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ORIGINAL ARTICLE

EFFECT OF ADDING UREA FERTILIZER AND SPRAYING WITH NUTRIENT SOLUTION (FOLIA RATAL) ON SOME VEGETABLE AND CHEMICAL TRAITS AND FRUIT WEIGHT FOR FIG SEEDLINGS (*FICUS CARICA* L.) WAZERI CULTIVAR

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Abstract: The experiment was conducted in one of the orchards in the Hindiya Barrage region during the agriculture season 2019 on fig seedlings at the age of three years. The research includes two factors, the first is the effect of adding urea fertilizer at three levels at an average of (0, 250, 500 g) for the seedling and the second factor is spraying the foliar solution (FOLIA RATAL) has four levels (0, 10, 15, 20 ml) for seedlings and their interactions on the green, chemical and fruit weight traits. The results showed that adding (500 g) of urea.seedling^{-1} resulted in a significant increase in the number of branches, leaf area, chlorophyll, fruit weight, yield, the percentage of carbohydrate, nitrogen and phosphorous and that spraying the solution (FOLIA RATAL) showed the excelled of the treatment 30 ml.L^{-1} in all studied traits and the interaction of urea fertilization with spraying solution (FOLIA RATAL) showed significant excelled with those studied traits.

***Key words*:** Urea fertilizer, Folia ratal, Vegetable, Fruit, Fig seedlings.

Cite this article

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1. Introduction

Fig (*Ficus carica* L) belongs to the Moraceae family and is one of the Deciduous fruit trees whose cultivation is widespread in all regions of Iraq, especially in the central regions, where the number of trees is 192,113 trees with a production value of 3271 tons. Fig fruits contain many nutrients. The average tree productivity is 17.03 kg. Fig fruits contain carbohydrates, protein, fats and citric acid. Fig fruits also contain vitamins in addition to containing water. In order to activate and increase the productivity of the tree, nutrients are added to it. In order to encourage the growth of seedlings, attention should be ground fertilizer, especially nitrogen and phosphorus, which are essential components of growth [Abu Dahi and Al-Younis (1988)], where nitrogen enters from the synthesis of amino and nucleic acids and that 70% of the leaf nitrogen is included in the composition of the chlorophyll molecule from the organic matter, an important factor in increasing tree activity, especially if added by leaves, speeds up the entry of nutrients added to the plant, especially rare elements, which increases its activity, which is reflected positively on the yield. Naji (2001) found significant differences in the average number of branches and foliar area when adding nitrogen to fig trees, a black cultivar Diyala compared to untreated trees. Al-Maamouri and Al-Bayati (2019) reached a significant effect on the leaf area percentage of nitrogen, phosphorus and chlorophyll when spraying seedlings of fig cultivar and ministerial with Tecamine Max organic fertilizer at a concentration of 5 ml.L^{-1} and Folirartal chemical fertilizer at a concentration of 4 ml.L^{-1} each separately. Therefore, the research aims to study the effect of adding nitrogen fertilizer and spraying

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organic fertilizer FOLIA RATAL to young fig seedlings ministerial type on growth traits, chemical properties and fruit size.

2. Materials and Methods

The research was conducted in one of the orchards in the Hindiya Barrage region during the agriculture season 2019 as a factorial experiment (4 × 3 according to Complete randomized block design (CRBD) and for three replicates on fig seedlings at the age of three years. The experiment included two factors, the first is the addition of urea chemical fertilizer at three levels (0, 250 ,500) g on 1/4/2019. The second factor is organic compost spray (FOLIA RATAL) at four levels (30, 20, 15, 0 ml.L^{-1}) (Table 1). The seedlings were sprayed in the early morning using a fifteen-liter sprayer with the addition of the Tween-20 (0.01%) volume/volume. The treatment was sprayed on the leaves to the degree of wetness and with the rate of the three sprayings, the first spraying on 1/4/2019 and after 20 days from the

Table 1: The components of organic fertilizer (19.3% w/w).

The elements content	Zn	M0	B	Cu	Mn	Fe	P	N
Concentration of element	0.002	0.002	0.01	0.002	0.001	0.02	40	7

first spray. The second spraying took place on 12/5/ 2019. The third spraying was conducted and the results were analyzed on 9/15/2019 using the GENE STAT program, then the differences between the averages were compared using Least Significant Difference (LSD) at 5% level of probability.

The following traits were measured:

The average number of secondary branches: The number of branches in each seedling was calculated.

The length of the main branch: The length of the main branch is measured using a tape measure.

