

Original Research

**Effect of Germination on the Nutritional Composition and
Antioxidant Potential of *Setaria italica***

Ms. B. Yogini

*Department of Nutrition & Dietetics,
Sri. Ramasamy Naidu Memorial College, Sattur,
(Affiliated to Madurai Kamaraj University)*

Tamil Nadu-626203

Yoginibaburam28@gmail.com

ABSTRACT:

Millets are one of the major underutilized crops with a Nutri-cereal potential. They are highly nutritious. Non-acid forming, gluten free and have several dietary properties. Moreover, they are inexpensive and available in large quantities. They are also a forage and grain crop that can survive in arid conditions. Because of awareness among public for a healthy diet millet have recently gained popularity. Foxtail millet is a good source of protein, dietary fibre, calcium, vitamins and iron. Various studies reveal that germination of foxtail millet enhances their nutritional value and provides various health benefits. Therefore, germinated foxtail millet is made to flour and developed into value-added Papad. The proximate composition such as energy, fat, protein, iron and fibre for the following product are compared. The incorporation of germinated foxtail millets are at a ratio of 25g, 50g, 75g into the product. The mean scores of sensory evaluations in appearance, flavour, taste, texture and overall acceptability are calculated to find out consumer satisfaction. Then the bacterial count was enumerated for the value-added papad using standard plate count method to estimate the shelf life of the product. Thus, the study on 'IMPACT OF GERMINATION ON NUTRITIONAL AND ANTIOXIDANT PROPERTIES OF SETARIA ITALICA' is carried out in this research to find out unknown facts.

Keywords: Foxtail millet, Antioxidant activity, Nutrient analysis, Product development.

INTRODUCTION

Millets are a group of small seeded grasses which are referred to as the "Miracle Grain" because it can withstand drought and requires significantly less water than other crops. Due to their capacity to thrive in challenging environmental conditions like little rainfall, they are essential foods in many developing nations. For those with celiac disease who are frequently aggravated by the gluten content of wheat and other more popular cereal grains, millet is a great

alternative because it is gluten-free. It is helpful for those who have atherosclerosis and diabetic heart disease as well (Gélinas et al., 2008). Millets include varieties including Jowar (sorghum), Sama (small millet), Ragi (finger millet), Korra (foxtail millet), and Variga (proso millet) (Ambati, K., & Sucharitha, K. V. 2019). 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 yield grain. (Saleh et al., 2013). It is one of the simple to grow cereal grains from the *Setaria* genus, family Poaceae, and subfamily Panicoideae. The earliest archaeological evidence for foxtail millet was discovered in northern China and dates back between 7,400 and 7935 years (Austin, 2006). It is one of the oldest crops still being grown today. Approximately 4000 years ago, its remnants from Europe were discovered.

In addition to being a valuable source and being unique among cereals for the specific balance of nutrients it provides, foxtail millet contains a variety of health-promoting ingredients. The starch, protein, dietary fibres, fat, vitamins, and minerals found in foxtail millet are its primary constituents (Yang et al., 2013). Foxtail millet's distinct composition gives rise to its nutritive and sensory properties, including aroma, flavour, and appearance. While Chen et al., showed that the 85 various kinds of foxtail millet ranged from 4.4 to 7.3 g/100g for crude fat level, 71.5 to 83.8 g/100g for total carbs, and 9.5 to 18.9 g/100g for protein content. The nutritional content, sensory qualities, and economic worth of foxtail millet have all been enhanced through the application of various processing techniques. These processing techniques, such as milling, malting, blanching, germination, and fermentation, increase the nutritional benefits of foxtail millet while reducing its anti-nutritional qualities.

OBJECTIVES

The following are the objectives set forth for the present study

- To estimate and compare the antioxidant values of germinated and non-germinated foxtail millet flour.
- To formulate and develop value-added Papad using germinated millet powder.
- To analyse and compare the nutritional compounds in developed product.
- To find out the microbial load for the value added-Foxtail millet papad.

