SUMMARY AND CONCLUSION

V. SUMMARY AND CONCLUSION

The present study was carried out on one year -old two olive cultivars, Coronaiki as oil cultivar and Manzanillo olive cv. As double purpose (table and oil) in a private farm located at western desert along Cairo, Alexandria Road (50 km from Cairo) and planted at 5 x 6 meter apart in Sandy soil and irrigated with drip irrigation system, similar in growth vigour and received the common horticultural practices.

The main aimed of this work was to investigate the response of different characters of the two olive cultivars to NPK and bio-NPK fertilizer as soil applied or foliar spray treatments. Thus, two experiments were conducted using complete Randomized block design with three replications. Every replicate was represented by two trees.

V.I. Experiment, I :

Effect of NPK and different combination between some bio-NPK fertilizers soil application on growth, flowering, leaf and shoot chemical composition of Coronaiki and Manzanillo olive trees:

Investigated treatments were representative of different twelve (12) combinations between two olive cvs. (Coronaiki and Manzanillo) and five bio- NPK fertilizer beside ordinary program as control as follows treatments:

1. Ondinary programs (control).
2. Soil application of Kotengin at 80 g/ tree + $(NH_4)_2SO_4$ at 150 g actual N/ tree + P_2O_5 at 150 g + K_2SO_4/at 150 g /tree .

3. Soil application of Kotengin at 80 g/ tree+ phosphorene at 200 g/ tree + $(NH_4)_2SO_4$ at 150 g /tree + K_2SO_4 at 150 g/tree

4. Soil application of Kotengin at 80 g/ tree+ phosphorene at 200 g/ tree Rhizobacterin at 200 g/ tree + K_2SO_4 at 150 g/tree.

5. Soil application Kotengin at 80 g/ tree + superphosplate at 150 g/ tree + Rhizobacterin at 200 g/ tree + K_2SO_4 at 150 g/tree.

6. Soil application Kotengin at 80 g/ tree + Biofertilizer at 40 cm^3/tree + K_2SO_4 at 150 g/tree.

V.II. Experiment, II:

Effect of different combination between some bio- NPK foliar spray and soil application on growth, flowering, leaf and shoot chemical composition of Coronaiki and Manzanillo olive trees.

Investigated bio-NPK fertilizer treatments (NPK, Nofaterin, Biomagic sprayed solely or combined with T4 and T6 from 1st experiment) was studied through investigating the influence of (16) treatments representative of various combinations between two olive cultivars (Coronaiki and Manzanillo) as follows treatments:

1. Ordinary program (control).

2. Foliar spray of urea at 1% + P_2O_5 at 100 ppm + K_2SO_4 at1 %

3. Foliar spray of Nofaterin at 2L/ 300 L. water.

4. Foliar spray of (Biostimulant) Biomagic at 7.5 g/L.

5. Foliar spray of Nofaterin at 2L/ 300 L. water + the T4 from 1st exp.
6. Foliar spray of Nofaterin at 2L/ 300 L. water + the T6 from 1st exp.
7. Foliar spray of Biomagic at 7.5 g/L. water + the T4 from 1st exp.
8. Foliar spray of Biomagic at 7.5 g/L. water + the T6 from 1st exp.

Specific and interaction effects of the investigated factors and their combinations included in the aforesaid 1st and 2nd factorial experiments were studied through the response of the following measurements:

I. Growth parameters:

Average number of shoots/ branch/ meter, average shoot length, average shoot diameter, average leaf area (cm^2) and average leaf fresh and dry weight were investigated growth measurements in 1st and 2nd experiments.

2. Flowering behaviour and some fruiting measurements:

In this regard, Number of inflorescences per shoot, number of flowers / inflorescences, sex ratio %, fruit set%, fruit retention % and fruit drop % .

III. Physical characters of fruit and seeds

III. 1. Fruit physical characterists:

Average fruit length, diameter, fruit shape index, weight, size , flesh weight and thickness were investigated in 1st and 2nd experiments.

III.2. Seed physical measurements:

Average seed length, diameter, weight and seed shape index (length / diameter were investigated in both 1st and 2nd experiments during the two seasons of study.

