

Effect of ground addition and spraying with ALGA seaweed extract on the chemical traits of *Citrus aurantium* seedlings

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Abstract. *A factorial experiment was conducted in lathhouse covered with saran affiliated to Al- Musayyib Technical College at the age of 2 years planted in plastic anvils during the growing season 2021 to study the effect of ground application and spraying with seaweed extract with concentration (0,15,20,25) cm³ / L for both addition methods and the interaction between them in the vegetative growth and chemical traits under study of citrus seedlings, and using the randomized complete sector design with three replications. The results showed significant differences when ground application and spray addition of algae extract in vegetative and chemical traits under study. The ground addition achieved 25 cm³ / L had the highest average values for the studied traits, while the comparison treatment gave the lowest values for traits under study*

Keywords : *ALGA, Citrus, seedlings, ground addition, spraying*

1.INTRODUCTION

Citrus belongs to the Rutaceae family, which is characterized by the presence of oil glands in most parts of the plant, which gives it a distinctive aromatic smell. year BC It seems that citrus was known in Iraq in that period of ancient history. The original home of citrus is the tropical and subtropical regions of Southeast Asia, that is, India, Indochina, southern China, the Malay Islands, and West India. From these areas, citrus fruits spread to other parts of the world, so oranges Their origins are from China, and the orange and lemon zalina, whose homeland is India. It is believed that the Arabs introduced the bitter orange around the tenth century AD to Iraq, Syria, Palestine, Egypt and North Africa. In the year 1150 AD, the Arabs introduced the bitter orange, lemon

zal and shaddock to Spain and North African countries [1]. Citrus fruits are characterized by a high nutritional value as they are an important source of many vitamins, especially vitamin C as well as (A12, B2, B1, A) and vitamin P in lemon peels and on some sugars and various nutrients. It also contains organic acids such as citric acid as well as a group of amino acids. Calaspartic and Serine [2] Despite the importance of citrus fruits as one of the basic foods in the Iraqi consumer basket, its production now does not meet the needs of the Iraqi market, and the shortage is compensated by importing from neighboring countries. Citrus aurantium production reached 22,143 tons for the winter season 2020, while the production of oranges reached 142717 tons for the 2020 winter season [3]. The common methods of propagating the important cultivars of citrus is by grafting on good-quality roots. Citrus aurantium is one of the most widely used assets, as it is characterized by having a strong root system, many branches, deep in the soil, and resistant to gum disease resulting from high ground water level and root rot disease, so it succeeds. As an asset in heavy soils, it is a semi-shortened origin and has a good compatibility with most varieties. It is also characterized by its ease of propagation through seeds. In recent years, the trend has become to use organic fertilizers in agriculture such as amino acids, seaweed, humic and fulvic acids, humic lion in low concentrations to improve soil properties and nourish Plant and accelerate growth and increase production.[4] and since the addition of liquid amino acids to the plant is a good effective way to provide ready-made formulas of the building blocks of the protein, as it directly or indirectly affects the physiological activities carried out by the plant, this research aims to reach the best concentration that gives good growth ,Chemical characteristic and in an appropriate manner.

Materials and methods

Experiment site:

This experiment was conducted at Al- Musayyib Technical College for the year (2021-2022) in March on 2-year-old citrus seedlings obtained from the citrus seedlings production station in Karbala and planted in black plastic bags. washed peat moss. As 63 seedlings of homogeneous growth were selected as possible, and service operations were carried out equally for all transactions.

Sprinkler irrigation system:

The spraying system was used to water the seedlings in the canopy, and it consists of a main tube extending along the canopy and branching from it sub-tubes distributed on the canopy. Water the seedlings by spraying method in the early morning.

A sample of the study soil on which the experiment was conducted was taken for the purpose of conducting some physical and chemical analyzes.

Experiment Parameters:

The treatments were randomly distributed to 63 seedlings, the RCBD was followed by a factorial experiment with three replications. Each replication includes 21 citrus seedlings with three seedlings for each experimental unit. The first factor was the use of marine algae extract at four levels (0, 15, 20, 25) g / Liter ALGA AL-ZUHOOP supplied by the Jordanian Agricultural Investment and Development Company. The fertilizer liquid wild algae extract consists of(N by 4%, P₂O₅ by 4%, k₂o by 4%, Mg by 32ppm, Fe by 30 ppm, Mn by 31 ppm, Zn by 17.5 ppm, and Cu by 12.6 ppm.

