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STUDIES ON CHARACTER ASSOCIATIONS IN FORAGE CLUSTER BEAN *Cyamposis tetragonoloba (L.) Taub)**

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Correlation and path-coefficient analyais were studied in forty three fodder types of cluster bean. In association analysis, the characters leaf weight and stem weight showed high positive associations with both the green fodder yield and dry matter yield. The traits plant height, number of leaflets and leafweight and leaflet length width, and stem weight were positively and significantly associated among themselves. In path analysis the stem weight had high positive effect followed by leaflet length, number of branches and leaf weight. In general, for maximum green fodder yield, selection can be made for leaflet length, stem weight and leaf weight.

Cluster bean is an important multipurpose drought resistant as well as a restorative leguminous crop. The selection based on yield alone is not likely to be efficient In deed a knowledge of esvironmente variarions the genotypic corralation of yield components with each other and with the yield and the relative contribution of the yield components with yield help in identifying those components upon which greater emphasis should be placed by the breeders for the purpose of selection. Since, only limited work has been done in this corp for these aspects, the present investigation was undertaken to obtain more information on the fodder aspects of cluster bean.

MATERIAL AND METHODS

The experimental materials for the present investigation consisted of forty three fodder types of cluster bean (*Cyamopsis tetragonoloba* (L.) Taub). obtained from different regions. Each type was sown in single row during the month of August, 1979 adopting a spacicg of 30 cms x 10 cms. The field experiment was laid out in a randomized block design with three replications in the Agricultural College and Research Institute, Coimbatore. All the agronomic practices were followed for the better stand of the crop. Nine important quantitative characters were studied on the five randomly selected plants/type/replication at the time of pod initiation. The mean values of the characters were subjected to statistical analyses. The appropriate variances and convariances were used to calculate phenotype, genotypic and environmental correlation Co-efficients (Johnson *et al*., 1955) Path-coefficient analysis as applied by Dewey and Lu (1959) was utilised to partition the genotypic correlation co-efficients in to direct and indirect effects.

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RESULTS AND DISCUSSION

Analysis of variance showed the presence of significant variations for all the characters in the selected materials. In the present investigation in general the genotypic correlation co-efficients were higher than the phenotypic oorrelation coefficients (Table 1). This may be due to the masking effects of environment in modifying the total expression of the genotype and hence the phenotypic expression was reduced (Nandpuri *et al.* 1973). Though the correlation analysis in the present study revealed the positive significant association of green fodder yield with all the eight charateers, the magnitude of the genotypic correlation co-efficients was high for leaf weight, stem weight, leaflet length and width of the central leaflet of 4th leaf from the top. Positive significant association of leaflet length and width was also reported by Dangi and Paroda (1974). Positive associations of leaf weight and stem weight was also reported by Jhorar and Paroda (1976) in forage sorghum. The characters stem weight, leaf weight and number of leaf lets showed high genotypic correlation with dry matter yield. Such a strong positive association between number of leaves and dry matter yield was reporeed by Solanki *et al.*, (1975) in cluster bean Among the various characters, stem weight and leaf weight showed high positive association not only with green fodder yield but also with dry matter yield and the selection based on these two traits may help in the improvement green as well as the dry matter yield.

To formulate effective selection programme, information on the interrelationship among the various yield componets is needed in addition to the knowledge of the association between yield and its components. Among the various characters, inter-correlations among plant height, number of leaflets and leaf weight and leaflet length, width and stem weight were high and positive at genotypic level. This indicated the possibility of effecting simultaneous selection for these characters

In the present experiment, none of the characters, examined showed significant negative association with yield at genotypic level. But some of the charactets were negatively correlated among themselves at genotypic level. The characters; number of branches and number of leafters showed significant negative correlation with leaflet length as well as with leaflet width. Hence the genotypes with more branches had smaller leaves than those genotypes with less number of leaves and in the same way t e genotypes having more leaves had small sized leaves and vice versa. This is in similarity with the reports of Dangi and Paroda (1974) with respect to low fertility environment. The low residual effect in path analysis indicated the adequacy of the chosen characters for this analysis. From this study it could be seen that the stem weight recorded the high direct effect on green fodder yield followed by leaflet length, number of branches and leaf weight (Table 2). Phul *et al* (1972) in fodder sorghum found tha the length of the leaf exerted the higl direct influence on fodder yield. Jhorar and Paroda (1976) reported that the leaf weight and stem weight showed high direct effect on green fodder yield in fodder sorghum.

