Plant Archives Vol. 18 No. 1, 2018 pp. 247-250 *ISSN 0972-5210*

EVALUTION OF NUTRITIONAL VALUE AND ANTI NUTRITIONAL FACTORS OF KODO MILLET *(PASPALUM SCROBICULATUM* L.*).* GERMPLASM GROWN IN EASTERN (U.P.)

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Abstract

The persent study was conducted to evalutate ten advanced germplasm of Kodo millet for nutritional and anti nutritional factors during *kharif* season 2014-15 at the students Student's Instructional Farm of Narendra Deva University Agriculture and Technology, Kumarganj Faizabad (U.P.) India. A significant variation was detected for all traits suggested that there was considerable variability among germplasm. The protein content was recorded in the range of 8.56 to 9.44 per cent Maximum protein content was recorded in the germplasm K-6 (9.44%) followed by K-10 (8.90%) The total free Amino Acid content was recorded in the range of 62.01 to 72.62 mg/100g. Maximum total free amino acid content was recorded in the germplasm K-6 (72.62 mg/100g) and total mineral was recorded in germplasm K-10 (3.31%). Curde fiber content was recorded in germplasm K-8(8.73%) and total carbohydrate content was found between ranged 63.25 to 65.28% and maximum carbohydrate found in germplasm K-5 (65.28%). Total sugar content was found in the range of 2.41 to 3.92%. Maximum total sugar was found in the germplasm K-4 (3.92%). The anti nutritional content such as tannin was found in the range of 106.38 to 124.75 (mg/100g). Phytic acid 126.38 to 136.58 (mg/100g) and total phenol 18.83 to 21.83 (mg/100g). On the basis of overall germplasm were found superior K-4, K-5, K-6, K-8, K-9 and K-10 and utilized in further research work.

Key words: Cooking attributes, kodo millet.

Introduction

Kodo millet, one of the ancient grain of the world, originated from Africa and domesticated in India few thousand years ago is a drought resistant plant. This millet crop is grown in arid and semi-arid regions of African and Asian countries. In India, kodo millet is grown mostly in the deccan region and the cultivation extends to the foothills of Himalayas.

Kodo millet (*Paspalum scrobiculatum* L.), is an indigenous cereal of India and widely distributed in damp habitats across the tropics and subtropics of the World. It occupies an area of 9.08 lakh ha with an annual production of 3.11 lakh tonnes and average productivity of 342 kg/ha (Ahmad and Yadav. 1996). Kodo millet is propagated from seed, ideally in row planting instead of broadcast sowing and its preferred soil type is a very fertile, clay based soil (Agricultural service in, 2013). The kodo millet is prone to lodging at maturity, causing loss of grain (Dewet *et al.* 1983).

The Kodo millet is mainly grown in Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Bihar, Gujarat, Uttar Pradesh, Maharashtra and Orissa. It is cultivated in U.P. mostly in Gorakhpur, Basti, Gonda, Deoria, Mirzapur and Sitapur districts. These millets are grown during *Kharif* (rainy season) and sown with the onset of the southwest monsoon. The Kodo grains are recommended as a substituted for rice to the patients suffering from diabetes.

Kodo millet contains 66.6 g of carbohydrates and 353 kcal energy per 100 g of grain, comparable to other millets. It also contains 3.6 g of fat per 100 g. It provides minimal amounts of iron, at 0.5mg/100 mg, and calcium, 27mg/100 mg. Kodo millet also contain high amounts of polyphenols, an antioxidant compound. (Hedge and Chandra, 2005). Kodo and little millets can be used for preparation of malted and alcoholic beverage production. (Nikita Sethi 2016).

Kodo millet is very easy to digest, it contains a high amount of lecithin and is excellent for strengthening the

nervous system. Kodo millets is rich in B complex vitamins, especially niacin, B_6 and folic acid, as well as the minerals such as calcium, iron, potassium, magnesium and zinc. kodo millet contain no gluten and is good for people who are gluten intolerant. Regular consumption of kodo millet is very beneficial for postmenopausal women suffering from signs of cardiovascular disease, like high blood pressure and high cholesterol level.

