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RESPONSE OF POMEGRANATE SEEDLINGS (*PUNICA GRANATUM* L.) TO SPRAYING WITH ORGANIC FERTILIZER (SPECIAL MARINE) AND NUTRIENT SOLUTION (MICRO NATE14)

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Abstract

The experiment was connected in the lath house of the Al-Mussaib Technical College during 2016 on pomegranate seedlings and included two factors is the first effect of adding four levels of Special marine organic fertilizer (20, 15, 10, 0) ml. L^{-1} in three batches. The second factor is spraying the seedlings with a nutrition solution Micro Nate14 in concentrations (20, 15, 10, 0) g.L^{-1} and in three batches and the interaction between them in some traits of vegetative growth, dry weight of the vegetative group, the leaf content of chlorophyll, N, P, Fe and Mn for seedlings. A factorial experiment was conducted according to the Completely randomized design (C.R.D) with three replicates and three seedlings for the experimental unit. The averages were compared according to the least significant difference test under the probability level 0.05 and the results showed the following: The organic fertilizer spraying at a concentration 15 ml.L^{-1} treatment excelled in length seedlings average (90.8 cm), leaf area reached (6.5 cm^2), dry weight average of (44,53 g), phosphorus and manganese rate (0.36%, 27.66). While treatment of 20 ml.L^{-1} gave the seedling diameter average was (8.5) mm, the chlorophyll average was (24.1 mg.cm^2), nitrogen (1.50%) and the iron average was (139.4 mg.Kg^{-1}) compared to the control seedlings which gave the lowest average. The spraying treatment with a nutrient solution (MICRO NATE 14) at a concentration of 20 g.L^{-1} significantly excelled on the vegetative traits (plant length, diameter, leaf area and the dry weight average of the vegetative growth) and gave the highest results (89.6 cm, 8.0 mm, 6.4 cm^2, 46.36 g) compared to the control treatment, which gave the lowest average, It also significantly affected the chemical traits (the amount of chlorophyll, the percentage of nitrogen and phosphorous and the amount of iron and manganese) and gave averages amounted to (23.7 mg.cm^2, 1.54%, 0.38%, 136.0 mg.Kg^{-1}, 28.03 mg.Kg^{-1}), respectively, compared to the control treatment that gave (20.0 mg.Cm^2, 1.45%, 0.33%, 126.8 mg.Kg^{-1}, 24.13 mg.Kg^{-1}. The bi-interactions gave significant differences in the traits mentioned above, where the interactions treatments (20 ml (Special marine) and 20 g.L^{-1} (MICRO NATE 14) gave seedlings length of 94.5 cm, seedling diameter 8.9 mm and leaf area 6.5 cm^2, compared to untreated trees and interactions between 15 ml of (Special marine) and 20 g.L^{-1} (MICRO NATE 14) gave the highest average of dry weight (47,30 g). While the interaction between (15, 20) ml of (Special marine) and 20 g.L^{-1} (MICRO NATE 14 liters) significantly affected in the chemical traits, compared to untreated trees.

Key words: Pomegranate seedlings, (Special marine), (MICRO NATE 14), vegetable, chemical traits.

Introduction

Pomegranate. *Punica granatum* L. Punicaceae family is a decadent fruit crop widely spread in Iraq, especially in the central regions. Its fruits are distinguished by a high nutritional value as well as its use for medicinal purposes. Its fruits contain a high content of monosaccharides and Total Soluble Solids (T.S.S) and its fruits contain a significant percentage of protein, fats and acids and pomegranate peels contain tannin, an important substance in the treatment of diarrhea, which is astringent in case of wounds and intestinal bleeding (Periodic and Narrator, 2000). Following modern methods of serving fruit seedlings and using some materials that reduce the effects of stress on the plant and provide better water content can increase the growth of seedlings (Zink and Allen, 1998). Such as organic fertilization by using highly concentrated seaweed extract, where they are rich in their content, providing the plant with its needs of nutrients, vitamins, amino acids and organic matter, thus increasing the efficiency of the division process and elongation of cells and then working to develop different growth processes in the plant (Taiz and Zeiger, 2002). They are natural materials used after being dried or extracted that are excellent bio stimulants for secondary metabolism

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and as a nutritional source for the environment-friendly and non-toxic plant to be used (Zhang and Ervin, 2008) and nutrients with the small mineral elements needed by the plant in small quantities, because it has an effective role in preserving the plant from the various diseases caused by its deficiency and that the factors of fixing it in the soil are many and multiple, adding them in a timely spray is a correct method to meet the needs of the plant (Christensen *et al*., 1982). The use of foliar spray with some microelements (Fe, Zn, Mn, B, Cu) and seaweed extract has an effect on plant growth and improving its trait. Al-Salhi *et al*., (2010), have found that spraying pear trees with Germor fertilizer resulted in a significant effect on their nitrogen, phosphorous and iron content. Ethbeab *et al*., (2018) obtained significant results in the average of plant height, diameter, leaf area and protein ratio when spraying pomegranate seedlings with marine seaweed extract marin verte. Through this, the aim of the research is to know the effect of the organic fertilizer (special marine) and nutrient solution MICRO NATI 14) on some traits of the vegetative and chemical growth of pomegranate seedlings.