IV. Chemical analysis:

Photosynthetic pigments (foliar pigments); leaf total free amino acids, nutritional status (leaf , N, P, K, Ca, Mg, Fe, Mn, Zn and Cu contents) and shoot N, total carbohydrates and C/N ratio in response to the included treatments of 1st and 2nd experiments were investigated.

Data obtained during both experimental seasons 2002/2003 and 2003/2004 could be summarized as follows:

V.I. First experiment:

V.I.I. Growth measurements:

In this regard siven growth parameters namely, average number of shoots/ branch/ meter, average shoot length, average shoot diameter, average leaf are (cm^2) and average leaf fresh and dry weights in response to specific effect of two studied factors (olive cultivar and bio- NPK fertilization treatments as well as interaction effect of their possible Compinations were investigated during both 2002/ 2003 and 2003/2004 seasons.

A. Specific effect:

Regarding the specific effect of olive cultivar, data obtained during both seasons revealed that Coronaiki olive trees was the superior with all the investigated growth measurements while Manzanillo olive trees was the inferior during the two seasons of study.

As for the specific effect of different bio- NPK treatments; data obtained displayed obviously that, all bio- NPK soil applied treatments significantly increased all investigated growth measurements under study i.e., number of shoots/ branch/ meter, shoot length, shoot diameter, leaf area (cm^2) and leaf fresh and dry weights during the two seasons of study while the T6 (Kotengin + Biofertilizer + K_2So_4) was the superior with all investigated growth measurements.

B. Interaction effect:

Data obtained revealed that specific effect of each investigated factor was directly reflected on its own combination. Herein, Coronaiki olive trees fertilized with the T6 (Kotengin + Biofertilizer + K_2So_4) exhibited statistically the greatest values of various growth parameters during the two seasons of study. On the contrary, the least values of the investageted growth measurements were always in concomitant to those Manzanillo olive trees received ordinary program (control). Moreover, other combinations were in between regarding such siven growth measurements.

V.I.II. Flowering behaviour and some fruiting measurement:

Number of inflorescences per shoot, number of flowers per inflorescences sex expression, fruit set percentage, fruit remained percentage and fruit drop percentage in response to olive cultivar and bio- NPK soil fertilized treatments and their combination were investigated flowering behaviour and some fruiting measurements.

The obtained results could be summarized as follows:

A. Specific effect :

Data obtained during both seasons, displayed that the aforesaid fifth flowering behaviour and some fruiting measurements didn't follow the same trend regarding their response to specific effect of a given factor of the 2 investigated ones (olive cultivar and bio- NPK soil fertilized treatments). Hence each factor followed its own trend. Anyhow, it could be conducted that:

1. Regarding the specific effect of olive cultivar, data obtained revealed that the highest value of number of inflorescence/ shoot, number of flowers/ inflorescence and retained fruits% were always in concomitant to Coronaiki olive trees, while the reveres was true with Manzanillo olive trees. Differences were significant with the three characterstics.

On the other hand, Manzanillo olive trees exhibited significantly the highest values of both fruit set percentage and fruit drop percentage as well as sex expression while the opposite was found with Manzanillo olive trees during the two seasons of study.

2. Concerning the specific effect of bio- NPK fertilizer treatments, obtained results revealed that all five bio- NPK fertilized treatments significantly increase during the study.

B. Interaction effect:

1. Data obtained regarding the interaction effect of (olive cultivar x bio- NPK soil fertilizer treatments) showed that the highest value of number of inflorescence/ shoot and number of flowers / inflorescence exhibited statistically their highest values by Coronaiki olive trees fertilized with the T6 (Kotengin + Biofertilizer + K_2So_4) while the lowest increase was found by

Manzanillo olive trees fertilized with the T2 (NPK) soil applied treatment during the two season of study.

2. The interaction effect between the two investigated factors i.e., olive cultivar and bio- NPK fertilized treatments on sex expression, showed that the combination between Manzanillo olive trees x T4 (Kotengin + Phosphorene + Rhizobacterin + K_2So_4) or T6 (Kotengin + Biofertilizer + K_2So_4) exhibited the highest value of sex expression while Coronaiki olive trees received NPK soil applied showed that lowest increase in this respect.

