Novelty Journals

ISSN 2394-966X

International Journal of Novel Research in Life Sciences
Vol. 7, Issue 4, pp: (1-4), Month: July - August 2020, Available at: www.noveltyjournals.com

THE EFFECT OF SPROUTING ON THE PROXIMATE COMPOSITION OF PROSO MILLET

Ambugus Peter O*., Dorathy Ekpeyong Eyo, Halima Zubair, Jumoke Kafayat Shittu, Amaya J. Habila, Danlami A. Danzarami

Directorate of Science and Technology, Nigeria Institute of Leather and Science Technology, P M B 1034 Zaria

***Corresponding Author:** Ambugus Peter O., Email: ambuguspeter@gmail.com, Phone: 09067120318

Abstract: **The proximate analysis for sprouted and unsproutedproso millet grain was determined by the standard method. All the values are in percentages (%). The moisture content for sprouted and unsprouted was found to be 24.20 and 12.28 respectively, while total Ash was 3.78 and 3.40 for sprouted and unsprouted respectively. Total lipid for sprouted and unsprouted grain was 22.25 and 16.50 respectively. The protein content was 17.27 and 13.89 respectively for sprouted and unsprouted grain. The fibre content was found to be 4.90 and 3.45 for sproutd and unsprouted grain respectively and lastly the carbohydrate content was 32.51 and 53.94 for sprouted and unsprouted respectively.**

Keywords: **Nutrition, Millet, Proximate, Sprouting, Diet, Obesity.**

1. INTRODUCTION

Millets are small – grained, annual, warm weather cereals belonging to the grass family. They are highly tolerant of drought and other extreme weather conditions and have similar nutrient contents to other major cereals (Fahad*et al.*, 2017). Millet is one of the oldest foods – stuff known to mankind. It was used in Biblical days to make unleavened bread (Ezekiel 4:9) and was grown as early as 2700 BC. It is a major source of food to both man and livestock (Morah and Etukudo, 2017).

There are different species of millet but they are all members of the family Poaceae (the grasses). They include: *Eleusine coracana* (finger millet), *Setaria italica* (foxtail millet), *Panicum miliaceum* (proso millet), *Panicumsumatrense* (little millet), *Pennisetumglaucum* (pearl millet), *Paspalum scrobiculatum* (kodo millet) and so on. The various species of millet were initially domesticated in different parts of the world most notably East Asia, South Asia, West Africa and East Africa. However, the domesticated varieties later spread well beyond their initial areas (Zhang and Zhou, 2009). Proso millet and foxtail millet are the most important varieties of millets, thus, the oldest noodles in China were made from these two varieties (Lu and Yang, 2005).

Millets are not only adapted to poor, droughty, and infertile soil but they are also more reliable under these conditions than most other grain crops. This has in part made millet production popular, particularly in countries surrounding the Sahara in West Africa. However, millets respond to high fertility and moisture. Improved breeds of millets improve their disease resistance and can significantly enhance farm yield productivity (Roy, 2009).

Sprouting is the natural germination process by which seeds or spores put out shoots, plants produce new leaves or buds, or other newly developing parts undergo further growth. In nutrition, the term signifies the practice of germinating seeds, to be eaten raw or cooked briefly and eaten plain. It can also be added to bread recipes, or dried and ground into flour

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(Shipard, 2005). According to recent medical review, when comparing sprouted grains with unsprouted grains, the unsprouted grains had lower protein content, deficiency of certain essential amino acids, lower starch availability, and the presence of certain antinutrients. While, the sprouted ones are rich in digestible energy, vitamins, minerals, amino acids, proteins and phytochemicals. These nutrients are also essential to human health (Martinez –Villaluenga, and Kuo, 2006).

The incidence of obesity is still a major medical challenge. Prescriptions like, exercise, dieting are popular methods of remedying the problem of overweight (Kathy and RUTH, 2018). In dieting however, there are lots of options to explore. This research therefore explore the option of sprouting proso millet to ascertain its effects on the nutrient contents which will bring to fore useful data that could be used to manage obesity and other ailments that requires wise application of diet.

In handling the challenge of overweight or obesity, there arises the question of cost. Most synthetic drugs used in managing this medical condition are very costly. In addition, these synthetic drugs have overwhelming side effects. The option of exercise is time consuming and challenging as most patients will need a guide and modern implements for exercise (WHO, 2019). These all boils down to high cost which some locals may not be able to afford. Hence, the findings of this research can be useful as novel information in the management of obesity and other ailments like diabetes from the easily accessed proso millet.

