

Research article

CHEMICAL AND FUNCTIONAL CHARACTERISTICS OF FLOURS FROM BLENDS OF MILLET GRAIN FLOUR FROM DISTILLED WATER SOAKING AND MALTING. (PENNESITUM GLACUM)

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Abstract

Millet Flour from soaked and malted in distilled water were prepared and manually blend and analyzed and then comparing properties with the control for physical, chemical and nutrient characteristic values. The physical properties such as bulk density, water absorption capacity, and hygroscopicity, swelling index, least gelation concentration and viscosity at 30 RPM were favorable for blended flour on food functionalities. The chemical properties were significant for food applicability, the nutrient values. This indicates nutraceutical property on the blended flour. Blends from soaked and malted flour reveals that when used at home can inhibits and reduce primary infections and offset terminal illness like diabetes, cholesterol level and colon cancer. **Copyright © acascipub.com, all rights reserved.**

Keywords: Blended flour, malted flour, soaked flour, physical property, chemical property, nutrient values, distilled water

Introduction

Pear millet (*Pennisetum glaucum*) is a staple in Africa and also in some Asian countries like India. Basavaraj et al (2010). Millet flour is rich in minerals and its caloric content is low. It is rich in iron, amino acids, calcium, phosphorus, fiber and certain vitamins. Mathanghi and Sudha (2012).

Pearl millet (*Pennisetum glaucum*) in West Africa, especially Nigeria, is a good source of diet for growing children, expectant mothers and the aged. From its physicochemical characteristics, millet is good for the diabetic's. Kulkairi et al (1991). During germination processes, both its starch and protein are partially degraded, making it a better digesting meal. They are used for flour puddings, porridge commonly called *enyiokwolla* in Benue state and *ocheme* and *chinma* (2008). The flour nutritional and functional properties have great importance because of its starch digestibility and its resistant starch when applied on food bioprocess. Traditional variety from finger millet *Eleusine coracora* is processed by either malting or by fermentation, Rao and Murahkrishna (2004). These approaches enhance its chemical and functional properties of the final product. According to Darber (1976), the benefit of malting enhances the vitamin C content, phosphorus leaching as well as tryptophan and lysine synthesis. Similarly, flour product from Ragi is extensively used in the preparation of weaning food, instant mixers, beverages and pharmaceutical products. Rao and Ramakrishna (2004).

Product from pearl millet often encourages food security, its availability of its food flour all year round. The blends from soaked and malted millet grains by reasons of soaking, malting and blending may confer certain physical, chemical and nutrient characteristics on the flour which would enhance home usage and industrial application. Soaking and malting using distilled water undertakes fermentation processes and this is encouraged because diverse microbial phages may adhere to the surface of soaking and malting millet grains encouraging secondary fermentation of the flour blends outside solute absorption, desorption and osmotic intakes during the processes.

