Foliar Application of Liquid Organic Nitrogen and Iron Chelate Response of Almond (*Prunus Amigdalus* L.) Seedling Growth

Shlier Mahmood **Shiraz Abdulkhaliq Abdullah**

College of Agricultural Engineering Sciences/ University of Salahalddin

Horticulture Department

shlier.taha@su.edu.krd shiraz.abdullah@su.edu.krd

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Abstract

The research included study of the effect of foliar spray of three concentrations (0, 30 and 60 mg.l^{-1}) of chelated Iron (Fe – EDDHA) containing (6% iron) applied one time on April 25 and three concentrations (0, 2 and 4 ml.L^{-1}) of liquid organic nitrogen applied three time on April 22, May 7 and May 22, 2019 on the root and some vegetative growth and some vegetative characteristics of Almond (*Prunus amygdalus*) seedlings grown in black poly ethylene bags filled with loamy soil. A complete randomized block design (R.C.B.D) with three replicates each consisted of 5 seedlings was used to carry out this research. Thus, the number of seedlings in this study was 135 seedlings. Data collected at the end of September 2019 indicated that the spraying of chelated iron and organic liquid nitrogen fertilizer gave a significant increase in the number of leaves, stem diameter, shoot length, fresh and dry weight of leaves, leaf area, root length, Root fresh and root weight when compared with the control.

Keywords: Almond, Liquid Organic Nitrogen, Iron Chelate, Bitter Almond

استجابة نمو شتلات اللوز (*Prunus Amigdalus* L.) لرش الورقي النيتروجيني العضوي السائل و الحديد المخلبي

شلير محمود طه **شيراز عبدالخالق عبدالله**

كلية علوم الهندسة الزراعية – جامعة صلاح الدين

shlier.taha@su.edu.krd shiraz.abdullah@su.edu.krd

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الملخص

تهدف الدراسة لبيان تأثير الرش الورقي بثلاثة مستويات لكل من الحديد المخلبي (صفر، 30 و 60 ملغلتر-1) على شكل (Fe - EDDHA)يحتوي على (6٪ من الحديد) مرة واحدة عند (4/25) و سماد النتروجين السائل العضوي(0 , 2 و 4 مل.لتر-1) و كررت معاملات الرش للشتلات ثلاث مرات في الموسم و بفترة 15 يوما بين رشة و أخرى و كانت مواعيد الرش بتاريخ (4/22 ، 5/7 ، 2019/5/22) في تحسين مواصفات النمو الخضري والجذري لشتلات اللوز البذرية المحلية المرة . . أتبع في تنفيذ هذه الدراسة تصميم القطاعات العشوائية الكاملة بتجربة عامليه بسيطة بعاملين هما الحديد المخلبي و سماد السائل النتروجيني العضوي و بثلاثة مستويات لكل منهما (R.C.B.D) و بثلاثة مكررات و باستخدام 5 شتلات لكل وحدة تجريبية و بذلك يكون عدد الشتلات في هذه الدراسة 135 شتلة. أظهرت النتائج المتحصل عليها في نهاية شهر أيلول من الموسم 2019 تشير إلى أن رش الحديد المخلبي و سماد السائل النتروجيني العضوي أعطت زيادة معنوية في كل عدد الأوراق ، قطر الساق، ارتفاع الشتلات ، الوزن الطري و الجاف للأوراق ، مساحة الورق، طويل الجذر ، الوزن الطري الجذري والوزن الجذري استنادا إلى معاملة المقارنة.

الكلمات الدالة: اللوز، النتروجين السائل العضوي، الحديد المخلبي، اللوز المر

Introduction

The almond, (*Prunus amygdalus* L.) is a countenance of the nut fruits, because the edible part is the seed. Almond is also categorizen with the stone fruits. The outer layer, involving of an outer exocarp, or skin, and mesocarp, fleshy in the residuum of the stone fruits, is thick, leathery, gray-green coat, called the hull. Inside the hull is a woody endocarp hard shell. Inside the shell is the edible seed, commonly called a nut. After the fruit matures, the hull cracks and split up from the shell, and an abscission layer forms between the stem and the fruit so that the fruit can fall from the tree (Esfahlan *et al.*, 2010).

