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JK Rajwade
Department of Plant Breeding and Genetics, Orissa University of Agriculture and Technology, Bhubaneswar, Odhisa, India

PN Jagadev
Department of Plant Breeding and Genetics, Orissa University of Agriculture and Technology, Bhubaneswar, Odhisa, India

D Lenka
Department of Plant Breeding and Genetics, Orissa University of Agriculture and Technology, Bhubaneswar, Odhisa, India

Shimla Gupta
Department of Plant Breeding and Genetics, Orissa University of Agriculture and Technology, Bhubaneswar, Odhisa, India

Correspondence
JK Rajwade
Department of Plant Breeding and Genetics, Orissa University of Agriculture and Technology, Bhubaneswar, Odhisa, India

Correlation and path coefficient studies on elite genotypes of maize inbred lines

JK Rajwade, PN Jagadev, D Lenka and Shimla Gupta

Abstract
Yield is the foremost consideration in the breeding of any crop. Since the yield depends upon many yield contributing characters, it becomes essential to study the contribution of each character to the yield. An experimental study was conducted to evaluate the relationship between yield and its components in maize through correlation studies. The objective of this present study was to evaluate of interrelationships among grain yield and related characters of 43 maize inbred lines. In present study, all components traits except days to 50% tasseling, days to 50% silking, days to 75% dry husk, leaf length, leaf breadth exhibited highly significant positive correlation with grain yield per plant at both genotypic and phenotypic level. Analysis of the path coefficient analysis indicated that character like cob weight, days to 50% silking, number of kernel row per cob, leaf length, ear height in order that had high direct contribution to grain yield per plant at genotypic level. And at phenotypic level the character like cob weight shelling %, number of kernel per cob in that order had high direct contribution to grain yield per plant. Cob weight been recorded for highest direct contribution to grain yield per plant at both genotypic and phenotypic level.

Keywords: correlation, path coefficient, maize, character

Introduction
Maize (*Zea mays* L., 2n = 20) which is referred as 'Queen of cereals' has the highest production potential among cereals and it occupies a prominent position in global agriculture. It is a unique crop which can be used as food, feed fodder, fuel in addition to hundreds of industrial uses. In India, it is the third important crop next to rice and wheat. It is an important cereal crop belonging to tribe *Maydeae*, of the grass family, *Poaceae*. Single cross hybrids have the highest yield potential than other type of hybrids. Grain yield in maize is a complex characters controlled by many factors. Selection for desirable genotypes should be made based on grain yield and also other yield component characters which influence the yield. Studies on correlation coefficients of different plant characters are useful criterion to identify desirable traits that contribute to improve the dependent variable. Correlation coefficient is one of the important biometrical tools for formulating a selection index as it reveals the strength of relationship among the group of characters. This also helps to decide the dependability of the characters that have little or no importance. The relationship of a character with yield and other component characters could also be useful for the proper choice of parents for hybridization programme. Yield being a complex character, direct selection could be an efficient approach without knowing its genetic background Roy *et al.*, 1995 [1]. Grain yield is also one of the such dependent trait, which is influenced by many independent characters. The present study was conducted to assess the genetic relationships among yield components, through association analysis for enhancing the usefulness of selection for grain yield improvement in maize.

Materials and Methods
A set of 120 maize populations were initially received from different sources from which 43 inbreds were developed by ear to row method and subsequently further purified and maintained by selfing at EB-II section, Department of Plant Breeding and Genetics, College of Agriculture, OUAT, Bhubaneswar. The field experiment was laid out in a randomized complete block design (RCBD) with two replications. The field experiment was conducted at EB-II section of the Department of Plant Breeding and Genetics, College of Agriculture, OUAT, Bhubaneswar during *kharif* 2015. Observations on 16 different quantitative characters were recorded. Observation on days to 50% tasselling, days to 50% silking and days to 75% dry husk were recorded on plot basis and observations for other characters were taken from a sample of 5 randomly chosen competitive plants from each treatment per replication and average was calculated. 16 Observations recorded are Days to 50% tasseling,

Days to 50% silking, Days to 75% dry husk maturity, Leaf length (cm), Leaf breadth (cm), Plant height (cm), Ear height (cm), Cob length (cm), Cob girth (cm), Number of kernels rows per cob, Number of kernels per row, Number of kernels per cob, 100 seed weight, Cob weight and Shelling%, Grain yield per plant. The data recorded for various characters were subjected to statistical analysis based on their sample means to study Correlation coefficient and path coefficient of elite genotypes of maize inbred lines.