MATERIALS AND METHODS

MATERIAL

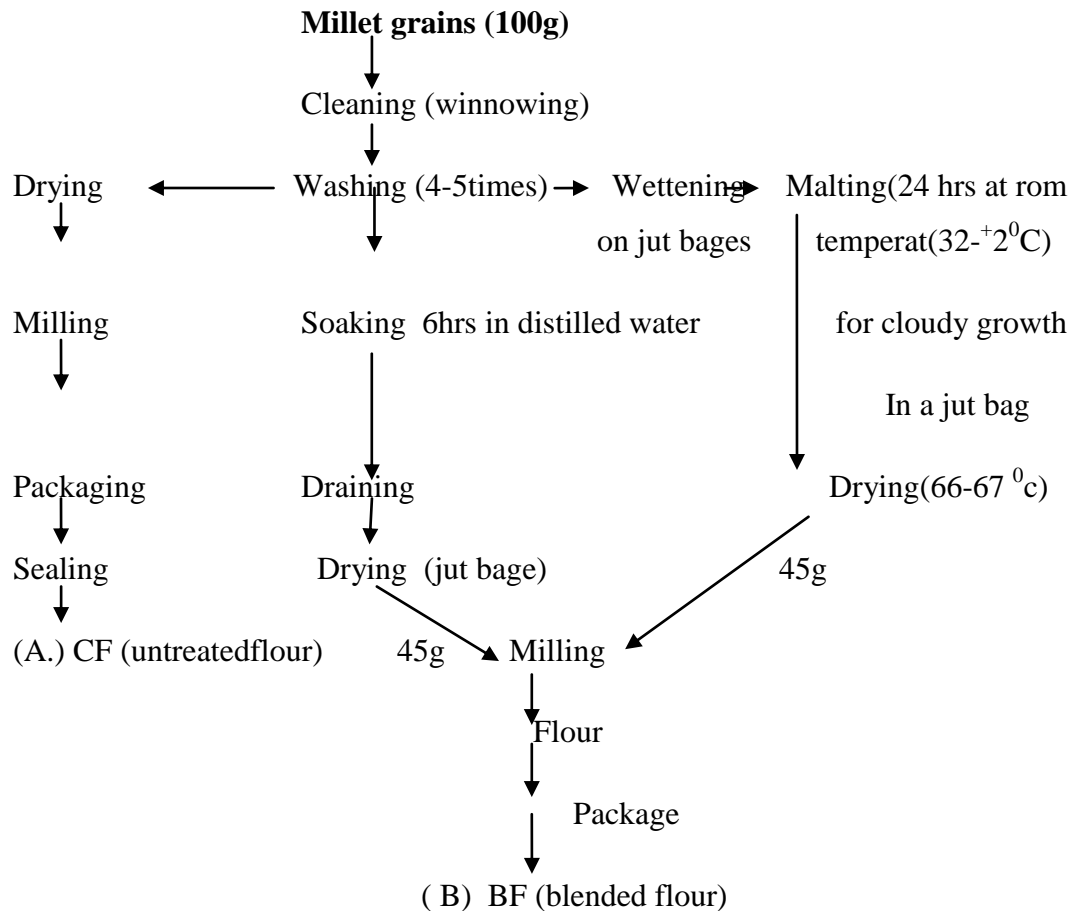
Pearl millets (*Pennisetum glaucum*) were purchased from federal college of education at departmental farm belonging to Department of Agricultural Science and then processed into stable flour. Distilled water was obtained from the chemistry laboratory, federal college of education, Kontagora used for the soaking and malting processes. The millet blended flour was then further conveyed to the department of food science and technology, federal university of Agriculture, Makurdi for analysis.

METHOD

The soaking and malting processes were carried out as modified by Nirmala and Marahkrishna (2012). Pearl millet were cleaned, washed for five minutes and then soaked in distilled water for five hours. Excess water were drained

and grains tightened in jut bags to drain its water away. Millets for malting were isolated from the lot and then spread on the floor with little sprinkled of distilled water at 32-2^oc ambient temperature for 48 hours ,thereafter dried in shade for a long day hours before drying using solar cabinet drier. The soaked were immediately dried Similarly while the control had a straight cleaned washing and then dry processed .All the dried millet grains where attrition milled to obtain respective flour with 40 um sieve size.

Fig 1: Processing and blending of each flour obtained.



Physiochemical analysis

The chemical analysis was carried out as described by Akpapunam and Markalis (1981) for bulk density determination. Hygroscopicity by Bhatta (1988) ,Water Absorption Capacity by Coffmain and Gaciar (1977),Swelling Power by Ooraikul and moledina (1981)

Chemical Analysis

The P^H determination was by (vasconcelos et al 1990). Total titratable acidity was by (pearson 1976).Thiobabituric acid TBA was by (Pearson, 1976) The proximate analysis were carried out as described by AOAC (2000).

RESULTS

Soaked and malted blends flour on some physiochemical characteristics of millet grains flour (pennisetum glaucum)

Table 1 Soaked and Malted blends flour on some phsiochemical characteristics of millet grains flour (pennisetum glaucum)

Sample	Bulkdensity	WAC	hygroscopicity	swelling power	LGC	viscosity at 30rpm
CF	0.57 ⁺ _{0.01} a	1.31 ⁺ _{0.01} a	65.46 ₊ 1.27	4.06+0.07	8.0+0.01	4420
BF	0.54 0.01a	1.35=0.01b	66.62=1.39b	4.15=0.14	14.0=0.00b	380
LSD	0.01	0.01	0.1	0.1	--	--

Values are mean of duplicate determinations..Means in the same column not followed by the same superscript are not significantly different at (T=0.05)

Table 2 Chemical characteristics of soaked and malted blend millet grains flour.

