Correlation Coefficient Analysis Between Grain Yield and Its Components in Corn (Zea Mays L.) Hybrids

Mojgan Bahoush[1], Hamid Abbasdokht [2]

1- MSc. In Plant breeding, Agriculture Learning Center, Shahrood Semnan Province, Iran.

2- Assistance Professor, Shahrood University of Technology

ABSTRACT

In order to study of the correlation coefficient analysis between grain yield and its components in maize hybrids an experiment was carried out in randomized complete block design with four replications in Shahrood Agricultural Research Station during 2006-07. The result of correlation analysis between grain yield and other traits showed that number of grains per ear and 100 grain weights had high and positive direct effects and ear length had positive and moderate direct effect on yield. Furthermore, ear height had low and negative direct effect on grain yield.

Key Words: Correlation coefficient, Grain yield, Maize hybrid, Path analysis

INTRODUCTION

Estimation of simple correlation between various agronomic characters may provide good information necessary for maize breeders, when, selection is based on two or more traits simultaneously. Information obtained from correlation coefficients for these characters could also be useful as indicators of the more important ones under consideration. The association among traits may be measured by gerotypic and/ or phenotypic coefficients of correlation depending on the types of studied materials and the kind of experimental design used (Sadek et al(2006)). it is worthy to mention that the characters most responsible for variation plant yield(directly and indirectly) were in order of importance, LAI, blades area, ears dry weight/plant, number of kernels/ row, number of days to 50% of plant silking , ear length, ear diameter, plant height, 4^{th} leaf area, 100 kernels weight, ear height and migration coefficient. Mohan et al (2002) studied path analysis on corn cultivars (169 cultivars) for grain yield and oil content and resulted that number of seed per row, 100 seed weight, Number of seed row and ear, Length had direct effect on grain yield and ear height, plant height and number of days until 50% Tasseling had most minus direct effect on grain yield. Our intention from this investigation is to study correlation and path coefficient analysis. Thus, the path coefficient analysis which in turn associated with yield. Thus, the path coefficient analysis which measure the direct influence of one variable upon another and permits the separation of the simple correlation coefficient into components of direct and indirect effects was done according to Wright and Snedector and Cochran.

MATERIALS and METHODS

In order to selection of best hybrids of corn between 17 hybrids (including KSC700, ZP434 ,BC678 COVENTRY , MAVERIK,PONCHO , BC504 , BC666, BC404,NS540 ,OSSK444 ,OSSK499 ,OSSK590 ,KOSS444 ,CISKO) an experiment was carried out as Randomized complete block design with 4 replications in Agricultural Research Station of Shahrood. Plots included 2 rows of corn with 6 mt in each row. Distance between rows was 70 cm and between plants 20 cm . Traints included plant height without tassel, plant height with tassel, cub dry weight, seed dry weight, Number of seed row per ear, Number of seed per row, Number of seed per ear, seed deep, ear length, ear diameter, cub diameter, 100- seed weight, seed yield, Biological yield and harvest index. Analysis of variance did with SAS program.Correlation analysis did with SPSS program ver. 9 .

RESULTS and DISCUSSION

Components of variance revealed a wide range of variability for all the characters. Variance arising due to differences among genotypes were highly significant for all the characters.

Analysis of variance showed different between that all of traits between hybrids was significant. Except for Number of seed per ear, seed deep, ear diameter and cub dry weight traits phenotypic correlation coefficient showed that grain yield had highly significant and positive correlation with all of traits except cub diameter, ear height($P<1\%$).

For separating of simple correlation coefficient between traits to direct and indirect effects with using of path analysis, grain yield used as depend variable and step wise regression analysis did. Seed dry weight was eliminated because it hidded effects of other traits. Results showed that Number of seed per ear, 100 seed weight, ear length, ear height had high significant effect on grain yield(82% of grain yield variation) for calculating of direct effect on yield, path analysis estimated (Table 1). Results showed that Number of seed per ear (0.51) and 100 seed weight (0.41) had maximum and minimum effect on grain yield. Ear length had moderate and positive effect on grain yield (0.21) but ear height had negative direct effect (0.12) on grain yield inspite of (Non significan correlation coefficien with grain yield. This results showed that simple regression cefficient is not enough for selection of traits which effect grain yield. Indirect effect of traits showed that only ear length trait had highly significant effect (0.35) on grain yield through out Number of seed per ear and indirect effect of other traits was not important. Then, Number of seed per ear and 100 seed weight traits significantly effected graim yield and could be used as selection index for selection of corn hybrids with high grain yield. Ear length trait was important after number of seed per ear trait and 100 seed weight trait and effected yield directly and inehiretly by number of seed per ear trait (r= 0.76), this trait could be another trait for inerease of yield.

In directly effect of this trait was throught 100 seed weight (r=0.146), ear length (r=0.144) traits and correlation coefficient was significant. Indirect effect of namber of seed per ear trait through out of ear height (r=0.0321) was minus. Directly and index effect of 100 seed weight trait (r=0.41) was

through out other traits. This trait through out number of seed per ear (r=0.18), ear length (r=0.08), and ear height traits had direct effect on grain yield. Direct and indirect effects of 100 seed weight on grain yield produced significant correlation coefficient (r=0.68**). Direct and indirect effect of ear length on grain yield was throught out all of studied traits. Maximum and minum indirect effect on yield was thrugh out number of seed per ear (r= 0.35), 100 seed weight (r=-0.16) and ear height (r=0.02) traits.

Correlation between ear length and grain yield was through out indirect effect of number of seed per ear (r=0.35). ear height was last trait that explaired by path analysis and had positive indirect effect on grain yield by ear length (0.04) and number of seed per ear (0.13) and negative indirect effect 100 seed weight (r=-0.06) correlation between. This trait with grain yield was non significan(r= -0.014). (Table1).

Table 1. Path analysis of 17 hybrids of corn for grain yield

Correlation with seed yield	Ear height	Ear length	100 seed weight	Number of seed per ear	Independet traits
**0.761	-0.0321	0.1446	0.1469	0.5128	Number of seed per ear
**0.678	0.0198	0.0829	0.4175	0.1805	100 seed weight
**0.699	-0.0275	0.2111	0.1640	0.3512	Ear length
-0.014	-0.1256	0.0462	-0.0659	0.1312	Ear height

$0.87 = R^2$

E = 0.42

** , significant at 5% level

REFERENCES

Mohan, Y. C., D. K. Singh and N.V. Rao. 2002. Path coefficient analysis for oil and grain yield in maize (*Zea mays* L.) genotypes. National J. Plant Improvement 4 (1): 75-76.

Sadek, S. E., M. A. Ahmed and H. M. Abd - El-Ghaney. 2006. Correlation and path coefficient analysis in parents inbred lines and their six white maize (*Zea mays* L.) single crosses develobed and grown in Egypt. J. App. Sci. Res. 2 (3): 159-167.