Madras Agric. J., 82(5): 391-393 May, 1995
https://doi.org/10.29321/MAJ.10.A01216

CORRELATION AND COMPONENT ANALYSIS IN MAIZE

V. KRISHNAN and N. NATARAJAN

ABSTRACT

Correlation and path coefficients were studied in a set of 65 maize genotypes. High positive association was observed between grain yield on the one hand, and plant height, ear length, ear weight, number of kernels per row, dry matter production and harvest index on the other. The inter correlations among these traits were also significant. Path coefficient analysis revealed that selection on any trait in maize will influence the grain yield only through dry matter production.

KEY WORDS : Correlation, Component Analysis, Maize

Grain yield in maize, as in any other crop, is a complex character influenced by several components. For an effective breeding programme, it is essential to have some information on the association between the different yield components and their relative contributions to the yield. The inter-relations among the yield components can be analysed with the help of path coefficient analysis which permits the seperations of the correlation coefficient into direct and indirect effects. The objective of the present investigation was to study the relationship between yield and other quantitative traits to estimate the direct and indirect effects of the component characters on grain yield

MATERIALS AND METHODS

A set of 65 maize genotypes (8 parents, 56 hybrids obtained through full diallel mating design and a check variety Co 1) was grown in a randomised block design with three replications Each genotype in a replication had a two row plo of 3 m length, with a spacing of 60 x 20 cm Observations were recorded on days to 50 per cen flowering, plant height, ear length, ear weight number of kernels per row, 100 kernel weight grain yield per plant, dry matter production and harvest index. The mean values of 10 plants selected at random from each plot were used for analysis. Phenotypic and genotypic correlations were calculated from the variance and covariance component following the method of Al- jibouri *et al.* (1958). Path coefficient analysis was done to estimate the effects of one character on the other characters (Dewey and Lu, 1959).

RESULTS AND DISCUSSION

The phenotypic and genotypic correlation coefficients among the characters indicated that

Table 1. Phenotypic and genotypic correlation co-efficient among yield and yield components in maize

Character		Plant height	Ear length	Ear weight	Number of kernels per row	100 kernel weight	Dry matter production	Harvest index	Grain yield per plant
Days to 50% flowering	P	-0.30*	-0.11	-0.05	-0.10	0.12	-0.06	-0.01	-0.05
	G	-0.31*	-0.11	-0.05	-0.12	0.13	-0.06	-0.08	-0.04
Plant height	P		0.26*	0.45*	0.36*	0.08	0.45*	0.24*	0.46*
	G		0.26*	0.45*	0.37*	0.08	0.45*	0.25*	0.49*
Ear length	P			0.64*	0.66*	-0.20	0.67*	0.23*	0.58*
	G			0.64*	0.68*	-0.21	0.68*	0.24*	0.63*
Ear weight	P				0.78*	0.05	0.96*	0.49*	0.90*
	G				0.80*	0.05	0.96*	0.49*	0.97
Number of kernels per row	P					-0.47*	0.78*	0.35*	0.72*
	G					-0.50*	0.80*	0.36*	0.79*
100 kernel weight	P						0.03	0.19	0.09
	G						0.03	0.21	0.10
Dry matter production	P							0.31*	0.88*
	G							0.32*	0.94*
Harvest index	P								0.56*
	G								0.61*

* - Significant at 5 per cent level. P - Phenotypic correlation coefficient. G - Genotypic correlation coefficient.

Table 2. Direct and indirect effects of yield components as partitioned by path analysis in maize

Character	Days to 50% flowering	Plant height	Ear length	Ear weight	Number of kernels per row	100 kernel weight	Dry matter production	Harvest index	Genotypic correlation coefficient wiht grain yield
Days to 50% flowering	0.033	-0.017	0.001	-0.007	-0.006	0.003	-0.043	-0.002	-0.04
Plant height	-0.010	0.056	-0.003	0.056	0.020	0.002	0.30	0.074	0.49*
Ear length	-0.004	0.014	-0.010	0.081	0.037	-0.005	0.45	0.072	0.63*
Ear weight	-0.002	0.025	-0.006	0.125	0.043	0.001	0.64	0.15	0.97*
Number of kernels per row	-0.004	0.021	0.007	0.100	0.054	-0.012	0.53	0.11	0.79*
100 kernel weight	0.004	0.005	0.002	0.006	-0.027	0.024	0.022	0.062	0.10
Dry matter production	-0.002	0.025	-0.007	0.120	0.043	0.001	0.66	0.098	0.94*
Harvest index	-0.001	0.014	0.002	0.062	0.020	0.005	0.22	0.30	0.61*

* - Significant at 5 per cent level. Diagonal values are direct effects.

highly significant positive correlations were observed between grain yield on one hand and plant height, ear length, ear weight, number of kernels per row, dry matter production and harvest index on the other (Table 1). Significant and positive association between grain yield and plant height, ear length, ear weight and number of kernels per row had been reported earlier (Malhotra and Khehra, 1986). Reddy *et al.* (1985) have reported a significantly positive association of grain yield with dry matter production and harvest index. Hence greater importance should be given for plant height, ear length, ear weight, number of kernels per row, dry matter production and harvest index while selecting for grain yield.

