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Effect of levels organic fertilizers and kinds of Bio-feritilizers in characterical of two classes of Okra plant (Abelmoschus esculentus L.) growning in the plastic house .

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Abstract:

The experiment was carried out for the agricultural season 2020-2021 under unheated greenhouse conditions at the Agricultural Research Station of the Department of Horticulture and Garden Engineering / College of Agriculture - University of Dhi Qar, studying the effect of levels of organic and biological fertilizers on the growth and yield of two okra varieties (Al-Hussainawi, Petra). The experiment was carried out with three factors: the first cultivar includes two okra cultivars (Al-Hussainawi A, Petra B), the second sheep manure with four levels O_0 without addition, O_1 (2.5 kg experimental unit), O_2 (5 kg experimental unit) and O_3 (7.5 kg experimental unit) and the third is a mixture of bio-fertilizer And at four levels: O_0 without addition, A(*Azo.*) (*Azotobacter chroococcum*): at a concentration of 1.1×10^9, B(Pseu.): (*Pseudomonas flourescens*) at a concentration of 3.6×10^9 and C (*Azo.*+*Pse.*): (*Azotobacter chroococcum* + *Pseudomonas flourescens*) at a concentration. 4.7×10^9 The arithmetic averages were compared according to the LSD Least Significant Difference test at a probability level of 0.05. The results can be summarized as follows: It showed the superiority of the Husseinawi okra variety over the Petra okra variety in the leaf content of carbohydrates and phenols in the fruits, which amounted to (12.448 mg 100 gm^{-1}, 2.132%).) respectively. While the Petra cultivar was superior in the content of leaves of chlorophyll and a decrease in the content of the leaves of carotene and proline, it reached (69.615 mg 100 gm^{-1}, 1.882 mg 100 gm^{-1}, 190.0 microgram g^{-1}). With regard to the organic fertilizer, the treatment O_3 (7.5 kg experimental unit) for Al-Hussainawi variety was superior in the content of leaves of chlorophyll and phenols in the fruits, it amounted to (74,729 mg 100 gm^{-1}, 2.742 %), while the Petra variety excelled in the content of carbohydrates and the low content of the leaves of carotene and proline. It reached (14,394 mg 100 g^{-1}, 0.951 mg 100 g^{-1}, 142.9 mcg g^{-1}) respectively. As for the biofertilizer, the treatment C (*Azo.*+*Pse.*) was superior in the leaves content of chlorophyll and carbohydrates, and the leaves content of carotene, proline and phenols in the fruits was (72,555 mg 100 g^{-1}, 13.683 mg 100 g-1, 0.974 mg 100 g^{-1}, 156.7 micrograms g^{-1}, 2.534%) respectively. As for the effect of the bilateral interaction between okra cultivars and biofertilizer types, the BC (*Azo.*+*Pse.*) treatment was superior to the chlorophyll content of leaves and the decrease in the leaves' content of carotene and proline, it amounted to (72,996 mg 100 g^{-1}, 0.762 mg 100 g^{-1}, 136.2 micrograms g^{-1}), while the AC (*Azo.*+*Pse.*) treatment excelled in the leaves content of carbohydrates and phenols in fruits, it reached (13.878 mg/100 gm^{-1}, 2.576 %), respectively. The bilateral interaction between organic and biofertilizers showed the superiority of O_3 C (*Azo.*+*Pse.*) treatment in the leaves content of chlorophyll and

carbohydrates, and the decrease in the leaves' content in carotene, proline and phenols in fruits, it amounted to (77,065 mg 100 g^{-1}, 15.722 mg 100 g^{-1}, 0.297 mg (100 gm^{-1}, 121.6 mcg g^{-1}, 3.4088%) respectively. The triple interactions showed a significant effect on most of the studied traits.

I. INTRODUCTION

Okra crop, scientific name *Abelmoschus esculentus* L., is one of the important summer vegetable crops in Iraq, which grows in all agricultural areas belonging to the family Malvaceae (Boras et al., 2011). Okra is called by other names such as Ladies Finers, Bamya, Gumbo, Okura, Kacang Bendi And other designations in relation to the countries in which it is located (D.Sathish et al., 2013) Okra is grown in the regions of Iraq for the purpose of obtaining its fresh green fruits, and provides humans with proteins, vitamins (K, E, C, B, A), carbohydrates and minerals (Abd EI-Kader et al., 2010).Researchers and specialists worked to increase the agricultural area in vegetable crops and to devise new varieties and hybrids with good fruit and vegetable traits and high productivity, and the introduction of hybrids is considered one of the cheapest methods of breeding and genetic improvement in countries, especially developing countries, to obtain good genetic results and select genetic structures. Through the Center for Scientific Research and knowledge of the most appropriate environmental conditions (Al-Shammari and Saud, 2014) The large population in the world requires an increase in the production of multiple agricultural crops inside greenhouses (glass and plastic) without Its season is in addition to open cultivation. The use of organic fertilizers will be an inevitable practice in organic agriculture to meet the plant's need of nutrients necessary for growth, and organic fertilizers are interventions that increase production and improve the quality of crops by preparing elements and improving the course of vital activities in plants (Verma et al., 2017), as well as the use of fertilizers The vitality and activity of microorganisms in the soil is considered an appropriate source for providing the necessary elements for plants, as compared to chemical fertilizers (Al-Haddad, 1998). Recently, many countries have tended to encourage the biological production of plants that are characterized by clean food free of harmful effects resulting from chemical fertilizers (Al-Amri, 2011). The technique of using biological fertilizers in natural agriculture or modern agricultural technology (Bio. Farming) is one of the advanced technologies through the better use of biological and organic fertilizers, and the reduction of the addition of chemical fertilizers despite the cheapness and abundance compared to chemical fertilizers, in addition to improving the physical properties of soil Chemical, stimulating plant physiological functions, stimulating organic farming as fertilizer for many horticultural crops, increasing the readiness of basic nutrients NPK and micro-elements, fixing nitrogen in the soil and improving plant growth and production (Al-Jubouri, 2013). Given the great importance of adding organic fertilizers and types of biological fertilizers in reducing pollution, reducing economic damage, maintaining public health, increasing plant growth production and creating a clean healthy environment, so the research goal is to use such fertilizers and reduce chemical fertilizers and apply them to the two types of okra plant in Iraqi soils and homes.