The third factor is the method of addition, where the addition was done by two methods of spraying and adding to the soil and mixed well with it for all concentrations, and a manual sprayer with a capacity of (5 liters) was used and with each concentration (1 cm³) of the cleaning agent (Al-Zahi) was added as an alternative to the diffuser (Tween 20). It was added five times, starting from 1/4/2021, with an interval of 15 days between each addition. The addition process was carried out in the morning until the seedlings were completely wet, as the comparison treatment was sprayed with distilled water only, after the irrigation process was carried out for the field one day before the spraying process to increase the plants' efficiency in absorbing the sprayed substance, as moisture plays a role in the process of swelling the guard cells and opening the stomata, as well as being Watering before spraying reduces the concentration of solutes in the leaf cells, thus increasing the permeability of the ions of the spray solution to the leaf cells[5] .At the end of the experiment on 12/1/2021, the data were taken to study the following chemical properties:

1- Intensity of chlorophyll pigment in leaves: (SPAD unit):

The chlorophyll content in the leaves of Citrus aurantium and orange was estimated by using a (Chlorophyll Meter) type SPAD 502 (SPAD: Soil Plant Analysis Device), which was supplied by the Japanese company Minolta Co.LTD. The reading was taken for three leaves from different places for each seedling and the average was calculated for each seedling. Then Calculating the average for each experimental unit[6] .

2- Percentage of nutrients in the leaves (N, K):

Leaf samples were taken from each seedling and each repeater, then washed with distilled water to get rid of dust and impurities suspended in it, placed in perforated paper bags, then dried in an electric oven at a temperature of 70 ° C for 48 hours, until the dry weight was established [7], after which the samples were crushed and analyzed. 0.5 g of sample powder was taken. The ground (dry leaves) were used by the electric mill and digested by concentrated sulfuric acid and 1 ml of concentrated pyrrole and chloric acid[8] and the following elements were estimated:

1-2-Nitrogen (%):

Estimated using the microcalcium device [9]

2-2-Potassium (%):

Estimated by a flame photometer according to the method used by [10] .

3- Leaves content of total carbohydrates (%) in leaves:

Calculated according to the method [11], as 0.2 gm of dried leaf sample was taken from each duplicate and 8 ml of ethylene alcohol was added to it at a concentration of 80%, then it was placed in a water bath at 60 °C for 30 minutes, then centrifugation was carried out for 15 minute and at a speed of 3000 revolutions / sec, and the filtrate was withdrawn and these steps were repeated three times (8 + 8 + 8), after which the clear solution (the leached) was collected in a volumetric flask and the volume was completed to 25 ml by adding ethylene alcohol and taking 1 ml of the diluted solution and adding to it 1 ml of the solution Phenol concentration 5% and 5 ml of concentrated sulfuric acid, then the light absorption was read by a spectrophotometer at a wavelength of 560 nm, and the concentration of dissolved carbohydrates was extracted on the basis of the standard curve for pure glucose sugar prepared by dissolving different concentrations of glucose (2, 4, 6, 8, 10) mg in (100) ml of distilled water, then from each solution (1) ml was taken and 5) ml of concentrated sulfuric acid was added to it. Then the optical absorption readings with a wavelength of 560 nm were taken for each solution and the data were recorded to make the standard curve for glucose, then Calculate the percentage of carbs The dissolved values were multiplied by the final sample size (25) and divided by the sample weight (0.2).

5- Percentage of total protein in leaves:

It was calculated on the basis of dry weight, based on the estimation of the percentage of total nitrogen according to the following equation [12] : % of total protein = % of total nitrogen x F

F: a coefficient of 6.25.

Results and discussion :

1 Intensity of chlorophyll pigment spad unit

Note from the results of the statistical analysis shown in Table (1) that the Citrus aurantium cultivar excelled when adding marine algae extract as a ground addition to the plant. The third focus was superior to the rest of the treatments, as the chlorophyll pigment reached a value of 54.38 Spad unit, a significant superiority over the comparison treatment, which gave the lowest value in chlorophyll, which amounted to 30.97 Spad unit .The method of addition led to a significant increase in chlorophyll. The method of ground addition recorded the highest values of chlorophyll, which amounted to 54.38 spade unit, compared to the method of adding sprinklers to the leaves, which gave 48.72 spad unit.The treatment of the addition of the third concentration uric acid achieved the highest values, reaching 71.85 Spad unit, and it was significantly superior in the value of chlorophyll to all treatments, and was superior to the comparison treatment, which gave 30.99 Spad unit.

