INTRODUCTION

Millet is the name given to the group of cereal other than wheat, rice, maize and barley. They are mostly tiny in size, round in shape and ready for use as it is. Millets is a general category for several species of small grained cereal crops and is a food staple part of India, Africa, China and elsewhere. Millets are good source of macro and micronutrients and hence they are rightly termed as nutra-cereal\(^1\). The richness of starch, protein and fibre, niacin, magnesium, phosphorus, manganese, iron, potassium and vitamin E make millet an important nutritional bio-source\(^2,3\). Millet release sugars very slowly and they have low glycemic index\(^4\). Many types of biologically active constituents in these millets, including tannins, phenols, anthocyanin, flavonoids and phytate\(^5,6\). Millet...
MATERIALS AND METHODS
Barnyard millet was collect from the local market of Dheradun (Uttarakhand) and was clean thoroughly and stored in containers for the further study. Processing of Barnyard millet by three methods; soaking 4-6 hours, germination 48 hours and roasting 5-10 minutes and grounded separately. All these methods greatly improves its nutritive value and improve the shelf life.
The ground powder of unprocessed and processed were analyzed for proximate like ash, moisture content, crude fiber estimation, Protein estimation was done by macrok-jeldhal method. Estimation of iron by Wong’s method, Calcium analysis was done by titrimetric method.
Phytochemical analysis was done on both processed and unprocessed barnyard millet flour. Alkaloid was done by Mayer’s test, glycosides done by Brontrager’s test. Terpenoids, steroids, tannins, phytosterol were done by Libermann-buchard’s test. Flavonoid was done by Shonoda test. Tannin was done by Folin Denis method, Phytic acid.
RESULT AND DISCUSSION
Table 1. Macronutrient and micronutrient analysis of unprocessed and processed barnyard millet flour

<table>
<thead>
<tr>
<th>Nutrient (%)</th>
<th>UPMF</th>
<th>SMF</th>
<th>GMF</th>
<th>RMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>9.4±0.2</td>
<td>2.4±0.1</td>
<td>6.1±0.3</td>
<td>2.4±0.1</td>
</tr>
<tr>
<td>Ash</td>
<td>2.2±0.1</td>
<td>3.1±0.1</td>
<td>3.3±0.4</td>
<td>3.8±0.1</td>
</tr>
<tr>
<td>Protein</td>
<td>5.1±0.1</td>
<td>4.1±0.3</td>
<td>5.4±0.1</td>
<td>3.2±0.3</td>
</tr>
<tr>
<td>Fat</td>
<td>2.9±0.1</td>
<td>2.4±0.2</td>
<td>2.4±0.2</td>
<td>3.4±0.1</td>
</tr>
<tr>
<td>Fibre</td>
<td>6.6±0.3</td>
<td>2.2±0.2</td>
<td>7.1±0.1</td>
<td>2.5±0.1</td>
</tr>
<tr>
<td>Calcium</td>
<td>18.8±0.1</td>
<td>12.2±0.4</td>
<td>20.2±0.3</td>
<td>7.8±0.2</td>
</tr>
<tr>
<td>Iron</td>
<td>11.1±0.2</td>
<td>8.2±0.3</td>
<td>14.4±0.1</td>
<td>7.8±0.1</td>
</tr>
</tbody>
</table>

UPMF- Unprocessed millet flour  
SMF- Soaked millet flour  
GMF- Germinated millet flour  
RMF- Roasted millet flour

Table 2. Phytochemical Analysis of unprocessed barnyard millet flour

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>BMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>Glycosides</td>
<td>-</td>
</tr>
<tr>
<td>Tannins</td>
<td>+</td>
</tr>
<tr>
<td>Phytosterol</td>
<td>-</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>-</td>
</tr>
<tr>
<td>Phenolic compound</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 3. Antinutrient analysis of unprocessed and processed Barnyard millet flour

<table>
<thead>
<tr>
<th>Antinutrient</th>
<th>UPF</th>
<th>SPF</th>
<th>GPF</th>
<th>RPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytic acid (mg/100gm)</td>
<td>159</td>
<td>104</td>
<td>97</td>
<td>99</td>
</tr>
<tr>
<td>Tannin (g/100gm)</td>
<td>5.2</td>
<td>4.1</td>
<td>2.8</td>
<td>3.2</td>
</tr>
</tbody>
</table>

PROXIMATE ANALYSIS
The proximate compositions of barnyard millet are shown in table 1. Results show significant variation in moisture after processing like soaking, germination and roasting. It was found that moisture content decreased after processing. The ash content was found to be increased after processing and protein content slightly decreased after processing but protein content was increases in germinated barnyard millet flour (5.4). Fat content of the barnyard millet was decreased after processing but the roasted barnyard millet flour was found to be increased fat (3.4). Fibre composition of germinated barnyard millet flour (7.1) was increased in the comparison of other processed and unprocessed flour. Calcium content was respectively decrease after processing but the germinated barnyard millet flour was shown.
increased calcium content comparison to other processed and unprocessed millet flours. Iron content of germinated barnyard millet is increased (14.4) in the comparison of other flours. The unprocessed barnyard millet flours nutrient content was slightly different when compare to other studies.**

**PHYTOCHEMICAL ANALYSIS**

Phytochemical testing to detect for the presence of different chemical group of phyto-compounds are alkaloid, tannin, terpenoids, phenolic compound and flavonoids. Barnyard millet flour is a good source of phytochemical like other millets such as finger millet and little millet.

**ANTINUTRIENT ANALYSIS**

The antinutrient present in barnyard millet is phytic acid and tannins shown in table 2. Phytic acid was found to be in decreased amount after processing. Tannin content was also decreased in processed barnyard millet flour in comparison of unprocessed barnyard millet flour. Other millet like foxtail mille, pearl millet and finger millet also decreases the content of antinutrients such as tannin and phytic acid by the different processing methods such as germination, roasting, soaking and sprouting.

**CONCLUSION**

This work has shown that barnyard millet flour is a potential source of fibre, calcium for use in food and feed formulation. Germinated barnyard millet flour has higher protein, calcium, iron content. It is an essential and easily available source of phytochemicals. The presence of antinutrient was decreased by processing and may limit its utilization.

**REFERENCES**

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