

Correlation and Path-Coefficient Analyses in *Cenchrus Ciliaris* L.*

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Correlations and path-coefficient between fodder yield and yield components were estimated in 80 genotypes of *Cenchrus ciliaris*. Among the characters studied number of tillers, length and breadth of leaf, length and thickness of internode and height of clone were positively correlated with fodder yield. Path-coefficient analysis revealed that number of tillers, length and breadth of leaf and height of clone showed higher positive direct effect on fodder yield. Even though the direct effect of thickness of internode was low and positive, its contribution through height of clone and length and breadth of leaf was considerable.

Cenchrus ciliaris L. is a popular pasture grass in Coimbatore, Salem and Madurai districts of Tamil Nadu. It is highly a drought resistant grass and withstands heavy grazing. Crop improvement work in this species has been taken up recently to isolate superior high yielding clones. As an adjunct, studies were initiated to determine the characters associated with yield of green fodder and their degree of association and the results are presented below.

MATERIAL AND METHODS

Eighty clones of *Cenchrus ciliaris* were raised in a randomised block design replicated thrice. Slips of uniform length possessing approximately equal number of nodes were selected as planting materials from the mother clones. Ten slips from each clone were planted adopting a spacing 60 cm x 60

cm. Observations were recorded from five randomly selected ones among the eight clones leaving the end ones in each replication. About forty days after planting, the clones were given the first cut. Just before the second cut, which was given 40 days thereafter, observations were recorded on (i) height, (ii) number of leaves, (iii) length and breadth of 4th leaf and (iv) length thickness of 4th internode from the top of main tiller. After counting the number of tillers per clump, cutting was done clump by clump and the weight of green fodder was recorded and statistically analysed. Phenotypic and genotypic correlation coefficients were estimated using the formula suggested by Miller, *et al.* (1958). The path-coefficient analysis was done following Dewey and Lu (1959) using genotypic correlation coefficients of the eight characters.

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RESULTS AND DISCUSSION

The correlation coefficients between pairs of characters both at genotypic and phenotypic levels are presented in Table I. It is evident that the height of clone, number of tillers, length and breadth of leaf and length and thickness of internode had positive and significant association with yield of fodder. The highest positive association was observed between yield and number of tillers followed by length and breadth of leaf. Yadav *et al.* (1974) reported significant and positive association of these characters with yield of fodder.

The association between number of tillers and length and breadth of internode did not reach the level of significance. The results were also similar between number of leaves on

one hand and length of leaf internode on the other, thereby indicating that these characters are to be independently weighed in selection. It is interesting to note that the number of tillers exhibited highly positive association only with yield whereas with other characters it showed either significantly negative or no association. When different developing structures of a plant compete for a common nutrient supply a negative correlation may arise if one structure is favoured over the other in the amount of nutrient received (Adams, 1967). Height of clone, length and breadth of leaf, thickness of internode and green fodder yield exhibited highly significant positive association in all possible combinations both at genotypic and phenotypic levels. Length of internode showed significant correlation with yield at genotypic level only. In general, the estimates of genotypic correlations

TABLE I. Phenotypic (P) and genotypic (G) correlations between yield and height, number of tillers, number of leaves, length and breadth of leaf and length and thickness of internode among clones in *C. ciliaris*

Character		Height	Number of tillers	Number of leaves	Length of leaf	Breadth of leaf	Length of internode	Thickness of internode
Yield	P	0.2480*	0.5869**	-0.2243*	0.4438**	0.4893**	0.1758	0.2638*
	G	0.2256*	0.8054**	-0.3616**	0.5532**	0.5501**	0.3138**	0.3959**
Height	P		-0.1877	0.6843**	0.6716**	0.6413**	0.3475**	0.6233**
	G		0.3082**	0.8074**	0.7606**	0.7155**	0.4383**	0.8141**
Number of tillers	P			-0.4333**	0.0014	0.0552	0.0549	-0.1739
	G			-0.6633**	-0.0037	0.0093	0.0430	-0.2312*
No. of leaves	P				0.1520	0.1729	0.0969	0.1481
	G				0.2169	0.2492*	0.1616	0.2483*
Length of leaf	P					0.7290**	0.2303*	0.7060**
	G					0.8337**	0.3048**	0.9386**
Breadth of leaf	P						0.3657**	0.7864**
	G						0.4642**	1.0047**
Length of internode	P							0.3953**
	G							0.6152**

* and ** Significant at 5 and one per cent level respectively

were slightly higher than the phenotypic correlations, thus, showing the effects of the environment in masking or modifying the full expression of the characters. The genotypic associations between breadth of leaf and thickness of internode exceeded the unity and registered 1.0047. Similar observations were reported by many workers in different crops (Carlson and Moll, 1962; Quenoille, 1964 and Sree Rangaswamy and Murugesan, 1973). It therefore becomes evident that the number of tillers, length and breadth of leaf, length and thickness of internode and height of clone are the important contributing factors to yield of fodder in this species.

The path coefficient analysis suggested by Dewey and Lu (1959) provided an effective means of untangling direct and indirect causes of association and permitted a critical examination of the specific forces acting to produce a given correlation and measure the relative importance of each factor involved. In other words, by this analysis, it is possible to measure the direct influence

of one variable upon another and separate the correlation coefficient into components of direct and indirect effects.

The present study showed (Table II) that the number of tillers exerted the maximum direct effect on yield and its influence through other characters was negligible. Length and breadth of leaf, height of clone also showed positive direct effect on yield. Indirect effect of height of clone through number of tillers as well as through number of leaves was negative and positive respectively. The indirect influence of length and breadth of leaf *viz.* other characters was rather low. Eventhough length and thickness of internode had positive association with yield, their direct effect on yield was very low. The indirect effect of length of internode through other characters was either negative or low and positive whereas, thickness of internode had positive indirect effect *viz.* height of clone and length and breadth of leaf. Therefore it becomes evident that height of clump

TABLE II. Path analysis showing direct and indirect effects of height (X_1), tillers (X_2), number of leaves (X_3), length (X_4) and breadth of leaf (X_5) and length (X_6) and thickness of internode (X_7) on yield

Characters	X_1	X_2	X_3	X_4	X_5	X_6	X_7	Correlation with yield
X_1	0.1726	-0.2565	-0.0485	0.1748	0.1136	0.0111	0.0545	0.2256
X_2	-0.0532	0.8325	0.0395	-0.0008	0.0014	0.0010	-0.0150	0.8054
X_3	0.1394	-0.5522	-0.6000	0.0509	0.0395	0.0042	0.0166	-0.3616
X_4	0.1313	-0.0030	0.0130	0.2350	0.1323	0.0077	0.0628	0.5532
X_5	0.1235	0.0077	-0.0149	0.1959	0.1587	0.0118	0.0671	0.5501
X_6	0.0755	0.0357	-0.0097	0.0716	0.0737	0.0255	0.0114	0.3138
X_7	0.1405	-0.1924	-0.0149	0.2206	0.1595	0.0185	0.0668	0.3959

Residual factors 0.1393

and size of leaf are influenced by the extent of thickness of the stem.

Number of tillers had the maximum direct effect on yield followed by length and breadth of leaf and height of clump. The importance of leaf size in enhancing the yield of fodder has been reported by Gupta and Nanda (1971) in fodder *bajra*. Dangi and Paroda (1974) in fodder cowpea and Paroda, *et al.* (1975) in fodder sorghum. Therefore, genotypes which are capable of producing profuse and tall tillers with long and broad leaves would be ideal fodder types for selection in *Cenchrus ciliaris*.

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