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EFFECTS OF FOLIAR APPLICATION OF $(NH_4)_2SO_4$ AND ALGA21ST ON VEGETATIVE GROWTH AND CHLOROPHYLL CONTENT OF TWOCULTIVARS SWEET CHERRY *(Prunusavium*L.) TRANSPLANTS.

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ABSTRACT

This study was carried out during 2016 growing season at the lath house of the College of Agriculture, Duhok University, Kurdistan region, to study the effect of foliar application of three concentration of $(NH_4)_2SO_4$(0, 3 and 6 g.l^{-1}) and three concentration of alga21ST (sea weed extract powder high potassium) (0, 1 and 2g.l^{-1}) a on two cultivars of sweet cherry (Eveyloly and shampion) transplant. The results showed that cultivar eveyloly over dominate on cultivar shampion on this traits shoot numbers, leaf area and chlorophyll content. (NH4)2SO4at6g.l^{-1} significantly increased leaf area, shoot number andchlorophyll content.Alga21stat 2 g.l^{-1}significantly increased most studied traits. The interactions between cultivar eveyloly and 6g.l^{-1}$(NH_4)_2SO_4$significantly increased shoot number formed,leaf area, shoot length and chlorophyll content. The dual interaction between cultivar and alga21st significantly increased brunch numbers, leaf area and chlorophyll content and chlorophyll type. And the interactions between $(NH_4)_2SO_4$and alga21st significantly increased most characteristics. The interactions between cultivar, $(NH_4)_2SO_4$and alga21st caused positive significant differences in all vegetative characteristics and chlorophyll type.

KEYWORDS: Sweet cherry transplant, Ammonium sulphate, Seaweeds extract.

1. INTRODUCTION

The *Rosacea* family contains several fruit crop species from the *Malus*, *Prunus*and *Fragaria*genera that are of importance in the human diet. *P. cerasus*L. and *P. avium*L. are two species representing economically important fruit crops. *P. cerasus*L. comprises the sour fruit types (sour cherries), whereas *P. avium* L. comprises sweet cherry fruit trees used for human consumption as well as wild cherry trees (also called Mazzard) that are mainly used for wood (Webster and Looney, 1996). The origin of wild sweet cherry encompasses all of mainland Europe and part of Russia, with the greatest prevalence between the Caspian Sea and Black Sea (Watkins, 1976). Cherries belong to the family of *Rosaceae*, subfamily *Prunoideae*, to the genus Prunus, subgenus Cerasus (Linnaeus, 1753; Ohba, 1992). Sweet cherry is an important industrial fruit crop in the world. According to the Food and Agriculture Organization (USDA, 2014).

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Nitrogen is known to be one of the major elements for plant nutrition and development since it plays an important role as a constituent of all proteins, nucleic acids and enzymes (Nijjar, 1985). Ammonium sulfate is a nitrogen fertilizer that is common throughout the world. Ammonium sulfate, containing nitrogen and sulfur two nutrients, has a nitrogen content of 21% and sulfar 24%.It's also one of the world's important sulfur fertilizers.

Seaweed extracts act as plant growth stimulants. Overall crop performance is improved due to their effect on plant growth, protein, carbohydrate production and prolonged chlorophyll production and photosynthesis (Aitken and Senn, 1965). Algae extract or seaweed extract is containing N, P, K, Ca, Mg, and S as well as Zn, Fe, Mn, Cu, Mo, and Co, some growth regulators, polyamines and vitamins that can be applied to improve nutritional status, vegetative growth, yield and fruit quality in orchards as well as vineyards (Abd El-Moniemand, 2008 and Spinelli*et al.*, 2009).

Jensen (2004) found that spraying seaweed extract containing micro-elements (Co, B, Mo, Zn, Cu, Mn, Ni) as well as macro-elements and the phytohormones auxins, gibberellins and cytokinines, led to increasing root ability for growth and nutrient absorption and increasing stem thickness and strong vegetative and root growth. These extracts enhance growth, yield and uptake of nutrients by the plants. Seaweed extracts are now available commercially under different names (Jeanin*et al.,* 1991). Also Jensen (2004) reported that seaweed extracts contain various micro elements (Cu, Zn, Mo, B, Co) in addition tomacro elements and contain Auxins, Gibberellins and Cytokinins, when sprayon plants lead to increase root growth ability, nutrient elements absorption, andstem thickness and growth significantly.The aim of this study is to determine the effect of $(NH_4)_2SO_4$and Alga21ST on vegetative growth and chlorophyll content of two cultivars of sweet cherry *(Prunus avium*L.) transplants leaves.

