Internat. J. agric. Sci. Vol.2 No.2 July 2006 : (472-473)

Correlation coefficient analysis in sugarcane evaluated for fodder yield

D. Arun Prabhu* G. Vijayakumar and U.S.Natarajan[1]
Department of Forages, Tamil Nadu Agricultural University, COIMBATORE (T. N.) INDIA

ABSTRACT
An investigation was conducted to evaluate twenty sugarcane genotypes for cane and fodder yield. Sugarcane tops is major byproduct of sugarcane cultivation which is left in field after harvest, retains its nutritional value over a long period when compared to other grasses. The potential of sugarcane, and its intrinsic advantages over other tropical grasses, as a converter of solar energy into biomass is the rationale for the concept of "energy cane" (Alexander, 1985). In many parts of Tamil Nadu, the matured leaves removed from the growing sugarcane crop are used as fodder. Sugarcane tops can be fed as green fodder to animals, which can meet the demand during dry season..Considering the nutritional significance of sugarcane tops an attempt was made to study promising sugarcane genotypes for dual purpose. Genetic correlation between different characters is very essential in any crop improvement programme. Correlation coefficient study for nine biometrical character and five quality characters revealed that stem weight, leaf weight, dry fodder yield, number of tillers, and crude protein were highly positively significant, plant height and leaf length were positively significant. Leaf breadth, leaf/stem ratio, crude fat, oxalate, and silica recorded negative correlation.

Key words: Correlation coefficient, Fodder yield, Sugarcane clones.

INTRODUCTION

Sugarcane is the second most important agro industrial crop in the country economically, politically and sociologically next to cotton. Sugarcane was known to be under cultivation in India from Vedic times or even earlier. In India, there is a huge annual shortage of concentrate, green fodder and dry roughage for animal feed. We need better forage crop varieties, producing higher dry matter yield and higher digestible nutrients. The major sugar producing states in the countries are Tamil Nadu, Maharastra, Karnataka, Gujarat, Andhra Pradesh, Uttar Pradesh and Bihar considering total sugarcane production and area under cultivation. Sugarcane tops is generally known to be a major byproduct of sugarcane cultivation, which is left in the field after cane harvest. Sugarcane tops are highly palatable with good intake characteristic (Sansoucy, 1972). In most of sugarcane producing areas, the sugarcane tops are the sole green material available to dairy animals, particularly between February to April, when it is relatively dry. Average quantity of tops available is about one third of the cane harvested; these are mostly fed as green fodder to the animals or sometimes dried, stored as silages, and later fed to animals. Knowledge on genetic correlation between different characters is very essential in any crop improvement programme. Accordingly present investigation was undertaken to study correlation coefficients of green fodder yield and yield attributing traits in sugarcane clones.

MATERIALS AND METHODS

The experiment consisted of twenty elite sugarcane genotypes released from Sugarcane Breeding Institute, Coimbatore. Varieties evolved by state sugarcane research stations and the promising clones selected from various research projects of Sugarcane Breeding Institute, was planted in an randomized block design with two replication during 2004-2005 in Department of Forages at Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu (India). Nursery was prepared by planting single bud in polybags. Sugarcane clones were raised in the main field by making suitable pit with a depth of 30 cm, a proper spacing of 1.2×1.5 cm is maintained. Nine biometrical characters *viz.,* plant height, number of tillers, leaf length, leaf breadth, number of leaves, stem weight, leaf / stem ratio, green fodder field (leaf weight) and dry fodder yield were taken for analysis. In sugarcane, both cane yield and quality characters are very important to satisfy the farming community as well as the sugar industry.

Genotypic correlation were observed between green fodder yield on one hand and plant height, number of tillers, leaf length, leaf breadth, number of leaves, leaf weight, stem weight, leaf/stem ratio, green fodder yield, dry fodder yield and also quality traits (Dewey and Lu, 1959; Singh *et al.* 1994; Sreekumar *et al.* 1994 and Zu Hu *et al.,*1995) viz., crude protein (Humphires, 1956), crude fat AOAC (1970), crude fibre Goering and Vansoest (1970), ash, oxalate content Baker (1952), and silica content Banerjee (1986), on the other hand. The genotypic correlation coefficient was worked out following the method of Al – Jibouri *et al,* (1958).

RESULTS AND DISCUSSION

Twenty sugarcane clones evaluated for fodder were harvested four times. Nine biometrical characters and six quality parameter were recorded on third cutting (Table 1) only because it was best cut among the four cuts . Study on correlation analysis provides information about interrelationship between yield components and thus helps in the selection of superior genotypes from diverse genotypic population.

Correlation between green fodder yield with stem weight, leaf weight, dry fodder yield, number of tillers, and crude protein were highly positively significant at 1 % level. The plant height and leaf length showed significance at 5 % level. Green fodder yield with leaf breadth, leaf/stem ratio, crude fat, oxalate, and silica recorded negative correlation.

Plant height showed positive correlation for leaf length, leaf weight, stem weight, dry fodder yield, and crude protein. Breadth of leaf, number of leaves, crude fat and silica showed negative correlation. Number of tillers showed highly significant positive correlation for leaf stem ratio and crude protein. Leaf length, leaf weight and stem weight showed positive correlation. Negative correlation was observed in leaf breadth, crude fat, crude fibre, oxalate and silica.

