Development of instant gluten free porridge

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Abstract

Appropriate nutrition practice plays a vital role in determining optimal health and development. The main aim of this study was to develop healthy nutritious malted breakfast especially for celiac and autism patients. The raw materials were procured from the Rajmata Vijaya Raje Scindia Krishi Vishwavidyalaya. The malted grains (ragi, sorghum and mung) were mixed in different proportion to prepared salty Porridge and named as treatments T1, T2 and T3. Organoleptic analysis was done to assess the sensory attributes by using nine point of hedonic scale. The result shows that T3 scored best in overall acceptability among all the treatments. Hence, it was concluded that germinated grains can be suitably used as porridge.

Introduction

The current scenario of nutritional status in the country is distributing, necessitating essential remedial measures. In recent years, a wide range of processed foods in ready-to-eat form have been marketed with increased interests in health foods. In India, wide ranges of traditional foods are consumed as breakfast. To attract consumers, traditional products must be reformulated to meet demands for fast preparation time, convenience and health significance. Wheat porridge (dalia) is a major breakfast cereal in north India. In addition to whole grain benefits, multigrain concept can provide breakfast foods with number of benefits associated with these grains. The cooking of grains with steam under pressure is the initial process for porridge making. This process is important as it develops the grain properties necessary for the development of product characteristics such as flavour, colour and texture—primarily by gelatinisation of starchy grain fractions. This multigrain blends helps to mix different whole grains to maximize their nutritional, functional and sensory properties.

Autism and celiac disease

Intensified opioid activity would result causing the abnormalities of perception, cognition, emotions and behaviors that are observed in autism. This theory is often called the “the Opioid-Excess Theory” given by Panksepp [1]. These peptides react with opiate receptors in the brain, thus mimicking the effects of opiate drugs like heroin and morphine. The peptide from wheat is called gluteomorphin (gluten+morphine) and the peptide from milk is called caseomorphin (casein+morphine). According Sciarini et al. [2] gluten must be eliminated from the diet of patients suffering from celiac disease because its ingestion causes serious intestinal damage.

Ragi

Finger millet is commonly known as Ragi (Eleusine coracana) which is having family Gramineae. Finger millet is a cereal crop and is mostly preferred as staple food by the peoples from the arid and semi arid region. Importance of finger millet has been increased due to its dietary fibre, starch pattern and high calcium-iron contents. In addition, it is nutritionally superior to Wheat and Rice because of its high Calcium (380 mg), Dietary fibre (18 g) and Phenolic compounds (0.03 g-3 g) per 100 g. The health benefits from ragi consumption are attributed to its polyphenol and dietary fibre contents. Its health beneficial effects are anti-diabetic, anti-tumorogenic, atherosclerogenic effects, antioxidants, etc. There are three anti-nutritional factors are present in the ragi viz., phytic acid, tannin and trypsin inhibitor. The process of malting improves digestibility, sensory and nutritional quality of finger millet and lowers anti-nutritional factors from it [2-10].

Mung

Mung bean (Vigna radiata L. Family: Fabaceae) is well known as green gram or moong bean. Mung beans are recognized for its high nutritive value, composed of about 20%-25% protein of total dry weight. Among them, globulin (60%) and albumin (25%) are the primary storage proteins. The protein in the mung beans contains a greater quantity of essential amino acids, including phenylalanine, leucine, isoleucine, valine, tryptophan, arginine, methionine, and lysine For incidence during sprouting, the reduces the content of triacylglycerol, increases the levels of free amino acids and total phenolic acids and alters the metabolites of fatty acid methyl esters, free fatty acids, monosaccharides, and disaccharides. Furthermore, these sprouts contain more potential antioxidant substances such as polyphenols when compared to the raw seeds. Hence, germination is thought to enhance the nutritional and medicinal qualities of mung beans [11-15].

Sorghum

Sorghum is a genus of flowering plants in the grass family Poaceae. Seventeen of the 25 species are native to Australia. They found that grain sorghum protein varies from 4.4 to 21.1% with a mean value of 11.4%. Sorghum grain is known for its hardness compared to other food grains. The hardness of the grain is due to higher content of...
protein prolamin. Prolamin content varies from 3.6 to 5.1%. The Lysine content ranges from 1.06 to 3.64%. The protein fractionation studies in sorghum indicated that the distribution of albumin-globulin, prolamin and glutelin is about 15, 26 and 44% respectively of total nitrogen. The important nutritional implication of phytic acid is that it chelates di and trivalent cations particularly Fe, Ca, Na, Mg and Zn and decreases their bioavailability. Phytic acid forms insoluble compounds with mineral elements including Ca, Fe, Mg and S. Fermentation resulted in a mean decrease of phytic acid of 64.8% after 96 hours and 39.0% after 72 hours in sorghum grain. Malting also resulted in a mean decrease of 23.9 and 45.3% after 72 and 96 hours, respectively. Phytic acid occurs primarily in the seed coats (brain) and germ of plant seeds. Genetic variation for low phytic acid is available in rice mutants. Presently the new research investigations on polyphenols and phytic acid consider these compounds as health factors and consumption of these factors increases immunity in animal and human systems against several diseases.

