



Biochemical screening of sawan millet (*Echinochloa frumentacea*) grown in Devipatan mandal of Eastern U.P.

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ABSTRACT

The present investigation entitled “Biochemical screening of sawan millet (*Echinochloa frumentacea*) grown in Devipatan Mandal of Eastern U.P.” was carried out in the laboratory of Department of Biochemistry, N.D. University of Agriculture and Technology, Kumarganj, Ayodhya. Ten germplasm of sawan millet were selected as the experimental material. NDS-1, NDS-2, NDS-3, NDS-4, NDS-5, NDS-6, NDS-7, NDS-8, NDS-9, NDS-10, were collected from Devipatan mandal, and used as experimental materials in the field trail. The various biochemical parameters such as protein content NDS-5 (9.33 per cent), crude fibre content NDS-9 (6.90 percent), Total mineral content NDS-5 (2.29 percent), tryptophan content NDS-2 (39.33mg/g), lysine content NDS-10 (85.33mg/g), methionine content NDS-1 (107.33mg/g), were also noticed in present investigation. Antinutritional factors such as Phytic acid content NDS-2 (85.33mg/100g) and Tannin content NDS-6 (59.85mg/100g) were found reported minimum in the present germplasm, so the germplasm were utilized in the further research work.

Introduction

Sawan millet or barnyard millet (*Echinochloa frumentacea*) is a group of grassy plant with short slender culm and small grains possessing remarkable ability to survive under severe drought. Barnyard millet (*Echinochloa frumentacea*) is one of the hardiest millet, which is

called by several other names viz., Japanese barnyard millet, ooda oadalu, sawan, sanwa and sanwank. Nutritionally too, barnyard millet is an important crop and a good source of protein, which is highly digestible and is an excellent source of dietary fibre with good amounts of soluble and insoluble fractions. The carbohydrate content is low and slowly digestible, which makes the barnyard millet a nature's gift for the modern mankind who is engaged in sedentary activities. Barnyard millet (*Echinochloa frumentacea*) is a fast growing multipurpose crop, thrives well even under adverse agro climatic condition 's' an investigation regarding physico-chemical characteristics, nutrient composition, storage quality, value addition potentials of barnyard millet and efficacy tasting in management of diabetes mellitus the results indicated the barnyard millet grain exhibit good cooking quality, short cooking time (10-15 min) and exhibit maximum grain in weight (390-418 percent) and volume (420-440 percent) after cooking, protein (10.52 percent), fat (3.56 percent), minerals (2.02 percent) and calorific value (398 kcal) with relatively low carbohydrate content (68.76 percent), high dietary fiber (12.60 percent), soluble (4.24 percent) and insoluble (8.36 percent) were recorded. Nutraceutical components viz, tannins (62.50 percent) free phenols (51.00 percent) and phytic acid (96.00 percent). Grain is the storehouse of many chemical components including nutrients, phytochemical, and non-nutritive value of millets is comparable to other cereals with slightly higher contents of protein and mineral (Gopalan *et al.* 2002). Differences germplasm in nutrient composition within the species of minor millet were reported by several investigations. Studies indicated that barnyard millet recorded the lowest moisture content of 8.15 to 9.84 percent it was also reported (Veena *et al.* 2005). Studies have indicated that among the millets barnyard millet recorded highest protein content (15.07 percent) respectively, with varietal differences within species as reported by several investigators. (Kumar and Parmeshwran, 1998). Barnyard millet like other minor millets is embedded in thick seed coat covered with bran. Hence, requires dehulling prior to human consumption. The adherent seed coat protects the grains from infestations and oxidative changes. The barnyard millet resembles Italian and little millet but is smaller in size volume and density (Srivastava and Batra 1998). Barnyard millet is dull greenish small seed prior to dehulling after dehulling the seed size is further reduced. The small seeded poses problems of utilizing this grain for culinary purposes generally minor millets in the market contain. Keeping in view of aforesaid importance, the present investigation has been carried out.

Materials and methods

The investigations were carried out during Kharif season. Details of the materials are used and the techniques employed in the present investigation are summarized as under. Total mineral content was determined by method described by the Hord and Fisher (1971). The content of crude fibre in dried grains of kodo were analyzed by the method as described by Hort and Fisher (1971). Tryptophan content was estimated by the method of Spices and Chamber (1949). Lysine content was estimated by method of Felker *et al.* (1928). Methionine content was analyzed as described by the Horn *et al.* (1946). The tannin content in kodo was determined by method given by "Ranganna (1986). Tannin reduces phosphor tungsto molybdcic acid in alkaline solution to form blue color complex which is measured calorimetrically at 760 nm on spectrophotometer. Phytic acid in the sawan millet has been analyzed by method of method of Wheeler and Ferrel (1971). The phytate is extracted with trichloroacetic acid and precipitated as ferric salt. The iron content of the precipitate is determine calorimetrically and the phytate phosphorus content was calculated from this value assuming a constant 4Fe:6P molecular ratio in the precipitate.

