

## Character Association and Path Analysis for Yield Contributing and Physiological Parameters for Grain Yield in Maize (*Zea mays* L.)

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### ABSTRACT

The present study was undertaken to carry out correlation and path analysis for yield, yield contributing traits and physiological parameters in Maize. Correlation analysis revealed that 100 seed weight, Leaves above ear, Ear girth, Ear length, Chlorophyll content and Plant height were significantly and positively associated with Grain yields. Path analysis indicated that 100-seed weight exhibited the largest direct positive effect on grain yield followed by leaves above ear.

**Key Words:** Maize, A.S.I, Correlation, Path analysis.

### INTRODUCTION

Yield is quantitative character controlled by polygenes and it is the result of combined effect of several component characters and environment. Knowledge of interaction among the characters is very essential in plant breeding to determine the extent and nature of relationship between yield, yield components and physiological characters. Path Coefficient analysis enables a plant breeder to separate direct and their indirect effects through attributes by partitioning the correlations. Thus Correlation and Path coefficient analysis form a basis for selection and helps in understanding yield contributing characters affecting yield in Maize (*Zea mays* L.).

### MATERIALS AND METHODS

The experiment material for the present investigation comprised of forty nine genotypes obtained from Agricultural Research Station, Amberpet Hyderabad. These genotypes were diverse in nature both from the view of geographical distribution and yield contributing traits. The material was sown in Simple Lattice design with two replications at College Farm, College of Agriculture, Rajendranagar, Hyderabad. Data were recorded on five randomly selected plants in each entry in two replications and averages were computed. Anthesis-Silking Interval (A.S.I) calculated as difference between days to 50 per cent silking and days to 50 per cent tasseling. Chlorophyll content recorded in the Ear leaf using SPAD-meter at 50 per cent silking. Flag Leaf Area (m<sup>2</sup>) calculated as maximum width of leaf X length X 0.75. The data were subjected to statistical analysis to estimate genotypic and phenotypic correlation Coefficients<sup>2</sup> and Path Coefficient analysis<sup>1</sup>.

### RESULTS AND DISCUSSIONS

Grain yield was found to be positively associated with Plant Height (0.3994\*\*/0.4697\*), Leaves above Ear (0.6536\*\*/1.1384\*\*), Chlorophyll content (0.3373\*/0.4321\*\*), Leaf per plant (0.2895\*/0.3242\*), Ear length (0.5832\*\*/0.7327\*\*), Ear girth (0.6331\*\*/0.7887\*\*) and 100 seed weight (0.7629\*\*/0.8282\*\*). Positive association of plant height, Ear girth, Ear length and 100 seed weight with grain yield is in agreement with findings of Umakanth and Sunil, (2000) Kumar and Satyanarayana<sup>3</sup> and Mohan *et al.*<sup>4</sup>.

Negative association was observed for grain yield through days to 50 per cent tasseling and days to physiological maturity. Days to physiological maturity exhibited significant negative genotypic correlation with ear length (-0.3162\*), 100 seed weight (-0.4666\*) and yield per plant (-0.4295\*\*). (Table 1)

**Table 1. Phenotypic and Genotypic correlation for Physiological parameters, Grain yield and its components in Maize (*Zea mays* L.)**

		Days to 50% tasseling	Days to 50% silking	A.S.I	Plant height (cm)	Leaves above Ear	Chlorophyll content (SPAD-units)	Flag leaf area/ plant (cm <sup>2</sup> )	Days to phy.maturity	Ear length (cm)	Ear girth (cm)	100 seedweight (g)	Yield/plant (g)
Days to 50% tasseling	(P)	1.0000	0.9543**	-0.5238**	-0.0697	-0.1222	-0.3391*	-0.0466	0.7134**	-0.3405*	-0.0599	-0.4082**	-0.3987**
	(G)	1.0000	0.9773**	-0.6024**	-0.0580	-0.2437	0.4097**	-0.0507	1.1116**	-0.4359**	-0.1064	-0.5253**	-0.4358**
Days to 50% silking	(P)		1.0000	-0.2452	-0.0716	-0.1240	-0/3450*	-0.0274	0.6878**	-0.3220*	-0.0649	-0.4005**	-0.4172**
	(G)		1.0000	-0.4195**	-0.0603	-0.2570	-0.4207**	-0.0275	1.0978**	-0.4061**	-0.0855	-0.5166**	-0.4708**
A.S.I	(P)			1.0000	0.0221	0.0432	0.1165	0.0730	-0.3538*	0.1865	0.0095	0.1825	0.1043
	(G)			1.0000	0.0211	0.0757	0.1703	0.1137	-0.6263**	0.3374*	0.1338	0.3042*	0.1706
Plant height (cm)	(P)				1.0000	0.4323**	0.1797	0.4454**	-0.0579	0.5400**	0.3591*	0.2255	0.3994**
	(G)				1.0000	0.7236**	0.1945	0.4733**	-0.0880	0.7181**	0.5409**	0.3150*	0.4697**
Leaves above Ear	(P)					1.0000	0.1962	0.3179*	-0.1039	0.4279**	0.4373**	0.4992**	0.6536**
	(G)					1.0000	0.2928*	0.5381**	-0.2298	0.8235**	0.9218**	0.8092**	1.1384**
Chlorophyll content	(P)						1.0000	0.1070	-0.3477*	0.3148*	0.1668	0.2397	0.3373*
	(G)						1.0000	0.1280	-0.6332**	0.4017**	0.3446*	0.3896**	0.4231**
Flag leaf area /plant (cm <sup>2</sup> )	(P)							1.0000	-0.0827	0.3049*	0.3168*	0.3629*	0.2895*
	(G)							1.0000	-0.1377	0.3723**	0.4444**	0.4532**	0.3242*
Days to phy.maturity	(P)								1.0000	-0.2086	-0.0629	-0.1959	-0.2346
	(G)								1.0000	-0.3162*	-0.1077	-0.4666**	-0.4295**
Ear length (cm)	(P)									1.0000	0.3957**	0.5061**	0.5832**
	(G)									1.0000	0.4985**	0.6890**	0.7327**
Ear girth (cm)	(P)										1.0000	0.5062**	0.6331**
	(G)										1.0000	0.6009**	0.7887**
100 seedweight (g)	(P)											1.0000	0.7629**
	(G)											1.0000	0.8282**
Yield/plant (g)	(P)												1.0000
	(G)												1.0000

