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GENETIC VARIABILITY FOR FODDER ATTRIBUTES IN GUINEA GRASS *Panicum maximum. Jacq.*

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ABSTRACT

Genotypic and phenotypic variance, co-efficient of variation, heritability and genetic advance were estimated in 51 genotypes of guinea grass on 10 different fodder attributes. The analysis of variance indicated significant variation among the genotypes for all characters except crude fibre content and leaf-stem ratio. The GCV and PCV were the maximum for leaf weight, number of tillers per plant, green fodder yield per plant, stem weight, number of leaves per plant and dry matter content. Heritability values were very high for eight of the characters. High heritability combined with high genetic advance as percentage of mean was observed for number of leaves per plant, stem weight, leaf weight, green fodder yield per plant and dry matter content.

KEY WORDS : Guinea grass, Genetic analysis, Heritability

Guinea grass is an important perennial fodder crop of the vast arid and semi arid regions of India and many of the African Countries. In India it is largely cultivated under irrigation in fairly rich soils and is popular with dairy farmers. It is also suitable for cultivation under shade in coconut gardens. Though it is extensively cultivated, only a very few varieties like Hamil, Makueni, Green panic, Riversdale etc have been recognised. However very little genetic information is available since awareness on the importance of green fodder in increasing milk production is only slowly catching up. Studies were taken up to analyse the extent of genetic variability present in the species and to estimate the heritability and genetic advance for different fodder attributes.

MATERIALS AND METHODS

Fifty one genotypes of guinea grass collected from different sources and maintained at the Department of Forage Crops, Tamil Nadu Agrl. University, Coimbatore were planted adopting a spacing of 50 cm x 30 cm in a randomised block design with three replications during kharif'96. Each genotype was planted with 15 plants in each row. Uniform cultural practices were followed. The first cut was taken on 80th day after planting and subsequent cuts at 45 days interval. Observations on 10 metric traits were recorded from five random plants in each genotype per replication at each harvest and the mean data were utilized for analysis of variance (Panse and Sukhatme 1961), and to estimate the genotypic and phenotypic variance (Johnson *et al.*, 1955), genotypic and phenotypic co-efficients of variation (Burton 1952), heritability in the broad sence (Robinson 1966) and Genetic Advance (Johnson *et al.*, 1955).

RESULTS AND DISCUSSION

The mean per se performance of the best 10 genotypes is given in Table 1. The analysis of variance indicated significant differences among the genotypes for all the characters except leaf-stem ratio and crude fibre content. The genotypic

Table 1. The mean per se performance of the best genotypes for ten different fodder attributes

Genotype	Plant height (cm)	No.of tillers per plant	No.of leaves per plant	Stem weight (g)	Leaf weight (g)	Leaf stem ratio	Green fodder yield per plant (g)	Dry matter content (%)	Crude protein content (%)	Crude fibre content (%)
Makueni	142.07	26.53	123.17	344.52	207.78	0.60	552.30	25.10	11.54	33.66
Green panic	201.53	25.80	131.77	335.13	205.60	0.61	540.73	24.28	10.83	30.33
Co-1	168.46	31.00	219.27	283.53	201.94	0.71	485.52	23.98	11.20	20.86
PGG.511	151.82	21.90	130.37	363.53	121.97	0.33	485.50	15.85	10.01	22.33
CP 59961	174.25	15.33	109.47	276.37	191.40	0.69	471.00	23.94	9.25	24.33
CP 59964	175.09	13.97	102.80	327.13	125.63	0.38	452.77	23.37	6.85	32.11
CP 59962	155.04	23.40	122.87	258.00	185.23	0.72	443.27	26.91	6.17	29.77
PCG 297	167.63	16.50	98.73	257.97	112.30	0.44	370.10	24.92	5.47	21.55
Dhan PM 281	145.87	25.40	126.27	258.00	102.97	0.40	360.87	24.53	6.12	23.78
CP 59926	159.67	14.07	100.40	223.21	122.13	0.54	344.90	19.33	7.46	30.11
SE	2.10	4.09	2.02	3.19	1.68	0.01	6.48	0.78	0.28	2.46
CD	4.17	8.12	4.01	6.33	3.33	0.02	12.86	1.55	0.56	4.53

and phenotypic variances and genotypic and phenotypic co-efficients of variation among the 51 genotypes for the 10 characters are presented in Table-2. The phenotypic and genotypic variances were the highest for green fodder yield per plant, followed by stem weight, number of leaves per plant and plant height. There was a close correspondence between the phenotypic and genotypic variances with only a minor difference between the two and this would indicate that there was little effect of the environment and most of these characters are stable.

The phenotypic (PCV) and genotypic (GCV) co-efficients of variation did not vary widely in all the 10 characters. The PCV and GCV estimates were

Table 2. Mean, variance, heritability (Broad sense) and genetic advance for different fodder attributes in guinea grass genotypes

Characters	Mean	Range	Variance		PCV %	GCV %	Herit ability	Genetic advance	Genetic advance as % of mean
			Pheno typic	Geno typic					
Plant height	159.95	135.18 - 201.53	725.83	719.22	9.77	9.64	97.3	31.32	19.58
No.of tillers per plant	25.25	13.00 - 49.37	328.22	303.11	42.99	38.12	78.6	17.58	69.62
No.of leaves per plant	134.57	84.43 - 286.50	5167.61	5161.48	30.86	30.80	99.6	85.24	63.34
Stem weight	193.09	102.12 - 363.53	11652.20	11636.89	32.30	32.33	99.6	127.96	66.26
Leaf weight	93.78	50.15 - 205.60	5058.87	5054.65	43.80	43.75	99.7	84.42	90.02
Green fodder yield per plant	285.75	152.33 - 540.73	29268.45	29205.45	34.60	34.49	99.4	202.38	70.82
Dry matter content	23.53	12.67 - 48.23	146.72	145.81	29.81	29.53	98.1	14.18	60.26
Crude protein content	7.48	5.09 - 11.54	9.21	9.09	23.58	23.12	96.1	3.49	46.65
Crude fibre content	28.66	20.66 - 37.55	119.80	88.90	24.61	15.27	38.5	5.62	19.52

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the maximum for leaf weight followed by number of tillers per plant, green fodder yield per plant, stem weight, number of leaves per plant and dry matter content. As such there is enough scope for improvement of these six characters through selection. The existence of such a high genetic variation in guinea grass especially for number of leaves. number of tillers and leaf wieght has been recently reported by Pinto *et al.*, (1994).

The estimates of heritability (broad sense), genetic advance (GA) and genetic advance as per cent of mean are also presented in Table-2. Heritability estimates are useful in selecting genotypes based on phenotypic performance. Eight of the characters under study including crude protein content had high heritability values. Heritability was moderate for number of tillers per plant and it was low for crude fibre content. The low variation between the values of genotypic and phenotypic variances for the above characters also reflects the high heritability of these characters. Genetic advance is a measure of genetic gain that can be expected in the process of selection. Genetic advance as percentage of mean was high for six characters ie., leaf weight, green fodder yield per plant, number of tillers per plant, stem weight, number of leaves per plant and dry matter content. High heritability combined with high genetic advance as per cent of mean observed for number of leaves per plant, stem weight, leaf weight, green fodder yield per plant and dry matter content suggest that these characters are under the control of additive type of gene action. High heritability with moderate genetic advance was obtained for leaf-stem ratio and crude protein content. High heritability with low genetic advance as per cent of mean was observed for plant height while crude fibre content showed low heritability value with low genetic advance as percentage of mean.

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