Garden cress (Lepidium sativum L.) – A non conventional traditional plant item for food product

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Garden cress (Lepidium sativum L.), is a traditional plant that has been relegated to the margins on account of its off-beat to pungent odour and presence of antinutrients despite a high density of nutrients and bioactive substances in its seeds and other plant parts. In the present study, garden cress seeds were quantitatively analyzed as whole (WGCS), husk removed (HRGCSP), husk (HGCSP), roasted (RGCS) and microwave processed (MPGCSP) forms, for proximate principles, selected minerals, and phenol content. Thereafter, a representative food product was developed in various versions incorporating each type of powders and evaluated for acceptability characteristic. The results revealed that all forms of garden cress seeds were good sources of macro (protein and fat) as well as micro (iron, calcium and phosphorous) nutrients. Processing is improved acceptability by denting anti-nutrients and off flavor components. All versions of Mathri - the product developed were found moderately to highly acceptable. The product versions developed from all types of powders made the product rich in nutrients including energy, protein, iron, calcium and phosphorous along with antioxidants making it value added to treat various diseases, including protein energy malnutrition, anemia, diabetes mellitus, hypertension and cardiovascular disease.

Keywords: Garden cress, Lepidium sativum L, Traditional plant, Mathri, Nutrients, Phytochemicals

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India is a country with its more than 5000 yrs old civilization. Obviously, wealth of its traditional knowledge systems related to the use of plant species is as old and time tested. Plants have played a great role in the sustenance and development of human race offering food, fodder, fuel wood, timber, dyes, latex, gums, fibres, fruits, etc. People have been using medicinal plants from time immemorial for the treatment of various types of diseases. For instance, Juice of basil tulsi (Ocimum tenuiflorum L.) leaves and honey partaking regularly for six months for expelling renal stones and its acting anti-diarrheal-dysentery agents. The metanolic extract of neem (Azadirachta indica A. Juss.) (NCL-11) leaves is used as an antiviral agent.

Traditional medicines of plant origin have become the alternative remedies to treat human as well as animal ailments. The knowledge pertaining to the medicinal significance of plant species have passed from previous to the present generation through oral communication and folklore. About 80% population of the developing world is still dependent upon the traditional medicine available in vegetation and forest to treat ailments. People rely on medicinal plants due to their faith in the traditional healing means in causing effectiveness as well as the inability of modern healthcare system to enter to their needs.4,5

One of traditional medicinal plant loaded with nutrients, is garden cress (Lepidium sativum L., Fam: Cruciferae, Common names: Hindi-chansur, Tamil-aliverai, Marathi-ahliva, Punjabi-shargundai), an annual erect herbaceous plant, cultivated all over India, North America and parts of Europe. In India, it is mainly cultivated in UP, Rajasthan, Gujrat, Maharashatra, and Madhya Pradesh. Despite ubiquitous occurrence, people know very little about this nature’s creation of a treasure trove of nutrients. However, it has been an important medicinal plant since Vedic era. Traditionally, seeds of garden cress seeds are used as fodder for animals as they tend to enhance milk output. The plant is also used as fodder for horses, camels, etc.7

It has been found to contain high amount of protein and iron, and significant amount of calcium. Besides,
it is also beneficial in treating and curing certain diseases. A tea spoon full of garden cress seeds boiled in 6 ounces of water for ½ hr and the decoction with a table spoonful of honey is given as an effective medicine to increase breast milk, sexual stamina, and sexual retenivity. Seeds roasted in ghee and mixed with sugar are given as a tonic for general weakness in young girls and after child birth to increase breast milk. Kheer made of garden cress seeds increases milk production and secretion in lactating mothers. Because of its high iron and protein content, it is often given post-partum to lactating mothers. It helps in preventing postnatal complications too. One part of seeds added to twenty parts of boiling water or ten parts of cold water, when consumed orally is remedy for dysentery, diarrhea and skin disease caused by impurity of blood. Powder of garden cress seeds with sugar can also be used to cure diarrhea, indigestion and dysentery. Seeds are recommended for the dispersion of chronic enlargement of spleen. The seeds of garden cress are aperient, diuretic and gently stimulant. These are demulcent, aphrodisiac, carminative, galactogogue and emmenagogue. Seeds are reported to have hypoglycemic activity, antihypertensive and diuretic effect. The effectiveness of this plant in treatment of bronchial asthma, hiccups, cough with expectoration and bleeding piles has been reported. Seeds are also reported to have antioxidant activity. However, cooking, such as boiling, microwaving, pressure cooking, grilling, baking, and frying, can profoundly affect both the texture and the nutritional value. In this way, the aim of the study is to estimate the nutrients and antinutrients present in garden cress seeds along with antioxidant activity assay and effect of household processing on the above all (nutrients, antinutrients and antioxidants).

