The Effect of Different Concentrations of Some Nanoparticles and Seaweed Extract on the Vegetative Growth of Rosmary [Salvia Rosmarinus L.] Plant

Safa Hashim Jummah[1]*, Wasan. H. Mazeil Al-Shammeryi[2]

[1,2]Department of Biology, College of Sciences, Wasit University, Iraq.

Corresponding author: Safa Hashim, safa.hashim.jumah@uowasit.edu.iq

Abstract:

The presented study to investigate the response of rosmary (Salvia rosmarinus L .) plants on the influence of nanoparticles (zinc and magnesium) and seaweed extract carried out in 2024 on fields in wasit university , College of Sciences , Iraq. The treatment construction was a perfectly randomized factorial experiment (5×5×3) in completely randomized design , done with three replications . The rosemary plants treated with nanoparticles (zinc oxide) with concentrations (0, 0.03 , 0.05) mg/ml and (magnesium oxide) with concentrations (0, 0.02 , 0.04) mg/ml and rosmary treated with seaweed extract with concentrations (0, 50 , 100 , 150 , 200)gm/L.Studing plant height (cm) , total chlorophyll (μmol m-2) , percentage of dry matter (%) , leaf surface area (cm2.plant-1) , nitrogen (%) , phosphorus (%) and potassium percentage .Based on results , adding nano zinc and nano magnesium and seaweed extract to the rosemary plant significantly increased all triats , regardless of vegetable characteristics or chemical content achieved wih highest concentrations using highest effects whether alone or with two interactions .

Keywords: *Rosemary, Nanoparticles, Seaweed extract, Nano zinc, Nano magnesium*

Key findings: In the rosemary plants, adding nanoparticles and seaweed extract and their interactions highly improved all vegetative and biochemical traits

1.Introduction

Rosemary (*Rosmarinus officinalis* L.) is an evergreen brush belonging to the Lamiaceae family. In natural conditions, it can reach from approx. 1 m to even 2.5 m in height. The stemsare quadrangular, erect, and tend to lignify in the 2nd year. They are densely covered with small needle-like leaves without stalks (sessiles) ; the leaves are linear with entire slightly revolute margins that are dark-green above, lighter and tomentose beneath. Rosemary blooms from early June to August. The flowers are very small, white or purplish-blue, gathered in terminal racemose inflorescences (Pawłowska K et al ., 2020) . Rosemary is cultivated in the Mediterranean region, as well as in the former Yugoslavia, along the Black Sea coast, in the USA and in Mexico (Pawłowska K et al ., 2020) It is best planted in a sunny position and must be protected from cold winds (mainly in temperate climate zones). The plant reproduces predominantly sexually. The soil needs to be loose and loamy with excellent drainage.When grown in such conditions, the plant will have a more intense aroma, though at the expense of size. Leaves produced at the beginning of bloom contain the highest amounts of oil, and is when they should be collected. Apart from the leaves, non-woody sprigs are also used. After harvesting, the material is air dried, in the shadepreferably, at 30–35°C(Pawłowska K et al ., 2020) . The use of rosemary spice in food increases the secretion of gastric juice, improves digestion For this importance of rosemary there has been a trend towards using modern technologies in treating rosemary, including nanotechnology, which is considered one of the modern technologies used to treat the plant due to its effective and positive impact in increasing the productivity and effectiveness of this plant .

The prefix 'nano' is referred to a Greek prefix meaning 'dwarf' or something very small and depicts one thousand millionth of a meter (10^{-9} m). We should distinguish between nanoscience, and nanotechnology. (Gnach A et al ., 2015) .

Assessing the role of nano-fertilizers and elicitor as a strategy is important for reducing the negative effects of drought stress on plants. The physicochemical properties, such as outstanding refractive index, excellent corrosion resistance, high thermal conductivity, low electrical conductivity, physical strength, stability, flame resistance, dielectric resistance, mechanical strength and excellent optical transparency, magnesium oxide (MgO) is an eco-friendly, economically feasible and industrially important nanoparticle(Abinaya S et al ., 2021).It is regarded as a promising high-surface-area heterogeneous catalyst support, additive, and promoter for a variety of chemical reactions due to its unique properties, which include stoichiometry and composition, cation valence and redox properties, acid-base character and crystal and electronic structure , (Julkapli N M & Bagheri S , 2016) .

