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CORRELATION STUDIES IN MULTICUT FORAGE SORGHUM GROWN UNDER DIFFERENT ENVIRONMENTS

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SUMMARY

Correlation has been studied in various growth, quality characters and yield of multicut forage sorghum cultivars which were planted at two locations in a split plot design during **kharif** season of 2007. The linear correlation study revealed positive and highly significat association between yield and growth/quality components at both the loecations. Perfect correlation (r=1) was between crude protein yield and total N-uptake at both the locations. Among quality and growth parameters, significant positive correlation was noticed at both the locations except between crude protein/N-content and plant height, leaf : stem ratio, dry matter accumulation in third cutting at Lakhaoti, dry matter accumulation and disgestibility in first cutting at Pantnagar, where the positive correlation was not significant.

Key words : Correlation, multicut forage sorghum, protein, digestibility, environment

Fodder yield of sorghum is a complex cause of several effects and influenced by many component traits. The degree of associations among various components of yield and with yield ensures the importance of the specific components. Thus, study of correlation provides an opportunity to assess the magnitude and direction of association of yield with its direct and indirect components, which are essential for formulating an effective and efficient crop improvement scheme. Direct selection for yield generally results in low genetic gain, thus knowledge of the correlation of component responsible for desired cause forms an integral part of the scheme. For this, knowledge of components having significant positive correlation with yield and quality is

TABLE 1
Correlation coefficients between growth and quality parameters of multicut sorghum

Growth parameters	Quality parameters											
	Crude protein (%)				Digestibility (%)				N content (%)			
	1st	2nd	3rd	Total	1st	2nd	3rd	Total	1st	2nd	3rd	Total
						Pantnagar						
Plant height	.857	.897	.858	.910	.846	.894	.917	.901	.853	.905	.857	.909
Stem diameter	.875	.880	.897	.890	.755	.828	.934	.875	.875	.883	.896	.898
L : S ratio	.899	.778	.919	.926	.794	.811	.941	.911	.902	.783	.918	.927
Dry matter accumulation	.763	.788	.817	.781	.603*	.775	.866	.749	.761	.790	.815	.787
						Lakhaoti						
Plant height	.679	.859	.667*	.835	.713	.866	.856	.898	.677*	.845	.670*	.828
Stem diameter	.901	.794	.726	.870	.895	.802	.841	.901	.900	.795	.724	.863
L : S ratio	.896	.805	.595*	.856	.911	.774	.738	.896	.894	.800	.593*	.849
Dry matter accumulation	.779	.885	.587*	.767	.730	.867	.721	.824	.780	.874	.583*	.760

*The correlation coefficients are not significant and rest are significant at P=0.05 level (t=0.707).

TABLE 2
Correlation between growth parameters, quality characters and yields

Parameters	Yields (q/ha)											
	Green fodder						Crude protein					
	Pantnagar			Lakhaoti			Pantnagar			Lakhaoti		
	1st H	2nd H	3rd H	1st H	2nd H	3rd H	1st H	2nd H	3rd H	1st H	2nd H	3rd H
Growth												
Plant height (cm/plant)	.980	.914	.970	.527*	.944	.865	.956	.925	.959	.655*	.928	.859
Stem diameter (cm/plant)	.963	.986	.912	.960	.843	.926	.967	.963	.949	.947	.853	.941
L : S ratio	.939	.771	.901	.932	.861	.910	.945	.794	.980	.913	.887	.854
Dry matter accumulation (g/m^2)	.923	.970	.977	.912	.948	.943	.911	.954	.961	.877	.949	.903
Quality characters (%)												
Crude protein	.867	.892	.720	.912	.968	.716	.951	.924	.919	.979	.971	.852
Digestibility	.839	.885	.798	.901	.977	.758	.861	.918	.928	.958	.966	.845
Nitrogen content	.866	.896	.718	.911	.960	.710	.949	.925	.918	.979	.965	.846
Total N uptake (kg/ha)	.965	.989	.910	.967	.993	.970	1.000	1.000	1.000	1.000	1.000	1.001

*The correlation coefficients are not significant and rest are significant at P=0.05 level (t=0.707).

essential. In this view, the present study was undertaken to identify inter-relationship of economic traits and their association with the yield of multicut forage sorghum under different locations.

The experiments were conducted at Instructional Dairy Farm of G. B. Pant University of Agriculture & Technology, Pantnagar and A. S. (PG) College, Lakhaoti during **kharif** season of 2007 taking 16 treatments. The experiment was laid out in a split plot design with four replications and the crop was harvested on 11/06, 23/07, 02/08 and 21/09 /2007 at Pantnagar and on 13/07, 24/08, 03/09 and 13/10/2007 at Lakhaoti. Observations were recorded on plant height, stem diameter, leaf : stem ratio, dry matter accumulation by plants, crude protein content, digestibility per cent, nitrogen content, green fodder and crude protein yield at all the cuttings and total of these over two years was used for correlation study as per procedure given by Cochran and Snedecor (1994).

Growth Parameters and Fodder Quality

Estimates of correlation coefficients presented in Table 1 reveal that all the growth parameters were significantly and positively associated with crude protein, digestibility and nitrogen content at all the cuttings and total of three cuttings under Pantnagar environment. Similar association was noticed under Lakhaoti conditions except that plant height, leaf : stem ratio, dry matter accumulation with protein and nitrogen content were significantly and positively correlated. It suggests that in multicut forage sorghum, it is possible to enhance quality of fodder at different cuttings by enhancing the growth parameters like plant height, stem diameter, L : S ratio and dry matter accumulation irrespective of differences in the environment. Higher leaf : stem ratio has been found to enhance quality characters of forage sorghum (Yadav *et al.,* 2003; Chaudhary *et al.,* 2007).

Quality Parameters and Yield

The green fodder and protein yield of multicut forage sorghum showed significant positive correlation with all the growth parameters and quality characters at all the cuttings irrespective of location (Table 2). This indicated that more fodder yield genetically depended on growth paramerers. Yadav and Pahuja (2005) reported good general combining ability for fodder yield and yield attributes. A perfect positive correlation (r=1) was noticed between crude protein yield and total nitrogen uptake at both the locations in all the harvests. Thus, in multicut forage sorghum it is possible to combine high nitrogen uptake with high protein yield.

From the foregoing discussion, it can be concluded that the quality parameters and fodder yield of multicut sorghum can be maximized by enhancing the growth parameters irrespective of regional differences. The crude protein yield can be maximized by producing more biomass with high nitrogen content.

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