FORMULATION AND EVALUATION OF MANGO FRUIT KALAKAND

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ABSTRACT

Kalakand was prepared by replacing 10 per cent (T₁) and 20 per cent (T₂) milk by mango pulp. Control (T₀) was taken as without any replacement of milk. The overall acceptability was rated as 8.94, 8.88 and 8.46 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 mango pulp increased. Fat content of the kalakand decreased significantly by the addition of mango pulp. Protein content also decreased but there were non-significant differences. However carbohydrate and ash content were increased by the addition of mango pulp. Acidity of the product was lowered down and as proportion of mango pulp was increased. Cost of production of kalakand of T₀ treatment worked out was Rs. 81.53/kg which was dropped by 7 to 8 and 14 to 15 per cent in the treatment T₁ and T₂, respectively.

INTRODUCTION

Among the indigenous milk products, kalakand, occupies an important place. Kalakand is partially desiccated milk product with caramelized flavor and granular texture prepared from acidified milk (Suresh and Jha; 1994) and found to be an attractive product amongst all the classes of consumers.

Fortification of different milk products with fruit juices or pulp has been shown to improve their acceptability to a considerable extent (Dhanwade, 2000). It has helped in enhancing the nutritional quality and market value of the products. The studies on preparation of kalakand fortifies with mango pulp are rare and hardly reported so far. In general there is a considerable scope for standardizing the process of kalakand preparation incorporated with mango pulp in order to improve its quality and also to enhance consumer preference. Mango is the most popular and the choices 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 mango fruits (Variety Benishan) were procured from local market. Pulp was extracted from such selected fruits discarding seeds or stones. Other provision material like sugar; cardamom etc. was obtained from the local market. Citric acid of Qualigens chemicals was used as coagulant.

TREATMENTS

In the present investigation three treatments were studied i.e.

- T₀ (control) : only buffalo milk was used,
- T₁ : 10 per cent milk was replaced by mango pulp,
- T₂ : 20 per cent milk was replaced by mango pulp.

The product was subjected to sensory evaluation following standard Nine Point Hedonic scale.

- M₁ :- 900ml milk and 100 ml mango fruit pulp with 6 per cent sugar
- M₂ :- 800 ml milk and 200 ml mango fruit pulp with 6 per cent sugar.

Then the prepared sample of kalakand were sensory evaluated by the panel of judges using Nine Point Hedonic Scale, as per IS – 6273 (Part-II) and after that subjected to chemical analysis and worked out the cost of mango fruit kalakand.

PROXIMATE ANALYSIS

The total solids and protein content in mango fruit kalakand were determined as per IS-1479 (Part-II) 1961. Fat content was
Flow Diagram for Mango Fruit Kalakand

↓
Buffalo milk (6 per cent Fat)
↓
Filtration/clarification
↓
Addition of fruit pulp (warm at 40 °C)
↓
Boiling (20-25 minutes)
↓
Addition of citric acid @ 0.03 per cent W/T
↓
Stirring (till semisolid consistency)
↓
Addition of sugar @ 6 per cent, Crushed Cardamom @ 2.02 per cent and mix well
↓
Keep on low fire for five minutes with Continuous stirring.
↓
Pour in greasy trays
↓
Cool and store at room temperature
↓
Mango Fruit kalakand

determined as per procedure described in IS-1223 Part–II, 1970, and carbohydrate content was determined as per IS 1981 and acidity in fruit kalakand determined as per procedure described in IS – 1479 (1960) Part-II.

The entire data of experiment was properly tabulated, analyses and interpreted as described by Panse and Sukhatme (1967)

RESULTS AND DISCUSSION
Sensory Qualities Of Mango Fruits Kalakand

It may be seen from Table 1 that flavor characteristics of mango fruit kalakand based on buffalo milk varied significantly. The significantly higher score at 8.95 was given to T0, followed by T2 (i.e. 6 per cent sugar and 20 per cent mango fruit pulp) as 8.82. The highest value 8.92 was recorded for color and appearance at in case of T1 treatment. The body and texture of mango fruit kalakand differ and among the treatments significantly higher score was recorded 8.96 in case of T0, it was followed by 8.89 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 kalakand with big granular texture. Regarding the overall acceptability showed significant difference. The high mean score was obtained for the control T0 at 8.94 this was followed by T1, valued at 8.88. The overall acceptability may be taken, as the sum total of flavor, colour, body
TABLE 1: Sensory Qualities Of Mango Fruit Kalakand

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Flavour</th>
<th>Color</th>
<th>Body and 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>M₁</td>
<td>8.82</td>
<td>8.88</td>
<td>8.89</td>
<td>8.88</td>
</tr>
<tr>
<td>M₂</td>
<td>8.84</td>
<td>8.62</td>
<td>8.32</td>
<td>8.46</td>
</tr>
<tr>
<td>SE</td>
<td>0.014</td>
<td>0.009</td>
<td>0.0081</td>
<td>0.0089</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.04</td>
<td>0.028</td>
<td>0.024</td>
<td>0.027</td>
</tr>
</tbody>
</table>

