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MEAN PERFORMANCE AND COMBINING ABILITY OF SOME MAIZE INBRED LINES AND THEIR F١ CROSSES

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ABSTRACT

Seven white parental lines were planted at Minia University Education Farm, EL-Minia, Gov., Egypt in the summer seasons of ٢٠٠٧ and ٢٠٠٨. At flowering time, all possible combinations crossing among the seven parents were made (excluding reciprocal) to produce hybrid seeds of ٢١ single crosses. In addition, the parental lines were maintained by selfing. In ٢٠٠٩ summer season; the ٢١ single crosses with their parental inbred lines were evaluated, for ٥٠٪ pollen shedding, ٥٠٪ silking, protandrous interval, grain yield per plant (gm) and ١٠٠-kernel weight (gm). Randomized complete block design (RCBD) with three replications was used. General and specific combining ability effects were calculated according to Griffing's, method ٢ model ١, (١٩٥٦). Mean squares of both GCA and SCA were significant and highly significant for all studied traits expect SCA for ١٠٠-kernel weight. The results pointed to the role of both additive and non-

additive effects in the inheritance of the studied traits, and the largest part of the total genetic variance was due to non-additive gene action.

Combining ability of some maize inbred lines

INTRODUCTION

Maize (*Zea mays* L.) is one of the major cereal crops, and its production is increasing gradually in Egypt. Continuous improvement of yielding ability of maize hybrids is the main goal of the breeding programs to meet the demands of maize consumption.

Several breeding procedures have been established to increase grain yields of maize populations and their hybrids. However, to choose the best hybrid combinations a large number of chosen inbred lines are crossed. Diallel crossing programs have been applied to achieve this goal by providing a systematic approach for the detection of suitable parents and crosses for the investigated characters.

Combining ability describes the breeding values of parental lines to produce hybrids, the term of general combining ability (GCA) designates the average performance of a line in hybrid combinations, and the term of specific combining ability (SCA) defines those cases in which certain combinations do relatively better or worse than would be expected on the basis of the average performance of the lines involved.

The variance due to general combining ability (GCA) is usually considered to be an indicator of the extent of additive type of gene action, whereas specific combining ability (SCA) is taken as the measure of non-additive type of gene actions in hybrid production.

Sughroue and Hallauer (١٩٩٧) concluded that the diallel mating design should only be used to estimate genetic parameters when parents of the diallel have been randomly selected from a population in linkage equilibrium.

Significant GCA and SCA effects were estimated by El-Hosary and Sedhom (١٩٩٠) for grain yield, tasseling date, silking date and some agronomic traits. Mathur and Bhatnagar (١٩٩٥) indicated that combining ability analysis play a major role for additive gene effects for number of days to ٥٠٪ tasseling and silking.

Dubey *et al.* (٢٠٠١), Mahto and Ganguli (٢٠٠٣) and Abdel-Moneam *et al.* (٢٠٠٩) stated that additive gene action was important than non-additive in the inheritance of days to tasseling, days to silking, plant height and grain yield.

The present investigation, therefore, was designed to evaluate ٢١ maize single crosses and their parents, estimate their general and specific combining ability effects, and recognize the good combiner inbred lines for each trait.

MATERIALES AND METHODS

Seven parental white maize inbred lines developed by Egyptian Agriculture Research in Mallawy; namely Inb-١٥١($P_١$), Inb-٨٥($P_٢$), Inb -١٤٤($P_٣$), Inb -١٧٣($P_٤$), Inb -٧٤($P_٥$), Inb -١٠٢($P_٦$), Inb -١٢٠($P_٧$) were used. In the summer seasons of ٢٠٠٧ and ٢٠٠٨, the seven white parental lines were planted at Educational Farm, Faculty of Agriculture, EL-Minia University. At flowering time, all possible cross combinations among the seven parents were made (excluding reciprocal) to produce the hybrid seeds of the ٢١ single crosses. In addition the parental lines were maintained by selfing.

In ٢٠٠٩ summer season, the ٢١ single crosses with their parental lines were evaluated. Randomized complete block design (RCBD) with three replications was used. Plot size was one row, ٤ meters long and ٧٠ cm apart. Planting was in hills spaced ٣٠ cm; two kernels per hill, seedlings were thinned to one plant/hill three weeks after sowing (before first irrigation). Phosphorus fertilizer was added at rate of ١٥.٥ kg $P_٢O_٥$ / fed in the form of calcium super-phosphate during land preparation. Nitrogen fertilization was applied at a rate of ١٢٠ kg / fed in two equal before the first and second irrigation. Irrigation, pest, weed control, and other agriculture practices were carried out as recommended.

