University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

STUDY OF THE EFFECT OF SPRAYING WITH GROWTH STIMULANTS ROOTEX AND VAGE AMINO IN IMPROVING THE QUALITATIVE CHARACTERISTICS OF THE FRUITS OF *ZIZIPHUS SPINA* L. TREES

[1]OLA AHMED NAJM, [2]MAHMOUD S. ABDUL-WAHID

[1, 2] COLLEGE OF AGRICULTURE - DHI QAR UNIVERSITY

E-mail: Ola.post2024@utq.edu.iq

E-mail : mahmoud@utq.edu.iq

Abstract

The research was carried out in a private orchard associated with Dhi Qar Governorate during the autumn season of 2024-2025 to examine the impact of spraying the growth stimulant Rootex and vage amino on enhancing the qualitative attributes of Ziziphus spina trees. Rootex was utilised at three concentrations (0, 1, and 2 g/L), whilst vage amino was employed at three concentrations (0, 1.5, and 0.3 ml/L). The experiment was conducted as a factorial study utilising the randomised complete block design (RCBD) with three replications. Upon conclusion of the trial, the statistical analysis yielded the following results:

1. The application of 2 g/L of Rootex growth promoter shown superiority in average fruit length and drop, average fresh and dry weight of fruit, flesh and seed, and average pulp/seed ratio, yielding values of 2.55 cm, 2.41 cm, 11.28 g, 10.15 g, 1.36 g, and 7.37 g, respectively.
2. The administration of 3 ml/L of vage amino growth promoter demonstrated superiority in average fruit length and drop, average fresh and dry weight of fruit, flesh and seed, and average pulp/seed ratio, yielding measurements of 2.67 cm, 2.53 cm, and 11.44 .
3. The interaction treatment demonstrated significant superiority, with the combination of Rootex at 2 gm/L and vage amino at 3 ml/L surpassing the average length and diameter of the fruit, as well as the average fresh and dry weight of both the flesh and seed, and the average pulp/seed ratio, yielding results of 2.85 cm, 2.71 cm, 12.96 gm, 11.99 gm, 1.46 gm, and 8.19 gm, respectively.

I. Introduction

Ber or Christi thorn is classified within the genus Ziziphus and the family Rhamnaceae. It is a perennial fruit tree that thrives in tropical, subtropical, and temperate regions[1]. Ber fruits possess a delightful flavour and appealing hues, are extensively consumed commercially, and are utilised in the culinary industry for products such as beverages, jams, pastries, pickles, and more. They possess significant nutritional value due to the presence of carbohydrates, proteins, organic acids, amino acids, vitamins, lipids, fibres, mineral salts, and antioxidants [2; 3]. Global interest in cultivating Sidr trees has surged due to their status as underutilised fruit plants capable of enduring

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

severe environmental conditions. Sidr trees can thrive in soils unsuitable for other fruit trees due to their exceptional resilience to drought and poor soil conditions. They can endure elevated temperatures of up to 50°C and reduced temperatures as low as -29°C[4]

Ber trees are extensively grown in South and Central Asia, where they are referred to as Chinese dates or desert apples. Ber trees are cultivated in tropical Africa, northern Australia, the islands of the Indian Ocean, and the Caribbean. In recent years, they have been cultivated in Southeast European countries, including Spain and Italy[5]. Foliar feeding is a process that involves the application of chemical fertilisers by spraying diluted nutrient solutions over the green sections of plants multiple times. It is regarded as one of the significant and effective techniques for addressing certain nutrients, particularly the trace elements [6]. Rootex is regarded as a fertiliser that promotes the growth of new plants, since it is a material that stimulates root development and facilitates new vegetative growth, containing the essential elements nitrogen, phosphorus, and potassium (N-P-K). Its advantages include the stimulation of root hairs and the enhancement of the plant's tolerance to external conditions, as it is a high-phosphorus fertiliser. Regarding Vege Amino It is regarded as a biostimulant comprising amino acids, which are essential organic ingredients for plant growth [7]. This research was conducted to assess the impact of foliar feeding with the growth stimulant compounds ROOTEX and VAGE AMINO, as well as their interactions, on certain qualitative characteristics of Sidr apple fruits, given the paucity of studies regarding the nutrition of the Sidr plant in Dhi Qar Governorate.