Results and Discussion

In general, genotypic correlations were of higher magnitude than the corresponding phenotypic values which indicates that though there is strong inherent association between characters studied, its expression is lessened due to influence of environment and considering the importance of phenotypic correlation as it was discussed in the results. The grain yield per plant was positively and significantly correlation with ear height (0.640), plant height (0.565), cob length (0.584), cob girth (0.867), number of kernel row per cob (0.0.717), number kernels per row (0.917), number of kernels per cob (0.911), 100 kernel weight (0.568), cob weight (0.996), shelling % (0.621). Its correlation with days to 50 % tasseling, days to 50% silking were negative but non-significant. At phenotypic level almost similar trend were observed (Table 4.5) at the grain yield per plant was positively and significantly correlated with cob weight (0.992), Plant height (0.554), Cob length (0.547), Cob girth (0.846), number of grain row per cob (0.684) number of grain per row (0.904), number of grain per cob (0.873), 100 kernel weight (0.546), shelling% (0.554). Its correlation with days to 50% tasseling, days to 50% silking, were negative but non-significant.

Out of 105 genotypic correlation among 16 characters 65 were significant 61were positive and 4 were negative (Table 4.4). Ear height showed significantly and positive correlation with days to 75 % dry husk, plant height, leaf length, leaf breadth, cob length, cob girth, number of kernel row per cob, number of kernel per row, number of kernel per cob, cob weight and grain yield per plant. Plant height showed significantly positive correlation with days to 75% dry husk, ear height, leaf length, leaf breadth, cob length, cob girth, number of kernel per row, number of grain row per cob, 100 kernel weight, cob weight and grain yield per plant. Ear length showed significantly positively correlated with days to 50% tasseling, days to 50% silking, days to 75 % dry husk, ear height, plant height, leaf breadth, cob girth, number of kernel per row, number of kernel per cob 100 kernel weight, cob weight,grain yield per plant. Cob girth showed significantly positively correlated with ear height, plant height, cob length, number of grain row per cob, number of grain per row, number of grain per cob, 100 kernel weight, shelling %, grain yield per plant. Number of kernel row per cob showed significantly positively correlated with cob weight, cob girth, Number of kernel per row, Number of kernel per cob, cob weight, shelling %, grain yield per plant. Number of kernel per row showed significantly positively correlated with ear height, plant height cob length, cob girth, number of kernel row per cob, 100 kernel weight cob weight, shelling %, grain yield per plant. Number of kernel per cob showed significantly positively correlated with ear height, plant height, cob length, cob girth, number of kernel row per cob, cob weight, shelling %, grain yield per plant. 100 kernel weight significantly positively correlated with days to 50% tasseling, days to 50% silking, days to 75 % dry husk, plant height, leaf length, leaf breadth, cob length, cob girth, number of kernel per row, cob weight, grain yield per plant. Cob weight showed significantly positively correlated with ear height, plant height, cob length, cob girth, number of kernel row per cob, number of kernel per row, number of kernel per cob, 100 kernel weight, shelling %, grain yield per plant. Shelling % showed significantly positively correlated with cob girth, number of kernel row per cob, number of kernel per row, number of kernel per cob, cob weight, and grain yield per plant.

Out 105 phenotypic correlation among 16 characters 66 were significant 62 were positive and 4 were negative (Table 4.5). Ear height showed significantly positive Correlation with height, leaf length, leaf breadth, cob length, cob girth, number of kernel per row, number of kernel per cob, cob weight, and grain yield per plant. Plant height showed significantly positive Correlation with days to 75 % dry husk, ear height, leaf length, leaf breadth, cob length, cob girth, number of kernel per row, number of kernel per cob, cob weight, and grain yield per plant. Cob length showed significantly positive Correlation with days to 50 % tasseling, with days to 50 % silking, days to 75 % dry husk, ear height, plant height, leaf breadth, cob girth, number of kernel per row, number of kernel per cob, 100 kernel weight, cob weight, grain yield per plant. Cob girth showed significantly positive Correlation with ear height, plant height, cob length, number of kernel per row, number of kernel per cob, 100 kernel weight, cob weight, grain yield per plant. And negatively significantly correlated with days to 50 % tasseling, with days to 50 % silking. Number of kernel row per cob showed significantly positive Correlation with cob girth number of kernel per row, number of kernel per cob, cob weight, grain yield per plant. And negatively significant correlated with days to 50 % tasseling, with days to 50 % silking. Number of kernel per row showed significantly positive Correlation with ear height, plant height, cob length, cob girth, number of kernel row per cob, number of kernel per cob, 100 kernel weight, cob weight, shelling %, grain yield per plant. Number of kernel per cob showed significantly positive Correlation with ear height, plant height, cob length, cob girth, number of kernel row per cob, number of kernel per row, cob weight, grain yield per plant. Shelling % showed significantly positive Correlation with cob girth, number of kernel row per cob, number of kernel per row, number of kernel per cob, 100 kernel weight, cob weight, grain yield per plant. Cob weight showed significantly positive Correlation with ear height, plant height, cob length, cob girth, number of kernel row per cob, number of kernel per row, number of kernel per cob, 100 kernel weight, shelling %, grain yield per plant.

