Effect of Root Enhancer and Cytoplus on Vegetative and Root Characteristics of Olive Sapling Cultivar Sourany.

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ABSTRACT:

A Factorial experiment was conducted using randomized complete block design (RCBD). The duration of the experiment spanned out across two seasons of growth 2016 -2017 In lath house in order out to investigate the influence of organic fertilizer "Root Enhancer" and "Cytoplus" as soil application on vegetative and root growth on one year old "Sourany" olive sapling . The "Root Enhancer" (E) is applied in four amount (0, 2, 3, 4 g. sapling $^{-1}$) and "Cytoplus" (C) at four amount (0, 3, 5, 7 ml. sapling $^{-1}$).Level E4 of Root Enhancer (4 g .sapling $^{-1}$) had a significantly high value for the two seasons the higher of sapling was 10.93 , 11.04 cm, leaf area was 544.9, 861.8 cm^2 , Fresh weight of root was 27.84,34.26 g , Main root diameter was 2.958,2.275 mm , number of root was 10.00 , 19.83 , Root surface area was 320.4, 368.6 cm^2, for two seasons .Cytoplus at (7 ml. sapling^{-1}) application was give highest values for the higher of seedling10.48,10.55cm , branches number 14.58, 13.09 branch , leaf area 475.5, 664.8 cm^2, , Main root diameter2.370, 2.408 mm , Root number 9.83, 14.42 , Main root length19.41, 36.50 cm, Root surface area 324.7, 373.2 cm^2 , for two seasons. The interaction between the experimental factors was influenced by the growth parameters.

Key word: olive, Humic acid, seaweed extracts , Soil application , Sourany

تأثير اضافة Root enhancer و Cytoplus على صفات النمو الخضري والجذري لشتلات الزيتون صنف " صوراني" .

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الخلاصة:

أجريت تجربة عاملية بتصميم القطاعات العشوائية الكاملة (RCBD) خلال موسمي النمو 2016 –2017 في الظلة الخشبية لمعرفة تأثير الاضافة الارضية للأسمدة العضوية Root enhancer و Cytoplus على النمو الخضري والجذري لشتلات الزيتون صنف صوراني بعمر سنة واحدة . تم اضافة "Root enhancer " بأربعة مستويات (0 و2 و 3 و 4 غم . شتلة $^{-1}$) ورمز له بالحرف (E) و Cytoplus (0 و 3 و 5 و7 مل .شتلة $^{-1}$) ورمز له بالحرف(C). اعطت المعاملة E4 (4 غم .شتلة $^{-1}$) اعلى فرق معنوي لارتفاع الشتلة بلغت 10.93 ,11.04سم ,والمساحة الورقية بلغ 544.9 , 861.8 سم^2 , والوزن الطري للجذور بلغ 27.84 ,34.26 غم , وقطر الجذر الرئيسي بلغ2.958, 2.275 ملم , وعدد التفرعات الجذرية 10.00 ,19.83 ,والمساحة السطحية للجذور 320.4, 368.6 سم^2 للموسمين على التوالي . وكان لأضافة المعاملة C7 (7 مل .شتلة$^{-1}$) اعطاء اعلى قيم لارتفاع الشتلات بلغت 10.48 و 10.55 سم , وعدد الافرع 13.09,14.58 , و المساحة الورقية 664.8,475.5 سم^2 ,وقطر الجذر الرئيسي 2.370, 2.408 ملم , وعدد التفرعات الجذرية
9.83, 14.42 , و وطول الجذر الرئيسي 19.41, 36.50 سم, والمساحة السطحية للجذور 373.2,324.7 سم^2 . وكان التداخل بين عاملي التجربة اثر معنويا في زيادة اغلب مؤشرات النمو المدروسة .

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*Part of M.Sc. thesis of the first author

الكلمات المفتاحية : زيتون ,حامض الهيومك ,مستخلصات الاعشاب البحرية , إضافة ارضية .