TABLE 2: Proximate Analysis Of Mango 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>M₁</td>
<td>75.70</td>
<td>25.81</td>
<td>15.13</td>
<td>36.20</td>
<td>2.73</td>
<td>0.39</td>
</tr>
<tr>
<td>M₂</td>
<td>75.78</td>
<td>23.20</td>
<td>15.12</td>
<td>37.08</td>
<td>2.81</td>
<td>0.36</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>

and texture and overall acceptability. Taste of the final products of calcium as well as associated magnesium along with the level of tannin might be compensating the acidity character of final product. The present findings can be supported by the Joshi and Roy (1986), Ramole (1986), Magdum (1989), Suresh and Jha (1994), Dhanwade (2000) and Chavan (2001).

Proximate Analysis of 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 mango pulp and 6 per cent sugar) in case of T₂, where as T₀ (control) recorded the total solids content as 75.68 per cent. The higher value of total solids in case of T₂ may be attributed to the fact the total solids content of mango pulp is more than buffalo milk. Bose (1985) reported 18.22 per cent total solid and Joshi and Roy (1989) reported 18.55 per cent total solid in mango pulp. The level of fat of fruit kalakand varied significantly over the control. The control T₀ was highest at 26.00 per cent. Where as T₂ as 25.81 per cent and T₁ as 28.20 per cent. Within the treatments significant difference were noticed but T₁ as found to be at par with that of the T₀.

The treatment combination did not differ significantly with regards to the protein content, which was recorded at 15.14 for T₀ (control). The protein content of T₁ and T₀ were recorded at 15.13 and 15.12 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 of various blends. It was the addition of mango fruit pulp at both levels of fruit pulp (10 and 20 per cent) that the protein contents seemed to have dropped.

The carbohydrate content of fruit kalakand showed significant difference over the control. Treatment T₂ was recorded highest carbohydrate content at 37.08 per cent, which was followed by T₁ at 36.20 per cent and T₀ was lowest at 35.44 per cent. The particular nature of carbohydrate content of fruit kalakand could be understood in the light that the original buffalo milk has carbohydrate make up as observed in the control. The addition of mango fruit pulp at 20 per cent seemed to enhance the carbohydrate to the higher level. Ash content was significantly higher at 2.81 per cent in case of T₂. The behavior of ash content may be understood in the height of level of addition of mango fruit pulp use.

The acidity values were highest at 0.44 per cent in case of T₀. M₁S₁ recorded the mean value of 0.39 per cent. The acidity of fruit
TABLE 3: Cost of Production for Mango Fruit Kalakand.

<table>
<thead>
<tr>
<th>Particular (cost/kg)</th>
<th>( T_0 )</th>
<th>( M_1 )</th>
<th>( M_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (gm)</td>
<td>Amount (Rs.)</td>
<td>Quantity (gm)</td>
</tr>
<tr>
<td>Milk</td>
<td>3932</td>
<td>62.91</td>
<td>3380</td>
</tr>
<tr>
<td>Mango pulp</td>
<td>-</td>
<td>-</td>
<td>393</td>
</tr>
<tr>
<td>Sugar</td>
<td>236</td>
<td>3.77</td>
<td>236</td>
</tr>
<tr>
<td>Cardamom</td>
<td>0.8</td>
<td>0.85</td>
<td>0.8</td>
</tr>
<tr>
<td>Labour</td>
<td>-</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Fuel</td>
<td>-</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Total amount of Rs./kg</td>
<td>81.53</td>
<td>75.45</td>
<td>69.80</td>
</tr>
</tbody>
</table>

Kalakand may be attributed to the initial acidity of buffalo milk followed by addition of citric as coagulant and with the supplementation of mango fruit pulp. In present study nature of acidity may explained with the fact that the control treatment retained acidic nature of kalakand due to no addition of mango fruit pulp. Further more the addition of mango fruit pulp seemed to further lower. The acidity content with the increase in level of mango pulp as in case of \( M_2 S_1 \) valued at 0.36 per cent. A probable reason may be that the mango pulp could be containing the matching level of the prepared value of \( T_1 \) significantly. These findings can be supported by the results of Suresh and Jha (1994), Shingade (1995), Dhanwade (2000) and Chavan (2001).

Cost of Production of Mango Fruit Kalakand
Cost of production of kalakand was the highest at Rs. 81.13 in case of \( T_0 \) (Table 3), however the treatment \( M_2 S_1 \) amounted to the value of Rs. 75.45. The major portion of the cost in all the combine action may be attributed to the cost of milk.

As may be experienced there was a drop in cost of the product with the addition of mango 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 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. 120/kg. The present study could be taken up as a positive step in the direction of development of fruit pulp combined novelties. The results may be substantiated by those reported by Khemchand et al. (1994) and Chavan (2001).

REFERENCES