Effect of Microorganisms and algae Extracts on growth of Olive seedlings (*Olea europea* L) Mandelolillo Cultivar

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Abstract
The study was conducted in covering at Al-Qassim Green University Agriculture faculty the Horticulture and Landscape Engineering Department. The experiment was carried out on 11/17/2022, where olive seedlings of the Manzilillo variety were transferred from plastic bags to anvils, and after treatment with dry yeast extract, microorganisms, and seaweed extract at different concentrations, the best results were found. The vegetative traits, which include stem length/number of branches, number of leaves, and antioxidants had a significant effect. The best results were at a concentration of 15 g/L for the yeast extract and at a concentration of 15 mL/for the marine algae extract. The interaction between the two extracts showed that they had a significant effect on the shoot and the antioxidant value of the xenon plant. Manzillo. The results also showed that treatment with a 15 g/L concentration of mushroom extracts showed resistance to Verticillium wilt and scab diseases.

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Introduction

Olive (*olea europea* L.) is one of the trees that lives for hundreds of years and has an important role in the economy of the peoples living around the Mediterranean region. Also, its neighboring regions (Syria, Lebanon, Palestine), which is considered its original homeland. As the olive tree is still widespread in these countries in the wild and from there it has spread to the rest of the world: the number of olive trees in the world has reached about 750 million tons [1]. The economic importance of olives is mainly represented in extracting oil from the fruits and in black and green pickling. Olive oil is considered a nutritional, industrial and medical ingredient. In countries that produce natural olive oil, it replaces animal fats that are used in cooking and preserving food, as it is easy to digest [2]. The yeast suspension contains a high percentage of auxin and cytokinin. It is affluent in carbohydrates, contains sugars, amino acids and many vitamins, especially B1, which is a source of cytokinin [3]. Marine algae are considered a non-fertilizer substance that stimulates the plant in small quantities and contains macro- and micro-nutrients and contains more than one group of growth-encouraging substances such as cytokinins, auxins, vitamins, amino and organic acids, and compounds similar to auxins. It increases the growth of roots and shoots, increases the quantity of yield and improves its quality, in addition to increasing the plant's resistance to pathogens [4]. The aims of this study is to Studying the effect of foliar spraying with seaweed extract and yeast, independently or overlapping with each other, on the growth of the olive tree in order to improve the characteristics of vegetative growth, which has a positive effect on the yield. Study the effect of foliar spraying on the value of antioxidants in olive tree leaves and the plant's resistance to pathogens.

Materials and Methods

- **Experiment site**

The research study was conducted in covering at Al-Qassim Green University Agriculture faculty the Horticulture and Landscape Engineering Department for the summer season (11/17/2022) on olive seedlings of the Manzillo variety (a high-oleic

Syrian variety) to determine the effect of treatment with both yeast and marine algae extracts on the growth and development of olive seedlings. The research used 27 one-year-old olive seedlings planted in mixed soil in perforated bags polyethylene that 5 kg capacity. The seedlings were divided into three groups with three replicates and were treated with three levels of both yeast and algae extracts: (0; A; B) grams per liter. [1] A 3*3*3 trial was implemented in a randomized complete block design (R.C.B.D) [5].

- **The experimental design used and the study parameters**

The experiment was carried out in the year 2022-2023 in the green house in the nursery affiliated with the College of Agriculture (Al-Qasim Green University) for Horticulture

- The experiment included foliar spraying with yeast at two concentrations (10 and 15) gm/L, as well as spraying with seaweed extract at two concentrations (10 and 15) gm/L.
- One liter of distilled water, warm water and sugar at a concentration of 5.5 per 10 grams
- Sugar at a concentration of 7.5 per 15 grams and adding a diffuser (al-Zahi) to break the surface tension.

The first treatment was prepared at 9:00 pm, 24 hours before spraying the plant. The transaction was completed on Tuesday, February 10, 2023

Symbols were chosen for the seedlings in which the treatment takes place

Comparative treatment

- A1 without treatment, just adding water to the plant
- A2 treatment was done with yeast (10g), sugar (5.5), and one liter of filtered (warm) water, and more than one replicate was made.
- A3 Treatment was done with yeast at a concentration of (15g) and one liter of warm water. More than one iteration is made.

