Plant Archives Vol. 18 No.1, 2018 pp. 144-146 *ISSN 0972-5210*

STUDIES ON PHYSICALAND BIOCHEMICAL CHARACTERISTICS OF KODO MILLET GERMPLASM [*PASPALUM SCROBICULATUM* L.]

Radhey Shyam[1] and R.P. Singh[2]

[1&2]Department of Biochemistry, N.D. University of Agriculture & Technology, Kumarganj, Faizabad-224 229 (U.P.) India

Abstract

Millets are one of the oldest foods known to humans and cultivated since time immemorial. Kodo millet [*Paspalum Scrobiculatum* L.] is nutritious, healthy and versatile and hence would be a worthy addition to one's diet. Significant differences in nutrient composition and physico-chemical characteristics were observed of kodo millet. Moisture content of kodo millet seed was observed on the range 7.25 to 10.03 percent. Diameter of seed (1.71-1.97mm). kodo millet exhibited excellent cooking attributes The cooking time ranged from 9.61 -12 .21 minutes. Amino acids namely methionine was recorded (72.79 to 94.34 mg/g), Trypto Phane found in range (25.55 to 33.27 mg/g) and lysine was recorded (135.17 to 179.17 mg/g). The reducing sugar was found in the range (1.27 to 1.72 %) and non reducing sugar was recorded between (1.02 to 2.65 %). Followed by germplasm K-7 (2.21 %). On the basis of overall germplasm were found superior K-2, K-6, K-8, K-9 and k-10 and utilized in further research work.

Key words: Cooking attributes, kodo millet

Introduction

Kodo millet (*Paspalum Scrobiculatum L.*) is a group of grassy plant with short slender culm and small grains possessing remarkable ability to survive under severe drought. Kodo millet is multipurpose crop which is cultivated for food and fodder it can be cultivated in all types of soil and sustains adverse climatic condition. It is fast growing millet, occasionally producing ripe grains in 40 days after seedling (Nagar and Sharma 2005). Nutritionally kodo 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 kodo millet a nature's' gift for the modern mankind who is engaged in sedentary activities. Moisture content determines the shelf life and milling characteristics of the grains it is interesting to note that kodo millet exhibited lower moisture content than other minor millets such as Proso, Little, Foxtail and Kodo millet with values ranging from 10.60 to 15.00 percent (Kulkarni and Naik 1999)

The Kodo millet is mainly grown in india, Pakistan, philipinse, indonacia weaitname, Thailand west affrica. It is measurd food source in the decame flatau of india. Kodo millet is nutrouse grown and good substituted in rice or weight the nutricutical composition. mainely protein fiber and mineral content are much hair the maijor cerial in rice. The kodo millet grain composed on 8 per cent protein the maijor protein fraction in kodo millet in glutein it is an excellent source of fiber 9 per cent as compare to rice (0.2%) and wheight (1.2%).

The nutritive value of millet is comparable to other staple cereals like wheat and rice; some of them are even better with regard to average protein, fat and mineral contents (Gopalan *et al.* 2007). Minor millets have also excellent nutritional value in view of their good protein content and better amino acid profile. Their starch composition and low glycemic index (which make them ideal for diabetic patients) are also accompanied by gluten free status of the flour, thus making them very suitable for the preparation of weaning products.

Millet is the richest source of Ca among cereals (340 mg/l00g) of which only 162 mg/l00 g is bioavailable in the raw grain. Processing improved its bioavailability up to 227 mg/l00 g. Iron availability improved from 0.34 to 1.4 mg/l00g due to processing Total free amino acids

increased rapidly by about 45 fold during germination and doubled at 18 h fermentation, reaching a maximum at 36 h, of fermentation. The increase in free amino acid content is favourable as the protein quality of food depends not only on its amino acid composition but also on the availability of these amino acids (Hamand and Fields, 1979). Total phenols decreased on germination from 1.43 to 1.28 g/100 g and increased on fermentation to1.86g/100g (Sripriya, *et al.* 1997).

.Kodo millet flour has gelatinization temperature range of 13^0C (76.6 to 90^0C) which has less regestant gelatinization and can been corporate backing of bread and cackes , gravey, shoop.

Materials and methods

The investigations were carried out during *Kharif* season 2014-15. Details of the materials are used and the techniques employed in the present investigation are summarized as under.

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 place 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 moisture of seeds, diameter of seeds and coocking time was recorded above germplasm. and stored in decicator for further biochemical analysis. The methionine content in biological sample was analyzed by method of Horn *et al.* (1946). Tryptophan content was estimated by the method given by Spies and Chamber (1949) and Lysine content was estimated by the method of Felker *et al.* (1978). Reducing sugar content in sawan millet was determined by the method of Miller (1959). Non reducing sugar content was calculated by substracting reduce sugar from total sugar. Non Reducing sugar = Total sugar - Reducing sugar×0.95.

