V. SUMMARY AND CONCLUSTONS

This investigation was carried out during two successive seasons of 1997 and 1998 on twelve – year old Le-Conte pear trees grown in the Horticulture Research Station at EL- Kanater region–Kalyobia Governorete. Fourty five trees nearly uniform in their vigour and received regularly the same horticultural care adopted annually in the region were carefully selected and devoted for the present study.

This work aimed mainly to improve growth, nutritional status and productivity of Le-Conte pear trees through investigating their response to some N, P, K, and Fe fertilization treatments. Hence, three soil added levels of NPK fertilizers namely: a- Ammonum sulphate (20.6 % N); b- monosuper phosphate (15.5 % P_2O_2) and c- potassium sulphate (48 % K_2O) in combination with three concentrations of the iron sequestereted – 12% foliar spray solutions were the investigated fertilization treatments.

Accordingly, during each season a factorial experiment with two foctors was conducted, whereas every factor included three levels/ variables as follows:

a) 1st factor (three rates of NPK soil applied fertilizers)as follows:

a-1- The ordinary NPK fertilization regime adopted in EL-Kantater region as control ($N_0P_0K_0$),whereas P and N fertilizers were yearly added once each at 100 kg per Feddan in late february and early March respectively, while K fertilizer applied at 50 kg per Feddon in early March.

a-2- NPK soil application at one kg from each fertilizer/source per tree ($N_1P_1K_1$).*

a-3- NPK soil application at two kg from each nutrient element fertilizer per tree ($N_2P_2K_2$).*

b- Second factor (3 concentrations of iron sequestereted- 12% spray solution)** as follows:

b-1- Fe_0 solution i.e, water spray or no Fe application as control.

b-2- Fe_1 solution, (iron sequestereted–12% solution at 0.2% conc.).

b-3- Fe_2 solution, (iron sequestereted–12% solution at 0.4% conc.).

The complete randomized design with four replications (an individual tree per each) was adopted for arranging the following nine combinations of NPK x Fe fertilization treatments.

1- Ordinary NPK fertilization with no iron/water spray as control "$N_0P_0K_0 + Fe_0$".

2- Ordinary NPK fertilization plus Fe spray at 0.2 % "$N_0P_0K_0 + Fe_1$".

3- Ordinary NPK fertilization plus Fe spray at 0.4 % "$N_0P_0K_0 + Fe_2$".

4- NPK soil added at 1 kg from each fertilizer + water spray "$N_1P_1K_1 + Fe_0$".

5- NPK soil added at 1 kg from each fertilizer + Fe spray at 0.2 % "$N_1P_1K_1 + Fe_1$".

6- NPK soil added at 1 kg from each fertilizer + Fe spray at 0.4 % "$N_1P_1K_1 + Fe_2$".

7- NPK soil added at 2.0 kg from each fertilizer + water spray "$N_2P_2K_2 + Fe_0$".

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*With both ($N_1P_1K_1$) and ($N_2P_2K_2$) treatments the corresponding amount of phosphorus was added once in late Feb., while for either N or K it was fractionated into two equal doses to be applied in late Feb. and early May.

**Iron spray solutions (0.0; 0.2 and 0.4 %) were sprayed twice in early. Apr. and Jun. with 5 liters/tree a time.

8- NPK soil added at 2.0 kg from each fertilizer + Fe spray at 0.2 % "$N_2P_2K_2 + Fe_1$".

9- NPK soil added at 1 kg from each fertilizer + Fe spray at 0.4 % "$N_2P_2K_2 + Fe_2$".

Since, those NPK x Fe fertilization treatments were evaluated regarding their influence on some vegetative growth measurements; nutritional status (leaf mineral composition) and some fruiting aspects of Le-Conte pear trees. Data obtained during both 1997 and 1998 seasons could be summarized as follows:

V.1- Vegetative growth measurements:

In this regard the average increase in both shoot length and number of leaves per shoot, increase % in trunk diameter and some leaf parameters (dimensions; shape index/length: widith; area and dry weight) were the growth measurements evaluating pertaining their response to specific and interaction effects of investigated factors and their combinations, respectively.

