SUMMARY AND CONCLUSIONS

IV.3- Total indols.

IV.4- Total phenols.

V. Anatomical examination.

V.I. The first experiment (budding of citrus):

V.I.1- Vegetative growth measurements:

In this regard the success percentage, both scion length and diameter, number of leaves per budded transplants, leaf area (cm^2) and fresh and dry weights of both shoot and root system were the growth measurements evaluated pertaining their response to the citrus rootstocks used under study (Volkamer lemon, Sour orange and Balady lime).

Regarding the effect of citrus rootstocks in this study on the abovementioned growth measurements, it is quite evident from obtained data in this study that, Valencia orange transplants budded on Volkamer lemon rootstocks was statistically the superior. However, the greatest values success percentage, the highest values of both scion length and diameter, the higher number of leaves per transplant, largest area of leaves and heaviest weights of fresh and dry shoot and root systems were induced in both seasons. Whereas, the opposite was true in most cases with Valencia orange Cv. budded on Sour orange rootstocks which exhibited statistically the least values of most abovementioned growth measurements during two seasons of study. Moreover, Valencia orange transplants budded on Balady lime rootstocks ranked statistically the second as compared to either the superior (Volkamer lemon) or the inferior on (Sour orange) during two experimental seasons of study.

V.I.2- Leaf mineral composition:

There were a significant differences between the three studied citrus rootstocks in this investigation. However, the richest leaves in their mineral contents either macro-elements (N, P, K, Ca and Mg) or micro-nutrients (Fe, Zn and Mn) were statistically in closed relationship with those Valencia orange Cv. budded on Volkamer lemon rootstocks during both 2008 and 2009 seasons. Moreover, the opposite was detected with those Valencia orange Cv. budded on Balady lime rootstocks which exhibited the poorest leaves in their macro and micro-nutrients contents during both seasons of study. On the other hand in most cases, leaf mineral contents of Valencia orange Cv. budded on Sour orange rootstocks were in between the abovementioned two extremes during two experimental seasons.

V.I.3- Photosynthetic pigments

Data obtained revealed clearly that Valencia orange budded on Volkamer lemon rootstocks exhibited the richest leaves in their chlorophyll A and B as well as carotenoids contents in two seasons of study. Meanwhile, the reverse was found with Valencia orange Cv. budded on Balady lime rootstocks which induced the poorest ones in their chlorophyll A, B and carotenoids contents in the first and second seasons of study. In addition, leaf chlorophyll A, B and carotenoids contents of Valencia orange budded on Sour orange rootstocks was in between the abovementioned two extremes.

V.I.4- Some chemical constituents.

Obtained results indicated obviously that, the greatest and the highest values of total carbohydrates, starch and total

indoles contents were significantly in relationship with Valencia orange budded on Volkamer lemon rootstocks followed statistically in a descending order by those budded on Sour orange and Balady lime rootstocks. On the contrary, the trend took the other way around with total phenols where its highest content was always in concomitant with Valencia orange budded on Balady lime rootstock, while the reverse significantly coupled with those budded on Volkamer lemon rootstock. The differences between three investigated citrus rootstock were significant as compared each other during both experimental seasons.

V.I.5- Anatomical study:

Anatomical examinations of union zone of all investigated treatments proved the success of union process between citrus scions (Valencia orange) from one hand and any of the 3 rootstocks. However, grade of success was relatively varied as the perfect union depending upon the anatomical measurements base was concerned. Hence, anatomical examinations revealed that budding of Valencia orange scion on Volkamer lemon followed by sour orange rootstocks showed to great extent the perfect union between two graft elements (scion & rootstock). Herein, the widest diameter of the whole section, secondary cortex in either union zone (newly developed tissues between two elements) or tissues of both scion and rootstock themselves, as well as the decrease of vacuoles and necrotic tissues all were clearly observed. The reverse was true with budded transplants on other rootstock (Balady lime rootstock) whereas wider vacuoles and thicker necrotic tissues associated with thinner layers of other union zone tissues were detected.

V.II- The second experiment "Olive"

V.II.1- Vegetative growth measurements:

It is quite evident from obtained data that Kalamata olive Cv. grafted on Shemlali olive rootstocks exhibited statistically the highest value of the percentage of grafting success in the first grafting date i.e., (February). Also, both scion length and diameter of Kalamata olive Cv. grafted on Shemlali olive rootstock seedlings were statistically the superior in the 1st grafting date (February) as compared to those grafted in the second grafting dates (November) during both 2008 and 2009 seasons. Furthermore, the response of number of leaves per plant, leaf area and roots length to grafting dates i.e., (February and November), data showed that the highest number of leaves per plant, associated with the largest area and the tallest root were in closed relationship with those grafted in the first grafting date (February). While, the reverse was found with those Kalamata olive transplants grafted on Shemlali olive rootstocks in the second grafting date (November).

However, the highest values of fresh weights for both root and shoot system were statistically on concomitant to the Kalamata olive Cv. grafted on Shemlali olive rootstocks in the first grafting date (February). The trend took the other way around with the dry weight of both shoot and root systems.

V.II.2- Leaf mineral composition:

The richest leaves in their nitrogen content and the highest values of leaf phosphorus, potassium and calcium contents as well as the greatest value of leaf magnesium content were always in concomitant to the Kalamata olive Cv. grafted on Shemlali olive rootstocks in the first grafting dates i.e.,

February. Moreover, with respect to the micro-nutrients, data obtained revealed that Kalamata olive Cv. grafted on Shemlali olive rootstock in the first grafting date (February) had leaves contained the highest values of both leaf iron and zinc contents as well as the greatest value of leaf manganese content. On the other hand, Kalamata olive Cv. grafted on Shemlali olive rootstocks in the second grafting date (November) induced statistically the least values and the poorest leaves in their macro-elements (N, P, K, Ca and Mg) and micro-nutrients (Fe, Zn and Mn) during both 2008 and 2009 seasons of study.

V.II.3- Photosynthetic pigments (foliar pigments):

Data showed that leaves of that Kalamata olive Cv. grafted on Shemlali olive rootstocks in the first grafting date (February) had significantly richer leaves with both chlorophyll A, B and carotenoids contents as compared to the analogous ones grafted in the second grafting date (November).

V.II.4- Some chemical constituents.

Data obtained during both seasons showed that, on obvious relationship between the total carbohydrates, starch, indoles and phenols of Kalamata olive transplants grafted on Shemlali olive rootstock grafted at either February or November. Since, the highest values of total carbohydrates and starch as well as the total indoles were always in concomitant to those grafted on Shemlali olive rootstock in February. However, the reverse was true with total phenols content.

V.II.5- Anatomical study:

Anatomical examinations revealed that the suitability of grafting in February than in November. Herein, most anatomical measurements investigated i.e., diameter of whole section,

rootstock thickness, scion thickness, scion and rootstock cortex thickness, cambium & xylem thickness, secondary cortex thickness were increased by aging, while the reverse was detected with vasuoles (number and thickness) and necrotic layer which were decreased or/and completely absent by aging. The widest diameter of the whole section, secondary cortex in either union zone or tissues of both scion and rootstock themselves, with the increase of vacuoles and necrotic tissues all were clearly observed.