The wild form of almonds grows in parts of the Levant, signifying that almonds must first have been cultivated in this region (Abdulrahman, 2013). Almond agriculture brings a highly important part in the agricultural economy of different regions, like arid, semi-arid and different climate zone countries. (Rieger, 2001 and Mitra *et al*., 1994). Wild separation almond species, considered by a great amount of morphological and topographical forms, it has varied throughout Southwest and Central Asia from Turkey and Syria (Iraqi Kurdistan, Turkey and Syria). The most important countries famous for the cultivation of almonds are United States of America, Spain, Iran, Morocco, Italy, Australia and Algeria (Mayi, 2016 and Denisov, 1988).

(Dawood, 2012) was found that foliar application at the different concentrations of sea force (as source of nitrogen) on almond seedlings at all rates significantly increased vegetative and root growth (Abdulrahman, 2013). Nitrogen supports the absorption and utilization of other nutrients including potassium, phosphorous and controls the overall growth of plants, also, biomass accumulation, photosynthetic traits and root development of plants as affected by nitrogen-fertilization. (Parvaneh *et al*.,2011 and Taha, 2016). In almonds, nitrogen is a main and important nutrient which is needed in large amounts (Muhammad *et al*., 2018), it contributes in cell division and growth of young tissues and increases photosynthesis and plant growth (Blevins, 1989 and Carranca *et al*., 2018).

Mayi (2007) observed that foliar spray of humic acid at different levels led to increasing root ability for growth and nutrient absorption and humic acid foliar application at $50 mg.l^{-1}$ increasing significantly led to increase shoot length, stem diameter, shoot length, number of leaves h, fresh and dry weight of leaves, stem dimeter, root fresh and dry weight and root length.Taha (2016) results indicated that the application of nitrogen at different concentrations significantly increased seedling high, leaves number, leaves area, stem diameter, leaves fresh and dry weight, stem diameter, root fresh and dry weight and root length in pistachio seedlings.

Soil is considered the essential source of iron nutrient as most of Kurdistan soils contains large quantities of this element, so far, the attainable quantities for assimilation by the plant may be less and do not meet the plant needs (Mayi, 2007). The soil contains a high percentage of calcium, which, leads to an increase in the acidity of the soil (Al-Zubaidi, 1989), and this led to lowering iron obtainability in the soils, aside from, the continual tree's elimination of iron from the soil. thus, the foliar spray of iron to get better growth of plants is needed. (Tsipouridis, *et al.*,2006). One of the most iron fertilizers used is the iron chelate as the chelating compounds are water soluble and to be accessible to plants, iron chelates are more easily translocated within the plant easy absorption and transportation by the plant as they do not decompose by soil, the Fe-EDDHA compound of iron chelating in common use in many plants (Mahmoud, 2006). Iron is considered an important element in plant biochemical reactions which can lead to raising the growth representation of plants (Zarghamnejad *et al*., 2015). Fe has many of significant roles in plants, counting photosynthesis, respiration and chlorophyll synthesis (Eskandari, 2011).

Likewise, iron led to activity of many metabolic passages and enzymes. Also, iron is considered to play an important role in growth by activating cell division. During growth, all plants need supply of iron in order to continue, because it is an immobile nutrient element and not translocated from the lower leaves to top leaves. Many plants are exposed to iron lack, which leads to decrease in growth, quantity and quality of the crop (Rout and Sahoo, 2015).

Taha (2016) stated that the foliar sprays of cheated iron, increased vegetative growth (number of leaves, stem diameter, shoot length, leaf fresh weight, leaf dry weight, leaf dry matter percentage, leaf area, root length, root fresh weight and root dry weight) as compared with the control, many researchers have intentinally that the effect of iron on the growth vegetative of trees and seedlings of pear (Awad and Atawia, 1995) and peach (Al-Bamarny *et al*., 2010). Iron (Fe) is one of the most intended elements in the environment, the reason for this, is due to its low dissolve in soil water, especially in alkaline soils, which contain a high percentage of calcium. (Rout and Sahoo, 2015). Iron appears an important role in the composition of chlorophyll and in formation of many different cytochromes which contribute in the respiration operation and also in the formation of many enzymes that control some diverse purposes in the plant metabolism Mayi, 2016 and Tsipouridis *et al.*,2006

Therefore, the aims of this research are to find out the most appropriate level of Liquid Organic Nitrogen and Chelated Iron used as spray application for finest vegetative and root growth and to influence of almond seedlings.