INTRODUCTION

The cultivated olive (Olea europaea L.) is an evergreen tree belonging to the family Oleaceae The olive is native to the Mediterranean region, tropical and central Asia and to various parts of Africa. The genus Olea includes at least 30–35 species (12)(19) . Sourany is a Syria cultivate dual purpose use to draw oil and pickling. Humic acid is a bio-stimulant, which acts as a growth booster by inflicting positive effects on soil and plant characteristics. It is a complex mixture of many nutrient elements that one very important to the plant (5) (9) .the amino acids increased deferent physiological activity directly and indirect and the amino acids enter the organic nitrogenous compounds and are the building blocks in the synthesis of proteins and a number of co-enzymes and may play a role in stress resistance (2)(10) (16) . Algae extract as a new bio-fertilizer containing macronutrients as well as micronutrients, some growth regulators, polyamines, natural enzymes carbohydrates , proteins and vitamins applied to improve vegetative growth and yield (1)(17).The target of this study was to evaluate vegetative and root growth of "Sourany" olive cultivar by using Root enhancer and Cytoplus under local conditions

materials and methods

This study was conducted in College of Agriculture - Baghdad University during the growing season 2016 and 2017 to investigate the influence of adding Root enhancer and Cytoplus on Vegetative and Root growth of Olive transplant c.v " Sourany" one year old cultivation in lath house ,the sapling cultivated in black polyethylene bags dimension 35× 40 cm filled with washed sand mixed well with decomposable organic fertilizer with volumetric percentage 1:15 ,where the applied factorial experiment with two Treatments and three replicates were applied in a randomized complete block design (R.C.B.D) the first factor "Root enhancer" was four levels (E) (0,2,3, 4 g. sapling^{-1}) ,the second factor "Cytoplus" was four levels (C) (0,3,5 ,7 ml.sapling^{-1}), was taken Three seedlings in each experiment unit , the total number became 48 sapling. The Root enhancer Contains Free amino acid 38 %, Humic extract 14%, Vitamins 3.9 %,and ,N, P ,K, Ca, while Cytoplus Contains Seaweed Extract with NPK. The adding procedure was done at early morning to each treatment. The period between add and other 20 days and between the Cytoplus 72 hours . The data were analyzed using the Genstat program (15) and the mean was compared using least significant difference of L.S.D at the probability level of 0.05 .

The following parameters were measured for both seasons:

1- Height of seedlings (cm)

Measured from soils surface to the top of sapling in the begin and the end of experiment .

2- main stem diameter (mm)

Measured by Vernia at an altitude of 10 cm of the bag soil surface at the beginning and the end of the experiment was calculated incensement in diameter by the difference between average of the two values .

3- Vegetative branches number (branch .sapling^{-1})

The number of branches Account for each plant in experiment unit and extracted average.

4 -leaf area (cm^2)

The area of the leaf was calculated in June by the Digimizer program, in the first a whit sheet put behind the leaf and draw color line 10 cm length beside the leaf and scanner by photo scanner thin analyze the picture by computer.

5 - Fresh weight of root (g)

After the seedling was extracted from the plastic bag the Root group was separated and wished by using water than the Fresh weight for root was measured by sensitive electronic balance for all experiments unit .

6 - Main root diameter (mm)

Main root diameter was measured for all experiments unit by (Vernier) in 3cm from the begin of root and the root diameter Summation

was division on seedling number and extracted average.

7 - Root number

Measured by account Root number for each seedling in experiments unit and extracted average.

8 - Main root length (cm)

The length of main root Measured by measuring tape from the connection point to the end of it ,the Main root length Measured for all experiments unit and extracted average.

9 - Root surfs area (cm^2)

It was measured for seedling root in experiments unit by (Digimizer) program ,the extracted root for seedling shoot by digital camera after put the root on white board and draw color line 10 cm length beside the root thin analyze the picture by computer .

