CHAPTER 5
SUMMARY

A breeding work was carried out at Sabahya Horticultural Research station, Alexandria, Egypt. This breeding program started in 2011 autumn season and ended in 2013 late summer season, the investigation portioned for two parts, the first part aimed to measure the magnitude of development after tow cycles of selfing and selection by selection index method, in tow lines locally produced (lin1 $_{\text{Orange flesh}}$ and line 2_{Sandafa}) not arrive to homogeneity yet, selfing technique was done in autumnal season of 2011 and summer season of 2012, and the evaluation for selection generations was done in early and late summer seasons of 2013 in randomized complete block design with three replicates.

The second part aimed to produce all possible crosses (diallel) between locally produced lines but had more homogeneity within individuals "pure lines" (Line 1 $_{\text{Kos-El-Asal}}$, Line $2_{\text{Charantais}}$, Line $3_{\text{green flesh}}$, Line 4_{Matroh} and Line 5_{primal}) in the autumn season of 2011, and evaluated it in summer seasons of 2012 and 2013 respectively, in randomized complete block design with three replicates, and determined heterosis and type of gen effects in terms of general and specific combining abilities in melon regarding some plant and fruit traits, and evaluate the exterior properties (fruit skin color, fruit skin texture, fruit odor, fruit firmness and general acceptable) and interior prosperities (flesh color, flesh sweetness, flesh flavor, flesh texture and flesh odor). Sensory evaluation was assessed by the panel taste, using Hedonic Scale. This knowledge about the genetics and consumer's palate of particular characters is helpful to planning a successful breeding program in melon.

Most important observations were summarized as follows:

1- Selection index applied to the five important characters; net weight, placenta hardness, flesh thickness, netting and TSS increased the mean values for these traits.

2- Second selection generation and the check cultivar scored the highest values with significant differences between all genotypes in most traits under studied. Range values declared that the homogeneity became more within individual for most of traits in second selection generation and check variety compared with original population.

3- Large portion of genotypic variance for the following characters; plant length, netting and total sugars would be attributed to the genotypes of line$1_{\text{Orange flesh}}$. Data of line 2_{Sandafa} showed that the; flowering, average fruit number / plant , net weight, placenta hardness, netting, fruit shape index, TSS, moisture content(%) and β-carotene have the higher portion of the genotypic variance. These results in accordance with values of genotypic and phenotypic coefficient of variance which explained low differences between them with high heritability values for the same previous traits in two lines under studied

4- Genetic advance values for line $1_{\text{Orange flesh}}$ were in the favorable direction and were larger in the second selective generation than in the first selective generation in; plant length, flowering, maturity duration, average fruit weight and total yield / plant, fruit shape index and vitamin C In lines under studied.

5- The inbreeding depression values were positive in vegetative measurements and yield components traits.

6- The important significant positive correlation relationships were detected among average fruit number / plant and total yield / plant, net weight with each of the; flesh thickness, placenta hardness and netting, flesh thickness with each of the; placenta hardness and netting, placenta hardness and netting. But the significant negative correlation were detected among plant length with each of the; brunches number, average fruit number / plant, brunches number and average fruit weight / plant, average fruit number and average fruit weight, average fruit weight with each of the; total yield / plant and total soluble solids, moisture content with each of the; net weight, flesh thickness %, placenta hardness and netting.

7- Flesh thickness was strongly positive direct effect on net weight. Netting, placenta hardness and fruit shape index had high indirect positive effects on net weight through their relations with flesh thickness. Moisture content had indirect negative effect on net weight.

8- Direct effect was positive and large in average fruit number, average fruit weight, branches number and maturity duration were. Indirect effects were highly positive in average fruit number through its relation with branches number. The large negative indirect effect was in average fruit number through its relations with each of average fruit weight and maturity duration.

9- From data of sensory evaluation score values for all genotypes, it could be observed that the second selection generation and the check cultivar scored the highest values for exterior and interior properties with significant differences between all genotypes,

10- From the experiment of hybridization. It could be observed that the hybrids and check variety (ananas monanasa) scored the highest values in all characters under studies with exception of the average fruit weight.

11- The differences were significant or highly significant among all genotypes (5 parents, 10 hybrids, 10 reciprocals, and ananas monanasa as a check variety) for all characters of the study.

12- Heterosis values were significant and positive over mid-parents and better parents in most crosses for all characters under studies, and most of dominance degrees had appeared.

13- The values of GCA effects for all studied traits in each of the studied parental cultivars showed that L 4_{Matroh} followed by L $1_{\text{kuz el-asal}}$ and L $2_{\text{charantaise}}$ is the best parents.

14- A critical examination of data obtained on specific combining ability (SCA) and reciprocals effects for F1 hybrids showed that certain crosses had significant SCA effects values for certain traits, but not for all of them. The best combinations were; L1×L4 for plant length and flesh thickness, L5×L3 for branches number, L5×L1 for maturity duration, L4×L3 for average fruit number / plant and netting, L4×L2 for average fruit weight / plant, L5×L2 for total yield, L2×L1 for moisture content, L3×L4 for β-carotene content and L2×L1 for vitamin C content and total

sugars content. Accordingly these superior and prospective materials can be used in melon improvement through breeding programs.

15- The additive genetic variance values (δ^2A) were larger in magnitude than the dominance variance (δ^2 D) for netting, fruit shape index, TSS, moisture content, β-carotene and total sugars, this finding could be verified by the (A / D ratio) values which was more than one for these characters, indicating that additive gene action played a major role in the inheritance of these characters

16- From data of mean sensory evaluation score values of; exterior and interior prosperities for 5 parents, 10 hybrids and 10 reciprocals. it could be observed that the differences were significant between all crosses, and most of crosses scored the highest value compared with their parents. The best genotypes according to values of the consumers preferring L1×L5 followed by L3×L5, L1×L2, L2×L4 and L2×L5.

Conclusion

Selection indices method help to detect the good genotypes, making it effective in breeding programs aimed at improving the qualities fruiting attempt to produce improved varieties and high purity of melons to be introduced later in the production of hybrids to take advantage of the phenomenon of hybrid vigor in recipes vegetative growth, yield and its components. It was already getting some hybrids can be used in the local market and competitive for hybrids imported because of the compatibility with the local consumer taste and distinguish some of the important characteristics of quality.

Regarding the future prospects for these work, the seeds of the first experiment which obtained from selfing and selection not pure yet, so, the inbreeding by selfing pollination can be applying to get the pure line which used in hybridization after that. But the seeds of hybrids (F1) may subjugate to plant diseases experiments to detect the tolerant hybrids, the genetic diagnosis, license of invention or registration steps and measure the seeds vitality.