DEVELOPMENT AND STANDARDIZATION OF SOUP MIX BASED ON BLACK RICE AND OKRA POWDER VALUE ADDED WITH BARLEY

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Abstract
Black rice is generally known as purple rice with high nutritional value, whereas it is a source of iron, vitamin E and antioxidants (more than blueberries). Black rice has a similar amount of fibre and a mild nutty taste as compared to the brown rice. The okra mucilage is a glycoprotein comprising of about 10% protein and 80% polymeric carbohydrates. The okra mucilage helps to stabilize blood sugar by curbing the rate at which sugar is absorbed from the intestinal tract. Barley is the most energy efficient food available in nature, having major implications for those who are concerned with maximizing longevity, increasing athletic performance and fighting obesity. It also stabilizes glucose level and good potential food for diabetic patients. For this study, okra powder has been prepared by drying method. The product soup mix has been prepared from the combination of black rice, okra powder & barley. The prepared product was evaluated with sensory evaluation and analyzed for chemical composition. According to sensory evaluation the ratio T2 was best. Among the other treatments, T1 was considered as better. On the basis of proximate chemical analysis, T1 was highest content of moisture, ash, protein, fat and iron followed by T2 & T3. This study was emphasised on evaluation of organolaptic acceptability and nutritive value of black rice, okra, and barley. It provides idea about how much black rice and other ingredients should be incorporated in convenient healthy food, which can be easily swallowed by patients, who cannot chew. It is also provide the information about nutrients of black rice and to make it familiar to the people.

Key words: Black rice, antioxidant, okra, barley, glycoprotein, polymeric, mucilage, obesity, diabetic, glucose, nutritional value.

Introduction
Black rice is known as purple rice and is a species (Oryza sativa L.) of rice. It was consumed from ancient time, but it was not so popular among Indian. Centuries ago black rice was known as ‘Forbidden Rice’ in ancient China because only nobles were allowed to eat it. Food scientist Dr ZaminXu (2010) said: ‘Just a spoonful of black rice bran contains more health promoting anthocyanin antioxidants than are found in a spoonful of blueberries, but with less sugar and more fibre and vitamin E antioxidants. The bran hull (outermost layer) of black rice contains one of the highest levels of anthocyanin antioxidants found in food. Anthocyanins provide the dark colours of many fruits and vegetables, such as blueberries and red peppers. They are what make black rice ‘black’. Research suggests that the dark plant antioxidants, which mop up harmful molecules, can help protect arteries and prevent the DNA damage that leads to cancer.

Okra is valued for its edible delicious and nutritious vegetables as throughout the world. The mucilaginous material of this vegetable has several food and medicinal uses. The okra mucilage is a glycoprotein comprising of about 10% protein and 80% polymeric carbohydrates. It has large water binding properties due to hydroxyl group of sugar. The okra mucilage helps to stabilize blood sugar by curbing the rate at which sugar is absorbed from the intestinal tract.

Barley is the most energy, efficient food available in nature, having major implications for those who are concerned with maximizing longevity, increasing athletic performance and fighting obesity. Barley is much more than supplement found at local health food store, it is a complete food, which has been converted into super food through an all natural process, making it so powerful and functional that it can be used to nourish those who are struck by famine. Barley transforms into get in the GI track, slowing its passes through the body which in turn allows maximum nutrient absorption. It also stabilizes glucose level and is great for use by diabetics.
Materials and Methods

The present investigation was carried out in the Department of Food Science & Nutrition, College of Home Science, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.), India. For preparation of soup mix Black rice (*Oryza sativa* L.) were collected from Manipur; whereas okra and barley were procured from university farm.

Preparation of okra powder

Wash and cut okra into pieces and keep for sun drying for 1-2 hours. Now dry the okra pieces in hot air oven at about 55 to 65°C for 7-8 hours per day till become crispy and grind it into powder form.

Preparation of barley flour

Roast for half an hour. Then grind it and sieve to get fine powder.

Preparation of soup mix

Mix the powder of black rice, okra and barley at three different level *i.e.* T₁ (50:10:40), T₂ (50:15:35) and T₃ (50:20:30), respectively. Roast for 10-15 mins and add sufficient water and salt. Cook for sometimes to get desirable thickness.

Sensory evaluation

The product soup mix was evaluated by 5 panel members according to the flavour, texture, taste, appearance and colour on the basis of Hedonic rating scale.

Chemical analysis

Proximate analysis was done by AOAC method (A.O.A.C., 1980). Protein was estimated through Kjeldahl method, whereas fat was estimated through soxhlet method. Iron was estimated by Spectrophotometric method.

