SUMMARY AND CONCLUSION

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The present investigation was carried out during both successive seasons of 2006 and 2007 on six-year-old of "Canino" apricot cv. trees budded on local apricot seedlings rootstock, grown in the Experimental Farm at El-Kanater Horticultural Research Station, Kalyubia Governorate.

Fifty four healthy fruitful apricot trees "Canino" cv. budded on local apricot rootstock were carefully selected and devoted for this work. Trees were nearly uniform as possible in their growth vigour, free from diseases, grown in a clay loamy soil and planted at 5 x 5 meters apart under flood irrigation system. All trees used received regularly the same cultural practices adopted in this region.

The purpose of this investigation aimed mainly to improve growth, nutritional status and increase productivity as well as improve both fruit physical and chemical characteristics of "Canino" apricot trees through investigating their response to some N, K and bio-stimulants fertilization treatments included two levels of NK i.e., (N_1K_1) and (N_2K_2) fertilizers soil application in combined with one or more from some bio-stimulants compounds under study i.e., Nitrobein, Phosphorene and active dry yeast soil applied. The source of the applied mineral fertilizers i.e., N and K were ammnium sulphate (20.6 % N) and potassium sulpate (48 % K_2O) for the N and K sources, respectively. In addition, one (1.0) kg from each mineral fertilizer source was soil applied for the first level, while in the second one (N_2K_2) the dose was doubled i.e., became two (2.0) kgs from each N and K fertilizer per tree. Moreover, as for some bio-stimulants compounds.

The corresponding amounts from N and K mineral fertilizers used for NK level were mixed together and fractioned into equal doses to be soil applied on the last week of February and after two weeks of fruit setting for the first and second doses, respectively. Whereas, the entire phosphorus quantity rate added onece in early February during each season, phosphorus level was soil applied to all NK treatments at a constant level once dose at one kg per tree in the form of superphosphate (15.5 % P_2O_5). Meanwhile, the rate of investigated bio-stimulants were (100, 50 and 40 gms/tree) for Nit., Phos. and active dry yeast, respectively. Moreover, the abovementioned amounts were divided into two equal doses.

The complete randomized block design with three replications (an individual tree per each) was adopted for arranging the following eighteen combinations of (NK x bio-stimulants compounds) fertilizations treatments.

Accordingly, the investigated N, K and bio-stimulants soil applied fertilization treatments were as follows:

1- Control treatment (N_0K_0 + no bio-stimulants) soil applied.

2- N_1K_1 + no bio-stimulants soil applied.

3- N_1K_1 + Nitrobein (Nit) soil applied.

4- N_1K_1 + Phosphorene (Phos) soil applied.

5- N_1K_1 + Active dry yeast (y) soil applied.

6- N_1K_1 + Nitrobein (Nit) + Phosphorene (Phos) soil applied.

7- N_1K_1 + Nitrobein (Nit) + Active dry yeast (y) soil applied.

8- N_1K_1 + Phosphorene (Phos) + Active dry yeast (y) soil applied.

9- N_1K_1 + Nitrobein (Nit) + Phosphorene (Phos) + Active dry yeast (y) soil applied.

10- Control treatment (N_0K_0 + no bio-stimulants) soil applied.

11- N_2K_2 + no bio-stimulants soil applied.

12- N_2K_2 + Nitrobein (Nit) soil applied.

13- N_2K_2 + Phosphorene (Phos) soil applied.

14- N_2K_2 + Active dry yeast (y) soil applied.

15- N_2K_2 + Nitrobein (Nit) + Phosphorene (Phos) soil applied.

16- N_2K_2 + Nitrobein (Nit) + Active dry yeast (y) soil applied.

17- N_2K_2 + Phosphorene (Phos) + Active dry yeast (y) soil applied.

18- N_2K_2 + Nitrobein (Nit) + Phosphorene (Phos) + Active dry yeast (y) soil applied.

Hence, those combinations of NK x bio-stimulants fertilization treatments were evaluated concerning their influence on some vegetative growth measurements, nutritional status (leaf mineral composition) and some fruiting parameters as well as some physical and chemical characteristics of "Canino" apricot fruits.

Therefore, data obtained throughout 2006 and 2007 seasons of study could be summarized as follows:

V-I- Response of some vegetative growth measurements:

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

A- Specific effect:

Concerning the specific effect of the NK soil applied level, data obtained displayed obviously that all the growth measurements i.e., increase in shoot length (cm.), number of

leaves per shoot, increase percentage in trunk diameter, leaf dimensions (length and width); leaf shape index; leaf area (cm^2) and leaf dry weight (mg) responded specifically to the two investigated NK fertilizers levels. However, the greatest and highest values of all investigated growth measurements were significantly exhibited by those "Canino" apricot trees supplied with the higher level of NK fertilizer treatment i.e., (N_2K_2). On the other hand, the opposite trend was detected with the lower level of NK i.e., (N_1K_1) which induced statistically the least value of any investigated growth parameters under study. Moreover, the differences were significant as the two (N_2K_2) and (N_1K_1) fertilization treatments were compared each other except with the specific effect of NK levels on shape index however, data show the response was completely absent from the standpoint of statistics. Since the leaf shape index of trees received any of (N_1K_1) and (N_2K_2) treatments were insignificant as compared each other. Such trend was true during both 2006 and 2007 seasons of study.

