Summary

The study was conducted in the Experimental Farm of Horticulture Department, Faculty of Agriculture, Moshtohor, Benha University, Kalubia, and the greenhouse and laboratory of the Cross Pollinated Vegetable Crops Section; Vegetable Research Department; Horticultural Research Institute; Agricultural Research Center; during summer and fall seasons of 2004 to 2007.

Eight inbred lines of squash (*Cucurbita pepo* L.) i.e. inbred line TQ-1, Mosh.15-27S-19, Mosh.11-5S-34, Mosh.2-10S, Mosh.2-7S-18 and Mosh.33-27-13 Lines#1 and Line#2 were used in making half diallel set of crosses to determine some of the genetic parameters which are necessary in squash breeding programs to improve fruit yield and seed yield as well as seed oil and protein. The previously mentioned parental genotypes were chosen to be used in the present study based on the relatively wide variation in the different characters observed among these genotypes. A randomized complete block design with four replicates was utilized in conducting this experiment.

The following measurements were recorded for the individual plants:

1- Main stem length (cm)
2- Flowering characters
   2-1- First female flower appearance
   2-2- Sex expression:
       2-2-1- Number of male flowers
       2-2-2- Number of female flowers
2-2-3- The sex ratio
2-2-4- Femaleness percentage
2-3- Fruit set percentage

3- Fruit yield and yield components
3-1- Days to first harvest
3-2- Early yield/plant:
   3-2-1- Fruit number /plant
   3-2-2- Fruit weight/plant
   3-2-3- Relative early yield
3-3- Total yield/plant:
   3-3-1- Fruit number /plant
   3-3-2- Fruit weight/plant
3-4- Fruit characters:
   3-4-1- Fruit weight (g)
   3-5-2- Fruit length (cm)
   3-4-3- Fruit diameter (cm)

4- Seed yield and yield components
4-1- Seed yield:
   4-1-1- Seed yield/plant (g)
   4-1-2- Seed yield/fruit (g)
   4-1-3- Seed yield index.
4-2- Seed characters:
   4-2-1- 1000-seed weight
   4-2-2- Seed length (cm)
   4-2-3- Seed width (cm)
   4-2-4 Seed thickness (cm)
   4-2-5- Seed net weight (%)
4-3- Chemical analysis of seeds:
   4-3-1- Total oils (%)
   4-3-2- Total proteins (%)

The results can be summarized as follows:

1. The results indicated significant differences among different parental genotypes and hybrids concerning all studied characters.

2. The results showed significant general and specific combining ability effects which indicate the presence of both additive and non-additive gene effects in the inheritance of all characters except early fruit yield number/plant and fruit set percentage, whereas SCA values were not significant.

3. The calculated ratio GCA/SCA was more than unity, which indicates that the additive type of gene action was more important in the inheritance of all studied characters.

4. The parental TQ-1 was a good combiner in forming hybrids with low fruit weight and length, high fruit diameter, low seed yield index, low seed width and high total proteins seed-content.

5. The parental line Mosh.15-27S-19 was found to be a good combiner in forming hybrids with low days to first harvest and high early fruit yield number and weight, high relative early yield, high fruit weight and length, low fruit diameter, high seed yield per plant and fruit, high 1000-seeds weight, high seed length, width, thickness and net weight.

Summary
6. The parental Mosh.11-5S-34 was a good combiner in forming hybrids with early female flower appearance, low sex ratio, low days to first harvest, high early fruit yield number and weight, high total fruit yield weight, high fruit set and low fruit diameter and low seed yield index.

7. The parental Mosh.2-10S was a good combiner in forming hybrids with high fruit set percentage, high fruit weight, high seed yield per plant and fruit, high 1000-seeds weight, high seed length, width and thickness.

8. The parental Mosh.2-7S-18 was a good combiner in forming hybrids with short main stem length and low number of male flowers and low sex ratio, low days to first harvest, high early fruit yield weight, high total fruit yield number and weight, high fruit weight, high seed yield/fruit, low seed yield index, high 1000-seeds weight, high seed length and net weight, and high total oils seed-content.

9. The parental Mosh.33-27-13 was a good combiner in forming hybrids with high number of female flowers, low sex ratio, high femaleness percentage, high total fruit yield number, low fruit diameter and high seed length.