Rustles and Discussion

Effects of soil application of Root enhancer and Cytoplus on vegetative growth: Concerning the result in table (1) Height of seedlings, Main stem diameter, vegetative branches number ,Leaf area, were significantly affected by all treatments ,the soil application for Root enhancer with 4 $g.seedling^{-1}$ and Cytoplus with 7 ml. $seedling^{-1}$ gave the best result. The increments on all vegetative Characters for olive seedling due the direct or indirect effect of Root enhancer and Cytoplus ,the Root enhancer gave positive effect because its compound of amino acid ,Humic acid, phosphor, calcium while the Cytoplus mixture of Seaweed Extract with nitrogen ,phosphor, potassium, the significant increase of Height of seedlings may be due adding potassium because of its role in raising apical dominant, which results in the encouragement for both vegetative and root apical buds this contributes to increase branches and root length (7). the phosphor component of important compounds of plant cells ,It is also a component of nucleotides used in plant energy metabolism (such as ATP) and in DNA and RNA (14),Maybe The increments in vegetative branches number due effect of Seaweed Extract it have effective role to increase Lateral branches and the solutes including cytokine used for this purpose (6) these result are in agreement with those obtained by (13). Maybe the positive effect of the Humic acid as it stimulates plant vegetative growth because it contains many nutrients and improving cation exchange and increase availability of nutrients (20).

Effects of soil application of Root enhancer and Cytoplus on Root growth: Concerning the result in table (2) Fresh weight of root, Main root diameter, Root number, Main root length, Root surfs area, were significantly affected by all treatments ,the soil application for Root enhancer with 4 $g.seedling^{-1}$ and Cytoplus with 7 ml. $seedling^{-1}$ gave the best result for the most .

The increments in Main root diameter and Main root length due to calcium used in the synthesis of new cell walls, particularly the middle lamellae that separate newly divided cells. Calcium is also used in the mitotic spindle during cell division (18)Humic acid is a bio-stimulant, which acts as a growth booster by inflicting positive effects on soil and plant characteristics. This may be due to the effect of humic acid in increasing root growth in a manner similar to auxin (8). The increase in Main root length may be due clear effect of Seaweed Extract in the increase of the average of main root length by build chlorophyll which raises the efficiency of photosynthesis then increases the average of growth especially the cell wall and increases root length (4). these result are in agreement with those obtained by (3). The direct effect of amino acids increased enzymatic activity works on speed up the absorption of nutrient mineral that reflect in positive way in plant growth(11)

Table(1) : Effects of soil application of Root enhancer and Cytoplus on vegetative growth.

Treatment	Height of seedlings (cm)		Main stem diameter (mm)		vegetative branches number (branches.plant^{-1})		Leaf area (cm^2)	
	2016	2017	2016	2017	2016	2017	2016	2017
E_0	5.66	5.73	2.019	2.008	6.34	5.75	223.2	250.3
E_2	10.09	9.95	2.740	3.130	1.92	10.83	285.9	312.4
E_3	9.53	9.88	3.045	3.231	14.17	14.33	398.5	479.8
E_4	10.93	11.04	3.242	3.180	13.17	13.42	544.9	861.8
L.S.D 5%	0.111	0.281	0.068	0.132	1.166	0.820	19.99	21.33
C_0	5.98	6.35	2.207	2.212	8.08	7.50	185.1	228.3
C_3	9.82	9.88	2.864	3.067	11.50	12.00	332.5	413.5
C_5	9.93	9.83	2.862	3.283	11.43	11.75	459.4	597.6
C_7	10.48	10.55	3.114	2.988	14.58	13.09	475.5	664.8
L.S.D 5%	0.111	0.281	0.068	0.132	1.166	0.820	19.99	21.33
E_0 C_0	5.20	5.27	1.947	1.827	5.00	4.67	140.3	175.3
E_0 C_3	5.57	5.53	2.030	1.943	5.67	5.33	182.3	205.1
E_0 C_5	5.70	5.80	2.033	2.080	6.67	6.33	227.5	258.2
E_0 C_7	6.17	6.33	2.067	2.183	8.00	6.67	342.8	362.4
E_2 C_0	5.27	5.80	2.690	2.667	5.00	5.33	189.4	208.6
E_2 C_3	11.70	10.37	2.160	3.767	11.33	10.33	248.0	273.2
E_2 C_5	10.70	10.57	3.053	3.020	14.33	12.00	390.4	327.9
E_2 C_7	12.70	13.07	3.057	3.067	17.00	15.67	315.8	439.8
E_3 C_0	6.37	6.93	2.037	2.050	9.00	8.00	227.9	242.6
E_3 C_3	11.33	12.83	3.700	2.720	19.67	16.00	386.0	440.8
E_3 C_5	8.73	7.63	3.270	4.593	10.67	14.00	462.3	559.6
E_3 C_7	11.67	12.13	3.173	3.560	17.33	19.33	517.8	676.1
E_4 C_0	7.07	7.40	2.153	2.303	13.33	12.00	182.8	286.6
E_4 C_3	10.67	10.77	3.567	3.837	9.33	16.33	513.7	735.0
E_4 C_5	14.60	15.33	3.090	3.437	14.03	14.67	757.4	1244.5
E_4 C_7	11.37	10.67	4.157	3.143	16.00	10.67	725.7	1181.0
L.S.D 5%	0.222	0.561	0.137	0.263	2.332	1.641	39.99	42.66

