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RESEARCH ARTICLE

Correlation Analysis for Grain Yield and its Components in Pearl Millet [*Pennisetum glaucum* (L.) R. Br.]

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ABSTRACT

The study was conducted to determine the correlation coefficients among the grain yield and yield contributing characters in 14 parental lines (4 lines and 10 testers) and their 40 hybrids of pearl millet. Positive and significant correlations were observed for 1000 seed weight followed by fodder yield per plant, harvest index, earhead girth, number of effective tillers per plant, earhead length and plant height while, negative association with days to 50% flowering at both genotypic and phenotypic level with grain yield per plant. Based on correlations analysis, it is concluded that the selection for these characters would help improve the yield potential of pearl millet.

Keywords: *Correlation; L x T; Pearl millet; Character association*

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] an important coarse grain drought-tolerant warm-season cereal that is commonly known as bajra in different parts of the world. It is a highly cross-pollinated diploid (2x=14) annual C4 crop with protogynous flowering and wind-borne pollination mechanism, amenable for development of heterozygous populations, which can be utilized for the production of high grain yielding hybrids. It is originated in western Africa. Pearl millet provides nutritionally superior and staple food for millions of people. Knowledge of the association between yield and its component characters and among the component characters themselves can improve the efficiency of selection in plant breeding. The present research was undertaken to study the correlation analysis in different parental lines and hybrids of pearl millet to develop a criterion for selection that could be effectively used for selecting the desirable genotypes or lines with high yield potential.

MATERIAL AND METHODS

The experimental material comprised of four male sterile lines (S-16/760A, S-16/769A, S-16/704A, DHLB-23A) and ten restorers (S-19/03, S-19/04, S-19/05, S-19/08, S-19/09, S-19/10, S-19/11, S-19/12, S-19/13, S-19/14) with two standard checks (Aadishakti and AHB 1200 (Fe)) obtained from Bajra Research Scheme, College of Agriculture, Dhule. Crosses were done in line x tester fashion to obtain 40 hybrids. All experimental materials were evaluated in randomized block design with two replications. Five competitive plants were selected randomly from each treatment in each replication for grain yield per plant and its component traits viz., days to 50% flowering, days to maturity, number of effective tillers per plant, plant height, earhead length, earhead girth, 1000 seed weight, grain yield per plant, fodder yield per plant, harvest index and averages were worked out. The mean data were subjected to analysis of variance following Panse and Sukhatme (1967). Genotypic, phenotypic and environmental correlation coefficients, between pairs of characters were computed by the procedure of Falconer (1964). For this purpose, the data was subjected to covariance analysis.

RESULT AND DISCUSSION

The yield is highly complex character and polygenic in nature, which is influenced by the environment. Hence the study of inter-association is essential to understand the relationship of simple traits with complex grain yield and yield contributing traits as well as for enhancing the usefulness of selection. The study of genetic correlation gives an idea about the extent to which the characters are under the control of the same set of gene. The pleiotropy assumes information of the correlation is high, whereas the independent inheritance of traits may be perceived of the correlation is found to low.

It was evident from data that the correlations at the genotypic and phenotypic levels had the same trend. In general, the magnitude of the genotypic correlation coefficient was relatively higher than the corresponding phenotypic correlation

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coefficient for almost all the characters paired. Thus, it suggested that though there was a strong inherent association between various characters, the phenotypic expression of the correlations was influenced by the environment. However, some characters showed almost the same or slightly lower genotypic correlation coefficients compared to phenotypic ones indicating a strong influence of the environment in the expression of these traits.

Grain yield per plant exhibited positive and significant association with 1000 seed weight followed by fodder yield per plant, harvest index, earhead girth, number of effective tillers per plant, earhead length and plant height at both genotypic and phenotypic level. Hence selection for these characters would help improve the yield potential of this crop. Similar kind of association reported by Patil and Jadeja (2005), Arya *et al.* (2009), Rasitha *et al.* (2019) and Kumar *et al.* (2020) for 1000 seed weight. The characters such as fodder yield per plant and harvest index positively and significantly correlate with grain yield per plant. A similar result also registered by Bikash *et al.* (2013) and Kumar *et al.* (2020). Singh and singh (2016), Bhaskar *et al.* (2017), Anuradha *et al.* (2018) and Sharma *et al.* (2018) for the number of effective tillers per plant, earhead girth and earhead length. For plant height, Ezeaku *et al.* (2015) and Kumawat *et al.* (2019) exhibited the same result.