Materials and methods

This experiment was conducted at the Collage at Agricultur Engineering Sciences field, Salahaddin University during 2019 – 2020 to study the effect of foliar application of liquid organic nitrogen and iron chelate response on almond seedling (*prunus amygdalus* L.) cv. local bitter seedling almond, to test the effect of different levels (0, 30 and 60 mg.L^{-1}) of iron as iron chelate (Fe – EDDHA) comprising of (6% of iron) applied one time at 25/4 and three levels of liquid organic nitrogen (0 , 2 and 4ml.L^{-1}) applied three times at 22/4, 7/5, 22/5 /20119. A complete randomized block design (RCBD) with three replicates each consisting of 5 seedlings was used to perform this study (Al-Rawi and Khalafalla 2000). At the end of the experimental periods the field Vegetative and Root growth measurements were recorded. Data were statistically analyzed using the (SAS, 2000) software to study the effect depending on the following general linear model:

$$Y_{ijk} = \mu + A_i + B_j + AB_{ij} + e_{ijk}$$

Where:

Y_{ijk}: is the value of jth observation

µ: over all mean

A_i: the effect of Liquid Organic Nitrogen

B_j: the effect of Iron chelates

AB_{ij}: the interaction

e_{ijk}: The value of the experimental error for that experimental unit

Duncan Multiple Rang Test within SAS used for comparison between means within each group factors (Duncan, 1955; SAS institute,2000).

Vegetative and Root growth measurements

At mid-August the canopy of three seedlings is collected randomly from all treatments, later that, the plants were placed in polyethylene bags and relocated to the laboratory, the seedlings were cut at the soil surface and roots were separated from the soil by washing roots onto sieves then manual separating roots from remaining soils, after that these parameters were taken: -

1. Number of Leaves / Seedling: The number of leaves was studied in three seedlings randomly selected from each treatment, after that taken mean leaves number per seedling.

2. Leaf area (cm^2): Leaf area was measured non-destructively using the easy leaf area mobile app (Samsung android A70 plus 2018 mobile).

3. Vegetative fresh, dry weight (g. plant-1) and Dry Weight Percentage (%): After the fresh leaves and shoots weight intention, the leaves and shoots were put in an electric oven at 70˚c into weight fixing (Al-Sahaf, 1989). Vegetative dry matter (%) was studied as follows:

$$\text{Vegetative dry matter (\%)} = \frac{\text{Vegetative dry weigh}}{\text{Vegetative fresh weigh}} \times 100$$

4. Shoot length: the measurement shoot length of almond seedling was taken by ruler.

5. Stem Diameter (cm): It was measured at 5cm above soil surface using Vernier

That's in the table

6. Root fresh and dry weight (g. plant^{-1}) After the fresh weight of roots studied, the roots were put in an electric oven at 70˚C into weight fixing. **(Torki-Harchegani, *et al.*, 2016).**

7. Root length: the measurement root length of almond seedling was taken by ruler.

Results and Discussion

1-Number Leaves per Seedling: Results in table (1) showed that all almond seedlings that were treated with Liquid Organic Nitrogen significantly increased Leaves Number per Seedling when related with the control seedlings which gave (60.0) when the seedlings which treated with 4 ml.L^{-1} Liquid Organic Nitrogen provided the maximum plant length (93.33). Addition of Iron Cheleate (30 and 60) mg. L^{-1}showed significantly superior over control treatment, amount (80.67), (75.78) whereas the lowest value (69.78) was observed at control. The interaction of Liquid Organic Nitrogen and Iron Cheleate at (4 ml.L^{-1} + 30 mg.L^{-1}) was significantly increased Leaves Number per Seedling compared to other treatments. The control (0.0 ml. L^{-1} + 0.0 mg. L^{-1}) showed minimum value Leaves Number per Seedling during the interaction study, a higher value is recorded (108.0) but lower weight is shown (55.0).

