The Pharma Innovation Journal 2019; 8(3): 286-288

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(3): 286-288

www.thepharmajournal.com
Received: 16-01-2019
Accepted: 20-02-2019

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Studies on physical properties and nutritional profile of foxtail millet

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Abstract
The physical properties and nutrient composition of foxtail millet seeds were evaluated of their grain and nutritional characteristics. The objective of the present study was to evaluate foxtail millet with the aim of quantifying physiochemical properties information that might serve as a guide to exploit its potential and benefits for human and animal nutrition. The proximate compositions (%) were determined as moisture content (10.8 ± 0.02), ash (2.3 ±0.06), crude fibre (6.2 ±0.01), crude carbohydrate (65 ±0.02), crude fat (4.5 ±0.01), crude protein (11.2 ±0.05). The physical properties of, weight of 1000 grains, true density, bulk density, porosity and Angle of repose are 2.64±0.06, 1264.82±1.02, 735.70±0.50, 41.08±1.0, 25.782±0.04 respectively. The present study may provide a guideline for the use of foxtail millet flour are good functional foods for nutrition, food formulation and utilization.

Keywords: nutrients, proximate composition, physical properties, foxtail millet

Introduction
Millet is a very important crop with following characteristics: millet is known to be a drought-resistant crop, resistance to pests and diseases, short growing season as compared to other major cereals. Due to above mentioned advantageous characteristics; millet grains are receiving specific attention in the developing countries (like India, China & some countries from Africa Continent) in terms of utilization as food. Millets are important crops of Asia and Africa (especially in India, Nigeria and Niger), with 97% of millet production in developing countries. (Sarita and Singh, 2017) [5].
Foxtail millet (Setaria italica (L.) P. Beauv.) Has been identified as a major millet in terms of worldwide production, as it is the sixth highest yielding grain. It is one of the easily cultivated cereal grains belonging to the Setaria genus of Poaceae family and subfamily Panicoideae. Foxtail millet is one of the world's oldest cultivated crops. At present, foxtail millet is cultivated in 26 countries and ranks second in world production of millets. In terms of its yielding ability, foxtail millet ranks fourth among all millets with normal production practices not utilizing pesticides, which makes it easier to classify as a product derived from organic farming.
Foxtail millet, like most millets, is also a good source of crude fiber, helps in the digestive process and helps to induce bowl movement, thus producing a laxative effect that is beneficial for a healthy digestive system. All these nutritional properties have made foxtail millet an important ingredient for preparing noodles, nourishing gruel or soup, brewing alcoholic beverages, cereal porridges, and pancakes in China. In addition to its nutritional properties, foxtail millet has also shown to possess several health benefits like prevention of cancer, hypoglycemic, and hypolipidemic effects. (Sharma and Niranjan, 2017) [6].

Materials and Methods
Foxtail millet were obtained from local area of Parbhani region. Chemicals and reagents (analytical grade) and standards taken from laboratory, Department of Food chemistry and nutrition, College of Food Technology, Parbhani.

Physical properties of foxtail millet
The important physical properties studied were: weight of 1000 grains, true density, bulk density, porosity and Angle of repose.

Weight of 1000 grains: One thousand grains were randomly selected and weighed using an electronic balance with an accuracy.

Three replications were weighed and the mean weight of one thousand grains was calculated (Mohsenin, 1986) [3].

True Density: 50ml of toluene was taken in a measuring jar. A known weight of grain sample was poured to the measuring jar and rise in the toluene level was recorded. The true density of the grain was calculated by using the following formula (Mohsenin, 1986) [3].

$$\text{True density, kg/m}^3 = \frac{\text{Weight of grains (kg)}}{\text{Volume of grains excluding void space (m}^3\text{)}}$$

Bulk density: Bulk density was determined by using a container of known volume. The Sample was taken into the container for the known volume and weighed. The bulk density was determined using the formula (Mohsenin, 1986) [3].

$$\text{Bulk density, kg/m}^3 = \frac{\text{Weight of grains (kg)}}{\text{Volume of berries including pore space (m}^3\text{)}}$$

Porosity: Porosity of foxtail millet grains was calculated from the bulk density and true
Density values (that were found earlier) by using the following formula (Mohesenin, 1986) [3]:

$$\text{Porosity \%} = 1 - \frac{\text{Bulk density}}{\text{True density}} \text{ X } 100$$

Chemical analysis of horse gram
All samples were analysed for the moisture, ash content, protein content, fat content, minerals and yield of foxtail millet.