Moreover, the eight vegetative growth measurements abovementioned responded significantly to the different bio-stimulants treatments. Whereas, all studied bio-stimulants treatments significantly exhibited the greatest values in all investigated growth parameters as compared to the control treatment during both the first and second seasons of study. In addition, the treatment of bio-stimulants (Nit x Phos x y) treated trees was statistically the superior and more effective than the other bio-stimulants treatments which induced significantly the greatest and highest values of eight aforesaid growth parameters the two seasons of study. However, the opposite trend was detected with the control treatment was statistically the inferior as exhibited the least values all studied growth parameters during the first and second seasons of study. Furthermore, differences in

the eight vegetative growth measurements due to studied bio-stimulants soil application were more pronounced than those previously discussed with the NK application level hence, differences between all used bio-stimulants were significant as each treatment compared the other such trend was true both 2006 and 2007 seasons of study.

B- Interaction effect:

Regarding the interaction effect of the different combinations treatments between the various variables of both investigated factors on the eight abovementioned vegetative growth measurements of "Canino" apricot trees, data show clearly that the specific effect of each factor i.e., NK level and bio-stimulants soil applied was directly reflected on their combinations during both 2006 and 2007 seasons of study. However, the greatest and highest values of any investigated growth measurement were always in concomitant with those two combinations treatments the (N_2K_2) from one hand any the (Nit x Phos x y) and (Nit x y) from the other. Contrary to that, the reverse was true with the control treatment of "Canino" apricot trees which showed statistically the inferior as resulted in the least values in all growth parameters during the two seasons of study. Meanwhile, other combinations treatments were intermediate the aforesaid two extents with a tendency of variability in their effectiveness. Such trend was detected during both 2006 and 2007 seasons of study.

V-II- Response of nutritional status (leaf mineral composition):

Regarding the leaf macro and micro nutrients (N, P, K, Ca, Mg, Fe, Zn and Mn) contents of "Canino" apricot trees estimated as either mg./leaf (absolute value) or a ratio on the matter base (percent for the five macro-elements and part per

million for the three micro-nutrients) in response to the specific and interaction effects of the differential NK and some bio-stimulants fertilization treatments were investigated during both 2006 and 2007 seasons.

A- Specific effect:

Obtained data during both 2006 and 2007 seasons indicated clearly that all leaf nutrient contents either macro-elements (N, P, K, Ca and Mg) or micro-nutrients (Fe, Zn and Mn) were significantly responded to the specific effect of the NK soil added levels. However, the greatest statistically values of leaf macro and micronutrients content was always in concomitant to those "Canino" apricot trees subjected to the highest (NK) level i.e., (N_2K_2) soil applied level. On the other hand, the rate of increase resulted by raising NK applied level varied from one element to another, since, with N, K, Ca, Mg, Fe and Zn the rate was more pronounced than that with P and to some extent Mn. In addition, the opposite trend was observed with the lowest NK soil added level, hence the poorest leaves in their macro and micro-elements contents were in closed relationship to the trees received lowest level of N_1K_1 soil application. Moreover, differences were significant between the two (NK) investigated levels. Such trend was detected during the first and second seasons of study.

As for the response to the specific effect of some bio-stimulants compounds under study i.e., Nitrobein, Phosphorene and active dry yeast, data revealed that the leaf content of macro-element (N, P, K, Ca, Mg, Fe, Zn and Mn) responded significantly. However, the leaf content of studied macro-nutrients were generally increased with using all investigated bio-stimulants compounds either alone or in combined together as compared to the control treatment during both 2006 and 2007

seasons of study. The increase exhibited in the leaf macro and micro-elements content in this respect was significant. On the other hand, the differences were more pronounced as the apricot trees were provided with the treatment of (Nit x Phos x Y) whereas the (Nit x Phos x Y) treated trees induced statistically the richest leaves in their macro and micro-nutrients content as compared to any bio-stimulants treatments during the two seasons of study.

B- Interaction effect:

Considering the interaction effect, data obtained displayed obviously that the specific effect of both factors under study reflected directly on their interaction effect. Hence, the combinations between the highest (NK) soil applied level i.e., (N_2K_2) from one hand and (Nit x Phos x Y) combined with them from the other exhibited statistically the greatest values and the richest leaf N, P, K, Ca, Mg, Fe, Zn and Mn contents. Moreover, the superiority of the (N_2K_2 x Nit x Phos x Y) combinations treatment over the other investigated treatments was clearly observed during both 2006 and 2007 seasons of study. On the other hand, lowest and poorest leaf in their content of N, P, K, Ca, Mg, Fe, Zn and Mn was always in concomitant to those "Canino" apricot trees supplied to both the control and N, K without bio-stimulants soil application treatments however, both treatments were statistically the inferior as both showed significantly the least value of leaf macro and micro-nutrients content. In addition, other (NK x bio-stimulants) soil applied combinations came in between with a tendency of variability in their effectiveness as compared to the aforesaid two extents. Such trend was generally true during both 2006 and 2007 seasons of study.