Materials and methods
Garden cress seeds were procured from University of Agriculture Sciences, Banglore, Karnataka, India.

Preparation of samples
Whole garden cress seed powder (WGCSP): Garden cress seeds were sundried and hand sorted to remove wrinkled, moldy seeds and foreign material. Then, they were ground in a mixer equipped with stainless steel blade and stored in an airtight container. Husk removed garden cress seed powder (HRGCSP): Garden cress seeds were sundried and hand sorted to remove wrinkled, moldy seeds and foreign material. Then, they were ground in a mixer equipped with stainless steel blade and stored in an airtight container. This step was followed by sieving WGCSP through muslin cloth. Sieved garden cress seed powder was husk free and stored in another air tight container.

Husk of garden cress seed as powder (HGCSP): Husk obtained from above process was stored in air tight container.

Roasted garden cress seed powder (RG CSP): Garden cress seeds were roasted in a griddle and ground in a mixer equipped with stainless steel blade. Then, this powder was stored in an air sealed container.

Microwave processes garden cress seed powder (MPGCSP): Garden cress seeds were kept in a microwave oven at 130°C for 18 minutes. They were cooled and processed through grinder equipped with stainless steel blade and this powder was stored in an airtight container.

Proximate analysis: The proximate and nutritional parameters evaluated were moisture, crude protein, fat, crude fibre, ash, total carbohydrate, calcium, iron and phosphorous. All were analyzed in triplicate sets. Moisture content was determined by drying up the sample in air oven at 100-125°C. Crude protein was carried out using the Kjeldhal procedure with nitrogen to protein factor of 6.25. Fat was estimated through soxhlet extraction. Fibre was analyzed through resistant to the action of dilute mineral acid (Sulphuric acid) and alkali (Sodium hydroxide) and total carbohydrate was calculated by subtracting from 100, a sum of values (gm / 100 gm) for moisture, protein, fat, ash and crude fibre. Calcium, iron and phosphorous was estimated by dry ashing method.

Antioxidants
Preparation of extracts for phenol: Extracts of both powders were prepared according to the method described by Oktay et al. (2003). Samples (10 gm) were extracted overnight with 150 ml of methanol and the extracts were filtered through Whatman No.1 paper.

Determination of total phenolic content: Total phenolics were determined using Folin-Ciocalteu reagent after slight modifications. Samples (200 µl) were introduced into test tubes, and then 2.0 ml Folin-Ciocalteu's reagent and 4 ml sodium carbonate (7.5%) were added. The absorbance of all samples was measured at 760 nm after incubating at 30 °C for 1.5 hrs. Results were expressed as milligram of gallic acid equivalent (GAE) per gram of fresh weight.
Antinutrients

**Determination of oxalic acid:** Weighed 2 gm of sample in a 250 ml volumetric flask, added 190 ml of H\textsubscript{2}O\textsubscript{2} and 10 ml of 6N HCl and digested for 1 hr on boiling water bath. The volume was made up after cooling and filtered the supernatant. Then, to 50 ml of filtrate was taken and added 20 ml of 6N HCl. The mixture was evaporated to half of its volume and filtered. The precipitate was washed several times and mixture was evaporated to half of its volume and filtered. The precipitate was washed several times with hot water to make it free of Ca ions. Precipitate was transferred to the original beaker by washing with distilled water and H\textsubscript{2}SO\textsubscript{4} solution (1:4) added till the precipitate was completely dissolved. The contents were warmed and titrated with N/20 KMnO\textsubscript{4} to the near end point\textsuperscript{22}.

**Determination of total cyanogens:** One gm of sample was homogenized in 25 ml water with 3-4 drops of chloroform. This homogenate was placed in 500 ml conical flask. Filter paper strips were saturated with alkaline picrate solution. These saturated strips were placed in hanging position with the help of a cork stopper inside the conical flask. The mixture was incubated at room temperature (20°C) for 20-24 hrs. Sodium picrate present in the strips was reduced to reddish compound in proportion to the amount of hydrocyanic acid evolved. The color was eluted by placing the paper in a clear test tube containing 10 ml distilled water and compared it with standard hydrogen cyanide solution at 625 nm\textsuperscript{23}.