Treatments		**Iron Chelate**			**Liquid Organic Nitrogen Average**
	ml.L^{-1}	**0.0**	**30mg.L^{-1}**	**60mg.L^{-1}**	
Liquid Organic Nitrogen	**0**	55.0 f	61.0 f	64.0 ef	60.00 c
	2 ml.L^{-1}	72.33 de	73.0 cde.	76.33 cd	73.89 b
	4 ml.L^{-1}	82.0 bc	108.0 a	87.0 a	93.33 a
Iron Chelate Average		69.78 b	80.67 a	75.78 a	

Table (1) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on No. of Leaves of Almond seedling

Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level

2-Leaf Area (cm^2): In Table (2) it is observed that the spray application of Liquid Organic Nitrogen was significantly influenced on leaf area of almond seedlings which treated with 4ml.L^{-1} provided the maximum value of leaf area (12.56 cm^2). It is noticeable from the similar table that significantly effected of Iron Chelate on leaf area especially at (60 g.L^{-1}) which gave the higher effect (9.40 cm^2) as compared to the control (7.94 cm^2). The interactions between Liquid Organic Nitrogen and Iron Chelate effected significantly on the leaf area, the interactions treatment of (4ml.L^{-1} Liquid Organic Nitrogen) + (30, 60 mg.L^{-1} Iron Chelate) seemed to be the maximum functional treatment, as it gave the maximum value (10.56 cm^2), while the control recoded the lowest value (5. 42 cm^2)

Treatments	Iron Chelate				Mean of Liquid Organic Nitrogen
	ml.L-1	0.0	30mg.L-1	60mg.L-1	
Liquid Organic Nitrogen	0	5.42 d	5.82 d	8.11 c	6.44 c
	2 ml.L-1	8.15 bc	8.43 bc	9.52 b	8.70 b
	4 ml.L-1	10.26a	10.56 a	10.56 a	10.46 a
Mean of Iron Chelate		7. 94 c	8.27 b	9.40 a	

Table (2) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on Leaf Area (cm^2) of Almond seedling

Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level.

3-Leaf Fresh Weight(gm): Table (3) appear that the almond seedling when treated with 4 $ml.L^{-1}$ Liquid Organic Nitrogen significantly improved in leaf fresh weight when compared with other treatment which gave the highest value (12.99 g). Concerning Iron chelate treatment, 60 $mg.L^{-1}$ gave the highest significant increase in leaf fresh weight was noted (12.67 g). The interaction between the Liquid Organic Nitrogen with Iron Chelate, exposed that treatment of 4 $ml.L^{-1}$ Liquid Organic Nitrogen and 60 $mg.L^{-1}$attained the maximum significant rate (14 .9 g).

Treatments	Iron Chelate				Mean of Liquid Organic Nitrogen
	ml.L-1	0.0	30mg.L-1	60mg.L-1	
Liquid Organic Nitrogen	0	9.6 c	10.23 bc	11.2 bc	10.34 b
	2 ml.L-1	11.6 abc	12.2 abc.	11.9 abc	11.9 a
	4 ml.L-1	10.47 bc	13.6 ab	14 .9 a	12.99 a
Mean of Iron Cheleate		10.56 b	12.01 ab	12.67 a	

Table (3) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on leave Fresh Weight(g) of Almond seedling Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level.

4- Leaf dry weight (g): Table (4) exposed that foliar application Liquid Organic Nitrogen at (2 and 4) $ml.L^{-1}$ significantly increased leaves dry weight and the values were (3.03 and 3.267) g when compared with control treatment. Iron chelate 60 $mg.L^{-1}$ gave the highest significant value (3.17 g), but there was significant difference with 30m $g.L^{-1}$. The interaction between the Liquid Organic Nitrogen with Iron chelate, showed that treatment of 4 $ml.L^{-1}$ Liquid Organic Nitrogen and 60m $g.L^{-1}$ Iron chelate gave the highest significant value.

5- leave dry matter percentage: In table (5) regarding Liquid Organic Nitrogen, 2 $ml.L^{-1}$ gave the highest significant value 26.56%, but there was no significant different with 4$ml.L^{-1}$. But Iron Chelate had no significant effect on this trait. Also, in same table Results showed that almond seedlings when treated with interaction of Liquid Organic Nitrogen and Iron Chelate at (2 $ml.L^{-1}$ Liquid Organic Nitrogen + 30 $mg.L^{-1}$ Iron chelate) significantly gave the highest value (29.44%).

6- Stem Diameter (cm): Table (6) is shown the application of Liquid Organic Nitrogen significantly affected on stem diameter of almond seedlings, the maximum value (0.96) at 4 ml.L^{-1} as compared with other treatments, and the lowest value (0.88 cm) was recorded in control. It is obvious from the same table that there was significant effect of Iron Chelate on stem diameter 2 g.L^{-1} which gave the higher effect (0.95 cm) as compared to the control (0.88 cm). The interactions between Liquid Organic Nitrogen and Iron Chelate effected significantly on the leaf area, the interactions treatment of (4ml.L^{-1} Liquid Organic Nitrogen + 30 ml.L^{-1} Iron Chelate) appeared to be the most operative treatment, as it gave the maximum value (0.99 cm), while control recoded the lowest value (0.84 cm).