3. Obtained results revealed that the highest value of fruit set % associated with Manzanillo olive trees received the T6 (Kotengin + Biofertilizer + K_2So_4) while the lowest increase was observed between Coronaiki olive trees fertilized with NPK soil treatment during the two seasons of study.

4. The highest values of retained fruit percentage was exhibited by Coronaiki olive trees fertilized with T_3 (Kotengin + Phosphorene + $(NH_4)_2So_4$ + K_2So_4) while the least increase was found by Manzainllo olive trees fertilized with T_2 (NPK) soil applied treatment during the two seasons of study.

5. It could be generally concluded that Manzanillo olive trees fertilized with NPK soil applied had the highest value of fruit drop % while Coronaiki olive trees received T_3 (Kotengin + Phosphorene + $(NH_4)_2So_4$ + K_2So_4) showed the lowest decrease in fruit drop % during the two seasons of study.

V.I.III. Response of fruit and seed physical characteristics :

V.I.III.1.1. Physical fruit characteristics:

The average fruit length, diameter, weight (gm) volume (cm^3), flesh weight (gm) and flesh thickness (cm) in response to olive cultivar and bio- NPK soil fertilizer treatments and their combination were investigated physical fruit characters.

The obtained results could be summarized as follows:

A. Specific effect :

Data obtained during both seasons, displayed that the aforesaid 6 physical fruit characters follow the same trend regarding their response to specific effect of two factors (olive cultivar and bio- NPK soil applied treatments). Anyhow, it could be concluded that:

1. Regarding the specific effect of olive cultivar, data obtained revealed that the highest values of the average fruit length (cm), fruit diameter (cm), weight (gm), volume (cm^3), flesh weight (gm) and flesh thickness (cm) were always in concomitant to Manzanillo olive fruits, while the reverse was true with Coronaiki olive fruits. Differences were significant with the 6 physical fruit characteristics.

On the other hand, Coronaiki fruits exhibited significantly the highest value of fruit shape index (fruit length / diameter) while the opposit was found with Manzanillo fruits.

2. Concerning the specific effect of bio- NPK soil fertilized treatments; obtained results revealed that, the height values of average fruit length, diameter, weight, volume, flesh weight and thickness were significantly coupled with all treatments while the

T6 (Kotengin + Biofertilizer + K_2So_4) soil applied treatment caused the superior with all investigated fruit physical characterists . Moreover, the lowest increase was found with the Coronaiki trees fertilized with the T_2 (NPK) soil applied treatment. On the other hand, the fruit length / diameter didn't show any defint trend during the two seasons of study.

B. Interaction effect:

Data obtained regarding the interaction effect of (olive cvs x different bio- NPK soil fertilized treatments) showed that the highest values of all the 6 physical fruit characteristics exhibited statistically their highest values by Manzanillo olive trees received that T6 (Kotengin + Biofertilizer + K_2So_4) treatment. On the other hand, the lowest increase in 6 fruit physical characteristics was found when Coronaiki olive trees fertilized with the NPK soil treatment. Moreover, other combinations were in between regarding such 6 physical fruit properties.

V.I.III.1.2. Seed physical characteristics:

A. Specific effect :

1. Concerning the specific effect of olive cultivars on seed length, diameter and weight were statistically the highest values in Manzanillo seeds followed in a descending order by those of Coronaiki seeds while the opposite was found with seed shape during the two seasons of study.

2. The obtained results revealed that, seed length and diameter as well as weight in olive fruits, was increased by all bio-NPK soil fertilized treatments while the T6 (Kotengin + Biofertilizer + K_2So_4) was the superior in this respect during the two seasons of study.

B. Interaction effect:

Data obtained revealed that specific effect of each investigated factor was directly reflected on its own combinations. Herein, Manzanillo trees fertilized with the T6 (Kotengin + Biofertilizer+ K_2So_4) exhibited statistically the greatest values of seed length, width and weight while Coronaiki olive trees received the T2 (NPK) soil applied showed the lowest increase in this respect during the two seasons of study. Moreover, other combinations were in between.

