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INFLUENCES OF HUMIC ACID AND SEA FORCE ON OLIVE TREES GROWTH (*OLEA EUROPAEA* L.)

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ABSTRACT

This study was conducted during 2019 in a private farm located at south around Erbil Governorate, Kurdistan region on olive trees (Sorani c.v.) in order to identify the most suitable fertilizer. Two types of fertilizers supplied as foliar application, humic acid and seaweed extract (Sea Force) at four levels (0, 2 $ml.L^{-1}$, 4 $ml.L^{-1}$and 6 $ml.L^{-1}$). Vigor and fruit properties of trees were measured. The two fertilizers resulted a significant difference in means between treatments; all of them recorded a significant increase at 6 $ml.L^{-1}$ of chlorophyll, leaf area, number of leave/ shoot, shoot length, oil content, TSS, fruit diameter, fruit weight, pulp weight and seed weight. While the interaction between the two fertilizers resulted a significant increase at ((6 $ml.L^{-1}$humic acid +6 $ml.L^{-1}$ seaweed extract).) for all vegetative growth and fruit parameters except oil content and TSS increased significantly at interaction level (4 $ml.L^{-1}$ humic acid+ 6$ml.L^{-1}$ seaweed extract).

Keywords: Olive tree, Sorani cv., Humic acid, seaweed extract.

Introduction

Olive (*Olea europaea* L.) is one of the world's oldest cultivated tree crops, dating back over 8000 years. Its origins can be traced back to ancient times on the Mediterranean Sea's eastern shore. Olives have spread throughout the Mediterranean basin, which is still the primary region for olive production today (Osman *et al.,* 2010).

Olive trees thrive in several parts of Iraq's central and northern regions, with Nineveh being the major producer, with cultivation in Nineveh, Kirkuk, Baghdad, Erbil and Duhok (Mahdi, 2007). The importance of olive fruit stems from its high caloric content and nutritional value, as the fruit is high in vitamins (A, B, C, D, E, and K) as well as minerals (K, Ca, Mg, and P) (Ibrahim and Khlaef, 2007).

Olive oil is also high in monounsaturated fatty acids and contains phenol acid, which has anti-oxidant qualities (Hill and Giacosa, 1992). Many countries, like Spain, Italy, Greece, Turkey, and Tunisia, rely heavily on international olive production. Olive trees provide two major products: oil and table olives, which are produced by a variety of cultivars such as Coratin and Klamata, Picual. Although the olive tree's nutrient requirements are lower than those of many other fruit trees, a lack of these requirements causes the tree to suffer from serious physiological problems (Dimassi *et al.,* 1999 and Popovic *et al.,* 1999). The results showed that adding 8m. L-1 humus to the fruit resulted in an increase in fruit weight, length, flesh weight, and nitrogen content (AL-Tememe and colleagues, 2018). Hidayatullah *et al.* (2018) investigated the effects of humic acid fertilization at various amounts (0, 50, 75, 100, 125, and 150g potassium humate) on apple trees planted in limestone soils. $Tree^{-1}$) and found that the potassium humate fertilizer supplied to the trees equaled to 125 and 150 g potassium humate. Tree produced the most fruits per tree and enhanced tree output the most. Khan *et al.* (2019) investigated the effect of humic acid fertilization on apple trees in 2017 and 2018 using three concentrations (0.05 percent, 0.010 percent, and 0.015 percent), all of which resulted in increased tree yields, especially when the concentration was 0.015 percent compared to the other concentrations.

AL-Barwari and AL-A'araji, 2020, confirmed that the addition of nitrogen and humic acid separately, as well as their two-way interactions, had a significant effect on yield and specific characteristics (total soluble solids, total carbohydrates in the fruits, and percentage of oil in the fruits), particularly at the levels of 450g N.Tree-1 and 75 g H.Tree-1. Sea force includes nearly all of the minerals and trace elements required for human and plant survival, as well as amino acids and vitamins. (SAFA Biological sea plant) Sea force is also a major source of iodine (melson) (Berlyn and Russo, 1990). The efficiency of Sea Force as a plant growth stimulant may be modified by the species included and the manufacturing technique utilized (Turan and Kose 2004). Mansour *et al.* (2006) studied the effects of applying algal extract to thirty 12-year-old Anna Apple trees. The use of algal extract was found to be particularly successful in increasing shoot length, leaf area, total leaf carbohydrates, and leaf mineral content.

