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EFFECT OF SOME LIQUID ORGANIC FERTILIZERS ON THE GROWTH OF SEEDLINGS OF APRICOT

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Abstract

This study was conducted during the 2019-2020 growing season in the field of the Department of Horticulture and Gardening Engineering/College of Agriculture and Forestry/University of Mosul, to find the effect of fertilizing with three types of liquid organic fertilizers (humic acid, Tikamine Max and Neutergreen and four levels for each type) 2, 4, 6 and 8 ml Seedling^{-1}) In addition to the comparison treatment (not adding) in some of the vegetative growth characteristics and nutrient content of the grafted apricot seedlings Zaginia cultivar, the implementation of the study followed the design of complete randomized sectors (RCBD) with three replicates and by using three seedlings per experimental unit, organic fertilizers were added Mentioned above and Transactions twice in the season (beginning and end of April), the results confirmed that all studied traits were significantly affected by the addition of liquid organic fertilizers, whereby fertilizing with 8 ml. Liters^{-1} of Neutergreen fertilizer gave the highest averages of (increase in height and diameter of seedlings, nitrogen ratio and content Iron in leaves), and fertilizing with 4 ml.Liters^{-1} of Neutergreen fertilizer gave the highest chlorophyll content and phosphorous ratio in the leaves, while fertilizing with 6 ml.Liters^{-1} and 4 ml.Liters^{-1} of Tikamine Max fertilizer resulted in Significant increase in potassium and zinc content in the leaves respectively.

Key words: seedlings: apricots: fertilizing: liquid organic fertilizers

Introduction

Apricot (*Prunus armeniaca* L.) returns to the Rosaceae family, a fruit of the temperate regions and the Mediterranean basin, and its original homeland is likely to be western and central Asia as the Romans called the Armenian apple, and this is why some scholars believed that the origin of apricots was from Armenia (Punia, 2007). The zaggenia variety is considered to be one of the local varieties of apricots and elected by the General Horticulture Directorate of the village of Zaghnia in Diyala Governorate (Al-A'areji, 2017). Since soils in Iraq contain lime, many nutrients are not available for the plant, so fruit seedlings, including apricots, are required for fertilization, especially organic fertilizers, and they are extremely important for fruit orchards, along with their nutritional benefit as they supply the soil and then fruit plants with many essential nutrients. It increases its readiness, as it produces many organic acids when decomposed, which works to reduce pH of the soil, thus facilitating the absorption of nutrients by the roots. The organic matter also contributes to increasing the vital activity within the root-spreading area because it contains some pain. Useful Krobat stimulant and vital processes (AlcaAntara *et al.,* 2016 and Adiaha, 2017).

Organic compounds are some of the alternatives that impact a number of physiological processes in the plant. It is also one of the important methods to supply plants with basic needs, without bringing any negative impact to the environment (AL-Taey and AL-Musawi, 2019; AL-Taey, *et al.,* 2019).

Liquid organic fertilizers are one of the most important clean alternatives to the nutrients needed by fruit plants because they contain some organic acids such as humic and fulvic acids and amino acids and other materials that are characterized by cheap price and ease of use and low pollution to the environment and agricultural products and their contribution to improving the physical, chemical and biological characteristics of the soil, which is reflected Positively in the growth and production of different plants (Alwan and Al-Hamdani, 2012 and Alalaf, 2019), Also, these substances are absorbed by the roots of the plant

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and liberate their ions easily and move quickly so that the plant can benefit from it by participating in the physiological processes, which provides the plant with the energy necessary to absorb it, especially in the critical stages of its growth (Hassan *et al.,* 2010; Hasan, *et al.,* 2019) and these fertilizers also contain organic nitrogen that works on Increasing the building of chlorophyll and organic carbon that includes the synthesis of all organic compounds and a large number of amino acids that increase the activity of various physiological activities in the plant, directly or indirectly, which is reflected in improving the efficiency of photosynthesis and improving the characteristics of vegetative growth (Singh, 1999 Nag *et al.,* 2001).

This study aims to improve the vegetative growth and nutritional status of grafted apricot seedlings by fertilizing them with some liquid organic fertilizers for the purpose of planting them in the orchard and early entry into the fruiting stage.

