Consequence of pineapple (ananus cosmous) pulp on physico-chemical and sensory properties of shrikhand

SB Patil, PV Padghan and YN Patil

Abstract
Effect of addition of different levels of pineapple pulp on chemical composition of pineapple pulp added shrikhand. The three levels of pineapple pulp viz. 5(T1), 10(T2) and 15(T3) on weight basis of shrikhand were shrikhand prepared as 40% sugar as per the weight of chakka and compare T0, T1 and T3 along with T0(as a control). With increase in the level of pineapple pulp acidity, moisture and fiber goes on increase and pH, fat, protein, total solid and ash goes on decrease. The range of acidity for pineapple pulp added shrikhand was 1.03, 1.18, 1.28 to 1.43 for treatments T0 to T3, respectively and the pH range for pineapple pulp added shrikhand was 4.08 to 4.68 per cent, respectively. The fat content of pineapple pulp added shrikhand was 9.13, 7.50, 7.48 to 6.25 and the of protein content for pineapple pulp added shrikhand was 7.70, 7.29, 6.91 and 6.52 for treatment T0, T1, T2 and T3. The moisture content of pineapple pulp added shrikhand was found to be 60.55, 58.56, 55.92 and 52.48 per cent for treatment T0, T1, T2 and T3. The mean ash content in the pineapple pulp added shrikhand was found to be 0.82 to 0.52 per cent. The range of fiber content in pineapple pulp added shrikhand was found to be 0.00 to 0.07.

Keywords: Pineapple pulp shrikhand, physico-chemical analysis, sensory property

Introduction
Shrikhand is one of the fermented indigenous milk product obtained by fermented action of lactic acid bacteria. The name shrikhand is derived from the Sanskrit word ‘Shrikharami’ meaning a curd prepared with added sugar, flavouring agent like saffron fruits and nuts Srinivas et al. Shrikhand commonly prepared from chakka, is base material for making shrikhand. Besides fresh milk, other products like diluted condensed milk, reconstituted skim milk, buttermilk, skim milk and condensed milk has been used for preparation of shrikhand. However, quality of shrikhand obtained from these products is inferior. Fermented milk product like shrikhand has some advantages over fluid milk because of more keeping quality, digestibility and palatability, with its distinct taste, richness, delicacy, diversity, fairly longer shelf-life Abhimanyu et al. Pineapple (Ananas cosmous) is the third most important fruit crop in the tropical and subtropical region of world preceded by Banana and Citrus. It is one of the most important commercial fruit crop in the world and known as the Queen of fruits due to it’s excellent flavour and taste. Pineapple belongs to the bromeliaceous family and grows on the ground. It can be grow upto 1 M height and 1.5 M wide. Pineapple mainly contains water, carbohydrates, sugar, vitamins –A, vit-C, and Beta-carotene. It contains low amount of protein, fat, ash, and fiber. Pineapple contains antioxidants namely flavonoids, vit-A and C. These antioxidants reduce the oxidative damage such as that caused by free radicals and chelating metals. It also has enzymes complex protease (Bromelain). Bromelain contains peroxidase and acid phosphate, several protease inhibitors and organically bound calcium Tochi et al.

Materials and Methods
Materials
Following material were collected to meet the objectives of the present study.

1. Collection of buffalo milk
Already standardized fresh buffalo milk was procured from local market of Latur city, of Natural Milk Pvt., Ltd., Latur having 6.0 per cent fat and 9 per cent SNF.
2. Collection of pineapple pulp
Fresh pineapple purchased from local market of Latur and pineapple pulp was prepared in laboratory.

3. Dahi culture
Standard dahi culture (NCDC-167) was available in laboratory which was procured from National Dairy Research Institute, Karnal.

Preparation of Pineapple Pulp:

Collection of fresh Pineapple
Sorting (not infected)
Washing
Peeling and slice made
Grinding of pineapple pulp
Sieve the pulp
Pineapple pulp
Stored at refrigerator condition

Treatment Combinations
For preparation of shrikhand by using pineapple fruit (Ananas comosus) pulp, the treatments combinations were finalized on weight basis as per follows:

<table>
<thead>
<tr>
<th>T0</th>
<th>100 Parts of shrikhand as a control</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>95.0 Parts of shrikhand + 5.0 Parts of pineapple pulp</td>
</tr>
<tr>
<td>T2</td>
<td>90.0 Parts of shrikhand + 10.0 Parts of pineapple pulp</td>
</tr>
<tr>
<td>T3</td>
<td>85.0 Parts of shrikhand + 15.0 Parts of pineapple pulp</td>
</tr>
</tbody>
</table>

The different levels was tried and compared with control (T0). For all treatments 40 per cent ground sugar was used.

