A Study of Nutritional Profile and Antioxidant Properties of Chick Pea (Cicer arietinum L) and Horse Gram (Macrotyloma Uniflorum)

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Abstract: India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. Pulses are good source of protein, high in fibre and have a low glycemic index. The objective of this work was to assess the physico-chemical properties, nutritional composition, dietary fibre (DF) and antioxidant properties of locally available chickpea (Cicer arietinum L) Horse Gram (Macrotyloma uniflorum). The color and shape of the chick pea was observed to be creamish with irregular shape and horse gram was black color with kidney bean shape. The density and one thousand kernel weight of the samples chick pea and horse gram were came out to be 2.81, 1.39 g/ml and 391, 32.69 g respectively. The values for crude fiber and crude protein were calculated as 3.84, 5.4 and 22.4, 21.28 per cent respectively. Chick pea contain a good amount of dietary fiber than horse gram as the values were established as 22.38 and 15.99 per cent respectively. Horse gram flour was observed with good antioxidant properties and the values for total phenolic compound (TPC), total flavonoid compound (TFC) and FRAP were calculated as 0.78, 0.91, and 1.2 mg/g respectively. Samples comes under low glycemic index (GI) pulse and the value calculated as 40.23 for chick pea and 40.28 for horse gram. From the aforesaid discussion it conferred that these pulses chick pea and horse gram are suitable to the palate of diabetic and other health conscious persons.

Keywords: Chick pea (C.P), Horse gram (H.G), Physico-chemical, Total flavonoid content (TFC), Total phenolic contents (TPC)

1. Introduction

Pulses has important role in contributing to food and nutritional security and replenishing soil nutrients having a huge potential in addressing needs like future global food security, nutrition and environmental sustainability needs. They also play an important role in mitigating greenhouse gas emissions in agriculture production by lowering GHG emissions. For both large and small farmers, pulses represent important economic opportunities to boost income and reduce risk by diversifying their crop and income stream portfolio. Besides the environmental benefits of adding pulses to crop rotations, there is an also social and economic benefit of pulse production as it helps needs for protein, minimize soil degradation, and support diversification in food production and consumption. Pulses have been consumed for at least 10 000 years and are among the most extensively used foods in the world. A wide variety of pulses can be grown globally, making them important both economically as well as nutritionally. Pulses are high in fibre and have a low glycemic index, making them particularly beneficial to people with diabetes by assisting in maintaining healthy blood glucose and insulin levels.

Chickpea is an important pulse crop with a wide range of potential nutritional benefits because of its chemical composition. The purpose of the current work is to assess the physico-chemical properties, nutritional composition, dietary fibre (DF) and antioxidant properties of locally available chickpea (Cicer arietinum L) Nobile et al (2013). Chickpea (Cicer arietinum L.), originally domesticated in Middle Eastern, African and Asian countries, is the third largest pulse crop in the world FAO (2011). It has become an important source of vitamins and minerals to the cereal-based daily diet of millions of people in under-developed countries Jukanti et al (2012). Horse gram (Macrotyloma uniflorum) commonly known as kuth is a minor, under-exploited legume of tropics and subtropics grown mostly under dry-land agriculture. Horse gram is largely cultivated, especially in dry areas of Australia, Burma, India and Sri Lanka mainly for animal feed. It is an important source of protein, iron and molybdenum. It has been identified as one of the potential food sources for the future by the US National Academy of Sciences (1979) Srerarma et al (2007). The high content of dietary fibre in horse gram flour might be helpful in terms of maintaining positive effects on intestine and colon, besides other homoeostatic and therapeutic functions in human nutrition Srerarma et al. (2012).

2. Material and Method

Chick pea and Horse gram were purchased from local market at Palampur, Himachal Pradesh, India. All the grains were cleaned from soil particles and debris. The grains were ground...
Physico-chemical properties

Bulk density of flours was measured by method of Wang and Kinsella, (1976). True density was determined by liquid displacement method ASAE (2001). Porosity of flour mixture was measured by method of Thompson and Issac (1967) Proximate analysis was done by method of AOAC (2010) and minerals were analyzed with atomic absorption spectrophotometer Model 3100, perkin Elmer, and flame photometer, Mediflame127.

Functional properties

Water absorption index (WAI) and water solubility index (WSI) were determined by the method of Anderson (1982). Foaming Capacity (FC) and Foam Stability (FS) were determined by method of Narayana and Narasinga Rao (1982). Oil absorption capacity was determined with slight modification to the method of Wani et al. (2013).

Antioxidant profile

Antioxidant profile was as total phenolic content, total flavonoid content and ferric reducing antioxidant power was measured by method Chandra and Dave (2009). Statistical analysis The data reported in all of the tables are the averages of triplicate observations. Statistical analysis of the results was done with Microsoft Excel 2007 (Microsoft Office) determine the means.

3. Result and Discussions

Physical properties

The raw material flours were analyzed for physical properties and the data shown in Table 1. The colors of the crops were observed manually and found creamish for chick pea and black for horse gram.

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Functional properties

The raw materials chick pea and horse gram flour, were analyzed for functional properties and data shown in (Table 3). Water absorption capacity (WAC) was observed high in chick pea as 73.38g/100g than horse gram 62.38 g/100g. Related to oil absorption capacity (OAC) of studied pulses flours, OAC was also found in chick pea flour 86.05 g/100g than horse gram flour 80.85g/100g. There is an advantage for best organoleptic characteristics of meal that high water and oil absorption capacity of the flour can positively influence the flavor, moisture and fat content in food. The foaming capacity (FC) of
a flour refers to the amount of interfacial area that can be created by the protein and foam stability (FS) refers to the ability of protein to stabilize against gravitational and mechanical stresses.

Table 3

<table>
<thead>
<tr>
<th>Crops</th>
<th>Horse Gram</th>
<th>Chick Pea</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAC (g/100g)</td>
<td>62.38</td>
<td>73.38</td>
</tr>
<tr>
<td>OAC (g/100g)</td>
<td>80.85</td>
<td>86.05</td>
</tr>
<tr>
<td>FC (g/100g)</td>
<td>47.00</td>
<td>54.00</td>
</tr>
<tr>
<td>FS (g/100g)</td>
<td>37.00</td>
<td>45.00</td>
</tr>
<tr>
<td>WSI (g/g)</td>
<td>6.53</td>
<td>23.64</td>
</tr>
<tr>
<td>WAI (g/100g)</td>
<td>7.24</td>
<td>1.72</td>
</tr>
</tbody>
</table>

The concentration of antioxidants present in the grains may vary depending on the species, cultivar, and growing location and environmental conditions, among others. Also dehulling decreased the TPC of whole grain millets and this change was essentially due to the removal of the outer layers of the grain, as phenolic compounds of cereal grains are mainly concentrated in the outer layers of the grain.

4. Conclusion

The results of the study revealed great potential of pulses to address the food security nutrition and environmental sustainability needs. Pulses can be produced with a minimum use of resources and hence, it becomes less costly even than animal protein. Pulses are mostly cultivated under rainfed conditions and do not require intensive irrigation facility and this is the reason why pulses are grown in areas left after satisfying the demand for cereals/cash crops. These crops are more important from the nutritional point of view because of which they play important role in human health also. These pulses can be use in food industry and can be replace the conventional costly protein sources

References


Fig. 1. Antioxidant Profile of Selected Crops