The estimates of direct and indirect effects of the component characters on yield both at genotypic and phenotypic levels are presented in Table 4.6 and 4.7. At genotypic level the analysis had high R2 (100 %) value and residual effect of PR =0.006 The cob weight (1.388), days to 50% silking (0.359), number of kernel row per cob (0.166), leaf length (0.133), ear height (0.101) in order that had large positive direct effect on grain yield per plant. The character viz. days to 50 % tasseling (-0.279), number of kernel per cob (-0.234), 100 kernel weight (-0.207), cob girth (-0.150), plant height (-0.130), cob length (-0.068), days to 75% dry husk(-0.009) had negative effects. While characters like shelling % (0.016) number of kernel per row (0.026) leaf breadth (0.019) recorded very small but positive effect on grain yield per plant. Significant correlation between ear height and grain yield per plant (0.640) were through direct positive effect of ear height (0.101) and higher indirect negative effect via. Plant height (-

0.161) and higher positive effect on cob weight (0.873). Significant correlation between plant height and grain yield per plant (0.565) were through negative direct effect of days of plant height (-0.130) and higher indirect negative effect via. number of grains per cob (-0.118), 100 kernel weight (-0.089) and high positive indirect effect on cob weight (0.777). Significant correlation between cob length and grain yield per plant (0.584) were through direct negative effect of cob length (-0.068) and higher indirect negative effect via. number of kernel per cob (-0.136) and 100 kernel weight (-0.104) and high positive indirect effect on cob weight (0.855), days to 50 % silking (0.162).

Significant correlation between cob girth and grain yield per plant (0.897) were through direct negative effect of cob girth (-0.150) and higher indirect negative effect via. days to 50 % silking (-0.124), number of kernel per cob (-0.217) and high positive indirect effect on cob weight (1.252). Significant correlation between number of kernel row per cob and grain yield per plant (0.717) were through direct positive effect of number of kernel row per cob (0.166). and higher indirect negative effect via. days to 50 % silking (-0.185), cob girth (-0.177), number of kernel per cob(-0.189) and high positive indirect effect on days to 50 % tasseling (0.143), cob weight (0.955). Significant correlation between number of kernel per row and grain yield per plant (0.917) were through direct positive effect of number of kernel per row (0.026) and higher indirect negative effect via. Cob girth (-0.127) number of kernel per cob (-0.234) and high positive indirect effect on cob weight (1.270). Significant correlation between number of kernel per cob and grain yield per plant (0.911) were through direct positive effect of number of kernel per cob (-0.234) and higher indirect negative effect via. days to 50 % silking (-0.096), cob girth (-0.139) and higher positive indirect effect on cob weight (1.240). Significant correlation between 100 kernel weight and grain yield per plant (0.568) were through direct negative effect of 100 kernel weight (-0.207) and higher indirect negative effect via. days to 50 % tasseling (-0.094) and higher positive indirect effect on days to 50 % silking (0.128), cob weight (0.832). Significant correlation between cob weight and grain yield per plant (0.996) were through direct positive effect of cob weight (1.388) and higher indirect negative effect via. cob girth (-0.135), number of kernel per cob (-0.209), 100 kernel weight (-0.124) and higher positive indirect effect on number of kernel row per cob (0.080). Significant correlation between shelling % and grain yield per plant (0.621) were through direct positive effect of shelling % (0.016) and higher indirect negative effect via. number of kernel per cob (-0.180), days to 50 % silking (-0.086), and higher positive indirect effect on cob weight (0.795). Genotypic path coefficient analysis revealed that Cob weight produced highest direct effect and low indirect positive effect for almost all character except number of kernel row per cob. Similarly days to 50% silking have highest direct effect and almost all the character have low positive indirect effect. Similarly number of kernel per row have highest direct effect on cob weight, days to 50%tasseling, have indirect positive effect.so while selection is made those three character should be taken into consideration for high productive inbred selection.