Five traits: days to ٥٠٪ pollen shedding, days to ٥٠٪ silking and protandrous interval were recorded on plot mean basis while data related to grain yield/plant (gm) and ١٠٠-kernel weight (gm) were recorded on ten guarded plants of each row.

Mean data of each plot were used for analysis of variance. The combining ability analysis was carried out following Method٢ Model-١ of Griffing (١٩٥٦).

L.S.D١ values were use to compare means according to El-Rawai and Khalafala (١٩٨٠).

RESULTS AND DISCUSSION

The analysis of variance revealed the presence of significant amount of variability among the parents and hybrids for all studied traits (Table١). These results are in harmony with those reported by Abd EL-Satter *et al* (١٩٩٩), Jyoti *et al* (٢٠٠٩) and Imtiaz *et al* (٢٠٠٩).

Partitioning mean square of genotypes into general (GCA) and specific (SCA) combining abilities for studied traits is presented in Table ١. The mean square of GCA includes the additive genetic portion, while SCA represents the non-additive genetic portion of the total variance.

Table ١: Mean squares from ordinary analysis and combining ability of the parents and their F١ crosses for days to ٥٠٪ pollen shedding, days to ٥٠٪ silking, protandrous interval, grain yield per plant (gm) and ١٠٠-kernel weight (gm).

	d.f	M.S

S.O.V.		Days to ٥٠٪ pollen shedding	Days to ٥٠٪ silking	Protandrous interval	Grain yield per plant (gm)	١٠٠- kerenl weight (gm)
Rep.	٢	١٠.٥٤*	١٢.٠٢	٠.٣٩٠	١٧٢٠.٨١**	٢٢١.٩**
Genotypes	٢٧	٢٨.١٣**	٥٥.٣٢**	١٣.٠٢**	٥٥٨٩.١٥**	٢٩.٣٩**
Parents (P)	٦	٣٠.٣٩**	٣٦.٦١**	١٩.٦١**	١٤٨.٠٤	٢٧.٨٣**
Crosses (C)	٢٠	٩.٩٤٠**	٣٠.٩٧**	٩.٨٢٣**	٢٢٤٨.١٠**	٢٥.٣٥**
P vs. C	١	٣٧٨.٤**	٦٥٤.٦**	٣٧.٤٢**	١٠٩١٤١.٣**	١١٩.٦**
GCA	٦	٤٠.٦٣**	٨٧.١٠**	٢٤.٢٩**	٣٢٢٢.٣٠**	٦٩.٨٩**
SCA	٢١	٢٤.٥٦**	٤٦.٢٤**	٩.٧٩٨**	٦٢٦٥.٣٩**	١٧.٨٢**
Error	٥٤	٢.٤١٦	٥.٢٤٩	١.٩٥٣	١٩٨.٨٠	٧.٢٥٥
∑gi٢/∑sij٢		٠.٠٦	٠.٠٧	٠.٠٩	٠.٠٢	٠.٢٠

*, ** Significant and highly significant at ٥ % and ١٪, respectively.

Mean squares of both GCA and SCA were significant and highly significant for all studied traits expect SCA for ١٠٠-grian weight. These results pointed to the role of both additive and non-additive effects in the inheritance of these traits. Mean squares of parents vs. crosses was highly significant for all the studied traits indicating that the large portion of the genetic variance in this population could be ascribed to non-additive effects of genes.

To reveal the nature of genetic variance, which has the greater role, ∑gi٢/∑sij٢, was computed. The ratio less than unity indicating that the largest part of the total genetic variance associated with these traits was due to non-additive gene action confirming the highly significant mean squares of parents vs. crosses. The importance of non-additive effects of genes on the expression of yield and other studied traits was reported by Dubey *et al.* (٢٠٠١), Mahto and Ganguli (٢٠٠٣) and Abdel-Moneam *et al* (٢٠٠٩).

