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Character Association in Elite Recycled Early Inbred lines of Maize (*Zea mays* L.)

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ABSTRACT

Character association was carried out on ten diverse elite early inbreds of maize and their forty five direct single cross hybrids (derived by crossing in a half diallel fashion) along with two checks at College Farm, College of Agriculture, Rajendranagar, Hyderabad during *kharif,* 2003. The results indicated that grain yield was significantly and positively associated with 100-kernel weight, number of kernel rows per ear, ear height, ear length and ear girth at both genotypic and phenotypic levels. Hence, it is suggested that, for these prime characters utmost importance should be given in selection programme for the identification and development of high yielding maize hybrids or inbred lines of early maturing group.

Key words : Elite recycled, Inbred lines, Maize.

Maize (*Zea mays* L.) is one of the most important cereal crops in the world next to rice and wheat. It occupies a prominent position in global agriculture. Maize crop owes its importance to the grain (seed) meant for human consumption, poultry feed, live stock feed and green fodder to animals. Increasing the grain yield is of paramount importance and in this direction efforts have been intensified among plant breeders and the development of commercial seed industry is testimony of the breeding methods that have been evolved for economic production of high yielding maize hybrids and have been accepted and demanded by the modern farmers.

Yield is a complex character, governed by several contributing traits. The studies on correlation of grain yield and its associated components would be helpful in selection programme used for development of improved hybrids in maize. Hence, an attempt was made to study association among grain yield and its components in elite recycled early inbred lines and their hybrids of maize.

MATERIAL AND METHODS

The experimental material comprised fifty seven genotypes including ten promising elite inbreds (five dent and five flint grain types of maize), their forty five F_1 crosses and two standard checks *viz*., KH-510 and B10 9637 of early and medium maturing group. The experiment was carried out at College Farm, College of Agriculture, ANGRAU, Rajendranagar, Hyderabad with the collaboration of Agricultural Research Station (Maize), Amberpet, Hyderabad during *kharif,* 2003. The experiment was laid out in randomized block design with three replications. The genotypes were planted in a single row of 5 m length with a spacing of 75 cm x 20 cm. Data were recorded on the yield and its component characters *viz*., days to 50% tasselling, days to 50% silking, plant height (cm), ear height (cm), ear length (cm), ear girth (cm), number of kernel rows per ear, number of kernels per row, 100-kernel weight (g) and grain yield per plot (kg). Simple correlation coefficients (genotypic and phenotypic) were calculated by working out variances and co-variances for each character pair using the method given by Johnson *et al.* (1955).

RESULTS AND DISCUSSION

The data (Table 1) revealed that genotypic correlations were higher than their respective phenotypic correlations and were in perfect agreement with each other. This is possible because of the fact that genotypic correlation arises because of either linkage or pleiotrophy. However, correlation at phenotypic level gets reduced due to

Table 1. Phenotypic (P) and Genotypic (G) correlation coefficient analysis of yield and yield contributing characters in maize.

Characters		Days to 50% tasseling	Days to 50% silking	Days to maturity	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear girth (cm)	No of kernel rows / ear	No of kernels/ row	100 grain weight (g)	Grain yield/ plant (g)
Days to 50% tasseling	P	1.0000	0.8026 **	0.5076 **	-0.0635	0.1325	-0.0728	-0.1333	-0.0904	-0.2445 **	-0.1163	-0.2426 **
	G	1.0000	0.9374 **	0.5749 **	-0.0348	0.1864 *	-0.1168	-0.2260 **	-0.1264	-0.3219 **	-0.1226	-0.2909 **
Days to 50% silking	P		1.0000	0.3997 **	0.0018	0.1898 *	-0.0351	-0.0866	-0.0608	-0.2313 **	-0.0335	-0.1867 *
	G		1.0000	0.4748 **	0.0319	0.2536**	-0.0616	-0.1703	-0.0642	-0.2369 **	0.0024	-0.214 **
Days to maturity	P			1.0000	0.0813	0.1265	0.0778	-0.0437	-0.0681	-0.0844	-0.0133	-0.1209
	G			1.0000	0.0850	0.1353	0.0721	-0.0391	-0.0237	-0.1042	-0.0349	-0.1234
Plant height (cm)	P				1.0000	0.8729**	0.6700 **	0.6588 **	0.2703 **	0.5435 **	0.4776 **	0.6528 **
	G				1.0000	0.9077**	0.8114 **	0.8316 **	0.3733 **	0.6676 **	0.5806 **	0.7139 **
Ear height (cm)	P					1.0000	0.5866 **	0.6224 **	0.2948 **	0.4699 **	0.4833 **	0.5936 *
	G					1.0000	0.7342 **	0.8042 **	0.4427 **	0.6035 **	0.5843 **	0.6523 **
Cob length (cm)	P						1.0000	0.7231 **	0.3561 **	0.7100 **	0.4278 **	0.6432 **
	G						1.0000	0.7550 **	0.4418 **	0.8048 **	0.5483 **	0.7342 **
Cob girth (cm)	P							1.0000	0.4533 **	0.5700 **	0.4458 **	0.7215 **
	G							1.0000	0.5110 **	0.6967 **	0.5446 **	0.8594 **
No of kernel rows/ear	P								1.0000	0.3768 **	0.0328	0.3714 **
	G								1.0000	0.4687 **	0.0468	0.4294 **
No of kernels/ row	P									1.0000	0.2842 **	0.6376 **
	G									1.0000	0.4118 **	0.7600 **
100 grain weight (g)	P										1.0000	0.5680 **
	G										1.0000	0.6640 **
Grain yield / plant (g)	P											1.0000
	G											1.0000

