SUMMARY AND CONCLUSION

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This study was conducted during the two successive seasons of 2000 and 2001 at El-Maghara Station, Sinai Governorate as a trial to study the effect of different nitrogen form i.e., slow release, fast release nitrogen fertilizers and biofertilizers on growth, leaf minerals content, fruiting and fruit quality of Thompson seedless grapevines.

Ten-year-old Thompson seedless grapevines, nearly similar in growth vigour, healthy, planted at 3 x 3.5 m apart in a sandy soil were devoted for this investigation. Ninety-six Thompson seedless grapevines, received regularly the recommended horticultural practices were selected for this study. However, three factors were studied during the present investigation as follows:

1-Nitrogen fertilizer source:

Response of vine growth, fruiting and fruit quality of Thompson seedless grapevines to four forms of nitrogen fertilizers namely (Ammonium sulphate and urea) as fast release nitrogen fertilizers and (Sulphur coated urea and Phosphorus coated urea) as slow release nitrogen fertilizer was investigated.

According to the recommendation of Horticultural Institute, Ministry of Agriculture, Egypt, the most of actual nitrogen (g/vine/year) required to grape.

Ammonium sulphate $(NH_4)_2O_4$ 20.6%).

Urea (NH_2-O-NH_2 46%N.

Sulphur coated urea (SCU 41.0% N + 0.0 % S).

Phosphorus coated urea (Pcu 37.11% N).

2-Nitrogen fertilizer rates:

Four rates of nitrogen fertilizers [40, 60, 80 and 100 g N/vine/year] application of the four tested nitrogen fertilizer sform i.e., fast release N-fertilizers (Ammonium sulphate and urea) and slow release N-fertilizers (SCU and PCU) were studied as follows:

a)- fast release N-fertilizers was added four times at (February, April, June and August).

b)- slow release N-fertilizers was added once time at vegetative growth start (February).

All nitrogen fertilizer forms studied were applied in trench and digged in the soil during deep hand hoeing practice (about 5 cm depth).

3- Biofertilization (N-fixing bacteria):

The remaining N-requirement for each vine was assumed to be partially satisfied through using N-fixing fertilizers. In the first week of March of each season, Thompson seedless grapevines were inoculated with *Azotobacter chrococcum* (1/2 liter per vine) two-liter liquid bacteria mixed with fifteen-liter tap water and applied in trenches. Irrigation was conducted after biofertilizer application.

Consequently, this investigation is considered a factorial experiment included three factors (4 N-fertilizer forms x 4 N-

fertilizer rates and biofertilizers). The treatments were arranged in split split plot design.

The obtained results could be summarized as follows:

1- The growth:

Generally, slow release N-fertilized vines produced bud burst percentage, fruitful percentage, vegetative shoot percentage, longer shoots, higher number of leaves per shoot, larger leaf area, leaves richer in their total chlorophyll content than the analogous ones fertilized with fast release N-fertilizers. Besides, the studied vegetative growth parameters responded significantly to the increase in nitrogen fertilizer rate, hence the higher N-fertilizer rate (80 and 100 g N/vine/year) recorded the highest values of the previously mentioned vegetative growth parameters than did the lower nitrogen fertilizer rate (40 and 60 g N/vine/year). This stimulate effect on growth was enhanced when the nitrogen fertilizer forms were applied and supported with N-fixing biofertilizer *Azotobacter chrococcum*.

Furthermore, the tested forms of slow release nitrogen fertilizers (PCU and SCU) surpassed the tested forms of fast release N-fertilizers (ammonium sulphate and urea) with or without biofertilizers in exerting higher positive effect on the studied vegetative growth parameters. Briefly, SCU proved to be the superior slow release N-fertilizer form with N-fixing bacteria, followed descendingly by PCU. On the contrary, urea showed to be the least efficient fast release N-fertilizer form in this respect.

2- Leaf minerals contents:

Fertilizing Thompson seedless grapevines with slow release N-fertilized had higher values of leaf nitrogen, phosphorus, potassium, calcium, magnesium, zinc, and boron than those of fast release N-fertilizer ones. Besides, increasing nitrogen fertilizer rate enhanced the previously mentioned leaf minerals content. Furthermore, the tested forms of slow release N-fertilizers particularly SCU with biofertilizers (N-fixing bacteria followed by PCU gave higher positive effect on the aforementioned leaf mineral content than did the tested forms of fast release N-fertilizer forms (Ammonium sulphate and urea) with N-fixing biofertilizer. On the contrary, the stimulate effect of N-fertilizer sources was enhanced when applied in trenches and supported with biofertilizer *Azotobacter chrococcum*.

3- Vine fruiting:

Slow release N-fertilizers vines gave the highest yield (kg/vine) as compared with those fertilized with fast release N-fertilizers. Besides, high rates of nitrogen fertilizers surpassed the low rate of nitrogen application in enhancing the aforementioned vine fruiting parameters. On the other hand, the combination between slow release N-fertilizers and high rate of nitrogen application exerted the highest positive effect on the studied vine fruiting parameters.

Shortly, out of all interactions between N-fertilizer forms and rate with biofertilizer *Azotobacter chrococcum* of application Scu and high rate of nitrogen fertilization with

biofertilizer proved to the most promising treatment in enhancing the previously mentioned vine fruiting parameters.

Shortly, slow release N-fertilizers succeeded in enhancing fruit yield/vine (kg). Besides, fast release N-fertilizers increased number of cluster per vine. Increasing nitrogen fertilization rate from (80 and 100 g N/vine) with biofertilization *Azotobacter chrococcum* induced to the wonted effects on tree fruiting parameters. In addition, the different forms of slow release N-fertilizers particularly (SCU) with biofertilizers enhanced the previously mentioned fruiting parameters.

4- Fruit quality:

Fruit quality parameters i.e., fruit weight, fruit diameters, juice volume, cluster number/vine, total soluble solids acidity, TSS/acidity and total sugar responded positively to slow release N-fertilizers rather than fast release N-fertilizers. Besides, the high rate of nitrogen fertilizers surpassed the low rate in enhancing the aforementioned fruit quality parameters.

On the other hand, fruit quality parameters were greatly increased with slow release N-fertilizers at the higher rate(80g N/vine) of nitrogen application with biofertilizers *Azotobacter chrococcum*.

Briefly, the result of interaction between the different nitrogen fertilizer forms and rate of applications and biofertilizers *Azotobacter chrococcum* indicated that (SCU) applied at high rate with N-fixing bacteria proved to be the supprier interaction in enhancing the aforementioned fruit quality parameters.

Consequently, upon the results of this study it is preferable to fertilize Thompson seedless grapevines with slow release N-fertilizers particularly sulphur coated urea or phosphorus coated urea at (80 and 100 g N/vine/year). *Azotobacter chrococcum* could be used as a form for fixing nitrogen in the soil which fertilized with organic manure rate of $15m^3$/ feddan. Used of bacteria in combination with slow release N-fertilizers results encouraging yield and helps to keep the environment clean for coming generations.