PREPARATION OF KALARAND WITH SAPOTA FRUIT

V. Y. Sawant, B. M. Thombre*, D. S. Chauhan and P. V. Padghan
Department of Animal Husbandry and Dairying
College of Agriculture, Latur-413 512 India

ABSTRACT
To minimize the cost of production of the fruit kalakand and to make available for the rural people was the main objective of the present study. Kalakand partially desiccated milk product was prepared by replacing 10 per cent (T1) and 20 per cent (T2) milk by sapota pulp. Control (T0) was taken as without any replacement of milk. The overall acceptability was rated as 8.94, 8.62 and 8.21 in the treatment T0, T1 and T2, respectively. Proximate analysis of the product indicated the increasing trend of total solids content as the proportion of sapota pulp increased. Fat content of the kalakand decreased significantly by the addition of sapota pulp. Protein content also decreased but there were non-significant differences. However carbohydrate and ash content increased by the addition of sapota pulp. Acidity of the product lowered as the proportion of sapota pulp increased.

INTRODUCTION
Since times immemorial milk has been known to human beings as an almost complete food. Milk is utilized in various forms like cream, butter, cheese, concentrated milk (Khoa) and dried milk products. There is an ever increasing varieties of milk products being introduced in the market with an increased palatability and fascinating forms.

India stands first in liquid milk production in the world. With the annual milk production of 9.10 million tones. Out of the total production of milk about 45.70 per cent of milk is consumed as market milk while 54.30 per cent is converted into various milk products, out of which 6.80 per cent is utilized towards khoa based products (Baxi, 1994). Among the indigenous milk products, kalakand, occupies an important place and found to be an attractive product amongst all the classes of consumers. Kalakand is more popular in Northern and Eastern India, particularly with Bengali people. Kalakand is a milk sweet prepared by heating a mixture of khoa and sugar with continuous and stirring until characteristic grainy texture and caramelised flavour develops. Studies on preparation of kalakand fortified with sapota pulp are rare and hardly reported so far. In general there is a considerable scope for standardizing the process of kalakand preparation incorporated with sapota pulp in order to improve its quality and also to enhance consumer preference. Sapota is the most popular choice of fruits of the tropics. It is also known as the 'King of fruits' because of its palatability excellent taste, pleasant aroma and nutritive value.

MATERIAL AND METHODS
Milk was obtained from Department of Animal Husbandry and Dairying, College of Agriculture, Marathwada Agricultural University, Parbhani (MS). Good quality well developed and fully ripened fresh fruits (Variety Kalipatti) were procured from local market. Pulp was extracted from selected fruits discarding seeds. Other ingredients like sugar, cardamom etc. were obtained from the local market. Citric acid was used as coagulant.

The total solids and protein content in sapota fruit kalakand were determined as per IS-1479 (Part-II) 1961. Fat content was determined as per procedure described in IS-1223 Part-II, 1970, and carbohydrate content was determined as per IS 1981 and...
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Buffalo milk (6.5 per cent Fat)

↓

Filtration/clarification

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Addition of sapota fruit pulp (40 °C)

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Boil (20-25 minutes)

↓

Addition of citric acid @ 0.03 per cent w/v

↓

Stirring (till semisolid consistency)

↓

Addition of sugar @ 6 per cent and Crushed Cardamom @ 2.02 per cent of volume and mix well

↓

Keep on low fire for five minutes with Continuous stirring.

↓

Setting of kalakand in greased trays

↓

Cool and store at room temperature (25 to 30 °C)

↓

Packaging

Flow Chart for Preparation of Sapota Fruit Kalakand

TREATMENTS:

Treatments studied.

T₀ (control) : only buffalo milk.

T₁ : 10 per cent milk was replaced by sapota pulp.

T₂ : 20 per cent milk was replaced by sapota pulp.

The products were subjected to sensory evaluation following standard nine point hedonic scale number of semi trained panel of judges.

C₁ : 900ml milk and 100 ml sapota fruit pulp with 6 per cent sugar.

C₂ : 800 ml milk and 200 ml sapota fruit pulp with 6 per cent sugar.

S₁ : 60 grams sugar per liter

S₂ : 80 grams sugar per liter

Products were subjected to chemical analysis and cost calculation was carried out.

acidity in fruit kalakand determined as per procedure described in IS – 1479 (1960) Part-II.

RESULTS AND DISCUSSION

Organoleptic Evaluation of Sapota Fruit Kalakand

Data with subject to organoleptic evaluation of the product is presented in Table 1. The significantly higher score at 8.95 was given to T₀, followed by T₁ (i.e. 6.5 per cent sugar and 20 per cent sapota fruit pulp) as 8.40. The highest value 8.82 was recorded for color and appearance in case of T₁ treatment. The body and texture of sapota fruit kalakand differed and among the treatments significantly higher score was recorded 8.96 in case of T₀, it was followed by 8.38 for the combination T₁. The highest rating as given to the control may be understood with the fact that the normal liking of the Judges was towards a firmer body of the
TABLE 1: Organoleptic Evaluation of Sapota Kalakand

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Flavour</th>
<th>Color</th>
<th>Texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>8.95</td>
<td>8.32</td>
<td>8.96</td>
<td>8.94</td>
</tr>
<tr>
<td>C1</td>
<td>8.40</td>
<td>7.82</td>
<td>8.38</td>
<td>8.62</td>
</tr>
<tr>
<td>C2</td>
<td>8.22</td>
<td>7.21</td>
<td>8.24</td>
<td>8.21</td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.04</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

