PROXIMATE COMPOSITION OF SORGHUM GRAIN AND PEARL MILLET

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ABSTRACT

Millet is one of the foremost dry season safe crops in terms of world agrarian generation. Sorghum and pearl millet are the major millet crops developed in India. Sorghum and Pearl millet grain were analysed for proximate composition. The results found that the moisture, protein, crude fat, ash, carbohydrate, crude fibre and energy value of sorghum grain were 11.08 g/100g, 10.27g/100g, 3.26g/100g, 1.12g/100g, 72.91g/100g, 1.65g/100g and 359.19 kcal respectively. The minerals, for example, calcium (Ca), phosphorous (P), iron (Fe) and zinc (Zn) of sorghum grain were 21.40, 210.03, 4.14, and 1.65 mg/100g. The moisture, protein, crude fat, crude fibre, ash, carbohydrate and energy value of pearl millet was 12.20 g/100g, 11.59 g/100g, 4.4 g/100g, 1.55 g/100g, 1.6 g/100g, 68.64 g/100g and 360.6kcal/100g respectively. Ca, P, Fe and Zn mineral content of pearl millet was 30.40, 292.08, 8.45 and 7.14mg/100g respectively. The proximate analysis revealed that these grains have appreciable amounts of nutrients.

KEYWORDS: *Millet, Sorghum, Pearl Millet, Proximate Composition.*

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INTRODUCTION

Worldwide millet generation was evaluated around 27.83 million tons (FAOSTAT, 2014). India is the biggest producer (41.04%) within the world taken after by Nigeria (11.94%). Maharashtra, Rajasthan and Karnataka are the highest states of millets development in India. Role of millets in total food grain production of India decreased from 22.17 % to 6.94 % over the final six decades from 1950-51 to 2011-12. These days, more than 50% of the millet production is finding its way to substitute uses as opposed to its utilization as it were as a staple (Malathiet *al.*, 2016).

Tripathi and Platel, (2011) stated that micronutrient deficits, particularly iron, iodine, vitamin A and zinc are widely predominant in developing and some developed countries. Nutrient deficiencies could be alleviated by fortification of cereal grains with millets.

Sorghum is the ruler of millet cereals and is one of the imperative nourishment crops in dry lands of tropical Africa, India and China (Vannalliet *al.*, 2008). Sorghum production, India ranks second positions in the world and first with esteem to provincially significant crops like millets and pseudo-cereals. “Sorghum is the central staple food of Maharashtra, and is additionally a vital nourishment of Karnataka, Madhya Pradesh, Tamil Nadu and Andhra Pradesh” (Chavan *et al.*, 2017).

India is the biggest manufacturer of pearl millet within the world. Gujarat, Rajasthan and Haryana are conventional pearl millet developing states of India. Pearl millet (*Pennisetum typhoideum*) is the foremost broadly developed sort of millet all through the world and is prevalent to major cereals healthfully viz., high-quality

proteins, fat and minerals such as calcium, iron and zinc. Additionally, it is additionally a wealthy source of dietary fiber and small-scale supplements (Malik *et al.*, 2002).

Pearl millet is usually cultivated as grain and fodder crop in dry land. India is the foremost commercial producer of pearl millet followed by China and Nigeria. The entire pearl millet production in India is around 8.3 MT (ICRISAT, 2013). Around 90 million people depend upon pearl millet as food source in the form of porridge, flat breads or chapatti (CGIAR, 2015).

MATERIAL & METHODS

All the glasswares utilized in this research were cleaned carefully. Chemicals and reagents used in this work were of analytical grade (AR) and freshly prepared reagents. Proximate analysis of grains is the determination of the major components which include moisture, lipids (fat), ash (minerals), protein, carbohydrate and fibre. Procedures recommended by Association of Official Analytical Chemist (AOAC, 1984) were used for this analysis.

RESULTS & DISCUSSION

Sorghum and pearl millet grain proximate composition are presented in Table 1. The results uncovered that protein contents in sorghum was 10.27 g/100g. The value was concurrent with the findings of Jimoh and Abdullahi, (2017) who reported that protein content ranged from 6.23 to 13.81%. These findings are in accordance with the findings of Torres *et al.*, (2006) of 9.01 -11.43%; Asha *et al.*, (2005) of 10.40% and Abu, (2001) of 10.08 - 15.55% protein. The differences in protein substance of the several sorghum samples are chiefly due to the nature and absence of vital element required for plant life (Arnon, 1995 and Jimoh & Abdullahi, 2017). Belhadi *et al.*, (2013) testified that the white sorghum grains contain crude protein values were $12.27 \pm 0.18\%$.

The carbohydrate content was found at 72.91 g/100 g and comparable with the range of 65.57-76.28%/100g obtained by Jimoh and Abdullahi, (2017). Nutritionally, carbohydrate substance is present in sorghum grains in the form of starch. As sorghum, like other cereals, is rich in starch, around 70% and has fabulous potential for industrial applications (Zhan *et al.*, 2003). The values of sorghum starch were $65.05 \pm 0.19\%$ for the white sorghum grains (Belhadi *et al.*, 2013).

The sample showed a lipid content value of 3.26%, which is in agreement with the research works carried out by Torres *et al.*, (2006) who reported a lipid value of 2.76% - 3.75%; Gassem & Osman, (2003) of 3.58 - 4.47% and Abu, (2001) of 2.22 - 3.65% (Jimoh & Abdullahi, 2017).

The ash content was 1.12% for sorghum millet. The ash content of the sample might be influenced by the nature and number of ions existing within the soil from which plants draw its supplements (Akinsola, 1993). Gassem & Osman, (2003) conveyed that 1.90 - 1.97% of ash content which is higher than the result attained in this study, but Abu (2001) stated that 1.01 - 1.56% of ash content which correlates well with the results found in this work.

The mean crude fibre content of the sorghum sample was 1.65%. This is identical to the findings of Gassem & Osman, (2003) who reported the crude fibre content ranged from 1.64 - 2.66%; Asha *et al.*, (2005) of 1.21% and Abu *et al.*, (2001) of 1.04 - 2.81% (Jimoh & Abdullahi, 2017).

The pearl millet, crude protein value was 11.59g/100g. "The recommended dietary allowance of (RDA) protein is 60 g/adult". The findings were comparable with those gotten by Subramanian *et al.*, (1986) who testified a range of 8.6-15.6% crude protein for 20 pearl millet cultivars (Abdalla *et al.*, 1998). The results were concurrent with the findings of

Sullivan *et al.*, (1990) who reported 8 to 19% of protein content present in pearl millet. Millet protein may be a great source of fundamental amino acids but for lysine and threonine and is generally high in methionine content (Ratnavathi, 2016).

The carbohydrate content was found to be 68.64 g/100 g and reasonably comparable with the range of 59.4 to 69.5g/100g achieved by Upreti and Austin, (1972).

The crude fat content is 4.4 % and these values are within the range of 4-9% detailed by Desikachar, (1975) and Elyaset *al.*, (2002). Fat gives remarkably a great source of energy and helps in transport of fat-soluble vitamins protecting and ensures inside tissues and contribute to important cell processes (Jones *et al.*, 1985 and Akpabio & Ikpe, 2013).

Crude fibre in food is a sign of the level of non-digestible carbohydrate and lignin. The crude fibre value of 1.55g/100g in pearl millet is suitable since it ruins assimilation of glucose, fat and enhances digestibility and diminished supplement utilization (Oladiji *et al.*, 2005 and David *et al.*, 2014).

Ash content was 1.6g/100g and values obtained were within the range 1.2-2.4% as reported by Hadimani and Malleshi, (1995) and Elyaset *al.*, (2002). Ash in food contributes the leftover residues after all the wetness has been removed as well as organic material have been incinerated at a temperature of about 550°C. Ash content is commonly measured to be a quantity of the mineral content of the original food (Onwuka, 2005 and David *et al.*, 2014).

The proximate composition showed that pearl millet has abundance protein, crude fat and total ash content than sorghum, but carbohydrate is high in sorghum millet when compared with pearl millet.

Table 1: Proximate Composition of Sorghum and Pearl Millet (Mean±SD)[@]

Component (G/100g Dry Basis)	Sorghum Millet	Pearl Millet
Moisture	11.08±0.164	12.20 ±0.16
Protein (g) (% of N×6.25)	10.27 ±0.04	11.59±0.02
Crude Fat (g)	3.26±0.05	4.4±0.03
Total Ash(g)	1.12±0.005	1.6±0.01
Carbohydrate(g)	72.91±0.427	68.64±0.166
Crude Fibre (g)	1.65±0.022	1.55±0.042
Energy (Kcal)	359.19±0.023	360.6±0.069
Calcium, (mg/100g)	21.40 ±0.030	30.40 ±0.190
Phosphorous, (mg/100g)	210.03±0.016	292.08±0.046
Iron, (mg/100g)	4.14±0.019	8.45±0.023
Zinc, (mg/100g)	1.65±0.023	7.14±0.021

@-average of six trials

On account of pearl millet being higher in protein, lipid and energy than those from sorghum and maize showing that pearl millet may be utilized in novel nourishment applications. The normal protein and fat contents of millet at 12% moisture are 11.8% and 4.8% respectively (FAO, 1995). These are similar to values for sorghum (10.4% protein and 3.1% fat).

The supplement composition of pearl millet in comparison to other cereal grains appears generally high gross energy substance of roughly 363 Kcal/100 g. This high energy content is due to the high-fat substance of the grain which is related to the large size. Compared to maize, Pearl millet has higher arginine, threonine, valine, isoleucine and lysine.

Minerals such as calcium (Ca), phosphorus (P), iron (Fe), and zinc (Zn) content of sorghum millet and pearl millet grains were found to be 21.40, 210.03, 4.14 and 1.65mg/100g and 30.40, 292.08, 8.45 and 7.14 mg/100g respectively.

CONCLUSIONS

The proximate analysis revealed that sorghum and pearl millet contain appreciable amounts of nutrients. This study proved that sorghum and pearl millet contain high protein, energy, fibre and essential minerals. Hence, these grains have considerable potential to be used as a good nutrient source in developing versatile food products and beverages in food industry.

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