Nano magnesium -fertilizers include the nutrients with the size 30 to 40 nanometer and can carry nutrients properly due to their high surface.The use of nano-fertilizers to control the release of nutrients accurately can be considered as an effective step toward achieving sustainable and eco-friendly agriculture. Further, Mg is an important task for plants based on quantitative and qualitative, energy conservation, protein synthesis, structure stability, and sugar accumulation, as well as controlling pH in the cell and a cofactor for many enzymes (Blasco et al ., 2015) .Zinc is required for chlorophyll production, pollen function, fertilization, and germination(Kaya and Higgs 2002; Pandey, Pathak, and Sharma 2006; Cakmak 2008). It plays an important role in biomass production (Kaya and Higgs 2002). Among the micronutrients, Zn and Mn can affect the susceptibility of plants to drought stress (Khan, McDonald, and Rengel 2003). A number of mechanisms may underlie Zn efficiency (Rengel 2001).

Seaweed extracts contain trace elements and plant growth hormones IAA and IBA growth stimulators such as auxin, gibberellins and cytokinin required by plants. It is also reported that seaweed extracts are rich in vitamins, amino acids, trace elements (Fe, Cu, Co, Ni, Zn and Mn) (Booth E ,1969). Seaweed extracts have nitrogen, phosphorus and higher amount of water soluble potash, other minerals and trace elements in a readily absorbable by plants. They control deficiency diseases. Today is being used of low concentration of seaweed extracts in combination with commercial fertilizer. It has been used more effectively in the world in promoting plant growth (Chatterji, 2004).

seaweed extracts have been highly explored for possible use in crop production for improving biomass yield and produce quality. These extracts have been shown to positively affect seed germination and plant growth at all stages up to harvest and even post-harvest (Ali O et al ., 2019 ; Ali O et al ., 2021). The improved rooting architecture could be a result of small levels of phytohormones present in the extracts such as auxins as well as various stimulatory processes engaged in the plant system upon treatment with these extracts (Crouch IJ et al ., 1992).

2.MATERIALS AND METHODS:

The experimentation commenced in 15/11/2023 at the private archard field in Wasit University ,college of science The soil mixture was placed in the pot, the capacity of each anvil (10kg) placed in the pots and watered with water and on foliar spraying operations were carried out and soil spraying according to the previously mentioned concentrations Spraying plant leaves until the entire leaf is covered with concentrations of nanocomposites and seaweed extract, and repeated spraying and addition after a month of the first treatment agricultural service operations of plant watering and soil fertilization were carried out throughout the duration of the experiment . In this study, nanocomposites were prepared and prepared at certain concentrations depending on the manufacturer concentrations (0,0.02,0.03,0.04,0.05) mg/ml by dissolving the required concentrations with 5 ml of ethanol . The volume is supplemented to 500ml of deionized water to obtain the above required concentrations , as well as the use of seaweed extract in concentrations. (0,50 , 100 , 150 , 200) gm/ L and attended concentrates dissolved with distilled water and complete the volume to 1 liter.

There were 75 panels the folair spraying of nanoparticles at contcentrations (0,0.02 ,0.04 ,0.03 , 0.05) mg/ml and seaweed extract at contcentrations (0,50 , 100 , 150 , 200) gm/L .Foliar spraying at one time ensure for treatment in the vegetative stage of the plant After two weeks Foliar spraying was done for the second time and after two week we begin the methods , estimation of plant height , chlorophyll(Minotti P et al ., 1994) , percentage of dry matter (Teye E et al ., 2011) , leaf surface area(Lang, A R G ,1973)., nitrogen percentage(Gresser M S & Parsons J M ,1979), and phosphorus percentage((Pratt P F & Chapman H D ,1961 and potassium percentage (A.O.A.C ,1990).

2.1 STATISTICAL ANALYSIS:

The Randomized complete block design (RCBD) analysis of variance test helped examin how statistically different treatments differed. The the least significant differences (LSD) at 0.05 % levels assessed mean comparison (Steel and Torrie , 1980).

3.RESULTS AND DISCUSSION:

3.1 Average Plant Height

Table 1 shows that nano compound significantly affects average plant height. When the concentration of nano zinc 0.05 mg/ml the mean plant height 23.33 cm. Plants treated with control grew the fastest 26.33 cm. Nano magnesium also significantly affected average plant height. Similarly, when the concentration of nano magnesium 0.02, it increased the average plant height. The greatest average of plant height was created by Seaweed extract at 150 gm /L (6.811)cm, compared to 50 (25.07) cm and the control (23.93) cm.Nanocompound and Seaweed extract had a significant interaction effect (see Table 1).Plants treated with 0.03 mg/ml of nanozinc and 50 of Seaweed extract averave of plant height.

