SUMMARY AND CONCLUSIONS

V. SUMMARY AND CONCLUSION

The present investigation was undertaken during the two successive seasons of 2008 and 2009 at a private orchard located at Qalyubeia Governorate.

This study was carried out on 22-year-old trees of two sweet orange cultivars (*Citrus sinensis* L. Osbeck) namely Washington navel and Valencia orange Cvs., were the plant material used in this work.

Forty bearing trees from each cultivar were carefully selected and devoted for this investigation. All trees were budded on sour orange rootstock, planted at 5 meters apart under flood irrigation system grown in a clay loamy soil.

Trees were randomly chosen and approximately healthy, nearly uniform as possible in their growth vigor, free from diseases and received regularly the same horticultural practices as for chemical and organic adopted in this region.

This stimulative investigation was conducted to study the effect of different treatments under study on some vegetative growth measurements, fruiting aspects and some fruit characteristics as well as leaf nutritional status of both orange cultivars i.e., "Washington navel" and "Valencia orange" trees. Therefore, the investigated treatments were representative of the different nine treatments besides the ordinary treatment (control).

Thus the different studied treatments used in this respect were as follows:

1- Spraying trees with tap water (control).

2- Spraying trees with GA_3 at 50 ppm.

3- Spraying trees with GA_3 at 75 ppm.

4- Spraying trees with yeast extract at 150 ml/l.

5- Spraying trees with yeast extract at 300 ml/l.

6- Spraying trees with Best flowers at 0.5 g/l.

7- Spraying trees with Best flowers at 1.0 g/l.

8- Spraying trees with Amino power at 0.5 ml/l.

9- Spraying trees with Amino power at 1.0 ml/l.

10- Spraying trees with GA_3 (at 50 ppm) + yeast extract (at 150 ml/l) + Best flower (at 0.5 g/l) + Amino power (at 0.5 ml/l).

Spraying trees with all used of these treatments including control treatment during both seasons of study twice firstly at the full bloom and secondly after fruit set about two weeks.

Obtained data could be summarized as follows:

V.I. Washington Navel orange.

V.I.1- Vegetative growth:

- Shoot length (cm).

The longest of shoot was obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3" and 150 ml/l "yeast extract". On the other hand, the lowest length of shoot was obtained from "control" .

- Leaf area (cm^2).

The largest leaf area was obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3" and 150 ml/l "yeast extract". On the contrary, the lowest leaf area was obtained from "control".

- Dry weight of leaf (mg.).

The highest dry weight of leaf was obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3", 50 ppm "GA_3" and

150. ml/l "yeast extract". On the other hand, the lowest dry weight of leaf was obtained from "control".

V.I.2- Leaf mineral composition:

- N (%).

Concerning leaf nitrogen content, the highest value of leaf nitrogen content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the contrary, the lowest value of leaf nitrogen content was obtained from "control".

- P (%).

The highest value of leaf phosphorus content was obtained from 300 ml/l "yeast extract" followed by 1.0 ml/l "amino power" and 0.50 g/l "best flowers". On the contrary, the lowest value of leaf phosphorus content was obtained from "control" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract + 0.5 g/l "best flower" + 0.5 ml/l "amino power".

- K (%).

Regarding leaf potassium content, the highest value of leaf potassium content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract", 50 ppm "GA_3" and 150 ml/l "yeast extract". On the other hand, the lowest value of leaf potassium content was obtained from "control".

- Ca (%).

The highest value of leaf calcium content was obtained from 0.5 ml/l "amino power" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml/l "amino power" and 0.5 g/l "best flowers". Meanwhile, the lowest value of leaf calcium content in the first season was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract".

- Mg (%).

The highest value of leaf magnesium content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest value of leaf magnesium content was obtained from "control".

- Fe (ppm).

In this respect, the highest value of leaf iron content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the contrary, the lowest value of leaf iron content was obtained from "control".

- Mn (ppm).

The highest value of leaf manganese content was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the other hand, the lowest value of leaf manganese content was obtained from "control".