Materials and Methods

The research was connected in the lath house of the Al-Mussaib Technical College during the season 2016, The factorial experiment (4 × 4) conducted according to completely randomized design (CRD) with three replicates on the pomegranate seedlings. The experiment included two factors, the first is spraying the leaves with special seaweed extract at four levels (0, 10,15,20) ml. Lt's completely wetness, it is a seaweed containing *Ascophyllum nodosum* which contains cytokinin and a large group of macronutrients, Auxin and natural organic acids, which in turn works to increase the division of plant cells and increase the plant's resistance to inappropriate weather conditions and increase the plant's immunity and disease resistance. And sprayed on 5/4/ 2016 and four levels of fertilizer MICRO NATE 14 (0, 10, 15, 20) $g.L^{-1}$ and sprayed the seedlings leaves a week after each spray of seaweed extract and in the early morning using a hand spray of 15 L capacity, With the addition of the published material Tween-20 (0.01%) volume / volume with an average of three spraying from one to another thirty days. The results were taken on 1/ 11/2016 and The data were analyzed using the (GENE STAT) program, then the differences between the averages were compared using the lowest significant difference mean of L.S.D. At the level of probability (5%) of the Al-Rawi and Khalaf Allah, (1980).

The following characteristics were measured

1. Seedling height average (cm): The seedlings height was measured with a metric tape measure, Where the seedlings height average was taken for each treatment.

2. The stem diameter (mm): Seedling diameter was measured using Vernier at a distance of 5 cm above soil level and the average was calculated for each treatment.

3. leaf area (cm^2). Samples were taken from the middle of the branches and then drawn on graph paper and then the area was calculated.

4. Percentage of dry matter for the total vegetable:

$$\text{Percentage of dry matter} = \frac{\text{Dry weight}}{\text{Wet weight}} \times 100$$

5. Estimation of the chlorophyll content: It was done by the Chlorophyll meter of the type SPAD-502 and equipped by the Japanese company Minolta by taking the reading of a number of leaves per experimental unit (seedlings) and then taking the average (Minnotti *et al.,* 1994) and measured in units SPAD UNIT.

6. The percentage of nutrients (P, N) and quantity (Fe).

7. The nitrogen element concentration in the leaves was estimated using the Microkjedhal device according to the method (Black, 1965), where the leaf samples were taken from each seedling and each replicates, then washed with distilled water and placed in perforated paper bags and then dried in an electric oven at a temperature of 65 degrees Celsius for 48 hours and until proven. Dry Weight (As-Sahaf, 1989). Then the samples were ground and 0.5 g of the crushed sample powder (dry leaves) were taken. According to Black, 1965, the nitrogen concentration was calculated using the Microkjedhal apparatus and it was digested by concentrated sulfuric acid 96% (15) ml and (3 g) of the mixture (copper sulfate 0. 2) + potassium sulfate 0.8) with heating for an hour, then transfer the digestion solution to a 50 cm volumetric flask, complete the volume with distilled water (20) ml and then wipe it with a standard hydrochloric acid 0.1.

Then the nitrogen percentage was calculated according to the following formula:

Percentage of nitrogen = consumed acid volume (HCL × its standard × total diluted sample × nitrogen atomic weight × 100 / diluted sample size in the distillation chamber × sample weight taken for analysis × 1000).

8. Phosphorous was also estimated by the method of soft digestion using ammonium molybdate and ascorbic acid in the Spectrophotometer (John, 1970). 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 and (4) ml of ammonium molybdate solution were added to each sample after which the contents of the flask were heated on a hot plate for one minute and the solution

became 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 amount of iron was also estimated by the Flame-Photometer according to the method mentioned (Al-Nuaimi, 1999).

9. Determination of manganese ($mg.kg^{-1}$) dry matter:

Manganese ($mg.kg^{-1}$) Dry matter: By Atomic Absorption Spectrophotometer taken from (Walsh, 1970).