Materials and Methods

The research was carried out during the 2019-2020 growing season in the field of the Department of Horticulture and Gardening Engineering/College of Agriculture and Forestry/University of Mosul to study the effect of some liquid organic fertilizers on the growth of apricot seedlings *Prunus armeniaca* L. "Zaginia" cultivar. The seedlings of apricots and grafted on the origin of homogenous and apricot apricots were elected approximately two years old (height 60-80 cm and the main stem diameter at a height of 5 cm from the soil surface 6-8 mm) planted in 10 kg plastic bins filled with mixture soil and shown some of their physical and chemical characteristics in the table 1. The seedlings were fertilized with three types of liquid organic fertilizers (Humic acid, Tikamine max, and Neutregrine) and at four levels for each type (2, 4, 6 and 8 ml. Seedlings^{-1}) in addition to the comparison treatment (not added) and table 2 shows the contents of the liquid organic fertilizers used in this studying. Follow in the implementation of the study, designing the complete random sectors of global experiments (RCBD) in a simple experiment with three replicates and three seedlings per experimental unit, so that the number of seedlings used in the study is 117 seedlings and the mentioned organic fertilizers were added according to the transactions twice in the season, the first at the beginning of April and the second at the end April around the main stem of the seedlings with a depth of 5 cm in the soil and add each fertilizer by 100 ml of each concentration and according to the parameters and return the soil to its place. At the end of the growing season, the leaf content of chlorophyll (SPAD unit) was measured using the SPAD digital scale device - 502 meter (Felixloh and Bassuk, 2000), the increase in seedlings height (cm) from the surface of the bag soil to the top of the stem and the increase in the main stem diameter of the seedlings (mm) by foot at a height of 10 cm from the soil surface by measuring both the height of the seedlings height and the diameter of the main stem before Conducting the experiment and at the end of the experiment and record the difference between the two readings, The concentrations of nutrients in the leaves (nitrogen%) were measured using the Microkjeldahl device described by (Bhargava and Raghupathi, 1999) and phosphorous% by Spectrophotometer and potassium% according to the method proposed by Horneck and Hanson (1998) and iron and zinc (mg. $^{-1}$) By using the Atomic Absorption Spectro photometer, the results were statistically analyzed according to the design

Table 1: Some physical and chemical properties of field soils.

Character	measruing unit	the value
Electrical conductivity	Deci Siemens M^{-1}	0.595
pH		7.50
Organic matter	Gkg^{-1}	9.50
$CaCO_3$	Gkg^{-1}	175.00
Bicarbonate	Gkg^{-1}	0.195
Sand	Gkg^{-1}	247.40
Clay	Gkg^{-1}	211.60
Silt	Gkg^{-1}	541.00
The tissue		Alluvial mixture
Total nitrogen	j	0.0105
Ready phosphorous	Mg-kg $^{-1}$	16.92
Ready potassium	Mg-kg	133.39

Soil analyzed in the central laboratory / College of Agriculture and Forestry/University of Mosul.

Table 2: The contents of the dissolved organic fertilizers used in the study.

Nutergreen		Tecamin max		Humic acid	
(%)	Component	(%)	Component	(%)	Component
8.00	Organic Nitrogen	18.4	Total amino acids	12.00	Humic acids
23.50	Organic carbon	14.20	Free amino acids of vegetable	6.00	Fulvic acids
39.40	Organic matter	9.5	N		
50.00	Amino acids				

Table 3: Effect of adding liquid organic fertilizers on the increase in the height and diameter of seedlings and the leaf content of chlorophyll for apricot seedlings Zaginia cultivar.

Treatments	Concentrations (Ml.seedling^{-1})	Studied traits		
		The increase in the height of seedlings	The increase in the diameter of seedlings	The leaf content of chlorophyll
Control	zero	23.16e	2.05c	23.13f
Humic acid	2	35.43d	3.20b	30.53e
	4	33.90d	3.25b	33.05c 5 e
	6	37.77c d	3.70ab	31.21e
	8	39.18b 5 d	3.85ab	32.52d e
Tikamine Max	2	36.51c d	3.44ab	34.65b 5 d
	4	46.47a	3.85ab	33.47c 5 e
	6	38.33c d	4.05a	35.92a 5 c
	8	38.17c d	3.71ab	32.60d e
Neutregrine	2	42.6a 5 c	3.70ab	33.41c 5 e
	4	45.40ab	4.03a	37.62a
	6	42.50a 5 c	3.84ab	35.17a 5 d
	8	47.71a	4.10a	37.23ab

* The mean of the coefficients of interference followed by different letters indicate that there are significant differences between them at the 5% probability level according to the Dunkin Polynomial test.