The treatment was done with seaweed and is symbolized as B for seedlings

- B1 is done without a transaction
- B2 is treated with marine algae at a concentration of (10g) and one liter of warm filtered water
- B3 is treated with marine algae at a concentration of (15g) and one liter of filtered water.

The second treatment of plants takes place on Thursday, 3/24/2023 The treatment was done with yeast extract at a concentration of (10g) and a concentration of (15g). The treatment is carried out with marine algae at a concentration of (10g) and a concentration of (15g). The transactions were as follows: -

1- Comparison
2- Yeast 0 + algae 10 ml/l
3- Yeast 0 + algae 15 ml/liter
4- Yeast 10 g/L + algae 0
5- Yeast 10 g/l + algae 10 ml/l
2- Yeast 10 g/l + algae 15 ml/l
0- Yeast 15 g/L + Algae 0
8 - Yeast 15 g/l + algae 10 ml/l
9- Yeast 15 g/l + algae 15 ml/l

Studied attributes

Vegetative growth characteristics were measured after selecting (3) plants from each experimental unit

- Indicators of plant vegetative growth:
- Plant height (cm): It was measured with a ruler from the point where the plant contacts the soil surface to its highest peak.
- Number of leaves (leaf - 1 plant): It was calculated for each seedling at the end of the experiment and the average was extracted
- Number of branches (branch. plant^{-1}): It was calculated for each seedling and the average extracted.
- -Chemical measurements
- total phenols Determination (mg. g^{-1} dry weight)

Extraction

The method used by [6] was adopted, by taking 2 g of dried sepal leaves powder and adding 40 ml of 80% ethanol (vol/vol), placing it in a 100 ml glass beaker and then placing it in a shaking water bath at a high temperature. Heat at 32°C at 180 rpm for 72 hours.

Determination of total phenols (mg. g^{-1}dry weight):

The method described by [6] was followed. 13 ml of the extract was taken, 1 ml of distilled water was added to it, then 5 ml of Folin Ciocalteu reagent, 10% concentration (v/v), was added. The sample was left for 8 minutes, then add 4 ml sodium carbonate 7.5%. Leave the samples for 90 minutes at a temperature of 25°C, after which an optical absorption reading is taken at the wavelength of 765 nm. A calibration curve was made using Gallic acid at concentrations from 10 to 100 micrograms.cm3. After calibration, the readings were attributed to dry weight mg. g^{-1}.

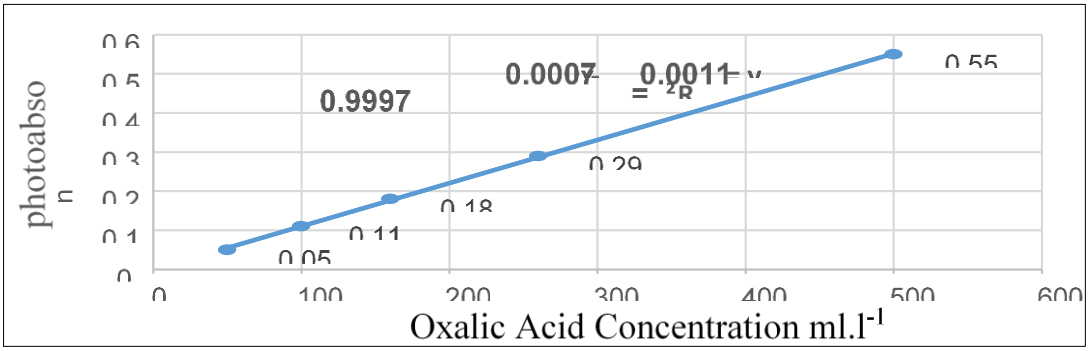

Fig 1: Standard Curve for Phenols

Results and discussion

Samples were taken from the selected plants 14 days after the third spraying, when the fully developed leaves are at their highest physiological activity, as mentioned in [7].