The average leaf area (cm²): The leaf area was calculated on the basis of the dry weight of the leaf where a number of papers were taken from each experimental unit, then information tablets were taken of the area 6 cm². The cut discs and whole leaves were dried to be calculated their area and were placed in perforated paper bags in an electric oven at a temperature of 70 m 5 for a period of 48 hours until proven. Weight and then the average leaf area was calculated from the following equation:

Leaf area (cm²) = Dry leaf weight (g) × Area of the cutting part (cm²) / Average dry weight of cutting area (g)

Average fruit weight: Average fruit weight is measured using a sensitive balance.

The leaves content of carbohydrate: The total dissolved carbohydrate content was estimated according to the method mentioned by Joslyn (1970) by taking a dried and ground sample from the part, which is intended to estimate the percentage of carbohydrates in the leaves at a weight of 200 mg from each treatment and add 8 ml of ethyl alcohol 80% concentration and then put in a water bath at 60°C for 30 minutes then the centrifugal was performed for 15 minutes at a speed of 3000 cycles.sec^{-1}, pull the filtrate and repeat these steps three times. Then collect the clear solution (filtrate) in a volumetric flask and complete the volume to 25 ml by adding ethyl alcohol and withdraw 1 ml of the dilute solution and add 1 ml of 5% phenol solution and 5 ml of concentrated sulfuric acid then the optical absorption was read by the Spectrophotometer wavelength 560 nm. The dissolved carbohydrates were estimated on the basis of the standard curve of pure prepared glucose sugar by dissolving 1 g of glucose in 100 ml distilled water and then took different concentrations of glucose (2, 4, 6, 8 and 10 ml) and completed the volume to 100 ml with distilled water from this mixture and optical absorption readings were recorded with a wavelength of 560 nm. For each solution and data were recorded to make the standard curve for glucose sugar and extract the equation as shown in the following below, the percentage of dissolved carbohydrates was calculated according to the following equation:

Total Insoluble Carbohydrates = Corrected reading of treatment × 25 × 10 / Sample weight × 1000

Leaf content of Chlorophyll (SPAD unit): The chlorophyll content was estimated by a Chlorophyll meter of the type SPAD-502 equipped by the Japanese company Minolta by taking a reading of a number of leaf per experimental unit (seedlings) and then taking the average [Minnotti *et al*. (1994)] and measured in units SPAD UNIT.

Percentage of nutrients (Fe, P, N): The nitrogen element concentration in the leaves was estimated using a Microkjedhal device according to the method of Black

(1965), as the leaf samples were taken from each seedling and each replicate, then washed with distilled water and placed in perforated paper bags and then dried in an electric oven at a temperature of 65^0C for 48 hours and until proven. Dry weight, after which the samples were ground and 0.5 g of the ground sample powder (dry leaves) were taken. According to Black (1965), the nitrogen concentration was calculated using the Microkjedhal apparatus and digested by concentrated sulfuric acid 96% (15 ml) and 3g of a mixture (copper sulfate 0.2 + potassium sulfate 0.8) with heating for an hour, and then transferred the digestion solution to a volumetric flask with a capacity of 50 cm^3 and complete the volume with distilled water in the amount of 20 ml and then wiped using a standard hydrochloric acid 0.1, then the percentage of nitrogen was calculated according to the following formula:

Percentage of nitrogen (%) = consumed acid volume (HCL × normality × The volume of the diluted sample digested sample × nitrogen atomic weight × 100 /Diluted sample size placed in the distillation chamber × sample weight taken for analysis × 1000).

Phosphorous was also estimated by the method of fresh digestion by using ammonium molybdate and ascorbic acid in the Spectrophotometer. Where, 10 ml of the solution of the digested sample was taken and placed in a volumetric flask, then 0.1 g of ascorbic acid was added and 4 ml of ammonium molybdate solution for each sample, after which the contents of the beaker are heated on a hot plate for one minute, then the solution becomes blue. Then the reading was done at a wavelength of 620 nm. At the same time, the samples of the standard prepared solutions were read at the same time and method of preparing the digested sample, then the percentage of phosphorus was calculated. The iron element ratio was also estimated by the Flame-Photometer according to the method mentioned by Al-Nuaimi (1999).

3. Results and Discussion

The results in Table 2 show that the adding of urea in the amount of 500g for the seedlings significantly affected the studied vegetative and chemical traits and the weight of the fruit, as it gave a average of number of branches, branch length, leaf area, amount of chlorophyll, the amount of carbohydrates, nitrogen, phosphorus, iron and fruit weight reached 43.8, 79.3 cm, 183.3 cm^2, 32.3 $mg.cm^2$,, 37.0%, 1.41%, 0.83%, 218.6 mg. Kg, 19.3g, respectively compared to untreated seedlings, as shown in the same table, spraying fig seedlings with compost (FOLIA RATAL) has a concentration of 20 $ml.L^{-1}$ significantly in most of the studied traits (branch length, leaf area, amount of chlorophyll, nitrogen, phosphorus, iron and weight of fruit). The spraying treatments (20 and 30 $ml.L^{-1}$) effects in the traits (number of branches, percentage of carbohydrates and weight of the fruit) compared to untreated seedlings, as the above table indicates that the bi-interactions between the experiment factors had a significant effect on all the studied traits.

