SUMMARY

The present investigation was carried out at Sakha Agricultural Research Station during the three successive seasons of 2005, 2006 and 2007. The main objectives of this study were obtained the information about, genetic behavior of new yellow inbred lines of maize through line x tester analysis for vegetative traits, yield and yield component traits under two different locations, to identify highly lines for general combining ability and evaluate their diallel crosses under two nitrogen levels, determine the phenotypic and genotypic correlations among pairs studied traits and to identify the superior top crosses and single crosses.

In 2005 summer season, the 26 inbred lines derived from different sources were top crosses with three testers i.e. inbred lines Sk 8008, single cross SK 74 and comp Sk-21.

The resultant 78 top crosses along with 26 parental inbred lines and 3 parental testers were evaluated in 2006 under two locations (Sakha and Sids stations). In 2007 early summer growing season, the highest six inbred lines were chosen for GCA effects for grain yield and crossed in a diallel crossing mating system. In 2007 late summer growing season, the 15 F_1's single crosses and three commercial hybrids i.e. SC 155, SC 162 and SC 170 were evaluated under two nitrogen levels i.e. 80 N kg/Fed. (N_1) and 120 N kg/Fed. (N_2).

All above experiments were used in a Randomize Complete Block Design with four replications in the top crosses experiments and three replications in the diallel crosses experiments. The data was taken on line x tester analysis for

vegetative traits, yield and yield component traits according to **Kempthorne (1957)** and choice the best inbred lines for the highest GCA effect for grain yield, while diallel crosses analysis according to **Griffing's Method-4, Model - 1 (1956)** were practiced for the separate and their combined data, and then studied traits were recorded in the first experiment: Days to 50% silking, plant height, ear height, grain yield in ardab per feddan, ear length, ear diameter, No. of rows per ear, No. of kernels per row, weight of 100 kernels and No. of ears per 100 plants.In the second experiment: Days to 50% silking, leaf area, plant height, ear height, grain yield in ardab per feddan, ear length, ear diameter, No. of rows per ear, No. of kernels per row and weight of 100 kernels.

The obtained results could be summarized as follows:

1. Top crosses experiments:

- The mean squares of locations showed highly significant for all studied traits except number of kernels per row.

- The mean squares due to the genotypes i.e. checks, crosses and checks *Vs.* crosses were highly significant for most studied traits at the two locations and their combined data. Also, the mean squares due to lines (L), testers (T) and their interaction (L x T) were significant or highly significant for most studied traits at the two locations and their combined data.

- The interactions of genotypes x locations and their partition crosses were significant for all studied traits except number of kernels per row. Also, the interactions of lines and testers by locations were significant except L x Loc. for number of rows per ear ; number of kernels per row and T x Loc. for number of kernels per row.

- The best mean performances top crosses were the crosses No. 50, No. 53, No. 53, No. 63, No. 15, No. 56, No. 15, No. 36 and No. 66 for days to 50% silking, plant height, ear height, ear length, ear diameter, number of rows per ear, number of kernels per row, weight of 100 kernels and number of ear per 100 plants, respectively. There are top crosses gave 17, 23 and 13 higher grain yield estimates compared with the highest commercial hybrid SC 3084 under Sakha, Sides locations and their combined data, respectively. The top crosses No. 6, No. 8, No. 9, No. 15, No. 18, No. 24. No. 45. No. 54. No. 60, No. 63, No. 64, No. 66 and No. 78 were surpassed from the check SC 3084 (32.9 Ard. per Fed.) for grain yield under combined data.

- The results revealed that σ^2GCA was higher than σ^2SCA for days to 50% silking, plant height, ear height, ear length, number of rows per ear, number of kernels per row, weight of 100 kernels and number of ears per 100 plants at the two locations and their combined data except grain yield and ear diameter. Also, the results showed that the values of σ^2GCA x Loc. interaction were higher than those σ^2SCA x Loc. for all studied traits except plant height, ear length and ear diameter.

- The results revealed that the GCA effects were showed desirable negative and highly significant values for the inbred lines No. 6, No. 17 and No. 18 for days to 50% silking at the two locations and their combined data. Also, the same inbred lines exhibited desirable significant GCA effects towards shortness and short ear height at the two locations and their combined data. The results showed that the GCA effects were highly significant for inbred lines No. 5 and No. 22 for grain yield (Ard. per Fed.). Furthermore, the best combiners for ear length, ear diameter, number of rows per ear, number of

kernels per row, weight of 100 kernels and number of ears per 100 plants were the inbred lines No. 21, No. 20, No. 5, No. 5, No. 12 and No. 22, respectively.

- For specific combining ability effects, the results indicated that the top cross No. 68 showed significant and negative SCA effects for days to 50% silking (earliness) at Sakha and their combined data.