Grain yield per plant had a negative association with days to 50% flowering, Vetriventhan and Niramalakumari (2007), Ezeaku *et al.,* (2015) and Kumar *et al.,* (2020) reported almost similar kind of results. Days to maturity exhibited a perfectly positive association with grain yield per plant following earlier findings of Patil and Jadeja (2005), Sharma *et al.,* (2018), and Kumawat *et al.,* (2014).

Table 1. Genotypic and phenotypic correlation coefficients for different characters in pearl millet.

Traits		DF	DM	NET	PH	EL	EG	TW	FY	HI	GYP
DF	G	1.000	1.003**	0.001	0.718**	0.630**	-0.137	-0.157	0.364**	-0.515**	-0.066
	P	1.000	0.853**	0.000	0.632**	0.526**	-0.141	-0.158	0.312**	-0.468**	-0.071
DM	G		1.000	0.060	0.696**	0.597**	-0.050	-0.104	0.467**	-0.498**	0.044
	P		1.000	0.050	0.607**	0.504**	-0.048	-0.090	0.410**	-0.461**	0.036
NET	G			1.000	0.262**	0.092	-0.181	0.195*	0.651**	0.005	0.517**
	P			1.000	0.217*	0.081	-0.178	0.186*	0.595**	0.005	0.498**
PH	G				1.000	0.736**	0.041	0.114	0.574**	-0.243**	0.299**
	P				1.000	0.680**	0.102	0.116	0.514**	-0.225*	0.267**
EL	G					1.000	0.242**	0.382**	0.317**	0.024	0.345**
	P					1.000	0.267**	0.348**	0.260**	0.035	0.303**
EG	G						1.000	0.610**	-0.060	0.656**	0.557**
	P						1.000	0.559**	-0.021	0.577**	0.511**
TW	G							1.000	0.317**	0.660**	0.773**
	P							1.000	0.290**	0.618**	0.738**
FY	G								1.000	-0.266**	0.635**
	P								1.000	-0.274**	0.574**
HI	G									1.000	0.585**
	P									1.000	0.579**
GYP	G										1.000
	P										1.000

* and ** Significant at 5 and 1 per cent level, respectively.

Whereas,

DF = Days to 50 % flowering
DM = Days to maturity
NET = No. of effective tillers/ plant
EG = Earhead girth
PH = Plant height (cm)
EL = Earhead length
TW = 1000-seed weight (g)
FY = Fodder yield/plant (g)
HI = Harvest index (%)
GYP = Grain yield per plant (g)

The interrelationships were positive and significant among the yield contributing characters like, number of effective tillers per plant with plant height, 1000 seed weight and fodder yield per plant; plant height with

days to 50% flowering, days to maturity, fodder yield per plant; earhead length with days to 50% flowering, days to maturity, earhead girth, 1000 seed weight, fodder yield per plant; earhead girth with 1000 seed weight and harvest index; 1000 seed weight with fodder yield per plant and harvest index. Similar kinds of interrelations for most of the traits were reported by Kumawat *et al.,* (2014). The interrelationships were negative and significant among the traits like harvest index with days to 50% flowering, days to maturity, plant height and fodder yield per plant. Almost identical results have been reported by Bikash *et al.,* (2013), Kumar *et al.,* (2016) and Kumar *et al.,* (2020).

CONCLUSION

Based on correlation analysis, the main grain yield contributing characters are 1000 seed weight followed by fodder yield per plant, harvest index, earhead girth, number of effective tillers per plant, earhead length and plant height and selection for these characters would be rewarding in improving the yield potential of this crop.

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