7-- Shoot length (cm): In table (7) observation its almond seedlings when treated with 4 ml.L^{-1} Liquid Organic Nitrogen significantly improved shoot length (62.5 cm) while compared for other seedlings, and the lowest value (40.03 cm), which recorded in control. In same table detects that the almond seedling when treated with Iron Chelate (30 and 60) mg.L^{-1} significantly increased when compared with control which gave the highest value (56.23and 57.54 cm) and (44.24 cm) respectively. Results concerning shoot length parameter revealed that was affected significantly in interaction of Liquid Organic Nitrogen and Iron Chelate. Whereas, control of this interaction was giving the lowest value (37.6) but the higher value (68.4 cm) was found at (4 ml.L^{-1}) Liquid Organic Nitrogen and 60 mg. L^{-1} Iron Chelate).

Treatments	**Iron Chelate**				**Mean of Liquid Organic Nitrog**
	ml.L^{-1}	**0.0**	**30 mg.L^{-1}**	**60 mg.L^{-1}**	
Liquid Organic Nitrogen	**0**	2.0 d	2.3 cd	2.7 bcd	2.333 b
	2 ml.L^{-1}	2.6 bcd	3.2 ab.	3.3 ab	3.033 a
	4 ml.L^{-1}	2.9 abc	3.4 ab	3.5 a	3.267 a
Mean of Iron Chelate		2.5 b	2.97 a	3.17 a	

Table (4) Foliar Application of Liquid Organic Nitrogen and Iron Cheleate on leaves dry Weight (g) of Almond seedling

Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level

Treatments	**Iron Chelate**				**Mean of Liquid Organic Nitrogen**
	ml.L^{-1}	**0.0**	**30mg.L^{-1}**	**60mg.L^{-1}**	
Liquid Organic Nitrogen	**0**	22.26 c	22.99 c	24.27 c	23.17 b
	2 ml.L^{-1}	22.81 c	29.44 a	27.44 ab	26.56 a
	4 ml.L^{-1}	28.16 a	25.41 bc	24.06 c	25.88 a
Mean of Iron Cheleate		24.41 a	25.95 a	25.26 a	

Table (5) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on leaf dry matter percentage of Almond seedling Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level.

Treatments	**Iron Chelate**				**Mean of Liquid Organic Nitrogen**
	ml.L^{-1}	**0.0**	**30mg.L^{-1}**	**60mg.L^{-1}**	
Liquid Organic Nitrogen	**0**	37.6 d	40.1 d	42.4 d	40.03 c
	2 ml.L^{-1}	42.8 d	61.8 b.	61.8 b	55.5 b
	4 ml.L^{-1}	52.3 c	66.8 ab	68.4 a	62.5 a
Mean of Iron Chelate		44.24 b	56.23 a	57.54 a	

Table (6) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on stem diameter (cm) of Almond seedling Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level

8- Root fresh weight (g): Spraying of Liquid Organic Nitrogen was significantly illustrated at the highest root fresh weight (4 ml.L^{-1}).The maximum value is (6.27 g) in comparison with the control. Addition of Iron Chelate at (60 mg.L^{-1}) showed significantly superior over treatments, amount (5.87 g) of root fresh weight, whereas the minimum score (5. 0 g) was showed at control. Results showed that the interaction of Liquid Organic Nitrogen and Iron Chelate at (4 ml.L^{-1} Liquid Organic Nitrogen+ (60 mg.L^{-1} Iron Chelate) was significantly increased root fresh weight compared to other treatments recorded the lowest value (18.8 cm).