   In the same time, the top crosses No. 5, No. 26, No. 53 and No. 66 had the best SCA effects for plant height and ear height. Also, the two crosses No. 62 and No. 63 showed positive SCA effects for grain yield (Ard. per Fed.) at the two locations and their combined data. The best SCA effect were the top crosses No. 55, No. 76, No. 71, No. 65, No. 56 and No. 15 for ear length, ear diameter, number of rows per ear, number of kernels per row, weight of 100 kernels and number of ears per 100 plants, respectively.

- A positive phenotypic and genotypic correlations among most pairs of studied traits were recorded except for days to 50% silking with No. of rows per ear, ear height with No. of rows per ear, ear length with ear diameter and No. of rows per ear and No. of rows per ear with weight of 100 kernels.

2. Diallel cross experiments:

- The mean squares due to the two nitrogen levels (N_1 and N_2) were significant or highly significant for all studied traits except for ear diameter and number of rows per ear.

- The differences between different crosses (C) showed significant to highly significant for all studied traits under the two nitrogen levels and their

combined data except for N_2 for ear height and N_1 for number of rows per ear. The mean squares due to checks (Ch) and C. *Vs.* Ch were either significant or highly significant for most studied traits at the two nitrogen levels and their combined data.

- The interaction between crosses (C), checks (Ch) and C. *Vs.* Ch with environments (nitrogen levels) were not significant for all studied traits except for C x N for weight of 100 kernels and C. *Vs.* Ch x N for grain yield and ear length.

- The mean values for all the crosses and checks were higher under the high nitrogen level (120 kg N/Fed.) than the low nitrogen level (80 kg N/Fed.) for all studied traits except for days to 50 % silking. The crosses No. 1 and No. 7 were earliness from the best check for earliness SC 155 at the two nitrogen levels and their combined data. For leaf area, the crosses No. 5 and No. 2 were higher than the checks SC 155 and SC 170 at the two nitrogen levels and their combined data. On the otherhand, for plant and ear heights, the three crosses No. 15, No. 8 and No. 9 gave the lowest values under the two nitrogen levels and their combined data. The crosses No. 10 and No. 11 were out yield than the three checks under the two nitrogen levels and their combined. The crosses No. 10, No. 2, No. 11, No. 13 and No. 12 were the best for ear length, ear diameter, number of rows per ear, number of kernels per row and weight of 100 kernels, respectively.

- The values of GCA mean squares were higher than those of SCA mean squares for all studied traits except grain yield (Ard. per Fed.) number of rows per ear and weight of 100 kernels.

- The parental lines No. 2 and No. 4 showed desirable significant negative values (earliness) of GCA effects for days to 50% silking under the two nitrogen levels and their combined data. Also, the parental lines No. 3 expressed significant or highly significant and positive GCA effects for leaf area.

  On other side, the best inbred lines for GCA effects was No. 5 for plant height and ear height under two nitrogen levels and their combined data. The best inbred lines was No. 3 for grain yield, ear length, ear diameter, No. of kernels per row, and weight of 100 kernels under the two nitrogen levels and their combined data. For No. of rows per ear the inbred lines No. 5 showed significant positive GCA effects under N_1 level and the combined data.

- The results cleared that the crosses No. 4, No. 9, No. 11 and No. 14 showed significant or highly significant desirable negative of SCA effects for days to 50% silking at N_1 level and the combined data. Also, the crosses No. 3 and No. 10 had the best SCA effects for plant height and ear height. In general, the single crosses No. 1, No. 5 and No. 13 showed high positive values and significant of SCA effects for all most studied traits.

- The phenotypic and genotypic correlations among the ten studied traits were positive except for days to 50% silking by all studied traits, ear height by number of rows per ear and number of rows per ear by number of kernels per row. Also, the phenotypic and genotypic correlations were highly significant for most studied traits.

CONCLUSION

Finally, the results showed that:

1- Line x Tester:

- The mean squares due to the genotypes i.e. checks, crosses and checks *Vs.* crosses were highly significant for most studied traits at the two locations and their combined data.

- The best top crosses were the cross No. 8 (34.5 Ard. per Fed.) and No. 64 (33.63 Ard. per Fed.) which were superior for grain yield compared with the commercial hybrids SC 155 (31.32 Ard. per Fed.) and SC 3084 (32.29 Ard. per Fed.).

- Significant and desirable GCA effects were exhibited in the inbred lines No. 3, No. 5, No. 8, No. 10, No. 22 and No. 26 for grain yield and other studied traits.

2- Diallel cross:

- The differences between different crosses (C) showed significant and highly significant values for all studied traits under the two nitrogen levels and their combined except for N_2 for ear height and N_1 for number of rows per ear.

- The crosses No. 10 and No. 11 were out yield than the three chicks under the two nitrogen levels and their combined.

- The best inbred line for GCA effects was No. 3 for leaf area, grain yield, ear length, ear diameter, No. of kernels per row and weight of 100 kernels under the two nitrogen levels and their combined data.