The results indicated that the inbred line P٥ was the earliest, which had ٥٥.٣٨ days to ٥٠٪ pollen shedding. This line (P٥) also had the highest grain yield per plant, ٣٩.١٢ gm. For $F_{١}$'s crosses, the most desirable cross for grain yield per plant was the hybrid ($P_{٤}XP_{٥}$) which had ١٥٥.٣٤ gm (Table ٢).

Estimates of GCA effects (g_i) for parental genotypes (Table ٣) revealed that four parental lines *viz.* $P_{١}$, $P_{٤}$, $P_{٥}$ and $P_{٧}$ had good GCA effects for days to ٥٠٪ pollen shedding. $P_{٣}$, $P_{٤}$ and $P_{٧}$ had good GCA effects for days to ٥٠٪ silking and protandrous interval. The parental lines $P_{٤}$ and $P_{٥}$ had good combiners for grain yield per plant. With respect to ١٠٠-kernel weight $P_{١}$ and $P_{٣}$ were observed to be good combiners. These lines can be utilized in further breeding programme.

Estimates of SCA effects (S_{ij}) for $F_{١}$ crosses are presented in Table ٣. Some hybrids showed negative and significant SCA effects for days to ٥٠٪ pollen shedding; ($P_{١}XP_{٢}$), ($P_{١}XP_{٣}$), ($P_{١}XP_{٥}$), ($P_{٢}XP_{٣}$), ($P_{٢}XP_{٤}$), ($P_{٢}XP_{٧}$), ($P_{٣}XP_{٦}$), ($P_{٤}XP_{٦}$), ($P_{٤}XP_{٧}$) and ($P_{٥}XP_{٦}$). Seven best crosses with negative and significant SCA effects for days to ٥٠٪ silking; ($P_{١}XP_{٣}$), ($P_{١}XP_{٥}$), ($P_{٢}XP_{٤}$), ($P_{٢}XP_{٧}$), ($P_{٣}XP_{٦}$), ($P_{٤}XP_{٦}$) and ($P_{٥}XP_{٦}$). Only five hybrids showed negative and significant SCA effects for protandrous interval; ($P_{٣}XP_{٦}$), ($P_{٤}XP_{٥}$), ($P_{٤}XP_{٦}$), ($P_{٥}XP_{٦}$) and ($P_{٥}XP_{٧}$). Most of these crosses involved one or two parents of good GCA effects, so they might be exploited for breeding high earlier hybrids.

Table ٢: Mean performance of the parents and their $F_{١}$ crosses for days to ٥٠٪ pollen shedding, days to ٥٠٪ silking, protandrous interval, grain yield per plant (gm) and ١٠٠-kernel weight (gm).