Nevertheless, considering the magnitude of genotypic correlation of plant height with green fodder yield, the direct effect of this character was low. This phenomenon can be evidenced from the negative indirect influence of plant height *via* number of branches, number of leaflets, leaflet length and dry matter yield. In the same way considering the magnitude of direct effect of number of branches with green fodder yield, the genotypic correlation of number of branches with green fodder yield was low. This may be due to the negative indirect influence of number of branches through number of leaves, leaflet length and leaf weight. The high nagative direct effect of leaflet width was converted into high positive association of this character with green fodder yield by high positive indirect effect of this character *via* leaf weight and stem weight.

A perusal of the indirect effects of each trait through the other traits revealed that the leaf weight had the maximum indirect effect through stem weight. This is the main reason for the high positive significant association of leaf weight on green fodder yield. This situation may also be due to the very strong association between leaf weight and stem weight. From the present investigation, it is evident that the selection for the improvement of green fodder yield can be efficient if it is based on leaf let length, eaf weight and stem weight as these three characters satisfy both the requirements of correlation and path analysis. Paroda *et. al.* (1975) also reported the leaflet length as one of the component characters of green fodder yield in sorghum based on which selection can be made. Jhorar and Paroda (1976) were of the opinion that the character leaf weight was one of the important characters contributing to the green fodder yield in sorghum.

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Table 1 : Phenotypic (P), Genotypic (G), Environmental (E) and Correlation co-efficients among the Characters

Characters		Plant height	No. of branches	No. of leaflets	Leaflet length	Leaflet width	Leaf weight	Stem weight	Dry matter yield	Green fodder yield
Plant height	G		-0.0754	0.3697**	-0.0847	-0.1634	0.5004**	0.1486	0.3122**	0.26308*
	P		0.1881	0.1646	0.1135	0.1845	0.4216**	0.4031**	0.4434**	0.4597**
	E		0.4285**	0.0874	0.3472**	0.4677**	0.4174**	0.4663**	0.4839**	0.5045**
No. of branches	G			0.9946**	-0.5233**	-0.5854**	0.3640**	-0.2575*	0.1513	-0.0820
	P			0.7404**	-0.3341**	-0.2994**	0.3595**	0.1359	0.3248**	0.2531*
	E			0.3183**	0.1735	0.2841**	0.5106**	0.4551**	0.5381**	0.5452**
No. of leaflets	G				-0.4974**	-0.5100**	0.·848**	-0.0086	0.4478**	0.2754*
	P				-0.2751*	-0.1881	0.4197**	0.2734*	0.3915**	0.3675*
	E				-0.0058	0.1532	0.3602**	0.3933**	0.3702**	0.4165**
Leaflet length	G					0.9824**	0.0962	0.3808**	0.0889	0.3355**
	P					0.8324**	0.0717	0.1632	0.0801	0.1636
	E					0.4722**	0.1040	0.0340	0.0990	0.1029
Leaflet width	G						0.2164*	0.3025**	0.1059	0.4291**
	P						0.1738	0.3276**	0.1818	0.2971**
	E						0.2209*	0.2800**	0.2760*	0.7900**
Leaf weight	G							0.9865**	1.0000**	1.0000**
	P							0.6161**	0.5925**	0.8534**
	E							0.5719**	0.8334**	0.8406**
Stem weight	G								0.9040**	0.9507**
	P								0.8375**	0.9319**
	E								0.82·0**	0.9196**
Dry matter yield	G									0.9619**
	P									0.8649**
	E									0.8410**

* Significant at 5% level ** Significant at 1% level

Table 2 Path Co-efficient analysis showing the direct and indirect effects of eight characters on Green fodder yield in fodder Cluster Bean

Character	Plant height	No. of branches	No. of leaflets	Leaflet length	Leaflet width	Leaf weight	Stem weight	Dry matter	With green fodder yield
Plant height	*0.1222*	-0 0249	-0.0904	-0.0355	0 0645	0 0934	0.1363	-0 0026	0 2630
No. of branches	-0 0092	*0.3302*	-0 2433	-0 2192	0.2309	0.0661	-0 2362	-0.0012	-0.0820
No. of leaflets	0.0452	0.3284	*-0.2446*	-0.2084	0.2012	0.1652	-0.0079	-0 0037	0.2754
Leaflet length	-0 0103	-0.1728	0.1217	*0.4189*	-0 3875	0.0180	0.3493	-0 0007	0.3365
Leaflet width	-0.0200	-0.1933	0.1248	0 4115	*0.3945*	0.0404	0.4610	-0.0009	0.4291
Leaflet weight	0.0611	0.1169	-0 2165	0.0403	-0.0854	*0.1867*	0.9050	-0 0082	0.1000
Stem weight	0.0182	-0.0850	0.0021	0.1595	-0.1962	0.1842	*0.9174*	-0.0074	0 9907
Dry matter yield	0.0381	0.0500	-0.1095	0.0373	-0.0418	0.1867	0.8293	*-0 0082*	0 9819

Figures italic show direct effects

Residual effect (P_*) = 0.055928