At phenotypic level, similar trend was also noticed irrespective of direct and indirect effects of component traits on grain yield per plant. The analysis had high R2 = 99.14 value and residual effect of 0.093. the character like cob weight (0.960), shelling % (0.098), number of kernel per cob (0.093) in that order had large positive direct effect on grain yield per plant. The character viz. number of kernel per row (-0.109), days to 50% silking (-0.068),while other character had small direct effect but was non-significant at both 5% and 1% level. Significant correlation between ear height and grain yield per plant (0.611) were through direct positive effect of ear height (0.004) and higher indirect negative effect via. number of kernel per row (-0.064) and high positive indirect effect by cob weight (0.575), number of kernel per cob (0.056). Significant correlation between plant height and grain yield per plant (0.550) were direct positive effect of plant height (0.024) and higher indirect negative effect via. number of kernel per row (-0.052) and high positive indirect effect by cob weight (0.518). Significant correlation between cob length and grain yield per plant (-0.547) were through direct negative effect of cob length (-0.006) and higher indirect negative effect via. number of kernel per row (-0.059), days to 50% silking (-0.027) and high positive indirect effect by cob weight (0.557), number of kernel per cob (0.046) Significant correlation between cob girth and grain yield per plant (0.846) were direct positive effect of cob girth(0.002) and higher indirect negative effect via. number of grains per row(-0.085) number of kernel row per cob (-0.030) and high positive indirect effect by cob weight(0.807), number of kernel per cob (0.076) shelling % (0.046). Significant correlation between number of kernel row per cob and grain yield per plant (0.684) were through direct negative effect of number of kernel row per cob (-0.043) and higher indirect negative effect via. number of kernel per row (-0.073) and high positive indirect effect by cob weight (0.0627), shelling % (0.074) number of kernel per cob (0.068).

Significant correlation between number of kernel per row and grain yield per plant (0.904) were through direct negative effect of number of kernel per row (-0.109) and higher indirect negative effect via. number of kernel row per cob (-0.029) and high positive indirect effect by cob weight (0.846), number of kernel per cob (0.087) shelling % (0.062). Significant correlation between number of kernel per cob and grain yield per plant (0.873) were direct positive effect of number of kernel per cob (0.093) and higher indirect negative effect via. number of kernel per row(-0.101), number of kernel row per cob (-0.031) and high positive indirect effect by cob weight (0.825), shelling %(0.061). Significant correlation between 100 kernel weight and grain yield per plant (0.546) were direct positive effect of 100 kernel weight (0.015) and higher indirect negative effect via. number of kernel per row(-0.036),days to 50 % silking (-0.022) and high positive indirect effect by cob weight (0.550) number of kernel per cob (0.019). Significant correlation between cob weight and grain yield per plant (0.992)were direct positive effect of cob weight (0.960) and higher indirect negative effect viz. number of kernel per row(-0.098) and high positive indirect effect by number of kernel per cob (0.080) shelling %(0.049).Significant correlation between shelling % and grain yield per plant (0.554) were direct positive effect of shelling % (0.098) and higher indirect negative effect via. number of kernel per row (-0.069), number of kernel row per cob (-0.032) high positive indirect effect by cob weight (0.481).

The path coefficient analysis not only specify the effective measure of direct and indirect causes of association, but also depicts the relative importance of each factor involved in contributing to the final product of yield. The estimates of direct and direct and indirect effect of components characters on yield both at genotypic and phenotypic level are presented in Table 4.6 and Table 4.7. In the present investigation, The

cob weight (1.388) found positive and highly significant direct effect for grain yield per plant was also reported by Nataraj *et al.* [2]. And also noticed favourable influence of days to 50% silking (0.359), ear girth (0.166) leaf length (0.133), ear height (0.101) in order that had large positive direct effect on grain yield per plant. days to 50 % silking also contribute direct positive effect towards grain yield was also reported by Lingaiah *et al.*[3], Bello *et al.*[4], Azam *et al.*[5] and for ear height was reported by Reddy *et al.* [6], Bello *et al.* [4]. At phenotypic level, similar trend was also noticed irrespective of direct and indirect effects of component traits on grain yield per plant. The character like cob weight (0.960), shelling % (0.098), number of kernel per ear (0.093) in that order had positive direct effect on grain yield per plant. The character viz. number of kernel per row (-0.109), days to 50% silking (-0.068), while other character had small direct effect. Grain yield in maize is a complex traits that play interdependent roles selection for desirable genotypes should be carefully made based on types of influence in each characters makes an yield. Ojha *et al.* [7]. Positive and significant association that existed between grain yield per plant and most yield related characters suggested that grain yield can be improved through simultaneous selection of this character. This finding confirmed of other worker. (Kumar and Satyanarayan [8], Umakanth and khan [9], Singh *et al.* [10], Rafique *et al,* [11].