2. MATERIALS AND METHODS

Collection and Preparation of Proso Millet Grain

The proso millet used for this research was purchased from Samaru market Zaria, Sabon Gari Local Government, Kaduna State, Nigeria. It w as authenticated at the faculty of Biological Sciences Ahmadu Bello University Zaria. The grain was sorted, cleaned to remove all extraneous matter and was divided into two parts. One part was sprouted by soaking in water for five minutes. The other was drained and the millet was spread on a sprouter jar with plastic sieve-lid for 96 hours at room temperature. At the end of the sprouting period, it was rinsed and grinded to paste and used for the proximate analysis. The second part was not sprouted, but pulverized to flour and used for the analysis.

Proximate analysis

The proximate analysis was carried out on the sprouted and unsprouted proso millet for the following nutrients: protein, carbohydrate, lipids, moistre, ash and crude fibe using standard methods described by AOAC (2005) etc.

Determination of Moisture Content

Aluminium dishes were washed and dried to a constant weigh in an oven at 100^{o}C. They were removed, cooled and weighed (W1). 2 grams of the paste or flour sample was placed in the weighed moisture dish (W2). The dish containing the sample was kept in an oven for about 3 hours, then removed, cooled and weighed (W3). The % of moisture was calculated as: $\frac{W2-W3}{W2-W1}\times 100$

Determination of Fibre

Two grams of the sample was placed in a beaker containing 1.2ml of H_2SO_4 per 100ml of solution and boiled for about 5 minutes, the residue was filtered and washed with hot water then transferred to a beaker containing 1.2 grams NaOH per 100ml of solution and boiled for about 5 minutes. The residue was washed with hot water and dried in an oven and weighed (C2). The weighed sample was incinerated in a furnace of about 550^{o}C then removed, cooled and weighed (C3). The % fibre was calculated as: $\frac{C2-C3}{W}\times 100$

Determination of Ash

Crucibles were cleansed and dried in the oven, after drying, they were cooled and weighed (W1). 2g of the paste or flour was placed in the crucibles and weighed (W2). They were transferred into the Muffle furnace of about 550^{o}C then removed, cooled and weighed (W3). The % Ash was calculated as: $\frac{W3-W1}{W2-W1}\times 100$

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Determination of Lipids(Fats)

250ml clean boiling flask was dried in oven, and cooled. Empty filter paper was weighed and labeled (W1). Two grams of sample was weighed into the labeled filter paper (W2). The boiling flask was filled with petroleum ether. The soxhlet apparatus was assembled and allowed refluxing for 8 hours then, removed and transferred to an oven and dried. It was then cooled and weighed (W3). The % fat was calculated as: $\frac{W2-W3}{W2-W1} \times 100$

Determination of Protein

Digestion: 2g of sample was weighed into a Kjeldahl flask. Copper catalyst and 15ml of concentrated sulfuric acid were added. It was heated in a fume cupboard till solution assumed a green colour. It was cooled and black particles showing at the mouth and neck of the flask were washed down with distilled water. The digest then washed thoroughly with distilled water.

Distillation: the Markham distillation apparatus was steamed through for about 15 minutes before use. 100ml conical flask containing 10ml of boric indicator was placed under the condenser. 10ml of the digest was pipetted into the body of the apparatus via the small funnel aperture; washed down with distilled water followed by 10ml of 40% NaOH solution.

Titration: the solution was titrated in the receiving flask using N/100 (0.01N) hydrochloric acid and the Nitrogen content and hence the protein content of the sample was calculated. The blank was run through along with the sample. The % protein was calculated as:

$$final\ reading - initial\ reading - blank(0.2) \times \frac{standard\ number\ of\ nitrogen(1.4)}{initial\ weight(0.5)} \times standard\ number\ of\ protein(6.25)$$

Determination of carbohydrate (CHO)

CHO content was determined by difference: $100 - (\%moisture + \%ash + \%protein + \%fat)$

3. RESULTS AND DISCUSSION

The table 1 bellow gives the proximate composition of sprouted and unsprouted *Panicum miliaceum.* The analysis was carried out in duplicates. Table 2 shows the average values of the proximate composition of individual content in it.