Table 4: Effect of liquid organic fertilizer application on nitrogen, phosphorous and potassium content and iron and zinc content in apricot seedlings of Zaginia cultivar.

Treatments	Concentrations (Ml.seedling^{-1})	Studied traits				
		N %	N %	K %	Feppm	Znppm
Control	Zero	1.60b	0.143e	1.58c	100.97b	30.59c
Humic acid	2	1.87a	0.196b 5 d	2.00ab	126.67ab	32.66bc
	4	1.84a	0.216a 5 c	1.96ab	130.29a	34.03bc
	6	1.83a	0.196b 5 d	1.99ab	126.18ab	42.70ab
	8	1.91a	0.203b 5 d	1.87ab	135.63a	42.03ab
Tikamine Max	2	1.88a	0.200b 5 d	1.84b	111.97ab	40.07a 5 c
	4	2.01a	0.196b 5 d	2.00ab	119.92ab	46.32a
	6	1.93a	0.223ab	2.07a	129.56a	45.33a
	8	1.85a	0.176c 5 e	1.90ab	113.81ab	39.78a 5 c
Neutregrine	2	1.87a	0.186b 5 d	1.99ab	116.43ab	38.85a 5 c
	4	1.80a	0.246a	2.04ab	135.54a	42.63ab
	6	1.88a	0.180c 5 e	1.84b	134.57a	40.00a 5 c
	8	2.02a	0.173d e	1.93ab	138.34 a	40.03a 5 c

* The mean of the coefficients of interference followed by different letters indicate that there are significant differences between them at the 5% probability level according to the Dunkin Polynomial test.

used by using the computer according to the SAS program (SAS / STAT, 2001).

Results and discussion

The effect of adding liquid organic fertilizers on the increase in the height and diameter of seedlings and the leaf content of chlorophyll for apricot seedlings Zaginia cultivar: The addition of liquid organic fertilizer resulted in Neutregrine at a concentration of 8 ml. L^{-1} and Tikamine Max at a concentration of 4 ml. L^{-1} to a significant increase in the increase in the height of the main stem of the seedlings compared to other treatments table 3, as the highest averages of this characteristic for these two treatments were 47.71 and 46.47 cm, respectively, compared to the comparison treatment that gave the lowest leg height of 23.16 cm, It also shows from the results of the same table that the highest moral value of the increase in stem diameter was the result of the addition of organic fertilizers Neutregrine in the concentrations 4 and 8 ml. L^{-1} and treatment of 6 ml. L^{-1} of fertilizer Tikamine Max measured by the comparison treatment (which gave less leg diameter), and it is noted from the results of the same table that the addition of the concentration is 4 ml. L^{-1} of fertilizer for Neutregrine for grafted apricot seedlings resulted in a significant increase in chlorophyll in the leaves in the form of units of SPAD, as the value of this characteristic for this treatment reached 37.62 SPAD, while the comparison treatment recorded the lowest value of this quality reached 23.13 SPAD.

The effect of adding liquid organic fertilizers on the ratio of nitrogen, phosphorous, potassium and iron and zinc content in the leaves of apricot seedlings Zaginia variety: From the results shown in Table 4, it is inferred that the addition of all liquid organic fertilizers at all levels to apricot seedlings led to a significant increase in the percentage of nitrogen in the leaves compared to By comparison treatment, the highest mean of this trait was when adding Neutregrine fertilizer at a concentration of 8 ml. L^{-1}, also recorded a 4 ml addition treatment. L^{-1} of the same fertilizer has the highest percentage of phosphorus in the leaves and most of the treatments were significantly superior, especially the comparison treatment, while it was shown that the addition of organic fertilizer Tikamine Max at a concentration of 6 ml. L^{-1} gave the highest significant value for the percentage of potassium, but it was only superior