* Significant at 5 per cent level;
** Significant at 1 per cent level.

P represents Phenotypic correlation coefficient
G represents Genotypic correlation coefficient

Table 2. Path analysis of yield and yield component characters in maize.

Source	Days to 50% tasseling	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Eargirth (cm)	No. of Kernel rows / ear	No. of Kernels / row	100 Kernel wt. (g)	Grainyield / Plot (kg)
Days to 50% tasseling	—	0.9558**	0.3751**	0.2352	-0.0322	0.0222	0.2535	0.1053	0.1749	0.0497
Days to 50% silking	0.9692**	—	0.3851**	0.1959	-0.0390	-0.0055	0.2444	0.1401	0.1448	-0.0361
Plant height (cm)	0.4238**	0.4235**	—	0.5829**	0.2599	0.2455	0.0829	0.0165	0.0233	0.0558
Ear height (cm)	0.3141*	0.2921*	0.8170**	—	0.2965**	0.2683*	0.0992	0.0871	0.1730	0.3111*
Ear length (cm)	-0.0347	-0.0445	0.2775*	0.4363**	—	0.9639**	0.0128	0.0880	0.2211	0.3452**
Ear girth (cm)	-0.0212	-0.0001	0.2865*	0.4033**	0.9917**	—	0.0001	0.110	0.1978	0.2781*
No. of Kernel rows / ear	0.3266*	0.2976*	0.1063	0.1598	0.0199**	0.0081	—	-0.1541	0.1370	0.4048**
No. of Kernels / row	0.1751	0.2251	-0.107	0.2302	0.1105	0.1203	-0.1740	—	0.0735	0.0530
100 Kernel wt. (g)	0.1885	0.1494	0.0164	0.2556	0.2292	0.2060	0.1711	0.1353	—	0.6214**
Grain yield / Plot (kg)	0.0512	-0.0414	0.0620	0.4455**	0.3682**	0.3021	0.5087**	-0.0578	0.6609	—

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

environment and genotype x environmental interaction component and when experiment is conducted in a single environment/location or single season.

Grain yield was found positively and significantly associated with 100-kernel weight (0.6609, 0.6214), number of kernel rows per ear (0.5087, 0.4048), ear height (0.4455, 0.3111), ear length (0.3682, 0.3452) and ear girth (0.3021, 0.2781) at both genotypic and phenotypic levels. This indicates that these characters should be considered as prime characters in the direct selection programme for the improvement or development of high yielding early maturing maize inbred lines or hybrids. Similar results were reported earlier in maize for association of grain yield with these characters by Raman *et al.* (1983), Sharma and Kumar (1987), Satyanarayana (1995) and Devi *et al.* (2001).

There was a positive and significant association was found between the characters *viz.,* days to 50% silking and days to 50% tasselling, days to 50% silking and plant height, plant height and ear height, ear height and ear length, and ear girth and ear length at both genotypic and phenotypic levels. This indicates that the characters *viz.,* days to 50% silking, days to 50% tasselling, plant height were also associated with the grain yield through the other characters *viz.,* ear length, ear height and ear girth which are otherwise positively and significantly related with the grain yield at both genotypic and phenotypic levels. Hence, it is suggested that the selection for these characters would also helpful in the indirect selection of high yielding early maturing maize inbred lines or hybrids. These results were in conformity with the observations of Sharma and Kumar (1987), Farhathullah (1990) and Satyanarayana (1995).

It can be concluded from the study that, the characters *viz.,* 100-kernel weight, number of kernel rows per ear, ear height, ear length and ear girth were considered as prime component characters in the direct selection for developing high yielding maize hybrids or inbred lines of early maturing group since they showed highly significant and positive association with the grain yield.

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