Table (1) Effect of ground application and spraying with ALGA seaweed extract on the chlorophyll pigment of citrus seedlings

cultivars	Adding method	Control treatment	seaweed extract			average
		T0	T1	T2	T3	
Citrus aurantium	spraying	31.00	45.77	51.03	67.07	48.72
	ground	30.97	60.83	49.10	76.63	54.38
average		30.99	53.3	50.07	71.85	
LSD(0.05)		8.80				3.33

Percentage of nutrients in leaves (N, K)

It is noticed from tables (2 and 3) that the addition of marine algae extract has a significant effect on the percentage of nutrients in the leaves, where the percentage of nitrogen increased in the treatment of the addition of the addition, while it increased in the spray treatment in the percentage of potassium, which gave 1.83 and 1.28% for the elements nitrogen and potassium, respectively.

The treatment with the second concentration of algae extract, ground addition, and the second concentration of algae extract sprinkled on the leaves gave the highest percentages of the two components, giving a value of 2.18 and 1.56%, respectively. As for the rate of addition treatments, the treatment gave the third concentration of algae extract the highest percentages in nitrogen, which it reached 1.98% and significantly outperformed the control treatment, which amounted to 1.09% in potassium. The first treatment was significantly superior to the control treatment, which gave a value of 1.41%, while the comparison treatment gave 0.72%.

Table (2) The effect of ground application and spraying with ALGA seaweed extract on nitrogen percentage of seed citrus seedlings

cultivars	Adding method	control treatment	seaweed extract			average
		T0	T1	T2	T3	
Citrus aurantium	spraying	0.950	1.757	1.753	2.200	1.23
	ground	1.237	2.133	2.180	1.760	1.83
average		1.09	1.95	1.97	1.98	
LSD(0.05)		0.20				0.08

Table (3) The effect of ground application and spraying with ALGA seaweed extract on potassium percentage

cultivars	Adding method	Control treatment	seaweed extract			average
		T0	T1	T2	T3	
Citrus aurantium	spraying	0.713	1.473	1.560	1.383	1.28
	ground	0.733	1.340	1.233	1.163	1.12
average		0.72	1.41	1.40	1.27	
LSD(0.05)		0.03				0.01

total Leaves content of carbohydrates (%) in leaves and protein

It is noticed from the tables (4 and 5) that the addition of seaweed extract and the method of addition has a significant effect on the leaves content of total carbohydrates (%) and protein. .31%, respectively. The treatment of adding marine algae extract the third concentration was also superior to the rest of the treatments, which gave a percentage of 14.15 and 12.30%, respectively, a

significant superiority over the comparison treatment, which gave a percentage of 9.39 and 6.29% for carbohydrates and protein, respectively.

Table (4) Effect of ground application and spraying with ALGA seaweed extract on carbohydrates percentage of citrus citrus seedlings

cultivars	Adding method	control treatment	seaweed extract			average
		T0	T1	T2	T3	
Citrus aurantium	spraying	9.67	12.30	12.33	13.20	11.88
	ground	9.10	13.70	13.33	15.10	12.81
average		9.39	13	12.83	14.15	
LSD(0.05)		0.33				0.13

Table (5) Effect of ground application and spraying with ALGA seaweed extract on protein percentage of citrus seedlings .

cultivars	Adding method	control treatment	seaweed extract			average
		T0	T1	T2	T3	
Citrus aurantium	spraying	6.240	10.940	10.950	13.125	10.31
	ground	6.343	13.125	13.563	10.934	10.99
average		6.29	12.03	12.26	12.30	
LSD(0.05)		0.06				0.02

The reason for the increase in nutrients in the leaves and the percentage of carbohydrates and protein may be attributed to the marine algae extract containing many nutrients important for plant growth, major and micro elements and plant hormones, especially auxins and gibberellins that encourage cell elongation and increase growth and thus increase the amount of materials manufactured in the leaves from Carbohydrates and proteins needed to build plant tissues,[13] . These results are consistent with [14].

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