2-MATERIALS AND METHODS

This experiment was carried out during 2016growing season, at the lath house /College of Agriculture, Duhok University, on cherry transplant,two cultivar of sweet cherry transplant of two years old of each transplant were chosen and planted on black plasticbag (35*40 cm can hold 15 kg of soil),contain clay and sand (1:1) on February 2016 in the lath house and used trip irrigated. A completely randomized block design (RCBD) was used in this experiment. Experimental unit consisted of eighteen transplants with three replication each replicate have one transplant. The factors undertaken in this study were two cultivar of sweet cherry nursling (shampion and eveyloly),three concentrations of $(NH_4)_2SO_4$(0, 3 and 6 $g.l^{-1}$)and three concentration of Alga21st(0, 1 and 2 $g.l^{-1}$). All plants in this study received regular agricultural and horticultural practices that were usually carried out in the transplant. Ammonium sulfate spraying was applied three times within twenty days intervals, starting at April. Data were analyzed by using S A S program (SAS, 2001)and using Duncan's multiple rang test at 5٪ level.

The following parameters were determined :

1-Leaf Area (cm^2): On the 1st of August, twenty fully expanded leaves were randomly collected from all transplants under the treatment and the leaves were picked up from the third leaf to six leaves of current season terminal shoots (Westwood, 1978). They were put in carton bags to be quickly transferred to the laboratory. Leaf area was taken by area meter AM300 apparatus.

2-New shoot number on transplant were measured after spray. (Rosado *et al.*, 2002).

3-New Shoot length (cm): New shoot length were measured after spray. (El-Sabagh and Mostafa, 2003).

4-Number of new leaf per shoot: Number of new leaves on transplants was counted after spray.

5-Chlorophyll A and B, Total chlorophyll in the Leaves (mg. gm^{-1} fresh weight)

For determining chlorophyll A, B and total chlorophyll, 5-10 leaves from each transplant **(Tattini*et al.*, 1988)**, were taken, mixed, collected in polyethylene bags, and transferred quickly to laboratory. 1gm from each sample was taken and transferred to 30ml ethanol (98%) for 72 hrs. and repeated three times, when chlorophyll pigment was completely extracted into ethanol, the maximum absorbance (A) of the solution was determined spectrophoto-metrically at two waves length (665 and 645 nm). The total chlorophyll content of leaves (mg. gm^{-1} fresh weight) was calculated according to Knudsen method as described in Wintermans and DeMots (1965**)** and shown in the following equations:

mg chl. a/ml solution = (13.7) (A 665 nm) – (5.76) (A 645 nm)

mg chl. b/ml solution = (25.8) (A 645 nm) – (7.6) (A 665 nm)

Total chlorophyll = (chl. a) + (chl. b).

A 665 nm and 645 nm was the reading of Spectrophotometer at 665 and 645 nanometer respectively.

3-3. RESULTS AND DISSCUTION

The results presented in table (1) indicated that there is no significant difference between the two cultivars on new shoots formed per transplant. While spraying transplant by $(NH_4)_2SO_4$ causedsignificant increase in new shoots number formed as compared with control. Whereas, there is no significant difference found when spraying transplant with alga21st.

Concerning the effect of interactions between two factors, the best interactions was observed between eveyloly cultivar and 6 $g.l^{-1}(NH_4)_2SO_4$. As for interactions between cultivar and alga21st

it is no significant difference on this trait. While the maximum interactions between Nitrogen and alga21st was occurred between 6 g.$^{-1}$ $(NH_4)_2SO_4$ with 2 g. alga21st l^{-1}(5.46 shoot / transplant) for new shoot formed.

The superior triple interactions was noticed between eveyloly with 6 g.l^{-1}$(NH_4)_2SO_4$ and 2 g.l^{-1} alga21st (5.44 shoot/transplant) of new shoots number per transplant.

Table (1): Effects of Foliar Application of $(NH_4)_2SO_4$ and Alga21ST on new shoots number of two cultivars of sweet cherry *(Prunusavium*L.) transplants

Cultivars	**$(NH_4)_2SO_4$** (g.l^{-1})	Alga21ST (g.l^{-1})			Cultivar * **$(NH_4)_2SO_4$**	Cultivar
		0	**1**	**2**		
Shampion	**0**	4.26 bc	4.11 c	4.63 a-c	4.33 b	4.87 a
	3	5.11 a-c	5.12 a-c	5.11 a-c	5.11 a	
	6	4.67 a-c	5.38 ab	5.47 a	5.17 a	
Eveyloly	**0**	4.41 a-c	5.22 a-c	4.78 a-c	4.80 ab	5.03 a
	3	5.26 ab	4.89 a-c	5.15 a-c	5.10 a	
	6	4.81 a-c	5.33 ab	5.44 a	5.19 a	
Alga21ST		4.75 a	5.01 a	5.10 a	$(NH_4)_2SO_4$	
Cultivar * Alga21ST	**Shampion**	4.68 a	4.87 a	5.07 a		
	Eveyloly	4.83 a	5.15 a	5.12 a		
$(NH_4)_2SO_4$ * **Alga21ST**	**0**	4.33 c	4.67 bc	4.70 a-c	4.57 b	
	3	5.19 ab	5.00 a-c	5.13 ab	5.11 a	
	6	4.74 a-c	5.35 ab	5.46 a	5.18 a	

*** Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.**

The obtained data in table (2) revealed that eveyloly cultivar was significantly dominated over shampion cultivar in plant length. For the $(NH_4)_2SO_4$treatment, it could be noticed that there is a significant increase in plant length by $(NH_4)_2SO_4$ atconcentrations 3 and 6 g.l^{-1} as compared with the control treatment. But there were no significant differences between the concentrations of alga21st.

