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THE EFFECT OF SPRAYING NANO, CHEMICAL AND BIO FERTILIZER AND THEIR INTERACTION ON SOME GROWTH AND YIELD TRAITS OF EUROPEAN GRAPES *VITIS VINIFERA* L. CV. AL-KHALILI

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Abstract

The experiment was conducted in one of the private orchards in the Al-Medhatia Al-Seyahi region in the Babylon province during the agriculture seasons 2019-2020 on *Vitis vinifera* L. *cv.* Al-Khalili grape cultivar. To study the effect of spraying with nano fertilizer at a concentration of (0, 10, 20) mg.L^{-1} and the chemical fertilizer at a concentration of (10, 20) mg.L^{-1} and bio fertilization with a concentration of (0, 5) mg.L^{-1} and their interaction In some characteristics of vegetative growth and the yield of the Al-Khalili grape cultivar. A factorial experiment was conducted according to the randomized complete block design (R.C.B.D) with three factors distributed randomly with their concentrations in three replicates. The results were analyzed by using the Genstat program in data analysis to study the effect of each of the three factors and their interaction in the studied traits. Average treatments were tested according to the least significant difference test (L.S.D) and below at the probability level 5% . Nano fertilizer spray showed a significant effect on most studied traits, especially the concentration (20 mg.L^{-1}) compared with (10 mg.L^{-1}) and the control treatment where it excelled in (leaf area 168.2 cm^2) , the relative content of chlorophyll 67.36 SPAD , the percentage of nitrogen 4.453% , the percentage of Phosphorous is 1.283%, the potassium percentage is 3.802%, the fresh weight is 7.016 g and the total yield 280.1 kg). The effect of spraying with chemical fertilizer was significant with the studied traits (leaf area 165.2 cm2, the relative content of chlorophyll 63.21 SPAD, the percentage of nitrogen 4.0720% and the total yield of 287.4 kg) and the use of biofertilizer concentrate (5 ml.L^{-1}) has no effect except in the traits of fresh weight of leaves 6.877 g compared to the control treatment. The bi-interaction treatment between the nano fertilizer with a concentration of (20 mg.L-1) and the chemical fertilizer (20 mg.L^{-1}) significantly affected in most of the studied traits (leaf area of the vine was 175.2 cm and the total yield was 300.3 kg), while the treatment of the bi interaction between the nano fertilizer at a concentration of (20 mg.L^{-1}) and chemical fertilizer (20 ml .L^{-1}), a significant effect on the nitrogen percentage was 4.613% with the control treatment.

Key words: Nano, bio fertilizer, European grapes, *Vitis vinifera*

Introduction

The grapes are mentioned in the Holy Qur'an in ten sura and eleven verses (Almisiriu, 2002) and its cultivation have been known in Iraq since the Mesopotamian civilization, where the grape trees were known to the ancient Iraqis before the birth of the Prophet (Al-Saeedi, 1982). *Vitis vinifera* L belongs to the genus Vitis and is one Of 14 genera of the Vitaceae family (Al-Saeedi, 2000), The original homeland of European grapes in the region of Central Asia between the southern Black Sea and the Caspian Sea, from which all other grape cultivars originated and have great economic importance, which led to its cultivation on a large scale. Grapes are ranked first among the various fruit trees in terms of production and cultivated area in the world, where it is estimated at 8291220 hectares and total production is 74584600 tons (F.A.O, 2007). The area cultivated with grapes in Iraq is estimated at 8 thousand hectares, with a total production of 254788 tons, and the average productivity of one tree (22.9) kg. The Al-Khalily grape cultivar is a good grape cultivars. Its fruits contain a high content of monosaccharides and organic acids prevalent in it, tartaric and malic acid. Its fruits also contain a small percentage of protein and some vitamins and mineral salts such as potassium, magnesium and calcium (Hulme, 1970). Experiments have proven that foliar feeding reduces the phenomenon of contrast between the elements that can hinder its absorption by the plant compared to its absorption by the soil in addition to it reduces the effort and costs by