Seaweed extract is useful in sustainable agriculture because it is organic and biodegradable (Cassan *et al.,* 1992). The application of seaweed products in diverse crops may result in higher crop yield, quality, and inorganic element uptake from the soil, plant stress resistance, reduced incidence of fungal and insect attack, and lower production costs (Berlyn and Russo, 1990; Fornes *et al.,* 2002).

The aims of this study were to investigate the effect of application the current fertilizers practice in olive orchards to the soil as supplementary amendments to trees and reduce pollution happened concerning both soil and underground water. The goal was to compare between the fertilizer sin various concentration on olive trees.

Material and Methods

This experiment was carried out on olive tree (7) years olds (Sorani cv.), in one of the olive orchard far away from Erbil city about (20 Km) to the south. Olive trees (Sorani cv.) age 7 years' uniform in size and vigor in growth were selected to receive treatments, humic acid (0, 2 $ml.L^{-1}$, 4 $ml.L^{-1}$ and 6 $ml.L^{-1}$) and Sea force extract (0, 2 $ml.L^{-1}$, 4 $ml.L^{-1}$ and 6 $ml.L^{-1}$) using foliar application techniques and each fertilizer was added in 3 dosages. Tween 20 (0.01%) used as wetting agent. The trees were monitored twice a week and recorded air temperature. The experiment was designed as randomized complete block design (RCBD) with 3 replicates (3 trees/ replicate). Data was subjected to analysis of variance to determine the significant differences and Duncan's multiple range tests was used for means comparison when F test was significant at p 0.05.

Table 1 : Some of the soil physic- chemical properties used in the study

Characteristics	Experiment media
pH(pH- meter)	7.80
EC (Electrical conductivity)	0.3 des/m
Organic mater	1.08 %
Nitrogen %	0.150
P_2O_5	5.56
K_2O	112 ppm
Soil texture	Loamy Clay

*The data analyzed at Erbil Directorate of Agricultural Researches

The following parameters for each treated trees were measured:

1. Vegetative growth : I selected at random from each replicate to measure their chlorophyll content, leaf area (cm^2), number of leave/shoots and shoot length (cm) according to Ahmed and Morsy (1999), and the length of the terminal shoots (cm) on the 4 chosen branders of each tree was measured at the end of experiment, the average of shoot length was calculated and number of leaves/ shoot.

2. Fruit parameters: A sample of 10 random mature fruits per tree were used for the determination TSS of fruit, fruit weight, fruit diameter, pulp weight and seed weight was measured.

3. Fruit oil percentage : Fruit oil content was determined by means of the Soxhlett fat extraction apparatus using Hexane of 60-80 C° boiling points according to A.O.A.C 1995.

Results and Discussion

The results of the study (Table 2) indicate the significant results for growth parameters which resulted a significant increase of chlorophyll content (77.94%), leaf area (4.6 1 cm^2), number of leaves/shoot (9.09) and shoot length (10.72 cm), while fruit parameters resulted a significant increase of an oil content (33.45 %), TSS (15.15), fruit diameter (8.69 cm), fruit weight (4.81 g), pulp weight (4.00 g) and seed weight (0.81 g) respectively, recorded at 6 $ml.L^{-1}$. Increasing in vegetative growth and fruit are agreed with Ibrahim (2013).

Table (3) shows the most significant results for growth parameters which resulted a significant increase of chlorophyll content (77.96 %), leaf area (3.89 cm^2), number of leaves/shoot (9.87) and shoot length (9.97 cm), while fruit parameters resulted a significant increase of an oil content (33.15 %), TSS (15.15), fruit diameter(8.46 cm), fruit weight (3.67 g), pulp weight (2.92 g) and seed weight (0.75 g) respectively, recorded at 6 $ml.L^{-1}$. This result of increasing the vegetative growth and fruit of the trees caused due to increasing uptake of the elements and it agree with results of Ibrahim 2013.

