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CHARACTER ASSOCIATION AND COMPONENT ANALYSIS IN MAIZE

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ABSTRACT

An experiment with four hybrids and one open pollinated maize variety was conducted to study the association of seven characters with grain yield by subjecting it to path coefficient analysis. Ear girth, kernel rows, 1000-seed weight, kernels per row and ear length had significant and positive correlation with seed yield. Ear length and ear girth play major role in deciding grain yield since they had inter-correlation with other yield contributing characters. High and positive direct effects were observed for kernel rows and 1000-seed weight. Considerable indirect effect of most of the yield contributing characters through kernel rows was observed. Hence, ear girth and kernel rows should be given more importance while formulating selection indices for yield improvement in maize.

KEY WORDS : Maize, correlation, path analysis, grain yield

Grain yield in maize (*Zea mays* L.) is a complex characters controlled by many factors. Selection for desirable genotypes should be made based on grain yield and also the other yield component characters which influence the yield. The association analysis is usually taken up to measure the relative magnitude of influence of each of these independent variable on a dependent variable like yield. Path coefficient analysis seperates the total correlation with grain yield into direct and their indirect effect through other yield components on grain yield. Hence, a study was made in this direction to formulate selection indices for breeding programme in maize.

MATERIALS AND METHODS

The experimental materials consists of four hybrids and one open pollinated variety. The experiment was conducted at National Pulses Research Centre, Vamban during summer, 1995. Each of the entry was grown in a 4 X 5 m^2 plot with a spacing of 60 X 20 cm. Recommended cultural practices were followed throughout the crop growth. Seven yield contributing characters *viz*., plant height (PH), nodes to first ear (NFE), ear length (EL), ear girth (EG), kernel rows (KR), kernels per row (KPR), 1000-seed weight and grain yield (GY) were recorded on ten competitive plants per entry per replication. The collected data were analysed as per the standard method for genotypic correlation coefficient analysis. The direct and indirect effects of seven components on grain yield were estimated by path coefficient analysis.

RESULTS AND DISCUSSION

Character association

The genotypic correlation coefficient between the different characters are presented in Table 1. Grain yield had significant positive association with EL (0.55), EG (0.89), KR (0.81), KPR (0.73) and 1000-seed weight (0.79). This indicated that the GY in maize was highly influenced by EG followed by KR, 1000-seed weight, KPR and EL. The characters PH and NFE had no association with GY. Similar reports of EG, EL, 1000-seed

Table 1. Genotypic correlation coefficients between grain yield and yield contributing characters in maize

Characters	Nodes to first ear	Ear length (cm)	Ear girth (cm)	Kernel rows	Kernels per row	1000-seed weight (g)	Grain yield (g)
Plant height (cm)	0.56**	0.08	0.16	-0.14	-0.07	0.31	0.16
Nods to first ear		0.39	-0.06	-0.23	0.11	0.02	0.07
Ear length (cm)			0.46*	0.25	0.72**	0.35	0.55*
Ear girth (cm)				0.73**	0.62**	0.71**	0.89**
Kernel rows					0.65**	0.41	0.81**
Kernels per row						0.36	0.73**
1000-seed weight (g)							0.79**

*, ** = significant at 5 and 1 per cent level respectively.

Table 2. Direct (diagonal) and indirect effects of yield components on grain yield in Maize

Characters	Plant height (cm)	Nodes to first ear	Ear length (cm)	Ear girth (cm)	Kernel rows	Kernels per row	1000-seed weight (g)	Genotypic correlation with grain yield
Plant height	-0.013	0.077	0.007	0.028	-0.063.	-0.007	0.127	0.16
Nodes to first ear	-0.007	0.137	0.037	-0.011	-0.104	0.011	0.008	0.07
Ear length	-0.001	0.054	0.094	0.078	0.115	0.070	0.143	0.55*
Ear girth	-0.002	-0.009	0.043	0.169	0.338	0.061	0.292	0.89**
Kernel rows	0.002	-0.031	0.023	0.124	0.461	0.063	0.169	0.81**
Kernels per row	0.001	0.016	0.067	0.105	0.298	0.098	0.149	0.73**
1000-seed weight	-0.004	0.003	0.033	0.120	0.189	0.036	0.410	0.79**

Residual = 0.022 *, ** = significant at 5 and 1 per cent level respectively.

weight positively associated with GY were reported by Kuldeep Singh *et al* (1987) and Satyanarayana *et al* (1990). Plant height had positive association with NFE (0.56) and none of the yield components had association with these two characters. EL had positive association with EG (0.46) and KPR (0.72). EG had positive correlation with (0.730), KPR (0.62) and 1000-seed weight (0.71). KR had positive association with KPR (0.65). Sathyanarayana *et al* (1990) reported that the characters, EG, EL and 1000-seed weight were inter-correlated. Hence, while formulating the selection programme for grain yield improvement, the characters EL and EG should be given importance since they had positive association with other yield contributing characters namely KR, KPR and 1000-seed weight.

Component analysis

As the correlation coefficients are insufficient to explain the true association, the path coefficient analysis was done. This analysis gives a method for partitioning the total genotype correlation into direct and their indirect effect through other characters on seed yield.

The path coefficients on grain yield are presented in Table 2. The estimated residual effect (0.022) in the present study indicated the adequacy and appropriateness of the characters chosen for path analysis. KR (0.461) followed by 1000-seed weight (0.410) had high direct effect on GY. Though the characters EG, KPR and EL recorded significant positive correlation, the direct effect of these characters was low. The characters PH and NFE also recorded low direct effect. Among the different characters, EL exerted moderate indirect effect through KR and 1000-seed weight. KR had low indirect effect through KG and 1000-seed weight. KPR had moderate indirect effect through KR and low indirect effect through EG and 1000-seed weight. Thousand 1000-seed weight recorded low indirect effect through EG and KR. In general, KR should be given much importance in selection programme, since it had high direct effect on GY and the other important yield contributing characters namely EG and KPR had high indirect effect through this trait.

From the foregoing discussion, it can be concluded that the characters, EG and KR should be given more importance in formualting selection indices for breeding programme of grain yield improvement in maize.

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