II. Materials and methods

The experiment was conducted in a private orchard associated with Dhi Qar Governorate during the autumn season of 2024-2025 to investigate the impact of spraying the biostimulant Rootex and vage amino on enhancing the qualitative characteristics of Ber trees (Ziziphus spina), each approximately seven years old and cultivated in silty clay soil. All necessary agricultural practices, including regular irrigation, pruning, pest management, and both manual and mechanical weeding, were systematically implemented throughout the duration of the experiment. The experiment was structured utilising the Randomised Complete Blocks Design (R.C.B.D.), encompassing two factors: ROOTEX and VAGE AMINO. Each treatment was replicated three times, involving 27 trees that were uniform in size, shape, type, and growth vigour, with each tree serving as a sector. Four primary branches were systematically selected from each tree and marked with a distinct identifier. The statistical analysis of the experimental data was performed utilising the statistical software (Genstate, 2007), and the means were compared employing the least significant difference (L.S.D) test at a significance level of 0.05 [8]. The subsequent characteristics were examined:

Average length and diameter of the fruit (cm):
Ten fruits were chosen for each experimental unit, and their diameter and length were measured using a Vernier calliper.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Fresh and dry weight of the fruit, flesh and seed (g)

The fresh weight of the fruit was determined by selecting 10 random fruits from each replication using a precise balance, followed by calculating the average fresh weight in grammes by dividing the total weight by the number of fruits. The average fresh weight of the seed was determined subsequent to its extraction from the fruits. The weight of the fleshy layer was determined by subtracting the weight of the seed from the weight of the fruit. Subsequently, the dry weight was obtained by dehydrating the pulp of the fruits and seeds in an electric oven at 70 ˚C until a constant weight was achieved. The samples were then measured using a precision balance, and the average dry weight of the fruit, pulp, and seed was calculated, as illustrated in the following equations:

Average fruit weight (g) = Fruit weight (g) / Total number of fruits

Flesh weight (g) = Fruit weight - Seed weight

Pulp/Seed Ratio

The pulp/seed ratio was determined by dividing the weight of the pulp by the weight of the seeds.

III. Results and discussion

Length and diameter of the fruit (cm):

The results in Table (1) indicate that the final development stage of the research components and their interactions significantly influenced fruit length. The plants administered the growth stimulant ROOTEX at a concentration of 2 g/L exhibited a significantly higher growth measurement of 2.55 cm compared to those treated with the same stimulant at a concentration of 0 ml/L and the control plants, which recorded the lowest measurements of 2.24 cm and 2.44 cm, respectively. This phenomenon may be ascribed to the efficacious components of the growth stimulant Rootex, which encompasses essential elements that have augmented the synthesis of manufactured materials within the leaves. This enhancement boosts photosynthetic efficiency and potentially amplifies the activity of enzymes facilitating the translocation of manufactured and stored carbohydrates (CHO) from the leaves to the fruits. The concentration of CHO in the leaves has risen due to treatment with Rootex, concurrently regulating growth-related activities and cell division within the plant, thereby increasing the rate of fruit elongation. The plants treated with the growth stimulant VAGE AMINO at a concentration of 3 ml/L exhibited a significantly higher growth measurement of 2.67 cm compared to those sprayed with the same stimulant at a concentration of 0 ml/L and the control plants, which recorded lower values of 2.49 cm and 2.06 cm, respectively. The interaction between the two study variables, application of the growth stimulant and VAGE AMINO, significantly influenced this trait, as the plants treated with VAGE AMINO (3 ml\L-1) and ROOTEX (2 g\L-1) exhibited the highest measurement of (2.85) cm, in contrast to the lowest measurement of (2.00) cm observed in the control plants. This aligns with their findings [9;10]