The results presented in Table (4) revealed the consistent and most significant results for growth parameters due to the interaction between the three levels of humic acid and seaweed extract, which resulted a significant increase in all vegetative parameters (75.09%, 6.01 cm^2, 12.00 and 10.93 cm) and fruit parameters fruit diameter, fruit weight, pulp weight and seed weight (9.37 cm, 5.39 g, 3.29 g and 0.99 g)respectively, while fruit parameters resulted a significant increase of an oil content (37.70 %), TSS (20.23), This also may be a result of increasing the vegetative growth and some fruit parameters which may increase the uptake of the elements and it agree with results of Maksoud *et al.* (2009) and Ibrahim (2013).

It was observed from table from the data that the two fertilizers had a positive effect on the olive growth parameters. As comparing among the two fertilizers we see significant differences in means between treatments, humic acid fertilizer and seaweed extract increased dramatically at (6 $ml.L^{-1}$and 4 $ml.L^{-1)}$ for all parameters, and dominated on the same parameters in the at the same concentration. This also may be a result of increasing the vegetative growth and fruit parameters of the olive tree Sorani cv. The reason behind increasing all vegetative parameters that studied could be attributed to increasing which may increase the uptake of the elements and enhance the ability of nutrients translation and their role in activating the cell division and increasing biosynthesis of organic products that lead to accumulation of carbohydrates and protein in leaves.

Table 2 : Effect of humic acid on the growth of olive trees.

Concentration	Chlorophyll content %	Leaf Area Cm^2	Number of leaves/ shoot	Shoot Length cm	Oil content %	TSS	Fruit Diameter mm	Fruit Weight g	pulp Weight g	Seed Weight g
Control	53.18 d	2.13 c	4.00 c	3.61 c	19.28d	9.90 c	4.42 c	1.71 c	1.22 c	0.49 c
2 $ml.L^{-1}$	60.96 c	2.31 c	5.03 c	7.54 b	22.19 c	12.12	6.58 b	3.20 b	2.54 b	0.66 b
4 $ml.L^{-1}$	70.21 b	3.44 b	7.20 b	8.33 b	29.06b	14.14a	7.15 b	3.30 b	3.17 a	0.13 d
6 $ml.L^{-1}$	77.94 a	4.16 a	9.09 a	10.72a	33.45 a	15.15a	8.69 a	4.81 a	4.00 a	0.81 a

*The similar letters vertically between treatments mean there are no significant differences between them using Duncan's Multiple Range test at %5 level.

Table 3 : Effect of seaweed extract on the growth of olive trees.

Concentration	Chlorophyll content %	Leaf Area Cm^2	Number of leaves/ shoot	Shoot Length cm	Oil content %	TSS	Fruit Diameter mm	Fruit Weight g	pulp Weight g	Seed Weight g
Control	67.03 c	2.32b	4.21 b	6.35 d	17.05 c	10.1 c	5.17 d	1.94 d	1.54 c	0.40 c
2 $ml.L^{-1}$	66.54 c	2.75b	5.39 b	8.00 c	25.08b	11.11c	6.54 c	2.33 c	1.79 b	0.54 b
4 $ml.L^{-1}$	68.47 b	3.48a	8.47 a	8.61 b	32.24a	13.13b	7.80 b	3.25 b	2.85 a	0.43 c
6 $ml.L^{-1}$	77.96 a	3.89a	9.87a	9.97 a	33.15a	15.15a	8.46 a	3.67 a	2.92 a	0.75 a

* The similar letters vertically between treatments mean there are no significant differences between them using Duncan's Multiple Range test at %5 level.

Table 4 : Effect of interaction between humic acid and seaweed extract on the growth of olive trees.