V-III- Response of some fruiting parameters:

Considering some fruiting parameters such as the percentage of fruit set and productivity of tree as either kgs per tree and number of fruits/tree as well as yield increment % relation to the control were investigated concerning their response to the specific and interaction effects of the two investigated factors (NK and some bio-stimulants) soil application and their combinations, respectively.

A- Specific effect:

Data obtained during two seasons of study revealed obviously that all studied abovementioned fruiting parameters of "Canino" apricot cv., responded specifically to the NK soil applied levels. Since, the four parameters of cropping aspects (the percentage of fruit set, yield as both kgs and number of fruits per tree as well as yield increment % over the control) were in closed positive relationship with the NK soil applied level i.e., (N_2K_2) was the superior. On the other hand, the opposite trend was true with lower NK level soil applied i.e., (N_1K_1) which had significantly the least values of four parameters of cropping aspects. Such trend was detected during the first and second seasons of study.

Considering the response to the specific effect of some bio-stimulants compounds soil application data indicated that treated trees with bio-stimulants soil applied induced statistically the highest fruit set %, the greatest tree yield either kgs or number of fruits per tree and the highest yield increment % over the control as compared to the control. Moreover, the differences were significant and this trend was true during 2006 and 2007 seasons of study.

B- Interaction effect:

Data obtained displayed clearly that the specific effect of each investigated factor was directly reflected on their combinations (interaction effect). Whereas, the "Canino" apricot trees supplied with (N_2K_2 x Nit x Phos x y) combinations treatment as soil application was statistically the superior. On the other hand, the reverse was detected by those control trees and (N_1K_1 x no bi-stimulants) soil added which exhibited statistically the least values of some fruiting parameters under study during both 2006 and 2007 seasons. In addition, other (NK x bio-stimulants) combinations were in between the aforesaid two extents.

V-IV- Response of some fruit characteristics:

With respect to some fruit characteristics namely (a) fruit physical characteristics such as (fruit weight, volume, height, diameter, fruit shape index, flesh firmness of fruit, flesh weight, seed weight and flesh/ seed ratio) and (b) fruit juice chemical characteristics such as (TSS %, acidity %, TSS/acid ratio and total sugars content) were investigated concerning their response to the specific and interaction effects of the two studied factors (NK levels and some bio-stimulants) soil applied and their combinations.

A- Specific effect:

Results obtained throughout the two seasons of study revealed obviously that all investigated fruit characteristics of "Canino" apricot cv., responded specifically to the NK soil added levels. However, most fruit physical characteristics (fruit weight, volume, height, diameter, both flesh and seed weight) of

"Canino" apricot fruit except (fruit shape index, flesh fruit firmness and flesh/seed ratio) from one hand and some fruit juice chemical characteristics (TSS %, acidity % and total sugars %, except TSS/acid ratio) all were always in concomitant to the NK soil applied level. Since, the NK soil added at the higher level i.e., N_2K_2 was the superior which had statistically induced the highest and greatest values of the most abovementioned fruit characteristics. Whereas, the opposite trend was true with lower NK level i.e., N_1K_1 soil applied level during both 2006 and 2007 seasons.

Concerning the specific effect of some investigated bio-stimulants soil application on the aforesaid fruit characteristics, data indicated that the response was more pronounced than that detected with the NK level. Hence, with the most fruit physical and chemical characteristics an improving was observed by treated trees with either (Nit x Phos x y) or (Nit x y) bio-stimulants soil applied treatments as compared to the control. Such trend was detected during both the first and second seasons.

B- Interaction effect:

Data obtained revealed clearly that the specific effect of each investigated factor was directly reflected on their interaction effect (combinations), whereas the "Canino" apricot trees supplied with the higher NK level i.e., (N_2K_2) soil applied combined with both (Nit x Phos x y) and (Nit x y) bio-stimulants soil added i.e., (N_2K_2 x Nit x Phos x y) and (N_2K_2 x Nit x y) combinations were statistically the superior in improving the most fruit physical and chemical properties. Such trend was true during both 2006 and 2007 seasons of study.

Generally it could be safely concluded that, the obtained results proved the great benefit could be achieved from bio-stimulants soil application as additional N, P or K source (Nitrobein, Phosphorene and active dry yeast) which was positively reflected on most measurements either those related to vegetative growth, nutritional status, tree productivity or fruit characteristics. It could recommended that, "Canino" apricot trees treated with 2.0 kgs from each ammonium sulphate (20.6 % N) and potassium sulphate (48 % K_2O) + 100 gms. of Nitrobein + 50 gms of Phosphorene + 40 gms of active dry yeast as soil applied combinations treatment per tree annually was the best and the most effective treatment for increasing growth measurements and fruiting parameters from one hand and improving the nutritional status and both physical and chemical fruit characteristics of "Canino" apricot trees cultivated under the same conditions.