**Standardization of recipes**

Standard recipe was prepared by controlling all the variables such as ingredients, amounts, cooking time, duration and water content. Selected recipe was prepared accordingly. Standard recipe was prepared without garden cress seeds powder and other samples were prepared by incorporating WG CSP, HRGCSP, HGCSP, RG CSP and MPG CSP, respectively. The samples were compared in terms of appearance, color, taste, after taste, flavor, texture and overall acceptability. Powder incorporation in the products was done at three levels, viz. 2.5%, 5% and 7.5% initially. The prepared products were analyzed for sensory attributes and it was found that only 5% powder incorporation gave the acceptability scores Therefore, it was decided to incorporate 5% of the powders in the product.

Table 1 shows the various ingredients along with garden cress seeds used in the preparation of Mathri.

Standard product was prepared without incorporation of garden cress seeds powder. While, other products were prepared by incorporation of various processed forms of garden cress seeds. All other ingredients were same. The only difference among test products was in the form of garden cress seeds.

**Organoleptic evaluation**

First of all, triangle test was applied to select semi trained panel for performing sensory evaluation. Finally, the product prepared was evaluated for acceptability through hedonic method by 15 semi-trained panel members. Hedonic scale has nine points and theses points are given ‘word descriptions’ ranging from “dislike extremely” to “like extremely”\textsuperscript{24}. This test explores consumer likings or preference levels of the developed food products\textsuperscript{25}. All the three samples were served to the panelist members at one session. They were then asked to rate the acceptability of the product on a scale, usually of points, ranging from like extremely to ‘dislike extremely’.

**Results and discussion**

Table 2 demonstrates the proximate composition of all versions of GCSP. The mean moisture content of HGCSP was found highest among all. There were no significant differences in HGCSP and RG CSP but significant differences were found in HRGCSP and MPG CSP when compared with WGCSP.

The mean ash content for MPG CSP was reported as highest among all. No significant differences were found in mean scores of ash content for all versions (HRGCSP, HGCSP, RG CSP and MPG CSP) when compared with WGCSP. The mean protein content of HRGCSP was highest as compared to other versions. There were no significant differences of protein content in HGCSP, RG CSP and MPG CSP when compared with WGCSP. Only HGCSP had significant difference. Mean scores of fat content was also highest for HRGCSP. No significant difference was found in WGCSP and HRGCSP. However, rest versions (HGCSP, RG CSP and MPG CSP) were having significant differences on comparing with WGCSP. Mean fibre content of HGCSP was highest among all as husk contains more fibre.
difference was found only in WGCSP and HRGCSP. Other versions (HGCSP, RGCSP and MPGCSP) were not having significant differences when compared with WGCSP. The mean total carbohydrate content for all MPGCSP was highest among all versions. But, there was no significant difference between all samples and WGCSP.

Table 3 depicts the mean mineral content of all versions. The mean iron contents RGCSP was found more as compared to other versions. Significant difference was found only in WGCSP and HGCSP. No significant difference was found in remaining samples on comparing with WGCSP.

The mean calcium content of HGCSP was highest among all. WGCSP and HGCSP were having non-significant difference. While rest of the samples was found significantly different when compared with WGCSP. On the other hand HRGCSP was having the highest content of phosphorous among all versions. There were significant differences in all samples excluding HRGCSP when compared with WGCSP. According to Gokavi et al (2004), protein and fat were concentrated in endosperm whereas dietary fibre, minerals and carbohydrate in the bran fraction of garden cress seeds. While endosperm of garden cress seeds has more iron (8.31±0.06 mg/100 gm) and phosphorous (652.81±14.59 mg/100 gm) content than whole meal (iron-7.62±0.04; phosphorous-514.59±10.67 (mg/100 gm)). However, calcium content was found more in bran (556.32±3.03 mg/100 gm).
gm) as compared to endosperm (210.51±1.08 mg/100 gm) and whole meal (296.60±1.04 mg/100 gm). This is in agreement with the present study.