9- Root dry weight (g): The results obtained in table (9) observed that the addition of Liquid Organic Nitrogen alone was positively affected of root dry weight. The peak value (3.23 g) was observed at 4ml.L^{-1}, while the lowest value (2.37 g) was noted at the control. Also, table (9), indicates that Iron Chelate application induced positive effect on root dry weight, Higher score (3.16 g) was showed at the second concentration, while the lowest value (2.54 g) was observed at control. Shortly, Liquid Organic Nitrogen + Iron Chelate treatment showed superiority in this concern. However, the interaction between the two nutrients factors showed that Liquid Organic Nitrogen interaction with Iron Chelate enhanced root dry weight as compared with the control. The maximum content (3.57 g) was found at 4ml.L^{-1} Liquid Organic Nitrogen and 60 mg.L^{-1} Iron Chelate, in conversely the lowest value (2.2 g) was recorded at the control.

Treatments	Iron Chelate				Mean of Liquid Organic Nitrogen
	ml.L^{-1}	0.0	30mg.L^{-1}	60mg.L^{-1}	
Liquid Organic Nitrogen	0	4.1 d	4.8 cd	4.8 cd	4.57 c
	2 ml.L^{-1}	5.1 bcd	5.4bcd	6.1 abc	5.53 b
	4 ml.L^{-1}	5.8 abc	6.3 ab	6.7 a	6.27 a
Mean of Iron Chelate		5.0 b	5.5 ab	5.87 a	

Table (7) Foliar Application of Liquid Organic Nitrogen and Iron Chelate on Shoot length (cm) of Almond seedlings.
Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level.

Treatments	Iron Cheleate				Mean of Liquid Organic Nitrogen
	ml.L^{-1}	0.0	30mg.L^{-1}	60mg.L^{-1}	
Liquid Organ Nitrogen	0	2.2 d	2.3 cd	2.6 bcd	2.37 b
	2 ml L^{-1}	2.6 bcd	3.1 abc	3.3 ab	3 .0 a
	4 ml.L^{-1}	2.83 bcd	3.3 ab	3.57 a	3.23 a
Mean of Iron Chelate		2.54 b	2.9 ab	3.16 a	

Table (8) Foliar Application of Liquid Organic Nitrogen and Iron Cheleate on Root fresh weight (g) of Almond seedling Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level.

Treatments	Iron Chelate				Mean of Liquid Organic Nitrogen
	ml.L^{-1}	0.0	30mg.L^{-1}	60mg.L^{-1}	
Liquid Organic Nitrogen	0	18.8 g	18.8 g	22.6 f	20.07 c
	2 ml.L^{-1}	26.8 e	32. 67 d	40.4 c	33.29 b
	4 ml.L^{-1}	42.3 bc	45.1 b	48.5 a	45.3 a
Mean of Iron Chelate		29.3 c	32.19 b	37. 17 a	

Table (9) Foliar Application of Liquid Organic Nitrogen and Iron Cheleate on Root Dry weight (g)of Almond seedling .Means of each factor and their interactions followed by the same letter's are not significantly different

from each other, according to Duncan's multiple ranges test at 5% level.

10- Root length(cm)Table (10) signal it almond seedlings which treated with 4ml.L^{-1} Liquid Organic Nitrogen significantly improved root length (45.3cm) when compared with different seedlings, and the minimum value (20.07 cm) was noted in the control. Same table shown that spraying Iron Chelate on almond seedlings was found significantly increase in root length, the maximum value (37.17 cm) was obtained from (60 mg. L^{-1}) that it was different as compared to control. The interactions between Liquid Organic Nitrogen and Iron Chelate affected significantly on the root length, the interactions treatment of (4 ml.L^{-1} Liquid Organic Nitrogen + 60 mg. L^{-1} Iron Chelate) seemed to be the maximum effective treatment, as it gave the maximum value (48.5cm), while the control.

Table (10) Foliar Application of Liquid Organic Nitrogen and Iron Cheleate on Root length(cm) of Almond seedling

Means of each factor and their interactions followed by the same letter's are not significantly different from each other, according to Duncan's multiple ranges test at 5% level