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mixing it with some pesticides (Haytova, 2013). Numerous studies and research have shown that nanotechnology has had a positive effect in increasing production of agricultural crops, reducing excessive fertilizer use, reducing losses and clearing the soil of heavy elements that hinder plants' absorption of nutrients and that they are less costly when using nanomaterials in agricultural fertilizer as an effective supplement to traditional fertilizers In smaller quantities, as long periods of time can be stored as a result of its high stability under different conditions (Ali and Al-Jodhry, 2017). Also, nanotechnology provides new, interdisciplinary windows in the field of agricultural and food sciences that can lead to the solution of many agricultural problems (Ghormade *et al.,* 2011), Prosol foliar fertilizer is an important fertilizer that works to increase the average of plant growth by providing nutrients, so it has become necessary to provide these elements by spraying them on the vegetative growth to be absorbed by plant tissue (Zakaria, 2013). and that the reason for increasing the content of both chlorophyll and the leaf content of nitrogen elements, carbon, phosphorus, potassium and protein when adding a nutrient solution with a PRO.SOL may be due to the content of this nutrient from the macro and micronutrients that have a wide impact in stimulating vital activities within the plant (Osman 2010). The increase in the population of the world requires an increase in the productivity of agricultural crops. Therefore, in many countries of the world, concerns have focused on encouraging the biological production of crops that are characterized as clean food free of the remaining negative effects of chemical fertilizers (Al-Amiri, 2011). Likewise, the technique of using biological fertilizers, which is known as Bio farming technology or Natural Agriculture, is one of the most important advanced agricultural techniques through the optimal and integrated use of chemical and biological fertilizers to reduce excessive additions of chemical fertilizers as well as being inexpensive and environmentally friendly if there are chemicals and it plays an important role in improving the natural, chemical and biological traits of the soil, stabilizing atmospheric nitrogen, increasing availability and absorbing nutrients such as phosphorus, potassium and micronutrients, and then improving plant growth and production (Juburi, 2013). Therefore, the study aims to know the following:

1- Knowing the extent of the response of European grape trees, the Al-Khalily cultivar, to the treatment with nano chemical, and biofertilizers in some of the growth traits and quantitative and qualitative yield traits.
2- Studying the effect of the interaction between the factors of the study on the traits of growth and the quantitative and qualitative yield.
3- Determine the best concentration of nano, chemical and biological fertilizers.

Materials and Methods

The experiment was conducted in one of the private orchards in the Al-Medhatia-Al-Seyahi region in the Babylon province during the two agriculture seasons 2019-2020 on the Vitis vinifera L grape trees. To study the effect of spraying the nano and chemical and biological fertilization and their interaction in some growth traits of the AlKhalili grape cultivar with parallel lines (2 × 3) meters, which are propagated by cutting and that breed on locally manufactured wire cabin tied with iron wires on poles of the palm trunk. The experiment included (72) grape vine, at the age of (10) years, the same as possible, in the stem diameter , the length of the branches, the number of branches, the number of peduncle and eyes on the peduncle.

Experiment design and study factors

A Factorial experiment (3 × 4) was conducted with Randomized Complete Block Design (R.C.B.D) (Alrawi and Khalaf Allah, 1980) and included three spray treatments of nano fertilizer NPK (0, 1, 2) (0, 10, 20) mg.L^{-1}, respectively, interaction with two levels of Biofertilizer (0, 1) (0, 5) mg.L^{-1} respectively and two levels of PRO.SOL (1, 2) (10, 20) mg.L^{-1} respectively and with three replicates, the experimental unit included one plant, bringing the total number of vines to 36 and the averages were compared according to the least significant difference at the level of 5%. As fertilizer was added to the soil at an average of (5 mg per vine.L^{-1} water) for level (B1) and spraying with chemical fertilizer, ProSol K, for the levels (K1, K2) (10, 20) mg.L^{-1} and nano fertilizer (N0, N1, N2) (0, 10, 20) mg.L^{-1} using a sprayer (16-litre capacity) until the degree of complete wetness of the vegetative group with the addition of the diffuser (Inex-A) at an average of 0.75% to reduce the surface tension of water particles on the total vegetative of grapevines by the first spraying in 4/4/2019 and the second spraying 20/5/2019.