Concentration Humic + SeaForce	Chlorophyll content %	Leaf Area Cm^2	Number of leaves/ shoot	Shoot Length cm	Oil content %	TSS	Fruit Diameter mm	Fruit Weight g	pulp Weight g	Seed Weight g
0	61.72 e	1.8 0 f	5.00	5.58 i	19.20 g	10.11 i	4.14 f	1.90 e	1.12 c	0.78 d
2 $ml.L^{-1}$	65.84 e	2.15 e	7.00 e	7.32 f	21.22ig	12.12 f	6.38 e	2.29 de	1.54 c	0.75 d
4 $ml.L^{-1}$	70.51d	3.22 d	8.00 d	9.11 cd	26.64 f	13.13 e	7.10 ce	3.11 cd	2.34 bc	0.77 d
6 $ml.L^{-1}$	73.90 c	4.61 c	10.00 b	10.89 b	36.05 c	15.15 c	7.99 c	3.75 c	2.81 b	0.94 b
(2 + 2) $ml.L^{-1}$	62.33 e	1.97 f	6.55 f	6.77 f	19.87 g	12.12 f	5.33 e	2.85 d	2.21bc	0.80 cd
(2 +4)$ml.L^{-1}$	63.67 e	1.98 f	7.66 e	7.89 e	20.69ig	12.78 f	6.58 d	3.32 cd	2.83 b	0.82 cd
(2 +6)$ml.L^{-1}$	73.45 c	2.67 e	8.00 d	8.65 d	23.78i	14.65 d	7.34 c	3.87 c	2.87 b	0.83 cd
(4 + 2)$ml.L^{-1}$	74.34 b	4.88 c	10.00 b	9.53 c	27.00 e	13.65 e	7.89 c	3.77 c	2.74 b	0.91bc
(4 +4)$ml.L^{-1}$	74.30 b	5.76 b	6.55 f	9.82 cd	28.33 d	17.59 c	8.06bc	4.21bc	2.90 b	0.94 b
(4 +6)$ml.L^{-1}$	74.98 b	4.89 c	9.00 c	10.01bc	30.33 cd	18.88 b	8.67 b	4.70 b	2.95 b	0.95 b
(6 + 2)$ml.L^{-1}$	73.22 c	5.62 b	8.77 cd	9.57 c	26.11 f	15.32 c	7.25 c	4.00bc	2.11bc	0.87 c
(6+ 4)$ml.L^{-1}$	74.89 b	5.77 b	10.55 b	10.75 b	37.70 a	20.23 a	8.94 b	4.89 b	2.87 b	0.98 a
(6+ 6) $ml.L^{-1}$	75.09 a	6.01 a	12.00 a	10.93 a	35.79 b	18.91 b	9.37 a	5.39 a	3.29 a	0.99 a

*The similar letters vertically between treatments mean there are no significant differences between them using Duncan's Multiple Range test at %5 level

References

AOAC (1970). Official Methods of Analysis of the Association of Official Agricultural Chemists Washington, D.C., U.S.A. pp: 832.

Ahmed, F.F. and Morsy, M.H. (1999). A new method for measuring leaf area in different fruit species. *Minia J. Agric. Res. & Develop*.19: 97- 105.

Abou El-Khashab, A.M., AbouTaleb, S.A. and Wafaa, T.S (2005). Aggezi and Koroneki olive trees as affected by organic and bio-fertilizers, calcium citrate and potassium. *Arab Univ. J. Agric. Sci., Ain shams Univ*., 13: 419-440.

AL-Tememe, Z.M.; AL-Tamimi, H.M.A.; AL-Asedy, A.A.A. and AL-Amirry, A.T. (2018). Effect of addition of Humic acid and seaweed extract and foliar application in some characteristics on fruit growth of olive (*Olea europaea* L.) c.v Bashiqa. 5(5) (2018): Proceedings of the 3rd Agricultural Scientific Conference 5-6 March 2018/ College of Agriculture / University of Kerbala.

AL-Barwari, B.J.T. and AL-A'araji, J.M.A. (2020). Effect of nitrogen and humic acid on fruit yield and qualitative characteristics of olive trees (*Olea europaea* L.) cv. kistawy. *Plant Archives,* 20(2): 8716-8720

Beryln, G.P. and Russo, R.O. (1990). The use of organic bio-stimulants in nitrogen fixing trees, Nitrogen Fixing Trees Research Report, 81, 1/2.

