iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 5 **Issue:** XII **Month of publication:** December 2017

**DOI:**

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor :6.887*
*Volume 5 Issue XII December 2017- Available at www.ijraset.com*

# Chemical and Antioxidant composition of Tender Sorghum

Renuka Meti[1]
[1]*Department of Food Processing and Nutrition, Akkamahadevi Women University, Vijayapur, Karnarka*

***Abstract:*** ***The present study was undertaken to study the chemical and anti oxidant composition of tender sorghum. The proximate composition revealed as the moisture content (g percent) to be 60.35gm .The ash content 1.33gm.The carbohydrate content(by calculation ) was found to be 26.22gm.Similarly the protein Content/100g was found to be 7.62gm. The fat content was 3.0gm .The amount of crude fiber was 1.48gm and dietary fiber was found to be 7.10 gm. The minerals like phosphorous 212mg, calcium 22mg and iron was 3.0mg.The sodium content was 7mg.***
***Polyphenol content of the Sorghum was found to be 0.39%.The percentage of tannins was found to be 0.22 where as percentage of flavonoids was o.16.The amount beta carotene was found to be 0.85mg/kg.The percentage of DPPH radical scavenging activity of Tender Sorghum: found to be 64.45 where as iron chelating activity was found to be 2.58mg/100gm.Nitric oxide radical scavenging activity was found to be 36.13% where as vitamin C in the fresh grains was found to be 5.67mg/100gm. The study concludes that the tender sorghum which is nutritionally rich and gluten free would be commercialised like tender maize which has entered the global market***

## I. INTRODUCTION

Research has shown that sorghum, millets and pseudo cereals are generally very rich in phenol phyto chemicals, which may have important health-promoting properties. (przbylskietal.,1998;reviewed by Dykes and Rooney,2006).Because of this, these minor grains should be a component of everyone's diet, thereby increasing people's dietary diversity and maintaining food plant biodiversity. The very concept of food is changing from past emphasis on health maintenance to the promising use of foods to promote better health benefits to prevent chronic illnesses. Attempts have been made in many parts of the world to explore the use of millets and for the treatment of variety of human ailments,(Israil2012) This is because of their adaptation to the harsh environmental conditions of their centers of origin and similar agro-ecological zones. However, over the past 30 years their relative and even actual production has declined. There is need to promote a deeper understanding of the unique properties and potential of these minor grains to improve human health and well-being ,with the aim of increasing their cultivation productivity and utilization, particularly in developing countries, (ICRISAT 1988). This is crucially important as a "Nutrition Transition "from traditional grains to a western high fat and high sugar diet in developing regions, such as sub-saharan Africa, is already leading to dramatic increases in cardiovascular disease and Type 2 diabetes (Taylor 2013). However no scientific evidence is available on Tender Sorghum which is one among the minor millets. Tender Sorghum season falls in the month of January in northen part of Karnataka and remain just for ten to fifteen days. In early January Sorghum grain is very juicy & tender just like Tender maize which has entered the global market for its ready to use & nutritional aspects, the present study focused to explore the chemical and anti oxidant composition of Tender Sorghum.

## II. MATERIALS AND METHODS

Procurement of Tender Sorghum Samples: The sample was procured directly from the local farm near by Dharwad city Karnataka , the Tender Sorghum was plucked directly from the fields, separated from the stalk and dehusked then carried to the research centre under zero degree temperature with ice cubes, the time taken for transportation was thirty minutes. The sample was immediately cleaned; outer husk was further removed mechanically, kept under deep cold storage for analysis.

### A. *Chemical Analysis*

1) *Proximate principles:* Estimation of moisture, crude fiber total lipids , ash and protein analysed using AOAC method.
2) *Minerals:* estimation of iron using wong's method given by raghuramulu*et al.*,(1983), estimation of calcium (hawk *et al.*, 1957),estimation of phosphorus in the ash solution using method of fiske subba rao as given by raghuramulu*et al.*,(1983) was carried out.

3) *Antioxidants Analysis:* Estimation of total phenolics using the procedure given by Gao *et al*., (2000), Estimation of tannins using vanillin hydrochloric acid method given by Price *et al*.,(1978), Estimation of Flavonoids using the method given by Chang.C. Yang.M. Wen., H. And Chern, J.2002,Estimation of Glucosinolates using the method given by Kumar, Satyanshu*et al*.,2004.Beta - Carotene - The individual carotenoids were separated on a column of alumina And determined spectra photo metrically (Raghuramulu*et al*., 1983),Estimation of Vitamin Cin fresh and dry sample using the method of Roe and Kother(1965) as described by Caraway (1970),Estimation of DPPH radical scavenging activity using the method given by Sreejayan And Rao (1996),Estimation of Iron – chelating activity using the method given by Benzie and Strain(1996) and Benzie and Szeto (1999),Estimation of Nitric oxide radical scavenging activity using the method given By Sreejayan and Rao (1997) and Marcocci*et al*., (1994).