Leaf area (cm^2)

Three full-size leaves (the fifth corresponding to the clusters) were taken from each plant in the experimental unit and measured by the method used by O'neal, ME, Landis, DA, & Isaacs, RR (2002) using a scanner using the loaded ImageJ software. On a computer, and then took the average to calculate the leaf area.

The leaf content of total chlorophyll (mg. 100 g) fresh weight

The leaf content of chlorophyll was estimated by taking (5g) of the leaves that were elected to measure the leaf area of each vine. Three leaves were randomly chosen from each experimental unit and washed to get rid of dust and impurities, It was cut and crushed using a ceramic mortar with (5ml) acetone at a concentration of (85%), then the mixture was filtered to separate the pigment solution from the vegetable tissue using filter paper and collect the filtrate and complete the volume by adding 10 ml acetone and was read with a spectrophotometer along the wavelength of 645 and 663 nm Then, I calculated the total chlorophyll dye concentration (mg pigmint 100 g^{-1} fresh tissue) (Goodwin, 1965). As in the following equation:

Total chlorophyll = 20.2 × 645 s + 8.02 × 663 s / f / 1000 ×

Where :

S 663 : Reading the optical absorption with a wavelength of 663 nm.

Q645 : Reading Optical absorption at 645 nm wavelength.

H : Final volume of the extract (ml).

And : Sample weight (g).

The leaf content of nitrogen

The adult and corresponding leaves of the clusters (the fifth leaf) were collected from the fruitful branches (Al-Sahaf, 1989) and digested according to the method (Cresser and Parsons, 1979), after which the following elements were estimated as follows :-

Total nitrogen (%):-

The percentage of total nitrogen was calculated using the Kjeldahl apparatus and according to the method reported by Al-Sahaf (1989) in the Horticulture and Landscape department Laboratory, University of Baghdad. Total nitrogen was calculated from the following formula:-

$$N\% = \frac{The\,volume\,of\,\,acid\,consumed\,by\,correction \times S\tan dard\,acid \times 14 \times Dilution\,volume}{Sample\,size\,taken\,at\,the\,time\,of\,\,distillation \times Weight\,of\,\,digested\,sample \times 100} \times 100$$

leaves the content of Phosphorous (%)

Determined using ammonium molybdate method according to the method mentioned in (Al-Sahaf, 1989).

The leaf content of potassium%.

It was estimated in the digested sample by taking 10 ml of the sample and placing it in a glass flask and diluted by 20 ml with distilled water and then read with a flame photometer according to the method mentioned in (Al-Sahaf, 1989).

The fresh weight of leaves (gm. $Leaf^{-1}$).

(15) full-size leaves were taken from each vine in the experimental unit and decorated with a sensitive scale.

Total yield (kg. $Vine^{-1}$)

The total vine yield was calculated by multiplying the average weight of the cluster x the number of clusters per vine.

Results and Discussion

Leaf area (cm^2)

Table 1 showed that there were significant differences for the effect of spraying with nano fertilizer in grapevine leaves under the probability level of 0.05, where The B3 concentration (20 $mg.L^{-1}$) recorded the highest leaf area as it reached 168.2 cm^2 while the control treatment b1 (0 $mg.L^{-1}$) recorded minimum leaf area 131.0 cm^2, From the same table, there are significant differences in the effect of spraying with chemical fertilizers and bio-fertilizers in the leaf area, The results showed that spraying with chemical fertilizer d3 concentration (10 $mg.L^{-1}$) recorded the highest area of 165.2 cm2, while the control treatment recorded d1 (0 $mg.L^{-1}$) the lowest leaf area was 131.0 cm^2. Significant differences were recorded for the interaction between spraying the nano, chemical fertilizer and bio-fertilization in the leaf area. The interaction treatment (b3 + d4) 0 $mg.L^{-1}$ nano fertilizer + 20 mg chemical fertilizer gave the highest leaf surface area of 175.2 cm^2, excelled on all interaction treatments. Where, the control interaction treatment (b1 + d1) 0 mg. L^{-1} nano fertilizer + 0 $mg.L^{-1}$ bio-fertilizer gave the lowest leaf area 92.0 cm^2.