Berlyn, G.P. and Russo, R.O. (1990). The use of organic biostimulatants in nitrogen fixing trees. *Nitrogen Fixing Trees Res Report,* 81: 1 –2.

Chuntonaparab, N. and Cummings, G. (1981). Seasonal trends in concentration of nitrogen, phosphorus, potassium, calcium and magnesium in leaf portion of apple, blueberry, grape and peach, *J. Am. Soc. Horb, Sci*. 105(6): 933.

Cassan, L.; Jeannin, I.; Lamaze, T. and MorotGavdry, J.F. (1992). The effect of the *Ascophyllum nodosum* extract Goemar GA14 on growth of spinach. Botanica Marina 35: 437–439.

Duncan, D.B. (1955). Multiple Range and Multiple F Tests. *Biometrics*, 11: 1-42.

Dimassi, K.; Therios, I. and Passalis, A. (1999). Genotypic effect on leaf mineral levels of 17 olive cultivars grown in Greece. Third International symptoms on Olive Growing, Chania, Crete, Gree, 22-26 Sep. 1997. *Acta Horticulture*, 474: 329-331.

David, G. (2002). Tree fruits production with organic farming methods. Center for Sustaining Agriculture and Natural Recourses. Washington state Univ. Wenatchee, AUS.

El-Hady, O.A.; Hanna, A.H. and Kattab, M.M. (1991). Interaction of organic manures and bitumen emulsion on a sandy soil and the growth response on nutrient levels in the olive leaves. *Egypt. J. Soil Sci*., 31: 65-88.

Francisca, G., Arnaud, T. and Albi, M.M. (1999). Influences of ecological cultivation on virgin oil quality. *J. A.O.C.S*., 76: 617-621.

Fornes, F.; Sanchez-Perales, M. and Guardiola, J.L. (2002). Effect of a seaweed extract on the productivity of Clementine mandarin and Navelina orange. *Botanica Marina*, 45: 486 –489.

Ibrahim, A.M. and Khalaef, M.N.H. (2007). Olive Tree Planting, Protection and Production, Egypt.

Ibrahim, Z.R. (2013). Effect of Foliar Spray of Ascorbic Acid, Zn, Seaweed Extracts (Sea) Force and Biofertilizers (EM-1) on Vegetative Growth and Root Growth of Olive (*Olea europaea* L.) Transplants cv. Hoj Blanca. *Int. J. Pure Appl. Sci. Technol*., 17(2): 79-89.

Lavee, S. and Wonder, M. (1991). Factors affecting the manure of oil accumulation in fruit of olive cultivars. *J. Hort. Sci*., 66: 583-591.

Maksoud, M.A. (2009). Response of growth and flowering of Manzanillo olive trees to different sorts of nutrients. *Egypt. J. of Hort*., 27(4): 513-523.

Mansour, A.E.; Cimpoies, Gh. and Ahmed, F.F. (2006). Application of algae extract and boric acid for obtaining higher yield and better fruit quality of Anna apple, *Stiinta Agricola*, 2:14-20.

Mahdi, F.T. (2007). Development of olive plantation, Popular Company of Horticulture and Forestry, Ministry of Agriculture, Iraq.

Steve, D. (2009). Sustainable farming compost tea. Cited in http://www.soil soup.com.

Turan, M. and Kose, C. (2004). Seaweed extract improve copper uptake of Grapevine, *Acta Agric. Scand., Sect. B, Soil and Plant Sci*., 54: 213-220.

Zulaikha, R.I. (2013). Effect of Foliar Spray of Ascorbic Acid, Zn, Seaweed Extracts (Sea) Force and Biofertilizers (EM-1) on Vegetative Growth and Root Growth of Olive (*Olea europaea* L.) Transplants cv. Hoj Blanca. *Int. J. Pure Appl. Sci. Technol.*, 17(2): 79-89.