4. Conclusion

The reason for this is due to that the good and integrated nutrition represented by urea fertilizer and organic fertilizer (FOLIA RATAL) stimulated the plant to perform its functions well as nitrogen works in organizing the bio-activities inside the plant that are related to the growth and division of cells and that increasing the concentration of nitrogen element in the plant tissues increases the efficiency of Photosynthesis and building enzymes involved in activating many physiological processes and building amino, nucleic acids and energy compounds, which led to an increase in the acting outputs and consequently affected the growth of plant growth [Abu Dahi and Al-Younis (1988)]. The presence of iron, manganese and copper in the compost led to the leaf area and an increase in chlorophyll as Iron is a catalyst for the formation of chlorophyll and cytochrome. Because of the role these elements play in the bioprocesses of forming chlorophyll and increasing the number and sizes of chloroplasts as well as increasing the number of Grana in them, Al-Tahafi *et al*. (2006) reached a significant increase in the leaf area and the percentage of chlorophyll, nitrogen and carbohydrates in the leaves when spraying grape vines Kamali and Halawani cultivars with the nutrient solution containing the elements (Fe, Zn, Mn, Cu, B) in concentrations (150, 100, 50, 10, 5 mg/L) and three spraying times. Also, the increase in the percentage of phosphorus led to the activity of vegetative growth caused by the organic fertilizer with some urea fertilizer and because it contains nutrients necessary for plant growth, including phosphorus, and its role in increasing the growth of the root system, which increases the absorption of nutrients and increases their percentage. Phosphorus also plays an essential role in building cellular membranes such as the plasma membrane, chloroplasts and others. Also, phosphorus contributes

Table 2: Effect of several levels of urea fertilizer and organic fertilizer spray (FOLIA RATAL) on the traits of Vegetative, chemical and yield for young fig seedlings.

Foliar spray levels ml.L^{-1}	Chemical fertilizer (g)	The number of secondary branches	The length of the main branch	Chlorophyll mg/cm ^{2}	The leaf area cm^2	Carbohydrate	Fruit weight (g)	N	P	Fe
0	0	35.6	74.5	22.9	174.7	30.9	16.6	1.14	0.70	199.3
	250	36.4	76.1	25.1	177.0	32.1	17.0	1.20	0.73	205.1
	500	37.5	76.6	29.1	178.0	33.6	17.3	1.20	0.72	210.1
15	0	36.9	75.5	27.7	178.5	33.6	17.6	1.25	0.70	205.5
	250	37.6	77.2	29.9	179.7181.3	35.9	18.3	1.20	0.71	216.7
	500	44.1	78.5	31.7	181.3	36.7	19.7	1.24	0.75	220.8
20	0	39.1	77.0	29.3	180.2	34.5	18.7	1.32	0.79	205.3
	250	45.5	79.1	32.2	182.5	36.3	19.0	1.43	0.91	217.7
	500	45.6	80.4	33.9	185.7	38.8	20.1	1.55	0.92	220.1
30	0	39.9	81.4	29.6	183.6	32.2	19.3	1.48	0.87	209.0
	250	43.6	80.3	34.0	185.8	36.1	20.0	1.59	0.94	221.7
	500	48.0	81.6	34.3	188.3	38.8	20.1	1.64	0.91	223.5
L.S.D0.05		2.25	1.1	2.05	2.0	1.92	1.10	0.03	0.03	5.24
The average of compost (FOLIA RATAL)	0	36.5	75.7	25.7	176.6	32.2	17.0	1.18	0.72	204.8
	15	39.5	77.1	29.8	179.8	35.4	18.5	1.23	0.72	214.3
	20	43.4	78.8	31.8	182.8	36.6	19.2	1.43	0.87	214.4
	30	43.8	81.1	32.6	185.9	35.7	19.8	1.57	0.91	218.0
L.S.D0.05		1.30	1.32	1.19	1.1	1.11	0.63	0.02	0.02	3.02
The average of Urea Fertilizer	0	37.9	77.1	27.4	179.2	32.8	18.0	1.30	0.77	204.8
	250	40.8	78.1	30.3	181.2	35.1	18.6	1.36	0.82	215.3
	500	43.8	79.3	32.3	183.3	37.0	19.3	1.41	0.83	218.6
L.S.D0.05		1.12	1.14	1.03	1.0	0.96	0.55	0.02	0.01	2.62