The relative content of chlorophyll (SPAD)

Table 1: Effect of spraying nano, Chemical and bio fertilizer and their interaction in the leaf area (cm^2).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
131.0	163.4	158.7	92.0	d1
142.9	161.4	146.8	120.4	d2
165.2	173.0	159.3	163.2	d3
156.4	175.2	145.7	148.3	d4
	168.2	152.6	131.0	Nano fertilization average
B = 13.07 15.09 = D 26.14 = B×D				L.S.D. (0.05)

Table 2: Effect of spraying nano , Chemical and bio fertilizer and their interaction in the relative content of chlorophyll (SPAD).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
58.88	67.43	57.81	51.41	d1
57.61	61.97	55.80	55.07	d2
61.26	68.90	58.37	56.51	d3
63.21	71.15	63.71	54.76	d4
	67.36	58.92	54.44	Nano fertilization average
N.S=B×D 3.689=D	B=3.195			L.S.D. (0.05)

The results in table 2 showed significant differences in the effect of spraying with nano fertilizer in the leaves content of chlorophyll, where (b3) the concentration (20 mg.L^{-1}) gave the highest content of chlorophyll 67.36 SPAD, while (b1) control treatment (0 mg.L^{-1}) gave the lowest content of chlorophyll 54.44 SPAD. The same table also showed significant differences in the effect of spraying with chemical and bio-fertilizers in the leaves content of chlorophyll. The chemical fertilizer (d4) concentration (20 mg.L^{-1}) was given the highest content of chlorophyll 63.21 SPAD while bio-fertilization (d2) (5 mg.L^{-1}) gave the lowest content of chlorophyll 57.61 SPAD. While the results of the interaction between the effect of spraying with nano ,chemical and bio-fertilization showed no significant differences.

Percentage of nitrogen %

Table 3 showed that there were significant differences for the effect of spraying with nano fertilizer in the percentage of nitrogen in grapevine leaves, where b3 the concentration (20 mg.L^{-1}) recorded the highest percentage of nitrogen was 4.453%, while the control treatment (0 mg.L^{-1}) was recorded the lowest percentage is 3.438%. It also shows from the same table that there are significant differences for the effect of spraying with chemical fertilizer and mineral fertilizer on the percentage of nitrogen in grapevine leaves, The results showed that spraying with chemical fertilizer d4 concentration (20 mg.L^{-1}) gave the highest percentage of nitrogen 4.072%, while control treatment d1 (0 mg. Liters^{-1}) recorded the lowest percentage of nitrogen 3.796%. There were also significant differences for the interaction between spraying with nano and chemical and bio-fertilization in the percentage of nitrogen in grapevine leaves, The interaction treatment (b3 + d4) 10 mg.L^{-1} nano fertilizer + 20 mg.L^{-1} chemical fertilizer gave the highest nitrogen percentage is 4.613%, excelled on all of the interaction treatments. Whereas, the interaction treatment control treatment (b1 + d1) 0 mg.L^{-1} 0 nano fertilizer + 0 mg.L^{-1} bio-fertilizer gave the lowest percentage of nitrogen by 3.313%.

Table 3: Effect of spraying nano, Chemical and bio fertilizer and their interaction in the Percentage of nitrogen (%).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
3.796	4.240	3.833	3.313	d1
3.817	4.417	3.573	3.460	d2
3.884	4.543	3.510	3.480	d3
4.072	4.613	4.107	3.497	d4
	4.453	3.756	3.438	Nano fertilization average
0.3090=B×D	D=0.1784 B=0.1545			L.S.D. (0.05)

Percentage of phosphorus %

Table 4 showed that there were significant differences for the effect of spraying with manure in the percentage of phosphorous in grapevine leaves, where (b2) the concentration (10 mg.L^{-1}) gave the highest percentage of phosphorus reached 1.283%, while (b1) control treatment (0) mg.L^{-1})gave the lowest percentage amounted to 0.850%. The table also showed that there were no significant differences in the effect of spraying with chemical and bio-fertilizers in the percentage of phosphorus in vine leaves. Whereas, the results of the interaction between the effect of spraying with nano, chemical and bio-fertilization showed no significant differences.