Result and Discussion

Ten germplasm of sawan millet were selected as the experimental material. NDS-1, NDS-2, NDS-3, NDS-4, NDS-5, NDS-6, NDS-7, NDS-8, NDS-9, NDS-10, were collected from Devipatan mandal, and used as experimental materials in the field trail.

The protein content was recorded in the range of 8.41 to 9.33%. Maximum protein content was reported in the germplasm NDS-5(9.33%) followed by NDS-5- (9.33%) and NDS-4 (9.08%). Minimum protein content was noticed in the germplasm NDS-2(8.41%). Nonsignificant correlation was obtained regarding protein content in various sawan millet germplasm. All the germplasm of sawan millet were found nonsignificant regarding protein content. The highest and lowest protein content in various germplasm might be due to genetic character of that germplasm. Veena *et al.* (2005) studied the nutritional quality of some sawan germplasm and observed similar range of protein. Roopashree, (2008) studied the seed protein content of sawan millet and found similar range protein. The Crude fibre content is different genotypes of sawan millet was recorded in the range of the 5.96 to 6.81%. Highest Crude fibre content was noticed in NDS -2 (6.81%) and lowest content was recorded in NDS-10(5.96 %). All the germplasm of sawan millet were found significant regarding Crude fibre content. The variation in Crude fibre content in the germplasm might be due to genetic character of that germplasm (Kulkarni, *et al* 1992). The Total mineral content is different genotypes of sawan millet was recorded in the range of the 1.94 to 2.29%. Highest Total mineral content was noticed in NDS-5 (2.29%) and lowest content was recorded in NDS-4 (1.94%). All the germplasm of sawan were found significant regarding total mineral content. The variation in total mineral content in the germplasm might be due to genetic character of that germplasm (Veena, *et al* 2005). Methionine content in various germplasm of sawan was found between 95.00 to 107.33mg/g protein and all the germplasm were found nonsignificant regarding this amino acids. Highest Methionine content was noticed in NDS-1 (107.33mg/g) and similar range of methionine content NDS-9 (95.00 mg/g) was also reported by (Chen *et al.* 1994). The difference in methionine variation between the germplasm was due to genetical character. Similar range of methionine amino acid in various germplasm of sawan also reported by (Manth and Cunnane *et al* 1995). The Tryptophan content is different genotypes of sawan millet was recorded in the range of the 36.66 to 39.33mg/g protein. Highest Tryptophan content was noticed in NDS-2 (39.33mg/g) and lowest Tryptophan content was recorded in NDS-6 (36.66 mg/g). All the germplasm of sawan were found nonsignificant regarding Tryptophan content. The highest and lowest Tryptophan content in the varieties might be due to genetic character of that germplasm. Chen *et al* 1994) studied the nutritional quality of some sawan germplasm and observed similar range of Tryptophan. (Manth and Cunnane *et al.* 1995). Studied the seed Tryptophan content after harvesting of the crop and found similar range of Tryptophan. The Phytic acid content is different genotypes of sawan millet was recorded in the range of the 85.33 to 97.61mg/100g. Highest Phytic acid content was noticed in NDS-4 (97.61mg/100g) and lowest content was recorded in NDS-2 (85.33mg/100g). All the germplasm of sawan millet were found significant regarding Phytic acid content. The variation in phytic acid content in the germplasm might be due to genetic character of that germplasm (Roopashree, 2008). The Tannin content is different genotypes of sawan millet was recorded in the range of the 59.85 to 70.53mg/100g. Highest Tannin content was noticed in NDS-1 (70.53mg/100g) and lowest content was recorded in NDS-(59.85mg/100g). All the germplasm of sawan were found significant regarding tannin content. The variation in tannin content in the germplasm might be due to genetic character of that germplasm (Roopashree, 2008) and found similar range of tannin content in sawan germplasm.

Sawan is the minor crop and also called the Srianna or nutricereals. In ancient time sawan is the major crop but due to hard seed cover and low production, called minor crop. Sawan is rich in protein, fibers, amino acids and huge amount of minerals. It is used for curing many diseases as nutraceuticals due to high content of nutrients.

