V- SUMMARY

The aim of this investigation was to determine heterosis, combining ability and their interaction with locations (environments), Path analysis for grain yield and stability parameters for grain yield. The studied characters were ; days to 50 % pollen shedding, days to 50% silking, plant height, ear height, number of ears per plant, number of rows per ear, number of kernels per row, 100-kernel weight, shelling percentage, grain moisture %, grain yield and late wilt disease. To achieve these targets F1 crosses between the ten inbreds of maize namely, 0PD (P1), 58A (P2), 4W7 (P3),V89 (P4), TJ6(P5), 22J(P6) , 0NM (P7), HJ3 (P8), VJ9 (P9) and N72 (P10) were used. These inbreds represent wide range of variability in most of the studied traits.

In 1996 season, all possible combinations among the ten parental inbred lines were made without reciprocals and evaluated in 1997 season with four commercial check varieties : (GH10) , (GH122), three way (GH322), Pioneer (3057W) in a randomized complete block design with three replications in five locations Sharkia Governorate (L1), Menofyia Governorate (L2), Bani Suef Governorate (L3), Gharbia Governorate (L4), and Pioneer Research Station in Moshtohor Kalubia (L5).

Data were recorded on plants of the two inner ridges. Analysis of variance was performed for the studied traits in each location and the combined analysis was carried out whenever homogeneity of error variance was realized.

The data were genetically analyzed by the procedures outlined by **Griffing (1956)** for combining ability, **Wright (1921,1923 and 1934)** for path coefficient analysis and **Eberhart and Russell (1966)** for stability analysis.

The results could be summarized as follows:

1- Location mean squares were significant for all traits.

2- Significant genotype mean squares in each location as well as the combined analysis were obtained, except for the number of ears per plant at (L4). The genotypes by locations interactions were also significant for all traits except the number of kernels per row.

3- The parental inbred line P4 ranked the first and the second for late wilt resistance and low plant height, respectively. Also , the inbred line P6 ranked the third among the tested inbred lines for number of rows per ear and was highly resistant to late wilt disease. The parental inbred line P8 was the best performing for grain yield , number of kernels per row , 100 - kernel weight, shelling percentage and resistance to late wilt disease.

4- The highest mean values for grain yield per plot were recorded by crosses (P5 x P9) and (P1 x P9) , (P1 x P3), (P2 x P5), (P2 x P7), (P2 x P9) , (P3 x P9) , (P4 x P5) , (P6 x P8), and (P6xP9) in the combined analysis. The yields of these crosses approached these of GH10 and GH122.The five crosses (P1 x P9), (P2 x P6), (P5 x P9), (P6 x P8) and (P6 x P9) showed insignificant true heterotic effects relative to either GH10 or GH122 in the combined analysis. Hence, it could be concluded that these hybrids may be useful for improving grain yield in Egypt.

5- Mean squares for parents vs. crosses were significant in separate location as well as the combined analysis except for number of ears per plant and grain moisture content in L5. Also significant mean squares due to interaction between parents vs. crosses and locations were detected for all traits except shelling percentage and number of kernels per row.

6- The mean squares of general and specific combining ability were significant for all studied traits in each location and their combined analysis except for grain yield and number of ears per plot at L4 and L2,respectively which showed insignificant GCA. It

is evident that non additive type of gene action was the most important part of the total genetic variability for the two exceptional traits. For other traits, both additive and non additive gene effects were involved in determining the performance of single cross progeny.

7- The interaction between location and SCA was significant for all traits under study except for ear height, number of kernels per row and number of rows per ear. However, insignificant mean squares of interaction between location and specific combining ability were detected for all traits except ear height , shelling percentage, number of rows/ear, grain moisture content and grain yield.

8- The parental inbred line P9 expressed significant desirable effects of GCA for tasselling date, silking date, number of rows per ear and grain yield . Also, the parental inbred lines P4,P5,P7 and P8 had significant positive GCA effects for late wilt disease and they were highly resistant to late wilt disease.

9- The six crosses (P2 x P10), (P3 x P8), (P4 x P10), (P5 x P10) , (P6 x P9) and (P7 x P10) exhibited significant positive SCA effects for late wilt disease. For grain yield the parental combinations of (P1 x P3), (P1 x P7), (P1 x P9), (P2 x P3), (P2 x P5), (P2 x P6), (P2 x P7), (P2 x P9),(P3 x P6), (P4x P5), (P5 x P9), (P6 x P8) and (P6 x P9) expressed significant positive (Sij) effects. They could be considered the best hybrids in the combined analysis.

10- Significant positive phenotypic correlation values were found between grain yield and each of ; number of kernels per row, number of rows per ear and 100-kernel weight at the four locations.

11- Based on path coefficient analysis, the most important sources of variation in yield were : the direct effect of number of kernels per row of (68.5%), (58.0%), (60.6%), and (74.1%), in L1, L2, L3 and L5 respectively, direct effect of 100 - kernel weight of (27.8%), (37.4%), (24.6%) and (14%) in L1, L2, L3 and L5 respectively.

and indirect effect of the number of kernels per row via 100-kernel weight of (12.45%), (18.07%), (6.9%) and (6.47%) in L1, L2, L3, and L5 respectively of grain yield variation. However, the direct effect of both number of kernels per row and number of rows per ear and indirect effect of number of kernels per row via 100 - kernel weight were 55.64 % of grain yield variation in L3 While, the direct effect of number of kernels per row and both indirect effect of number of kernels per row x 100 -kernel weight and number of kernels per row x number of rows /ear were 69.59% of grain yield variation in Moshtohor.

12- The eighteen crosses (P1x P4), (P1 xP6), (P3 x P5),(P3 x P6), (P3 x P8), (P4 x P5), (P4 x P7), (P4 x P9), (P5 x P7),(P5 x P8), (P5 x P9), (P5 x P10), (P6 x P7), (P7 x P8), (P8 x P9), SC.10, GH122 and TWC 322 were more stable than others under the five locations based on their high mean value,(b=1) and (S^2d) near zero.