V.I.IV. Chemical composition:

V.I. IV.1. Photosynthetic pigments (foliar pigments);

Data obtained regarding leaf photosynthetic pigments contents (chlorophyll A; B and carotenoids compounds) of olive trees as influenced by the specific and interaction effects of olive cultivars and different bio- NPK soil applied treatments and their possible combination revealed that:

A. Specific effect :

1. Concerning the specific effect of olive cultivars on leaf chlorophyll (A & B) and caratenoids compounds were generally the Manzanillo leaves was the richest in chlorophyll A & B and the poorest in Caratenoids while the reverse was true in Coronaiki leaves during the two seasons of study.

2. The obtained results revealed that, chlorophyll (A & B) and carotenoids compounds in olive leaves, were significantly increased with all different bio- NPK fertilizer soil applied treatments during both seasons and the T6 (Kotengin + Biofertilizer+ K_2So_4) treatment was the superior in this concern.

B. Interaction effect:

It could be generally concluded that Manzanillo plants fertilized with the T6 (Kotengin + Biofertilizer + K_2So_4) had the richest with both chlorophyll A & B while Coronaiki olive plants was the highest value of leaf carotenoids content as compared with control during the two seasons of study. Moreover, other combinations were in between.

V.I. IV.2. Total free amino acids content:

A. Specific effect :

1. Data obtained displayed that total free amino acids content responded specifically to each investigated factor. Manzanillo cultivar was the superior while Coronaiki the inferior during the two seasons of study.

2. Results also declared a significant increase in total free amino acids content with all bio- NPK fertilizers soil applied treatments while the T6 (Kotengin + Biofertilizer + K_2So_4) treatment was the superior in this respect during the two seasons of study.

B. Interaction effect:

The highest level of total free amino acids content in olive leaves were in closed relationship to Manzanillo plants fertilized with the T6 (Kotengin + Biofertilizer + K_2So_4) . The reverse was true with Coronaiki plants fertilized with the T2 (NPK) as compared with control treatment. Moreover, other combination were in between during the two seasons of study.

V.I. IV.3. Leaf mineral composition:

Data obtained regarding the leaf, N; P; K; Ca ; Mg; Fe; Mn; Zn and Cu contents of olive plants in response to specific and interaction effect of olive cultivar and different bio- NPK fertilizer soil applied treatments and their possible combinations revealed the following:

A. Specific effect :

1. Concerning the specific effect of cultivar, data obtained during both seasons revealed that Coronaiki cultivar exceeded statistically the other cultivar (Manzanillo), regarding their leaf N; P; K; Ca ; Mg; Fe; Mn; Zn and Cu contents during the two seasons of study.

2. Results showed that any of bio- NPK fertilizer soil applied treatments increased significantly leaf N; P; K; Ca ; Mg; Fe; Mn; Zn and Cu contents as compared to control during the two seasons of study. Moreover, the T6 (Kotengin + Biofertilizer + K_2So_4) was the superior in this respect.

B. Interaction effect:

A significant variations in leaf mineral due to interaction between olive cultivar and bio- NPK fertilizer soil applied treatments were detected. Meanwhile Coronaiki cultivar x T6 (Kotengin + Biofertilizer + K_2So_4) fertilized treatment showed the highest value of leaf N; P; K; Mg; Fe; Mn; and Zn contents and the lowest value of leaf- Ca content. On the other hand, Manzanillo cv x ordinary soil fertilizer treatment (control) had the lowest values of leaf- N; P; K; Mg; Ca; Fe; Mn and Zn contents and lower value of

leaf- Cu content during the two seasons of study. Other combination were in between.

V.I. IV.4. Shoot nitrogen, total carbohydrates contents and C/N ratio:

V.I. IV.4.1. Shoot nitrogen and total carbohydrates contents:

A. Specific effect :

1. Data obtained during both seasons revealed that both shoot nitrogen and total carbohydrates contents of olive transplants shoots responded significantly to the two investigated factors i.e., olive cultivar and bio- NPK fertilizer soil applied treatments. Hence, Coronaiki cvs was statistically the richest in both total nitrogen and total carbohydrate contents during the two seasons of study.