Leaf length showed highly significant positive correlation with stem weight and positive correlation for dry fodder yield, crude fat and ash. Leaf breadth, leaf stem ratio and silica recorded negative correlation. For breadth of leaf, positive correlation was observed with silica. Negative correlation was observed with number of leaves, leaf weight, stem weight, leaf / stem ratio, crude protein, ash, oxalate and silica. The number of leaf showed highly significant positive correlation for leaf weight, leaf / stem ratio and crude protein. Negative correlation was observed with stem weight, dry fodder yield, crude fibre, oxalate and silica content. Leaf weight recorded highly significant positive correlation with stem weight, dry fodder yield and crude protein whereas it showed negative correlation for crude fat oxalate

[1] Div. of crop imprvement, Sugarcane Breeding Inst., Coimbatore (T.N.)
* Author for correspondence

Table 1 : Correlation coefficients of Green fodder yield and yield attributing traits in Sugarcane clones

	PH	NT	LL	LB	NL	LWT	SWT	L/S	DFY	CP	CFAT	CFIB	ASH	OX	SIL
PH	1.0000														
NT	0.2933	1.0000													
LL	0.3761*	0.3570*	1.0000												
LB	-0.2556	-0.3782	-0.3495	1.0000											
NL	-0.1672	0.4371*	1.6086	-0.2377	1.0000										
LWT	0.3701*	0.9615*	0.2192	-0.2315	0.7004**	1.0000									
SWT	0.3940*	0.5278*	0.6649**	-0.1103	-0.2568	0.6718**	1.0000								
L/S	0.1117	0.5656**	-0.3932	-0.2528	0.9430**	0.3494*	-0.4286	1.0000							
DFY	0.4266*	0.6139	0.3886*	0.0978	-0.2894	0.8054**	0.7137**	0.0480	1.0000						
CP	0.3766*	0.5238**	0.2332	-0.2991	0.6669**	0.8019**	0.4427*	0.3769*	0.3147*	1.0000					
CFAT	-0.2159	-0.0454	0.3589*	0.2429	1.2047	-0.2343	-0.1583	0.0703	-0.0924	0.229	1.0000				
CFIB	0.1319	-0.2049	0.0319	0.2012	-1.5951	0.0500	0.1736	-0.2488	0.2567	-0.1559	-0.6318	1.0000			
ASH	0.2680	0.1508	0.3909*	-0.1761	2.9238	0.2266	-0.0653	0.4525*	0.2747	0.5305**	0.3512*	-0.0855	1.0000		
OX	0.1627	-0.0663	0.0203	-0.2001	-2.7076	-0.2031	0.0455	-0.1769	-0.1726	-0.4443	-0.2430	0.0314	-0.4228	1.0000	
SIL	-0.3765	-0.5331	-0.6180	0.3761*	-1.7885	-0.7266	-0.5382	-0.1551	-0.4494	-0.4230	-0.2021	0.2752	0.1171	0.2021	1.0000
GFY	0.4183*	0.8059**	0.4921*	-0.1845	0.2239	0.9078**	0.9205**	-0.0584	0.8289**	0.6736**	-0.2132	0.1247	0.0825	-0.0814	-0.7134

LL - Leaf length (Cm)
LB - Leaf breadth (Cm)
NT - Number of tillers
NL - Number of leaves
SWT - Stem weight (Kg)
L/S - Leaf stem ratio
GFY - Green fodder yield (Kg)
DFY - Dry fodder yield (Kg)
CFAT - Crude fat (%)
CFIB - Crude fibre (%)
ASH - Ash content (%)
SIL - Silica content (%)
** Significant at 1 % level
* Significant at 5 % level

and silica content. The stem weight showed highly significant and positive correlation for dry fodder yield. Crude protein recorded positive correlation. Negative correlation was recorded with leaf / stem ratio, crude fat, oxalate and silica content. For leaf / stem ratio crude protein showed positive correlation. Negative correlation was observed with crude fibre, oxalate and silica. The dry fodder yield showed positive correlation with crude protein. Negative correlation was recorded with crude fat, oxalate and silica content.

For crude protein, ash showed positive correlation. Crude fibre, oxalate and silica recorded negative correlation. Crude fat recorded negative correlation with crude fibre, oxalate and silica. Crude fibre had not shown positive correlation with all the characters. Ash showed negative correlation with silica. Oxalate and silica has not recorded positive correlation with all the traits.

CONCLUSION

Estimates of genotypic and phenotypic correlations are useful in planning and Selection of breeding programme (Robinson *et al.,* 1951). It may be concluded that stem weight, leaf weight, dry fodder yield, number of tillers and length of leaf are the major contributing factors to green fodder yield.

ACKNOWLEDGEMENT

The authors thank Dr. A. Gopalan, Professor Department of Forages TNAU, Coimbatore, Dr. U.S. Natarajan Principal Scientist, Sugarcane Breeding institute Coimbatore, and Dr. M .R. Backiyavathy, Assistant Professor, Department of Soil science and Agricultural Chemistry, TNAU, Coimbatore for their guidance and suggestions during the research programme.

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Received : November, 2005; Accepted : March, 2006