For the effect of interactions, the interactions between cultivar and 6 g. l^{-1}$(NH_4)_2SO_4$resulted in highest shoot length. In case of interactions between cultivar and alga21st, showed that the interactions between eveyloly and alga21st at concentration 2 g.l^{-1} gave a significant overtopping in shoot length (23.82 cm). Otherwise, the maximum interaction between $(NH_4)_2SO_4$ and alga21st was noised from spraying of 6 g l^{-1}$(NH_4)_2SO_4$and 2 g. alga21st l^{-1} which recorded 25.44 cm.

The interaction of the three factors had significantly affected the shoot length. The superior treatment noticed between eveyloly with 6 g. l^{-1} $(NH_4)_2SO_4$and 2 g.l^{-1} alga21st measured in 26.06 cm.

Table (2): Effects of Foliar Application of $(NH_4)_2SO_4$ and Alga21ST on shoot length (cm)of the two cultivars of sweet cherry (*Prunusavium*L.) transplants

Cultivars	$(NH_4)_2SO_4$ (g.l-1)	Alga21ST (g.l-1)			Cultivar * $(NH_4)_2SO_4$	Cultivar
		0	1	2		
Shampion	0	15.58 f	18.82 ef	21.31 b-e	18.57 c	21.46 b
	3	22.94 a-d	23.11 a-c	18.99 d-f	21.68 b	
	6	25.15 ab	22.41 a-e	24.81 ab	24.13 a	
Eveyloly	0	20.54 c-e	21.78 b-e	22.07 a-e	21.46 b	23.23 a
	3	23.55 a-c	22.44 a-e	23.34 a-c	23.11 ab	
	6	24.68 ab	24.64 ab	26.06 a	25.13 a	
Alga21ST		22.07 a	22.20 a	22.76 a	$(NH_4)_2SO_4$	
Cultivar * Alga21ST	Shampion	21.22 b	21.45 b	21.70 ab		
	Eveyloly	22.92 ab	22.96 ab	23.82 a		
$(NH_4)_2SO_4$ * Alga21ST	0	18.06 d	20.30 cd	21.69 bc	20.02 c	
	3	23.25 ab	22.78 a-c	21.17 bc	22.40 b	
	6	24.92 a	23.53 ab	25.44 a	24.63 a	

***** Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.

Table (3) indicates that eveyloly cultivar was significantly dominated over the shampion cultivar in plant area. For the effect of $(NH_4)_2SO_4$, the results show that there was an increase in leaf area by increasing the concentration of $(NH_4)_2SO_4$. But there is no significant difference noticed when spraying transplant by alga21st.

In case of interactions, the best interactions were observed between eveyloly and $(NH_4)_2SO_4$ at 6 g.l^{-1}. As for the interactions between cultivar with alga21st the cultivar eveyloly and 2 g.l^{-1} alga21st gave the highest leaf area (60.64 cm^2). Otherwise, the maximum interaction between ammonium sulfate and alga21st was noised from spraying of 6 g. $l^{-1}(NH_4)_2SO_4$and 2 g. alga21st -1 was 64.90 cm^2.

The interaction of the three factors had significantly affected the leaf area. The superior treatment recorded between shampion cultivar with 6 g. l^{-1} $(NH_4)_2SO_4$and 0 g.l-1 alga21st measured in 67.81 cm^2.

Table (3):- Effects of Foliar Application of $(NH_4)_2SO_4$ and Alga21ST on leaf area (cm2) of the two cultivars of sweet cherry (*Prunusavium* L.) transplants

Cultivars	$(NH_4)_2SO_4$ (g.l-1)	Alga21ST(g.l-1)			Cultivar * $(NH_4)_2SO_4$	Cultivar
		0	1	2		
Shampion	0	44.11 g	48.71 fg	49.77 fg	47.53 c	55.65 b
	3	51.93 f	56.24 d-f	55.72 d-f	54.63 b	
	6	67.81 a	63.46 a-c	63.10 a-c	64.79 a	
Eveyloly	0	50.98 fg	52.80 ef	51.86 f	51.88 b	59.75 a
	3	62.40 a-d	59.40 b-e	63.37 a-c	61.72 a	
	6	64.53 ab	65.72 ab	66.70 ab	65.65 a	
Alga21ST		56.96 a	57.72 a	58.42 a	$(NH_4)_2SO_4$	

Cultivar * Alga21ST	**Shampion**	54.62 c	56.14 bc	56.20 bc	
	Eveyloly	59.30 ab	59.31 ab	60.64 a	
$(NH_4)_2SO_4$ * **Alga21ST**	**0**	47.54 c	50.76 c	50.82 c	49.71 c
	3	57.16 b	57.82 b	59.55 b	58.18 b
	6	66.17 a	64.59 a	64.90 a	65.22 a

***** Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.

It can be noted from table (4) that the eveylolyhad significant difference in chlorophyll (a) when compared with shampion cultivar,as for effect of transplant spraying with $(NH_4)_2SO_4$ that led increase in chlorophyll a content when compared with other concentrations. Regarding the effect of alga treatment, there was a significant effect in increasing the chlorophyll a content at concentration 2 $g.l^{-1}$ as compared with the control.