2. As for the specific effect of bio- NPK soil applied treatments, it is quite evident that all bio- NPK soil applied treatments significantly increased both total nitrogen and total carbohydrate contents during the two seasons of study. In addition, the T6 (Kotengin + Biofertilizer + K_2So_4) treatment was the superior with the two investigated measurements during both seasons.

B. Interaction effect:

Data obtained during both seasons revealed that shoots total nitrogen and total carbohydrates each followed the same trend regarding their response to interaction effect of combination between two studied factors i.e., olive cultivar and soil bio- NPK fertilizer treatments. Herein, the highest value of total nitrogen and total carbohydrates contents were exhibited by such combination

between Coronaiki cvs T6 (Kotengin + Biofertilizer + K_2So_4). On the other hand, Manzanillo cvs. T2 (NPK) showed the lowest value of both total nitrogen and total carbohydrates contents as compared with control during the two seasons of study. Moreover, other combination were in between.

V.I. IV.4.2. C/N ratio

A. Specific effect :

1. As fore the specific effect of olive cultivar, it is quite evident that, the highest values of shoot C/N ratio was always in closed relationship to Coronaiki cvs., while the reverse was true with Manzanillo cvs. During the two seasons of study.

2. Results also cleared that a significant increase in shoot C/N ratio with all five soil bio- NPK fertilized treatments, the T4 (Kotengin + Phosphorene + Rhizobacterin + K_2So_4) was the superior in this respect.

B. Interaction effect:

The interaction effect between the two investigated factors i.e., olive cultivars and soil bio- NPK fertilizer treatments on shoot C/N ratio content in olive plants, showed that combination between Coronaiki plants x T4 (Kotengin + Phosphorene + Rhizobacterin + K_2So_4) increased significantly the C/N ratio and had the highest value, however , Manzanillo cvs received the T2 (NPK) had the lowest increase was detected. Other combination was in between.

V.II. Experiment II: Effect of different combination between some mineral and bio- NPK foliar sprays and soil treatments on olive transplants:

In this regard specific and interaction effects of two investigated factors i.e., olive cultivar (Manzanillo and Coronaiki) and kind of bio-NPK fertilizer treatments and their possiple combinations were studied regarding the influence on some growth measurements, flowering behaviour, fruit and seed physical characteristics and leaf and shoot chemical composition.

The obtained results could be summarized as follows:

V.II. I. Growth measurements:

Number of shoots/ branch/ meter ; number of leaves / shoot, shoot length, shoot diameter, leaf area (cm^2) and fresh and dry weight of leaf were investigated growth measurements.

A. Specific effect :

1. Concerning the specific effect of olive cultivar, data obtained during both seasons displayed that Coronaiki olive cultivar was the superior all regarding the 7^{th} investigated growth measurements, while Manzanillo olive plants was the inferior.

2. Regarding the specific effect of bio- NPK foliar or foliar combined with soil treatments, results decleared that all investigated growth measurements of the bio- NPK fertilizer treatments were significantly increased by any of 7 bio- NPK fertilizer treatments, however, Biomagic foliar spray + T6 1^{st} experiment soil applied treatment and Biomagic foliar spray + T4 1^{st} experiment soil applied treatment proved to be the most effective in this regard during the two seasons of study. In addition

the lowest increase in all vegetative growth measurements was the T2 (NPK) foliar spray as compared to the control treatment.

B. Interaction effect:

Asignificant interaction effect was detected as a result of the interaction between olive cultivar and find of bio- NPK fertilizer treatments, where Coronaiki olive plants fertilized with Biomagic foliar spray + T6 1st experiment (Kotengin + Biofertilizer + K_2So_4) showed the highest value of all 7 growth measurements followed in a decreasing order by Biomagic foliar spray + T4 1st experiment (Kotengin + Phosphorene + Rhizobacterin + K_2So_4) while the lowest increase of all 7 growth measurement was Manzanillo olive plants received solution of NPK foliar spray as compared to control during the two seasons of study.

V.II.II. Flowering behaviour and some fruiting measurements :

Six flowering behaviour measurements (number of inflorescences/ shoot, number of flowers/ inflorescences; sex expression %, fruit set,% , fruit retention% and fruit drop%) were investigated regarding the specific and interaction effects of olive cultivar and kind of bio- NPK fertilizer treatment and their combinations.