to some treatments, especially the comparison treatment. The treatment of adding fertilizer Neutregrine was recorded at a concentration of 8 ml. L^{-1} was the highest significant value of leaf content from the Iron Age, but it was only superior to the comparison treatment, and the addition treatment resulted in a 4 ml. L^{-1} concentration of fertilizer Tikamine Max to significantly increase the leaf content of zinc compared to other treatments, especially the comparison treatment. The results of this study were consistent with the results of a number of researchers who found that adding liquid organic fertilizers to a number of fruit plants leads to an increase in the content of plant tissues from nitrogen, phosphorus, potassium, iron, and zinc and an improvement in the characteristics of vegetative growth as in the results of Al-Aarji *et al.,* (2014) and Alalaf and Shayal Alalam (2014) for fig seedlings, Al-Aarji and Beirut (2017) for apricot and Alalaf (2019) for local orange seedlings and Salem *et al.,* (2020) for Sour orange seedlings.

It is clear from the results that the addition of two fertilizer Neutregrine fertilizers in concentrations (4 and 8 ml. $Liters^{-1}$) and Tikamine max fertilizers in concentrations (4 and 6 ml. L^{-1}) caused a significant increase in the characteristics of vegetative growth and the nutrient content in the leaves of the seedlings of the Zaggenia variety compared to a treatment By comparison, this may be due to the fact that these fertilizers contain good levels of organic and amino acids that improve the physical, chemical, and biological properties of the soil, as they make the soil more fragile and crumbly, thus improving soil aeration, which improves the growth and spread of roots and thus increases their ability to absorb nutrients from the soil. , As that It does not increase the readiness and absorption of nutrients from the soil and thus increase its concentration in the leaves table 4, some of which contribute to building chlorophyll such as nitrogen, phosphorus, potassium, iron, etc., in addition to activating many important enzymes in this process and thus increasing the speed and results of photosynthesis in the plant They are carbohydrates that can be used in various vegetative growth processes (Alwan and Al-Hamdani, 2012), Also, the composting of Neutregrine and Tikamine max contains amino acids table 2 increases the building of chlorophyll table 3 in order for nitrogen to enter the amino acid composition that contributes to building this dye, and amino acids are included in the synthesis of many practical enzymes Photosynthesis, which provides the materials necessary for growth, and the superiority of Neutregrine fertilizer concentrations may be due to an increase in the ratio of organic nitrogen and dissolved in water, organic matter and amino acids in this fertilizer, which leads to increased vegetative growth of seedlings (Al-Araji *et al.,* 2014).

Conclusions

We conclude from the results of this study that fertilization of grafted apricot seedlings of Zaggenia cultivar with Neutregrine fertilizer or Tikamine max fertilizer gave the best results compared to the comparison treatment for that and under similar conditions it is preferable to use these two fertilizers from liquid organic fertilizers and the aforementioned concentrations for obtaining well-grown seedlings for the purpose of planting them in the orchard and early in Entering the fruiting stage.

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References

Adiaha, M.S. (2017). The Role of Organic Matter in Tropical Soil Productivity. *World Scientific News,* **86(1):** 1-66.

Al-A'areji, J.M., A.H. Alalaf and A.T. ShayalAlalam (2014). The response of loquat (Eriopotrya japonica lindi) seedlings to different of sources of liquid organig fertilizers application. *Journal Of Kirkuk University For Agricultural Sciences,* **5(2):** 11-19.

Al-A'areji, J.M. and J.S. Beirut (2017). The effect of adding some liquid organic fertilizers and compound fertilizer NPK on the growth and fruit of Apricot trees "*Prunusarmeniaca* L." Royal cultivar. *Kirkuk University Journal of Agricultural Sciences,* **8(4):** 7-24.

Al-A'areji, J.M. (2017). The technology of deciduous fruits is propagated - cultivated - nurtured and produced (2). Al-Wadhah Publishing House. Oman. Jordan.

Alalaf, A.H. and A.T. ShayalAlalam (2014). Effect of organic fertilizer nutrgreen and salicylic acid foliar spray on growth of Fig transplants CvsAswadDiala and White Adritic. *Mesopotamia J. of Agric,* **42(1):** 21–30.