Table (1) : Effect of some Nano compounds (Nanomagnesium , Nanozinc) and Seaweed extract and the interactions between them on average plant height (cm)

Seaweed Extract (E)	Nanocompoumds					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO)mg/l	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	19.67	26.00	28.67	29.67	27.67	23.93
50gm/L	26.00	25.67	22.33	32.00	23.67	25.07
100gm/L	27.33	26.67	26.67	22.00	19.00	25.60
150gm/L	25.33	24.67	24.33	22.67	26.67	26.07
200gm/L	21.33	22.33	26.00	24.00	23.00	24.00
Average of Nanocompounds (N)	26.33	25.93	24.73	24.33	23.33	Nanocompounds (N)
LSD (P=0.05)	3.217					LSD (P=0.05) 3.217

3.2Estimation of total chlorophyll (µmol m-2)

Table 2 shows that nano compound significantly affects average total chlorophyll . When the concentration of nano zinc 0.05 mg/ml the mean total chlorophyll (1.161) µmol m-2**.** Plants treated with control grew the fastest (1.153) µmol m-2 Nano magnesium also significantly affected average total chlorophyll . Similarly, when the concentration of nano magnesium 0.02 mg/ml , it increased the average total chlorophyll. The greatest average of total chlorophyll was created by Seaweed extract at 150 gm /L (1.245) compared to 50 (1.165) µmol m-2 and the control (1.231) µmol m-2 Nanocompound and Seaweed extract had a significant interaction effect (see table 3) . Plants treated with 0.03 mg/ml of nanozinc and 50 mg/ml of Seaweed extract average of total chlorophyll.

Table (2) : Effect of some of nanocompounds and seaweed extract and the interactions between them on average Total chlorophyll (mg/m³)

Seaweed Extract (E)	Nanocmpounds`					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	1.063	1.360	1.273	1.307	1.150	1.231
50 gm/L	1.140	1.120	1.093	1.287	1.187	1.165
100gm/L	1.130	1.180	1.327	1.313	1.227	1.235
150gm/L	1.313	1.347	1.233	1.200	1.133	1.245
200gm/L	1.120	1.240	1.157	1.233	1.107	1.171

Average of Nanocompounds (N)	1.153	1.249	1.268	1.217	1.161	Nanocompound s (N)
LSD (P=0.05)	0.0576					LSD (P=0.05) O.O576
Two-way interaction LSD (P=0.05)	0.1288					

3.3The percentage of dry matter of vegetative parts of the plant (%)

Table 3 shows that nano compound significantly affects average the percentage of dry matter of the vegetative parts of the plant (%). When the concentration of nano zinc 0.05 mg/ml the mean the percentage of dry matter of the vegetative parts of the plant 88.9% . Plants treated with control grew the fastest 81.4 % Nano magnesium also significantly affected average the percentage of dry matter of the vegetative parts of the plant %.Similarly, when the concentration of nano magnesium 0.02 mg/ml, it increased the average the percentage of dry matter of the vegetative parts of the plant (%). The greatest average of the percentage of dry matter of the vegetative parts of the plant (%)was created by Seaweed extract at 150 gm /L (105.8%) , compared to 50gm/L (73.7%) and the control (105.8%) .Nanocompound and Seaweed extract had a significant interaction effect (see table7).Plants treated with 0.03 mg/ml of nanozinc and 50 of Seaweed extract averave of the percentage of dry matter of the vegetative parts of the plant (%).

Table (3) :Effect of some of Nano compounds (Nanomagnesium , Nanozinc) and seaweed extract and the interactions between them on average The percentage of dry matter of the vegetative parts of the plant (%)

Seaweed Extract (E)		Nanocmpounds				Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.04 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	43.3	104.6	42.1	50.2	139.3	75.9
50 gm/L	85.6	75.6	79.9	108.6	18.6	73.7
100gm/L	79.9	61.3	66.1	147.5	70.7	85.1
150gm/L	104.2	80.3	72.1	126.4	146.1	105.8
200gm/L	104.2	79.9	154.5	87.8	70.0	99.3
Average of Nanocompounds (N)	81.4	82.3	104.1	82.9	88.9	Nanocompounds (N)
LSD (P=0.05)		47.70				LSD (P=0.05) 47.70
Two-way interaction LSD (P=0.05)		106.67				