A. Specific effect :

1. Data obtained revealed that all investigated flowering behaviour didn't follow the same trend in their response to specific effect of either olive cultivar and kind of fertilizer treatments.

2. As for the specific of olive cultivar , it is quite evident that the highest values of number of inflorescence/shoot, number of flowers/ inflorescence and fruit retention % were always in closed

relationship to the Coronaiki cvs. While the reverse was true with Manzanillo cvs. During the study. In addition, Manzanillo cvs. Showed statistically the highest values of sex expression %, fruit set% and fruit drop % during the both seasons of study.

3. Concerning the specific effect of kind of bio- NPK fertilizer treatment, data obtained pointed out that all treatments significantly increased all 6 flowering behaviour measurements as compared with control during the two seasons of study.

4. The obtained results revealed that the Biomagic foliar spray + T6 from 1st experiment (Kotengin + Biofertilizer + K_2So_4) soil applied exhibited the higher values of number of flowers/ inflorescence, sex expression %, fruit set % and fruit retention% , while both Biomagic foliar spray and NPK solution foliar spray caused increased significantly the number of inflorescence / shoot and fruit drop % during the two seasons of study , respectively.

B. Interaction effect:

1. Data obtained that the investigated flowering behaviour didn't follow the same trend in their response to the interaction effect of olive cvs. x bio- NPK treatments. Herein, in most cases each character followed its own trend.

Anyhow, it could be generally concluded that the highest values of sex expression% and fruit set % were in closed relationship to fertilized Manzanillo plants with Biomagic foliar spray + T6 from 1st experiment (Kotengin + Biofertilizer + K_2So_4) while the lowest increase was markedly coupled with Coronaiki olive plants fertilized with NPK solution foliar spray treatment (T2) during the two seasons of study. Moreover other combination were in between.

2. On the other hand, the highest value of both number of flowers/ inflorescence and fruit drop percentage was markedly coupled with Coronaiki plants fertilized with Biomagic foliar spray + T6 from 1st experiment (Kotengin + Biofertilizer + K_2So_4) soil applied (T8). Meanwhile, the Manzanillo plants fertilized with NPK foliar spray treatment (T2) showed the least increase of number of flowers/ inflorescence and fruit drop % as compared to control during the two season of study. Moreover other combination, were in between.

3. Data obtained revealed that Coronaiki plants fertilized by Biomagic foliar spray (T4) or NPK foliar spray (T2) were the greatest values of number of flowers/ inflorescence and fruit retention%, respectively during the two seasons of study. Other combination were in between.

V.I. III. Response of fruit and seed physical characteristics:

V.I.III.1. Fruit physical characteristics:

Fruit length, diameter, fruit shape index (fruit length/ diameter, fruit weight, fruit volume, flesh weight and flesh thickness were investigated regarding their response to the aforesaid two factors and their combinations.

A. Specific effect :

1. Concerning the specific effect of olive cultivar, data obtained during both 2002/ 2003 and 2003/ 2004 experimental seasons revealed that, Manzanillo olive cultivar was the superior all regarding the 8th investigated physical fruit characteristics measurements except fruit shape index, while Coronaiki olive cultivar was the inferior.

2. Regarding the specific effect of bio- NPK fertilized treatments, results declared that all investigated fruit physic characterists measurements of the bio- NPK fertilized treatments were significantly increased by of 7 bio- NPK fertilizer treatments as compared with control, however Biomagic foliar spray + T6 from 1st experiment (Kotengin + Biofertilizer + K_2So_4) soil applied proved to be the most effective in this regard except fruit shape index during the two seasons of study.

B. Interaction effect:

Data obtained revealed that specific effect of each investigated factors was directly reflected on its own combination. Herein, Manzanillo olive plants fertilized with Biomagic foliar spray + T6 from 1st experiment (Kotengin + Biofertilizer + K_2So_4) soil applied treatment exhibited statistically the greatests values of various fruit physical characteristics measurements. On the other hand, the least increase of these investigated fruit physical characteristics measurements were always in concomitant to such combination represented Coronaiki olive plants sprayed with solution of NPK (T2) during the study. Other combination was in between.