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

Ear girth exhibited direct effect on yield followed by 100 seed weight, Ear girth, Ear length. Direct effect of 100 seed weight, Ear length with yield. Similar reports reported by Devi *et al.*<sup>5</sup> and Mohan *et al.*<sup>4</sup> Characters to days to 50 per cent silking, Plant height, Chlorophyll content and days to physiological maturity exhibited direct positive effects but of lower magnitude on grain yield per plant. Days to 50% per cent tasseling recorded negative direct effect on yield. (Table 2)

**Table 2: Estimation of Path co efficient between Physiological, Grain yield and its components in Maize (*Zea mays* L.)**

	Days to 50% tasseling	Days to 50% silking	A.S.I	Plant height (cm)	Leaves above Ear	Chlorophyll content	Leaf area/plant (cm <sup>2</sup> )	Days to phy.maturity	Ear length (cm)	Eargirth (cm)	100 seed wt(g)
Days to 50% tasseling	<b>-0.4046</b>	-0.3861	0.2119	0.0282	0.0495	0.1372	0.0188	-0.2886	0.1377	0.0243	0.1651
Days to 50% silking	0.1412	<b>0.1479</b>	-0.0363	-0.0106	-0.0183	-0.051	-0.004	0.1017	-0.0476	-0.0096	-0.0592
A.S.I	0.0798	0.0374	<b>-0.1524</b>	-0.0034	-0.0066	-0.0177	-0.0111	0.0539	-0.0284	-0.0014	-0.0278
Plant height (cm)	-0.0053	-0.0054	0.0017	<b>0.076</b>	0.0328	0.0137	0.0338	-0.0044	0.041	0.0273	0.0171
Leaves above Ear	-0.0334	-0.0339	0.0118	0.1182	<b>0.2735</b>	0.0537	0.0869	-0.0284	0.1294	0.1196	0.1365
Chlorophyll content	-0.0245	-0.0249	0.0084	0.013	0.0142	<b>0.0722</b>	0.0077	-0.0251	0.0227	0.012	0.0173
Leaf area/plant	0.0039	0.0023	-0.0061	-0.037	-0.0264	-0.0089	<b>-0.083</b>	0.0069	-0.0253	-0.0263	-0.0301
Days to phy.maturity	0.0394	0.038	-0.0195	-0.0032	-0.0057	-0.0192	-0.0046	<b>0.0553</b>	-0.0115	-0.0035	-0.0108
Ear length (cm)	-0.0214	-0.0202	0.0117	0.0339	0.0297	0.0198	0.0192	-0.0131	<b>0.0628</b>	0.0249	0.0318
Eargirth (cm)	-0.0162	-0.0175	0.0026	0.0971	0.1182	0.0451	0.0857	-0.017	0.107	<b>0.2704</b>	0.1369
100 seed wt(g)	-0.1576	-0.1546	0.0704	0.0871	0.1927	0.0925	0.1401	-0.0756	0.1954	0.1954	<b>0.3861</b>
Yield/plant (g)	<b>-0.3987**</b>	<b>-0.4172**</b>	<b>0.1043</b>	<b>0.3994**</b>	<b>0.6536**</b>	<b>0.3373*</b>	<b>0.2895*</b>	<b>-0.2346</b>	<b>0.5832</b>	<b>0.6331**</b>	<b>0.7629**</b>

RESIDUAL EFFECT = 0.4663, \*Significant at 5% level, \*\* Significant at 5% level

From the present study it was inferred that 100-seed weight, Ear girth, Ear length had significant association and also positive high direct effect on grain yield per plant. Hence direct selection for these traits would be effective for achieving higher yields.

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