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## Biochemical evaluation of different sorghum genotypes for high mineral and crude fiber content

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### Abstract

The present investigation entitled “Biochemical evaluation of different sorghum genotypes for high mineral and crude fiber content” was carried out in the laboratory of Department of Biochemistry N.D. University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) during the year 2015-16 in Completely Randomized Design with three replications. Sorghum (*Sorghum bicolor* (L.) Moench) is one of the staple food crops consumed by large population in India. The various biochemical parameters such as carbohydrates, mineral content, total amino acids and crude fiber were estimated and it was found that germplasm S-10 showed maximum value of carbohydrate (72.50%), germplasm S-4 exhibited maximum value of mineral content (3.40%), germplasm S-4 showed maximum value of total amino acids (40.20%) and variety N-4 exhibited maximum value of crude fiber content (6.50%).

**Keywords:** Jowar millet, carbohydrate, mineral, total amino acid, crude fiber

### Introduction

Sorghum (*Sorghum bicolor* (L.) Moench) is the king of millets and is one of the important food crops in dry lands of tropical Africa, India and China. The Sorghum genus is found in the family Poaceae. Sorghum is valued for its grain, stalks and leaves. It is one of the World's major cereal crops. Worldwide, there are a small number of grains that supply approximately 85% of the world's food energy. For 500 million people in over 30 countries of the semi arid tropics, sorghum is a dietary staple. Sorghum is used not only for human food, but also for fodder and feed for animals, building material, fencing, or for brooms (Doggett, 1988; House, 1985; Rooney and Waniska, 2000) [12]. The largest producers are the United States (almost 17% of world production), with yields obviously much higher, followed by India, Nigeria, China, Mexico, Sudan and Argentina (ICRISAT, 2006) [12].

The fiber and mineral content of grain sorghum is essentially similar, and is 1.60%. It is a good source of energy and provides about 349Kcal and contains 72.60% of carbohydrates. Sorghum contains Calcium (25mg /100g), phosphorous (222mg /100g) and iron content (4.1mg/100g). Gopaldas, and Surpam, (2011).

The chief sugars present in sorghum kernels are the monosaccharides *i.e.*, glucose and fructose, the disaccharides *i.e.*, sucrose and maltose and the trisaccharide *i.e.*, raffinose (Watson and Hirata 1960) [15]. Starch and fructosans are the chief polysaccharides and represent storage carbohydrates. The most common mutants contain waxy (only amylopectin) and high amylose starch (Boyer and Liu 1983) [2]. Color of sorghum starches is related to intensity of the pigments in the pericarp and in the leaves of the sorghum plant (Freeman and Watson 1971) [4].

A single serving of Sweet sorghum provides the dietary fiber by 48% of the daily recommended value. This assist in preventing the health conditions such as bloating, cramping, stomach aches, constipation, diarrhea and excess gas. The high amount of fiber helps to eliminate LDL cholesterol level which upgrades the heart health and also prevents heart attacks, atherosclerosis and strokes (Porter *et al.*, 1977) [10]. There is a need for further characterization of the sorghum collections with respect to food and other quality such as both macro and micro-nutrient attributes. With reference to the latter compounds, minerals have an essential role in human nutrition (Suzuki and Wada, 1994) [14].

## Materials and Methods

Ten germplasm (Jowar millet-1, Jowar millet-2, Jowar millet-3, Jowar millet-4, Jowar millet-5, Jowar millet-6, Jowar millet-7, Jowar millet-8 and variety (N-4, CSV-3) of jowar millet were collected from different districts of Uttar Pradesh namely Varanasi, Lakhimpur, Bahraich, Gonda, Sultanpur, Jaunpur, Ghazipur, Pratapgarh, were used as experimental materials in the field trail. Samples of jowar millets were brought to Biochemistry laboratory of Narendra Deva University of Agriculture & Technology, Kumarganj Ayodhya (U.P.) after collection they were analyzed for various biochemical parameters. The collected jowar millet seeds were cleaned and dried. The dried seeds were then crushed in pestle mortar in to powder form. The biochemical properties of the jowar millet powder were analyzed and the results were summarized. Total carbohydrate content analyzed by Yamme and wills (1954). Total amino acid was estimated according to Jayraman (1981). Total mineral content was determined by the method as described by Hart and Fisher, (1971) [5]. The content of crude fiber in dried grains of jowar millet was analyses by the method as described by Hart and Fisher (1971) [5].

## Result and Discussion

The results on biochemical composition of jowar millet seed powder are shown in table 1. The carbohydrate content in different germplasm/varieties of jowar millet was recorded in the range of the 69.50-72.50 per cent. Highest carbohydrate content was noticed in S-10 (72.50%) and lowest content was

recorded in S-1 (69.50%). All the germplasm/varieties of jowar millet were found significant regarding carbohydrate content. The highest and lowest carbohydrate content in various germplasm might be due to genetic character of that germplasm Amadou *et al.* (2013) [1]. The mineral content of jowar millet germplasm/ varieties varied between 2.40-3.40 per cent. Highest total mineral content was recorded in the germplasm S-4 (3.40%). Lowest total mineral content was noticed in the germplasm S-2 (2.40%). Total mineral content among all the jowar millet germplasm/ varieties varied significantly. Similar range of total mineral content in jowar germplasm/varieties was also reported by (sally *et. al.*, 2016). The total amino acid content in different germplasm/varieties of jowar millet was recorded in the range of the 40.20-24.36 per cent. Highest total amino acid content was noticed in S-4 (40.20%). Lowest content was recorded in S-3 (24.36%). All the germplasm/varieties of jowar millet was found significant regarding total amino acid content. The highest and lowest total amino acid content in various germplasm/ varieties might be due to genetic character of that germplasm. Omima E. Fadlallah *et al.*, (2011) studied the total amino acid content of jowar millet and found similar range. The crude fiber content of jowar millet germplasm/ varieties varied from 6.50 - 5.40 per cent. Highest crude fiber content was recorded in the variety N-4 (6.50%). Lowest crude fiber content was noticed in the germplasm S-10 (5.60%). Similar range of crude fiber content was also reported by (Ihekoronye, 1985) [7].

**Table 1:** Biochemical evolution of jowar millet germplasm/varieties

S.N.	Germplasm/ Varieties	Carbohydrate (g/100g)	Total amino acid (g/100g)	Total mineral content (g/100g)	Crude fiber (g/100g)
1	Jowar millet-1	69.50	37.46	2.60	5.90
2	Jowar millet-2	70.70	37.66	2.40	5.40
3	Jowar millet-3	70.60	24.36	2.70	6.30
4	Jowar millet-4	72.30	40.20	3.40	6.40
5	Jowar millet-5	70.10	35.20	2.70	5.70
6	Jowar millet-6	71.50	39.83	2.90	6.30
7	Jowar millet-7	72.50	36.20	2.80	5.70
8	N-4	69.90	36.80	2.90	6.50
9	CSV-3	71.30	25.36	3.20	6.30
10	Jowar millet-10	72.50	38.20	2.80	5.60

## Conclusion

The overall analysis revealed that sorghum samples contain appreciable nutrient contents. It could be concluded that sorghum is rich in dietary fiber and possess better nutritional and mineral profile due to which it has potential in fortification of food stuffs. On the basis of result obtain in the present investigation, germplasm jowar millet-4 was found superior in Mineral (3.40g/100g) and jowar millet-10 was rated best in carbohydrate (72.50/100g), Crude Fiber in N-4 (6.50) and Total amino acid in jowar millet-4 (40.20). So, these germplasms were performed best over other germplasm studied under investigation and could be used in further research work.

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