Genotypes	Days to ٥٠٪ pollen shedding	Days to ٥٠٪ silking	Protandrous interval	Grain yield per plant (gm)	١٠٠- kernel weight (gm)
١. Inb-١٥١ ($P_{١}$)	٥٦.٣٧	٦١.٢٦	٤.٨٩	٢٧.٠١	٢٨.٢٠
٢. Inb-٨٥ ($P_{٢}$)	٦٣.٨٠	٦٩.٦١	٥.٧٥	٢٠.٥٢	٢٢.٣٩
٣. Inb-١٤٤ ($P_{٣}$)	٦١.٠٤	٦٤.٢٣	٣.١٩	١٨.٢١	٢٤.٧٩
٤. Inb-١٧٣ ($P_{٤}$)	٥٧.١٢	٦٠.٧٧	٣.٦٥	٢٦.٧٦	٢٠.١٠
٥. Inb-٧٤ ($P_{٥}$)	٥٥.٣٨	٦٦.٢٢	١٠.٨٤	٣٩.١٢	٢٠.٤٦
٦. Inb-١٠٢ ($P_{٦}$)	٦١.٣١	٦٧.٧٩	٦.٤٧	٣١.٩٦	١٩.٦٧
٧. Inb-١٢٠ ($P_{٧}$)	٥٦.٨٠	٦١.٥٢	٤.٦٥	٢٤.٦٨	٢٢.٤٩
١. $P_{١}XP_{٢}$	٥٤.٢٠	٥٩.٣٦	٤.٩٦	٧٩.١٤	٢٧.٧٠
٢. $P_{١}XP_{٣}$	٥٠.٤٤	٥٣.٧٢	٣.٢٨	١٣٣.٢٥	٢٦.٩٧
٣. $P_{١}XP_{٤}$	٥٣.٨٥	٥٧.١٢	٣.٢٦	١٢٤.١٥	٢٥.٢٥
٤. $P_{١}XP_{٥}$	٥٠.٢٨	٥٤.٩٥	٤.٦٦	١٤٠.٤٣	٢٩.٥٣
٥. $P_{١}XP_{٦}$	٥٦.١٨	٦٢.٠٤	٥.٨٥	٩٨.٨٣	٣٠.٧٧
٦. $P_{١}XP_{٧}$	٥٣.٩٦	٥٧.٨١	٣.٨٤	١١٥.٥٩	٢٦.٦٢
٧. $P_{٢}XP_{٣}$	٥٥.٤٥	٦٠.٤٠	٤.٩٥	١١١.٨٦	٢١.٢٢
٨. $P_{٢}XP_{٤}$	٥٣.٨٠	٥٧.٦٤	٣.٨٤	١٠٢.٧٨	٢٠.٤٨
٩. $P_{٢}XP_{٥}$	٥٤.٦١	٦١.٣٤	٦.٧٢	٧٩.٨٦	٢٣.٤٢
١٠. $P_{٢}XP_{٦}$	٥٨.٢٩	٦٨.٤٨	١٠.١٨	٤٢.٩٧	٢١.٧٢
١١. $P_{٢}XP_{٧}$	٥٣.٩٩	٥٨.١٧	٤.١٨	١٠١.٥٨	٢٢.٨٧
١٢. $P_{٣}XP_{٤}$	٥٣.٢٢	٥٧.٠٥	٣.٨٣	١٠١.٠٢	٢٥.٢٥
١٣. $P_{٣}XP_{٥}$	٥٣.١٣	٥٧.١٤	٤.٠٠	١٤٩.٤٤	٢٨.٩٠
١٤. $P_{٣}XP_{٦}$	٥٤.٠٠	٥٦.٤٢	٢.٤٢	٨٥.٩٧	٣٠.١٣
١٥. $P_{٣}XP_{٧}$	٥٤.٦٣	٥٧.٥٣	٢.٨٩	١٢٢.٨٠	٢٥.٦٤
١٦. $P_{٤}XP_{٥}$	٥٢.١٦	٥٥.٠٤	٢.٨٨	١٥٥.٣٤	٢٤.٩٧
١٧. $P_{٤}XP_{٦}$	٥٣.٣٦	٥٥.٢٣	١.٨٧	١٠٧.٤٤	٢٢.٧٦
١٨. $P_{٤}XP_{٧}$	٥٢.٢٥	٥٥.٠٦	٢.٨١	١٢٣.٤٩	٢٣.٣٦
١٩. $P_{٥}XP_{٦}$	٥٣.٥٠	٥٦.٦٧	٣.١٧	٧٠.٨٣	٢٥.٠٠
٢٠. $P_{٥}XP_{٧}$	٥٥.٤٧	٥٨.٣٠	٢.٨٣	١٣٢.١٥	٢٣.٩٧

٢١. P٦XP٧	٥٥.٧٦	٥٩.٣١	٣.٥٥	١٠٠.٩٧	٢٥.٦١
Mean parents	٥٨.٨٣	٦٤.٤٨	٥.٦٣٣	٢٦.٩٠	٢٢.٥٨
L.S.D[١] ٠.٠٥	٣.١٠	٥.٤١	٣.٢٢	١٠.٠٧	٥.٦٥
Mean crosses	٥٣.٩٣	٥٨.٠٤	٤.٠٩٣	١٠٨.٥٧	٢٥.٣٤
L.S.D[١] ٠.٠٥	٢.٢٦	٣.٣٠	١.٨٨	٢٠.٣٧	٣.٠٥

Table ٣: GCA and SCA effects of the parents and their $F_{١}$ crosses for days to ٥٠٪ pollen shedding, days to ٥٠٪ silking, Protandrous interval, grain yield per plant (gm) and ١٠٠-kernel weight (gm).