Results and Discussion
The present study was based to evolve “Preparation of Shrikhand by using Pineapple pulp”. The data collected on different aspects were tabulated & analyzed statistically using the method of analysis of variance and critical difference. The significant & non significant differences observed have been analyzed critically within & between the treatment combinations. The physic-chemical Analysis was determined during three different conditions.

Effect of Pineapple Pulp on Composition of Shrikhand

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Acidity</th>
<th>pH</th>
<th>Fat</th>
<th>Protein</th>
<th>Moisture</th>
<th>Total solid</th>
<th>Ash</th>
<th>Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>1.03</td>
<td>4.68</td>
<td>9.13</td>
<td>7.70</td>
<td>39.43</td>
<td>60.55</td>
<td>0.82</td>
<td>0.00</td>
</tr>
<tr>
<td>T1</td>
<td>1.18</td>
<td>4.43</td>
<td>7.50</td>
<td>7.29</td>
<td>41.44</td>
<td>58.56</td>
<td>0.75</td>
<td>0.02</td>
</tr>
<tr>
<td>T2</td>
<td>1.28</td>
<td>4.23</td>
<td>7.48</td>
<td>6.91</td>
<td>44.08</td>
<td>55.92</td>
<td>0.62</td>
<td>0.05</td>
</tr>
<tr>
<td>T3</td>
<td>1.43</td>
<td>4.08</td>
<td>6.25</td>
<td>6.52</td>
<td>47.32</td>
<td>52.48</td>
<td>0.52</td>
<td>0.07</td>
</tr>
<tr>
<td>S.E.</td>
<td>0.052</td>
<td>0.070</td>
<td>0.146</td>
<td>0.063</td>
<td>0.208</td>
<td>0.210</td>
<td>0.012</td>
<td>0.004</td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td>0.160</td>
<td>0.218</td>
<td>0.450</td>
<td>0.195</td>
<td>0.643</td>
<td>0.647</td>
<td>0.038</td>
<td>0.014</td>
</tr>
</tbody>
</table>

Acidity: The average acidity per cent of finished product found to be 1.03, 1.18, 1.28 and 1.43 per cent for treatment T0, T1, T2 and T3, respectively. The acidity content of finished product was increased as increased in concentration of pineapple pulp. It may be due to higher acidity content of pineapple pulp. Siddhu et al., prepared kulfi blended with pineapple pomace. They observed acidity content of kulfi goes on increased with addition of pineapple pomace.

Sonawane et al., prepared strawberry pulp added shrikhand. In that they observed that significant increased in acidity content as the level of strawberry pulp increased, in strawberry pulp added shrikhand.

pH: The pH content in the develop product as found to be 4.68, 4.43, 4.23 and 4.08 per cent for treatment T0, T1, T2 and T3, respectively. The treatment T0 and T3 was significantly different from each other at 5% level of significance. Bhavsagar et al., manufacture of pineapple flavoured beverage from channa whey and observed the addition of increased level of pineapple increased the acidity of beverage and decreased the pH content of beverage. Chaudhari et al., prepared shrikhand by using banana pulp. In the standard shrikhand pH was 6 but in banana pulp added shrikhand pH goes on decreased was about 4.

Fat: The fat content ranged between 6.25 to 9.13 per cent. The highest value of fat content was recorded for treatment T0 (9.13 per cent) and lowest value was for treatment T3 (6.25 per cent) and found that the pineapple was reduced the fat content of shrikhand. It may be due to low fat content in pineapple pulp. Sawant et al., evaluated physico-chemical qualities of yoghurt drink fortified with pineapple pulp. The
addition of pineapple pulp resulted in no significance result between control and pineapple yoghurt drink samples for fat per cent. While fat percentage was decreased with increased in level of pineapple pulp. Thakur et al., prepared of shrikhand by using mango pulp and observed that increasing the level of mango pulp in shrikhand decreased the fat content of shrikhand.

**Protein:** The average protein content of the shrikhand samples was found to be 7.70, 7.29, 6.91 and 6.52 per cent for treatment T0, T1, T2 and T3 respectively. The highest protein content was recorded for control treatment T0 (7.70) per cent and the lowest protein content was recorded for treatment T3 (6.52) per cent. There was significantly difference between the protein content of all treatment. Revathi and Singh, chemical analysis of whey based pineapple. They observed that the protein content in whey based pineapple beverage decreased with increased of fruit pulp level. Kolape et al., evaluate chemical quality of papaya shrikhand. They observed that control treatment had significantly highest protein content while shrikhand prepared with papaya pulp had lowest protein content.

