FORMULATION PREPARATION AND EVALUATION OF SOYLAADOO

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ABSTRACT

Soybased product such as soyladoo was formulated in three different combinations with bengal dhal flour viz. 60: 40,50:50 and 40:60 respectively. All these three different combinations were evaluated organoleptically. Among these combination highest scored product from these combinations was selected and nutritionally evaluated on the basis of their storage stability. Due to attractive colour, flavour, taste, appearance and overall acceptability of soyladoo prepared with composition III i.e. use of soyflour 40g., with the combination of bengal gram dhal flour 60g. scored higher by organoleptically. Chemical compositions like moisture, ash, crude protein, iron, calcium zinc, carotene and vitamin B complex were found adequate in this soyladoo.

Key words : Soybased product, Nutritionally, Evaluated.

INTRODUCTION

Soybean is an important legume and oil seed crop in Maharashtra. It is one of the natures wonder for nutritional gift which provides good quality protein with minimum saturated fat and high calorie value. Soybean is endowed with apithel functional food of the country as beyond traditional basic nutrition (Vinnet Kumar et.al. 2004). Soybean also contain the nutraceutical properties like isoflavones, phytoestrogen, soluble phosphate and potassium sulphate in which these properties are mostly used to prevent the risk of dreaded diseases like breast cancer, osteoporosis, cardiorvasular disease, kidney stone and helps in beating menopausal blue (Messina, 1997).

Soybean is referred to as vegetarian meat due to its high quality amino acids profile. It is less expensive legume as well as oil seed due to excellent source of macronutrients and other biological properties. Hence, it is used for the formulation of high nutritious weaning and supplementary foods. Most of the studies (Sahay and Kocharu 1988, Chandrashekhar and Rani, 2004, Deshpande et.al. 2004) recommended that soybean could be used for the snacks food as well as weaning and supplementary food to combat the malnutrition and to maintain good health and nutritional status of preschool children. With the intention of high significance nutritive values of soybean, the most familiar, more popular in children soybased products such as soyaladoo, prepared and evaluated nutritionally.

MATERIALS AND METHODS

The local varieties of soybean ie. MACH-58 and bengal gram ie. pragati phule were procured from the local market. It was cleaned, washed, dried, coarsely grind, dehulled and make into flour separately by use of grinding machine. Soyladoo was prepared by use of following formulations.

I) Formulation and preparation of soyladoo :

a) Flour composition : On the basis of per cent formulation use of soylour three combination were made with the bengal gram dhal flour ie. 60 : 40 , 50: 50 and 40 : 60 respectively. The soyladoo were
prepared with these combination by use of standard method.

b) Type of shortening agent: Shortening agent ie. ghee and refined cooking oil with its use of different amount ie. 40, 50 and 60g per 100g. of flour combinations the product were prepared.

c) Roasting Time: The roasting period ie. 5, 10 and 15 minutes in different types of flames ie. low, medium and high speed the combination of the products were developed.

d) Sweetning agent: The amount of sweetning agent ie. 40, 50 and 60g. per 100g. of flour, with the sweetning types ie. jaggary and sugar along with its use of texture ie. grated jaggary and jaggary syrup, powdered sugar and sugar syrup the different of combinations the products were formulated.

e) Flavouring agent: According to the use of flavouring type cardamom powder and artificial liquid essence of cardamom with its amount use ie. 1.0, 1.5 and 2.0g. per 100g. the ladoo were prepared.

f) Use of Colouring agent: The soyladoos were prepaared with and without use of coloring agent. By use of different combinations of liquid yellow colour with varying amounts ie. 2.0, 4.0, 6.0 and 8.0ml per 100g the products were prepared.

II) Sensory evaluation:

By use of these different combinations the soy ladoos were prepared and evaluated by organoleptically with the help of trained panel of judges on a nine point “Hedonic scale” given by Amerine et al. (1965).

III) Chemical analysis of soyladoo:

High scored soyladoo in sensory evaluation was determined for moisture content, total ash, major nutrients like crude protein, fat, carbohydrates, B complex vitamins, minerals such as iron, calcium zinc and crude fiber with the use of methods described in A O A. C. (1975).