Genotypes	Days to ٥٠٪ pollen shedding	Days to ٥٠٪ silking	Protandrous interval	Grain yield per plant (gm)	١٠٠-kernel weight (gm)
١. Inb-١٥١ ($P_{١}$)	-١.٠٦٦**	-١.٠٧٥ **	-٠.٠٢٢	٤.٤٦٨	٢.٨٩٣**
٢. Inb-٨٥ ($P_{٢}$)	١.٨٥٧**	٣.٠٤٦ **	١.١٦٦**	-١٦.٢١٥**	-١.٦٧٠**
٣. Inb-١٤٤ ($P_{٣}$)	٠.١٩٠*	-٠.٧١٩ **	-٠.٨٩٩**	٣.٩٥٢	١.١٦٤**
٤. Inb-١٧٣ ($P_{٤}$)	-٠.٩٣٠**	-٢.٠٥٧**	-١.١١٥**	٦.٩٥٠**	-١.٦٦١**
٥. Inb-٧٤ ($P_{٥}$)	-١.٢٦٠**	-٠.١٤٦	١.١٢٤**	١١.٢٣٥**	-٠.٠٥٦
٦. Inb-١٠٢ ($P_{٦}$)	١.٣٨٥**	١.٨٣٥**	٠.٤٦٠**	-١٤.٩١٨**	-٠.٢٠٩
٧. Inb-١٢٠ ($P_{٧}$)	-٠.١٧٦*	-٠.٨٨٥**	-٠.٧١٥**	٤.٥٢٨	-٠.٤٦٢*
١. $P_{١}XP_{٢}$	-١.٧٤٤**	-٢.٢٦١	-٠.٦٦٦	٢.٧٤٢	١.٨٢٦
٢. $P_{١}XP_{٣}$	-٣.٨٣٧**	-٤.١٣٥**	-٠.٢٨١	٣٦.٦٨١**	-١.٧٣٧
٣. $P_{١}XP_{٤}$	٠.٦٩٣	٠.٦٠٢	-٠.٠٧٨	٢٤.٥٨٣**	-٠.٦٣٦
٤. $P_{١}XP_{٥}$	-٢.٥٤٨**	-٣.٤٧٥*	-٠.٩١٧	٣٦.٥٧٥**	٢.٠٣٩
٥. $P_{١}XP_{٦}$	٠.٧٠٤	١.٦٢٧	٠.٩٣٠	٢١.١٣٤**	٣.٤٣٩
٦. $P_{١}XP_{٧}$	٠.٠٤٨	٠.١٢١	٠.١٠٢	١٨.٤٤٢**	-٠.٤٥٨
٧. $P_{٢}XP_{٣}$	-١.٧٥٠**	-١.٥٧٣	٠.٢٠١	٣٥.٩٧٧**	-٢.٩٢٨
٨. $P_{٢}XP_{٤}$	-٢.٢٨٣**	-٢.٩٩٩*	-٠.٦٩٢	٢٣.٩٠٠**	-٠.٨٤٠
٩. $P_{٢}XP_{٥}$	-١.١٤٠	-١.٢١٠	-٠.٠٤٥	-٣.٣٠٥	٠.٤٩٦
١٠. $P_{٢}XP_{٦}$	-٠.١٠٥	٣.٩٤٩**	٤.٠٧٦**	-١٤.٠٤٦*	-١.٠٥٥
١١. $P_{٢}XP_{٧}$	-٢.٨٤٤**	-٣.٦٣٧**	-٠.٧٥٣	٢٥.١٢٢**	٠.٣٤٨
١٢. $P_{٣}XP_{٤}$	-٠.١٩٣	٠.١٨٠	١.٣٦٣**	١.٩٦٩	١.٠٩٣
١٣. $P_{٣}XP_{٥}$	-٠.٩٦٠	-١.٦٤٨	-٠.٧٠٣	٤٦.١٠١**	٣.١٣٩
١٤. $P_{٣}XP_{٦}$	-٢.٧٣١**	-٤.٣٤٩**	-١.٦٢٣**	٨.٧٨٣	٤.٥٢٨*
١٥. $P_{٣}XP_{٧}$	-٠.٥٣٧	-٠.٥١٨	٠.٠٢٥	٢٦.١٧٠**	٠.٢٨٨