Statistical study

The experiment was laid out in Completely Randomized Design (CRD). Means and standard deviations of experiment were calculated. ANOVA was performed at < 0.05.

Results and Discussion

The results the study obtained from the interpretation and observation of the datas, which are procured through sensory evaluation and chemical composition of value added product soup mix developed from black rice and okra powder along with barley together.

Sensory evaluation

The sensory evaluation of the product soup mix by 5 panelists is shown in table 1.

Table 1: Sensory evaluation of prepared soup mix by using 9-point hedonic scale.

<table>
<thead>
<tr>
<th>Characters</th>
<th>Control</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>6.46</td>
<td>8.26</td>
<td>8.66</td>
<td>7.53</td>
</tr>
<tr>
<td>Taste</td>
<td>6.73</td>
<td>8.20</td>
<td>8.40</td>
<td>7.33</td>
</tr>
<tr>
<td>Flavour</td>
<td>6.26</td>
<td>8.20</td>
<td>9.00</td>
<td>7.40</td>
</tr>
<tr>
<td>Texture</td>
<td>6.56</td>
<td>7.60</td>
<td>8.20</td>
<td>6.60</td>
</tr>
<tr>
<td>Colour</td>
<td>6.80</td>
<td>7.20</td>
<td>8.40</td>
<td>7.60</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>6.00</td>
<td>8.08</td>
<td>8.93</td>
<td>7.00</td>
</tr>
</tbody>
</table>

Table 2: Analysed chemical content of soup mix.

<table>
<thead>
<tr>
<th>Ash</th>
<th>Control</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>0.40</td>
<td>9.04</td>
<td>8.55</td>
<td>8.08</td>
</tr>
<tr>
<td>Fat</td>
<td>0.7</td>
<td>1.79</td>
<td>1.70</td>
<td>1.68</td>
</tr>
<tr>
<td>Iron</td>
<td>1.05</td>
<td>2.45</td>
<td>2.37</td>
<td>2.27</td>
</tr>
</tbody>
</table>

The mean result of sensory evaluation of soup mix in table 1 has shown that T₂ (black rice : okra powder : barley; 50:15:35) is best among the treatments. According to the appearance, taste, flavour, texture, colour and overall acceptability T₂ received a score of 8.66, 8.40, 9.00, 8.20, 8.40 and 8.93, respectively. On the basis of overall acceptability, the score revealed that T₂ is rated as ‘like very much’. In the comparison with control products, T₂ got highest scores than the control products. So, it has been shown that T₂ is best due to its high score than other three treatments.

Chemical analysis

The comparable results of soup mix has shown in the table 2, the ash of control sample of soup mix is found less *i.e.* 1.65%, whereas different treatment of T₁, T₂ & T₃ revealed ash 1.74%, 1.72% and 1.70% mean value, respectively. T₁ content high ash *i.e.* 1.74%. It is observed that the percentage of ash has been decreased with the decreased of barley percentage.

The protein of control sample of soup mix was found less *i.e.* 0.40%, whereas different treatment of T₁, T₂ & T₃ revealed protein 9.04%, 8.55% and 8.08% mean value, respectively. T₁ content high protein *i.e.* 9.04%. It has been observed, if the percentage of barley in product decreases, the protein content of the product also decreases.
The comparable results have shown that the control sample of soup mix was found 0.7% fat, whereas different treatment of $T_1$, $T_2$ & $T_3$ revealed fat 1.79%, 1.70%, and 1.68% mean value, respectively. $T_1$ contains high fat i.e. 1.79% among all other treatment. It can say that if the percentage of barley in product decreases, the fat content of the product also decreases.

In the table 2, it has been shown that the control sample of soup mix was found less iron i.e. 1.05 compare to other treatment, whereas different treatment of $T_1$, $T_2$ & $T_3$ revealed iron 2.45%, 2.37% and 2.27% mean value, respectively. $T_1$ contains high amount of iron i.e. 2.45% among all other treatment. It can say that if the percentage of barley in product decreases, the iron content of the product also decreases.

So, we can suggest that $T_2$ is best ratio according to sensory evaluation and $T_1$ is considered as best on the basis of nutritive value.

**Conclusion**

This value added product is convenient and nutritious. It can be easily swallowed by patients, who cannot chew. As Black rice is rich in anthocyanin antioxidant it should include in regular diet to keep human health away from any kind of inflammatory condition like allergies, cancer, asthma, atherosclerosis and arthritis.

**References**