IV) Storage stability of soyladoo and statistical analysis:

The organoletic qualities of soyladoo was carried out after its storage for 0 to 1 month and 1 to 2 months packed in polyethene and tetra packing material at room temperature. The differences noticed among this was calculated by statistically. The obtained data was analysed by statistical significant at p < 0.05 level, S. E. and CD. at 5 per cent level by the procedure given by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Formulation and preparation of soyladoo:

The data regarding formulation of soyladoo on the basis of different parameters such as flour composition, roasting time use of shortening, sweetening, flavouring and coloring agent with its score of sensory evaluation was presented in Table 1 to 6. Soyflour mixing 40 per cent with bengal gram dhal flour was scored more in terms of their all organoleptic qualities. Over all acceptability of this flour combination (i.e. 40:60: soyflour : bengal dhalflour) ranked highest ie. 8.2 as compared with other i.e. 6.8 for 50:50 and 6.4 for 60:40 soyflour : bengaldhal flour combinations (Table 1). Table 2 describes the sensory score of the product in relation with roasting time of flour with type of flame used. Flour roasting for 15 minutes on medium flame gave a better organoliptic qualities to the product. Roasting of flour with low or high flame for 5 minutes was shown not sufficient to develop better sensory qualities of the product. Use of ghee as a shortening agent proved high score when it was used in 50g. per 100g then that of refined cooking oil (Table 3). Soy ladoo prepared with powdered sugar scored higher as compared with the use of other sweetning agents ie. grated jaggary, jaggary syrup and sugar syrup (Table 4). The use of 50 per cent powdered sugar per 100g of the product scored more among all the sensory qualities than the use of 40 and 60 per cent powdered sugar. Table 5 highlights the score of flavouring agent in...
Table 1: Score of soyladoo with flour combination.

<table>
<thead>
<tr>
<th>Proportion</th>
<th>Orgnoleptic score</th>
<th>Colour</th>
<th>Flavour</th>
<th>Taste</th>
<th>Texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soy flour : Bengal gram dhal flour</td>
<td></td>
<td>Colour</td>
<td>Flavour</td>
<td>Taste</td>
<td>Texture</td>
<td>Overall acceptability</td>
</tr>
<tr>
<td>60 : 40</td>
<td></td>
<td>6.3</td>
<td>6.7</td>
<td>5.7</td>
<td>7.4</td>
<td>6.8</td>
</tr>
<tr>
<td>50:50</td>
<td></td>
<td>8.3</td>
<td>7.2</td>
<td>6.6</td>
<td>8.3</td>
<td>8.2</td>
</tr>
<tr>
<td>40:60</td>
<td></td>
<td>7.3</td>
<td>4.3</td>
<td>5.6</td>
<td>6.6</td>
<td>6.4</td>
</tr>
</tbody>
</table>

Table 2: Score of soyladoo on the basis of roasting time.

<table>
<thead>
<tr>
<th>Flame</th>
<th>Roasting time in (min)</th>
<th>Orgnoleptic score</th>
<th>Colour</th>
<th>Flavour</th>
<th>Taste</th>
<th>Texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>5</td>
<td></td>
<td>4.5</td>
<td>3.4</td>
<td>4.4</td>
<td>5.7</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>4.6</td>
<td>4.4</td>
<td>5.0</td>
<td>6.6</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td>5.0</td>
<td>6.4</td>
<td>6.4</td>
<td>7.6</td>
<td>4.9</td>
</tr>
<tr>
<td>Medium</td>
<td>5</td>
<td></td>
<td>4.9</td>
<td>4.2</td>
<td>4.4</td>
<td>6.4</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>5.6</td>
<td>5.4</td>
<td>5.5</td>
<td>6.6</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td>6.5</td>
<td>6.4</td>
<td>6.4</td>
<td>7.5</td>
<td>7.6</td>
</tr>
<tr>
<td>High</td>
<td>5</td>
<td></td>
<td>4.5</td>
<td>3.7</td>
<td>4.8</td>
<td>4.2</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>5.6</td>
<td>5.5</td>
<td>6.4</td>
<td>5.3</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td>3.4</td>
<td>4.5</td>
<td>7.3</td>
<td>4.8</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Table 3: Score of Soydadoo on the basis of use of shortening agents.