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (1) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on the average fruit length (cm)**.**

ROOTEX	**VAGE AMINO**			**average ROOTEX**
	0	**1.5ml liter -1**	**3ml liter -1**	
0	2.00	2.19	2.52	2.24
1g liter -1	2.05	2.61	2.65	2.44
2g liter -1	2.13	2.68	2.85	2.55
average VAGE AMINO	2.06	2.49	2.67	
LSD ROOTEX	**LSD VAGE AMINO**		**LSD V*R**	
0.028	**0.028**		**0.050**	

The findings in Table (2) for the final maturity stage indicate that the study variables and their interactions significantly influence fruit diameter. Specifically, plants treated with the growth stimulant Rootex at a concentration of (2 g/L-1) exhibited a markedly higher diameter of (2.41) cm compared to those treated with the same stimulant at a concentration of (0 g/L-1) and the control plants, which recorded lower diameters of (2.30 and 2.10) cm, respectively. This phenomenon may be ascribed to the efficacious components of the growth stimulant Rootex, which encompasses essential elements that have augmented the quantity of synthesised materials within the leaves. This enhancement improves photosynthetic efficiency and potentially amplifies the activity of enzymes facilitating the translocation of manufactured and stored carbohydrates (CHO) from the leaves to the fruits. The treatment with Rootex has also resulted in an increase in the CHO levels in the leaves, while regulating the internal activities of the plant associated with growth and cell division. The plants treated with the biostimulant VAGE AMINO at a concentration of 3 ml/L exhibited a significantly higher growth measurement of 2.53 cm, in contrast to the plants sprayed with the same stimulant at a concentration of 0 ml/L and the control plants, which recorded lower values of 2.35 cm and 1.92 cm, respectively. The interaction between the study variables, specifically the application of the growth stimulants VAGE AMINO and ROOTEX, significantly influenced this trait. Plants treated with VAGE AMINO (3 ml/L) and ROOTEX (2 g/L) exhibited the highest measurement of 2.71 cm, in contrast to the lowest measurement of 1.86 cm observed in the control plants. This aligns with [11].

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (2) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on the average fruit diameter (cm).

ROOTEX	VAGE AMINO			average ROOTEX
	0	1.5ml liter -1	3ml liter -1	
0	1.86	2.05	2.38	2.10
1g liter -1	1.91	2.47	2.51	2.30
2g liter -1	1.99	2.54	2.71	2.41
average VAGE AMINO	1.92	2.35	2.53	
LSD ROOTEX	LSD VAGE AMINO		LSD V*R	
0.028	0.028		0.050	

Fresh fruit weight

Table (3) illustrates that the study variables and their interactions significantly influence the fresh weight of the fruits. Plants treated with the growth stimulant Rootex at a concentration of (2 g/L-1) exhibited a markedly higher fresh weight of (11.28) g compared to those treated with the same stimulant at a concentration of (0 g/L-1) and the control plants, which recorded lower weights of (10.51 and 9.33) g, respectively. This phenomenon may be ascribed to the efficacious components of the growth stimulant Rootex, which encompasses essential elements that have augmented the quantity of synthesised materials within the leaves. This enhancement boosts photosynthetic efficiency and potentially amplifies the activity of enzymes that facilitate the translocation of synthesised and stored carbohydrates (CHO) from the leaves to the fruits. The treatment with Rootex has resulted in an increased concentration of CHO in the leaves, while also modulating the internal activities of the plant associated with growth and cell division. The plants treated with the growth stimulant VAGE AMINO (3 ml\L-1) exhibited a significantly higher yield of 11.44 g compared to those sprayed with the same stimulant at a concentration of 0 ml\L-1 and the control plants, which yielded lower values of 10.72 g and 8.96 g, respectively. The interaction between the study variables, specifically the application of the growth stimulant VAGE AMINO and ROOTEX, significantly influenced this trait. Plants treated with VAGE AMINO (3 ml/L) and ROOTEX (2 g/L) exhibited the highest weight of 12.96 g, in contrast to the lowest weight of 8.42 g observed in the control plants. The effects may stem from the constituents of the growth stimulant VAGE AMINO, particularly micronutrients like manganese and zinc, which are crucial for protein and nucleic acid synthesis in fruits, as well as enhancing photosynthesis and carbohydrate production, both vital for fruit growth and development. [12; 13].