The real aim of this study was to check the influence of various levels, usage of Liquid Organic Nitrogen and Iron Chelate on vegetable growth and development of Almond seedlings. The tests exposed that more treatments used at various levels of two spray fertilizers positively affected most morphological characteristics exposed that more treatments applied at different level of foliar two fertilizers positively affected most morphological characteristics (leaves number, leaf area, leave fresh weight, leave dry weight, dry matter percentage, steam diameter, shoot length, root fresh weight, root dry weight, Root length) of Almond seedlings. These results were supported by those of (Dawood, 2012) (Hardim *et al.*, 2012). Nitrogen in activating photosynthesis process it led to a significant increase in(leaves number and leaf area), that, it lead to an increase in the products of photosynthesis, and in turn, an increase in plant growth, nitrogen is involved in constituent of nucleic acids (DNA, RNA) and enzymes, which stimulates the vegetative growth of treated seedlings, for its role in the formation and revitalization of work chlorophyll pigment by entering into the porphyrin compounds that make up chlorophyll, raises leaves, stem, vegetative growth and development (Dawood, 2012) (Hardim *et al.*, 2012). the cause of rising vegetative growth specifications as a result of Liquid Organic Nitrogen spray might due to the function of nitrogen in activating growth characters and those function in an beneficent the nutrient uptake by roots, is one of the major element of all the amino acids in plant structures which are the building blocks of plant proteins, important in the growth and development of vital plant tissues and cells like the cell membranes and chlorophyll, which chlorophyll being an organelle essential for carbohydrate formation by photosynthesis and a substance that gives the plant their green color (Carranca *et al*., 2018).It promotes the uptake and application of other nutrients including potassium, phosphorous and controls the overall development of plant, also, Biomass Accumulation, Photosynthetic Traits and Root Development of plants as Affected by Nitrogen-Fertilization. (Blevins, 1989 andTaha, 2016).

Iron is a notable element in plant biochemical responses which can rise the performance of crops (Zarghamnejad et al., 2015). Fe has many important roles within plants, including photosynthesis, respiration and chlorophyll synthesis, the iron has a very necessary role in the chlorophyll construction through involvement in coproporphyrinogen oxidase, this enzyme is most necessary for the profane metabolism and for á–aminolaevulinic acid, the essential substance of chlorophyll synthesis (Barker and Stratton, 2015) and (Eskandari, 2011). Additionally, numerous of metabolic trails and enzymes are activated by iron. It is recommended to play an important function in development by activating cell division. All plants duty a continuous amount of iron during growing because it is not translocated from the established to developing leaves and is categorized as an immobile element. Many plants، suffers from Iron deficiency which is the result of its influences on reduced nutritious value and low production (Rout and Sahoo, 2015). Therefore, the foliar application and Sn of iron to improve growth of plants is required. (Tsipouridis *et al*.,2006). One of the most iron fertilizers used is the iron chelate as the chelating compounds are water soluble and to be accessible to plants, iron chelates are more easily translocated within the plant easy absorption and transportation by the plant as they do not decompose by soil, the Fe-EDDHA compound of iron chelating in common use in many plants (Mahmoud, 2006). the main source of iron nutrient is soil, most of Kurdistan soils contain major amount of this element, so far, the available amounts for assimilation by the plant may be minimum and do not meet the plant requests (Mayi, 2007). The soil contains a high percentage of calcium and so high pH (Al-Zubaidi, 1989), and this led for lowering iron availability in the soils, in addition usually the removal of iron from the soil as a result of the growth and development of trees. therefore, the spray use of iron to improvement growth of plants is essential. (Tsipouridis *et al.*,2006). One of the most iron fertilizers used is the iron chelate as the chelating compounds are water soluble and to be accessible to plants, iron chelates are more easily translocate within the plant easy absorption and transportation by the plant as they do not decompose by soil, the Fe-EDDHA compound of iron chelating in common use in many plants (Mahmoud, 2006).

conclusion

Almond cultivation plays an essential role in the agricultural economy of arid, Semi-arid and temperate zone countries. When establishing almond orchards going to be specific, the selection of rootstock and scion species should be specified according to its location features to reach the good and best amount of the production. So, their characteristisc and deficiency should be measured in directive to select the greatest choices. The root organization during its optimum acclimation to soil conditions is efficient in a good production, constant yields are less clear and so are fewer recognized and most morphological property of scion like flowering time, need for pollinations and trait of growth and fruit quality have been calculated from rootstock type and additionally this offered a use for bitter kernels. as well, concerning the increase of fruit in the orchard, rootstock organizes this action during removing growth balance in partiality of reproductive growth. The justification for using fertilizers is reflected primarily in the production of high-quality seedlings. Regarding to the application of Liquid Organic Nitrogen and Iron Chelate had the highest values in most of the chemical properties than control. According to the results we suggest using of Liquid Organic Nitrogen and Iron Chelate, as well as, using other levels of these fertilizers for the speed of growing seedlings, reaching the budding stage and after the budding process, then transferred to the permanent orchard.

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