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COMPONENTS OF GREEN FODDER YIELD IN *PANICUM MAXIMUM* J.

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ABSTRACT

A total of 111 germplasm lines of *Panicum maximum* were evaluated for yield and its attributes. ANOVA revealed significant differenes for plant height, stem diameter, leaf length and leaf width, leafsheath length, panicle length and green fodder yield. Crude protein percent ranged from 4.63 to 8.25%. All the characters under study showed high degree of interrelationships with yield except panicle length and leafsheath length. Based on the high heritability value, high genetic coefficient of variation, moderately expected genetic advance, leaf length seemed to be a good selection criterion.

Key words : Guinea grass, correlation

Various *Panicum* species viz. blue panic (*P. antidotale* Retz), coloured guinea (*P. coloratum* Linn.) and guinea grass (*Panicum maximum* Jacq.) are important forage grasses adapted to a wide range of soils and climate [1, 2].

P. maximum is commonly grown in countries in Latin America, East Africa and Japan [3]. Initially *P. maximum* var. Makuni was introduced in India in the last decade of 18th century from Australia and is still grown in large area but subsequently a number of other varieties such as Hamil, Riversdale and Gatton panic came into cultivation. The crop is noted for good protein content (4-15%) [4], *in-vitro* dry matter digestibility (41-72%) [5] and high yield (62.2 q/ha dry matter) [6].

The crop is primarily apomictic but sexual plants are also reported [3, 7, 8]. Breeding superior varieties of guinea grass has its own limitation because of its apomictic-tetraploid nature. Occurrence of sexual lines of the grass has also been reported from India but identification of such lines is a difficult task. However, in nature, it can be presumed that some natural crossing might have occurred between sexual and apomictic plants which could have resulted in a large number of transgressive segregants. Hence, with this presumption in mind it was planned to

collect the germplasm from those areas wherein the crop was introduced long back and evaluate them at one place so as to understand the available natural variability.

MATERIALS AND METHODS

The collections of *P. maximum* germplasm were made in Bangalore, Dharwad, Gangtok, Imphal and Agartala from natural grasslands, road sides and forest areas. A total of 111 germplasm lines were grown in two replications of single row of eight tussocks at a distance of 1m between rows and 75 cm between tussocks. Observations were recorded for plant height (cm), stem diameter (mm), leaf length (cm), leaf sheath length (cm), leaf width (cm), panicle length (cm) and fresh weight of eight tussocks (kg). Correlation analysis carried out following standard statistical procedure.

RESULTS AND DISCUSSION

Analysis of variance revealed significant differences for all the characters under study. The range of variation was quite high for all the characters (Table 1). Highest genotypic coefficient of variation was recorded for green fodder yield (36.63%) followed by stem diameter (28.16%). Substantial variation for crude protein percent

Table 1. Range, mean, genotypic coefficients of variations, heritability and expected genetic advance in guinea grass.

Character	General mean	Range	GCV %	h^2_b	GA
Plant height (cm)	169.40	99.3-230.0	13.14	52.7	33.31
Stem diameter (mm)	5.70	2.1-11.5	28.16	62.6	2.62
Leaf length (cm)	45.60	16.4-75.7	25.53	77.3	21.08
Leaf sheath length (cm)	16.29	10.7-22.7	9.64	51.0	2.31
Leaf width (cm)	1.76	0.9-2.6	18.25	70.8	0.56
Panicle length (cm)	37.60	20.9-53.5	14.32	50.1	7.86
Green fodder yield (kg) (8 tussocks)	3.63	0.85-8.59	36.63	36.2	1.65
Crude protein[1] percent	6.76	4.63-8.25	16.42	-	-

1.data recorded for 50 germplasm lines only

was also noticed (cV = 16.42%). In general, the lines with soft hairy leaves and hairy lemma were better for crude protein percent (7.5%). The lines resembling earlier varieties Hamil and Makuni were poor in quality (5.88%). These lines seem to possess less protein as compared to a range of 13.9 to 17.2% reported from Germany [9].

The correlation analysis established significant positive phenotypic associations (Table 2) of all the characters with green fodder yield except panicle length. However, a very strong positive phenotypic correlation of plant height, leaf length, stem diameter and leaf width with green fodder yield was noticed (Table 2). Although leaf sheath length and panicle length showed significant positive correlation with all other characters, it was not correlated with green fodder yield. The two characters leaf length and leaf width showed high broad sense heritability (h_b^2) i.e. 77.3% and 70.8% respectively. Leaf length also showed a moderately high expected genetic advance indicating it as the best selection criterion.

Table 2. Phenotypic coefficients of correlation in guinea grass

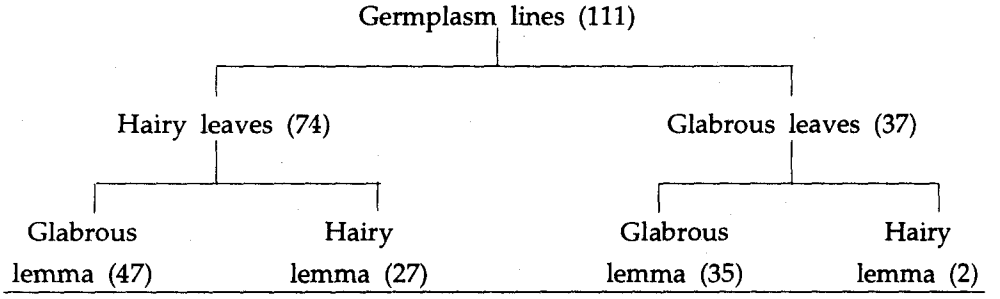
	Character	2	3	4	5	6	7
1.	Plant height	0.522**	0.589**	0.353**	0.529**	0.481**	0.276**
2.	Stem diameter		0.765**	0.537**	0.677**	0.465**	0.221*
3.	Leaf length			0.674**	0.706**	0.535**	0.255**
4.	Leaf sheath length				0.497**	0.425**	0.167**
5.	Leaf width					0.393**	0.264**
6.	Panicle length						0.124
7.	Green fodder yield						1.000

*P = < 0.05 **P = < 0.01

Leaf characters are mostly indicative of the quality and favorable leaf stem ratio is considered as desirable trait for obtaining high crude protein yield. The earlier reports [10] also confirm the association of leafiness with forage quality.

The whole set of germplasm contained, presumably, some original lines, since some lines possessed hairy and soft leaves with hairy lemma, the other category possessed glabrous leaves and lemma. The occurrence of some intermediate type of lines i.e. soft hairy leaves with glabrous lemma and glabrous leaves with hairy lemma indicate the possibility of natural crossing.

Grouping of germplasm based on leaf and lemma hairyness



Values in parenthesis indicate number of germplasm lines

Such lines also showed intermediate values of the two parents for leaf length and width, plant height and crude protein percent indicating that these are the natural crosses. More over, the lines belonging to this intermediate group which showed higher value of plant height, leaf length and crude protein support the earlier report of possibility of fixing heterosis in these apomictic lines [11].

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