<table>
<thead>
<tr>
<th>Shortening Amount (gm)</th>
<th>Orgnoleptic score</th>
<th>Colour</th>
<th>Flavour</th>
<th>Taste</th>
<th>Texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Ghee</td>
<td></td>
<td>Colour</td>
<td>Flavour</td>
<td>Taste</td>
<td>Texture</td>
<td>Overall acceptability</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>6.5</td>
<td>5.8</td>
<td>6.6</td>
<td>4.5</td>
<td>4.7</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>8.4</td>
<td>8.0</td>
<td>7.4</td>
<td>8.0</td>
<td>8.1</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>6.0</td>
<td>6.4</td>
<td>5.0</td>
<td>6.0</td>
<td>5.1</td>
</tr>
<tr>
<td>b) Oil</td>
<td></td>
<td>Colour</td>
<td>Flavour</td>
<td>Taste</td>
<td>Texture</td>
<td>Overall acceptability</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>5.9</td>
<td>5.2</td>
<td>6.1</td>
<td>4.8</td>
<td>5.1</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>7.1</td>
<td>6.2</td>
<td>4.8</td>
<td>6.6</td>
<td>7.5</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>5.3</td>
<td>5.5</td>
<td>3.9</td>
<td>6.4</td>
<td>6.1</td>
</tr>
</tbody>
</table>

soyladoo preparation. 1.5g of cardamom powder per 100g. of the product developed better aroma of the soyladoo. The overall acceptability of this combination was more than that of use of artificial cardamom liquid essence in the product. Soyladoo prepared with artificial colour as a coloring agent was not accepted much (Table 6). However, the overall acceptability of soyladoo was more when it was prepared without any use of colouring agent.

Biochemical compositions and storage stability of soyladoo:

The data given in Table 7 and 8 reveal the storage changes in proximate, biochemical compositions and sensory qualities in soyladoo kept in different packages for 0 to 1 and 1 to 2 months at room temperature. The changes in per cent of moisture and the content of B complex vitamins and β carotene in soyladoo were noticed at significant level after two months of storage (Table 7).
The per cent of proximate compositions such as fat and protein were found decreased at highly significant level i.e. 31.34 to 28.15 and 27.89 to 25.02 respectively in the ladoo stored upto 2 months of period, whereas the value of B complex vitamins such as vitamins B₁ (0.50 to 0.31 mg) vitamin B₂ (0.38 to 0.29 mg) and vitamin B₃ (2.51 to 2.09mg) were observed reduced significantly in the soyladoo for 2 months. Non significant effect was noticed in the changes of mineral and crude fiber contents in the soyladoo after 2 months of storage. Table 8 represents that, soyladoo stored in polythene and tetra packages for 2 months was noticed to reduce its sensory qualities. As compared to other packaging
Table 7: Proximate and biochemical composition in soyladoo (per 100g) with its storage stability.

<table>
<thead>
<tr>
<th>Bio-Chemical Compositions</th>
<th>Proximate and storage period</th>
<th>‘t’ test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 1 Month</td>
<td>1 to 2 Months</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>14.60</td>
<td>13.92</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>3.11</td>
<td>3.05</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>31.34</td>
<td>28.15</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>27.89</td>
<td>25.02</td>
</tr>
<tr>
<td>Vitamins B1 (mg)</td>
<td>0.50</td>
<td>0.31</td>
</tr>
<tr>
<td>Vitamins B2 (mg)</td>
<td>0.38</td>
<td>0.29</td>
</tr>
<tr>
<td>Vitamins B3 (mg)</td>
<td>2.51</td>
<td>2.09</td>
</tr>
<tr>
<td>B. carotene (μg)</td>
<td>239.00</td>
<td>237.10</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>7.23</td>
<td>7.09</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>168.80</td>
<td>168.21</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>4.65</td>
<td>4.25</td>
</tr>
<tr>
<td>Crude fibre (g)</td>
<td>1.85</td>
<td>1.82</td>
</tr>
</tbody>
</table>