V.II.III.2. Seed physical characteristics:

Five physical seed characteristics (seed length, diameter, shape index and weight) were investigated regarding their response to specific and interaction effects of olive cvs (Manzanillo & Coronaiki) and bio- NPK fertilized treatments and their combinations.

A. Specific effect :

1. Concerning the specific effect of olive cultivar, data obtained displayed the seeds of Manzanillo fruits had statistically the greatest values of seed length, diameter and weight but the reverse was true with the seed shape index where the least value were significantly coupled with Manzanillo seed fruits during two seasons of study. On the other hand the trend of 5 seed physical characteristics to olive cultivars took the other way arround as Coronaiki cultivar and Manzanillo cv as compared each other during both seasons.

2. With regard to specific effect of bio- NPK fertilizer treatments, data obtained during both seasons revealed that all bio-NPK fertilizer treatments had statistically the highest value of seed characteristics while the Biomagic foliar spray + either T6 or T4 from 1st experiment soil applied treatments were the superior. In addition NPK foliar spray treatment was the inferior as compared with control.

B. Interaction effect:

The interaction effect of the two investigated factors, i.e., olive cultivar and bio- NPK fertilizer treatments on seed physical characteristics, data obtained revealed that the highest value of seed length, diameter and weight were closed relationship to fertilized Manzanillo olive plants with Biomagic foliar spray + either T6 or T4 from 1st experiment soil applied, on the other hand the highest value of seed shape was markedly with Coronaiki olive plants sprayed with NPK foliar spray during the study.

2. Data obtained revealed that the lowest value of seed length, diameter and weight were in closed relationship to fertilized Coronaiki with NPK foliar spray during two seasons of study.

V.II.IV. Chemical composition:

V.II.IV. 1. Photosynthetic pigments (Foliar pigments):

Data obtained regarding leaf Photosynthetic pigments contents (chlorophyll A & B) and carotenids compounds of olive plants as influenced by the specific and interaction effect of olive cultivars and different bio- NPK fertilized treatments and their possible combination revealed that:

A. Specific effect :

1. Concerning the specific effect of olive cultivars on leaf chlorophyll (A & B) contents were generally the richest in Manzanillo followed in a descending order by Coronaiki cv while leaf carotenoids was inferior during the study.

2. The obtained results revealed that, chlorophyll (A & B) and carotenoids compounds in olive leaves, were statistically increased by all bio- NPK fertilizer treatments as compared with control while Biomagic foliar spray + T6 from 1st experiment soil applied was more effective during the two seasons of study.

B. Interaction effect :

Data obtained during both seasons revealed obviously that specific effect of each investigated factor i.e., olive cultivar and kind of bio- NPK fertilizer treatments was directly reflected on its own combinations. Heren, the Manzanillo plants fertilized with Biomagic foliar spray + T6 from 1st experiment soil applied (T8) and Coronaiki received the same treatment exhibited statistically

the greatest values of (Chlorophyll A & B) and carotenoids compounds, respectively.

The reverse was true with unfertilized olive trees. However, other combination were in between the aforesaid 2 extremes.

V.II.IV. 2. Leaf amino acid content:

A. Specific effect :

1. Concerning the specific effect of olive cultivar on leaf amino acid content, data obtained revealed that Manzanillo olive plants had statistically the richest leaves, while the reverse was found with Coronaiki cv. during the two seasons of study.

2. As for the specific effect of kind of bio- NPK fertilizer treatments, data obtained revealed obviously that all treatments significantly increased amino acid content while the Biomagic foliar spray + T6 from 1st experiment soil applied was the most effective than other in this concern.

B. Interaction effect :

The highest level of total amino acid contents was always in concomitant to leaves of Manzanillo olive plants fertilized with Biomagic foliar spray + T6 from 1st experiment soil applied treatment during the two seasons of study. The reverse was true with unfertilized Coronaiki plants. However, other combination were in between the aforesaid 2 extremes.