Regarding the dual integration, it was observed that cultivar eveyloly with $(NH_4)_2SO_4$ gave the best chlorophyll (a) content was 25.08 $mg.gm^{-1}$. For the interaction between cultivar and alga21st, it exhibited a significant increase in the chlorophyll a content. Concerning the effect of $(NH_4)_2SO_4$ and alga21st on this trait, it had a significant effect especially at concentration 6 $g.l^{-1}(NH_4)_2SO_4$ with 2 $g.l^{-1}$ alga21st recorded (25.40 $mg.gl^{-1}$).

The effect of triple interaction was significant and the maximum interactions occurred between cultivar eveyloly with 6 g. $l^{-1}(NH_4)_2SO_4$and 2 $g.l^{-1}$ alga21st measured 26.09 $mg.gm^{-1}$in compared with untreated transplanted.

Table (4): Effects of Foliar Application of $(NH_4)_2SO_4$and Alga21ST on leaf chlorophyll (a) content (mg.g-1) of the two cultivars of sweet cherry *(Prunusavium*L.) transplants.

Cultivars	**$(NH_4)_2SO_4$** ($g.l^{-1}$)	Alga21ST($g.l^{-1}$)			Cultivar * **$(NH_4)_2SO_4$**	Cultivar
		0	**1**	**2**		
Shampion	**0**	17.62 f	16.50 f	20.45 de	18.19 d	21.57 b
	3	21.22 c-e	22.54 b-d	23.02 bc	22.26 b	
	6	23.31 bc	24.76 ab	24.72 ab	24.27 a	
Eveyloly	**0**	19.67 e	19.73 e	19.80 e	19.73 c	22.27 a
	3	22.56 b-d	21.84 c-e	21.63 c-e	22.01 b	
	6	23.36 bc	25.81 a	26.09 a	25.08 a	
Alga21ST		21.29 b	21.86 ab	22.62 a	$(NH_4)_2SO_4$	
Cultivar * Alga21ST	**Shampion**	20.72 c	21.27 bc	22.73 a		
	Eveyloly	21.86 a-c	22.46 ab	22.50 ab		
$(NH_4)_2SO_4$ * **Alga21ST**	**0**	18.64 d	18.11 d	20.13 c	18.96 c	
	3	21.89 b	22.19 b	22.32 b	22.13 b	
	6	23.33 b	25.29 a	25.40 a	24.67 a	

***** Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.

The results which obtained from the table (5) showed that there were no significant differences between the both cultivar. The effect of $(NH_4)_2SO_4$ at ($6g.l^{-1}$) was significantly increased chlorophyll (b) content in which the maximum value was 6.60 $mg.g^{-1}$compared with control (5.49 $mg.g^{-1}$). Also there is significant difference illustrate between alga21st concentrations when compared with control.

With regarded to the interactions, the interaction between cultivar and $(NH_4)_2SO_4$ had significant difference in chlorophyll (b) content as compared with untreated. As for interaction between cultivar and alga21st, also was showed significant differs in chlorophyll (b) content, while about interaction between am and alga the maximum interaction was obtained between $(NH_4)_2SO_4$ at 6 $g.l^{-1}$ and alga21st at 2 $g.l^{-1}$.

The superior triple interaction was found between eveyloly with 6 g. $l^{-1}(NH_4)_2SO_4$and 2 $g.l^{-1}$ alga21st which recorded (8.83 $mg.g^{-1}$).

Table (5):- Effects of Foliar Application of $(NH_4)_2SO_4$ and Alga21ST on leaf chlorophyll (b) content (mg.g-1) of the two cultivars of sweet cherry *(Prunusavium*L.) transplants.

Cultivars	$(NH_4)_2SO_4$ (g.l-1)	Alga21ST(g.l-1)			Cultivar * $(NH_4)_2SO_4$	Cultivar
		0	1	2		
Shampion	0	3.77 g	5.65 de	7.14 bc	5.52 cd	5.97 a
	3	3.79 g	6.05 cd	8.02 ab	5.95 cd	
	6	5.17 d-f	6.07 cd	8.07 ab	6.44 ab	
Eveyloly	0	4.22 fg	4.57 e-g	7.61 ab	5.47 d	6.14 a
	3	6.03 cd	6.14 cd	6.39 cd	6.19 a-c	
	6	5.68 de	5.80 de	8.83 a	6.77 a	
Alga21ST		4.78 c	5.71 b	7.68 a	$(NH_4)_2SO_4$	
Cultivar*Alga21st	Shampion	4.24 c	5.92 b	7.74 a		
	Eveyloly	5.31 b	5.50 b	7.61 a		
$(NH_4)_2SO_4$ *Alga21st	0	3.99 f	5.11 ed	7.38 b	5.49 c	
	3	4.91 e	6.09 c	7.21 b	6.07 b	
	6	5.43 c-e	5.93 dc	8.45 a	6.60 a	

*Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.