- Zn (ppm).

The highest value of leaf zinc content was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3", 150 ml/l "yeast extract" and 300 ml/l "yeast extract". On the contrary, the lowest value of leaf zinc content was obtained from "control".

V.1.3- Fruiting parameters:

- Fruit set (%).

Referring the results, the highest fruit set percentage of the first and second seasons was obtained from spraying trees with GA_3 (at 50 ppm) + yeast (at 150 ml/l) + Best flower (at 0.5 g/l) + Amino power (at 0.5 ml/l) and yeast extract 300 ml/l. on the other hand, the lowest fruits set percentages were obtained when the trees were sprayed with best flower at 0.5 g/l and GA3 at 50 ppm

treatments compared with the control. Meanwhile, the differences between all used treatments were significant as each treatment compared with the control.

- **Remaining fruits after June drop, yield (kg/tree) and yield increment % over the control.**

Data obtained during both seasons pointed out that remaining fruits after June drop, yield the percentages of mature fruits and yield increment % over the control followed the same trend and significantly compared with the control.

V.I.4- Fruit quality:

V.I.4-a- Fruit physical properties:

- Average fruit length (cm).

The longest fruit was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the other hand, the lowest average length of fruit was obtained from "control" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml/l "amino power", 0.5 g/l "best flowers" and 0.5 ml/l amino power".

- Average fruit diameter (cm).

The highest average diameter of fruit was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3", 300 ml/l "yeast extract" and 150 ml/ yeast extract. On the contrary, the lowest average diameter of fruit was obtained from "control".

- Average fruit weight (g.).

The heaviest fruits were obtained from 75 ppm "GA_3" followed by 300 "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest average weight of fruit was obtained from "control".

- Average fruit volume (ml^3).

The highest average volume of fruit was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the contrary, the lowest average volume of fruit was obtained from "control".

- Average peel thickness.

The thickened peel was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest average thickness of peel was obtained from "control".

- Average juice volume (ml^3).

The highest average volume of juice was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the contrary, the lowest average volume of juice was obtained from "control".

- Average juice weight (g.).

The highest average weight of juice was obtained from 75 ppm "GA_3" followed by 300 "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest average weight of juice was obtained from "control".

V.I.4-b- Fruit chemical properties:

- TSS (%).

The highest values of T.S.S. in the first season were obtained from 0.5 ml/l "amino power" followed by 300 ml/l "yeast extract", 1.0 ml/l "amino power" and 50 ppm "GA_3". Meanwhile, the lowest values of T.S.S. in the first season were obtained from 75 ppm "GA_3" followed by 150 ml/l "yeast

extract", 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml/l "amino power" and "control". On the contrary, the highest values of T.S.S. in the second season were obtained from 1.0 ml/l "amino power" followed by 300 ml/l "yeast extract", 50 ppm "GA_3", "control" and 50 ppm "GA_3" + 150 ml/l "yeast extract" +0.5 g/l "best flower" + 0.5 ml "amino power". Meanwhile, the lowest values of T.S.S. in the second season were obtained from 75 ppm "GA_3" followed by 150 ml/l "yeast extract" and 0.5 ml/l "amino power".

- Acidity (%).

The highest values of acidity were obtained from 1.0 ml/l "amino power" followed by 1.0 g/l "best flower" and 0.5 ml/l "amino power". On the other hand, the lowest values of acidity were obtained from 150 ml/l "yeast extract" and 0.5 g/l "best flowers".

- TSS/acid ratio.

The highest values of TSS/acidity were obtained from 150 ml/l "yeast extract" followed by 300 ml/l "yeast extract" and 0.5 g./l "best flowers" . On the other hand, the lowest values of TSS/ acidity were obtained from 1.0 ml/l "amino power".

- L. ascorbic acid.

The highest values of L ascorbic acid were obtained from 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml "amino power" followed by 1.0 g/l "best flowers", 50 ppm "GA_3" and 300 ml/l "yeast extract". On the contrary, the lowest values of L ascorbic acid were obtained from "75" ppm "GA_3" followed by "control", 0.5 g./l "best flowers" .