**Moisture:** It was observed that the average moisture content of finished product were to be found as 39.43, 41.44, 44.08 and 47.32 per cent in treatments T0, T1, T2 and T3 respectively. It was also observed that the lowest moisture content was in T0 (39.43) and the highest was found in T2 (47.32). All treatments significantly different from each other. This might be due to due to higher water holding capacity of interactive mixture of pineapple and milk solids. Kamble et al., prepared burfi blended with pineapple pulp and observed that moisture content of burfi increased in different level of pineapple pulp. This might be due to pineapple pulp content more moisture (84.00%). Sharma et al., prepared shikhand with incorporation of sapota pulp and cocoa powder. Addition of different level of sapota pulp and cocoa powder increased the moisture content of shrikhand.

**Total solid:** It was observed that the average total solid content of treatment T0, T1, T2 and T3 were 60.55, 58.56, 55.92 and 52.48, per cent respectively. The values of total solid content in all the treatment significantly differed from each other. It was also observed that the total solid content was in decreasing order from treatment T0 to T3. Kamble et al., prepared pineapple pulp blended burfi. The total solid content in burfi was affected by addition of different levels of pineapple pulp. Highest level of total solid was noticed in control burfi i.e. 83.53 per cent and lowest level of total solid at 25% level of pineapple pulp was observed i.e. 80.73 per cent.

**Ash:** The average ash content of finished product was 0.82, 0.75, 0.62, and 0.52 percent in treatment T0, T1, T2 and T3 respectively. It was also observed that the lowest ash content was in T3 and highest was found in T0. All the treatments were significantly different from each other and decreased the ash content as the pineapple was increased. Hossain et al., studied nutritional value and medicinal benefits of pineapple. In that they observed that the pineapple pulp had very low ash content. Sameem et al., observed that ash of shrikhand changes due to addition of dragon fruit pulp while shrikhand preparation. The ash content of shrikhand treatment T0, T1, T2 and T3 was 1.70, 1.66, 1.63 and 1.59, respectively.

**Fiber:** The pineapple contains about 0.4-0.5% fiber. it is revealed that fiber content in the develop product as found to be 0.00, 0.02, 0.05 and 0.07 per cent for treatment T0, T1, T2 and T3 respectively. The all treatment was significantly different from each other at 5% level of significance. The fiber content range was about 0.00 to 0.07 percent for treatment T0, T1, T2 and T3 respectively. It was also observed that the total solid content was in decreasing order of pineapple pulp. Highest level of total solid was noticed i.e. 83.53 per cent and lowest level of total solid at 25% level of pineapple pulp was observed i.e. 80.73 per cent.

![Fig 1: Physico-chemical Properties of Pineapple Pulp added Shrikhand](http://www.chemijournal.com)
Outcome of pineapple pulp on sensory property of shrikhand

Sensory evaluation has been defined as a scientific method used to evoke, measure, analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste, and hearing. The shrikhand samples prepared from buffalo milk chakka with mixture of pineapple pulp with different levels were subjected for the sensory attributes such as colour and appearance, flavour, consistency, taste and overall acceptability by a semi panel of judges using a 9 point Hedonic scale and the data so obtained were analyzed by using completely randomized block design (CRBD).

Table 2: Effect of Pineapple Pulp on Sensory property of shrikhand

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Colour and appearance</th>
<th>Flavour</th>
<th>Taste</th>
<th>Consistency</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>7.88</td>
<td>8.00</td>
<td>8.25</td>
<td>8.00</td>
<td>8.00</td>
</tr>
<tr>
<td>T1</td>
<td>8.00</td>
<td>8.13</td>
<td>8.25</td>
<td>8.00</td>
<td>8.09</td>
</tr>
<tr>
<td>T2</td>
<td>8.83</td>
<td>8.13</td>
<td>8.38</td>
<td>7.88</td>
<td>8.30</td>
</tr>
<tr>
<td>T3</td>
<td>8.00</td>
<td>8.50</td>
<td>8.38</td>
<td>7.70</td>
<td>8.16</td>
</tr>
<tr>
<td>S.E.</td>
<td>0.221</td>
<td>0.108</td>
<td>0.114</td>
<td>0.152</td>
<td>0.091</td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td>0.682</td>
<td>0.333</td>
<td>0.351</td>
<td>0.470</td>
<td>0.286</td>
</tr>
</tbody>
</table>