Table 4: Effect of spraying nano , Chemical and bio fertilizer and their interaction in the Percentage of phosphorus (%).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
0.967	0.900	1.367	0.633	d1
1.300	1.467	1.433	1.000	d2
1.111	1.267	1.267	0.800	d3
1.133	1.367	1.067	0.967	d4
	1.250	1.283	0.850	Nano fertilization average
N.S=B×D	D=N.S B=0.2470			L.S.D. (0.05)

The fresh weight of the leaves (gm. Leaf^{-1})

Table 6 showed that there were significant differences for the effect of spraying with manure in the fresh weight of the leaves of the grapevine, where (b3) the concentration (20 mg.L^{-1}) gave the highest fresh weight of the leaves 7.016 g, while (b1) gave the control

Table 5: Effect of spraying nano , Chemical and bio fertilizer and their interaction in the Percentage of potassium (%).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
3.127	3.500	3.500	2.380	d1
2.876	3.733	2.793	2.100	d2
3.146	3.970	3.233	2.233	d3
3.323	4.003	3.067	2.900	d4
	3.802	3.148	2.403	Nano fertilization average
N.S = B×D	D = N.S	B = 0.4746		L.S.D. (0.05)

Table 7: Effect of spraying nano, Chemical and bio fertilizer and their interaction in the Total yield for vine (kg).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
262.0	278.9	251.8	255.3	d1
268.2	270.3	272.0	262.3	d2
267.5	270.8	262.6	269.0	d3
287.5	300.3	298.4	263.7	d4
	280.1	271.2	262.6	Nano fertilization average
14.05 = B×D	D = 8.11	B = 7.03		L.S.D. (0.05)

treatment (0 $mg.L^{-1}$) gave the minimum fresh weight of leaves 6.300 g. The table also showed significant differences in the effect of spraying with chemical and bio-fertilization on the leaf content of chlorophyll, where the biofertilizer (d2) concentration (5 $mg.L^{-1}$) was given the highest fresh weight of the leaves was 6.877g while the control treatment (d1) (0 $mg.L^{-1}$) gave the lowest fresh weight of the leaves was 6.344g. Whereas, the results of the interaction between the effect of spraying with nono, chemical and bio fertilization showed in the percentage of dry matter in grapevine leaves that there were no significant differences.

Table 6: Effect of spraying nano , Chemical and bio fertilizer and their interaction in the fresh weight of the leaves (g. $Leaf^{1}$).

The average of bio and chemical fertilization	Nano fertilization (B)			Treatments bio and chemical fertilization (D)
	b3	b 2	b 1	
6.344	6.233	6.867	5.933	d1
6.877	7.163	7.033	6.433	d2
6.813	7.100	6.773	6.567	d3
6.778	7.567	6.500	6.267	d4
	7.016	6.793	6.300	Nano fertilization average
N.S = B×D	D = 0.4011	B = 0.3474		L.S.D. (0.05)

Total yield for vine (kg)

Table 7 showed that there were significant differences for the effect of spraying with nano in Total yield for vine (kg), where (b3)the concentration (20 $mg.L^{-1}$) recorded the highest yield of grapevine was 280.1 kg, while the control treatment (b1) concentration (0mg. $Liters^{-1}$) recorded the lowest yield 262.6 kg. Also from the same table, there were significant differences for the effect of spraying with chemical and mineral fertilization in the total yield of grapevine, where the results showed that spraying with chemical fertilizer d4 concentration (20 $mg.L^{-1}$) recorded the highest yield of 287.4 kg while the control treatment recorded d1 (0 mg. $Liters^{-1}$) gave the lowest grapevine yield is 262.0 kg, There were also significant differences for the interaction between the spraying of nano, chemical fertilizer and bio fertilization in the total grapevine yield, The interaction treatment (b3 + d4) 20 $mg.L^{-1}$ nano fertilizer + 20 mg chemical fertilizer gave above the yield of 300.3 kg, excelled on all interaction treatments. Whereas, the interaction treatment, the control treatment (b2 + d1) 10 $mg.L^{-1}$ nano fertilizer + 0 $mg.L^{-1}$ bio fertilizers gave the lowest yield is 251.8 kg.