Results and Discussion

The vegetative growth average (plant height, diameter, leaf area and dry weight of the vegetative total) for seedlings

Table 3 indicates that the average of vegetative growth of the pomegranate seedlings was significantly affected when adding the Seaweed Extract (Special marine) Where it gave the treatment of the seedlings at a concentration of 15 $ml.L^{-1}$ of average length reached (90.8 cm) and leaf area reached (6.5 cm^2) and an average dry weight amounted to (44.53 g), while it gave a treatment of 20 $ml.L^{-1}$, the average seedling diameter was (8.5) mm compared to the control seedlings, which gave the lowest average amounted to (81.3 cm, 7.0 mm, 41.20 g, 6.2 cm^2), respectively. As can be seen from the aforementioned table, spraying seedlings with manure for microelements (MICRO NATE 14). The concentration of 20 $g.L^{-1}$ significantly affected the vegetative traits (plant length, diameter, leaf area and average dry weight of the vegetative total) and gave the highest results (89.6 cm, 8.0 mm, 6.4 cm^2, 46.36 g) compared to the control treatment that gave the lowest average. The table also shows that the bi-interactions gave significant differences in the trait mentioned above, where the interaction 20 ml of (Special marine) and 20 g of liters (MICRO NATE 14) gave the length of the seedlings is 94.5 cm, the diameter of the seedlings is 8.9 mm and the leaf area is 6.5 cm^2, Compared to untreated trees and gave an interaction of 15 ml of (Special marine) and 20 $g.L^{-1}$ (MICRO NATE 14), average dry weight of (47.30 g).

The average chemical traits (amount of chlorophyll, nitrogen, phosphorus, iron and manganese)

Table 3 shows that the average chemical trait of the pomegranate seedlings showed significant differences when adding the algae extract (Special marine), as the seedlings treatment was given at a concentration of 20 ml.L of chlorophyll average reached (24.1 $mg.cm^2$) and nitrogen reached (1.50%). The average of iron reached 139.4 $mg.Kg^{-1}$, while it gave a treatment of 15 ml.Liters of phosphorous and manganese. The average was 0.36%, 27.66 $mg.Kg^{-1}$. As for the control seedlings, the lowest average was 18.9 $mg.Cm^2$, 1.48%, 0.34%, 121.4 $mg.Kg^{-1}$, 24.55 mg. Kg) respectively. The above table also indicates that spraying seedlings with fertilizer for microelements (MICRO NATE 14) with a concentration of 20 $g.L^{-1}$ excelled in chemical traits (amount of chlorophyll, nitrogen and phosphorous ratio and the amount of iron and manganese) and gave average amounted to (23.7 $mg.Cm^2$, 1.54%, 0.38%, 136.0 mg. Kg^{-1}, 28.03 mg. Kg), respectively, compared to the control treatment given (20.0 mg. Cm^2, 1.45%, 0.33%, 126.8 mg. Kg^{-1}, 24.13 mg. Kg^{-1}). Table 3 shows that the bi-interactions between the two factors of the experiment had a significant effect on the above chemical trait, where the interaction treatment (15, 20) ml (Special marine) and 20 $g.L^{-1}$. MICRO NATE 14) gave the highest average compared to untreated trees).

The reason for the increase in the average of vegetative growth is due to the positive role of the nutrients used in fertilization that raised the plant's efficiency in increasing cell division and elongation averages, which is reflected in the production of proteins and nucleic acids, which have an important role in producing Auxin that helps increase vegetative growth averages as an increase Plant length and diameter, leaf area increase and dry weight of the vegetative population. The addition of nutrients, including nitrogen, iron and manganese during fertilization, had the primary role in the formation of the chlorophyll molecule and in the synthesis of proteins and amino acids that are important in photosynthesis (Mohamed and Al-Rayes, 1982). Which reflected on the increase in the amount of chlorophyll in the leaves and the dry matter in the vegetative growth. The efficiency of the roots in the absorption of nutrients due to the presence of phosphorus in the nutrients added to the seedlings affected the increase in vegetative growth and the increase in the amount of carbohydrates, which affected the dry weight, due to that chemical fertilizer Minor elements with some plant extracts as they contain the nutrients necessary for plant growth, including phosphorous and their role in increasing root system growth, which increases the absorption of nutrients and increases their percentage (Gobara *et al*., 2002). The increased leaf content of nitrogen with the treatments to

Table 1: Special marine seaweed extract component.

Element	K2O	P2O5	N	*Ascophyllum nodosum*
percentage	7	7	7	25

Table 2: Solution Composition (MICRO NATE 14).