## III. RESULTS AND DISCUSSION

Table 1 presents the proximate composition of the Tender Sorghum. The moisture content (gpercent) in Tender Sorghum found to be 60.35gm .The ash content of Tender Sorghum 1.33gm.Thecarbohydrate content(by calculation ) of was found to be 26.22gm.Similarly the protein Content/100g was found to be 7.62gm. The fat content was 3.0gm.The calorie content (by calculation) 162Kcal .The amount of crude fiber was 1.48gm.Where as dietary fiber was found tobe 7.10 gm. When compared with Tender maize the moisture content is 67.1gm,protein 4.7gm,fat 0.9gm,crude fiber 1.9gm,carbohydrates 24.6gm and energy is found to be 125Kcal(Gopalan C et al,NIN2007) when compared with Tender maize, Sorghum composition value found to be more nutritive than Tender maize.

Table 1:-Proximate composition of *Tender Sorghum*

| Proximate composition | Measured Values |
|---|---|
| Moisture content (%) | 60.35 |
| Carbohydrates (%) | 26.22 |
| Protein(%) | 7.62 |
| Fat (%) | 3.0 |
| Ash(%) | 1.33 |
| Crude fiber (%) | 1.48 |
| Total fiber (%) | 7.10 |
| Calories(by calculation) | 162Kcal |

Values are means of three replicates

### A. *Mineral Composition*

Table 2 depicts the mineral content of Tender Sorghum .The phosphorous content of the Tender Sorghum was 212mg, where as calcium content found to be 22mg and iron was 3.0mg.The sodium content was 7mg. Compare with tender corn.

Table 2:-Mineral composition of Tender Sorghum

| Mineral content | Measured value |
|---|---|
| Iron | 3.0mg |
| Calcium | 22mg |
| Phosphorus | 212mg |
| Sodium | 7mg |

Values are means of three replicates

*B. Phenol Composition*

Table3:-Total Phenolic composition of ***Tender Sorghum***

| SI.NO | Phenol composition | Amount |
|---|---|---|
| 1 | Total polyphenol | 0.36% |
| 2. | Tannins | 0.22% |
| 3. | Flavonoids | 0.16% |
| 4. | Beta carotene | 0.85mg/kg |

Values are means of three replicates

It has been suggested that antioxidant activity has a positive relationship with the phenolic content. Phenolic compounds are potent antioxidants which protect the body against damage byreactive oxygen and nitrogen species .Table 3 presents certain phytochemical of Tender Sorghum .The total Polyphenol content of the Tender Sorghum was found to be 0.36%.The percentage of tannins was found tobe 0.22 where as percentage of flavonoids was o.16.The amount beta carotene was found to be0.85mg/kg. The total polyphenol content of the Tender Sorghum was found to be 0.36%. Where in total phenolic content of dry sorghum ranged from 3-43mg/100,as reported by Dykes and Rooney 2006. The percentage of tannins as found to be 0.22 where as percentage of flavonoids was o.16.The amount of beta carotene was found to be 0.85mg/kg. However a study conducted by Reddy et al 2005, stated that he found beta-carotene in11 species of dry sorghum ranged from 0.6 to 1.1 mg/1kg.

*C. Antioxidant Analysis*

The percentage of DPPH radical scavenging activity of Tender Sorghum from the Table 4 reveals 64.45where as iron chelating activity was found to be 2.58mg/100gm.Nitric oxide radical scavenging activity was found to be 36.13% where as vitamin C in the grains was found to be5.67mg/100gm.Vitamin C is a good scavenger of several reactive oxygen species and helps to recycle vitamin E. It also possesses the ability of preserving the levels of other antioxidants.

Table4:-Antioxidant properties of Tender Sorghum

| SI.NO | Antioxidant composition | Amount |
|---|---|---|
| 1. | DPPH radicals scavenging activity | 64.45% |
| 2. | Iron chelating activity | 2.58mg/100gm |
| 3 | Nitric oxide radical scavenging | 36.13% |
| 4 | Vitamin c | 5.67mg/100gm |

Values are means of three replicates

It has been suggested that antioxidant activity has a positive relationship with the phenolic content. Phenolic compounds are potent antioxidants which protect the body against damage by reactive oxygen and nitrogen species.

