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Evaluation of Elite Sorghum [*Sorghum bicolor* (L.) Moench] Germplasm Lines for Morphological Traits

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A B S T R A C T

This study was performed at Instructional dairy farm, Govind Ballabh Pant University of agriculture and technology during *Kharif* season, 2017 to evaluate and characterize 96 sorghum accessions for various morphological and fodder yield parameters. Highest Shannon index was recorded for races (1.47) followed by glume color (1.33), ear head compactness (1.176) and glume covering (1.117) revealed the greater variability for these qualitative traits. The results of this study indicate that significant genetic diversity exists among the sorghum accessions.

Introduction

Sorghum [*Sorghum bicolor* (L.) Moench] also known as Jowar has originated in Africa about 5000 – 8000 years ago (De Candolle 1890). Sorghum is the fifth most important cereal crop providing food and fodder throughout the world (Doggett 1988). It is adapted to a wider range of stress conditions like salt and drought and known as a high-energy, drought tolerant crop because of its efficiency. It is planted in those areas which are considered to be hot and too dry for other cereals, because of its tolerance to heat and drought stress (Poehlman, 1987). Sorghum in general possesses a wide range of genetic variability. Adequate variability provides options from which selections are made for improvement and possible hybridization.

Introgression of new genetic diversity through hybridization with selected germplasm is one way to increase genetic variation in breeding populations, the base upon which gain from selection depends (Guedira *et al.*, 2000).

This study was conducted to classify the germplasm on the basis of frequency of visual characters. Different characters have different states of expression.

Materials and Methods

The present study was conducted at the Instructional Dairy Farm of the Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India during *Kharif* 2017. 96 germplasm accessions were used for the study and planted in an Augmented Block Design. Each genotype were sown in two rows of 3 metre length with a row spacing of 45cm. Recommended package of practices were followed to grow the normal healthy crop. An average rainfall of 948.6mm is experienced annually. Data was recorded on different types of morphological traits of 96 germplasm lines.

Results and Discussion

An evaluation was done to classify the sorghum germplasm on the basis of morphological traits into different categories. Sorghum has a wide range of variability, it has five different races viz., bicolor, kafir, durra, caudatum and guinea. Morphological characters have different states of expression and the number of plants coming under the different categories is calculated in this study. Frequency percentage and Shannon index is calculated. Higher value of Shannon index reveals greater variability in these qualitative traits. The observations are presented in the Table 1.

Table.1 Classification of Sorghum germplasm on the basis of frequency of visual characteristics

S. No.	Characteristics	States of expression	No. of genotypes	Frequency %	Shannon index
1	Leaf pigmentation	Tan Non tan	57 39	59.3 40.6	0.675
2	Leaf colour	Light green Medium green Dark green	16 48 42	16.66 39.5 43.7	1.027
3	Mid rib colour	White Green	40 56	41.66 58.33	0.679
4	Ear head shape	Pyramidal Symmetric Panicle broader in upper part Panicle broader in lower part	30 55 3 8	31.25 57.29 3.12 8.33	0.997
5	Ear head compactness	Loose Semi loose Semi compact Compact	28 4 20 44	29.16 4.16 20.83 45.83	1.176
6	Glume colour	Grayed yellow Grayed orange Grayed red Grayed purple	16 36 26 18	16.66 37.5 27.08 18.75	1.334
7	Glume covering	Short(50% of grain covered) Medium (75% of the grain covered) Long (100% of the grain covered) Very long (longer than the grain)	5 25 52 14	5.20 26.04 54.16 14.58	1.117
8	Presence of awns	Present	27	28.12	0.594

		Absent	69	71.87	
9	Seed colour	Grayed yellow Grayed orange Grayed purple	36 37 23	37.5 38.54 23.95	1.077
10	Seed lusture	Lustrous Non lustrous	50 46	52.08 47.91	0.692
11	Race	Bicolor Caudatum Guinea Kafir Durra	13 39 20 14 10	13.54 40.62 20.83 14.58 10.41	1.479

Highest Shannon index was recorded for races (1.47) followed by glume color (1.33), ear head compactness (1.176) and glume covering (1.117). A diversity index is a quantitative measure that reflects how many different types there are in a dataset. It is most often calculated as follows:

$H' = -\sum_{i=1}^{R} Pi\ In\ Pi$

In ecology, p_i is often the proportion of individuals belonging to the *i*th species in the dataset of interest.

Dong *et al.*, 2001, Tatineni *et al.*, 1996, Ghafoor *et al.*, 2002 and Malik *et al.*, 2011 also observed wide range of variability for morphological characters.

Conflict of interest

The authors declare that they have no conflict of interest.

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