METHODOLOGY

The methodology adapted for this study are discussed under the following headings

Determination of Impact on Antioxidant activity due to Germination

To determine the Antioxidant content, the sample was done by using DPPH scavenging method. Based on the procedure by Asha devi et al 2012 2ml of extract from the concentrations was mixed with 1ml of the methanolic solution DPPH radicles, with the final concentration made up to 0.2Mm DPPH. The content was shaken vigorously and kept in dark for 30 minutes. Absorbance was measured at 517 nm. Absorbance of control was determined by replacing the sample with methanol. The scavenging activity was calculated using the formula of

$$\text{Scavenging activity (\%)} = \frac{(A_{\text{control}} - A_{\text{sample}})}{A_{\text{control}}} \times 100$$

Ingredients used for the Development of Germinated Foxtail Millet Flour Papad

Ingredients such as Germinated Foxtail millet powder, Black gram flour, cumin seed, Asafoetida, Salt were used to develop the value added papad. Black gram flour and cumin seed were used to prepare the control.

Development and standardization of germinated Foxtail Millet Papad

The Foxtail millet papad was developed by using the germinated foxtail millet powder. The Germinated Foxtail Millet powder was measured and made to dough by blending with other required ingredients used for the preparation of Germinated foxtail millet Papad. In this study, sample A, sample B, sample C were prepared by using 25% 50% and 75% of Germinated foxtail millet powder with other ingredients respectively. Control was prepared as per the standard Papad recipe.

Sensory Evaluation of the Value-Added Germinated Foxtail Millet Products

The quality of the food product is assessed by means of human sensory organs. The evaluation is said to be sensory or subjective or organoleptic evaluation (Srilakshmi, 2005). Consumer

preference of Germinated foxtail millet incorporated Papad, was evaluated in terms of appearance, colour, flavor, texture, taste and overall acceptability using 5 point Hedonic scale.

Analysis of Microbial Load of Value-Added Germinated Foxtail Millet product.

Microbial count was found out in germinated foxtail millet incorporated food products for a period of 15 days. The number of microbes is tested by SPC (Standard Plate Count) method. The product was stored at room temperature. By this method, the proportions of food samples are blended or homogenized serially diluted in appropriate diluents, planted in or onto a suitable agar medium. Incubated at an appropriate temperature for a given time, after which all visible colonies are counted by use of Quebec or electronic colony counter. (Jay, 1996)

RESULT AND DISCUSSION

Determining the impact of antioxidant activity due to germination

The antioxidant values obtained from the germinated foxtail millet flour and raw foxtail millet flour is presented in the following table-1

Table 1: Comparative analysis of antioxidant activity

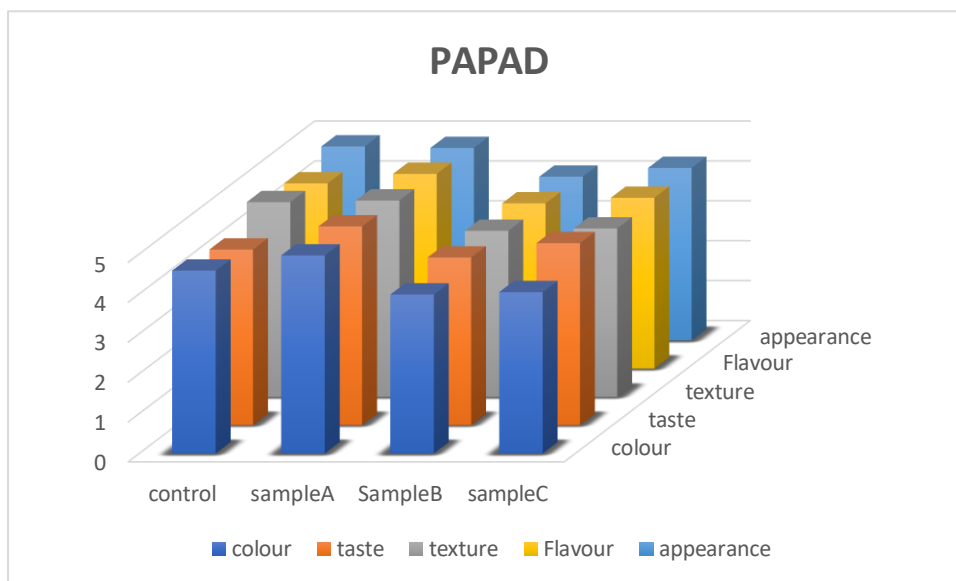
SAMPLES	ANTIOXIDANT ACTIVITY %
Raw Foxtail millet flour	62.5%
Germinated Foxtail millet flour	80.6%

Sensory evaluation of germinated foxtail millet Papad

The mean scores obtained from the sensory evaluation of Sample A, B, C and control are presented in the following table-2

Table 2: Sensory evaluation of value-added papad

Characteristics	Colour	Taste	Texture	Flavour	Appearance
Control	4.5	4	4.8	4.6	4.8
Sample A	4.9	4.9	5	4.8	4.8
Sample B	3.9	4.2	4.1	4.1	4.1
Sample C	4	4.5	4.2	4.2	4.3



Above table 2 and figure shows that Sample A (4.9, 4.9, 5, 4.8, 4.8) got more scores than the sample B and sample C. So, sample A and control was subjected to nutrient analysis.