Table 4.4: Estimation of genotypic (rg) correlation coefficient among sixteen agro-economic traits of 43 maize inbreds

Character		correlation	Days to 50 % silking	Days to 75 % dry husk	Ear height	Plant height	Leaf Length	Leaf width	Ear Length	Ea Girth	No. of rows / cob	No. of grains / row	No. of grains / Ear	100 gm kernels weight	Ear weight	Shelling%	Grain yield /plant
1.	Days to 50% tasselling (DT)	r_g	0.990**	0.153	-0.192	-0.046	0.127	0.183	0.425**	-0.307	-0.483	-0.177	-0.242	0.316*	-0.138	-0.216	-0.187
2.	Days to 50 % silking (DS)	r_g	-	0.537**	-0.185	-0.011	0.174	0.187	0.452**	-0.345	-0.516	-0.217	-0.267	0.358*	-0.155	-0.240	-0.206
3.	Days to75 % dry husk (DH)	r_g		-	0.303*	0.471**	0.490**	0.595**	0.559**	-0.090	-0.283	0.208	0.061	0.550**	0.270	-0.001	0.245
4.	Ear height (EHT)	r_g			-	0.825**	0.415**	0.341*	0.389**	0.611**	0.306*	0.631**	0.691**	0.256	0.629**	0.237	0.640**
5.	Plant height (PHT)	r_g				-	0.692**	0.615**	0.503**	0.475**	0.182	0.510**	0.506**	0.428**	0.560**	0.173	0.565**
6.	Leaf Length (cm)	r_g					-	0.811**	0.289	0.234	-0.002	0.159	0.154	0.418**	0.198	0.042	0.223
7.	Leaf breadth(cm)	r_g						-	0.335*	0.235	-0.060	0.105	0.067	0.558**	0.259	0.003	0.255
8.	Cob Length(cm	r_g							-	0.419**	0.276	0.588**	0.580**	0.502**	0.616**	0.148	0.584**
9.	Cob Girth (cm)	r_g								-	0.784**	0.847**	0.929**	0.399**	0.902**	0.491**	0.867**
10.	No. of rows per cob (R/C)	r_g									-	0.754**	0.807**	0.140	0.688**	0.857**	0.717**
11.	No. of grains per row (G/R)	r_g										-	1.002	0.340*	0.915**	0.720**	0.917**
12.	No. of grains per cob	r_g											-	0.239	0.893**	0.770**	0.911**
13.	100 gm kernels weight(gm)	r_g												-	0.599**	0.144	0.568**
14.	Cobweight (gm)	r_g													-	0.573**	0.996**
15.	Shelling %	r_g														-	0.621**

*r ≥ 0.301 (significant at 5%) ** r≥ 0.388 (significant at 1%)

Table 4.5: Estimation of phenotypic (r_p) correlation coefficient among sixteen agro-economic traits of 43 maize inbreds

Character		correlation	Days to 50 % silking	Days to 75 % dry husk	Ear height	Plant height	Leaf Length	Leaf width	Ear Length	Ear Girth	No. of rows / cob	No. of grains / row	No. of grains / Ear	100 gm kernels weight	Ear weight /plot	Shelling %	Grain yield /plant
1.	Days to 50% tasselling	r_p	0.955**	0.481**	-0.189	-0.044	0.107	0.187	0.390**	-0.306	-0.449	-0.153	-0.182	0.308*	-0.125	-0.216	-0.167
2.	Days to 50 % silking	r_p	-	0.485**	-0.177	-0.010	0.140	0.189	0.392**	-0.310	-0.456	-0.181	-0.188	0.330*	-0.132	-0.226	-.0174
3.	Days to75	r_p		-	0.289	0.444*	0.499*	0.573*	0.505*	0.065	-0.261	0.170	0.051	0.524*	0.245	-0.057	0.220