3.4Leaf surface area

Table 4 shows that nano compound significantly affects average leaf surface area . When the concentration of nano zinc 0.05 mg/ml the mean leaf surface area(78.9) cm2.plant-1 . Plants treated with control grew the fastest (73.5) cm2.plant-1 . Nano magnesium also significantly affected average leaf surface area . Similarly, when the concentration of nano magnesium 0.02 mg/ml, it increased the average leaf surface area. The greatest average of leaf surface area was created by

Seaweed extract at 150 gm /L (74.3) cm2.plant-1 compared to 50gm/L (73.9) cm2.plant-1 and the control (72.7) cm2.plant-1. Nanocompound and Seaweed extract had a significant interaction effect (see Table 4).Plants treated with 0.03 mg/ml of nanozinc and 50gm/L of Seaweed extract averave of leaf surface area.

Table (4) :Effect of some of nanocompunds (Nanomagnesium , Nanozinc) and seaweed extract and the interactions between them on average Leaf surface area (cm2.plant-1)

Seaweed Extract (E)	Nanocmpounds					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	88.4	76.0	65.4	64.7	69.0	72.7
50gm/L	71.1	63.7	65.0	49.1	70.7	73.9
100gm/L	72.3	55.0	61.0	90.7	91.3	74.1
150gm/L	67.2	78.3	52.0	85.3	88.7	74.3
200gm/L	68.4	81.3	65.0	68.0	74.7	71.5
Average of Nanocompounds (N)	73.5	70.9	81.6	61.7	78.9	Nanocompounds (N)
LSD (P=0.05)	13.14					LSD (P=0.05) 13.14
Two-way interaction LSD (P=0.05)	29.38					

3.5Nitrogen (%)

Table 4 shows that nano compound significantly affects average nitrogen content (%). When the concentration of nano zinc 0.05 mg/ml the mean nitrogen (%) 1.043 %. Plants treated with control grew the fastest 1.040 (%). Nano magnesium also significantly affected average nitrogen content (%). Similarly, when the concentration of nano magnesium 0.02 mg/ml, it increased the average nitrogen (%). The greatest average of plant height was created by Seaweed extract at 150 gm /L (0.912) % compared to 50 gm/L (1.064)% and the control (0.987)%. Nanocompound and Seaweed extract had a significant interaction effect (see Table(4).Plants treated with 0.03 mg/ml of nanozinc and 50 gm/L of Seaweed extract averave of nitrogen (%).

Table (5) :Effect of some of Nano compounds (Nanomagnesium , Nanozinc) and seaweed extract and the interactions between them on Nitrogen (%)

Seaweed Extract (E)	Nanocmpounds					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	1.097	1.213	0.910	0.700	1.013	0.987
50gm/L	1.073	1.307	1.050	0.957	0.933	1.064
100gm/L	1.120	0.700	1.013	1.120	1.587	1.108
150gm/L	1.013	0.910	0.863	0.910	0.863	0.912
200gm/L	0.897	1.260	1.633	1.073	0.817	1.136
Average of Nanocompounds (N)	1.040	1.078	0.952	1.094	1.043	Nanocompounds (N)

LSD (P=0.05)	**0.2427**	**LSD (P=0.05)**
		0.2427
Two-way interaction LSD (P=0.05)	**0.5426**	

3.6Phosphorus (%)

Table 6 shows that nano compound significantly affects average Phosphorus (%). When the concentration of nano zinc 0.05 mg/ml the mean Phosphorus (0.2689 %). Plants treated with control grew the fastest (0.2391%) . Nano magnesium also significantly affected average Phosphorus (%). Similarly, when the concentration of nano magnesium 0.02 mg/ml, it increased the average phosphorus (%). The greatest average of Phosphorus (%)was created by Seaweed extract at 150 gm /L (0.2552%), compared to 50gm/L (0.2535%) and the control (0.2589%).Nanocompound and Seaweed extract had a significant interaction effect (see Table 6).Plants treated with 0.03 mg/ml of nanozinc and 50 of Seaweed extract averave of Phosphorus (%) .