Data presented in table (6) shows eveyloly caused significant increase in total chlorophyll 28.42 $mg.g^{-1}$ as compared with shampion 27.54 $mg.g^{-1}$. The results showed that spraying Nitrogen caused positive significant differences in total chlorophyll content. For the alga21st effect, it also clear that significantly increased total chlorophyll content.

In case of interaction between two factors (cultivar and $(NH_4)_2SO_4$), the highest value was recorded in eveyloly and spraying $(NH_4)_2SO_4$ as at 6 $g.l^{-1}$. The interactions between cultivar and alga21st recorded the maximum total chlorophyll 30.47 $mg.gm^{-1}$ in shampion with 2 $g.l^{-1}$ alga21st. Results were obtained from interactions between $(NH_4)_2SO_4$ and alga21st and the superiority was for spraying 6g. $l^{-1}(NH_4)_2SO_4$with 2 $g.l^{-1}$ alga21st.

Data in table (6) also showed that the interactions between the three factors increased total chlorophyll eveyloly spray with 6 g. $l^{-1}(NH_4)_2SO_4$and 2 $g.l^{-1}$ alga21st had the highest value 34.91$mg.g^{-1}$ as compared with other treatments.

Table (6): Effects of Foliar Application of Nitrogen and Alga21ST on leaf total chlorophyll content ($mg.g^{-1}$) of the two cultivars of sweet cherry *(Prunusavium*L.) transplants.

Cultivars	$(NH_4)_2SO_4$(g.l-1)	Alga21ST(g.l-1)			Cultivar * $(NH_4)_2SO_4$	Cultivar
		0	1	2		
Shampion	0	21.38 h	22.15 gh	27.60 e	23.71 d	
	3	25.01 f	28.59 de	31.04 bc	28.21 b	27.54 b
	6	28.49 de	30.83 b-c	32.79 b	30.70 a	
Eveyloly	0	23.89 fg	24.30 fg	27.40 e	25.20 c	28.42 a
	3	28.59 de	27.98 e	28.02 e	28.20 b	
	6	29.03 c-e	31.61 b	34.91 a	31.85 a	
Alga21ST		26.07 c	27.57 b	30.29 a	$(NH_4)_2SO_4$	
Cultivar * Alga21ST	Shampion	24.96 c	27.19 b	30.47 a		
	Eveyloly	27.17 b	27.96 b	30.11 a		
$(NH_4)_2SO_4$ * Alga21ST	0	22.64 f	23.22 f	27.50 de	24.45 c	
	3	26.80 e	28.28 c-e	29.53 c	28.20 b	
	6	28.76 cd	31.22 b	33.85 a	31.28 a	

*Mean with a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple at 0.05 level.

The effect of cultivar on the vegetative growth, chlorophyll content, was shows cultivar eveyloly in table (2,3, 4 and 6) which significantly dominant (new shoot number, shoot length, leaf number, leaf area, chlorophyll a, b and total chlorophyll content).This may be ascribed to the differences in genotype characteristics for root growth, nutrient absorption efficiency and photosynthesis process efficiency **(**Eryüce and Püskülcü, 1995 and Jorda, *et a.l,* 1999).Also, the response of different cultivars to the local environmental condition according to the genetic variation between the cultivars (Graham *et al.*, 1996; Nielsen and Lovell, 2000 and Khalifa,2007).Eveyloly had significantly affected the chlorophyll content by increasing shoots length, number of leaf per shoots, increasing of single leaf area may lead to raising the chlorophyll content. Similar results were found by Al-A'areji and Hamadany (2006); Jime´nez*et al.,* (2007) and Krishkov (2007).

The effect of ammonium sulfate is fertilizers is one of the most expensive. However, the benefits are due to the substantial amount of it is consumed. A small amount of ammonium sulfate is produced as a byproduct of the steel industry and the lack of it comes out (Malakoti, 2008). Data in table (1,2,3,4,5 and 6) agree with Taylor (1970) studied Effect of three levels of nitrogen (0, 70.37 and 211.11 g. $transplant^{-1}$) on peach transplant one year old, note that the level of N 70.37 g increased the number of branches compared to non-fertilized transplant, either N level 211.11 g. has significantly reduced the number and length of branches. Zebari (2003) found when studying the effect of nitrogen fertilization in the growth of seedlings of apples and pears and growing grafts, nitrogen fertilization has increased significantly in the stem length and diameter of the it and the number of shoots formed on the main stem of the seedlings, while shoot length were not significantly affected by nitrogen fertilization in seedlings of both species (apples and pear). Bataha (2005) found when studying the effect of three levels of nitrogen (300, 450 and 500 and 600 g) in the vegetative growth of trees pear Cocia variety 16 years, found there was a significant increase in the length of the branches and the area of the leaves and weight with an increase level of nitrogen fertilizer added.