Mathews et al. (1993)27 reported 24.3 ± 0.67% protein, 14.9 ± 0.79% fat, 55.4 ± 1.8% carbohydrate, 27.3±0.43% acid detergent fibre and 35.7 ± 0.82% neutral detergent fibre in L. sativum L. seeds. In a study, the author28 concluded that roasting of peanut seeds showed significant differences in moisture, protein, ash, fat, magnesium, potassium, sodium, iron, copper, glucose, sucrose and stachyose. On the other hand calcium, zinc and magnesium didn’t differ significantly. Oboh et al. (2010)29 investigated that roasting caused a significant increase (P < 0.05) in the crude fat, carbohydrate, Ca, Na, Mg and Zn contents in yellow and white maize varieties. Conversely, a significant decrease (P < 0.05) was observed in crude protein, crude fibre, iron and potassium contents. In one study reported by Mubarak (2005)30, no significant differences in total protein and total carbohydrate were observed after microwave processing in mung bean seeds [Vigna radiata (L.) Wilczek syn. Phaseolus aureus]. While there were significant decreases in fat and ash contents. All minerals (sodium, potassium, calcium, phosphorous, magnesium, iron and manganese) were also reduced along with reducing sugars, stachyose and raffinose which might be attributed to their soaking before microwave cooking.

Antioxidants and Antinutrients

MPGCSP has the highest content of phenol as compared to other versions (Table 4). Significant difference was found only in phenol content of HRGCSP as compared to WGCSP. Aydmir and Becerik (2011)31 reported the total phenol content as 61.4 ± 1.58 in garden cress seeds which is somewhat closer to the analyzed value of WGCSP.

While Yadav et al. (2011)32 reported the total phenol content of garden cress seeds as 4.46±0.14mg / gm in ethanolic extract. This is different from the estimated value of the present study. This can be because of difference in extraction solvent. On the other hand, Beta et al. (2005)33 determined phenolic contents of fractions derived from pearling of wheat and from roller milling and also assessed the antioxidant activity of phenolics extracts of wheat fractions against free radicals. Total phenols were concentrated in fractions from the first and second pearlings wheat fractions, from the third and fourth pearlings still contained high phenolic content.

Similar trend was observed in antioxidant properties of milled fractions. Microwaving for 1.5 min increased anti-oxidant activity by 16.68%. Microwave cooking by different methods enhanced antioxidant activity in broccoli, spinach, green beans and pepper and caused no change to antioxidant activity in squash, peas and leek34. In the present study, microwave cooking also enhanced phenol content.

Phenols comprising of phenolic acids, flavonoids, biflavonoids, anthocyanins and isoflavonoids posses a wide spectrum of biochemical activities such as anti-oxidant, anti-mutagenic, anti-carcinogenic, as well as ability to modify the gene expression35, 36. Simple phenolics and flavonoids are important constituents of plants. These compounds show a wide range of antioxidant activities in vitro37 and are thought to exert protective effects against major diseases such as cancer and cardiac disease.

Total cyanogens were found more in husk (HGCSP) as compared to WGCSP. But there was non-significant difference in WGCS and HGCSP cyanogens content. While roasting and microwave cooking caused a significant loss in total cyanogens content of garden cress seeds. A significant loss of HCN content (62.5%) was observed in the vegetable cowpea (akidi) by roasting for 120 min. The heat treatment involved in the process must have caused the vaporization of the free cyanide38.

Oxalic acid was highest in WGCS as compared to other versions. Dehulling and both type of cooking (roasting and microwave) resulted in a significant decrease in oxalic acid content. Abiodun and Adepeju (2011)39 evaluated the effect of processing on anti-nutritional composition of bambara nut flour. Tannin contents ranged from 0.16 mg/100 gm in dehulled flour to 0.32 mg/100 gm in raw flour. Raw bambara nut flour had higher phytate content while the dehulled flour had lower value. The value of oxalate ranged from 0.10-1.34 mg/100 gm. Dehulling drastically reduced the antinutritional composition of the flour.

Organoleptic evaluation

Mathris or mathis are salted crisp crackers and popular afternoon snack. Namkeen mathri is one of the most common North Indian snack. It is great on its own with tea/coffee and even tastes better with spicy pickle or mango chutney. It lasts for few weeks if stored properly in air tight container, so it is a great anytime snack. This is an enhancement of mathri over traditional mathri as GCSP is added to compensate
its lacking nutrients as GCSP is rich in protein, fibre, calcium and iron, and refined wheat flour is deficient in these nutrients which are necessary for mass in all stage for proper growth and maintaining reserves for future.

The result of sensory evaluation of mathri is presented in Table 5.

Standard was found best among all samples. Version A got the place after version B. They were followed by version C, D and E. Appearance of version 3 was found best as compared to other versions like version A, E, D and B. While standard was even better than version C.