Chemicals	Fe	Cu	Zn	B	Mn	Mg	Molybdenum
percentage	9.3	0.15	0.20	0.4	2.0	2.0	0.10

Table 3: The effect of spraying marine seaweed extract (Special marine) and microelements (MICRO NATE 14) on the traits of vegetable and chemical pomegranate seedlings.

Mn	Fe	P	N	chlorophyll content (mg/cm²)	dry weight for the total vegetable (g)	leaf area (cm²)	The stem diameter (mm)	Seedling height (cm)	Nutrient solution (MICRO NATE (14)	The Foliar spray levels (Special marine) ml. L⁻¹
23.15	112.6	0.32	1.44	18.2	38.22	5.9	6.8	79.6	0	0
23.58	122.8	0.33	1.46	18.9	38.70	6.3	6.9	80.9	10	
25.22	124.4	0.35	1.49	18.9	42.08	6.2	7.0	81.1	15	
26.23	125.8	0.35	1.55	19.4	45.80	6.3	7.2	83.5	20	
23.95	125.8	0.33	1.46	19.5	40.21	6.2	7.2	83.9	0	10
23.90	130.5	0.34	1.48	19.8	42.50	6.3	7.4	83.5	10	
25.81	135.4	0.36	1.52	19.9	45.52	6.3	7.4	85.5	15	
27.18	141.1	0.38	1.54	23.1	45.52	6.3	7.8	86.0	20	
25.51	131.3	0.34	1.44	20.00	41.19	6.4	7.2	89.1	0	15
27.29	138.2	0.37	1.46	23.00	43.80	6.4	7.6	89.7	10	
28.49	145.2	0.39	1.48	22.00	45.82	6.5	7.6	90.0	15	
29.36	131.8	0.39	1.55	26.1	47.30	6.5	7.8	94.3	20	
23.92	137.4	0.33	1.46	22.2	40.58	6.2	8.0	87.7	0	20
26.73	136.8	0.37	1.47	23.4	43.03	6.4	8.5	89	10	
28.00	138.2	0.37	1.51	24.8	45.63	6.4	8.7	90.3	15	
29.36	145.2	0.38	1.54	26.1	46.83	6.5	8.9	94.5	20	
1.12	2.46	0.02	0.02	1.1	1.59	0.2	0.2	1.8	LSD 0.05	
24.55	121.4	0.34	1.48	18.9	41.2	6.2	7.0	81.3	0	The average of Special marine (ml.L⁻¹)
25.21	133.2	0.35	1.50	20.1	43.44	6.3	7.5	84.7	10	
27.66	136.6	0.37	1.48	22.8	44.53	6.5	7.5	90.8	15	
27.00	139.4	0.36	1.50	24.1	44.02	6.4	8.5	90.4	20	
0.56	1.23	0.01	0.01	0.5	0.80	0.1	0.1	0.9	LSD 0.05	
24.13	126.8	0.33	1.45	20	40.05	6.2	7.3	85.1	0	The average of MICRO NATE 14 (g.L-1)
25.37	132.1	0.35	1.47	21.3	42.01	6.3	7.6	85.8	10	
26.88	135.8	0.37	1.50	21.4	44.76	6.4	7.7	86.7	15	
28.03	136.0	0.38	1.54	23.7	46.36	6.4	8.0	89.6	20	
0.56	1.23	0.01	0.01	0.5	0.80	0.1	0.1	0.9	LSD 0.05	

which fertilizer was added to that the content of organic fertilizers from the nutrients has contributed to increasing the efficiency of photosynthesis, which was reflected in bringing about a clear improvement in the on growth traits, including an increase in the proportion of nitrogen, which is the cornerstone for building protein That has a role in the Hill Reaction, which is the conversion of light energy into chemical energy,Whereas, nutrition and biological processes are closely related to each other through the use of nutrients in the manufacture of their cellular content or as a source of energy that helps to create amino acids that are the cornerstone of protein formation (Tisdale *et al*., 1997). The increase in vegetative growth rates led to the result of an increased leaf content of nitrogen, phosphorus and iron and these are consistent with what was reached (Dissolved, 2018) when adding algae extracts to pomegranate seedlings and what was reached (Al-Salhi *et al*., 2010) when spraying pear seedlings with organic fertilizer Germs.

Conclusions

We conclude from the above that the treatment of pomegranate seedlings with spraying with organic fertilizer (Special marine and nutrient solution Micro Nate) led to an improvement in the vegetative and chemical growth traits, This makes it strong to withstand the transfer operations from the plant nursery ground to the permanent place.

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