Preparation of Value Added Food Products from Dehydrated Underutilized Hogweed (Boerhaavia Diffusa) Root Powder

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ABSTRACT

Boerhaavia diffusa is an important medicinal plant. It is a herbaceous member of the family Nyctaginaceae. It is widely distributed in the tropics and subtropics. It has a long history of uses by indigenous and tribal people and in Ayurvedic or natural herbal medicines. The objective of the present study is to incorporate Boerhaavia diffusa root powder for the development of traditional recipes as well as to evaluate organoleptic quality, and determine the nutritive value and cost of the developed products. Two different recipes “Fruit custard, and Lassi” were made by incorporating Boerhaavia diffusa root powder at 5 percent, 10 percent and 15 percent levels refers as T1, T2 and T3 respectively and the control T0 for all the prepared products was made without the incorporation of the Boerhaavia diffusa root powder. The products prepared were organoleptically evaluated for the color, texture, flavor and taste and overall acceptability using 9 Point Hedonic Scale. Lassi was the best product as compared to the Fruit custard. The data obtained during study were analyzed statistically using analysis of variance and critical difference techniques. Among the four products, the Lassi was found best nutritionally, Lassi had good nutrients such as energy, protein, and carbohydrate and vitamin were also enhanced after adding Boerhaavia diffusa root powder. The total cost of the prepared products ranged between Rs. 1.47 to 5.37.

Key words: Boerhaavia diffusa, Root powder, Product development, Sensory evaluation, Nutritive value, Cost.

INTRODUCTION

The herb is distributed throughout India. Herbs play an important role in our day to day life. Herb is a medicinal plant containing active component to inhibit the growth of microorganism where by controlling the health complaints. Ayurvedic stresses the use of plant-based medicines and treatments. Addition, fats are used both for consumption and for external use. Ayurvedic medicines are made up of a combination of herbs. [1] Underutilized crops are those marginalized by farmers and consumers due to agronomic, genetic, economic, environmental and cultural reason, which were once important and major crop in the community. Highly nutritious or have medicinal properties or other multiple uses. [2] Boerhaavia diffusa is an herbaceous member of the family Nyctaginaceae. It is widely distributed in the tropics and subtropics. [3] The swollen tap-roots when softened by boiling are applied externally as a poultice to draw abscesses and encourage the extraction of guinea worms. Apart from this, the root of B. diffusa is considered to have an expectorant action and thus used in the
treatment of asthma, cough, stomach and intestinal colic, haemorrhage, oedema, anemia, jaundice, piles, rheumatism, eye disease, liver ailments, gonorrhea, small pox, yaws, and cancer.\textsuperscript{[4,5]} It has also been used as a laxative, diuretic, emetic in large doses, antivenom, and in the treatment of heart disease.\textsuperscript{[6]} The root powder, when mixed with mamira (\textit{Thalictrum foliolosum}), is used to treat eye diseases. It cures corneal ulcers and night blindness and helps restore virility in men.\textsuperscript{[7]} The major active principle present in the roots is alkaloidal and is known as punarnavine.

**MATERIALS AND METHODS**

Boerhaavia diffusa roots were obtained from the field of Sam Higginbottom Institute of Agriculture, Technology and Sciences, (SHIATS) Allahabad district, India. They were mainly found to be growing near buildings and or in hard places with cement work. The roots were subjected to a very good washing with water as much as was necessary to remove all the attached soil and dirt. After this, they were sliced to expose a greater surface area and to facilitate drying. Other ingredients for the development of the value added products like milk, fruits, suji etc. procured from the local market of the Allahabad, district (India). The standard procedure was slightly modified for the drying of Boerhaavia diffusa root. The Boerhaavia diffusa root (Mature and free from insects and diseases) were subjected to a very good washing with water as much as necessary to remove all the attached soil and dirt. Cut the Boerhaavia diffusa root into thin slices. Keep the slices equally sized, and slice as thin as possible. Arrange the Boerhaavia diffusa root slices on the rack of a food dehydrator; do not overlap the slices for 2-6 hours. After this they were oven-dried at a temperature between 40-60°C for 4 hours. Turn the Boerhaavia diffusa root every few hours.

Two products were prepared, namely Fruit custard and Lassi with four treatments for each of the products i.e. T\textsubscript{0}, T\textsubscript{1}, T\textsubscript{2} and T\textsubscript{3} and the Boerhaavia diffusa root powder were incorporated at different levels. Sensory attributes like colour, flavour, taste, texture, crispness and overall acceptability were evaluated by trained judges using 9-Point Hedonic Score Card. The panelist gives score 9-1 for the product, ranging from ‘like extremely’ to ‘disliked extremely’ to find out the most suitable composition of the prepared food products. The prevailing prices of the ingredients used in the preparation of the products were used to calculate their actual cost.

**Drying process of Boerhaavia diffusa root:**

The standard procedure was slightly modified for the drying of Boerhaavia diffusa root.\textit{Boerhaavia diffusa} root (Mature and free from insects and diseases)

- **Washing** (Boerhaavia diffusa root)
- Cut the Boerhaavia diffusa root into thin slices. Keep the slices equally sized, and slice as thin as possible.
- Arrange the Boerhaavia diffusa root slices on the rack of a food dehydrator; do not overlap the slices.
- The sliced specimens were oven-dried at a temperature between 40-60°C for 4 hours.
- Turn the Boerhaavia diffusa root every few hours.
- Dehydration till the moisture become 6-8%.
- Grinding into powder
- Packing (Airtight tin containers or polythene bags)
- Storage (At ambient temperature in dry place)

\textbf{Source- Srivastava and Kumar (2009)\textsuperscript{[8]}}
Analysis of variance technique (ANOVA), CD, and other appropriate statistical test was used to analyze the data. The data obtained from sensory evaluation were statistically analysis of variance technique (one way classification). Significant difference the treatments was determined by using CD (critical difference) test.