** - significant at 1 % level.  * - Significant at 5% level.  NS - Non significant.

Table 8: Sensory qualities of soyladoo stored in different packages.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Storage parameters</th>
<th>Colour</th>
<th>flavour</th>
<th>Taste</th>
<th>Texture</th>
<th>overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>Polythene Package</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Up to 1 month</td>
<td>5.0</td>
<td>4.1</td>
<td>5.1</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>ii)</td>
<td>1 to 2 months</td>
<td>3.9</td>
<td>3.7</td>
<td>3.5</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.061</td>
<td>0.050</td>
<td>0.082</td>
<td>0.091</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>CD at 5%</td>
<td>0.201</td>
<td>0.190</td>
<td>0.361</td>
<td>0.380</td>
<td>0.199</td>
</tr>
<tr>
<td>(B)</td>
<td>Tetra package</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Up to 1 month</td>
<td>5.1</td>
<td>5.8</td>
<td>6.5</td>
<td>6.8</td>
<td>7.0</td>
</tr>
<tr>
<td>ii)</td>
<td>1 to 2 months</td>
<td>4.1</td>
<td>1.2</td>
<td>6.0</td>
<td>6.5</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>0.060</td>
<td>0.081</td>
<td>0.029</td>
<td>0.019</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>CD at 5%</td>
<td>0.199</td>
<td>0.360</td>
<td>0.190</td>
<td>0.090</td>
<td>0.085</td>
</tr>
</tbody>
</table>

Table 9: Cost calculation of prepared soyladoo per Kg.

<table>
<thead>
<tr>
<th>Ingredient used</th>
<th>Quantity</th>
<th>Rate / unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soyflour</td>
<td>250gm</td>
<td>20/kg</td>
<td>5/-</td>
</tr>
<tr>
<td>Bengal gram dhal flour</td>
<td>250gm</td>
<td>40/kg</td>
<td>10/-</td>
</tr>
<tr>
<td>Sugar</td>
<td>250gm</td>
<td>20/kg</td>
<td>5/-</td>
</tr>
<tr>
<td>Ghee</td>
<td>250gm</td>
<td>140/kg</td>
<td>35/-</td>
</tr>
<tr>
<td>Cardamom</td>
<td>10gm</td>
<td>-</td>
<td>8/-</td>
</tr>
<tr>
<td>Processing cost @ 20% of row material</td>
<td></td>
<td></td>
<td>20/-</td>
</tr>
<tr>
<td>Packaging cost</td>
<td></td>
<td></td>
<td>1/-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>84/-</td>
</tr>
</tbody>
</table>
material, less changes in sensory qualities were observed in the soyladoo stored in tetra package.

**Cost of production of soyladoo:**

Total cost of soyladoo was calculated on pilot plant trials and depicted in Table 9. It reveals that, for one kilogram soyladoo costs around Rs. 78.0. Out of this Rs. 63.0 was incurred for raw materials and Rs. 15.0 for processing and packaging charges. Total cost of soyladoo was very much less than the ladoos existed in the market.

From the above result, it is concluded that, soyladoo formulated with 40:60 per cent soyflour and bengal dhal flour composition, use of 50 per cent ghee as a shorting agent, roasting with 15 minutes on medium flame, use of 50 per cent powdered sugar as a sweetening agent with 1.0g powdered cardamom as flavoring agent and without any use of artificial colour scored highest by organoleptically.

Except mineral contents a remarkable loss in B complex vitamins, b carotene, fat, protein and sensory qualities are noticed due to storage of soyladoo for two month of period at room temperature. This loss could be minimised by storage of soyladoo in tetra package. The cost of production of soyladoo is affordable. Hence, it is concluded that the soyladoo prepared with this formulation it is more beneficial to combat the malnutrition especially in children.

**REFERENCES**