V.II. Valencia orange.

V.II.1- Vegetative growth:

- Shoot length (cm^2).

The highest shoot length was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the contrary, the lowest length of shoot was obtained from "control".

- Leaf area (cm.).

The largest leaf area was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 150 ml/l "yeast extract". On the other hand, the lowest leaf area was obtained from "control".

- Dry weight of leaf (mg).

The highest dry weight of leaf was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the contrary, the lowest dry weight of leaf was obtained from "control".

V.II.2- Leaf mineral composition:

- N (%).

The highest value of leaf nitrogen content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest value of leaf nitrogen content was obtained from "control".

- P (%).

The highest value of leaf phosphorus content was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the contrary, the lowest value of leaf phosphorus content was obtained from "control".

- K (%).

The highest value of leaf potassium content was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3", 300 ml/l "yeast extract". On the other hand, the lowest value of leaf potassium content was obtained from "control".

- Ca (%).

The highest value of leaf calcium content was obtained from 0.5 g/l "best flower" and 0.5 ml/l "amino power". On the contrary, the lowest value of leaf calcium content was obtained from "control".

- Mg (%).

The highest value of leaf magnesium content was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 150 ml/l "yeast extract". On the other hand, the lowest value of leaf magnesium content was obtained from "control".

- Fe (ppm).

The highest value of leaf iron content was obtained from 75 ppm "GA_3" followed by 150 ml/l "yeast extract" and 300 ml/l "yeast extract". On the contrary, the lowest value of leaf iron content was obtained from "control".

- Mn (ppm).

The highest value of leaf manganese content was obtained from 75 ppm "GA_3" followed by 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the other hand, the lowest value of leaf manganese content was obtained from "control".

- Zn (ppm).

The highest value of leaf zinc content was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast

extract". On the contrary, the lowest value of leaf zinc content was obtained from "control".

IV.2.3- Fruiting parameters:

- Fruit set (%):

It is obvious from sprayed trees with yeast extract 300 ml/l (17.00 & 21.64) followed by spraying trees with GA_3 (at 50 ppm) + yeast (at 150 ml/l) + Best flower (at 0.5 g/l) + Amino power (at 0.5 ml/l) (17.33 & 21.67), respectively. On the other hand, the remaining treatments were intermediate between the two mentioned treatment and the control.

- Remaining fruits after June drop:

It is clear from the results, in both seasons the highest values of remaining fruits after June drop were obtained when Valencia orange trees were sprayed with yeast extract with 300 ml/l (22.67 & 26.67) followed by spraying trees with GA_3 (at 50 ppm) + yeast (at 150 ml/l) + Best flower (at 0.5 g/l) + Amino power (at 0.5 ml/l) (22.50 &26.00) for both seasons, respectively.

- Yield (kg/tree) and yield increment % over the control:

Referring of spraying Valencia orange trees with different stimulative compounds on the mature fruits and the yield as kg/tree as well as the yield increment % over the control were obtained it is quite obvious that, generally the superiority treatment of both season was obtained when the trees sprayed with spraying trees with GA_3 (at 50 ppm) + yeast (at 150 ml/l) + Best flower (at 0.5 g/l) + Amino power (at 0.5 ml/l) (13.67 & 17.00) and (84.67 & 82.33), respectively.

On the other hand, GA_3 at 50 ppm treatments gave the lowest values of mature fruit percentage and the yield as kg/tree (6.67 & 10.00) (62.33 & 60.67), respectively.

V.II.4- Fruit quality:

V.II.4-a. Fruit physical properties:

- Average fruit length (cm).

The highest average length of fruit was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest average length of fruit was obtained from "control".

- Average fruit diameter (cm).

The highest average diameter of fruit was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the contrary, the lowest average diameter of fruit was obtained from "control".

- Average fruit weight (g.).

