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PROXIMATE, PHYTOCHEMICAL AND ANTINUTRIENT ANALYSIS OF UNPROCESSED AND PROCESSED BARNYARD MILLET FLOURS

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ABSTRACT

Millets are the stable food for majority of population around the world. These are neglected despite of their nutritive value and therapeutic use. Millets also have some anti-nutrients which gives the negative health impact but application of some processing methods are decrease these compounds. Relatively barnyard millet flour was processed to soaking, germination, roasting and proximate, phytochemical and anti-nutrient analysis investigated using the standard methods. Results showed the following findings moisture content decrease after processing. The ash content was found to be increased after processing and protein content slightly decreased after processing only germinated flour protein content was increased (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). Fiber composition of germinated barnyard millet flour (7.1) was increased in the comparison of processed and unprocessed flour. Calcium and iron content were respectively decrease after processing but the germinated flour was shown increased calcium(20.2)and iron (14.4) content comparison to other processed and unprocessed millet flours. The phytochemical investigation showed the presence of alkaloids, tannins, terpenoids and flavonoids. Anti-nutrient content was decreased after processing. These properties are also recognizing for their beneficial health effects. Barnyard millets are good source of macro and micro nutrients and phytochemical which are prevent the degenerative diseases

Keywords: Proximate, Phytochemical, Anti-nutrient, Barnyard millet, Processing

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 categoryfor 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 biosource[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]. Mil-

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lets posse's antioxidants properties as they contain phenolic compounds[7,8]. Polyphenols are majorly occurring antioxidants in millets and have positive health benefits. Millets have therapeutic benefits such as prevention of heart diseases, diabetes, obesity and cancer[9,10] and they are contain many nutrients so help to reduce specific nutrient deficiencies. Millets contain some antinutrient that is effect the bioavailability of mineral such as iron and zinc as well as some processing methods improves the digestibility and bioavailability of nutrients[11].

Barnyard millet is one of the millet which synonyms are Japanese Barnyard millet, Ooda, Oadalu, Sawan and Sanwank. Barnyard millet is small in size; it is a superior food grain with high nutritional profile. Barnyard millet is mainly grown in India, China, Japan and Korea for human consumption as well as fodder[12]. The crop is valued for its drought tolerance[13]. Barnyard millet is a good source of macronutrients, micronutrients and neutraceutical potential. Barnyard millet is also highly nutritious consisting of carbohydrate, protein, fat and crude fiber with significant amount of both calcium and iron and is highly digestible coupled with low content of carbohydrate content of slow digestibility[14]. These characteristics also make it a good candidate for manufactured food products such as baby food, snacks and dietary foods[15].

MATERIALS AND METHODS

Barnyard millet was collect from the local market of Dheradun (Uttrakhand) 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 greatlyimproves its nutritive value and improve the shelf life.

The ground powder of unprocessed and processed were analyzed for proximate like ash, moisture content[16] ,crude fiber estimation[17] ,Protein estimation was done by macrokjeldhal method, Estimation of iron by Wong's method[16] ,Calcium analysis was done by titrimetric method[17] .

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[18,19].

Tannin was done by Folin Denis method[20], Phytic acid[21].

RESULT AND DISCUSSION

Table-1.Macronutrient and micronutrient analysis of unprocessed and processed barnyard millet flour

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

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

Phytochemicals	BMF
Alkaloids	+
Glycosides	-
Tannins	+
Phytosterol	-
Terpenoids	+
Steroids	-
Phenolic compound	+
Flavonoids	+

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

Antinutrient	UPF	SPF	GPF	RPF
Phytic acid (mg/100gm)	159	104	97	99
Tannin (g/100gm)	5.2	4.1	2.8	3.2

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 decrease 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[22].

PHYTOCHEMICAL ANALYSIS

Phytochemical testing to detect for the presence of different chemical group of phytocompounds 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[23,24].

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 mille 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[25,26,27].

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, ironcontent. It is an essential and easily available source of phytochemicals. The presence of antinutrient was decreased by processing and may limit its utilization.

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