١٦. $P_{٤}XP_{٥}$	-٠.٨٠٧	-٢.٤٠٤	-١.٦٠٣**	٤٩.٠١٠**	٢.٠٤٠
١٧. $P_{٤}XP_{٦}$	-٢.٢٥١**	-٤.١٩٨**	-١.٩٥٦**	٢٧.٢٦٢**	-٠.٠٢١
١٨. $P_{٤}XP_{٧}$	-١.٨٠١**	-١.٦٤٤	٠.١٦٢	٢٣.٨٦٣**	٠.٨٢٩
١٩. $P_{٥}XP_{٦}$	-١.٧٨٢**	-٤.٦٧٢**	-٢.٨٩٥**	-١٣.٦٣٣*	٠.٦١٥
٢٠. $P_{٥}XP_{٧}$	١.٧٤٥**	-٠.٣١٥	-٢.٠٥٧**	٢٨.٢٤١**	-٠.١٦٦
٢١. $P_{٦}XP_{٧}$	-٠.٦٠٦	-١.٢٨٩	-٠.٦٧٦	٢٣.٢٠٧**	١.٦٢٧
Gi	٠.٠٧٧	٠.١٦٧	٠.٠٦٢	٢.٥١٢	٠.٢٣٠
Sij	٠.٦٤٩	١.٤١٠	٠.٥٢٤	٦.٢١٧	١.٩٤٨
Gi-Gj	٠.١٧٩	٠.٣٨٩	٠.١٤٥	٣.٨٣٧	٠.٥٣٧
Sij-Sik	١.٤٣٢	٣.١١١	١.١٥٧	١٠.٨٥٤	٤.٢٩٩
Sij-Skl	١.٢٥٣	٢.٧٢٢	١.٠١٣	١٠.١٥٣	٣.٧٦٢

*, ** Significant and highly significant at ٥ % and ١٪, respectively.

Most crosses had positive and highly significant values of SCA effects for grain yield per plant. For ١٠٠-kernel weight, all of crosses had insignificant values of SCA effects except one hybrid ($P_{٢}XP_{٦}$) which had positive and significant values of SCA effects.

It is of interest to note that most of the crosses selected on the basis of significant SCA effects for earliness and yield also had high mean performance (Tables ٢ and ٣).

CONCLUSION

The results of the combining ability pointed to the role of both additive and non-additive effects in the inheritance of the studied traits. The largest part of the total genetic variance was due to non-additive gene action.

The results indicated that the inbred line $P_{٥}$ was the earliest, which had ٥٥.٣٨ days to ٥٠٪ pollen shedding, while it was the latest for protandrous interval (١٠.٨٤ days). At the same time this line $P_{٥}$ had the highest grain yield per plant (٣٩.١٢ gm).

The parental lines $P_{٣}$, $P_{٤}$ and $P_{٧}$ were the earliest for days to ٥٠٪ silking and protandrous interval, while the parental line $P_{١}$ gave the heaviest ١٠٠-kernel weight.

For $F_{١}$'s crosses, the most desirable cross for grain yield per plant was the hybrid ($P_{٤}XP_{٥}$) which had ١٥٥.٣٤ gm. The hybrids ($P_{١}XP_{٣}$) and ($P_{٥}XP_{٦}$) were the best cross for days to ٥٠٪ pollen shedding, days to ٥٠٪ silking and protandrous interval.

Estimates of GCA effects (g_i) for parental inbred lines in each trait were computed. The parental lines $P_{٤}$ and $P_{٥}$ seemed to be good combiners for grain yield per plant. These results suggest that hybrids involving these lines in multiple crossing programs are expected to have high yielding ability.

Estimates of SCA effects (s_{ij}) in the ٢١ crosses showed that fifteen crosses gave significantly positive SCA effects for grain yield per plant. Three of them namely ($P_{١}XP_{٣}$), ($P_{٣}XP_{٥}$) and ($P_{٤}XP_{٥}$) gave the highest yield ١٣٣.٢٥, ١٤٩.٤٤ and ١٥٥.٣٤ gm, respectively.

REFERANCE

Abdel-Moneam, M. A.; A. N. Attia; M. I. El-Emery; E. A. Fayed (٢٠٠٩). Combining ability and heterosis for some agronomic traits in crosses of maize. Pakistan Journal of Biological Sciences. ١٢: ٥, ٤٣٣-٤٣٨.

Abdel-Sattar, A. A.; A. A. El Hosary and M. H. Motawea (١٩٩٩). Genetic analysis of maize grain yield and its components by Diallel crossing. Minufiya J. Agric. Res., ٢٤(١): ٤٣-٦٣.

Dubey, R. B.; V. N. Joshi and N. K. Pandiya (٢٠٠١). Heterosis and combining ability for quality, yield and maturity traits in conventional and non-conventional hybrids of maize (*Zea mays* L.). Indian J. of Gen. and Plant Breed, ٦١ (٤): ٣٥٣-٣٥٥.

