for acidity and pH.

Owing to that, acidity of date pulp added *shrikhand* also increased.

### Fat Content of Date Pulp Added *Shrikhand*

The results regarding the fat content in *shrikhand* by using of different levels of date pulp represented in table. 3.

**Table 3:** Fat content of date pulp added *shrikhand*

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	8.02	8.00	8.05	8.01	8.02 <sup>a</sup>
T <sub>2</sub>	7.90	7.92	7.95	7.91	7.92 <sup>b</sup>
T <sub>3</sub>	7.82	7.81	7.88	7.83	7.84 <sup>c</sup>
T <sub>4</sub>	7.78	7.77	7.80	7.75	7.78 <sup>d</sup>
S.E.± 0.0120 C.D. at 5% 0.0372					

The values with different superscript row wise differ significantly at 5 and level of significance.

From given table. 3 it is observed that, the fat content in formulated product *shrikhand* ranged in 8.02 to 7.78. The largest fat content was listed for T<sub>1</sub> (control) 8.02 per cent and lowest fat percentage was in T<sub>4</sub> 7.78 (30 per cent pulp). The present observation clearly shows that, by addition of date pulp in *shrikhand* decreased the level of fat in the product. The fat percentage of date pulp was 0.15 gm per 100 gm of date is the main cause for declined the fat content in developed treatments. The mean average scores for fat content were 8.02, 7.92, 7.84 and 7.78 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. In all treatments of *shrikhand*, significant reduction of fat were observed at par with each other at 5 per cent level of significance and supported by the following results. Mete *et al.* (2017) <sup>[5]</sup> a, studies on preparation of *khajoor burfi*. In that, the fat percentage of *khajoor burfi* was decreased due to the addition of date pulp. The average score for fat were 18, 16.63, 12.37 and 11.33 for samples B<sub>0</sub> (control), B<sub>1</sub> (10 per cent pulp), B<sub>2</sub> (20 per cent pulp) and B<sub>3</sub> (30 per cent pulp), respectively. From the above investigation it revealed that, due to the low amount of fat percentage in date as well as sweet corn, sapota pulp, *gulkand* and rose petal powder suppress the overall percentage of fat in developed products.

### Protein Content of Date Pulp Added *Shrikhand*

Proteins are one of the essential content of any product in terms of its healthy constitution. Protein has many roles in human body. It helps to repair and build human body tissue. The actual protein percentage of dates has 1.81 gm per 100 gm of dates. The protein percentage for prepared product was evaluated by the Kjeldhal's distillation flask method. The given data pertaining for protein content of *shrikhand* influenced by different treatments of date pulp are tabulated in table. 4.

**Table 4:** Protein content of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	9.00	9.10	9.02	9.15	9.07 <sup>a</sup>
T <sub>2</sub>	8.95	8.98	8.91	9.02	8.97 <sup>b</sup>
T <sub>3</sub>	8.88	8.83	8.83	8.96	8.88 <sup>bc</sup>
T <sub>4</sub>	8.79	8.75	8.77	8.89	8.80 <sup>c</sup>
S.E.± 0.0300 C.D. at 5% 0.0924					

The values with different superscript row wise differ significantly at 5 and level of significance.

The average protein percentage calculated in table. 4, of the date pulp added *shrikhand* went on decreasing. The average

mean values of date pulp added *shrikhand* ranged in between 8.80 per cent to 9.07 per cent. The lowest protein score observed in T<sub>4</sub> (30 per cent pulp) and highest protein content found in T<sub>1</sub> (control). The average mean of protein content in date pulp added *shrikhand* were 9.07, 8.97, 8.88 and 8.80 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. From the present investigation revealed that date pulp suppresses the level of protein in *shrikhand* and also noticed that protein level reduced significantly in pulp added treatments compared to control treatment but in developed treatments it reduced none significantly in successive treatments and significantly reduced in alternate treatments. It indicates that up to 10 per cent date pulp not affected on protein content but 20 per cent affected. And that's why treatment T<sub>2</sub> and T<sub>3</sub> and T<sub>3</sub> and T<sub>4</sub> were at par with each other. The treatment T<sub>1</sub> found significantly higher protein than other developed treatments. The below mentioned studies can be compared and may be supportive to present investigation. Mete *et al.* (2017) <sup>[5]</sup> a, prepared *khajoor burfi* in that, the protein percentage was decreased by the addition of date pulp. The average mean score for protein were 14.30, 13.36, 12.37 and 11.33 for samples B<sub>0</sub> (control), B<sub>1</sub> (10 per cent pulp), B<sub>2</sub> (20 per cent pulp) and B<sub>3</sub> (30 per cent pulp), respectively.