to the formation of ATP, phospholipids and coenzyme and has a role in controlling photosynthesis reactions and representation of protoplasm, respiration, growth, reproduction and other bioprocesses as Blevin (2001) mentioned that phosphate fertilization increases the percentage of Mg in the leaves of the plant and it emerged from the experiment in general that adding urea fertilizer well-grown as a result of raising the efficiency of photosynthesis and absorption process, which increased the average growth and the accumulation of vegetable seedlings, especially carbohydrates [Al-Nuaimi (1999)]. The vegetative growth activity that requires the absorption of the largest amount of phosphorus to meet the need of the plant in the formation of cellular membranes and chloroplasts in some of the energy-rich compounds that work as enablers for enzymes, which in turn increases the growth regulators (Auxin and cytokines), which affects the elongation of cells and thus increases the number of branches and increase in their lengths, as the increase in the phosphorus concentration is of great importance in increasing and strengthening the root system, which increases the absorption of nutrients and elements necessary for plant growth. It appears from the experiment that the addition of urea significantly excelled in increasing the amount of chlorophyll, number and leaves area and total dry weight as a result of the role of nitrogen in increasing the amount of chlorophyll because it is included in the formation of the porphyrin ring, which is four rings of cyclic tetrapyrrolic (C_4H_4N) that enter the composition of chlorophyll and raise his level in leaves leading to the activation of photosynthesis [Ahmed and Al-Mukhtar (1987)]. Abu Dahi and Al-Younis (1988) also mentioned that 70% of the leaf nitrogen is included in the composition of the chlorophyll pigment and that the increase in the size of the fruit is due to this, which led to encouraging physiological processes and stimulating cell growth and division due to the nutritional balance between the three factors of the experiment and thus an increase in average weight of lean fruit [Ibrahim (1995)]. We conclude from this that the addition of urea fertilizer at an average of 500 g.seedlings^{-1} or the addition of organic fertilizer (FOLIA RATAL) at a concentration of 30 ml.L^{-1} has a significant effect on the growth and composition of seedlings.

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References

Abu Dahi, Yousef Muhammad and Al-Younis Ahmad (1988). *Plant nutrition guide*. University of Baghdad, Ministry of Higher Education and Scientific Research, Iraq.

Ahmed, Nizar Yahya and Mundhir Ali Mukhtar (1987). *Fertility of soil and fertilizers (translated)*. Albasrah university. Ministry of Higher Education and Scientific Research, Iraq.

Al-Tahafi, Sami Ali Abdul-Majeed, Jabbar Abbas Hassan and Dawood Abdullah (2006). The effect of sulfur and spraying with some micronutrients on the vegetative and productive traits of the Halabi and Kamali grape cultivars. *Journal of Science*, **37(5)**, 28-19.

Al-Nuaimi, Saad Allah Najm Abdullah (1999). *Fertilizers and soil fertility*. Ministry of Higher Education and Scientific Research, University of Al Mosul.

Al-Maamouri, Sahar Muhammad and Ihsan Mahmoud Helmi Al-Bayati (2019). The effect of foliar feeding on the growth of fig seedlings. *Iraqi Journal of Agricultural Sciences*, **50(2)**, 689-696.

Naji, Abdullah Ali Mohammed (2001). Effect of some nutrients on growth, yield, and concentration of some nutrients and medicinal substance Methoxsalen in *Ficus carica* L. Black Diyala variety. *Master Thesis*, College of Agriculture, University of Baghdad, Iraq.

Black, C.A. (1965). *Methods of soil analysis*. Part I. Physical properties. Amer. Soc. Agron. Inc. Publisher, Madison, Wisconsin, U.S.A.

Blevin, D.G. (2001). Increasing the magnesium concentration of tall fescue leaves with phosphorus and boron fertilization, plant food control, Missouri Agricultural.

Ibrahim, A.O. (1995). The physiological relationship between growth regulators and fruit characters of date palms (*Phoenix dactylifera* L.) cv. Hillawi. *Ph.D. Thesis*, University of Basrah, Iraq.

Joslyn, M.A. (1970). *Method in food Analysis : Physical, Chemical and instrumental method of analysis*. 2nd Ed. Academic Press New York and London.

Minnotti, P.L., D.E. Halseth and J.B. Sieckla (1994). Chlorophyll measurement to assess the nitrogen stalus of potato varieties. *Hortscience*, **29(12)**, 1497-1500.