The inter-association study revealed that the characters which had significant correlation with grain yield were highly inter correlated among themselves (Table 1). Plant height showed significantly positive relationship with ear length, ear weight, number of kernels per row and dry matter production (Prasad, 1987) and harvest index (Khehra *et al.*, 1985). Ear length showed significantly positive correlation with ear weight (Prasad, 1987), number of kernels per row (Robin, 1988), dry matter production and harvest index (Prasad, 1987). Ear weight showed significantly positive relationship with number kernels per row, dry matter production and harvest index. The number of kernels per row showed significantly positive relationship with dry matter production and harvest index. The dry matter production exhibited positive and significant association with harvest index (Prasad, 1987). The inter-association study clearly indicated that all the significantly and positively correlated yield components were highly inter correlated among themselves. Therefore, intensive selection in the positive side for any of these traits would automatically improve other traits untimately increasing the grain yield per plant.

There was not much difference between the correlation coefficients at phenotypic and genotypic levels indicating that the environment did not play major role on the relationship between different traits at genotypic level (Table 1). Hence, selection based on phenotypic performance of different traits will be effective in the improvement of grain yield. Therefore, for intensive selection, easily observable characters like plant height, ear length, and number of kernels per row may be considered rather than the traits like ear weight, dry matter production and harvest index since all these characters are also highly inter correlated among themselves.

Path coefficient analysis revealed that all the yield components though had significant positive correlation with yield, their high correlation was not through their direct effects but due to their indirect effects especially through dry matter production (Table 2). This indicated that selection on any trait in maize would influence the grain yield only through dry matter production.

REFERENCES

AL-JIBOURI, H.A., HILLER, P.A. and ROBINSON, H.F. (1958). Genotypic and environmental variances and covariances in upland cotton crosses of inter specific origin **Agron. J., 50** : 633-636.

DEWEY, D.R. and LU, K.H. (1959). A correlation and path co-efficient analysis of components of crested wheat grass seed production. **Agron. J., 51**: 515-518.

KHEHRA, A.S., RAO, A.V.B., SHA., P.H., MALHI, M.S. and DHILLON, B.S., (1985). Variability and selection for har vest index in maize. **National Symposium on Genetics and Physiology of Dry Matter Production in Crop Plants.** Tamil Nadu Agricultural University, Coimbatore, p.31

MALHOTRA, V.V. and KHEHRA, A.S. (1986). Genotypic variation and covariation in indigenous germplasm of maize. **Indian J. Agric. Sci., 56**: 811-816.

PRASAD, K.V.N. (1987). Line x tester analysis in maize *(Zea mays* L.). M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

REDDY, M.N., RAO, K.N.S and NAGABUSHANAM, S.V. (1985). Pattern of dry matter production and its correlation with yield and component traits in maize *Zea mays* L.). **Andra Agric. J., 32**: 146-149.

ROBIN, S. (1988) Studies on biparental mating in maize *(Zea mays* L.) M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

(Received : October 1993 Revised : January 1994)

Madras Agric. J., 82(5): 393-394 May, 1995

RESEARCH NOTES

VARIABILITY IN *Setaria italica*

Genetic and breeding studies have been rather limited in *Setaria italica* as could be seen from published reports. Most of the studies in this millet was limited to studies on germplasm and varietal collection which were subjected to usual statistical analysis. Information originating from such studies, however, is very useful in formulating breeding strategies for improving yield. Sixteen cultures of *Setaria italica viz* AK 15-2, AK 19-1, AK 39-1, AK 54-1, AK 81-4, AK 112-5, AK 131-1, AK 132-1, AK 135-1, AK 320-2, AK 345-1, AK 346-1, AK 377-2, AK 381-1, AK 409-2 and AK 433-2 were selected from the germplasm collections of Anantapur and Kurnool districts of Andhra Pradesh. Further H_1, Co3 and Chitra, the released varieties were included as checks.

Plant height exhibited very low genotypic coefficient of variability and also low heritability (Table 1). Reasons for low variability of plant height could be due to the fact that all of them originated in South India. Total tillers per plant have shown low gcv while the pcv was high for their character. Low variability was observed in total tillers per plant because the differences among the entries were not found to be significant. Productive tillers per plant also showed the same trend with low gcv but the pcv was high and heritability was low.

Days to 50 per cent flowering and maturity showed significant differences between varieties. Highest gcv was observed in this character. Heritability was estimated to be very high for days to 50 per cent bloom and maturity. This character had high genetic advance as per cent of mean. The differences in panicle length and test weight were not significant among the cultivars. Weight of the earheads per plot exhibited very low variability and did not show significant differences. The range of

Table 1. Variability in *Setaria italica*

Character	Genotypic variance	Phenotypic variance	Heritability in broad sense	Genotypic coefficient of variability	Phenotypic coefficient of variability	Genetic advance as % of mean
Plant height (cm)	0.0409	43.5537	0.09	0.0392	41.7745	0.01
Total tillers per plant	0.0307	0.2942	10.44	1.3465	12.9035	3.95
Productive tillers per plant	0.0196	0.2719	7.21	0.9202	12.7652	2.82
Days to 50 per cent bloom	4.7904	5.3567	89.43	9.6834	10.8282	2.26
Days to maturity	6.3587	6.6238	96.00	7.5295	7.8435	0.98
Panicle length (cm)	0.6723	1.7767	37.84	4.9911	12.9308	4.88
Weight of earheads (kg)	0.0106	0.0756	14.06	0.6424	4.5818	3.64
Test weight (g)	0.0086	0.0117	73.71	0.3691	0.5021	3.43
Straw weight (kg/plot)	0.1583	0.4269	37.09	5.4775	14.7716	11.07
Grain weight (kg/plot)	0.0065	0.0457	14.31	0.5421	3.8115	4.17