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (3) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on fresh weight**.**

ROOTEX	VAGE AMINO			average ROOTEX
	0	1.5ml liter -1	3ml liter -1	
0	8.42	9.53	10.05	9.33
1g liter -1	9.10	11.13	11.30	10.51
2g liter -1	9.37	11.50	12.96	11.28
average VAGE AMINO	8.96	10.72	11.44	
LSD ROOTEX	LSD VAGE AMINO		LSD V*R	
0.039	0.039		0.068	

Soft pulp weight

Table (4) illustrates that the study factors and their interactions significantly influence the weight of the fruit's soft pulp. Plants treated with the growth stimulant Rootex at a concentration of (2 g/L-1) exhibited a markedly higher weight of (10.15) g compared to those sprayed with the same stimulant at a concentration of (0 g/L-1) and the control plants, which yielded lower weights of (8.28 and 9.12) g, respectively. This phenomenon may be ascribed to the efficacious properties of the growth stimulant Rootex, which comprises essential elements that enhance the synthesis of materials within the leaves. This augmentation improves photosynthetic efficiency and potentially amplifies the activity of enzymes facilitating the translocation of carbohydrates (CHO) from the leaves to the fruits. The treatment with Rootex has resulted in an increased concentration of carbohydrates in the leaves, while also modulating the internal activities associated with growth and cell division within the plant. The plants treated with the growth stimulant VAGE AMINO (3 ml/L) exhibited a significantly higher yield of 10.30 g compared to those sprayed with the same stimulant at a concentration of 0 ml/L and the control plants, which yielded 9.37 g and 7.88 g, respectively. The interaction between the study variables, specifically the application of the growth stimulants VAGE AMINO and ROOTEX, significantly influenced this trait. Plants treated with VAGE AMINO (3 ml/L) and ROOTEX (2 g/L) exhibited the highest weight of 11.99 g, in contrast to the lowest weight of 7.15 g observed in the control plants. The effects may be attributed to the constituents of the growth stimulant VAGE AMINO, particularly micronutrients like manganese and zinc, which are crucial for protein and nucleic acid synthesis in fruits, as well as enhancing photosynthetic activity and carbohydrate formation, essential for fruit growth and development[12].

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (4) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on the weight of fresh pulp (g).

ROOTEX	VAGE AMINO			average ROOTEX
	0	1.5ml liter -1	3ml liter -1	
0	7.15	8.76	8.94	8.28
1g liter -1	8.10	9.30	9.97	9.12
2g liter -1	8.39	10.06	11.99	10.15
average VAGE AMINO	7.88	9.37	10.30	
LSD ROOTEX	LSD VAGE AMINO		LSD V*R	
0.109	0.109		0.189	