### Moisture Content of Date pulp Added *Shrikhand*

The moisture percentage denoted the presence of water level in product. The observed values of moisture of prepared product are given in table. 5.

**Table 5:** Moisture content of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	41.28	40.44	41.00	41.21	40.98 <sup>a</sup>
T <sub>2</sub>	43.32	42.02	42.33	42.11	42.45 <sup>b</sup>
T <sub>3</sub>	44.98	44.30	44.50	43.24	44.26 <sup>c</sup>
T <sub>4</sub>	45.22	45.71	44.77	44.98	45.17 <sup>d</sup>
S.E.± 0.2744 C.D. at 5% 0.8455					

The values with different superscript row wise differ significantly at 5 and level of significance.

It shows that the result obtained from table. 5, it was revealed that, the percentage of moisture in date pulp added *shrikhand* was increased. The percentage range of moisture moderately increased in treatment T<sub>4</sub>. The lowest range of moisture observed in T<sub>1</sub> (control) for formulated product. The average mean scores of date pulp added *shrikhand* were listed as 40.98, 42.45, 44.26 and 45.17 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. The development in moisture percentage in *shrikhand* due to incorporating the date pulp in developed *shrikhand*. From the above observation clearly stated that all of them were significantly different from each other at 5 per cent level of significance. Value recorded in moisture content present investigation with similar to some another findings as follows. Mane *et al.* (2017) <sup>[4]</sup>, studied the physico-chemical properties *shrikhand* blended with sweet corn milk. The moisture content was observed to be increased similar to the date pulp added *shrikhand*. The moisture content ranges from (T<sub>3</sub>) 32.5 to (T<sub>0</sub>) 35.9, respectively. This might be due to the higher content of moisture in mango pulp, apple pulp and sweet corn milk, respectively. However, in date palm pulp added products prepared by different workers when compared with present result observed variation in moisture content of their products for examples.

### Total Solids Content of Date Pulp Added *Shrikhand*

Total solids are that remaining content other than moisture amount. After the removing of moisture that product is total solids. The total solids percentage for prepared product was recorded and is tabulated in table. 6.

**Table 6:** Total solids content of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	58.72	59.56	59.00	58.79	59.02 <sup>a</sup>
T <sub>2</sub>	56.68	57.98	57.67	57.89	57.56 <sup>b</sup>
T <sub>3</sub>	55.02	55.70	55.50	56.76	55.75 <sup>c</sup>
T <sub>4</sub>	54.78	54.29	55.23	55.02	54.83 <sup>d</sup>
S.E.± 0.2744 C.D. at 5% 0.8455					

The values with different superscript row wise differ significantly at 5 and level of significance.

From given table. 6, clear that the average of total solids went on decreased in date pulp added *shrikhand*. The mean average values for total solids were 59.02, 57.56, 55.75 and 54.83 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. The highest total solids content in T<sub>1</sub> (59.02 per cent) and lowest observed in T<sub>4</sub> (54.83 per cent). In all over result it revealed that, total solids reduced significantly. The present observation found that increased the percentage moisture declined the percentage of total solids by the addition of date pulp in *shrikhand*. From the above result all treatments were significantly different from each other. The present investigation was similar to some other findings works. Hamad *et al.* (2017)<sup>[2]</sup>, studied on effect of addition dates on yield, chemical composition and sensory evaluation of ice cream. The average mean score for total solids were 40.12, 38.05, 36.99, 34.82, 32.65 and 31.85 for 0 per cent, 5 per cent, 10 per cent, 15 per cent, 20 per cent and 25 per cent level of dates. It clearly showed that, the addition of dates in ice cream suppress the level of total solids. The variation for moisture content and total solids in respective products as compared to present study may be due to the different types of products prepared by them such as heat desiccated products, liquid blended products, fermented products and stage of addition of pulp i.e. before processing, during processing and at last stage no processing also affect on moisture variation and content of that products.