The effect of spray sources and concentrations on some growth indicators:

2- Leg length (cm):

It is clear from Table (1) the effect of spraying with yeast and marine algae on the stem length of olive plants has differences significant between the seaweed treatment, where, which represents spraying at a concentration of (15 ml/l), excelled in 3B treatment giving the highest rate of (59.33 cm) compared to 1B treatment, which The concentration represented (0: i.e. comparison), which gave the lowest rate of (56.22 cm), while the results of the same table show that there are significant differences between the concentrations of yeast, where treatment 3 A, which represents spraying with a concentration of (15 g/l), gave the maximum rate of (62.56 cm).) linked to the lowest value in treatment 1 A, which represents the concentration (0: i.e. comparison), which gave the lowermost rate of (53.33 cm). The results of the bilateral interaction between the two workers also show the presence of significant differences, as the highest value was in treatment (A3B3), which includes treatment Spraying with algae at a concentration of (15 ml/l) and yeast at a concentration of (15 gm/l) amounted to (64.67 cm) compared to the lowest value in the treatment (A1B1: comparison treatment), which includes the treatment of spraying with algae at a concentration of (0 ml/l) and yeast at a concentration (0 g/L) reached (51.67 cm).

Table 1: Shows the effect of spraying with yeast and seaweed on stem length (cm)

Algae concentration ml/L	Yeast concentration g/L			Average
	(0:A1)	(10:A2)	(15:A3)	
(0:B1)	51.67	55.67	61.33	56.22
(10:B2)	53.33	56.67	61.67	57.22
(15:B3)	55.00	58.33	64.67	59.33
Average	53.33	56.89	62.56	
L.S.D 0.05	Yeast con.0.813	Algae con. 0.813		Overlap 1.408

Number of leaves (leaf $^{-1}$. plant)

It is clear from Table (2) the effect of spraying with yeast and marine algae on the average number of leaves of olive plants that there are significant differences between the seaweed treatments, where treatment 3B, which represents spraying at a concentration of (15 ml/l). excelled in giving the highest rate of (212.4 leaves/seedling) compared to With treatment 1B, which represents the concentration of (0: i.e. the comparison treatment). which gave the lowest rate of (163.7 leaves/seedling), while the results of the same table show that there are significant differences between the concentrations of yeast. as treatment A3, which represents spraying, gave a concentration of (15 g/l). The highest rate was (240.6 leaves/seedling) compared to the lowest value in treatment A1, which represents concentration (0: i.e. the comparison treatment), which gave the lowest rate of (149.3 leaves/seedling). The results of the bilateral interaction between the two workers also show the presence of significant differences. The highest value was in treatment A3B3, which includes the treatment of spraying with algae at a concentration of (15 ml/L) and yeast at a concentration of (15 g/L), amounting to (306.0 leaves/seedling), compared to the lowest value in treatment (A1B1, the comparison treatment), which includes the treatment of spraying with algae. At a concentration of (0 ml/L) and yeast at a concentration of (0 g/L) amounted to (143.3 leaves/seedling)

Table 2: The effect of spraying with yeast and marine algae on the average number of leaves (leaf/seedling)

Algae concentration ml/L	Yeast concentration g/L			Average
	(0:A1)	(10:A2)	(15:A3)	
(0:B1)	143.3	158.7	189.0	163.7
(10:B2)	149.3	165.0	226.7	180.3
(15:B3)	154.7	176.7	306.0	212.4
Average	149.1	166.8	240.6	
L.S.D 0.05	Yeast con. 9.84	Algae con. 9.84		Overlap 17.05

Number of branches (branch. plant^{-1})

The result in Table (3) showed that the effect of spraying with yeast and marine algae on the average number of branches of the olive plant that there are significant differences between the seaweed treatments, as the B3 treatment, which represents spraying at a concentration of (15 ml/l), excelled in giving the highest rate of (19.11 branches. Plant^{-1}) compared to With treatment 1 B, which represents the concentration of (0: i.e. the comparison treatment), which gave the lowest rate of (14.33 shoots $^{-1}$), while the results of the same table show that there are significant differences between the concentrations of yeast, as treatment 3 A gave, which represents spraying with a concentration of (15 g). / liter) The highest rate was (23.22 shoots. Plant-1) compared to the lowest value in treatment A1, which represents the concentration (0: i.e. the comparison treatment), which gave the lowest rate of (9.00 shoots. Plant^{-1}). The results of the binary interaction between Factors: There were significant differences, as the highest value was in the treatment (A3B3), which includes the treatment of spraying with algae at a concentration of (15 ml/L) and yeast at a concentration of (15 g/L), amounting to (25.33 branches.plant^{-1}) compared to the lowest value in the treatment: A1B1 The comparison treatment (which includes spraying with algae at a concentration of (0 ml/L) and yeast at a concentration of (0 g/L) amounted to (6.33 branches. Plant^{-1}).