Table (6) :Effect of some of Nano compounds (Nanomagnesium , Nanozinc) and seaweed extract and the interactions between them on average Phosphorus percentage (%)

Seaweed Extract (E)	Nanocmpounds					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	0.2133	0.2347	0.2430	0.3453	0.2583	0.2589
50gm/L	0.2643	0.2897	0.2663	0.2583	0.1890	0.2535
100gm/L	0.2650	0.3580	0.1277	02183	0.2960	0.2530
150gm/L	0.2577	0.2283	0.2153	0.2480	0.3267	0.2552
200gm/L	0.1953	0.2563	0.2947	0.2720	0.2747	0.2586
Average of Nanocompounds (N)	0.2391	0.2734	0.2684	0.2294	0.2689	Nanocompounds (N)
LSD (P=0.05)	0.05102					LSD (P=0.05)
						0.05102
Two-way interaction LSD (P=0.05)	0.11407					

3.7Potassium (%)

Table 7 shows that nano compound significantly affects average Potassium (%) .

Table (7) :Effect of some of Nanocompounds (Nanomagnesium , Nanozinc) and seaweed extract and the interactions between them on average Potassium percentage (%)

Seaweed Extract (E)	Nanocmpounds					Average of Seaweed Extract (E)
	0	0.02(MgO) mg/ml	0.04 (MgO) mg/ml	0.03 (ZnO) mg/ml	0.05 (ZnO) mg/ml	
0	0.896	0.536	1.406	1.011	1.092	0.988
50gm/L	0.873	0.906	1.037	1.182	0.772	0.954
100gm/L	1.493	1.058	0.890	0.657	0.826	0.985
150gm/L	0.959	1.015	0.766	1.367	0.912	1.004
200gm/L	0.811	0.708	0.840	0.932	0.963	0.851
Average of Nanocompounds	1.006	0.845	1.030	0.988	0.913	Nanocompounds

(N)						**(N)**
LSD (P=0.05)	**0.3033**					**LSD (P=0.05)** **0.3033**
Two-way interaction LSD (P=0.05)	**0.6782**					

When the concentration of nano zinc 0.05 mg/ml the mean Potassium (0.913 %) . Plants treated with control grew the fastest (0.913%). Nano magnesium also significantly affected Potassium (%). Similarly, when the concentration of nano magnesium 0.02 mg/ml, it increased the average Potassium (%). The greatest average of Potassium (%)was created by Seaweed extract at 150 gm /L (1.004%), compared to 50 (0.954%) and the control (0.988%).Nanocompound and Seaweed extract had a significant interaction effect (see Table 7).Plants treated with 0.03 mg/ml of nanozinc and 50 of Seaweed extract averave of Potassium (%).

Comparison of nano-compounds and seaweed extract on the quantitative yield of plants with other reports from different parts of the world represents the difference characteristics in this species is in all Generally, vegetative growth such as wet and dry weight of leaves, stems and whole plant.

when the plant treated with nanoscale ZnO particles that increase in plant height can be ascribed to higher precursor activity of nanoscale zinc in auxin production (Kobayashi and Mizutani 1970). It was found that the nanocomposites containing zinc enhanced the growth indicators of the plant, which is consistent with the results of the current study, which showed that the foliar application of nano zinc Khoshgoftarmanesh et al. (2020) led to a significant increase in plant height, leaf area, and dry weight, compared to control plants. Zinc nanocomposites can improve the absorption and assimilation of nutrients in plants, which is consistent with the results of the current study that foliar application of zinc nanocomposites) Fakheri et al ., 2020) . It resulted in a significant increase in zinc concentration in plant leaves compared to untreated plants. Moreover, nano zinc compounds can enhance the availability and uptake of other essential nutrients, including nitrogen, phosphorus and potassium, which leads to improved nutrient status and overall plant growth according to (Seyedbagheri et al., 2021).

On the other hand, foliar spraying of nanocomposites directly on the leaves, this method provides effective pathways for delivering nutrients to plants, and foliar spraying allows rapid absorption of nutrients through the leaf surface, while fertilization ensures uniform distribution of nutrients to the root zone. The significant superiority obtained from nanocomposites on rosemary plants was consistent with what was obtained by a study on rosemary plants on the effect of foliar addition of nano zinc compounds (Borzouei et al., 2017) on rosemary plants, which found that the use of nano zinc led to a significant increase in plant height, leaf area, fresh ,dry weights, and improved chlorophyll pigments compared to the control group.