**Ash Content of Date Pulp Added *Shrikhand*:** The results in respect of ash content of *shrikhand* as influenced by different treatments of date pulp are given in table. 7.

**Table 7:** Ash content of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	0.85	0.84	0.80	0.82	0.85 <sup>a</sup>
T <sub>2</sub>	0.92	0.90	0.95	0.88	0.91 <sup>b</sup>
T <sub>3</sub>	0.99	0.96	1.02	0.98	0.99 <sup>c</sup>
T <sub>4</sub>	1.07	1.01	1.06	1.06	1.05 <sup>d</sup>
S.E.± 0.0134 C.D. at 5% 0.0413					

The values with different superscript row wise differ significantly at 5 and level of significance.

From given table. 7 it revealed that, the ash percentage T<sub>4</sub> (1.05), respectively. The lowest and highest score of ash percentage shows in T<sub>1</sub> and T<sub>4</sub> in formulating *shrikhand*. The values recorded in ash content in the present investigation were similar with given research works. Shinde *et al.* (2018)<sup>[8]</sup>, observed the physico-chemical analysis of date pulp added milkshake. The lowest ash content (0.86 per cent) was observed in milkshake prepared without date pulp (T<sub>0</sub>), whereas the highest per cent (1.88 per cent) in milkshake with 10 per cent date pulps (T<sub>4</sub>). The average score of ash in date pulp added milkshake were 0.86, 1.30, 1.52, 1.70 and 1.88 for treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. From the above discussion it is observed that, the level of ash percentage in milk products was increased might be due to the higher content of minerals in added ingredients.

### Colour Index of Date Pulp Added *Shrikhand*

The results in respect of colour index content of *shrikhand* prepared by different levels of date pulp are depicted in table. 8. The colour intensity of the all *shrikhand* samples was measured by reflectance spectroscopy technique (Hunter Lab, Reston, Virginia, USA). In which the L\* value shows lightness ranges from 0 (black) to 100 (white), a\* value indicating the redness ranges from yellowness of samples+60 (red) to-60 (green) and b\* value showing yellowness of samples ranges from + 60 (yellow) to -60 (blue) and presented in table no. 8. As observed in table for control and developed samples, the corresponding values for L\*, a\* and b\* were varies from 84.32 to 75.42, 1.37 to 4.41 and 14.26 to 18.72 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. From the observation all treatments were significantly different from each other at 5 per cent level of significant. The L\* value was lowest recorded in treatment T<sub>4</sub> (30 per cent pulp) and highest recorded in T<sub>1</sub> (control). The a\* value was highest observed in T<sub>4</sub> and lowest observed in T<sub>1</sub>. And the b\* value was highest present in T<sub>4</sub> and lowest present in T<sub>1</sub>, respectively. It was clearly indicates from colour of *shrikhand* that the addition of date pulp in *shrikhand* influence.

**Table 8:** Colour index of date pulp added *shrikhand*

Replication Treatment	R <sub>1</sub>			R <sub>2</sub>			R <sub>3</sub>			R <sub>4</sub>			Mean		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
T <sub>1</sub>	84.20	1.40	14.40	84.22	1.32	14.20	84.33	1.26	14.32	84.54	1.51	14.11	84.32 <sup>a</sup>	1.37 <sup>a</sup>	14.26 <sup>a</sup>
T <sub>2</sub>	82.24	2.57	15.61	82.20	2.49	15.50	82.15	2.39	15.47	82.21	2.47	15.25	82.20 <sup>b</sup>	2.48 <sup>b</sup>	15.46 <sup>b</sup>
T <sub>3</sub>	80.39	3.16	17.55	80.30	3.11	17.64	80.41	3.21	17.88	80.41	3.25	17.45	80.40 <sup>c</sup>	3.18 <sup>c</sup>	17.63 <sup>c</sup>
T <sub>4</sub>	75.47	4.36	18.47	75.40	4.30	18.85	75.61	4.41	18.95	75.61	4.55	18.61	75.42 <sup>d</sup>	4.41 <sup>d</sup>	18.72 <sup>d</sup>
L*						SE ± 0.0616						CD at 5% = 0.1899			
a*						SE ± 0.0448						CD at 5% = 0.1382			
b*						SE ± 0.0870						CD at 5% = 0.2680			