Version B and C got equal mean scores in terms of color. While standard got higher mean score than both. Version D and E got almost equal but lower mean scores than version A. In terms of texture, standard stood above all. Version A & B also got equal mean scores. Version E was next choice of panel members. It was followed by version C and D. Panel members liked the taste of version B after standard. They were followed by version E, C, A and D. Version B was second choice of panel members after standard in terms of flavor. Version A and C were next choice. They were followed by version E and D. Likeability of after taste for standard was more as compared to other samples; version B and A. Version C and D were equally accepted. Version E was also liked. Significant differences were found between all versions and standard but they were also in the range of ‘liked moderately to very much’.

Table 6 shows the nutrition composition of all versions of mathri. Protein and fat content of version

<table>
<thead>
<tr>
<th>Samples</th>
<th>Phenol (mg/100 gm)</th>
<th>Total Cyanogens (mg/100 gm)</th>
<th>Oxalic acid (mg/100 gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGCSP</td>
<td>47.10±1.01</td>
<td>5.50±0.10</td>
<td>135.66±2.08</td>
</tr>
<tr>
<td>HRGCSP</td>
<td>39.66±1.52</td>
<td>0.36±0.02</td>
<td>65.00±2.00</td>
</tr>
<tr>
<td>HGCS</td>
<td>46.00±0.50</td>
<td>5.76±0.32</td>
<td>54.33±1.52</td>
</tr>
<tr>
<td>RGCS</td>
<td>50.23±0.25</td>
<td>4.46±0.50</td>
<td>65.33±1.52</td>
</tr>
<tr>
<td>MGPSC</td>
<td>53.11±1.01</td>
<td>3.80±0.10</td>
<td>54.33±1.52</td>
</tr>
</tbody>
</table>

[Values: Mean ±SE]; NS: (p≥0.05) Non-significant; S: (p≤0.05) significant

<table>
<thead>
<tr>
<th>Samples →</th>
<th>Attributes ↓</th>
<th>S</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
<td>8.53±0.63</td>
<td>7.40±0.82</td>
<td>7.20±0.77</td>
<td>7.53±0.74</td>
<td>7.26±0.88</td>
<td>7.46±0.99</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>8.40±0.63</td>
<td>7.40±0.73</td>
<td>7.46±0.74</td>
<td>7.46±0.74</td>
<td>7.06±0.88</td>
<td>7.06±1.03</td>
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<tr>
<td>Texture</td>
<td></td>
<td>8.40±0.63</td>
<td>7.60±0.82</td>
<td>7.60±0.82</td>
<td>7.46±0.91</td>
<td>7.33±1.11</td>
<td>7.20±1.20</td>
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<tr>
<td>Taste</td>
<td></td>
<td>8.40±0.73</td>
<td>7.26±1.22</td>
<td>7.53±0.91</td>
<td>7.33±1.11</td>
<td>7.20±1.20</td>
<td>7.40±1.29</td>
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<tr>
<td>Flavor</td>
<td></td>
<td>8.46±0.63</td>
<td>7.26±1.27</td>
<td>7.40±0.98</td>
<td>7.13±1.24</td>
<td>6.93±1.22</td>
<td>7.06±1.27</td>
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<tr>
<td>After taste</td>
<td></td>
<td>8.33±0.72</td>
<td>7.13±1.24</td>
<td>7.20±1.20</td>
<td>7.06±1.33</td>
<td>7.06±1.33</td>
<td>7.06±1.38</td>
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<tr>
<td>Over all acceptability</td>
<td></td>
<td>8.46±0.63</td>
<td>7.53±0.99</td>
<td>7.66±0.81</td>
<td>7.46±0.99</td>
<td>7.33±1.11</td>
<td>7.20±1.26</td>
</tr>
</tbody>
</table>

S = Standard (Without incorporation of GCSP), A = WGCSP incorporated Mathri, B = HRGCSP incorporated Mathri, C = HGCS incorporated Mathri, D = RGCS incorporated Mathri, E = MGPSC incorporated Mathri