Regarding with results nitrogen and phosphorus concentration the highest concentrations of nitrogen, phosphorus and potassium were recorded in the leaves of plants treated with nanocomposites compared to the comparison group, as the study agreed with (Baghbani et al., 2018) .The interpretation of the moral superiority of foliar spraying with nano compounds in the current study was consistent with the study of (Soltani , 2017) on rosemary plants, as foliar spraying using nano zinc led to a significant increase in plant height and leaf area compared to the comparison group, in addition, the addition of nano zinc improved the chlorophyll content, photosynthesis rate, and accumulation of essential nutrients such as nitrogen, phosphorus, and potassium.

The increases in leaf surface area, dry weight and plant height concord with growth-stimulating effects of SWE reported in several studies on other horticultural crops (Kumari et al., 2011; Alam et al., 2013; Mattner et al., 2013; Hernández-Herrera et al., 2014). . Seaweed extract treatment enhanced both root :shoot Although they may contain different levels of minerals bio stimulants are unable to provide all the nutrients needed by a plant in required quantities (Schmidt and others 2003);however, their main benefit is to improve plant mineral uptake by the roots (Vernieri and others 2005) and in the leaves (Mancuso and others 2006). Both treatments resulted in higher chlorophyll levels versus controls measured on both days. The results imply that the enhanced leaf chlorophyll content of plants treated with seaweed extract might depend on betaines present in the extract (Blunden and others 1997).

(Blunden et al .,1996) found that the application of seaweed extract had a higher chlorophyll content than unapplied treatments, which might be attributed to the reduction in chlorophyll degradation caused by betaines in the seaweed extract.

Besides, some researchers found that the application of seaweed increased the leaf surface area,(Lola-Luz, T et al ., 2013)

The effect of seaweeds on plant growth and height (Kardiner *et al*.,1969). This result was consistent with what Sadeghi et al. (2009) in basil plants.. The positive effect of the extract of seaweed kelp on the studied traits may be due to its hormonal nature, as it contains auxins and cytokinins, which leads to an increase in the concentration of these hormones inside the plant, which is positively reflected on vegetative growth (Crouch et al., 1992). It also stimulates the growth of the root system, which helps in increasing the absorption of nutrients from the soil solution (Beckett and Van-Stden, 1989), which is positively reflected In increasing the vegetative growth indicators, and this is consistent with what Almohammedi et al. (2014) reached on the black seed plant.

We also find that the use of seaweed extracts leads to a significant increase in plant height, leaf area and chlorophyll content in the leaves, according to (Reitz, S.R. & J. T. Trumble ,1996) in the bean plant, (Reitz, S.R. & J. T. Trumble ,1996) in the cucumber plant and (Potter G , 2005) in the lettuce plant when using other seaweed extracts. This increase in the vegetative growth characteristics resulting from treatment with seaweed extracts may be due to the fact that these extracts contain auxins, amino acids and other plant hormones, which stimulate the growth and development of the vegetative and root groups, increase the resistance of plants to stress and prevent the oxidation of vitamin C and E Which is found in chloroplasts, which increases the efficiency of the photosynthesis process(O'Dell C , 2003), as mentioned (Potter G , 2005) These extracts work to form a branched root system and thus stimulate the process of absorbing water and nutrients better from the soil and form a good root system. As mentioned (Reeta KA & AK Bhatnager , 2011) these extracts contain iron, magnesium and nitrogen, which are part of the chlorophyll molecule, which helps in the photosynthesis process. This increase in the photosynthesis process gave good vegetative growth.

These results are in harmony with those mentioned by Gharib et al. (2014) on rosemary they showed that foliar application of seaweed on rosemary plant was positively active on microelement content and photosynthetic pigments (chlorophyll)compared to the untreated plant(Pise and Sabale , 2010) showed that carbohydrate, andproteins, free amino acids, polyphenols andnitrogen content increased in seaweed treated plants. In the same direction, there was significant effect due to seaweed extract on chlorophyll, carbohydrates, nitrogen, phosphorous and potassium in leaves of artichoke plants (Saif Eldeen, 2014).

4.CONCLUSION:

According to the results of the previously mentioned study, The effect of different concentrations of some nanoparticles and seaweed extract on the vegetative growth of rosmary [*Salvia rosmarinus* L.] plant to the plant significantly increased all traits, regardless of whether the characteristics of vegetable or chemical activity achieved the highest concentrations used the highest effects, whether alone or in combination with two other compounds..

5:COMPETING INTERESTS

Authors have declared that no competing interests exist.

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