Colour and appearance score: The average scores for colour and appearance attributes ranges between 7.88 to 8.83. That means of all treatment were acceptable and secured score for the point of like very much but T2 have much like on 9 point hedonic scale for colour and appearance. The score of colour attribute for the treatments T0, T1, T2 and T3 were 7.88, 8.00, 8.83 and 8.00, respectively. The colour and appearance score was found lowest for control treatment T0 (7.88) as compared to developed treatments and highest in T2 (8.83) indicate that the use of pineapple for shrikhand preparation have positive impact. The score in T2 treatment reduced subsequently might be due to the excessive yellow colour of shrikhand. The treatment T0, T1 and T3 were at par with each other and significantly differed from T2. Shambharkar et al. (2011), prepared sapota pulp added shrikhand. In that they observed that the colours of shrikhand indicate highest mean score out of 10 observed for T3 prepared with 10 per cent sapota pulp. The proportion of pineapple pulp increased the flavour score was also increased. The treatments T0, T1 and T2 were significantly at par to each other. Whereas treatment T3 and T1 was significantly differs from each other. Kamble et al. (2010), prepared the pineapple pulp added burfi. They observed that concentration of pineapple pulp increased the flavour score of prepared burfi. It was revealed that the 15 per cent level of pineapple pulp addition gives a highest score for flavour. i.e. (42.16).

Taste score: The taste of developed shrikhand was superior over control in all treatments. The mean score of taste for the treatments T0, T1, T2 and T3 was 8.00, 8.25, 8.38 and 8.38, respectively. The treatment T0 was significantly differs from treatment T2 and T3. Treatment T0 was significantly at par with treatment T1. The treatment T2 and T3 was at par with each other. The treatment T1 was also at par with T2 and T3. The highest score for taste for treatment T2 and lowest score for taste for treatment T0 was observed. Bhavsagar et al. (2010) [1], manufacture of pineapple flavoured channa whey. In that taste firstly goes on increased up to the T3 treatment and then decreased. The highest score for taste at 10 per cent level of pineapple pulp added in channa whey.

Consistency score: It was observed that the score for consistency for all treatments T0, T2, T3 and T4 was 8.25, 8.00, 7.88 and 7.70, respectively. The highest score for consistency was recorded for treatment T0 (8.25) whereas lowest score was recorded for treatment T3 (7.70). When we looked regarding consistency, it was clearly indicate that as the proportion of pineapple pulp increased the score was decreased, less consistency was observed in treatment T3 which disturbed the consistency of shrikhand prepared by using 15 per cent of pineapple pulp. For consistency treatment T0 and T3 was significantly different from each other. Treatment T0, T1 and T2 were at par with each other whereas developed treatments T1, T2 and T3 treatment also at par with each other. Similar result was recorded by Thakur et al. (2014), prepared shrikhand by using mango pulp. The score for consistency was recorded for T1, T3 and T4 were 7.44, 7.40, 7.64 and 7.32, respectively. The score for consistency goes on decreased with increasing level of the mango pulp.

Overall acceptability score: The mean score for overall acceptability of pineapple pulp added shrikhand for treatments T0, T1 and T3 were 8.00, 8.09, 8.30 and 8.16,
respectively. The lowest score of overall acceptability was recorded for treatment T\(_0\) (8.00) and highest score for overall acceptability was recorded for treatment T\(_2\) (8.30). It was observe that the overall acceptability score were found to be increased up to T\(_2\) treatment and then after decreased. The overall score for **shrikhand** was found decreased after T\(_3\) treatment as the proportion of pineapple increased it is due to the decreasing score of consistency otherwise all sensory properties were positively affected by pineapple. Only treatment T\(_2\) was found significantly superior over control and non-significantly differ with pineapple added treatments. The similar result for overall acceptability was obtained by Bhavsagar et al. (2010) \(^{[1]}\), who prepared channa whey beverage by addition of pineapple pulp. They observed that the overall acceptability was increased for 10 per cent level of pineapple pulp addition i.e. 7.9 per cent.

**Fig 3:** Sensory Evaluation of Pineapple Pulp added Shrikhand

**Conclusion**

It was observed that as the level of pineapple pulp increased, there was increased acidity, moisture, fiber content and decreased in ash, fat, total solid, protein and pH content of pineapple pulp added **shrikhand**.

It was observed that the score for colour and overall acceptability goes on increased at limited extent. The score for flavour and taste increased and score for consistency goes on decreased with addition of pineapple pulp.

**Reference**