Increasing of leaf area ,and total chlorophyll content, in which the alga21st spraying has a positive role in the availability and concentration of nutrient elements in the leaves, in which the translocation of stored photo-assimilates in the leaves are increased subsequently reflect in high accumulation of dry matter(Haruna, 2011), or may be attributed to a higher nutritional uptake mainly by greater expansion of root system due to increased supply of photosynthetic productions in the leaves, attributed to presence of plant growth regulators, which are produced by increased

activity of microbes such as fungi, bacteria, yeasts, actinomycetes and algae (Aranconet *al.*, 2004). Fertilized with organic and non-organic gave the higher leaf content of chlorophylls (A, B).

The effect of seaweed extract on the vegetative growth parameters, clearly shows that the concentration (2 $g.l^{-1}$) of alga21st was caused significantly increasing the number of new shoot formed, shoots length, single leaf area, chlorophyll a, b and total chlorophyll, this may be due to the role of alga21st in encouraging plant growth by acting on mechanisms involved in: cell respiration, photosynthesis, protein synthesis, water and nutrient uptake, enzyme activities**.** (Chen *et al.,* 2004 and Ali *et al.,* 2007).

4- CONCLUSION

From these results, it can be concluded that eveyloly, Nitrogen and alga21st seaweed extract leads to the enhancement of vegetative growth and chlorophyll content. Furthermore the dual interactions among the tested factors were a positive effect in improving these traits.

5-REFERENCES

-Abd El-Moniem, E and Abd-Allah, A. S. E. (2008). Effect of green algae cells extract as foliar spray on vegetative growth, yield and berries quality of superior grapevines. Am. Euras. J. Agric. And Environ. Sci. 4 (4): 427-433.

-Aitken, J. and T. Senn. (1965). Seaweed products as a fertilizer and soil conditioner, Botanica, Marin8, 144.

-Al-Aa'raji, J. M.A. and M.S.H Al-Hamadany. (2006). Effect of Foliar Application Iron and Gibberellic Acid on Some Vegetative Growth Parameters of Three Cultivars of Olive Transplant. J. Kerbela Univ.

-Ali, V. K.; H. Çelik; M. A. Turan and B. B. Aºýk.(2007). Effects of Soil and Foliar Applications of Humic Substances on Dry Weight and Mineral Nutrients Uptake of Wheat under Calcareous Soil Condition.1uludag University, agricultural faculty, department of soil science and plant nutrition. ust. J. basic & appl. sci., 3(2): 1266-1273.

-Arancon, N. Q.; C. A. Edwards; P. Bierman; J.D. Metzger, S. Lee and C. Welch. (2004). Effects of Vermi composts on Growth and Marketable Fruits of Field-Grown Tomatoes, Peppers and Strawberries.Pedobiol. 47: 731-735.

-Bataha, M. (2005). Effect of varying rates of nitrogenous fertilizer in the growth of pears.Damascus University Journal of Agricultural Sciences, 21.Cocia cultivar.

-Chen Y.; M. DE Nobili and T. Aviad. (2004). Stimulatory Effects of Humic Substances on Plant Growth. In: Soil Organic Matter in Sustainable Agriculture (Magdoff F., Weil R.R., Eds). CRC Press, NY, USA. pp. 103-129.

-Cooke, J.E.K. and M. Weih. (2005). Nitrogen storage and seasonal nitrogen cycling in Populus: bridging molecular physiology and ecophysiology. New Phytol. 167:19–30.

-Eryüce, N. and G. Püskülcü. (1995). Mineral Nutrition and Some Quality Characteristics of the MainOlive Cultivars of Western Turkey. International Symposium on Quality of Fruit and Vegetables: Influence of Pre- and Post-Harvest Factors and Technology, Chania, Greece, 20-24 Sep. 1993. ActaHortic. 379: 193-198.

-Graham, J.; R. J.McNicol, and J. W. McNicol. (1996). Acomparison of Methods for the Estimation of Genetic Diversity in Strawberry Cultivars 93: 402 – 406.

-Haruna, I. M. (2011). Dry Matter Partitioning and Grain Yield Potential in Sesame (*SesamumIndicum*L.) As Influenced By Poultry Manure, Nitrogen And Phosphorus At Samaru, Nigeria. J. Agric.7 Technol. 7(6): 1571-1577.

-Jeanin, J. C. Lescure and J. F. Morot-Gaudry. (1991).The effects of aqueous seaweed sprays on the growth of maize, Bot. Mar., 34, 469-473.

