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SUMMARY

The present investigation was carried out at Itai El-Baroud Agricultural Research Station, during the two growing summer seasons,2008and 2009 to study heterosis , combining ability and genetic variance components for several traits in soybean i.e, earliness, growth attributes, yield, yield components , oil and protein content. A half diallel set of crosses using six genotypes of soybean (***Glycine max)*** were used namely; (1) L86-K-73, (2) Giaza111, (3) Giza22, (4) H88L_1, (5) H155 and (6) DR101 in the first season.

In the second season, the six parents and their 15 F_1 crosses were planted in a randomized complete block design with three replicates. Data recorded on 10 individual plants were chosen at random from each plot.
Analysis of variance for each trait was firstly performed and then the combining ability analysis was used according to Griffing (1956) method 2, modle1.
Heterosis was estimated as the percentage deviation of F_1 mean from mid-parent and better parent values. The genetic components and heritability estimated for all traits in broad and narrow sense.
The obtained results could be summarized as follows.

I- Earliness and growth traits:

1- Highly significant mean squares due to genotypes (parents and their crosses) were detected for earliness traits and growth attributes indicating wide diversity between the parental genotypes of this study.

2- The parent L86-K-73 behaved as the earliest one for flowering date, maturity date and maturity period, while parent Giza111 was the best for plant height and parent DR101 the best for number of branches/plant.

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3- The F1 cross (L86-K-73xH155) was the earliest one among fifteen crosses; it gave the lowest mean values in flowering date and maturity date.

4- The cross (L86-K-73x H88L1) was the tallest among all crosses, while cross (Giza111xDR101) gave the highest mean value in number of branches/plant.

5- Highly significant negative heterotic effects relative to mid-parent for flowering date was detected for two crosses (L86-K-73xGiza111) and (L86-K-73xH88L_1).

6- Concerning maturity period one cross (Giza22xH155) expressed significant negative heterosis relative to mid-parent and better parent.

7- For plant height, six and four crosses exhibited highly significant positive heterotic effects to mid-parent and better parent respectively.

8- For number of branches/plant, eleven and eight crosses showed highly significant positive heterotic effects relative to mid-parent and better parent, respectively.

9- Highly significant mean squares due to both general and specific combining ability were detected for earliness and growth traits.

Moreover high G.C.A/S.C.A ratio which largely exceeded the unity were obtained for earliness traits and number of branches/plant indicating that the additive and additive x additive interaction types of gene action were predominant in controlling these traits.

10- Parent L86-K-73 seemed to be the best combiner for earliness traits followed by parent $H88L_1$.Whereas, parent $H88L_1$ was the good combiner for plant height and number of branches/plant.

11- The highest desirable S.C.A effects for earliness traits were detected for cross Giza111 x $H88L_1$ followed by cross Giza22x H155.

12- For plant height, all crosses expressed significant positive S.C.A effects except two crosses habited not significant, moreover, the cross (L86-K-73xGiza111) had the highest value for S.C.A effects.

13- For number of branches/plant, the crosses (Giza111x$H88L_1$) and (Giza22x H155) were the best crosses they had highest desirable S.C.A effects for this trait.

14- High heritability values in narrow sense were detected for flowering date and maturity date but intermediate values for maturity period while for plant height and number of branches/plant were low heritability values observed.

Π- Yield and its components traits:

1- Mean squares due to genotypes (parent and their crosses) were highly significant for all yield and its components traits except number of seeds/pod.

2- The parental variety Giza111 was the best in number of pods/plant, number of seeds/plant and seed yield/plant, it gave the highest mean values for this traits.

3- For oil and protein content, the parent DR101 gave the highest mean value in oil percentage, while parent L86-K-73 was the best in protein content.

4- The cross(Giza111x$H88L_1$) produced the highest mean values for number of pods/plant , number of seeds/plant and seed yield/plant, while cross (H155xDR101) gave highest mean value for oil percentage and cross (L86-K-73xH155) gave highest mean value for protein percentage.

5- The cross (L86-K-73x$H88L_1$) exhibited the highest desirable heterotic effects relative better parent for number of pods/plant and 100-seed weight, while cross (L86-K-73 x$H88L_1$) expressed highest desirable heterosis for number of seeds/pod and number of seed/plant.

6- For oil and protein percentage, the cross (Giza22 x DR101) expressed highest desirable heterotic effects relative to better parent for oil content, while cross (L86-K-73 x Giza111) expressed highest desirable heterotic effects relative to better parent for protein content.

7- Heterotic effects relative to mid-parent all crosses highly significant positive for number of pods/plant and number of seeds/plant but five crosses expressed significant positive for number of seeds/pod and eight crosses expressed significant positive for seed yield/plant.

8- The cross (H155 x DR101)expressed highest desirable heterotic effects relative to mid-parent for oil content , while cross (Giza22 x DR101) expressed highest desirable heterotic effects relative to mid-parent for protein content.

9- Highly significant mean square due to general and specific combining abilities were observed for yield, yield components, oil and protein percentage except number of seeds/pod. The ratio of G.C.A/S.C.A variances were exceeded the unity for number of pods/plant and number of seeds/plant.

10- Parent $H88L_1$ was the best general combiner for number of pods/plant and 100-seed weight. Whereas, parent Giza111 was good combiner for number of seeds/plant and seed yield/plant.
For oil and protein content, parent Giza22 was good combiner for oil, while parent L86-K-73 was best combiner for protein content.

11- The most desirable S.C.A effects for number of pods/plant and number of seed/plant were detected for the cross (L86-K-73 x $H88L_1$).

12- The best desirable S.C.A effects for seed yield/plant was obtained for the cross (Giza111 x $H88L_1$) followed by the cross (L86-K-73 x $H88L_1$).

13- For oil and protein percentage, the cross (L86-K-73 xH155) was best desirable S.C.A effects for oil content, whereas, cross (Giza111 x H155) was best desirable S.C.A effects for protein content followed by cross (L86-K-73 x $H88L_1$).

14- High heritability values in broad sense were detected for yield, yield components, oil and protein content, but low heritability values in narrow sense were detected for these traits.

CONCLUSSION

It could be concluded that the best combiner for the earliness traits was parental L86-K-73 Followed by $H88L_1$.
The parental $H88L_1$ good combiner for plant height and number of branches/plant.

The parental $H88L_1$ considered as an excellent combiner for number of pods/plant and 100-seed weight and second combiner for protein content.

The variety Giza 111 best combiner for number of seeds/plant and seed yield/plant.
For oil content the parental Giza22 considered as an excellent combiner followed by parental L86-k-73.

This may indicate that these parental genotypes could be used in breeding program to posse's additive genes for these traits.

On the other hand, the crosses L86-K-73xH155 and L86-K-73xGiza111 Could Be used for produced early soybean lines via suitable breeding program aim to select par line.

Moreover, the progeny of the cross Giza111x$H88L_1$ could be used to improve soybean with select for number of pods/plant.

Concerning the oil and protein content cross H155xDR101 produced high value for oil and cross L86-K-73 xH155 gave high value for protein.

The progeny of these crosses it can be used to improved the soybean for oil and protein by selection from following generation.

These crosses had significant better parent heterosis meanwhile; the transgressive segregates could be observed in the segregating generations with using pedigree method, especially the results of the present investigation that additive and additive x additive gene action effects predominant in the inheritance of all the traits in consideration.

In general in all studied traits selection of crosses involving genotypes of high general combining ability with additional attention given to high specific combining ability deviations would be expected to maximize genetic gain.