Alalaf, A.H. (2019). Effect of budding date and Chemical, Organic and bio fertilization on budding success of local orange and subsequent growth of the seedlings. Ph.D. Thesis. Hort. and Landscape Design Dept. College of Agric. &Forestry, Mosul Univ. Iraq.

AlcaAntara, B., R. Mary, B. Almudena and L. Francisco (2016). Liquid Organic Fertilizers for Sustainable Agriculture: Nutrient Uptake of Organic versus Mineral Fertilizers in Citrus Trees. *PLoS ONE,* **11(10):** 0161619. doi:10.1371/journal.

Al-Taey D.K.A. and Z.J.M. Al-Musawi (2019). Effect of Nano-fertilizers, salicylic acid and organic matter in growth and

yield of rocket (*Eruca sativa* Mill) under Salt stress. *International Journal of Botany Studies,* **4(3):** 77-81.

Al-AL-Taey D.K.A., M.J.H. Al-Shareefi, A.K. MijweL, A.R. Al-Tawaha and A.M. Al-Tawaha (2019). The beneficial effects of bio-fertilizers combinations and humic acid. *Bulgarian Journal of Agricultural Science,* **25(5):** 2019.

Alwan, J.M. and I.A. Al-Hamdani (2012). Organic farming and the environment. Ibn Al Atheer House for Printing and Publishing. University of Al Mosul. Iraq.

Bhargava, B.S. and H.B. Raghupathi (1999). Analysis of plant materials for macro and micronutrients. (49-82). In Tandon, H.L.S. (eds). Methods of analysis of soils, plants, water and fertilizers. Binng Printers L- 4, LajpatNagor New Delhi, 110024.

Felixloh, J.G. and N. Bassuk (2000). Use of the Minolta SPAD - 502 to determine chlorophyll level in *Ficusbenjamina* L. and populous deltoids Marsh leaf tissue. *Horticulture Science,* **35(3):** 423.

Hasan, A.M., T.J. Mohamed Ali and D.K.A. Al-Taey (2019). Effects of Winter Foliar Fertilizing and Plant Growth Promoters on Element and Carbohydrate Contents on the Shoot of Navel Orange Sapling. *International Journal of Fruit Science*, **19(1):** 1-10.

Hassan, H.S., S.M. Sarrwy and E.A. Mostafa (2010). Effect of foliar spraing with liquid organic fertilizer, some micronutrients and gibberellins on leaf mineral content, fruit set, yield and fruit quality of "Hollywood" plum trees. *Agricultur Biology Journal North America,* **1(4):** 638-643.

Horneck, D.A. and D. Hanson (1998). Determination of potassium and sodium by flame emission spectrophotometry. 153-155. In: Kalra, Y. P. (ed.). Handbook of Reference Methods for Plant Analysis. Soil and Plant Analysis Council, Inc. CRC Press. FL. USA. 287.

Lateef, M.A.A., A.M. Noori, R.A. Al-Qadi and M.H. Muhsin (2018). The role of nitrogen and boron fertilizers on growth and yield in pomegranate (*Punicagranatum* L.). *Plant Archives,* **18(2):** 1957–1960.

Nag, S., K. Saha and M.A.Choudhuri (2001). Role of auxin and polyamines in Adventitious root formation in relation to changes in compounds involved in rooting. *J. Plant Growth Regulation,* **20:** 182-194.

Nagham S.S., A.H. Alalaf and A.T. ShayalAlalam (2020). Response of Sour Orange seedlings to application of gibberellic acid and nutrigreen Fertilizer. *Future J. Agric.,* **1:** 1-5.

Noori, A.M., M.A.A. Lateef and M.H. Muhsin (2018). Effect of phosphorus and gibberellic acid on growth and yield of grape (*Vitisvinifera* L.). *Research on Crops,* **19(4):** 643–648. https://doi.org/10.31830/2348-7542.2018.0001.41.

Punia, M.S. (2007). Wild apricot . national oil seeds and vegetable oils development board. Ministry of Agriculture, Govt. of India.

SAS. (2001). SAS/STAT Users Guide for personal computers, SASInstitute Inc, Cary, N.C. USA.

Singh, B.K. (1999). Plant Amino Acids : Biochemistry and Biotechnology. Marcel Dekker Inc.; New York, U.S.A., 648.