The values listed in colour index in present research were observed variable to some other specified work might be due to the different non-dairy ingredients, variation in products as mentioned below. Dhumal *et al.* (2018)<sup>[1]</sup>, reported that the colour intensity *lassi* was increased by adding of pudina extract. The average mean values were for L\* 58.3, 60.4,

63.75 and 65.53 per cent for a\* value 1.52, 1.55, 1.61 and 1.65 and for the b\* value 2.15, 2.18, 2.21 and 2.23 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. The above researchers found same increasing trend in all L\* a\* and b\* value but in present work L\* value was found decreasing trend as compared to them, whereas a\* and b\* values found

increasing order.

### Fiber Content of Date pulp Added Shrikhand

Milk is considered complete food but they are deficient in fiber and iron. The date pulp contains nearly about 1.64 gm fiber for 100 gm of date sample. The values were shown in respects of fiber in final fresh product given in table. 9.

**Table 9:** Fiber content of date pulp added *shrikhand* (in per cent)

Replication/Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	0.00	0.00	0.00	0.00	0.00 <sup>a</sup>
T <sub>2</sub>	0.16	0.15	0.16	0.15	0.16 <sup>b</sup>
T <sub>3</sub>	0.32	0.31	0.32	0.30	0.31 <sup>c</sup>
T <sub>4</sub>	0.49	0.48	0.49	0.47	0.48 <sup>d</sup>
S.E.± 0.0036 C.D. at 5% 0.0113					

The values with different superscript row wise differ significantly at 5 and level of significance.

From given table. 9, it was concluded that, dates are good source of fiber content. The average mean value of fiber percentage went increasing from treatment T<sub>2</sub> to treatment T<sub>4</sub>, respectively. And control treatment T<sub>1</sub> was completely deficient in fiber percentage. The average mean scores for fiber were 0.00, 0.16, 0.31 and 0.48 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. From given result all treatments T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> and T<sub>4</sub> significantly different from each other. The treatment T<sub>4</sub> (0.48) show higher amount of fiber percentage as compared to other treatments. The values recorded in fiber content in the present analysis were similar with the following specified research works. Mete *et al.* (2017) <sup>[5]</sup> a, showed that in *khajoor burfi* fiber level percentage in finalized date pulp added *shrikhand* increased with the increased the level of date pulp. Dates contain maximum level of fiber. The average mean score for fiber percentage in date pulp added *shrikhand* were 0, 0.26, 0.52 and 0.78 for samples B<sub>0</sub> (control), B<sub>1</sub> (10 per cent pulp), B<sub>2</sub> (20 per cent pulp) and B<sub>3</sub> (30 per cent pulp), respectively.

### Conclusion

Date pulp is type of fruit ingredients in food products, which can impact specific functionalities to food products, while enhancing, preserving and nutritional and compositional quality of food. The date pulp could successfully utilize for preparation of *shrikhand*. It helps to improve the functional, nutritional and keeping quality of product. On an average the acidity of date pulp added *shrikhand* was found 0.90, 0.95, 1.02 and 1.07 per cent, pH 4.55, 4.48, 4.41 and 4.33 per cent, fat 8.02, 7.92, 7.84 and 7.78 per cent, protein 9.07, 8.97, 8.88 and 8.80 per cent, moisture 40.98, 42.45, 44.26 and 45.17 per cent, total solids 59.02, 57.56, 55.75 and 54.83 per cent, ash 0.85, 0.99, 0.99 and 1.05 per cent, fiber 0.00, 0.16, 0.31 and 0.48 per cent, respectively. Lastly the average mean score colour index for L\*, a\* and b\* were varies from 84.32 to 75.42, 1.37 to 4.41 and 14.26 to 18.72 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively. It was observed that, the addition of date pulp levels raised the acidity, moisture, ash, fiber and decreased the pH, fat, protein, total solids percentage.

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