Summary

Six parental genotypes of eggplant (*Solanum melogena L.*), i.e, Balady Long Purple, Black Beauty, Balady Long White, Belleza Nera, Violetta Lunga and Baker were used in making non-reciprocal diallel pattern of crosses during summer season of 2003 to study the inheritance of some characters. Seeds of the parental genotypes were obtained from the Germplasm Preservation Laboratory; Faculty of Agriculture- Moshtohor, Benha University. The previously mentioned parental cultivars were chosen to be used as genotypes in the present study based on the relatively wide variation in the different morphological, yield and quality characters observed among these cultivars.

The seeds of different parental genotypes and their F_1 seeds were planted in 30 cm-pots filled with sand and clay (1:1, v:v) on March 8th, 2004.The seedlings of the different genotypes, i.e, parents and related F_1 populations were transplanted in the field on May 15th, 2004. Each experimental plot consisted of 3-ridges. Each ridge was 3 m length and 80 cm width. The space between individual plants within each ridge was 50 cm apart. A randomize complete block design with three replicates was utilized in conducting this experiment.

The following measurements were recorded for the individual plants:

1) Plant height (cm.)
2) Number of branches / plant
3) Flowering date (days)
4) Fruit length (cm.)

5) Fruit diameter (cm.) 6) Fruit weight (g.)

7) Early yield (g.) 8) Number of fruits / plant

9) Total yield / plant (g.)

10) Total fibers content of the fruits (g./100g. d.w.)

11) Fruit non-reducing sugars content (g./100g. d.w.)

12) Fruit reducing sugars content (g./100g. d.w.)

13) Fruit total sugars content (g./100g. d.w.)

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 indicated the involvement of both additive and non-additive type of gene action in the inheritance of all studied characters.

3- The GCA/SCA ratio indicated that the non-additive type of gene action was more important in the inheritance of early yield/plant and total yield/plant, while the additive type was more important in the inheritance of all other characters.

4- The parental cultivar Balady Long Purple was a good combiner in forming hybrids with long plants which had low number of branches/plant, low fruit weight and low fruit sugars content.

5- The parental cultivar Black Beauty was found to be a good combiner in forming hybrids with high number of branches/plant, long fruits, high fruit diameter, high fruit weight, high total yield/plant, high fruit sugars content,

and with high number of days to first flower bud anthesis, low early yield/plant, low number of fruits/plant and low fruit fibers content.

6- The parental cultivar Balady Long White was a good combiner in forming hybrids with high number of branches/plant, low fruit fibers content and low fruit sugars content .

7- The parental cultivar Belleza Nera was a good combiner for forming hybrids with long fruits, high fruit diameter and weight, high total yield/plant, high fruit sugars content.

8- The parental cultivar Violetta Lunga was a good combiner in forming hybrids with long plants which had low number of days to first flower bud anthesis, high early yield/plant, high number of fruits/plant, but had low fruit diameter, low fruit weight, low total yield/plant and low fruit fibers content.

9- The parental cultivar Baker was a good combiner in forming hybrids with short plants which had low number of days to first flower bud anthesis, high early yield/plant, high number of fruit/plant and high fruit fibers content but had short fruits .

10- The results indicated the presence of partial dominance in the inheritance of plant height, number of days to first flower bud anthesis, fruit diameter and fruit weight, and over-dominance in the inheritance of number of fruits/plant. The direction of dominance was toward the parents with higher expression of these characters except

fruit diameter and fruit weight the direction was toward the parent which lower expression of character.

11- The relative values of the Vr and Wr showed that the parental cultivars Balady Long Purple and Black Beauty had the lowest values concerning plant height which indicated that these parental cultivars had the most dominant genes, while the cultivar Baker had unique high value of Vr-Wr and, hence had the most recessive genes concerning plant height.

12- The relative values of the Vr and Wr showed that the parental cultivars Belleza Nera, Violetta Lunga, Baker and Balady Long White had the highest values of Vr- Wr concerning number of days to first flower bud anthesis, which indicated that these parental cultivars had the most recessive genes, while cultivars Balady Long Purple and Black Beauty had the lowest values and, hence had the most dominant genes concerning this character.

13- The relative values of the Vr and Wr showed that the parental cultivars Belleza Nera, and Baker had the highest values of Vr- Wr concerning fruit diameter, which indicated that these parental cultivars had the most recessive genes, while the cultivars Balady Long Purple and Violetta Lunga had the lowest values, and hence had the most dominant genes.

14- The relative values of the Vr and Wr showed that the parental cultivars Belleza Nera, and Baker had the highest values of Vr- Wr concerning fruit weight, which indicated that these parental cultivars had the most recessive genes,

while the cultivar Balady Long Purple had the lowest values, and hence had the most dominant genes.

15- The relative values of the Vr and Wr showed that the parental cultivars Belleza Nera and Baker had the highest values of Vr- Wr concerning number of fruits/plant, which indicated that these parental cultivars had the most recessive genes, while the cultivars Black Beauty and Balady Long White had the lowest values, and hence had the most dominant genes.

16- The results indicated the unequal distribution of alleles which decreased the expression of plant height, number of days to first flower bud anthesis, fruit diameter, fruit weight and number of fruits/plant and that which increased it over the related loci in the six parents used in present study.

17- The six parents used in the present study had more dominant than recessive alleles concerning plant height, number of days to first flower bud anthesis, fruit diameter, fruit weight and number of fruits/ plant.

18- The broad and narrow sense heritability of plant height, number of branches/plant, number of days to first flower bud anthesis, fruit length, fruit diameter, fruit weight, early yield, number of fruits /plant and fruit total sugars content were 98.14 and 77.96%, 91 and 49%, 96.19 and 68.13%, 99.71 and 54.23%, 99.80% and 77.33%, 99.85 and 81.89%, 95.83 and 57.99%, 99.68 and 46.72%, and 89.61 and 47.33, respectively, which indicated the role of both additive and non- additive gene actions in

inheritance of these characters. However, the additive type had the greatest portion and more important role than the non-additive type.

19- The broad and narrow sense heritability estimates for total yield /plant were 98.86% and 12.96%. The very high broad sense heritbaility and the low narrow sense heritability indicate the involvement of the non-additive gene action and environmental effects on the expression of this character, and hence selection should be performed in replicated experiments to decrease the environmental effects on the expression of these characters as much as possible.

20- The broad and narrow sense heritability of fruit fibers content, and fruit non- reducing sugars content were 97.76 and 21.89%, and 87.16 and 39.14%, which indicated that progresses in improving these characters can be achieved.

21- The broad and narrow sense heritability estimates for fruit reducing sugars content were 89.72 and 2.80%, respectively. The very low value of the narrow sense heritability indicated the high influence of the non-additive and environmental effects on the expression of this character. According to these results, selection for lines or hybrids should be performed in replicated experiments to eliminate as much as possible the environmental effects on the expression of fruit reducing sugars content.