TABLE 2: Percent Proximate Composition of Sapota Fruit Kalakand (In per cent)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total Solid</th>
<th>Fat</th>
<th>Protein</th>
<th>Carbohydrate</th>
<th>Ash</th>
<th>Acidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>75.68</td>
<td>26.00</td>
<td>15.14</td>
<td>35.44</td>
<td>2.67</td>
<td>0.44</td>
</tr>
<tr>
<td>C1</td>
<td>75.74</td>
<td>25.40</td>
<td>15.13</td>
<td>35.84</td>
<td>2.77</td>
<td>0.30</td>
</tr>
<tr>
<td>C2</td>
<td>75.82</td>
<td>22.81</td>
<td>15.11</td>
<td>36.38</td>
<td>2.86</td>
<td>0.25</td>
</tr>
<tr>
<td>SE</td>
<td>0.015</td>
<td>0.18</td>
<td>0.014</td>
<td>0.013</td>
<td>0.0073</td>
<td>0.0057</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.044</td>
<td>0.52</td>
<td>NS</td>
<td>0.38</td>
<td>0.022</td>
<td>0.017</td>
</tr>
</tbody>
</table>

TABLE 3: Cost of Production of Sapota Kalakand.

<table>
<thead>
<tr>
<th>Particular</th>
<th>Quantity</th>
<th>Amount</th>
<th>Quantity</th>
<th>Amount</th>
<th>Quantity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(gm)</td>
<td>(Rs.)</td>
<td>(gm)</td>
<td>(Rs.)</td>
<td>(gm)</td>
<td>(Rs.)</td>
</tr>
<tr>
<td>Milk</td>
<td>3932</td>
<td>62.91</td>
<td>3340</td>
<td>53.44</td>
<td>2855</td>
<td>45.20</td>
</tr>
<tr>
<td>Sapota pulp</td>
<td>-</td>
<td>-</td>
<td>393</td>
<td>6.28</td>
<td>786</td>
<td>12.57</td>
</tr>
<tr>
<td>Sugar</td>
<td>236</td>
<td>3.77</td>
<td>236</td>
<td>3.77</td>
<td>236</td>
<td>3.77</td>
</tr>
<tr>
<td>Cardamom</td>
<td>0.8</td>
<td>0.85</td>
<td>0.8</td>
<td>0.85</td>
<td>0.8</td>
<td>0.85</td>
</tr>
<tr>
<td>Labour</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Fuel</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Total amount of Rs./kg</td>
<td>81.53</td>
<td>78.34</td>
<td>76.39</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The high mean score was obtained for the control T0 at 8.94 this was followed by T1 valued at 8.62. Acidity character of the final product is compensating which might be due to level of calcium as well as associated magnesium along with the level of tannin. The present findings are supported by the Suresh and Jha (1994), Shingade (1995), Wakchaure (1998), Dhanwade (2000) and Chavan (2001).

Proximate Analysis of Sapota Fruit Kalakand

It may be seen from Table 2 that the mean total solids content in fruit kalakand was highest 75.78 per cent (20 per cent sapota pulp and 6 per cent sugar) in case of T2, where as T0 (control) recorded the total solids content as 75.82 per cent. The higher value of total solids in case of T2 may be attributed to the fact the total solids content of sapota pulp is more than buffalo milk. The level of fat of fruit kalakand varied significantly over the control. The control T0 was highest at 26.00 per cent. Where as T1 as 25.40 per cent and T2 as 22.11 per cent. Within the treatments significant difference were noticed but T1 was found to be on par with that of the T0.

The treatment combination did not differ significantly with regards to the protein content, which was recorded at 15.1 for T0 (control). The protein content of T1 and T0 were recorded at 15.13 and 15.11 per cent, respectively. The protein content of buffalo milk kalakand was the highest. The particular of this trend may be understood in the light of the initial makeup of buffalo milk as well as that...
that of various blends. It was the addition of sapota fruit pulp at both levels of fruit pulp (10 and 20 per cent) to that of the protein contents.

The carbohydrate content of fruit kalakand varied significantly from the control. Carbohydrate content was found to be highest (36.38 per cent) for treatment T2 which was followed by T1 at 35.84 per cent and T0 was lowest at 35.44 per cent. The addition of sapota fruit pulp at 20 per cent seemed to enhance the carbohydrate to the higher level. Ash content was significantly higher at 2.86 per cent in case of T2.

The acidity values were highest at 0.44 per cent in case of T0. CiSi recorded the mean value of 0.30 per cent. The acidity of fruit kalakand may be attributed to the initial acidity of buffalo milk followed by addition of coagulant and with the supplementation of sapota fruit pulp. In present study nature of acidity may be explained with the fact that the control treatment retained acidic nature of kalakand due to no addition of sapota fruit pulp. The acidity content with the increase in level of sapota pulp as in case of CiSi valued at 0.25 per cent. A probable reason may be that the sapota pulp could be containing the matching level of the prepared value of T1 significantly. These findings can be supported by the results of Suresh and Jha (1994), Shingade (1995), Dhanwade (2000) and Chavan (2001) with increase in level of fruit pulp in the final product.

Cost of Production of Sapota Fruit Kalakand

Cost of production of kalakand was the highest at Rs. 81.13kg in case of T0 (Table. 3), however the treatment CiSi amounted to the value of Rs. 78.34kg. The major portion of the cost in all the combine action may be attributed to the cost of milk.

There was a considerable decrease in cost of the product with the addition of sapota fruit pulp and more so at the second level of addition. Hence though the kalakand is the product of choice for most of the consumer sent due to its increasing cost the commodity is becoming a luxury item. As the market rate of any of the sweet happens to be around Rs. 140/kg. The present study could be taken up as a positive step in the direction of development of fruit pulp combined novelties. The results are substantiated by those reported by Chavan (2001).

REFERENCES