Estimation of Proximate Composition of Germinated Foxtail Millet Papad

Table 3 Nutrient contents in value-added Papad

PROXIMATE COMPOSITION	CONTROL	SAMPLE A
Energy (Kcal)	410	428
Fat (g)	5.5	5.0
Protein (g)	5.8	6.5
Fibre (g)	1.2	1.8
Iron (mg)	0.3	2.5

Table 3 shows the energy, fat, protein, fibre and iron contents present in the foxtail millet flour incorporated papad. The enhancement of nutritional benefits are recorded.

Microbial load analysis of Value-added Germinated foxtail millet papad

Table 4 Microbial Analysis of the Standardized Germinated Foxtail Millet Food products

SAMPLE	TOTAL PLATE COUNT		
	Initial	7 th day	15 th day
Papad (Control)	-	78 (TFTC)	92 (TFTC)
Germinated Foxtail Millet Papad (Sample)	-	82 (TFTC)	105 (TFTC)

The following Table 4 presents the results of microbial analysis for the standardized Germinated Foxtail millet papad. The bacterial count was enumerated by using the standard spread plate method. They were stored at room temperature. On storage of the products Germinated Foxtail millet Papad do not show any undesirable changes. Thus, it is concluded that Germinated Foxtail millet incorporated Papad is stored for 15 days without any undesirable changes.

CONCLUSION

Millets are not just nutritious and healthy; they are also environment friendly and financially beneficial to farmers for their unique adaptability to climate changes. Thus, they are easily consumed and added to the diet. Foxtail millet, one of the major millets has a higher nutritional value which helps in preventing major lifestyle diseases. Therefore, various processing methods are undergone with foxtail millet, to assess their increase in nutritional content. Germination increases the moisture, ash content, proximate composition and antioxidant activity of the foxtail millet. Due to lack of gluten in foxtail millet it can be consumed by people with diabetes mellitus and gluten intolerance. So, I concluded that germination of foxtail millet increases the nutritive value and adds potential health benefits to the consumers of every age group.

REFERENCE

- Amadou, I., Gounga, M. E., & Le, G. W. (2013). Millets: Nutritional composition, some health benefits and processing-A review. *Emirates Journal of Food and Agriculture*, 501-508.

- ❑ Ambati, K., & Sucharitha, K. V. (2019). Millets-review on nutritional profiles and health benefits. *International Journal of Recent Scientific Research*, 10(7), 33943-33948.
- ❑ American Journal of Food Technology Year: 2011 | Volume: 6 | Issue: 1 | Page No.: 40-51
- ❑ Austin, D.F. Fox-tail millets (*Setaria*: Poaceae)—Abandoned food in two hemispheres. *Econ. Bot.* 2006, 60, 143–158.
- ❑ Saleh, A.S.M.; Zhang, Q.; Chen, J.; Shen, Q. Millet Grains: Nutritional Quality, Processing, and Potential Health Benefits. *Compr. Rev. Food Sci. Food Saf.* 2013, 12, 281–295
- ❑ Yang, T., Ma, S., Liu, J., Sun, B., & Wang, X. (2022). Influences of four processing methods on main nutritional components of foxtail millet: A review. *Grain & Oil Science and Technology*.
- ❑ Yang, X.S.; Wang, L.L.; Zhou, X.R.; Shuang, S.M.; Zhu, Z.H.; Li, N.; Li, Y.; Liu, F.; Liu, S.C.; Lu, P.; Ren, G.X. Determination of protein, fat, starch, and amino acids in foxtail millet [*Setaria italica* (L.) Beauv.] by Fourier transform near-infrared reflectance spectroscopy. *Food Sci. Biotechnol.* 2013, 22(6), 1495-1500.