Table 3: The effect of yeast and marine algae on the average number of branches (Section. Plant^{-1})

Algae concentration ml/L	Yeast concentration g/L			Average
	(0:A1)	(10:A2)	(15:A3)	
(0:B1)	6.33	15.67	21.00	14.33
(10:B2)	8.67	17.67	23.33	16.56
(15:B3)	12.67	19.33	25.33	19.11
Average	9.22	17.56	23.22	
L.S.D 0.05	Yeast con 1.218 Algae con 1.218 Overlap 2.110			

4 - Antioxidants (mg.L^{-1})

It is clear from Table (4) the effect of spraying with yeast and marine algae on the antioxidants of olive plants that there are significant differences between the seaweed treatments, where treatment 3B, which represents spraying at a concentration of (15 ml/l), excelled in giving the highest rate of (4.127) compared to treatment 1B. Which represents the concentration of (0: i.e. the comparison treatment), which gave the lowest rate of (3.590), while the results of the same table show that there are significant differences between the yeast concentrations, where A3 treatment, which represents spraying with a (15 g/l) concentration, gave the highest rate of (4.248).) compared to the lowest value in treatment A1, which represents the concentration (0: i.e. the comparison treatment), which offered the lowest rate of (3.414). The results of the binary interface between the two workers also show the presence of significant differences, as the highest value was in treatment (A3B3), which includes The treatment of spraying with algae at a concentration of (15 ml/L) and yeast at a concentration of (15 g/L) amounted to (4.322) compared to the lowest value in the treatment (A1B1: comparison treatment), which includes the treatment of spraying with algae at a concentration of (0 ml/L) and yeast at a concentration of (0 g/L) amounted to (2.607).

Table 4: Effect of spraying with yeast and seaweed on antioxidants

Algae concentration ml/L	Yeast concentration g/L			Average
	(0:A1)	(10:A2)	(15:A3)	
(0:B1)	2.607	3.961	4.202	3.590
(10:B2)	3.773	3.989	4.220	3.994
(15:B3)	3.863	4.197	4.322	4.127
Average	3.414	4.049	4.248	
L.S.D 0.05	Yeast con 0.1362 Algae con 0.1362 Overlap 0.2359			

Dissection

The increase in yield characteristics in plants sprayed with yeast may be due to the role of cytokinins contained in yeast in stimulating cell division, increasing their size, stimulating nutrient transfer and accumulation in the treated parts, as well as containing many nutrients necessary for growth, such as sugars, proteins, and amino acids that increase the growth rate. vegetative growth, thus increasing the efficiency of food processing and net carbon metabolism, which is reflected in an increase in the dry weight of the plant [8]. The reason for this may be due to the dry yeast extract containing growth-promoting substances such as vitamin thiamine and riboflavin, which have an important role in metabolism. Carbohydrates and building amino acids [9]. Alternatively, the role of dry yeast as a foliar fertilizer may be due to its effect in increasing carbon dioxide, the effect of which is reflected in improving the net output of photosynthesis achieved, in addition to its content of amino acids, which are the basis for building cell protein [10]

Spraying with marine algae extract is attributed to the increase in the vegetative growth characteristics of olive seedlings because these extracts contain many micro- and microelements in addition to plant hormones that help in the growth and elongation of the plant and its parts [11]. It also develops many physiological and biological processes that lead to an increase in the efficiency of metabolism and thus improve the characteristics of the plant. Vegetative growth, and this is consistent with previous studies showing the effect of marine algae on olive plant growth [12]. Through this study, we conclude that foliar spraying with yeast extract and marine algae extract has a positive effect on the vegetative growth characteristics of olive seedlings and antioxidant values, which certainly has an effective role in the growth, yield, nutritional value, and disease resistance of olive seedlings.

Conclusions

The incorporation of algae and microbiological extracts functions as an effective nutritional approach for the Mandelolillo cultivar. The results indicate that these extracts not only expedite the nursery hardening period but also confer a biological "priming" effect, bolstering the seedlings' inherent immunity against significant olive diseases. These findings endorse the implementation of bio-based treatments under integrated pest control (IPM) systems for Mediterranean olive orchards.

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