	% dry husk					*	*	*	*					*			
4.	Ear height (EHT)	**r_p**			-	0.799**	.0398**	0.337*	0.363*	0.565**	0.269	0.586**	0.595**	0.252	0.599**	0.203	0.611**
5.	Plant height (PHT)	**r_p**				-	0.665**	0.600**	0.468**	0.435	0.186	0.481**	0.468**	0.143	0.540**	0.157	0.550**
6.	Leaf Length (cm)	**r_p**					-	0.782**	0.289	0.223	0.019	0.165	0.158	0.400**	0.212	0.062	0.225
7.	Leaf width (cm)	**r_p**						-	0.319*	0.214	-0.054	0.109	0.084	0.535**	0.257	0.017	0.254
8.	Ear Length(cm	**r_p**							-	0.392	0.241	0.546**	0.497**	0.471**	0.580**	0.169	0.547**
9.	Ear Girth (cm)	**r_p**								-	0.711**	0.786**	0.809**	0.365*	0.841**	0.468**	0.846**
10.	No. of rows per cob	**r_p**									-	0.670**	0.733**	0.114	0.653**	0.752**	0.684**
11.	No. of grains per row (G/R)	**r_p**										-	0.927**	0.328*	0.900**	0.634**	0.904**
12.	No. of grains per cob	**r_p**											-	0.207	0.859**	0.615**	0.873**
13.	100 kernels weight	**r_p**												-	0.573**	0.118	0.546**
14.	Cob weight (gm)	**r_p**													-	0.501**	0.992**
15.	Shelling percentage	**r_p**														-	0.554**

*r ≥ 0.301 (significant at 5%) ** r ≥ 0.388 (significant at 1%)

Table 4.6: Path coefficient analysis indicating direct (diagonal) and indirect effect of various characters on grain yield at genotypic level

	Path Coeff.	**Days to 50% tasselling**	**Days to 50 % silking**	**Days to75 % dry husk**	**Ear height**	**Plant height**	**Leaf Length**	**Leaf width**	**Ear Length**	**Ear Girth**	**No. of rows / cob**	**No. of grains / row**	**No. of grains / Ear**	**100 gm kernels weight**	**Ear weight /plantt**	**Shelling %**	**Correlation With grain yield /plant**
Days to 50% tasselling	P_g	-0.279	0.355	-0.005	-0.019	0.006	0.017	0.003	-0.029	0.046	-0.056	-0.005	0.057	-0.065	-0.192	-0.003	-0.187
Days to 50 % silking	P_g	-0.294	0.359	-0.005	-0.019	0.001	0.023	0.004	-0.031	0.052	-0.060	-0.006	0.062	-0.074	-0.215	-0.004	-0.206
Days to75 % dry husk	P_g	-0.152	0.193	-0.009	0.031	-0.061	0.065	0.011	-0.038	-0.013	-0.033	0.005	-0.014	-0.114	0.375	0.000	0.245
Ear height	P_g	0.057	-0.066	-0.003	0.101	-0.107	0.055	0.006	-0.026	-0.196	0.035	0.016	-0.161	-0.053	0.873	0.004	0.640**
Plant height	P_g	0.014	-0.004	-0.004	0.084	-0.130	0.092	0.012	-0.034	-0.071	0.021	0.013	-0.118	-0.089	0.777	0.003	0.565**
Leaf Length	P_g	-0.038	0.062	-0.004	0.042	-0.090	0.133	0.015	-0.020	-0.035	0.000	0.004	-0.036	-0.087	0.275	0.001	0.223
Leaf breadth	P_g	-0.054	0.067	-0.005	0.035	-0.080	0.108	0.019	-0.023	-0.035	-0.007	0.003	-0.016	-0.116	0.360	0.000	0.255
Cob Length	P_g	-0.126	0.162	-0.005	0.039	-0.065	0.038	0.006	-0.068	-0.063	0.032	0.015	-0.136	-0.104	0.855	0.002	0.584**
Cob Girth	P_g	0.091	-0.124	-0.001	0.062	-0.062	0.031	0.004	-0.029	-0.150	0.091	0.022	-0.217	-0.083	1.252	0.008	0.897**
No. of rows /cob	P_g	0.143	-0.185	0.002	0.031	-0.024	0.000	-0.001	-0.019	-0.177	0.166	0.019	-0.189	-0.029	0.955	0.014	0.717**
No. of grains / row	P_g	0.053	-0.078	-0.002	0.064	-0.066	0.021	0.002	-0.040	-0.127	0.087	0.026	-0.234	-0.070	1.270	0.011	0.917**