Sample	PH	TTA	TOTAL SUGAR	REDUCING SUGAR	PHYTIC ACI
CF	6.66+0.01	0.52+0.01a	1.7+0.00	0.54+0.00	0.58+0.04
BF	6.36+0.14	0.61+0.05b	2.02+0.00a	1.17+0.00a	0.33+0.004
LSD	0.001	--	0.01	--	---

Values are mean of duplicate determinations. Means in the same column not followed by the same superscript are not significantly different at (T=0.05)

Table 3 Soaked and Malted blends flour on some proximate characteristics of millet grains flour

Sample	Fat	Protein	Ash	crude fiber	Carbohydrate	Energy value
CF	4.62 ⁺ _{0.13} a	12.87 ⁺ _{0.04} a	1.65 ₊ 0.04a	2.29+0.04a	78.57+0.41a	407.34a
BF	3.68 0.09a	13.605=0.01b	1.84+0.03b	2.35+0.04a	78.83+0.23a	401.64a
LSD	0.05	0.012	0.1	-	--	--

Values are mean of duplicate determinations..Means in the same column not followed by the same superscript are not significantly different at (T=0.05)

DISCUSSION

Table One above showed the physio- chemical characteristics of the distilled water soaked and malted blends of flours. The bulk density decreased significantly from 0.56-0.54 in the blended flours indicating low porosity or air spacing in the blend, therefore less auto-oxidation Merrill et al (1973).The is an advantage in respect to spoilage, packing and transportation as goods in relation to weight.The water absorption capacity, hygroscopicity and swelling index increased significantly in the blend which is good for chapattis production poongodi et al (2009).The

two flour blends could be used as pastry incorporation since hygroscopicity of 60% above may not produce stiff and semi pasty products and may also have good keeping quality poongodi et al (2009). The least gelation concentration and viscosity at 30 rpm should increase at blending; indicating that blends from soaked and malted flour could be used as weaning formula. The high viscosity value indicates that the amylase activity values might have been reduced poongodi et al (2009) and Merrill et al (1973). Snedecor and Cochran (1994) asserts that increased viscosity leads to increase nutrient or calories density of food and coked because of leaching of soluble carbohydrate mainly amylose, hence ability to form pasty solutions easily on heating.

Table two showed chemical property. The PH values of the blend reduces with the blended flour. This observation was also seen with reduced sugar and phytic acid. Titratable acidity and total sugar showed increased values at blends of soaked and malted flours. This shows lactic acid fermentation. The P^H is an indication of spoilage and microbial proliferation. This reduction might be due to reduced polyphenols as reflected from phytic acid content. According to Mantharghi and Sadha (2012) tannin and phenolics are good anti-microbial agent. Titratable acidity value increased significantly indicating free fatty acid product in the flour as a result of soaking and malting of the grain. According to Deep et al (2012) these may result from secondary and volatile metabolites. The total sugar and reducing sugar showed more on the blend than in the control flour (CF). There was reversed trend observed in the phytic acid content conferring utilization of phenolic substances.

Table three showed the nutrient content or the proximate value of blends from soaked and malted millet grain flour. The blended flour samples have 4.62-3.67 fat, 12.86-13.60 protein, 1.05-1.84 Ash, 2.29-2.35 crude fibre, 78.57-78.83 Carbohydrate and the energy value ranged from (407.34-401 cal). The energy values, ash content and fat values showed significant decrease on blending of the flours differing from the control significantly. The protein, crude fiber and carbohydrate increased on the blends. This was observed in millet flour for porridge preparation. Ocheme and Chinma (2008). It is similar to values obtained by Singha et al (2012) on millet flour proximate values.

The reduction in fat content maybe due to formation of secondary metabolites coupled with high lipolytic enzyme activity on the blends since their ratio in the different flour may not be the same. The increase in protein value observed have been reported to be due to conversion of bioactive ingredient, which also resulted in ionic leaching making the flour a healthy diet, Mathanghi and Sudha (2012). The values on ash content indicates mineralization of the blends, hence more nutraceutical in the absence of residual tannin, Mathrashi and Sudha (2012). The crude fiber content increased significantly in the blend indicating more arabinoxylane 1,3 and 1-4 α , β glucane and other micropolysaccharides cellulose and polysaccharide which increases upon malting of millet with reduced hemicellulose Mathiashi and Sudha (2012). There is also an indication that the blend could be a good source of lowering cholesterol and fat content in human nutrition, reducing disease symptoms of constipation and the risk of diabetes, atherosclerosis and colorectal cancer. The carbohydrate values which is however high with the blends points to that diabetic patients might not want to consume these kind of flour. According to Marthrashi and Sudha (2012), extract of finger millet inhibited glycation due to natural anti-oxidant from polyphenol and other phytochemical extract that are present during soaking and malting hence potent therapeutic dietary supplements for diabetes and the aging. The energy value showed a reversed trend, showing possibility of inhibiting glycation ability of the blends.

Conclusion

Soaking and malting of millet grain *pennisetum glaucum* using distilled water approach makes flour obtained from these blends a functional and nutraceutical food which could aid in alleviating lack of essential micro nutrients and unhealthy physiological conditions.

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