El-Hosary, A. A. and S. A. Sedhom. (١٩٩٠). Diallel analysis of yield and other agronomic characters in maize (*Zea mays*, L.). Annals of Agric. Sci. ٢٨:٤, ١٩٨٧-١٩٩٨, Moshtohor, Egypt.

EL-Rawai, K. and A. M. Khalafala (١٩٨٠). Design and analysis of agricultural experiments. EL-Mousel Univ. Iraq.

Griffing, B. (١٩٥٦). Concept of general and specific combining ability in relation to diallel crossing system. Australian J. Biol. Sci. ٩:٤٦٣-٤٩٣.

Imtiaz, H.; M. Ahsan; M. Saleem and A. Ahmad (٢٠٠٩). Gene action studies for agronomic traits in maize under normal and water stress conditions. Pakistan Journal of Agricultural Sciences. ٤٦: ٢, ١٠٧-١١٢.

Jyoti, K.; R. N. Gadag; G. K. Jha and H. C. Joshi (٢٠٠٩). Combining ability and gene action of grain yield and kernel quality traits in sweet corn (*Zea mays* L.). Research on Crops. ١٠: ٢, ٣٢٣-٣٣٢.

Mahto, R. N. and D. K. Ganguli (٢٠٠٣). Combining ability analysis in inter varietal crosses of maize (*Zea mays* L.). Madras Agric. J. ٩٠ (١:٣), ٢٩-٣٣.

Mathur, R. K. and S. K. Bhatnagar. (١٩٩٥). Partial diallel cross analysis for grain yield and its component characters in maize (*Zea mays* L.). Annals of Agric. Res. ١٦: (٣): ٣٢٤-٣٢٩.

Sughroue, J.R. and A. R. Hallauer. (١٩٩٧). Analysis of the diallel mating design for maize inbred lines. Crop-Sci.٣٧: ٤٠٠-٤٠٥.

الأداء والقدرة علي التآلف لبعض سلالات الذرة الشامية وهجن الجيل الأول

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تمت زراعة سبع سلالات من الذرة الشامية البيضاء في الموسم الصيفي٢٠٠٧ ، ٢٠٠٨ بالمزرعة التعليمية بكلية الزراعة-جامعة المنيا. وتم عمل كل التهجينات الممكنة بين السبع آباء (بدون الهجن العكسية) في أثناء وقت التزهير للحصول علي ٢١ هجين فردي. وفي نفس الوقت تم عمل التلقيح الذاتي الصناعي للسبع آباء وفي الموسم الصيفي ٢٠٠٩ تمت زراعة الـ٢١ هجين المتحصل عليهم والسبع سلالات في تجربة حقلية وكان التصميم المستخدم هو قطاعات كاملة العشوائية في ثلاث مكررات. وقد تم دراسة عدد من الصفات النباتية وهي عدد الأيام حتي نثر ٥٠%من حبوب اللقاح وعدد الأيام حتي ظهور ٥٠% من الحريرة و الفرق بين عدد الأيام حتي نثر ٥٠% من حبوب اللقاح وعدد الأيام حتي ظهور ٥٠% من الحريرة بالإضافة إلي صفة محصول الحبوب للنبات وصفة وزن الـ١٠٠ حبة وتم حساب تحليل التباين وتم تقسيم التباين إلي قدرة عامة وقدرة خاصة علي الائتلاف باستخدام طريقة جريفنج ١٩٥٦ الثانية-الموديل الأول. وتبين من تحليل التباين أن القدرة العامة علي التآلف كانت معنوية في كل الصفات وكذلك القدرة الخاصة علي التآلف

كانت معنوية لكل الصفات ما عدا وزن الـ١٠٠ حبة. وهذه النتائج تشير الي أهمية التأثير الإضافي والغير إضافي للصفات المدروسة.

أشارت النتائج الي أن السلالة ٥ كانت الابكر حيث أعطت ٥٥.٣٨ يوم حتي ٥٠% نثر حبوب لقاح كما أنها الأعلي محصولا للنبات (٣٩.١٢ جرام). كما أن الهجين ٤ × ٥ من أفضل الهجن لمحصول الحبوب في النبات حيث أعطي ١٥٥.٣٤ جرام.