Fresh seed weight

The results in Table (5) indicate that the study factors and their interactions significantly influence seed weight. Plants treated with the growth stimulant Rootex at a concentration of (2 g/L-1) exhibited a markedly higher seed weight of (1.36) g compared to those sprayed with the same stimulant at a concentration of (0 g/L-1) and the control plants, which recorded lower weights of (1.30 and 1.22) g, respectively. The rationale for this may be ascribed to the efficacious components of the growth stimulant Rootex, which encompasses essential elements that have resulted in an augmentation of synthesised materials within the leaves. This enhancement elevates the efficiency of photosynthesis and potentially amplifies the activity of enzymes that facilitate the transference of synthesised and stored carbohydrates (CHO) from the leaves to the fruits. The concentration of CHO in the leaves has increased due to treatment with Rootex, alongside the regulation of internal plant activities pertinent to growth and cell division. The plants treated with the growth stimulant VAGE AMINO at a concentration of 3 ml/L exhibited a significantly higher yield of 1.38 g compared to those sprayed with the same stimulant at a concentration of 0 ml/L and the control plants, which yielded 1.34 g and 1.16 g, respectively. The interaction between the study variables, specifically the application of the growth stimulant ROOTEX and VAGE AMINO, significantly influenced this trait. Plants treated with VAGE AMINO (3 ml/L) and those treated with ROOTEX (2 g/L) exhibited the highest weight of 1.46 g, in contrast to the lowest weight of 1.10 g observed in the control plants. This outcome parallels the findings of [14] about the treatment of olive trees with boron.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (5) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on fresh seed weight (g).

ROOTEX	VAGE AMINO			average ROOTEX
	0	1.5ml liter -1	3ml liter -1	
0	1.10	1.27	1.31	1.22
1g liter -1	1.17	1.35	1.38	1.30
2g liter -1	1.23	1.41	1.46	1.36
average VAGE AMINO	1.16	1.34	1.38	
LSD ROOTEX	LSD VAGE AMINO		LSD V*R	
0.0097	0.0097		0.0168	

Pulp/seed ratio

The findings presented in Table (6) for the final maturity stage indicate that the study variables and their interactions significantly influence the pulp-to-seed ratio in the plants. Specifically, plants treated with the growth stimulant Rootex at a concentration of (2 g/L-1) exhibited a markedly higher value of (7.37) g, in contrast to those treated with the same stimulant at a concentration of (0 g/L-1) and the control plants, which yielded lower values of (6.99 and 6.73) g, respectively. The rationale for this may be ascribed to the efficacious role of the constituents of the growth stimulant Rootex, which encompasses essential elements that have resulted in an augmentation of synthesised materials within the leaves. This enhancement boosts photosynthetic efficiency and potentially amplifies the activity of enzymes that facilitate the translocation of synthesised and stored carbohydrates (CHO) from the leaves to the fruits. The concentration of CHO in the leaves has increased due to treatment with Rootex, alongside the regulation of internal plant activities pertinent to growth and cellular division. The plants treated with the growth stimulant VAGE AMINO at a concentration of 3 ml/L exhibited a significantly higher yield of 7.40 g compared to those sprayed with the same stimulant at a concentration of 0 ml/L and the control plants, which yielded the lower values of 6.95 g and 6.73 g, respectively. The interaction between the study variables, specifically the application of the growth stimulant VAGE AMINO and ROOTEX, significantly influenced this trait. Plants treated with VAGE AMINO (3 ml/L) and those treated with ROOTEX (0 g/L) exhibited the highest weight of 8.19 g, in contrast to the lowest weight of 6.48 g observed in the control plants. These findings align with those obtained by both [15;16], which indicated an increase in the flesh percentage of olive trees treated with boron.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Table (6) shows the effect of spraying with ROOTEX and VAGE AMINO growth stimulants and their interaction on the pulp/seed ratio (g).

ROOTEX	VAGE AMINO			average ROOTEX
	0	1.5ml liter -1	3ml liter -1	
0	6.48	6.89	6.82	6.73
1g liter -1	6.90	6.87	7.19	6.99
2g liter -1	6.82	7.11	8.19	7.37
average VAGE AMINO	6.73	6.95	7.40	
LSD ROOTEX	LSD VAGE AMINO		LSD V*R	
0.096	0.096		0.167	

IV. References

1. Azam-Ali, S. (2006). Harvesting , Post-harvest handling and Processing. In : Williams , J.T.; Smith, R.W.; Haq, N. and Dunsiger, Z. (Editors), Ber and other Jujubes. International Center for Undertilised Crops, Southampton. UK., 113 – 153 .
2. **Guo, S.; Duan, J. A.; Qian, D.; Tang, Y.; Qian, Y. and Wu, D. (2013).** Rapid determination of amino acids in fruits of *Ziziphus jujuba* by hydrophilic interaction ultra-high-performance liquid chromatography coupled with triple-quadrupole mass spectrometry. Journal of Agricultural and Food Chemistry, 61: 2709–2719.
3. **Najafabadi, N. S.; Sahari, M. A.; Barzegar, M. and Esfahani, Z. H. (2017).** Effect of gamma irradiation on some physicochemical properties and bioactive compounds of jujube (*Ziziphus jujuba* var vulgaris) fruit. Radiation Physics and Chemistry, 130: 62–68.
4. **Pareek, O. P. (2001).** Ber extension manual international centre for under utilized crops. Southampton, UK.
5. Du,L,J;Gao, Q H; and wang, M.(2013).Coparsion of Flavonoids phenolic acids and antioxidant acivty of ziziphus JuJuba
6. Brayan,C. (1999) Foilar Fertilizion , Journal of Agricultural , Australia Publ. Adelaid univ . PP 30-36
7. Al-Ziyadi, Ali Karim (2017). The plant responded to treatment with vegea amino. Master's thesis, University of Baghdad.
8. Al-Rawi, Khashe' Mahmoud and Abdul Aziz Muhammad Khalaf Allah (2000). Design and analysis of agricultural experiments, Dar Al-Kutub Foundation for Printing and Publishing, University of Mosul, Iraq, second edition, 488 pp.
9. Taiz, L. and Zeiger, E. (2002) . Plant Physiology . Third Edition . Sinauer Associates Pub. Annals of Botany Company . pp 690 .

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 1 (2025) PP 79-87

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

10. Riyadh Mhawesh Al-Muhe, & Mahmmod S. Abdul-Wahid. (2023). Effect of spraying with Moringa plant extract and potassium silicate on some vegetative growth indicators of banana seedlings obtained from tissue culture Musa spp. *University of Thi-Qar Journal of Agricultural Research*, *12*(2), 46-58. https://doi.org/10.54174/utjagr.v12i2.260
11. Hamid.h.mhawesh. (2024). Estimation of active substances and compounds in orange seedlings Citrus aurantium L when spraying with nanofertilizers and humic acid. *University of Thi-Qar Journal of Agricultural Research*, *13*(2), 647-654. https://doi.org/10.54174/pe4skq71
12. Adnan , N.Y.; Mehmet, P.P. and Fatma, Y.M. (2007). Selection of Superior Ber (*Ziziphus jujuba* L.). Genotypes in Cirril Region Tarim Bilimler dergisi, 14 (1) : 51 – 56 . Ankara University, Ziraa Fakultes.
13. Wasen F. F. ALpreasm, & Mohammed A.H. ALnajjar. (2023). Content of fixed and volatile oils of pollen grains of five male cultivar of date palm Phoenix dactylifera L. *University of Thi-Qar Journal of Agricultural Research*, *12*(2), 269. https://doi.org/10.54174/j56pey98
14. **Aboud, Raad Lahoub, Zuhair Ezz El-Din Daoud and Ragheed Hamza Al-Sultan (2010).** The effect of spraying with iron and boron on some vegetative and fruit growth characteristics of olives (Olea europaea L.).
15. **Al-Jubouri, Ghanem Abdul-Razzaq Mohammed (2004).** Effect of spraying with urea and boron on the quantity, yield characteristics and chemical content of leaves in olive (Olea europaea L.) cultivar Bashiqa. Master's thesis, College of Agriculture and Forestry, University of Mosul, Ministry of Higher Education and Scientific Research, Iraq. Bashyki cultivar. Anbar Journal of Agricultural Sciences, 8(3): 42-52.
16. **Suleiman, Ahmed Haj (2009).** Effect of foliar fertilization with boron and calcium elements on the quality of fruits of the two olive cultivars Surani and Qaisi. Master's thesis, Faculty of Agricultural Engineering, University of Aleppo, Syria