No. of grains /Cob	P_g	0.072	-0.096	-0.001	0.070	-0.066	0.021	0.001	-0.039	-0.139	0.093	0.026	-0.234	-0.050	1.240	0.012	0.911**
100 kernels weight	P_g	-0.094	0.128	-0.005	0.026	-0.056	0.056	0.010	-0.034	-0.060	0.016	0.009	-0.056	-0.207	0.832	0.002	0.568**
Cob weight	P_g	0.041	-0.056	-0.002	0.064	-0.073	0.026	0.005	-0.042	-0.135	0.080	0.023	-0.209	-0.124	1.388	0.009	0.996**
Shelling %	P_g	0.064	-0.086	0.000	0.024	-0.023	0.006	0.000	-0.010	-0.073	0.099	0.018	-0.180	-0.030	0.795	0.016	0.621**

P (R) = 0.006 R SQR (%) = 100.00

Table 4.7: Path coefficient analysis indicating direct (diagonal) and indirect effect of various characters on grain yield at Phenotypic level

	Path coeff.	**Days to 50% tasselling**	**Days to 50 % silking**	**Days to75 % dry husk**	**Ear height**	**Plant height**	**Leaf Length**	**Leaf width**	**Ear Length**	**Ea Girth**	**No. of rows / cob**	**No. of grains / row**	**No. of grains / Ear**	**100 gm kernels weight**	**Ear weight**	**Shelling %**	**Correlation With grain yield/plant**
Days to 50% tasselling	P_P	0.021	-0.065	0.002	-0.001	-0.001	0.003	-0.005	-0.002	-0.001	0.019	0.017	-0.017	0.005	-0.120	-0.021	-0.167
Days to 50 % silking	P_P	0.020	-0.068	0.002	-0.001	0.000	0.003	-0.005	-0.002	-0.001	0.019	0.020	-0.018	0.005	-0.127	-0.022	-0.174
Days to75 % dry husk	P_P	0.010	-0.033	0.003	0.001	0.011	0.011	-0.015	-0.003	0.000	0.011	-0.018	0.005	0.008	0.235	-0.006	0.220
Ear height	P_P	-0.004	0.012	0.001	0.004	0.019	0.009	-0.009	-0.002	0.001	-0.011	-0.064	0.056	0.004	0575	0.020	0.611**
Plant height	P_P	-0.001	0.001	0.001	0.003	0.024	0.016	-0.016	-0.003	0.001	-0.008	-0.052	0.044	0.006	0.518	0.015	0.550**
Leaf Length	P_P	0.002	-0.009	0.001	0.002	0.016	0.023	-0.021	-0.002	0.001	-0.001	-0.018	0.015	0.006	0.204	0.006	0.225
Leaf breadth	P_P	0.004	-0.013	0.002	0.001	0.014	0.018	-0.027	-0.002	0.001	0.002	-0.012	0.008	0.008	0.247	0.002	0.254
Cob Length	P_P	0.008	-0.027	0.002	0.001	0.011	0.007	-0.009	-0.006	0.001	-0.010	-0.059	0.046	0.007	0.557	0.017	0.547**
Cob Girth	P_P	-0.006	0.021	0.000	0.002	0.010	0.005	-0.006	-0.002	0.002	-0.030	-0.085	0.076	0.006	0.807	0.046	0.846**
No. of rows /cob	P_P	-0.009	0.031	-0.001	0.001	0.004	0.000	0.001	-0.001	0.002	-0.043	-0.073	0.068	0.002	0.627	0.074	0.684**
No. of grains / row	P_P	-0.003	0.012	0.001	0.002	0.012	0.004	-0.003	-0.003	0.002	-0.029	-0.109	0.087	0.005	0.864	0.062	0.904**
No. of grains /Cob	P_P	-0.004	0.013	0.000	0.002	0.011	0.004	-0.002	-0.003	0.002	-0.031	-0.101	0.093	0.003	0.825	0.061	0.873**
100 kernels weight	P_P	0.006	-0.022	0.002	0.001	0.010	0.009	-0.014	-0.003	0.001	-0.005	-0.036	0.019	0.015	0.550	0.012	0.546**
Cob weight	P_P	-0.003	0.009	0.001	0.002	0.013	0.005	-0.007	-0.003	0.002	-0.028	-0.098	0.080	0.009	0.960	0.049	0.992**
Shelling %	P_P	-0.005	0.015	0.000	0.001	0.004	0.001	0.000	-0.001	0.001	-0.032	-0.069	0.057	0.002	0.481	0.098	0.554**