Table(2) : Effects of soil application of Root enhancer and Cytoplus on Root growth .

Treatment	Fresh weight of root (g)		Main root diameter (mm)		Root number		Main root length (cm)		Root surfs area (cm^2)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
E_0	17.31	22.11	1.718	1.422	5.83	7.17	11.64	15.91	155.4	178.2
E_2	25.09	26.48	1.858	15.83	8.75	11.17	17.57	19.43	259.9	273.4
E_3	26.99	30.59	2.023	1.813	9.17	11.92	17.38	22.28	312.9	288.9
E_4	27.84	34.26	2.958	2.275	10.00	19.83	17.29	38.08	320.4	368.6
L.S.D 5%	1.018	0.942	0.270	0.121	0.76	1.04	1.014	2.220	42.46	21.36
C_0	19.89	21.10	1.783	1.367	5.67	8.92	13.20	15.16	150.0	158.9
C_3	25.52	27.16	2.126	1.574	8.92	12.50	17.07	19.90	306.2	268.3
C_5	26.54	30.98	2.278	1.744	9.33	14.25	14.22	24.14	267.7	308.7
C_7	25.27	34.19	2.370	2.408	9.83	14.42	19.41	36.50	324.7	373.2
L.S.D 5%	1.018	0.942	0.270	0.121	0.76	1.04	1.014	2.220	42.46	21.36
E_0 C_0	11.64	13.77	1.542	1.230	4.33	5.33	8.03	13.98	116.8	129.7
E_0 C_3	19.15	21.78	1.613	1.353	5.33	7.00	8.18	15.14	134.4	151.4
E_0 C_5	21.28	24.54	1.797	1.383	6.33	8.00	11.58	15.90	146.9	167.0
E_0 C_7	17.16	28.34	1.918	1.723	7.33	8.33	18.78	18.63	223.4	264.6
E_2 C_0	13.60	17.20	1.722	1.283	4.67	6.00	16.20	16.21	139.3	146.4
E_2 C_3	29.21	26.53	1.787	1.580	9.33	11.00	20.16	14.57	338.6	308.5
E_2 C_5	32.69	28.70	1.872	1.240	10.33	13.00	11.23	20.83	248.8	294.2
E_2 C_7	24.84	33.50	2.50	2.227	10.67	14.67	22.69	26.09	312.8	344.4
E_3 C_0	25.23	25.24	1.857	1.343	5.33	8.00	11.93	11.94	128.6	148.9
E_3 C_3	28.11	29.27	2.033	1.640	10.33	14.00	20.98	15.96	401.4	237.5
E_3 C_5	27.77	33.08	2.049	1.910	11.00	14.00	18.14	21.03	366.6	376.8
E_3 C_7	26.84	34.76	2.153	2.357	10.00	11.67	18.47	40.18	355.1	392.2

$E_4 C_0$	29.08	28.20	2.011	1.610	8.33	16.33	16.62	18.50	215.2	210.4
$E_4 C_3$	25.61	31.07	3.070	1.723	10.67	18.00	18.94	33.91	350.4	375.8
$E_4 C_5$	24.40	37.58	3.393	2.443	9.67	22.00	15.93	38.81	308.3	396.6
$E_4 C_7$	32.25	40.17	3.357	3.323	11.33	23.00	17.68	61.11	407.6	491.6
L.S.D 5%	2.036	1.883	0.541	0.242	1.53	2.08	2.029	4.439	84.92	42.71

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