*D. Ntioxidant Analysis Of Tender Sorghum*

It has been suggested that antioxidant activity has a positive relationship with the phenolic content. phenolic compounds are potent food antioxidants which protect the body against damage by reactive oxygen and nitrogen species.(Soobratte etal2012.)

The human body has its own endogenous antioxidants system designed to counteract oxidative stress and this is supported by exogenously supplied dietary antioxidants .In this regard, phytochemicals in grains such as phenolic compounds are believed to potentially play a role in protecting the body against oxidative stress and its effects due to their well-known antioxidant properties. the

*E. DPPH Radical Scavenging Assay*

DPPH free radical compound has been widely used to test the free Radical scavenging ability of various food samples. The antioxidant Present neutralizes the DPPH by the transfer of an electron or Hydrogen atom. The extract of Tender Sorghum tested against DPPH Stable radicals spectrophotometrically which reveals that the radical Scavenging activity of Tender Sorghum methanol extract possessed excellent antioxidant capacity by increased with the increasing concentration of the extract at a concentration of 100µg/ml of percentage of DPPH radical scavenging activity of Tender Sorghum found to be 64.45 Nitric oxide radical scavenging activity was found to be 36.13% where as vitamin C in the grains was found to be 5.67mg/100gm.Vitamin C is a

good scavenger of several reactive oxygen species and helps to recycle vitamine. it also possesses the ability of preserving the levels of other antioxidants.

*F. Metal Chelating ability of Ferrous ions*

Transition metals have been proposed as the catalysts for the initial formation of radicals. Chelating agents may stabilize transition metals in living systems and inhibit generation ofradicals, consequently reducing free radical-induced damage. To estimate the antioxidant potential of the Tender Sorghum extract, its chelating activity was evaluated against Fe2+.Ferrozine quantitatively forms complexes with Fe2+. The Chelating effects of the Tender Sorghum extract and EDTA on ferrous Ions evaluated as 2.58mg/100gm.

*G. Summary and conclusion*

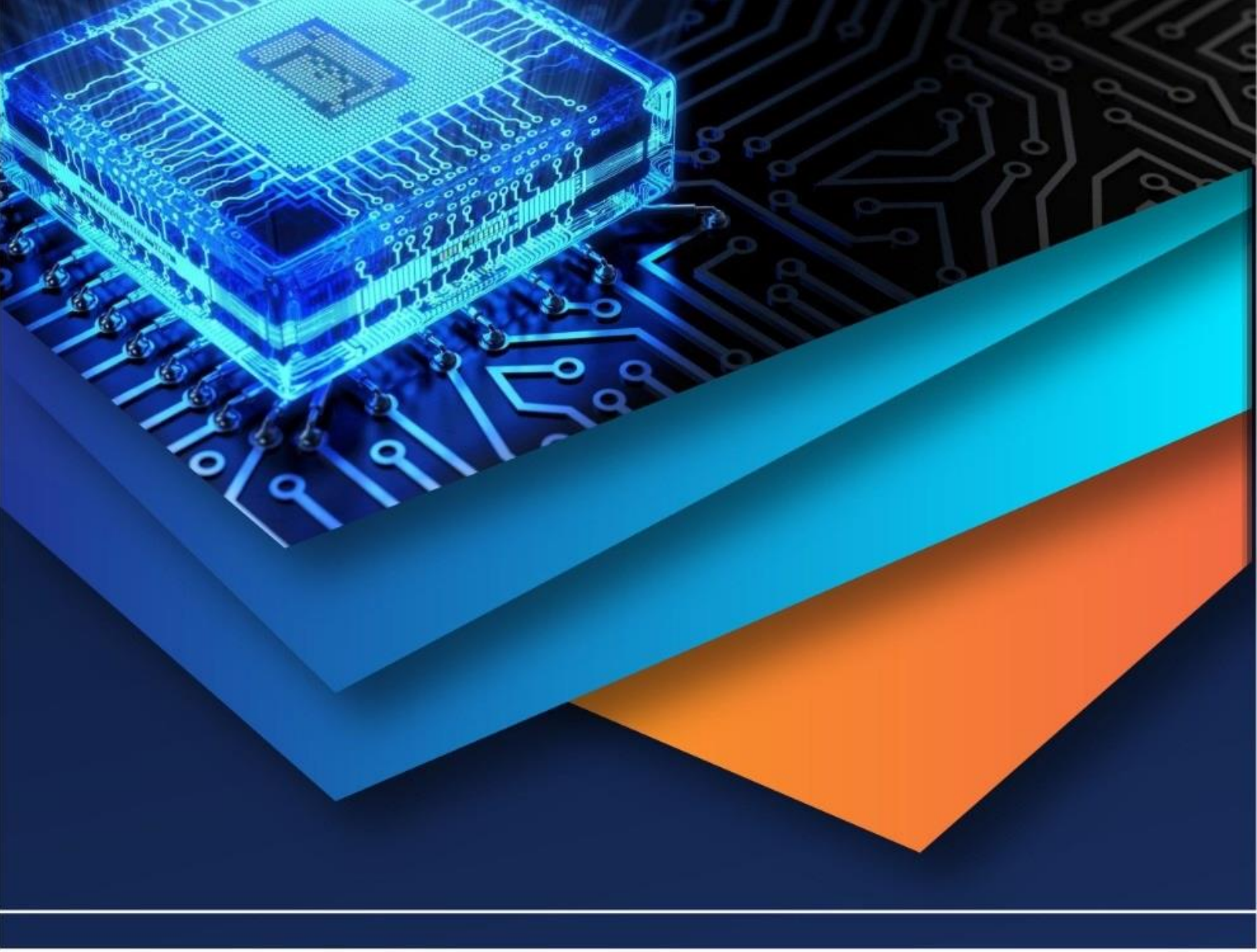
Jowar(Sorghum) is gaining popularity worldwide because of its gluten free nature .Jowar like all other millets requires less water for agriculture and the crops can be sustained on just rainfall. Therefore it reduces the demand on water, which for other crops has to be supplied using energy. Hence it is eco-friendly. Its water requirement is one fourth what is required by Rice and half of what is required by wheat. So when Jowar is eaten then one is saving the scarce water resources of the planet. Area cultivation of jowar is mainly concentrated in peninsular and Central India. Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Gujarat, Rajasthan, Uttar Pradesh and Tamil Naduare the major jowar-growing state.TJ need to gain the importance all over the world like tender maize which has entered the global market.