The interaction of nano fertilizers affects the increased spread and dissolution of nutrients and thus their availability to the plant which causes an increase in photosynthesis (Sekhon, 2014 and Tanou *et al.,* 2017). Likewise, the role of the nitrogen component is to increase the efficiency of the plant to carry out the process of photosynthesis in conjunction with the element phosphorus. The nitrogen component also stimulates the production of Auxin, which encourages cell division and elongation of cells, as well as the role of potassium that controls the process of opening and closing the stomata through the osmotic regulation of plant cells (Sharafi and Khader, 1985, Abu Dahi and Al-Younes, 1988). and that the reason for increasing the leaf area table 1 can be due to the increase in enzymatic activities and the average of their interactions, which leads to the production of raw materials to increase cellular divisions and then increase the leaf area as a result of treatment with nano fertilizer (Hatami *et al.,* 2014). As for the increase in the relative content of chlorophyll table 2, it may be due to the role of nanoparticles in increasing the activity of enzymes that stimulate the inhibition of the effectiveness and stopping the action of ethylene production, which has a role in the activity of the chlorine oxidation enzyme that destroys chloroplasts and leads to an increase in the division of chlorophyll and keeping the chloroplast alive for a period of time. Longer delay in senescence and stimulating photosynthesis enzymes (Siddiqui and AL-Whaibi, 2014) The reason for increasing the chlorophyll content in table

2 is due to the role of spraying with nano NPK in increasing the percentage of elements and their role in stimulating bioprocesses, including chlorophyll, especially the nitrogen component, which has a direct and important role in building the chlorophyll pigment, The nitrogen present in the fertilizer is involved in the formation of the four Porphyrins groups (a group of pigments and iron) involved in the synthesis of chlorophyll (Taiz and Zeiger, 2006), which increases the leaf content of chlorophyll. Since most of the nitrogen in the plant is concentrated in the leaves, Nitrogen helps in the formation of large-sized leaves rich in chlorophyll, and its deficiency can be easily noticed when the leaves of the plant are small in light green color with a yellowish color (Al-Douri and Al-Rawai, 2000). This is consistent with the results of Zagzog et al. (2017) in mango seedlings when sprayed with NPK nanostructures and that the increase in the percentage of nitrogen in the leaves is a table 3 by the action of the gibberellins that enter the nan iron in their composition by raising the average of growth and division and increasing the production of foodstuffs in sufficient quantities to supply the vegetative growth, which leads to an increase in the number of leaves (Rui *et al.,* 2016). Or perhaps the reason for the increase in the leaf area is due to the efficiency of nutrients (small and large) that increase metabolic processes inside the cells and thus increase the efficiency of photosynthesis, as well as the role of potassium, which increases cell division and increases its expansion due to the activation of many enzymes responsible for this process, which Increases the leaf area (Abu Dahi and Al-Younis, 1988). The use of different concentrations of nano fertilizer gave a significant difference in the number of leaves, leaf area and leaf content of chlorophyll. The levels used of the added nano fertilizer, especially nitrogen, contributed to the formation of new vegetative growth of the plant, which leads to the absorption of larger quantities of water, thereby increasing the water content in the various plant parts table 6. This is consistent with Mustafa et al (2018) found in figs and Hagagg *et al.,* (2018a, b) in olives. In light of these functions and the solidarity between the three elements, they led to improving the traits of the vegetative growth of seedlings, especially the increase in the leaf area table 1 and the increase in the tree's carbohydrate content leading to the increase in the fresh weight of the vegetative group table 6, these results are based on Qureshi *et al.,* (2018). The added nitrogen may have a role in reducing the soil PH, which caused increased phosphorus availability for the plant table 4. These results are consistent with Al-Mubarak (2014) and Al-Hamdani (2015) and phosphorus has an important role in the plant, where it works to form and build phosphorous organic compounds in the plant tissues needed to build nucleic acids and phospholipids, along with the union of the phosphorous element with the adenosine di phosphite ADP and convert it to the adenosine triphosphate ATP, which is a high-energy compound that is involved in metabolism processes. This is due to the increase in the leaf content of the phosphorous component, which has an effect on increasing the ATP energy complex, which is important in the process of phosphorylation and what follows from the chain of electron transport through photosynthesis that leads to the construction of energy carriers, nicotine amin adenine de nucleotide, phosphite, NADPH, from the reduction of the NADP compound, and as a result of that increase In foodstuffs manufactured in the leaves and stored in the tissues for use in the different growth processes (Taiz and Zeiger, 2002 and Zaid, 2002), these results are consistent with Al-Mubarak (2014). The increase in the amount of processed carbohydrates in the leaves may be due to the effect of spraying with nano NPK due to the increase in the leaf area table 1 and the leaf content of chlorophyll table 2 and then these carbohydrates use part of them in the growth of roots and provide the energy needed to absorb the elements from the soil (Al-Araji *et al.,* 2006), which has coincided with foliar spray and the ease of absorption of nutrients by leaves and not lost or fixed in the soil, where the amount of benefit through foliar feeding reaches 85% compared to nutrition through the roots and nutrients are absorbed through the stomata and leaf stems as well as cracks In the layer of cytokines and the cytoplasmic strands extending across them, this increases the efficiency of photosynthesis and carbohydrate production (Abdul, 1988). The reason for the increase in the quantity of the vine yield may be due to good nutrition, which led to an improvement in the nutritional status of the vine and to the reasons mentioned above in the increase in the weight and size of the grains, which led to the increase in the weight of the cluster and then the increase in the quantity of the yield table 7 and these results are consistent With his grandfather (Rasul, 2008), they obtained a significant increase in the yield of grapes when spraying trees with nutrients. That the containment of nano for many nutrients and raise the efficiency of photosynthesis of the vegetative group by increasing the leaf area of the vine table 1 and increasing the leaf content of chlorophyll table 2 and the transfer of its products to the fruits through the role played by potassium table 5 (Bentchikou *et al.,* 1992 and Poenaru, 1980 and Rasul 2008). The plant's response to foliar feeding depends on many factors related to the plant, environmental conditions, or with regard to the type