Table: Protein content (%) of sawan millet germplasm

S.No.	Name of germplasm	Place of Collection	Protein Content (%)
1	NDS-1	Mustafabad, Bahraich	8.64
2	NDS-2	Nasirganj, Bahraich	8.41
3	NDS-3	Bibipur, Bahraich	8.75
4	NDS-4	Para, Bahraich	9.08
5	NDS-5	Jhukiya, Bahraich	9.33
6	NDS-6	Puraina, Bahraich	8.83
7	NDS-7	Shahpur, Gonda	8.99
8	NDS-8	Ashokpur, Barabanki	8.82
9	NDS-9	Sirauli, Barabanki	9.02
10	NDS-10	Rudaine, Bahraich	8.81
SEm±			0.240
CD at 5%			0.713

Table: Total Mineral Content (%) in sawan millet germplasm

S. No.	Name of germplasm	Place of Collection	Total Mineral Content (%)
1	NDS-1	Mustafabad, Bahraich	2.00
2	NDS-2	Nasirganj, Bahraich	2.06
3	NDS-3	Bibipur, Bahraich	2.01
4	NDS-4	Para, Bahraich	1.94
5	NDS-5	Jhukiya, Bahraich	2.29
6	NDS-6	Puraina, Bahraich	2.01
7	NDS-7	Shahpur, Gonda	2.07
8	NDS-8	Ashokpur, Barabanki	2.05
9	NDS-9	Sirauli, Barabanki	2.08
10	NDS-10	Rudaine, Bahraich	2.05
SEm±			0.059
CD at 5%			0.176

Table: Crude Fibre Content (%) in different germplasm of sawan millet

S. No.	Name of germplasm	Place of Collection	Crude Fibre Content (%)
1	NDS-1	Mustafabad, Bahraich	6.76
2	NDS-2	Nasirganj, Bahraich	6.81
3	NDS-3	Bibipur, Bahraich	6.22
4	NDS-4	Para, Bahraich	6.48
5	NDS-5	Jhukiya, Bahraich	6.74
6	NDS-6	Puraina, Bahraich	6.62
7	NDS-7	Shahpur, Gonda	6.80

8	NDS-8	Ashokpur, Barabanki	6.46
9	NDS-9	Sirauli, Barabanki	6.90
10	NDS-10	Rudaine, Bahraich	5.96
SEm±			0.183
CD at 5%			0.554

Table: Methionine Content mg/g protien of sawan millet germplasm

S. No.	Name of germplasm	Place of Collection	Methionine Content (mg/g Protien)
1	NDS-1	Mustafabad, Bahraich	107.33
2	NDS-2	Nasirganj, Bahraich	99.33
3	NDS-3	Bibipur Bahraich	105.66
4	NDS-4	Para, Bahraich	103.33
5	NDS-5	Jhukiya, Bahraich	97.66
6	NDS-6	Puraina, Bahraich	96.66
7	NDS-7	Shahpur Gonda	99.66
8	NDS-8	Ashokpur, Barabanki	101.00
9	NDS-9	Sirauli, Barabanki	95.00
10	NDS-10	Rudain , Bahraich	102.00
SEm±			4.166
CD at 5%			12.380

Table:Tryptiphan Content mg/g protien of sawan millet in different germplasm

S. No.	Name of germplasm	Place of Collection	Tryptophan Content mg/g Protien
1	NDS-1	Mustafabad, Bahraich	38.00
2	NDS-2	Nasirganj, Bahraich	39.33
3	NDS-3	Bibipur, Bahraich	37.00
4	NDS-4	Para, Bahraich	38.66
5	NDS-5	Jhukiya, Bahraich	37.00
6	NDS-6	Puraina, Bahraich	36.66
7	NDS-7	Shahpur, Gonda	37.00
8	NDS-8	Ashokpur, Barabanki	39.00
9	NDS-9	Sirauli, Barabanki	39.33
10	NDS-10	Rudaine, Bahraich	37.00

SEm±	1.325
CD at 5%	3.938

Table:Phytic acid mg/100g content of sawan millet germplasm

S. No.	Name of germplasm	Place of Collection	Fatty acid content mg/100g
1	NDS-1	Mustafabad, Bahraich	96.33
2	NDS-2	Nasirganj, Bahraich	85.33
3	NDS-3	Bibipur, Bahraich	91.68
4	NDS-4	Para, Bahraich	97.61
5	NDS-5	Jhukiya, Bahraich	89.45
6	NDS-6	Puraina, Bahraich	91.87
7	NDS-7	Shahpur, Gonda	97.43
8	NDS-8	Ashokpur, Barabanki	95.73
9	NDS-9	Sirauli, Barabanki	90.51
10	NDS-10	Rudaine, Bahraich	97.07
SEm±			2.490
CD at 5%			7.401

Table: Tannin cotentmg/100g sawan millet germplasm

S. No.	Name of germplasm	Place of Collection	Tannin content mg/100g
1	NDS-1	Mustafabad, Bahraich	70.53
2	NDS-2	Nasirganj, Bahraich	62.83
3	NDS-3	Bibipur, Bahraich	65.18
4	NDS-4	Para, Bahraich	65.38
5	NDS-5	Jhukiya, Bahraich	62.03
6	NDS-6	Puraina, Bahraich	59.85
7	NDS-7	Shahpur, Gonda	68.50
8	NDS-8	Ashokpur, Barabanki	63.43
9	NDS-9	Sirauli, Barabanki	62.46
10	NDS-10	Rudaine, Bahraich	64.07
SEm±			1.955
CD at 5%			5.811

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