## IV. ACKNOWLEDGMENT

The author sincerely acknowledges the UGC ,New Delhi, for granting the fund to conduct the research.

## REFERENCES

[1] Przbylski,R.,Lee,Y,C.,Eskin.N.A.M..Antioxidants and radical-scavening activites in buckwheat seeds J Am.Oil chem..soc.75,1595-1601,1998
[2] Dykes.L.,Rooney,L.W., Review:sorghum and millet phenols and antioxidants J.cereal sci,44,236-251. 2006
[3] ICRISAT/FA, 1988. Proceedings of the International workshop on policy, practice and potential relating to uses of sorghum and millet, pp 8-12th, February, 1988.
[4] Taylor J.R.N. et.al.2013. Increasing the utilization of sorghum, millets and pseudocereals:developments in the science of their phenolic phytochemicals biofortification and protein functionality. Journal of cereal science, pp- 1-19, 2013.
[5] AOAC official methods of analysis, Association of Official Agricultural Chemists, Washington,D.1975
[6] Raghuramlu ,N.,Madhavan,N.K. anf Kalyanasundarm,s,biotechnology , a manula of laboratory technicques journal of chemical technology, NIN,421,1983.
[7] Hawk,Osei,B.L.and Scimmerson,studies on composition of proboitic soyafinger ,millet , Practical physiological chemistry , 13th edition ,644,1957.
[8] Pham-Huy,LA.,He,H.,Pham-Huy,C..Free radicals,antioxidants in disease and health ,Int J,Biomed,sci.42,89-96. ,2008
[9] Narsinga Rao ,b.S. And Prabhavathi,T.An 'In Vitro'method for predicting the bioavailability of iron from food Am.J.Clin.nutr.,1970,169-175 .
[10] Zemel,M.B 'Invitro estimation of the potential bioavailability of calcium from mustard (Undaria pennatefida)milk and spinach under stimulated normal and reduced gastric acid condition.J.Fd.sci.,1986,51,957-959.
[11] Andand S.L Rossi ,J.A. Colorimetry of total phenols with phosphomolybidic-Phosphotungstic acid reagents .AM.J.Enol.VATIC.,1995,16,144-158.
[12] Panse, V.S. and Sukhatme, P.V. Statistical Methods for Agricultural Workers. Indian Council Agricultural Research, New Delhi, 1967,347.
[13] Gopalan C et al, ,Nutritive Value of Indian Foods,NIN,Indian Council of Medical Research, Hyderabad ,India. 2007
[14] Soorbratte etal .Effect of polyphenols extracts from brassica vegetableson erythrocyte membranes(invitro study),Environmentaltoxicologyand pharmacology,vol34,issue3,783-790,2012.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY