EFEECT OF FERTILIZING WITH ORGANIC O-DAP AND SPRAYING WITH MORINGA LEAVES EXTRACT ON THE FRUIT CHARACTERISTICS AND YIELD OF SHARABI AND ANNA APPLE VARIETIES.

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Abstract
This study was carried out in one of the private orchards in the Hashimiya district in Babil Governorate during the 2023 growing seasons to study the effect of the organic O-DAP fertilizer and Moringa leaves extract on the vegetative and chemical characteristics of the Sharabi variety and the Anna variety at 5 years of age. The treatments in the experiment were distributed using a split-split plot design system with three replicates in a randomized complete block design (R.C.B.D). The main plots were represented by the varieties, symbolized by A (the Anna variety and the Sharabi variety), and the spraying with Moringa leaves extract, symbolized by M, as the secondary plots. - Plots at three concentrations (0, 150, 200) ml l-1 and the addition of O-DAP fertilizer, symbolized by D in the sub-sub-plots, and at three levels (0, 500, 1000) gm tree-1, as 27 trees were selected. Each variety is homogeneous in growth and age, and the total of both varieties is 54 trees, and each replicate contains 18 treatments. Each treatment was repeated three times, with one tree per experimental unit (2×3×3). The results were as follows.

Introduction:

The apple Malus domestica Borkh, which belongs to the genus Malus and the (Rosaceae), is one of the trees of the temperate region whose cultivation extends from China and Japan in the east to North America in the west. It is believed that its original homeland is the Caucasus and the Himalayas, as there are large areas of apples there. Wild, as found in a wild state in Europe, Asia and America, was cultivated in China and India more than 7,000 years ago and from there it moved to Europe, Africa, Australia and America and is currently grown in most parts of the world, especially in the temperate regions of both hemispheres (1.(

It is considered an economic tree, as it constitutes an important economic resource for countries due to its ability to be transported and stored for a long time. Its fruits are in demand all over the world and have a high nutritional and medicinal value, as every 100 grams of apples release 56 calories and contain Vitamin A 90 units, Vitamin C 7 mg, minerals such as phosphorus 10 mg, calcium 7 mg, magnesium and iron 5 mg each, potassium 110 mg, sodium 1 mg, pectin 5%, amino acids 0.3%, fats 0.6 g, Protein 0.2 gm,

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carbohydrates 41.1 gm, water 84.4%. Apples have medical benefits as they are used in treating kidney diseases, rheumatism, high blood pressure, obesity, and others (2). Global production in 2020 reached 86,442,716 tons and the cultivated area was 4,622,366 hectares. China ranks first in apple production with a production of 40,500,000 tons, followed by the United States of America, Turkey, Poland, and India (10). Apple production in Iraq was estimated at (79,413) tons for the 2020 season, an increase of (4.72%) over the previous year's production, which was estimated at (75,831) tons. Baghdad Governorate occupied first place in production with a percentage of (52.28%) of Iraq's total production, followed by Anbar Governorate with a percentage Productivity (22.90%), and Salah al-Din Governorate occupied third place with a productivity rate of (17.07%) of the total production of Iraq, while the rest of the governorates constituted a proportion of (6.75%), and the production of the apple crop constituted a proportion of (9.25%) of the total production of summer fruit trees in Iraq (7). Tree productivity is considered low in Iraq compared to the production of other countries, and perhaps the reason for this is due to the lack of attention to trees in terms of fertilization, irrigation, and disease and insect control (5.(

Mention (،1715) argue that the most promising challenge for modern sustainable agriculture is how to reduce unnecessarily high fertilization rates without negatively impacting plant nutritional needs and reducing crop yields and the quality of plant products. Organic matter leads to deterioration of soil quality (increased salinity, pH), pollution of surface and groundwater, and increased greenhouse gas emissions. Regardless of the mentioned effects of excessive use on the soil and some environmental aspects related to the climate, the low activity of microorganisms should not be neglected as a negative consequence on soil quality. Therefore, the large consumption and high cost of it, in addition to its impact on the environment, necessitates the use of alternative nutrient sources, from In order to reduce the demand for inorganic fertilizers.

Explain (9), plant extracts have been widely used recently as an alternative or supplement to agricultural fertilizers, some of which are added to the soil and some are sprayed on the foliage, as they are characterized by containing some nutritious elements and some compounds that combat insect and disease infestations, in addition to acting as an alternative. For growth regulators,)4 ،13) indicated that plant extracts are considered among the important organic sources used in agricultural production, and they are complementary to fertilizers and not a substitute for them, as they stimulate the physiological functions of the plant because they contain many elements and also contain the main nutrients N. , P, K and micronutrients such as Fe, B and Zn, in addition to growth-promoting substances such as auxins, gibberellins and cytokinins. It also contains some amino and organic acids necessary for building protein.

Explained (3) that there are several varieties of apples grown in Iraq, some of which are local and some are foreign, which were introduced through the Iraqi Ministry of Agriculture. Among the local varieties, the Sharabi variety is one of the varieties that has adapted and settled in the central regions of Iraq, and is desirable to the consumer. Their prices are low compared to foreign varieties, and it is possible to prolong their marketing period outside their production season if an

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appropriate warehousing policy is followed by determining treasury requirements for them.

Stated (14) that foreign varieties, such as the Anna apple variety, entered Iraq through the Ministry of Agriculture in the 1990s, and its cultivation spread quickly in the central regions of Iraq, due to its suitability to climatic conditions, as its trees bore fruit after four years. This variety is characterized by its few need for cold hours during the winter, as it can grow successfully in areas with warm winters, during which it accumulates between (300-350) hours of cold at a temperature of (7.2) C or less, which is sufficient to end the resting phase.

Therefore, the experiment aims to replace the expensive mineral fertilizers usually used in the region with cheaper, environmentally friendly, locally produced ones, and to compare the productivity of the two varieties under the influence of the experimental factors.

Materials and methods :

This study was carried out in one of the private orchards in the Hashemite District in Babil Governorate during the 2023 growing season to study the effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract on the Sharabi and Anna varieties at the age of 5 years. The treatments in the experiment were distributed with a split-split plot system in three Replicates in a randomized complete block design (R.C.B.D), where the main-plots represented the varieties (Anna variety and Sharabi variety) and spraying with Moringa leaves extract, the secondary panels were Sub-Plots with three concentrations (0, 150, 200) ml L-1 and the addition of O-DAP fertilizer. In the Sub-Sub-Plots, at three levels (0, 500, 1000) g tree-1, 27 trees were selected for each variety, homogeneous in growth and age. The total of both varieties is 54 trees, and each replicate contains 18 treatments. Each treatment was repeated three times, with one tree. One for the experimental unit (2 x 3 x 3). Fertilizer was added on 3/1/2023 and 5/1/2023 by making a strip trench around the trees, 20 cm wide and 25 cm deep, at a distance of 60-90 cm from the tree stem. After adding fertilizer, the trench is covered with soil and sprayed with Moringa leaves extract at a rate of four sprays (3/10, 4/10, 5/10, and 6/10). The experiment was carried out according to the Randomized Complete Block Design (RCBD). The results were analyzed according to Variance and means were compared using the LSD test under the 5% probability level.

Studied Traits

-1Fruit characteristics

:1-1Weight of the fruit (g:(

Ten fruits were weighed randomly after harvesting for each replicate and for each treatment using a sensitive electric balance, then the total weight was divided by the number of fruits to obtain the average weight of the fruit (in grams.(

:2-1Fruit diameter (mm:(

Fruit diameter was measured by taking (10) fruits at random from each replicate using a Vernier digital foot.

:3-1Total yield (kg tree-1:(

The fruits of each tree were weighed (kg.(

:4-1Total acidity in fruits:(%)

The total acidity of the fruit pulp was estimated as a percentage according to the method described in (Ranganna, 1977), by leaching the fruit juice with sodium hydroxide (NaOH) concentration (0.1 M) using the phenonphthalein index, and the percentage of acidity was calculated based on malic acid.

:5-1Total Soluble Solids (T.S.S.) in fruits :(%)

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It was estimated using a hand refractometer by placing several drops of fruit juice on the device bottle and reading it at an average of five readings for five fruits for the experimental unit and extracting the average.

Results

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Table 1. Effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract and the interactions between them on the weight of the fruit for the two varieties Sharabi and Anna.

Apple varieties A)(	Moringa leaves extract ml/l (M)	fertilizer O-DAP g/tree (D)			A*M	Average A
		0	500	1000		
Anna	0	69.50	95.00	119.00	94.50	102.28
	150	89.00	110.00	132.00	110.33	
	200	80.00	101.00	125.00	102.00	
Sharabi	0	41.50	48.50	56.80	48.93	52.24
	150	45.60	54.90	63.70	54.73	
	200	46.90	51.80	60.50	53.07	
LSD		LSD: A*M*D = 10.47			LSD: A*M= 12.11	LSD: A=12.42
- D x A-						
Anna		79.50	102.00	125.33	LSD: A*D =11.63	
Sharabi		44.67	51.73	44.67		
D x M					M Average	
0		55.50	71.75	87.90	71.72	
150		67.30	82.45	97.85	82.53	
200		63.45	76.40	92.75	77.53	
LSD		LSD: M*D = 1.79			LSD: M = 0.79	
Average D						
LSD		LSD: D = 1.18				

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It is noted from the results of Table (1) that fertilizing the soil with O-DAP fertilizer at a level of 1000 gm tree-1 had a significant effect in raising the average fruit weight, as it reached (92.83 gm) compared to the comparison treatment, which gave the lowest rate of (62.08 gm). As for spraying with leaf extract Morenga, through the data in the table above, shows the effect of spraying on the weight of the fruit, which exceeded the concentration of 150 ml L-1, which gave the highest rate, reaching (82.53 grams), compared to the comparison treatment, which gave the lowest rate, reaching (71.72 grams). From the table data, we note The Anna variety was superior in terms of fruit weight, as the Anna variety gave the highest rate, reaching (8102.2 grams) in fruit weight, compared to the sharabi variety, which gave the lowest rate, reaching (52.24 grams.(

As for the triple interactions, we notice, through the data in Table (1), that the triple interaction between the level of 1000 gm tree-1 and the concentration of 150 ml l-1 and the Anna variety was superior in terms of fruit weight, as it gave the highest rate and reached (132.00 g) compared to the triple interaction between not fertilizing and spraying. The sharabi variety that gave the lowest rate was (41.50 grams.(

As for the characteristic of fruit diameter, the data in Table (2) shows that fertilizing the soil with O-DAP fertilizer at a level of 1000 g tree-1 had a significant effect in increasing the average fruit diameter, as it reached (51.91 mm) compared to the comparison treatment, which gave the lowest rate, which reached (41.83 mm). As for the spraying agent with Moringa leaves extract, it had a significant effect on the fruit diameter characteristic, which exceeded the concentration of 150 ml L-1, which gave the highest rate, reaching (49.01 mm), compared to the comparison treatment, which gave the lowest rate, reaching (44.85 mm), and from the table data We note the superiority of the Anna variety in the fruit diameter characteristic, as the Anna variety gave the highest rate, reaching (54.11 mm), compared to the sharabi variety, which gave the lowest rate, reaching (40.25 mm.(

As for the triple interactions, and through the data in Table (2), we notice the superiority of the triple interaction between the level of 1000 g tree-1 and the concentration of 150 ml l-1 and the variety Anna in the fruit diameter characteristic, as it gave the highest rate and reached (62.00 mm) compared to the triple interaction between not fertilizing and spraying. The sharabi variety that gave the lowest rate was (35.00 mm.(

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Table 2. Effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract and the interactions between them on fruit diameter (mm) for the two varieties Sharabi and Anna.

Apple varieties A)(	**Moringa leaves extract ml/l (M)**	**fertilizer O-DAP g/tree (D)**			A*M	**Average A**
		0	**500**	**1000**		
Anna	**0**	**40.80**	**52.00**	**59.00**	**50.60**	**54.11**
	150	**51.00**	**57.00**	**62.00**	**56.66**	
	200	**50.20**	**54.00**	**61.00**	**55.06**	
Sharabi	**0**	**35.00**	**40.00**	**42.30**	**39.10**	**40.25**
	150	**38.00**	**41.90**	**44.20**	**41.36**	
	200	**36.00**	**41.90**	**43.00**	**40.30**	
LSD		**LSD: A*M*D** = 2.78			**LSD: A*M=** 3.27	**LSD: A=3.44**
- D x A-						
Anna		**47.33**	**54.33**	**60.66**	**LSD: A*D =3.16**	
Sharabi		**36.33**	**41.26**	**43.16**		
D x M					**Average M**	
0		**37.90**	**46.00**	**50.65**	**44.85**	
150		**44.50**	**49.45**	**53.10**	**49.01**	
200		**43.10**	**47.95**	**52.00**	**47.68**	
LSD		**LSD: M*D** = 0.59			**LSD: M =0.31**	
Average D		**41.83**	**47.80**	**51.91**		
LSD		**LSD: D = 0.37**				

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Table 3. Effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract and the interactions between them on the total yield of the tree for the two varieties Sharabi and Anna.

Apple varieties A)(	**Moringa leaves extract ml/l (M)**	**fertilizer O-DAP g/tree (D)**			A*M	**Average A**
		0	**500**	**1000**		
Anna	**0**	**16.5**	**18.3**	**19.1**	**18.0**	**18.6**
	150	**17.1**	**18.8**	**19.8**	**18.6**	
	200	**17.8**	**18.9**	**21.0**	**19.2**	
Sharabi	**0**	**23.3**	**28.3**	**30.0**	**27.2**	**29.5**
	150	**27.3**	**31.0**	**32.0**	**30.1**	
	200	**28.3**	**30.8**	**34.3**	**31.1**	
LSD		**LSD: A*M*D =** 4.6			**LSD: A*M=** 4.8	**LSD: A=4.9**
- D x A-						
Anna		**17.1**	**18.7**	**20.0**	**LSD: A*D =4.8**	
Sharabi		**26.3**	**30.0**	**32.1**		
D x M					**Average M**	
0		**19.1**	**23.3**	**24.5**	**22.6**	
150		**22.2**	**24.9**	**25.9**	**24.3**	
200		**23.7**	**24.9**	**27.6**	**25.2**	
LSD		**LSD: M*D =** 0.3			**LSD: M =0.2**	
Average D		**21.7**	**24.3**	**26.0**		
LSD		**LSD: D = 0.2**				

The data in Table (3) shows a significant effect of fertilizing with O-DAP fertilizer at a level of 1000 gm tree-1 in raising the total yield of the tree as it reached (26.0 kg) compared to the comparison treatment that gave the lowest rate of (21.7 kg). On the other hand, there was a significant effect of spraying With Moringa leaves extract in terms of total yield, which exceeded the concentration of

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200 ml L-1, which gave the highest rate as it reached (25.2 kg) compared to the comparison treatment that gave the lowest rate of (22.6 kg), and from the table data we notice the superiority of the sharabi variety in terms of total yield. It gave the highest rate, reaching (29.5 kg), compared to the Anna variety, which gave the lowest rate, reaching (18.6 kg.(As for the triple interactions, and through the data in Table (3), we notice the superiority of the triple interaction between the level of 1000 gm tree-1 and the concentration of 200 ml l-1 and the sharabi variety in terms of the total yield of the tree, as it gave the highest rate and reached (34.3 kg) compared to the triple interaction between not fertilizing And spraying and the variety Anna, which gave the lowest rate of (16.5 kg.(

It is noted from the data in Table (4) the effect of the 1000 gm tree-1 level of O-DAP fertilizer in reducing the percentage of fruit acidity, as it reached (0.362%) compared to the comparison treatment, which gave the highest percentage of (0.459%). As for spraying with Moringa leaves extract and from... Through the data in the table above, the effect of spraying on the acidity of the fruits was shown, as the concentration of 200 ml L-1 gave the lowest percentage, reaching (0.381%) compared to the comparison treatment, which gave the highest percentage, amounting to (0.438%). From the table data, we note the superiority of the sharabi variety in the percentage Acidity gave the highest percentage, reaching (0.515%) compared to the Anna variety, which gave the lowest percentage, reaching (50.29%.(

Regarding the triple interactions, we notice, through the data in Table (4), the effect of the triple interaction between the level of 1000 gm tree-1, the concentration of 200 ml l-1, and the variety Anna on the total acidity percentage, as it gave the lowest rate of (0.236%) compared to the triple interaction between not fertilizing and spraying. The sharabi variety had the highest percentage (0.622%.(

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Table 4. Effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract and the interactions between them on the total acidity percentage of the two varieties Sharabi and Anna.

Apple varieties A)(	**Moringa leaves extract ml/l (M)**	**fertilizer O-DAP g/tree (D)**			A*M	**Average A**
		0	**500**	**1000**		
Anna	**0**	**0.414**	**0.300**	**0.279**	**0.331**	**0.295**
	150	**0.317**	**0.290**	**0.248**	**0.285**	
	200	**0.307**	**0.269**	**0.236**	**0.236**	
Sharabi	**0**	**0.622**	**0.526**	**0.490**	**0.546**	**0.515**
	150	**0.557**	**0.500**	**0.461**	**0.506**	
	200	**0.536**	**0.482**	**0.458**	**0.492**	
LSD		**LSD: A*M*D** = 0.007			**LSD: A*M= 0.003**	**LSD: A=0.003**
- D x A-						
Anna		**0.346**	**0.286**	**0.254**	**LSD: A*D =0.004**	
Sharabi		**0.572**	**0.503**	**0.469**		
D x M					**Average M**	
0		**0.518**	**0.518**	**0.384**	**0.438**	
150		**0.437**	**0.437**	**0.354**	**0.395**	
200		**0.421**	**0.421**	**0.347**	**0.381**	
LSD		**LSD: M*D** = 0.005			**LSD: M =0.002**	
Average D		**0.459**	**0.394**	**0.362**		
LSD		**LSD: D = 0.003**				

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Table 5. Effect of fertilizing with O-DAP fertilizer and spraying with Moringa leaves extract and the interactions between them on the percentage total soluble solids (T.S.S.) for the two varieties sharabi and Anna.

Apple varieties A)(	**Moringa leaves extract ml/l (M)**	**fertilizer O-DAP g/tree (D)**			A*M	**Average A**
		0	**500**	**1000**		
Anna	**0**	**10.36**	**10.68**	**11.74**	**10.92**	**11.18**
	150	**10.47**	**11.21**	**11.95**	**11.21**	
	200	**10.55**	**11.50**	**12.21**	**11.42**	
Sharabi	**0**	**10.16**	**10.47**	**10.97**	**10.53**	**10.71**
	150	**10.27**	**10.58**	**11.23**	**10.69**	
	200	**10.36**	**10.73**	**11.66**	**10.91**	
LSD		**LSD: A*M*D =** 0.11			**LSD: A*M= 0.09**	**LSD: A=0.11**
- D x A-						
Anna		**10.46**	**11.13**	**10.46**	**LSD: A*D =0.08**	
Sharabi		**10.26**	**10.59**	**10.26**		
D x M					**Average M**	
0		**10.26**	**10.57**	**11.35**	**10.73**	
150		**10.37**	**10.89**	**11.59**	**10.95**	
200		**10.45**	**11.11**	**11.93**	**11.16**	
LSD		**LSD: M*D =** 0.06			**LSD: M =0.02**	
Average D		**10.36**	**10.86**	**11.62**		
LSD		**LSD: D = 0.04**				