of nutrient, that the reason for increasing all of its content of chlorophyll and the leaf content of nitrogen, carbohydrates, phosphorus, potassium and protein when adding the nutrient solution with a PRO.SOL may be due to the content of this nutrient from The macro and micronutrients that have a wide effect in stimulating vital activities within the plant (Osman, 2010), Phosphorus also plays an important role in the representation of carbohydrates and helps in the formation of amino acids and proteins that are important in building this pigment, while potassium is necessary to build chlorophyll even though it is not included in its composition (Jundia, 2003). Prosol in increasing the leaf content of nitrogen table 3, phosphorous (4) and potassium (5) to the role of added nutrients, especially nitrogen, as it stimulates the plant to produce Auxin, which encourages the elongation of cells and then increase the leaf area table 1 Also included in the construction of various organic compounds, such as chlorophyll, table 2. Also, the results agreed with Al-Fatlawi obtained (2011) when the apricot seedlings were sprayed with the leaf fertilizer containing the large and small elements, including zinc and manganese, as it achieved an increase in the length and diameter of the seedlings, the leaf area a table 1, chlorophyll table 2 nitrogen table 3, phosphorus, potassium and magnesium in addition to the role of these nutrients, especially nitrogen, in the formation of a large vegetative and root group, which reflected positively on the absorption of these nutrients and their accumulation in tissues (Mingle and Kirkby, 2011), This is consistent with (Al Jubouri, 2013) when studying the effect of foliar spray on sweet lemon trees has a significant effect on the physical properties of fruits. Thus, the total yield of the tree increases table 7 and this coincides with Al-Tai *et al.,* (1994) when spraying orange trees. Zinc sulfate in the form of zinc sulfate resulted in an increase in the yield of the crop compared to the control trees. In addition to the effect of bio-fertilizers on improving the biological and chemical traits of the soil, which resulted from the release of greater quantities of nutrients available for absorption by the roots and then affecting the physiological processes of the plant such as increasing the efficiency of photosynthesis in the leaves (Yu *et al.,* 2014) that increase carbohydrates The proteinuria is then reflected in the vegetative growth in the fresh weight of the leaf table 6.

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