Moisture content
Moisture content of foxtail millet was estimated by drying the samples in an oven at 105 °C till constant weight is obtained. It can also be done by digital moisture meter (AACC, 2000; Method No. 44-15A) [1].

Total ash
Ash was estimated by direct incineration of sample; igniting it in a Muffle Furnace at 550 °C till greyish white residue (AACC, 2000; Method No. 08-01) [1].

Protein
Protein content was determined by using Kjeldhal Apparatus as described in (AACC, 2000; Method No. 46-30) [1].

Total fat
Total fat content was determined using hexane as a solvent in Soxhlet apparatus as per the procedure given in (AACC, 2000; Method No. 30-25) [1].

Crude fiber
The fiber content was estimated by acid alkali method as suggested by (Chopra and Kanwar, 1978) [2].

Result and Discussion
Physical properties of foxtail millet
Different physical properties such as weight of 1000 grains, true density, bulk density, porosity and Angle of repose of foxtail millet were evaluated and results obtained are presented in Table 1.

Table 1: Physical Parameters of Foxtail millet

Sr. No.	Physical properties	Mean value
1.	Weight of thousand karnel weight (g)	2.64±0.06
2.	True density (kg.m^{-3})	1264.82±1.02
3.	Bulk density (kg.m^{-3})	735.70±0.50
4.	Porosity (%)	41.08±1.0
5.	Angle of repose (degree)	25.782±0.04

*Each value represents the average of three determinations

The physical characteristics of foxtail millet were observed to be yellowish white in colour. The Weight of thousand karnel weight were recorded 2.64g. The average True density was observed to be 1264.82 kg.m^{-3} The Bulk density was recorded to be735.70 kg.m^{-3}. Which revealed that suitability of foxtail millet for further processing. Similar results were obtained by (Sunil *et.al* 2016), (Sharma and Niranjan, 2017) [6].

Nutritional composition of foxtail millet
Data pertaining to various chemical properties like moisture, fat, carbohydrates, protein, ash, and crude fiber were investigated and results obtained are depicted in Table 2.

Table 2: Chemical composition of foxtail millet.

Sr. no.	Chemical Parameters	Mean Value*
1.	Moisture (%)	10.8 ± 0.02
2.	Total Fat (%)	4.5 ±0.01
3.	Total carbohydrates (%)	65 ±0.02
4.	Total Protein (%)	11.2 ±0.05
5.	Ash (%)	2.3 ±0.06
6.	Crude Fiber (%)	6.2 ±0.01

*Each value represents the average of three determinations

The data in the above table showed that the moisture content 10.8 per cent, fat 4.5 per cent carbohydrate 65 per cent, protein 11.2, ash 2.3 and crude fiber 6.2 respectively. Similar results were obtained by (Sharma and Niranjan, 2017) [6] (Nazni and Shobana 2016).

Conclusion
With the growing challenge of producing health-promoting food products, the food industries are focusing on less exploited ingredients. This paper highlights the versatility and importance of foxtail millet as a food source, which has pertinent levels of all the nutritional components and physical properties. It is a cereal suitable to address food and nutrition security due to its yielding potential in drought and poor-resource environments, and also due to its ability to produce food products with significant health-benefitting properties. Combination of millets with other sources of protein would compensate the deficiency of certain amino acids such as lysine. Successful improvement of these attributes would be a crucial key to expand the spectrum of applications of millet grains. Future trends should focus on the millet consumption in the developed countries that could help its industrial revolution.

References
1. AACC. Approved Methods of the American Association of Cereal Chemists, 10th Edition. AACC, St. Paul, MN, USA. Method No, 2000, 1-46.

2. Chopra SL, Kanwar JS. Analytical Agricultural chemistry. Kalyani Publishers, Ludhiana, 1978, 210.
3. Mohsenin NN. Physical Properties of Plant and Animal Materials, 2nd edition. Gordon and Breach Science Publishers, New York, 1986.
4. Nazni P, Shobana DR. Effect of processing on the characteristics changes in barnyard and foxtail millet. Journal of Food Processing and Technology. 2016; 7(3):1-8.
5. Sarita, Singh E. Potential of millets: nutrients composition and health benefits. Journal of Scientific and Innovative Research. 2017; 5(2):46-50.
6. Sharma N, Niranjan K. Foxtail millet: properties, processing, health benefits, and uses. Food Reviews International, 2017, 1-32.
7. Sunil CK, Venkatachalapathy N, Shanmugasundaram S, Akash P, Loganathan M. Engineering properties of foxtail millet (*Setaria italic* L): variety- hmt 1001. International Journal of Science, Environment. 2016; 5(2):632-637.