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Energy (Cal)</th>
<th>Protein (gm)</th>
<th>Fat (gm)</th>
<th>Fibre (gm)</th>
<th>Total CHO (gm)</th>
<th>Calcium (mg)</th>
<th>Iron (mg)</th>
<th>Phosphorus (mg)</th>
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</thead>
<tbody>
<tr>
<td>S</td>
<td>445.33</td>
<td>8.40</td>
<td>20.73</td>
<td>0.36</td>
<td>56.29</td>
<td>21.38</td>
<td>2.06</td>
<td>92.04</td>
</tr>
<tr>
<td>A</td>
<td>449.50</td>
<td>9.10</td>
<td>21.78</td>
<td>0.73</td>
<td>54.27</td>
<td>37.61</td>
<td>7.56</td>
<td>115.91</td>
</tr>
<tr>
<td>B</td>
<td>451.01</td>
<td>9.23</td>
<td>21.97</td>
<td>0.63</td>
<td>54.09</td>
<td>36.70</td>
<td>8.00</td>
<td>119.76</td>
</tr>
<tr>
<td>C</td>
<td>444.53</td>
<td>8.87</td>
<td>21.33</td>
<td>1.07</td>
<td>54.27</td>
<td>40.13</td>
<td>5.58</td>
<td>96.45</td>
</tr>
<tr>
<td>D</td>
<td>447.32</td>
<td>9.06</td>
<td>21.60</td>
<td>1.10</td>
<td>54.17</td>
<td>37.22</td>
<td>8.28</td>
<td>109.27</td>
</tr>
<tr>
<td>E</td>
<td>448.78</td>
<td>9.04</td>
<td>21.62</td>
<td>0.81</td>
<td>54.51</td>
<td>36.48</td>
<td>7.81</td>
<td>105.88</td>
</tr>
</tbody>
</table>

S = Standard (Without incorporation of GCSP), A = WGCSP incorporated Mathri, B = HRGCSP incorporated Mathri, C = HGCS incorporated Mathri, D = RGCS incorporated Mathri, E = MGPSC incorporated Mathri
B were highest. While, fibre content was highest in version 4. Carbohydrate content was highest in standard. Calcium content was highest in version 3. On the other hand, iron content was highest in version 4. Phosphorous content was highest in version 2. In a study done by Ballolli et al. (2010), highly acceptable barnyard millet cookies were developed with nutraceutical ingredients such as linseed, soy, cocoa, chocolate, dry fruits nuts and garden cress seeds. Among the value added cookies garden cress seeds incorporated for iron enriched recorded higher iron (21.21%), dietary fiber (9.34%), energy (483 Kcal) and manganese (145.45 mg/100 gm) content, besides exhibiting high sensory quality and excellent texture (3393.00 gm force). Consumer acceptability tests of iron enriched barnyard millet cookies (incorporating barnyard millet flour at 60 % level, replacing refined flour) revealed acceptability by more than 90 % and they were nutritionally superior over control too.

Traditional significance of study to the society/researchers and some constructive recommendations

Plant world is replete with an array of foodstuffs, many of which stood relegated to the margins for a long time owing to their low pallet appeal. This study unveils the nourishing and therapeutic potential of garden cress (Lepidium sativum L.) through product development endeavour after obligatory processing.

Garden cress has been used in traditional medicine to increase breast milk production & regulate the menstrual cycle. It has also been used to stimulate the appetite, as a laxative, and to settle colicky infants. The plant and seeds are regarded as a cure for asthma, throat disease, febrifuge, antirheumatic, diuretic, dysentery, bleeding piles, menstrual disorders, headache, diabetes mellitus & renal disease. The traditional medicines of Saudi Arabia and other Arab countries use the garden cress plant and seeds for healing bone fractures.

These are made into sugar-rich sweets. Ladoo incorporating garden cress seeds are mainly given to post-natal women to strengthen their bones and help regain the energy. Because of its high iron and protein content, it is often given post-partum to lactating mothers.

In nut shell, this treasure trove plant could have the potential in treating various diseases. It is yet to come to margins and become a main dietary ingredient. So the need of the hour is to throw light on its unexplored therapeutic potential through research studies.

Conclusion

It can be concluded that garden cress seeds are a rich source of macro as well as micro nutrients along with phytochemicals. Household processing (dehulling, roasting and microwave processing) is an effective way to reduce antinutrients and enhance antioxidants. Among all versions of developed food product namely mathri, standard (8.46±0.63) stood out. However, other versions were also acceptable and in the range of ‘liked moderately’ to ‘liked very much’ (7.20±1.26 to 7.66±0.81). GCSP incorporated mathri are more nutritious than standard and has the potential to act as a nourishing as well as therapeutic agent in curing various diseases.

Acknowledgement

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