The highest average weight of fruit was obtained from 75 ppm "GA_3" followed by 300 "yeast extract" and 50 ppm "GA_3". On the other hand, the lowest average weight of fruit was obtained from "control".

- Average fruit volume (ml^3).

The highest average volume of fruit was obtained from 75 ppm "GA_3" followed by 300 ml/l "yeast extract" and 150 ml/l "yeast extract". Meanwhile, the lowest average volume of fruit in the first season was obtained from "control" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml/l "amino power" and 0.5 ml/l "amino bower". On the contrary, the highest average volume of fruit in the second season was obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3", 150 ml/l yeast extract" and 50 ppm "GA_3". Meanwhile, the lowest average volume of fruit in the second season was

obtained from "control" and 50 ppm "GA_3" + 150 ml/l yeast extract + 0.5 g./l "best flower" + 0.5 ml/l "amino power".

- Average peel thickness.

The highest average thickness of peel was obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3" and 150 ml/l "yeast extract". On the other hand, the lowest average thickness of peel was obtained from "control".

- Average juice volume (ml^3).

The highest average volume of juice was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 ml/l "yeast extract". On the contrary, the lowest average volume of juice was obtained from "control" .

- Average juice weight (g.).

The highest average weight of juice was obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 300 "yeast extract". On the other hand, the lowest average weight of juice was obtained from "control".

V.II.4-b. Fruit chemical properties:

- TSS (%).

The highest values of T.S.S. in the first season were obtained from 150 ml/l "yeast extract followed by 1.0 g/l "best flowers" and "control". Meanwhile, the lowest values of T.S.S. in the first season were obtained from 0.5 g/l "best flowers" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml/l "amino power" and 0.5 ml/l "amino power". On the other hand, the highest values of T.S.S. in the second season were obtained from 0.5 g/l "best flowers" followed by 150 ml/ "yeast extract" and "control". Meanwhile, the lowest values of T.S.S. in the second season were obtained from 50 ppm "GA_3" + 150 ml/l "yeast extract + 0.5 g/l "best flower" + 0.5 ml/l

"amino power" followed by 300 ml/l "yeast extract" and 0.5 ml/l "amino power".

- Acidity (%).

It is clear that in both seasons, the highest values of acidity were obtained from 150 ml/l "yeast extract" followed by 1.0 g/l "best flowers" and 0.5 g./l "best flowers". On the contrary, the lowest values of acidity were obtained from 300 ml/l "yeast extract" followed by 50 ppm "GA_3" + 150 ml/l "yeast extract + 0.50 g./l "best flower" + 0.5 ml/l "amino power" (14.30 and 14.37 and 75 ppm "GA_3" (14.17 and 15.07) during the first and second season, respectively.

- TSS/acid ratio.

It is obvious that in both seasons, the highest values of TSS/acidity were obtained from 300 ml/l "yeast extract" followed by 75 ppm "GA_3" and 50 ppm "GA_3"+ 150 ml/l "yeast extract" + 0.5 g/l "best flower" + 0.5 ml "amino power". On the other hand, the lowest values of TSS/ acidity were obtained from 1.0 g/l "best flowers" followed by 0.5 ml/l "amino power" and 150 ml/l "yeast extract" during the first and second season, respectively.

- L ascorbic acid.

It is clear that in both seasons, the highest values of L ascorbic acid were obtained from 75 ppm "GA_3" followed by 50 ppm "GA_3" and 150 ml/l "yeast extract". On the contrary, the lowest values of L ascorbic acid were obtained from 1.0 ml/1 "amino power" followed by 0.5 ml/l "amino power", 1.0 g./l "best flowers" and 50 ppm "GA_3" + 150 ml/l "yeast extract + 0.5 g/l "best flowers" + 0.5 ml/l "amino power" (11.40 and 11.83) during the first and second season, respectively.

Thus, it is so worthy to be recommended spraying Navel orange and Valencia orange trees with 300 ml/l "yeast extract" to improve vegetative growth and productivity.