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Short Communication

Variability and Character Association in Buffel Grass

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Cenchrus ciliaris is a drought hardy and vigorously growing pasture species capable of producing good quality forage in arid and semi-arid areas of the country. In this obligate apomictic species, exhibiting enormous polymorphism, although breeding programme is feasible with sexual lines (Taliaferro and Bashaw, 1966), the improvement programme is mainly confined to the selection of promising types. Therefore, suitable selection criteria based on genetic parameters need to be identified. Information on the nature and range of variability and character inter-relationship in the germplasm of Anjan grass are meagre.

Twenty-two diverse genotypes of *C. ciliaris* were grown in randomized block design with three replications during *kharif* 1996 at the Central Research Farm, Central Arid Zone Research Institute, Jodhpur. Individual plot consisted of 2.65 m long 6 rows with inter and intra-row spacings of 45 cm and 50 cm, respectively. Observations were recorded on five randomly selected plants for days to flower initiation, days to 50% flowering, plant height (cm), tiller number per plant, leaves per culm, green fodder yield per plant (g) and dry matter yield per plant (g). The mean values were subjected to statistical analyses. The phenotypic and genotypic variances and genetic advance were calculated. Phenotypic and genotypic coefficients of variability (Burton, 1952), heritability in broad sense (Lush, 1940) and correlation and path analysis (Dewey and Lu, 1959) were analysed.

The analysis of variance revealed that the genotypes differed significantly for all the characters, thereby, indicating the presence of enormous variability. The range of the mean performance of the genotypes was wider for green fodder yield, dry matter yield, plant height and tiller number. Dry matter yield and green fodder yield showed higher values of genotypic and phenotypic coefficients of variation, while the values were moderate for tiller number and leaves per culm. Plant height, days to flower initiation and days to 50% flowering exhibited low values of genotypic and phenotypic coefficients of variation (Table 1).

The characters having high estimates of heritability and genetic advance are controlled by additive gene action. The values of genetic advance was high for dry matter yield, green fodder yield and moderate for tiller number and leaves per culm, while it was low for plant height, days to flower initiation and days to 50% flowering. Dry matter yield and green fodder yield exhibited high heritability and high genetic advance. These characters were, therefore, under the control of additive gene action

Table 1. Estimates of genetic variability, heritability and genetic advance in buffel grass

Characters	Range	Mean ± SEm	Genotypic coefficient of variation	Phenotypic coefficient of variation	Heritability (broad sense) (%)	Genetic advance as % of mean
Days to flower initiation	35.00-45.00	40.05±01.63	05.88	07.71	58.10	09.24
Days to 50% flowering	43.00-54.00	47.53±01.85	05.22	07.07	54.40	07.93
Plant height (cm)	57.53-84.40	69.55±06.65	08.44	14.43	34.20	10.17
Tillers/plant	18.67-34.53	26.23±03.56	15.14	22.48	45.40	21.01
Leaves/culm	03.87-05.93	04.82±0.42	12.38	16.38	57.10	19.29
Green fodder yield/plant (g)	43.33-126.67	71.53±10.59	31.85	36.65	75.50	57.01
Dry matter yield/plant (g)	15.10-53.10	25.25±04.43	33.46	39.77	70.80	65.84

and simple selection would be effective for their improvement, confirming the findings of Yadav *et al.* (1974). Tiller number and leaves per culm exhibited moderate heritability and moderate genetic advance, while days to flower initiation and days to 50% flowering exhibited moderate heritability and low genetic advance. This indicated that these traits are under the control of non-additive gene action. Improvement of such traits is possible through indirect selection methods. The genotypic correlation coefficients were higher for all the characters than their respective phenotypic correlation coefficients. Thus, inspite of significant genotypic correlation between character combinations, their phenotypic correlation coefficients decreased due to the environmental effects. At the genotypic level, the dry matter yield was significantly and positively associated with plant height, tillers per plant and green fodder yield. These results are in agreement with those of Thakral and Jatasra (1994) in *C. setigerus*. At the phenotypic level, the dry matter yield was significantly and positively associated with tillers per plant and green fodder yield. Yadav *et al.* (1974 and 1980) also reported similar findings. At genotypic level, days to 50% flowering was significantly and positively correlated with days to flower initiation, plant height and leaves per culm, and plant height was also significantly and positively correlated with tillers per plant, leaves per culm and green fodder yield. Tillers per plant and green fodder yield showed significant and positive correlation at both the levels. Plant height had highest positive and direct effect on dry matter yield followed by green fodder yield. The plant height was also positively associated with dry matter yield and governed by non-additive gene action, while dry matter yield was governed by additive gene action (Table 2). These characters exhibited high coheritability (112.5%). In this situation, improvement in dry matter yield is possible through simple selection for tallness. Even though tiller number had significant and positive correlation with dry matter yield, its direct effect towards dry matter yield was negative. The negative direct effect of tiller number on dry matter yield was nullified by its high positive indirect effects through plant height and green fodder yield. The indirect effect of

Table 2. Path analysis of the genotypic correlation between dry matter yield per plant and its contributing traits in buffel grass

Characters	Days to flower initiation	Day to 50% flowering	Plant height	Tillers/ plant	Leaves/ culm	Green fodder yield/ plant	Correlation coefficients with dry matter yield/plant
Days to flower initiation	*-0.446*	0.309	0.238	-0.006	-0.127	0.094	0.036
Days to 50% flowering	-0.405	*0.341*	0.769	-0.009	-0.651	0.187	0.232
Plant height	-0.118	0.290	*0.905*	-0.016	-0.687	0.418	0.792**
Tillers/plant	-0.116	0.136	0.618	*-0.023*	-0.283	0.513	0.845**
Leaves/culm	-0.068	0.267	0.784	-0.008	*-0.831*	0.198	0.307
Green fodder yield/plant	-0.068	0.103	0.612	-0.019	-0.267	*0.617*	0.979**

**Significant at 1% level; Diagonal values indicate direct effects; Residual effect = 0.097.

other characters, viz., days to 50% flowering through plant height, plant height through green fodder yield and green fodder yield through plant height on dry matter yield were also much appreciable. It is, therefore, inferred that plant height, tiller number and leaves per culm played an important role in determining the forage yield. Therefore, a desirable plant type for higher dry matter yield in buffel grass would be leafy and multi-tillered tall plant.

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