10. The parental Line#2 was a good combiner in forming hybrids with early female flower appearance, low number of male flowers, low days to first harvest, high early fruit yield weight, high relative early yield, high fruit weight, high seed yield/fruit, high seed thickness and seed net weight.

11. The broad and narrow sense heritability estimates for main stem length, first female flower appearance, number of
male and female flowers, sex ratio, femaleness percentage, days to first harvest, early fruit yield number and weight, total fruit yield number and weight, fruit weight, length and diameter, 1000-seeds weight, seed length, width, thickness, and net weight were 97.90 and 69.21%, 91.41 and 60.79%, 96.37 and 66.43%, 94.49 and 73.54%, 97.82 and 81.17%, 98.52 and 74.60%, 90.53 and 72.32%, 88.51 and 62.76%, 90.52 and 68.59%, 96.36 and 74.20%, 93.08 and 76.49%, 98.69 and 53.25%, 98.01 and 82.51%, 93.06 and 86.11%, 86.38 and 66.60%, 96.40 and 82.01%, 77.27 and 54.55%, 79.59 and 69.39%, 67.22 and 47.08%, respectively, which indicates that these characters can be improved through individual plant selection in segregating generations.

12. The broad and narrow sense heritability estimates for relative early yield, fruit set percentage, seed yield index, total oils and proteins seed-content were 96.66 and 39.74%, 55.63 and 33.62%, 89.74 and 21.36%, 81.89 and 29.63% and 97.28 and 35.07%, respectively. These results indicate the influence of the environmental factors and non-additive type of gene action on the expression and inheritance of these characters. Selection in the segregating generation to improve these characters should be performed on family mean basis.

13. The broad and narrow sense heritability estimates for seed yield/fruit were 73.99 and 10.62%. The relatively low value for narrow sense heritability indicated the high involvement of the non-additive and environmental effects on the expression of this character. Selection in the segregating
generations to improve seed yield/fruit should be performed on family mean basis.

14. The broad sense heritability for seed yield/plant was (88.84%) while the narrow sense heritability was (2.00%), which indicates that selection in the segregating generation of squash crosses should be performed on family mean basis to achieve progress in the genetic improvement of this character.

15. A highly significant negative association between total fruit yield/plant and each of days to first female flower appearance, number of male flower, sex ratio, days to first harvest, fruit diameter and main stem length were found. In addition, total fruit yield/plant had highly significant positive correlation with each of number of female flower, femaleness, early fruit yield measured as number of fruits and weight, total fruit number/plant, fruit weight and length, 1000-seed weight, seed yield/fruit, seed length and width. Moreover, a significant positive association was found between total fruit yield/plant and seed thickness. Such information should be considered in breeding programs of squash to improve the previously mentioned characters.

16. The estimation of correlation coefficients showed significant positive correlation between seed yield/plant and each of number of male flower, 1000-seed weight and seed width. In addition, seed yield/plant had highly significant negative values of associations were found with fruit set and seed yield/fruit. On the other hand, seed yield/plant had
significant negative association with relative early yield and seed yield index, i.e. mature fruit weight/seed weight, which means that, if the plant is grown for seed production, small fruits are favored. The results suggest the possibility of simultaneous improvement of the seed yield by using previous character in the breeding program as selection criteria.

17. Total oils percent had significant negative association with each of main stem length and total proteins percent. In addition, a highly significant positive association between total oils seed content and each of seed yield/fruit and seed thickness was found. The result suggested the difficulty of breeding for improving oil and protein in the same time.

18. Significant negative association between total proteins percent and each of fruit number/plant and seed length were showed. In addition, highly significant positive association between total proteins percent and main stem length was found. Such information will be useful in developing selection index to improve the previously mentioned characters.

19. The F1 hybrid TQ-1 X Line#1 scored the highest better parent heterosis for number of female flowers (76.32%), early fruit weight (38.30%), total fruit yield measured by number and weight (61.11% and 63.73%, respectively).

20. The F1 hybrid TQ-1 X Line#2 recorded the highest better parent heterosis for seed yield/plant (267.09%), 1000-seeds weight (24.89%) and total protein content (5.37%).