Through the results in Table (5) indicate a significant effect of the 1000 gm tree-1 level of O-DAP fertilizer on the percentage of T.S.S in the fruits, which gave the highest percentage of (11.62%) compared to the comparison treatment, which gave the lowest percentage of (10.36%). As for spraying with the extract Moringa leaves. From the data in

the table above, the effect of spraying on the percentage of T.S.S in the fruits is shown, as the concentration of 200 ml L-1 gave the highest percentage, reaching (1.161%) compared to the comparison treatment, which gave the lowest percentage, amounting to (10.73%). The same table data also indicates that it exceeds The Anna variety gave the highest percentage of T.S.S, reaching (11.18%), compared to the sharabi variety, which gave the lowest percentage, reaching (10.71%.(

We found through the results in Table (5) also indicates the significant effect of the triple interaction between the level of 1000 g tree-1 and the concentration of 200 ml L-1 and the Anna variety in the percentage of T.S.S, which gave the highest percentage of (12.21%) compared to the triple interaction between not fertilizing and spraying and the sharabi variety which gave The lowest percentage was (10.16%.(

Discussion:

It is noted from the results in Tables (1, 2, 3, 4, 5) regarding: fruit weight, fruit length, total tree yield, total acidity percentage, and T.S.S. percentage, as a significant effect was observed for fertilizing with O-DAP fertilizer and its various levels compared to the control treatment throughout the growth period and in a manner Especially the high level of it (1000 gm tree-1), which gave the treatment with which it was fertilized superior to the treatments of the rest of the levels of ground fertilization for the studied characteristics. The reason for this may be due to the fact that the fertilizer contains nitrogen, which in turn leads to an increase in the leaf area, which is reflected in an increase The process of photosynthesis, as well as the positive effect of phosphorus in forming a strong root system, which increases the ability to absorb nutrients, thus increasing their concentration in the plant. This in turn leads to an increase in the nutrients manufactured by the photosynthesis process and the transfer of the products of this process to the fruits, as well as the role of potassium, which has a major role in building Carbohydrates and their transport to other parts of the plant (19 ،20). In the same context, these results are related to the role of humic acid in physiological processes, and this occurs through enhancing the activity of enzymes and transporting products from the photosynthesis process, in addition to its role in cell division and the elongation process (11). This encourages evolution, and the explanation for this increase in the majority of plant traits examined may also be related to the involvement of humic acid, which has a physiological effect on plants similar to auxin and affects plant growth (16). From the results of the tables above, spraying with Moringa leaves extract has improved the physical characteristics of the fruits (weight, diameter) because the extract contains the compound Zeatin, which is one of the most common forms of cytokinin, which has an important role in cell division and elongation, as well as its antioxidant properties and its role in regulation and distribution. Products of the photosynthesis process and nutrients (8 ،21). The increase in total soluble solids (Table 5) may be attributed to attracting the products of photosynthesis towards the fruits (6). As for the reason for the decrease in acidity in Table (4), it may be due to the activation of some enzymes present in the cytoplasm that work to convert organic acids into sugars, which leads to a decrease in acidity (12.(

As for the disparity between varieties, the reason is that genetic factors play an important role in preparing nutrients in sufficient and balanced quantities, as genes affect the

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physiological processes in the plant, through their control over the enzymes specialized in those physiological processes, so the effect of genes appears in the form of a difference in shape and size. The thickness of the leaf, the distribution of stomata on it, and its pigment content, in addition to the height of the tree and the nature of its growth (18.(

Reference:

-1Al-Araji, J. M. A. (2014) Apple Fruit Production Book. College of Agriculture and Forestry. University of Mosul. p. 169.

-2Al-Naimi, J. H.(2010)Treatment with fruit trees, shrubs, and forests. Al- Hawraa Publishing House. Iraq.