-Jensen, E. (2004) Seaweed; Fact or Fanc. From the Organic Broadcaster, Published by Moses the Midwest Organic and Sustainable Education. From the Broad Caster. 12(3): 164-170.

-Jime´nez, S.; J. Pinochet; Y. Gogorcena, J.A. Betra´n and M.A. Moreno. (2007). Influence of DifferentVigor Cherry Rootstocks on Leaves and Shoots Mineral Composition./Sci. Horticulturae 112: 73–79.

-Jorda, O; L. Durarte; F. Calouroand A. Silva. (1999). Relationship Between Fruit and Foliar Mineral Levels In Twenty Olive

Cultivars Grown In Portugal.Acta Hort. (ISHI) 286: 267-270.

-Khalifa, G. H. F.H. (2007). Effect of Planting Date and on Growth and Yield Characteristics of TwoVariety of Strawberry (*Fragaria x ananassa*Duch), M.Sc. Thesis, Agriculture and Forest College, Mosul University, Ministry of Higher Education and Sci. Research. Iraq.

-Krishkov, E. (2007) Impact of Preplanting Fertilization on the Leaf Nutrient Content of Young SourCherry trees, Hort. Agrobot. Cluj,Volume 35, Issue 2.

Linnaeus, C. (1753). Species Planetarium, 1st Edn. Holmiae.

-Malakouti, M.j. (2008). The Effect of Micronutrients in Ensuring Efficient Use of Macronutrients. Turk J Agric For. 32. 215-220.

-Millard, P. and M.F. Proe. (1991). Leaf demography and the seasonal internal cycling of nitrogen insycamore (*Acer pseudoplatanus* L.) seedlings in relation to nitrogen supply.New Phytol.117:587–596.

-Millard, P., A. Hester, R. Wendler and G. Baillie. (2001). Interspecific defoliation responses of trees depend on sites of winter nitrogen storage. Funct. Ecol. 15:535–543.

-Neilsen, G. H.; E.J. Hogue; T. Forge; D. Neilsen and S.Kuchta. (2007). Nutritional Implications of Biosolisandpaper Mulch Applications in High Density Apple Orchards.Can. J. Plant Sci. 87, 551.

- Nielsen, J. A. and P. H. Lovell. (2000). Value of Morphological Characters for Cultivar Identification in Strawberry (*Fragaria x Ananassa*).New Zealand J. Crop and Hortic. Sci. 28:89-96.

-Nijjar, G. S. (1985). Nutrition of fruit trees.MrsUsha Raj Kumar, Kalyani, New Delhi, India, pp.306-308.

-Ohba, H. (1992). Japanese cherry trees under the genus Cerasus (*Rosaceae*). J. Japan. Bot. 67: 276-281.

-SAS, SAS/STAT, (2001). "User's Guide for Personal Computer".Release 6.12.SAS Institute Inc, Cary, NC.U S A.

-Spinelli, F.; Giovanni, F.; Massimo, N.; Mattia, S. and Guglielmo, C. (2009).Perspectives on the use of a sea weed extract to moderate the negative effects of alternate bearing in apple trees. J. Hort. Sci. Biotechn.17 (1): 131-137.

-Taylor, B.K. (1970). Influence of split and non-split applications of nitro chalk, superphosphate andsheep manure in factorial combination, on growth of one-year-old peach trees. J. Hort.Sci., 45:57-68.

-United States Department of Agriculture (USDA).(2014). Agricultural Research Service. Plants Profile for *Prunusavium* (sweet cherry). [Online Database].http://www.ars-grin.gov/cgi-in/npgs/html/taxon.pl.

-Warren, C.R., E. Dreyer and A. Adams. (2003). Photosynthesis–Rubisco relationships in foliage of *Pinussylvestris* in response to nitrogen supply and the proposed role of Rubisco and amino acids asnitrogen stores. Trees 17:359–366.

-Watkins, R. (1976). Cherry, Plum, peach, apricot and almond.*Prunus ssp*. In: Evolution of crop plantsN.W. Simmonds (ed.) Longman, London.

-Webster, A.D. and N.E. Looney (Eds). (1996). Cherries: Crop Physiology, Production and Uses. CAB International.

-Zebari, S. M. K. (2003). Effect of nitrogen and cayenne in the growth of apple seedlings Seeds and graftsdeveloping on them.Master degree, Faculty of Agriculture and Forestry, University of Mosul, Iraq.