Table 1

Proso millet	Moisture%	Ash%	Lipid%	Protein%	Fibre%	CHO%
Sprouted	24.60	4.25	22.50	16.60	5.20	32.05
	23.80	3.30	22.00	17.94	4.60	32.96
Unsprouted	12.40	3.70	16.30	13.34	3.10	54.21
	12.10	3.10	16.70	14.44	3.80	53.66

Table 2

Proso millet	Moisture%	Ash%	Lipids%	Protein	Fibre%	CHO%
Sprouted	24.20	3.78	22.25	17.27	4.90	32.51
Unsprouted	12.28	3.40	16.50	13.89	3.45	53.94

4. DISCUSSION

The protein content in the sprouted proso millet is higher than that of the unsprouted with the significant difference of about 4.38%. This agrees with the findings of Kaushik *et al.*, (2010) who noted increase in the percent protein in germinated grains. Increase in protein content is attributed to the activation of proteolitic enzymes present in the seeds as well as the hydrolysis of tannin – protein and enzyme protein complexes which release more free amino acids and

peptides for metabolism of the embryo and new protein synthesis (Morah and Etukudo, 2017). Increase in enzyme activities results in net synthesis of enzymatic protein, for example, proteases. Protein in seed is also degraded and converted into soluble state during sprouting. The speed of utilization of the soluble amino acids becomes faster leading to increased protein contents (Ominawa and Asoguo, 1987)

The ash content is higher in the sprouted proso millet than the unsprouted. Ash content of grains usually increase during sprouting and it is an index of mineral element concentration. However, the ash content may decrease if the grains were regularly sprinkled with plenty of water during sprouting (Morah and Etukudo, 2017). This is attributable to leaching out of part of the mineral constituents. Thus, the moistened grains were rather covered in a dark humid environment to minimize loss of moisture during sprouting. This must have been responsible for the observed increase in ash content with spouting.

There is significant increase in crude fibre content in sprouted than unsprouted proso millet. Chung *et al.*, (1998) reported that in barley, sprouting was associated with significant increase in crude fibre from 3.75% in unsprouted to 6.00% in 5 days due to synthesis of structural carbohydrates such as cellulose and hemicelluloses, which are major constituents of cell walls. The moisture content is higher in the sprouted proso millet than the unsprouted. The moisture content as expected increased with sprouting because of water intake by the seed during sprouting.

There is reduction in available carbohydrates. This is because starch in the cotyledons is hydrolyzed to soluble sugars during sprouting. The sugars are utilized for biochemical activities of the germinating seeds.

5. CONCLUSION

The result of this research underscores the importance of sprouting proso millet in nutrition especially that its calorific value is lowered which is an important index in the quest to curb obesity.

REFERENCES

[1] Association of Official Analytical Chemists (2005).Standard Official Methods of Analysis of the Association of Analitical Chemists.(18th Edition), *S. W. Williams (Ed). Washington Dc*

[2] Chung, T. Y.; Nwokolo, E. N.; Sim, J. S. (1998).Compositional and digestibility changes in sprouted barley and canola seeds.*Plant Foods & Human Nutrition*. 39(3): 267-78

[3] Fahad, S.; Bajwa, A. A.; Nazir, U.; Anjum, S. A.; Farooq, A.; Zohaib, A.; Sadia, S.; Nasim, W.;Adkins, S.; Saud, S.; Ihsan, M. Z.; Alharby, H.; Wu, C.; Wang, D.; Huang, J. (2017). Crop production under Drought and Heat Stress: Plant responses and management Options. *Frontiers in Plant Science*. 8: 1147

[4] Kathy Do and Ruth E. Brown (2018). Association between cardiorespiratory fitness and metabolic risk factors in a population with mild to severe obesity. York University. 510: 10-18

[5] Lu Huoyuan and Yang Xiaoyan (2005). Millet noodles in late Neolithic China 967-968

[6] Martinez-Villaluenga Cristina and Kuo Yu-Haey (2006). Kinetics of free protein amino acids, free non-protein amino acids and trigonelline in soybean and lupin sprouts. *European Food Research and Technology* 224(2): 177-186

[7] Morah, F. N. I. and Etukudo, U. P. (2017).Effects of sprouting time on Nutrition Value of *Panicum miliaceum*(Proso millet). *Edorium Journal of Nutrition Diet.* 4: 1 – 4

[8] Ominawa A. I. and Asuquo S. (1987).Effects of germination on the nutrient content and functional properties of pigeon pea. *Journal of Food Science and Technology.* 41(2): 170-4

[9] Roy Mira (2009). Agriculture in the vedic period. *Indian Journal of History of Science* 44: 497-520

[10] Shipard Isabel (2005). How can I grow and use sprouts as living food. *Nambour*. 10:5-7

[11] World Health Organization (2019). Nutrition: Challenges that prevent exercise

[12] Zhang, J. and Shou, K. (2009). Earliest domestication of common millet (Panicum miliaceum) in East Asia. *Oxford University press* 18: 7367 – 72