-3Al-Qaisi, W. G. (1998). The effect of storage temperature and calcium concentration on the storability of fruits. Local apples, red summer and Sharabi varieties, Master's thesis, College of Agriculture, University of Baghdad.

-4Almoussawi, A. M., and Al-Abbasi, G. B(2023) Effect of fertilization of Seaweed extracts and CuSO4 on some vegetative growth indicators of Citrus Limon L. grafted seedlings on rootstock aurantifolia. Kufa Journal for Agricultural Sciences, 15(2), 84-95 .

-5Alghanim, F. S., Al-Hadethi, M. M. E. A., and Yaviç, A(2023) Response of Apple Trees Performance to Moringa Extract, Humic Acid, and Liquid Organic Fertilizers (Vit-Org). Journal of Plant Production, 313-317 .

-6 Al-Hamoud, Firas Mahdi Abbas. (2019) The effect of spraying with some marine algae extracts, the Calmax nutrient solution, and the spraying method on some physical, chemical, and physiological characteristics of date palm fruits. Phoenix dactylifera L , Two types of palm trees. Master's thesis, College of Agriculture, University of Basra, Iraq. p. 131 .

-7Annual Statistical Collection of Fruits and Vegetables (2021). Ministry of Planning. Central Authority For statistics. Baghdad, Iraq.

-8 Anwar, F., Latif, S., Ashraf, M., and Gilani, A. H(2007) Moringa oleifera: a food plant with multiple medicinal uses. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives, 21(1), 17-25 .

-9Bulgari, R., Franzoni G., Ferrante, A(2019) Biostimulants application in horticultural crops under abiotic stress conditions. Agronomy, 9(306),1-30.

FAO(2021) FAO STAT Agricultural statistics database. http:⁄⁄www. 10 - Fao. Org.

-11Fawzy, Z.F., El-Nemr, M.A., Saleh, S. A. 2007. Influence of level and methods of potassium fertilizer application of growth and yield of eggplant. Journal of Applied, Science Reseurce, 3(1), 42-49.

-12Hasegawa P.M.; R. A. Bressan; J. K. Zhu and H. J. Bohnert, (2000). Plant cellular and molecular responses to high salinity. Annu Rev Plant Physiol 51: 463-499.

-13Hegab,M,Y,A,M. Sharawy and S.E-Saida(2005)Effect of alga extract and mono potassium phosphate n growth and fruiting of Balady orange trees (Citrus sinesis).proc.first Science .conf. Agriculture Science of Assuizt Univercity.(1):73-84 .

-14Ibrahim, A. M. (1996) Deciduous fruits, their cultivation, care and production, Madbouly Press. Cairo, Egypt .

ISSN 2072-3857

-15 Jakubus, M., and Bakinowska, E(2018) Visualization of long-term quantitative changes of microelements in soils amended with sewage sludge compost evaluated with two extraction solutions. Communications in Soil Science and Plant Analysis, 49(11), 1355-1369 .

-16 Jindo, K., Martim S. A., Navarro, E. C., Pérez-Alfocea, F., Hernandez, T., Garcia, C., Aguiar, N. O., Canellas, L. P(2012) Root growth promoting by humic acids from composted and non-composted urban organic wastes. Plant and Soil, 353: 209-220 .

-17 Miao, Y.; Stewart, B.A.; Zhang, F(2011) Long-term experiments for sustainable nutrient management in China. A review. Agron. Sustain. Dev, 31, 397–414 .

-18Muhammad, A.A. K.)1977(Principles of plant nutrition. Dar Al-Kutub for Printing and Publishing, University of Mosul, Iraq .

-19 Taiz. L. and E. Zeiger.2010. Plant physiology.5th ed. Sinauer Asseciates .Inc . Publisher Sunderland, Massachus-AHS. U.S.A .

-20 Zhang, X., and Ervin, E. 2004. Cytokinin-containing seaweed and humic acid extracts associated with creeping bentgrass leaf cytokinins and drought resistance. Crop science, 44(5), 1737-1745

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