RESULTS AND DISCUSSION

Fig 1.2 shows the sensory evaluation of Fruit custard with the incorporation of Boerhaavia diffusa root powder showed that the overall acceptability was highest in T1 (Milk with Fruits + Boerhaavia diffusa root powder, 80:15:5) scored (8.44) followed by T2 (75:15:10) scored (7.5), T3 (70:15:15) scored (7.37) respectively and there was a significant difference, between the three treatments. Similar results were also reported by Srivastava et al (2013) [7] the data shows that the highest score of in kheer prepared from the blend of standard Milk and Soya milk was obtained 7.56 for Treatment T2 in Kheer were followed by the T1 (7.52), T4 (7.16). The lowest average score of 7.04 was recorded for T3.

Boerhaavia diffusa root powder incorporated in the Lassi showed that T1 (Curd with Sugar+ Boerhaavia diffusa root powder, 70:25:5) (9:00) had the highest score followed by T2 (65:25:10) scored (7.98) and T3 (60:25:15) scored (7.97) respectively (Fig 1.3). The treatments were liked moderately by the panel of judges. There was a significant difference between the three treatments Similar result was also reported by Prakash et al (2013) [9] the data shows that in the case of "Banana Milk Shake" and "Mango Lassi" incorporated with Ashwagandha roots powder treatment T1 scored the best in colour and appearance, consistency, taste and flavour and overall acceptability. But in case of "Pineapple Drink" T0 scored the best in consistency and overall acceptability.
Table 1: Percentage of nutrients in control and treated sample Boerhaavia diffusa root powder (per 100g).

<table>
<thead>
<tr>
<th>Product and Treatments</th>
<th>Energy (Kcal)</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Fibre (g)</th>
<th>Calcium (mg)</th>
<th>Phosphorus (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Custard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T0</td>
<td>47.57</td>
<td>7.3</td>
<td>15.09</td>
<td>0.03</td>
<td>108.67</td>
<td>79.85</td>
</tr>
<tr>
<td>T1</td>
<td>47.69</td>
<td>7.37</td>
<td>15.1</td>
<td>0.05</td>
<td>133.77</td>
<td>80.65</td>
</tr>
<tr>
<td>T2</td>
<td>47.91</td>
<td>7.45</td>
<td>15.12</td>
<td>0.07</td>
<td>158.87</td>
<td>81.45</td>
</tr>
<tr>
<td>T3</td>
<td>48.08</td>
<td>7.52</td>
<td>15.13</td>
<td>0.09</td>
<td>183.97</td>
<td>82.25</td>
</tr>
<tr>
<td>Lassi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T0</td>
<td>67.6</td>
<td>2.5</td>
<td>3.2</td>
<td>0.02</td>
<td>121.16</td>
<td>39.50</td>
</tr>
<tr>
<td>T1</td>
<td>68.12</td>
<td>2.39</td>
<td>2.82</td>
<td>0.04</td>
<td>134.1</td>
<td>67.15</td>
</tr>
<tr>
<td>T2</td>
<td>66.74</td>
<td>2.44</td>
<td>2.64</td>
<td>0.065</td>
<td>162.05</td>
<td>68.10</td>
</tr>
<tr>
<td>T3</td>
<td>65.36</td>
<td>2.48</td>
<td>6.15</td>
<td>0.085</td>
<td>185.7</td>
<td>74.6</td>
</tr>
</tbody>
</table>

Table 2: Cost of the Prepared Products on the basis of raw materials Cost of the products in Rupees of the Fruit custard and Lassi.

<table>
<thead>
<tr>
<th>Developed product</th>
<th>T0 Rs</th>
<th>T1 Rs</th>
<th>T2 Rs</th>
<th>T3 Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit custard (100g)</td>
<td>5.37</td>
<td>5.18</td>
<td>4.99</td>
<td>4.80</td>
</tr>
<tr>
<td>Lassi (100g)</td>
<td>1.92</td>
<td>1.84</td>
<td>2.92</td>
<td>3.62</td>
</tr>
</tbody>
</table>

Table 2 Shows the Cost of the products based on the raw materials; Average cost of the fruit custard per 100gm was T0 control Rs. 5.37, T1 Rs. 5.18, T2 Rs. 4.99 and T3 Rs. 4.80. Average cost of the Lassi per 100gm was T0 control Rs. 1.92, T1 Rs. 1.84, T2 Rs. 2.92 and T3 Rs. 3.62.

CONCLUSION

From the results, it can be concluded that Incorporation of Boerhaavia diffusa root powder in products like Fruit custard and Lassi is well acceptable. The product prepared by the incorporation with Boerhaavia diffusa root powder, Fruit Custard was rich in Fat. Lassi was found rich in Calcium content. Fat and Calcium was found highest in Fruit custard. The total cost of the prepared products ranged between Rs. 1.47 to 5.37.

REFERENCES

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