The present study was carried out to develop multi grain Instant porridge having greater nutritional value with reference to celiac and autism patients. The aim of the present work was to prepare gluten free Porridge as breakfast cereal using germinating grains and to find out the acceptance of porridge.

Materials and methods

The details of materials, procedures followed have been elaborated under the following heads:

1. Procurement of raw materials: Mung, sorghum ragi and other cereals were brought from the Rajmata Vijayaraje Scindia Krishi Vishwavidhalaya and other spices from local market of Gwalior

2. Sprouting of cereals: Table 1 and Figure 1.

3. Dehydration of sprouts: Table 2 and Figure 2.

4. Sprouted cereals: Figure 3.

Treatment and replication of developed products

Table 3.

Formation of porridge

Dry mixing of all ingredients with salt, oils and some dry seasonings and packaged in Poly ethylene pack. This porridge requires pressure cooking of 4 whistles to form a final porridge like consistency [16-20].

<table>
<thead>
<tr>
<th>Cereal or legumes</th>
<th>Sorting and washing</th>
<th>Soaking in water for over night</th>
<th>Spraying in a muslin cloth for sprouting</th>
<th>Appearance of sprouts</th>
<th>Germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal</td>
<td>Time</td>
<td>Temp</td>
<td>Place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger millet (ragi)</td>
<td>4 hrs.</td>
<td>27 ± 3˚C</td>
<td>Shade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vigna radiate (mung)</td>
<td>3 days</td>
<td>25˚C</td>
<td>Hot air oven</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td>3 days</td>
<td>27 ± 2˚C</td>
<td>Hot air oven</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. General procedure of sprouting cereals

Source: Khader Vijaya, Textbook of Food Science and Technology, published by directorate of information and publication of agriculture ICAR.

Table 1. Standards of sprouting cereals

<table>
<thead>
<tr>
<th>Cereal</th>
<th>Time</th>
<th>Temp</th>
<th>Length (avg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger millet</td>
<td>24 hrs.</td>
<td>27 ± 3˚C</td>
<td>1.5 cm</td>
</tr>
<tr>
<td>Vigna radiate</td>
<td>3 days.</td>
<td>25˚C</td>
<td>4 cm</td>
</tr>
<tr>
<td>Sorghum</td>
<td>3 days.</td>
<td>27 ± 2˚C</td>
<td>1.2 cm</td>
</tr>
</tbody>
</table>

Table 2. Standards of dehydration of grains

<table>
<thead>
<tr>
<th>Cereal</th>
<th>Time</th>
<th>Temp</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger millet</td>
<td>2 days.</td>
<td>25˚C</td>
<td>Shade</td>
</tr>
<tr>
<td>Vigna radiate</td>
<td>20 hrs.</td>
<td>50˚C</td>
<td>Hot air oven</td>
</tr>
<tr>
<td>Sorghum</td>
<td>24 hrs.</td>
<td>40˚C</td>
<td>Hot air oven</td>
</tr>
</tbody>
</table>

Table 3. Proportions of dry cereals and pulse in porridge

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Ragi</th>
<th>Sorghum</th>
<th>Brown rice</th>
<th>Mung</th>
<th>Rajma</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>40</td>
<td>40</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>T2</td>
<td>20</td>
<td>30</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>T3</td>
<td>20</td>
<td>30</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Organoleptic analysis

Cooked multigrain porridge was served hot and evaluated for sensory attributes (appearance, colour, texture, stickiness, flavor and taste) were placed near the twenty panelists to evaluate for acceptability at nine point hedonic test. The panelist judged the acceptability and measured the pleasurable and unpleasurable experience of the food products ranging from ‘like extremely’ to ‘dislike extremely’ [21]. Sensory evaluation of the developed product was evaluated by 20 semi trained panel from Centre for food technology Jiwaji University Gwalior. The sensory attributes of color, appearance, texture, flavor, taste and overall acceptability by using nine point hedonic scale score card. The samples were placed before the lactating mother with sample code T1, T2, T3.
Acknowledgement

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References