کارتیکرناخارنابەلگی ب نایتروجینی و ئەلجی **21** ست ل سەرشینبووناکەسکاتی و هەبوونا‌کلوروفیلی د دوو جورین نەمامین(**PrunusaviumL.**)کەرەزارەش

پوختە

ئەڤفەکولینەهـــــاتیە بـــــجە ئیناندوەرزێشـــــینبوونێدە ســـــالا **2016** دە ,دێخـــــانیی داری دەسەربکولیژاجاندنێزانکویادهوکهەریماکوردستاناعیراقێلەسەردوو جـورین ژ نەماینکەرەزا شـرین, بـو دیارکرناکارتیکرنارەشـاندانابەلگی ب کبریتـات ئەلئەلەمنیومیبسـی ص ریـژا **(0, 3 و 6)** و سَـیریژین **(** هیرکێبەرمایکێنگیاییندەریاییت ب هێز ب بپوتاسـییومی**) (0,1** و **2** گـرام\لتـر**).**, لەسـەردوو جـورین فیقییـــی کـــورزا شـــرین. ئەنجامـــا هـــاتن دیارکرنکوجوریًایفیلولازیدەبوونەکابەرچافـــدیارکر ل سەرجوردێشـــامبیوونی د ڤـــان ســـاخلەتاندا. ژمـــارا جەقـــان, دریژاهیـــاجەقی, قەبـــارابەلگی و هەبوونا‌کلورفیلی. کبریتـاتینئەلەمنیومی ب ریـژێن **6**گـرام بـو هەرلیترەکـێ بـو ئەکەریزیـدەبونەکامەزن د قەبارەیبەلگیـــدە, و ژمـــارا جەقانوهەبوونـــاکلوروفیلی. ســـەبارەنئەلجی **21** ســـت ب ریـــژا **2**گرامبـــو هەرلیترەکـــێ د گەل **6** گـــرام بـــو هەرلیترەکـــێ ژ کبریتـــاتینئەمونیومی ب شـــیوەکێبەرجافایقیلولی. ســـەبارەنتیکەکەل گـــریم د نـــافبەراهەردوو جـــوران دەزیدەبوونەکابەرجافـــدیارکردێ ژمـــارا جەقـــان, قەبارێبەلگیودریژاهیـــاجەقی و هەبوونـــاکلوروفیلی. ســـەبارەنتیکەلکرناجووتدنافبەراهەردووحوراندە و بەرمایکینگیاینـــدەریایی بـــو ئەکەریزیـــدەبوونەکابەرجاف د ژمـــارا جەقینشـــینبوویی, قەبـــارێبەلگی , دریژاهیـــاجەقی, هەبوونـــاکلورفیلی و جوریکلـــوروفیلی. نێکەلکرنادنافبەراکبریتـــاتینئەمونیومی و ئەلجـــی **21**ســـت زیدەبووبشـــیوەکێبەرجاف د همـــان ســـاخلەتین هـــاتین خانـــدن, تیکەلبوونـــدنافبەرا جـــوران و کبریتانینئەمنیومیئوبەرمایکینگیایندەریاییجیزازینبەرجافـــدیارکرن د هەمانساخلەتێشینبوونا‌کوســـکاتی و کلورفیلی و جوریوێ.

تاثیرالرشالورقیمنالنیتروجینو**Alga21ST**علىالنموالخضریومحتوىالکلوروفیلفیصنفینمن شتلات الکرزالحلو **(*Prunusavium* L.).**

الخلاصة

أجریت هذه الدراسة خلال موسم النمو في عام **2016** في الظلة الخشبیة التابع لکلیة الزراعة**/**جامعة دهوك **/**إقلیم کردستان ، لدراسة تأثیر التسمید الورقي کبریتات الأمونیوم بثلاث تراکیز **(0** ، **3** و **6**

غم/لتر) وثلاثة تراكيز من **alga21ST** (مسحوق مستخلص الأعشاب البحرية عالية البوتاسيوم) (**0** ، **1** و **2** غم/لتر) على صنفين من الكرز الحلو. وأظهرت النتائج أن الصنف **eveyloly** قد تفوق معنويا على الصنف شامبيون في هذه الصفات. عدد الفروع ، طول الفرع، المساحة الورقة و محتوى الكلوروفيل. كبريتات الأمونيوم بتركيز **6**غم.لتر$^{-1}$ ادى الى زيادة كبيرة في مساحة الورقية ، وعدد الفروع ومحتوى الكلوروفيل.اما **Alga21st** بتركيز **2**غم.لتر$^{-1}$ ادى الى زيادة معنويا في معظم الصفات المدروسة. اما التداخل الثنائي بين الصنف**eveyloly** و **6** غم.لتر$^{-1}$ من كبريتات الأمونيوم بشكل ملحوظ ادت الى زيادة المعنوية في عدد الفروع المتكونة ، مساحة الورقة ، طول الفرع ومحتوى الكلوروفيل. إن التداخل الثنائي بين الصنف والمستخلص البحري ادى الى زيادة معنويا في عدد الفروع المتكونة ، مساحة الورقة ، طول الفرع ومحتوى الكلوروفيل ونوع الكلوروفيل. والتداخل بين كبريتات الأمونيوم و **alga21st** زادت بشكل ملحوظ في معظم الصفات المدروسة. وتسببت التداخل بين الصن, سلفات الامونيوم والمستخلص البحري في اختلافات معنوية موجبة في جميع صفات النمو الخضري ونوع الكلوروفيل ومحتواها.