V.II.IV.3. Leaf mineral composition:

A. Specific effect :

1. Referring the specific effect of olive cultivar, data obtained during both seasons revealed that, Coronaiki cultivar had the richest leaves and exceeded statistically the Manzanillo olive

cultivar regarding leaf, N; P; K; Ca, Mg; Fe; Mn and Zn contents from one hand, but the poorest leaves of least value of Cu content from the other. The reverse was true with Manzanillo cultivar during the two seasons of study.

2. As for the specific effect of different bio- NPK fertilizer treatments , it is quite clear that all treatments statistically increased leaf , N; P; K; Ca, Mg; Fe; Mn, Zn and Cu contents as compared with unfertilized treatments (control)

3. Data obtained revealed that biomagic foliar spray + T6 from 1st experiment soil applied treatment was most effective for increasing leaf N; P; K; Ca, Mg; Fe; Mn, Zn and Cu contents while Nofaterin foliar spray treatment was the superior for leaf- Ca content during the two seasons of study .

B. Interaction effect :

A significant response to interaction effect of various combination between olive cultivar and bio - NPK fertilized treatments. However, combinations represented Coronaiki x T8 (Biomagic foliar spray + T6 from 1st experiment soil applied treatment) exhibited the highest leaf N; P; K; Ca, Mg; Fe; Mn and Zn contents while Manzanillo olive plants fertilized with the same treatments (T8) had the highest value of leaf - Cu content during the two seasons of study. In addition, leaves of Coronaiki plants fertilized with Nofaterin foliar spray treatment exhibited the highest value of leaf- Ca content during the study.

On the other hand, unfertilized Manznaillo plants (control) exhibited the lowest value of all nutrients (leaf N; P; K; Ca, Mg; Fe; Mn, Zn and Cu contents) during the two seasons of study.

However, other combinations were in between the aforesaid 2 extremes.

V.II.IV.4. Shoot chemical composition:

V.II.IV.4.a. Shoot nitrogen shoot total carbohydrates contents and C/N ratio:

A. Specific effect :

1. Both nitrogen, total carbohydrates and C/N ratio contents of olive shoots followed the same trends regarding their response to either olive cultivar and bio- NPK fertilized treatments. Herein, with regard to specific effect of olive cultivar, data obtained revealed that, Coronaiki plants was statistically the richest both shoot nitrogen and total carbohydrates contents as well as C/N ratio while the reverse was found with Manzanillo transplants.

2. As for the specific effect of fertilized with bio- NPK fertilized treatments, it is quite clear that the 3 chemical constituents followed to the same trend, where all treatments increased both shoot nitrogen and total carbohydrates content as compared to control during the two seasons of study. Moreover, Biomagic foliar spray + T6 from 1st experiment soil applied was the superior in this concern.

B. Interaction effect:

Data obtained during both seasons revealed that shoots nitrogen, total carbohydrates content and C/N ratio each followed that same trend regarding their response to interaction effect of combination between two studied factors i.e., olive cultivar and bio- NPK fertilizer treatments. Herein, the highest level of both N, total carbohydrates contents and C/N ratio of olive shoots was

alway concomitant to Biomgaic foliar spray + T6 from 1st experiment soil applied treatments plants of Coronaiki while unfertilized. Manzanillo olive plants (control) had the lowest value. Moreover other combination were in between the aforesaid 2 extremes during the two seasons of study.

Recommendation:

Data obtained revealed that, all bio -NPK fertilizer treatments soil applied or foliar spray as wall as combination between them significantly increased all vegetative growth characters, fruit set percentage, fruit retained, fruit and seed physical characters, foliar pigments, leaf amino acid content and mineral composition, shoot nitrogen and total carbohydrate as well as C/N ratio contents were increased by T6 (Kotengin + Biofertilizer + K_2SO_4) soil applied solely (1st exp.) or combined with Biomgaic foliar spray treatments (2nd exp.) were the superior in this respect.

On the light of the obtained results it may be recommend that using T6 (Kotengin + Biofertilizer + K_2SO_4) soil applied solely or combined with Biomgaic foliar spray may be recommended to improve growth of olive trees specially Coronaiki under this study conditions (Juvenility phase) to encourage following and fruiting and produced the pest quality of fruit.