P (R) = 0.093 R SQR (%) = 99.14

Conclusion

At the genotypic level table (4.4). the grain yield per plant was positively and significantly correlation with ear height (0.640), plant height (0.565), ear length (0.584),ear girth (0.867), number of kernel row per ear (0.0.707), number kernels per row (0.917),number of kernels per ear(0.911), 100 kernel weight (0.568),ear weight(0.996), shelling % (0.621). Its correlation with days to 50 % tasseling, days to 50% silking were negative but non-significant. At phenotypic level almost similar trend were observed (Table 4.5). The grain yield per plant was positively and significantly correlated with ear weight (0.611), plant height (0.550), ear length (0.547), ear girth (0.846), number of grain row per ear (0.684) number of grain per row (0.904), number of grain per ear (0.873), 100 kernel weight (0.992), shelling% (0.554).Its correlation with days to 50% tasseling, days to 50% silking, were negative but non-significant. At genotypic level Path analysis indicated that the ear weight (1.388), days to50% silking (0.359), ear girth (0.166) leaf length (0.133), ear height (0.101) in order that had large positive direct effect on grain yield per plant. At phenotypic level, similar trend was also noticed irrespective of direct and indirect effects of component traits on grain yield per plant. The character like ear weight (0.960), shelling % (0.098), number of kernel per ear (0.093) in that order had positive direct effect on grain yield per plant. Cob weight (0.996) is highly significant positive correlated with grain

yield at both genotypic and phenotypic level. Path analysis revealed that cob weight (0.960), shelling % (0.098) in that order had positive direct effect on grain yield per plant. which will be amenable for direct selction for improve productivity.

References

1. Roy A, Panwar DVS, Sarma RN. Genetic variability and causal relationships in rice. Madras Agric. J. 1995; 82(4):251-255.
2. Nataraj V, Shahi JP, Agarwal V. Correlation and Path Analysis in Certain Inbred Genotypes of Maize (*Zea Mays* L.) at Varanasi. International Journal of innovative research & development. 2014; 3(1):14-17.
3. Lingaiah N, Praveen kumar G, Venkanna V. Character Association and Path Analysis for Yield Contributing and Physiological Paeameters for Grain Yield in Maize (*Zea mays* L.) Int. J Pure App. Biosci. 2014; 2(1):118-121.
4. Bello O, Abdulmaliq B, Afolabi SY, MS, Ige SA. Correlation and path coefficient analysis of yield and agronomic characters among open pollinated maize varieties and their F1 hybrids in a diallel cross. African Journal of Biotechnology. 2010; 9(18):2633-2639.
5. Azami Md. Golam, Umakanta Sarker, Maniruzzam, Bhagyarani Banik. Genetic variability of Yeild amd its contributing character on Cimmyt Maize Inbreds under drought stress. Bangladesh J Agril. Res. 2014; 39(3):419-426.
6. Reddy VR, Jabeen Farzana, Sudarshan MR, Rao AS. Studies on genetic variability heritability, correlation and path coefficient Analysis in maize (*Zea mays* L.) over locations. IJABPT. 2012; 4(1):195-199.
7. Ojha DK, Omikunle OA, Oduwaye Ajala MO, Ogunbayo SA. Heritability, character correlation and path coefficient analysis among six inbred-lines of Maize. (*Zea mays* L.) World Journal of Agricultural Sciences. 2006; 2(3):352-358.
8. Kumar P, Satyanarayana E. Variable and correlation studies of full season inbred lines of maize. Journal of Research, ANGARU. 2001; 29:71-75.
9. Umakanth AV, Khan HA. Correlation and path analysis of grain yield and yield components in maize (*Zea mays* L.). J Res., ANGRAU. 2001; 29:87-90.
10. Singh SB, Gupta BB, Singh AK. Genetic Divergence for Morpho-Physiological Traits and Yield Components Associated with Drought Tolerance in Maize (*Zea mays* L.) Inbreds. Indian J Plant Gent. Resour. 2009; 22(2):102-107.
11. Rafiq Muhammad, Muhammad Rafique, Amer Hussain, Muhammad Altaf. Studies on the heritability, correlation and path analysis in Maize (*Zea mays* L). J Agric. Res. 2010; 48(1):35-38.