Anti-nutritional factors are mainly organic compounds which when present in a diet, may affect the health of the animal or interfere with normal feed utilization. They occur as natural constituents of plant and animal feeds, as artificial factors, added during processing or as contaminants of the ecosystem. These factors interfering with the digestion, utilization and availability of minerals dietary proteins and carbohydrates, they are tannins, trypsin or protease inhibitors, saponins and haemagglutinin, phytates or phytic acid, oxalates or oxalic, glucosinolates and gossypol. This biological active factor reduce the availability of nutrients of seeds. Thus it is necessary to determine the toxicity of the seeds sample included in the dietary system. Keeping in view of above facts the present research work was conducted on evaluation of nutritional and anti nutritional parameters of kodo millets.

Materials and methods

The present research work was carried out during *kharif* sesasn 2014-15. Ten germplasm of Kodo millet namely K -1, K -2, K -3, K -4, K-5, K -6, K-7, K-8, K-9, and K-10 were collected from different parts of eastern Uttar Pradesh and used as experimental materials in the field trail. After harvesting the seeds were collect separating in gunny bags. The physical parameter namely plant hight, penical length, yield, test weight and colours was recorded above germplasm and stored in decicator for further biochemical analysis. Protein content were determined by lowrys method (1951) in kodo millet germplasm .The crude fiber content in kodo millet was analyzed by the method as described by Hart and Fisher (1971). And the total mineral content was estimated by the methods as described by Hart and Fisher (1971). Total free amino acid content was determined by using method given by Jayraman (1981). Total carbohydrate in kodo millet sample was analysed by method of Yemm and Willis (1954). Total sugar was determined by the method of Dubois *et al.*, (1956). The tannin content in kodo millet was determined by method given by Ranganna (1986) and Phytic acid content in the kodo millet has been analyzed by the method of Wheeler and Ferrel (1971). Total phenol content was analyzed by method as described by Swain and Hillis, (1984) Phenol reduces phosphotungstate molybdic acid under alkaline condition to produce blue colour complex which is measured calorimetrically in present research work.

Results and discussion

The plant height of various germplasm was observed between of 60.66 to 90.52 cm. seeds colour of kodo millet was found as dark brown colour seeds germplasm, K-1, K-2, K-6, K-9 while K-3, K-4, K-7 were brown K-8, K-10 were light brown and KK–1 was Dark Olive brown colour seeds. The test weight in various germplasm

Table 1: Variation of physiological and yield related traits in kodo millet seeds.

S. No.	Name of germplasm	Place of collection	Plant hight (cm)	Panice Length (cm)	Yied (q/h)	Yield per plant (g)	Strw yield (kg)	100 –Seed weight (g)	Colour of seeds
1.	K-1	Kadipur, Sultanpur	56.49	4.17	13.94	2.20	1.73	4.97	Dark brown
2.	K-2	Shyam Nagar, Ambedkar Nagar	54.87	4.37	14.63	2.10	1.64	5.02	Dark brown
3.	K-3	Sitapur	56.54	5.50	13.94	2.75	1.45	4.83	Brown
4.	K-4	Sultanpur	60.04	4.67	14.67	2.40	1.90	4.93	Brown
5.	K-5	Akbarpur	60.15	5.17	14.37	2.48	1.53	5.37	Light brown
6.	K-6	Nandani Nagar, Gonda	60.13	4.07	14.47	2.40	1.37	4.20	Dark brown
7.	K-7	Barawa, Ambedkar Nagar	57.57	4.90	14.17	2.80	1.73	4.80	Brown
8.	K-8	Haliyapur, Sultanpur	57.93	4.73	14.54	2.40	2.15	5.00	Light brown
9.	K-9	Kadipur	58.97	5.07	14.97	2.48	1.83	4.50	Dark brown
10.	K-10	Balar Mau, Faizabad	62.04	5.01	14.63	2.67	1.73	3.39	Light brown
11.	KK-1	Popular variety	59.21	4.87	14.28	2.42	1.68	4.21	Light brown
SE.m±			2.42	0.57	0.59	0.23	0.30	0.57	Light brown
Cd at 5 %			3.42	1.70	1.77	0.70	0.91	1.718	

Table 2: Biochemical traits in Kodo millet seeds.