Results and discussion

Moisture content of seed is an important parameter for determining the shelf life of kodo millet germplasm was observed on the range 7.25 to 10.03 percent. Maximum moisture content was recorded in germplasm K-9 (10.03) and K-10 (9.60). Lowest moisture content was observed in germplasm K-1 (8.05) and K-2 (7.25). All the germplasm of Kodo millet were significant. Lohany and pandey (2007) studied the effect of the degree of police on milling characteristics of sawan millet, Diameter of seed (1.71- 1.97 mm) highest in K-5 (1.97 mm) and K-1 (1.95mm) lowest diameter is observed in K-3 and K-2 (1.71 mm, 1.73 mm). All the germplasm of kodo millet were significant regarding diameter of seed. This result is supported by Vijeta Joshi (2013) length from 4.07-5.78 cm. Mehta *et al.* (2007) Cooking quality being an important determinant of utilization of any food, it was observed that barnyard millet exhibited excellent cooking attributes. The cooking time ranged from 9.61-12.21 minutes Lowest cooking time observed in K-1 (9.61min) and K-4 (9.36 min). This is comparable to those reported for proso millet *viz*., 8 to 15 minutes (Malagi *et al.,* 1997). The Methionine content in various Kodo millet germplasm was ranged from 72.79 to 94.34 mg/g protein.

Physico-chemical and biochemical charactistics of kodo millet germplasm.

S. No.	Name of germplasm	Place of collection	Moisture content in seed (%)	Diameter of seeds (mm)	Cooking time (min)	Methionin (m/g) protein	Tryptophan (mg/g) protein	Lysin (mg/g) protein	Redusig sugar (%)	Non reducing sugar (%)
1.	K-1	Kadipur, Sultanpur	8.05	1.95	9.61	74.72	27.33	135.17	1.33	1.98
2.	K-2	Shyam Nagar, Ambedkar Nagar	7.25	1.71	10.51	76.67	27.93	156.67	1.28	2.08
3.	K-3	Sitapur	8.34	1.73	11.02	75.73	28.52	141.67	1.50	1.56
4.	K-4	Sultanpur	8.87	1.84	9.36	85.75	30.96	177.87	1.27	2.65
5.	K-5	Akbarpur	9.41	1.97	10.96	72.79	25.55	155.83	1.56	1.57
6.	K-6	Nandani Nagar, Gonda	9.12	2.14	11.43	94.34	33.27	179.17	1.44	1.59
7.	K-7	Barawa, Ambedkar Nagar	8.59	1.74	11.27	79.06	28.52	158.33	1.56	2.21
8.	K-8	Haliyapur,Sultanpur	8.30	1.87	12.21	84.24	28.58	178.27	1.72	2.05
9.	K-9	Kadipur	10.03	1.89	10.03	84.36	30.90	165.83	1.44	1.61
10.	K-10	Balar Mau, Faizabad	9.60	1.86	9.87	93.21	31.09	177.50	1.55	2.14
11.	KK-1	Popular variety	9.27	1.90	9.69	84.13	28.52	176.57	1.39	1.02
SEm±			0.32	0.19	0.61	0.03	0.02	0.05	0.14	0.67
CD or LSD			0.95	0.55	1.81	0.08	0.07	0.14	0.42	1.96

highest methionine content was recorded in the germplasm K-6 (94.34mg/g protein) followed by K-10 (93.21 mg/g protein) K-4 (85.75mg/g protein) and K-9 (84.36 mg/g protein) while lowest methionine content was noticed in the germplasm K-5 (72.79 mg/g protein). The content of methionine in deferent germplasm of minor millet was studied by issoufou *et al.* (2013). Tryptophan content in various germplasm was obtained between 25.55 to 33.27 mg/g protein. Maximum tryptophan content was recorded in the K-6 germplasm (33.27 mg/g protein) followed by K-10 (31.09 mg/g protein) and K-4 (30.96 mg/g protein) and minimum tryptophan content was noticed in the germplasm K-5 (25.55 mg/g protein). Typical millet protein contains high quantity of essential amino acids especially the tryptophan in similer germplasm of millet found 21.15 mg/100g reported by Girish chandel *et al.* (2014). And issoufou (2013) and The Lysine content in various germplasm was obtained between 135.17 to 179.17 mg /g protein. Maximum lysine content was recorded in the germplasm K-6 (179.17mg/ g protein) followed by K-8 (178.27 mg/g protein) and K-4 (177.87 mg/g protein) and minimum lysine content was noticed in the germplasm KK-1 (135.17 mg/g protein). The content of lysine in deferent germplasm of minor millet was studied by issoufou *et al.* (2013). And chandel *et al.* (2014). Reducing sugar content in various kodo millet germplasm was observed from 1.27 to 1.72 per cent. highest Reducing sugar content was recorded in the germplasm K-8 (1.72 %) followed by K-5 (1.56 %) and K-10 (1.55 %) while lowest Reducing sugar content was noticed in the germplasm K-2 (1.28 %). And Non Reducing sugar content in various kodo millet germplasm was observed from 1.02 to 2.65 per cent. highest non reducing sugar content was recorded in the germplasm K-4 (2.65 %) followed by K-7 (2.21 %) and K-10 (2.10 %) while lowest Non Reducing sugar content was noticed in the germplasm K-1 (1.02 %). Rao *et al.* (2011) and Gupta *et al.* (2014) repoted 5.3 g/100g. similer germplsm observe by thilgavathi *et al.* (2015).

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