A- specific effect:

Regarding the specific effect of the NPK soil applied rates, data obtained revealed that all growth parameters responded specifically to the three investigated NPK fertililizers rates. Whereas, each parameter reached its maxemum value by the highest NPK soil applied rate ($N_2P_2K_2$/2.0 kg. from each N,P,K fertilizer added annually per tree), while the reverse was true with the ordinary $N_0P_0K_0$ soil applied regime adopted in the region. Meanwhile, the $N_1P_1K_1$ rate (one kg from each fertilizer/tree) was in between. In spite of differences in all parameters between the $N_2P_2K_2$ level and the control ($N_0P_0K_0$/ordinary regime) were

V.II. Response of nutritional status "leaf mineral composition":

In this concern, leaf N, P, K, Ca, Mg, Fe, Mn, Zn and Cu contents of Le-Conte pear trees estimated as either mg/leaf (absolute value) or a ratio on the dry matter base (percent for the five macro-elements and ppm for the four micro-elemnts) in response to specific and interaction effects of the differential NPK Fe fertilization treatments were investigated during both 1997 and 1998 seasons.

A- specific effect:

Data obtained during both seasons displayed obviously that all nutrient elements were significantly responed to the specific effect of the NPK soil applied rates, whereas the trend showed a closed positive relationship with the leaf nutrient elements contents under study except cupper which took the other way around. On the other hand, the rate of increase resulted by raising the NPK applied rate varied from one element to another, since with the N, K, Ca, Mg, Fe and Zn the rate was more pronounced than that with P and to some extent Mn.

As for the specific effect of Fe foliar sprays, obtained results pointed out that the response with all nutrient elements was less pronounced than that previously detected with the NPK soil applied rate even for the leaf Fe content. On the other hand some nutrient elements like as K, Ca, Mg, Fe, Mn and Zn were considerably responded than other like as N, while both P and Cu did not specifically influenced.

Anyhow such trends of response to specific effect of either NPK soil added rate or Fe foliar spray were true during both seasons, regardless of the concerned nutrient element was estimated as mg/leaf or a ratio on dry weight base.

B- Interaction effect:

From data obtained during both seasons, it could be generally concluded that the higher NPK soil applied rate i.e. adding 2.0 kg from each fertilizer per tree ($N_2P_2K_2$ level) in combination with the Fe_2 spray (0.4 % iron sequestereted solution) was the most stimulative NPK Fe fertilization treatment/combination for increasing contents of most nutrient elements. However, with both N and Zn contents two combinations of $N_2P_2K_2$ soil applied rate with either Fe_2 or Fe_1 were significantly the same, while with phosphorus the $N_2P_2K_2$ treated trees which recived no Fe application (Fe_0/water spray) had higher P content. In addition Cu did not follow specific trend in this respect.

V-III- Response of some fruiting measurements:

In this regard some fruiting measurements namely: a) cropping aspect (fruit set %, yield as kg/tree and yield increment % over control); b) fruit physical properities (height; diameter; shape index; weight; size and flesh firmness of fruit) and c) fruit juice chemical characteristics (TSS %; Acidity % and TSS/Acid ratio) were investigated regarding their response to the specific and interaction effects of investigated factors (NPK soil applied rate and concentration of chelated iron spray solution) and their combinations, respectively.

A- Specific effect:

Data obtained during both seasons revealed that all studied fruiting measurements of Le-Conte pear cv. responded specifically to the NPK soil applied rates. Since, the three parameters of cropping aspects (fruit set%, yield and its increment % over control); most fruit physical porperties (height, diameter, weight and size) of Le-Conte fruit except

shape index and flesh firmness) and fruit juice chemical constituents (TSS % and Acidity % except TSS/acid ratio) all were in closed positive relationship with the NPK soil added level. Whereas, the NPK soil applied rate at 2.0 kg from each fertilizer per tree ($N_2P_2K_2$) was the superior, while the reverse was true with the ordinary adopted regime ($N_0P_0K_0$).

Nevertheless, with the flesh firmness the trend of response to the NPK applied rate took the other way around during both seasons of study.

As for the specific effect of Fe spray solution, the response was less pronounced than that detected with the NPK level. However, with all/most fruiting measurements an increase was detected by spraying Fe solution at either 0.2 or 0.4 % (Fe_1 and Fe_2 respect) as compared to control (Fe_0/water spray). Such trend was true during both seasons of study, in spite of the differences were relatively intermediate and did not reach level of significance. The unique exception was detected with the fruit firmness which decreased by Fe foliar spray.

B- Interaction effect:

Data obtained revealed obviously that the specific effect of each investigated factor was directly reflecated on their combinations (interaction effect), whereas the Le-Conte pear trees supplied with the $N_2P_2K_2$ soil added rate regardless of the concentration of chelated iron spray of Fe-sequestereted-12 % were statistically the superior. However, such trend was true during both seasons from one hand, but those received the Fe_2 spray solution (0.4 % conc.) were more effective.