S.No.	Name of germplasm	Protein content %	Crude fiber content %	Total mineral content %	Total free amino acid	Carbohydrate content (%)	Total sugar (%)
1.	K-1	8.56	8.47	3.19	62.12	64.89	3.36
2.	K-2	8.61	7.63	3.12	62.47	63.80	3.06
3.	K-3	8.58	7.80	3.22	62.16	64.87	3.92
4.	K-4	8.89	7.50	2.92	66.91	64.24	3.13
5.	K-5	8.56	8.60	3.26	62.01	65.28	3.03
6.	K-6	9.44	7.83	3.08	72.62	63.35	3.77
7.	K-7	8.67	8.50	3.24	62.50	63.25	3.78
8.	K-8	8.69	8.73	2.98	63.02	64.96	3.05
9.	K-9	8.86	8.77	3.21	66.88	63.68	3.69
10.	K-10	8.90	7.83	3.31	72.30	62.99	2.41
11.	KK1	8.86	7.40	3.02	67.07	62.83	0.98
SEm±		0.58	0.05	0.03	0.02	1.68	2.34
CD at 5% level		1.70	0.15	0.09	0.07	4.95	3.36

Table 3: Anti nutritional factors (mg/100g) in kodo millet seeds.

S. No.	Name of Germplasm	Tannin content (mg/100g)	Phytic acid (mg/100g)	Total phenol (mg/100g)
1	K-1	124.75	136.58	22.17
2	K-2	123.45	133.30	21.50
3	K-3	124.48	134.27	21.83
4	K-4	117.32	128.20	19.83
5	K-5	122.28	131.53	21.33
6	K-6	109.85	126.91	18.83
7	K-7	121.42	129.97	20.50
8	K-8	121.26	130.17	21.17
9	K-9	120.20	128.63	20.33
10	K-10	114.15	127.90	19.50
11	KK1	106.38	126.38	21.33
SEm±		0.35	0.32	0.11
CD at 5% level		1.04	0.95	0.36

was found in the range of 3.39 to 5.19 g seed. Singh and Maurya (2013) evaluated the response of kodo millet *(paspalum scrobiculatum*) to varying levels of nitrogen under rainfed condition. Shirshat *et al*., (2009) observed physico properties of kodo millet and reported test weight between 5.55-7.32g in variation Kodo germplasm. The yield/ear of kodo millet germplasm was found in the range of 12.24 to 15.82 q/h. protein content in various germplasm was obtained between 8.56 to 9.44 (%). The Crude fiber content in various kodo millet germplasm was ranged from 7.50 to 8.77 per cent. Bisoi *et al.*, (2012) also studied in several genotypes of kodo millet revealed total mineral content ranging between 3.50 to 3.59per cent Variation in biochemical characteristics of kodo millet reported total mineral content was 2.57g by Roopa *et al.,* (2013). Total free amino acid in various germplasm was obtained between 62.01 to 72.62mg /100g. The protein content was maximum in proso millet (12.86 g/ 100g) and soybean (42.72 g/100g) followed by pearl millet, kodo millet, little millet and horse gram.by S. Kanchna *et al.* (2015). The Carbohydrate content in various germplasm was obtained between 63.25 to 65.28 (%). Total sugar content in various kodo millet germplasm was observed from 2.41 to 3.92 per cent. Ajay Banik *et al.* (2016) reported that processing and value addition of the underutilized agriculture crops and indigenous fruits of Bastar. The Phytic acid content in various germplasm was obtained between 126.38 to 136.58 mg/100g. The phytic acid content was observed significantly higher in local genotypes (74.20-115.13mg/100g) than improve variety (61.87-94.36mg/100g) as observed by Roopa *et al.,* (2013). The Tannin content in various germplasm was obtained between 106.38 to 124.75 mg/100g. Tannin content was recorded in little millet as 92.23 and 86.07mg/ 100g in local and improves genotype as observed by Roopa *et al*., (2013). The difference was not significant statistically. Hefnawy (2011) reported reduction in tanin content while cooking in the lentil. The Total phenol content in various germplasm was obtained between 18.83 to 121.83 mg/100g. Pragyani bora (2013) investigated that the nutrient quality of different millet types in their whole and decorticated forms. The documentation on the nutrient composition of millets suggested that they are rich in unsaturated fatty acids, phenolic acids and insoluble dietary fibre.

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