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II. MAERIALS AND WORKING METHODS

The field experiment was conducted during the agricultural season (2020-2021) in one of the unheated greenhouses with dimensions of 51 m x 9 m and an area of 459 m 2 affiliated to the College of Agriculture and Marshlands - Dhi Qar University, which is located in Al-Mustafaiya area, to study the effect of levels of organic fertilizer and types of biofertilizer of the two okra plant varieties. In some physical and chemical characteristics of okra plants inside greenhouses, random samples were taken before planting from different places of the soil of the greenhouse with a depth of 0-30 cm, mixed well, and then their physical and chemical properties were analyzed in the soil laboratory of the College of Agriculture.

Table (1): Physical and chemAnalysis type Unit of measure Value

Analysis type	Measruing unit	The value
Ec	ds m^{-1}	5.08
pH	-----	7.04
N	ppm	40
P	ppm	280.0
K	ppm	22.06
The sand	g kg^{-1}	261
The greedy	g kg^{-1}	590
Mud	g kg^{-1}	149
Organic matter	%	0.87
Soil texture	----	Sandy mixture

Laboratory of Soil Department at the Faculty of Agriculture - Dhi Qar University

Two types of local cultivars (Al-Hussainawy and Petra) were selected, desired by the consumer and known for their abundant production due to the large plants and many branches. They were planted directly in the ground after isolating the unwanted seeds in terms of shape and size. Then the seeds were soaked for 12 hours in lukewarm water before planting and then planted in A hollow at a depth of 3-4 cm, the distance between one hole and another is 30 cm on both sides of the meadow. The decomposed organic fertilizer was obtained from sheep residues from the barns and was added at the beginning of the experiment.

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A- Study factors

The first factor: my variety of okra

A type of Husseinawi

B class Petra

The second factor: levels of organic fertilizer

O_0 without adding fertilizer.

O_1 organic fertilizer at a rate of 2.5 kg. experimental unit.

O_2 organic fertilizer at a rate of 5 kg. experimental unit.

O_3 organic fertilizer at a rate of 7.5 kg. experimental unit.

The third factor: types of biological vaccine

O without addition

A vaccine for Azotobacter Chroococcum at a concentration of 1.1×10^9

B Vaccine for Pseudomonas fluorescens at a concentration of 3.6×10^9

C Azotobacter Chroococcum+ Pseudomonas fluorescens vaccine at a concentration of 4.7×10^9

The number of experimental units in each sector is 32 and the total number is 96 units.

Study Indications:

1- Chlorophyll content.

2- The carbohydrate content of the leaves.

3- Carotene content.

4- The content of the leaves of proline.

5- Phenols in fruits.

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III. RESULTS AND DISCUSSION

A. The content of the leaves of chlorophyll (mg 100 g^{-1}).

Table (2) shows that Petra okra cultivar B significantly outperformed Husseinawiya okra cultivar A, where the average leaf content of chlorophyll was 69.615, 68,544 mg 100 g-1, respectively. 2009). The same table showed that adding different levels of organic fertilizer had a significant effect on the amount of chlorophyll at levels 2.5, 5, and 7.5 kg as an experimental unit, as the rates of class B reached Petra. 69.114, 72,800, 73,879 mg $100gm^{-1}$ and the rates of class A Husseinawi.67.489, 71,900, 74.729 mg $100gm^{-1}$, respectively, compared to the control treatment. The content of chlorophyll increased with the increase in the level of addition, and the reason for this superiority is attributed to the positive effect of adding organic fertilizers that work to liberate Nitrogen in the soil and its large accumulation inside the plant, thus increasing the amount of chlorophyll in the leaves, as nitrogen enters the synthesis of chlorophyll through the construction of the porphyrins ring responsible for the formation of chlorophyll, and the amount of nitrogen in the leaf enters the composition of the chloroplast (Peter and Rosen, 2005). The same table also showed that the addition of types of biofertilizers had a significant effect, as it gave the rates of treatments (A, B, C) 67.798, 69.823, 72.555 mg 100 g-1 compared to without the addition, which amounted to 66,142 mg 100 g-1, and the amount of chlorophyll increased in the treatments When diversifying in the addition of bio-fertilizer, the reason for this is the ability of microorganisms to fix atmospheric nitrogen, which helps to increase the rate of absorption by the plant, and it is noted that there is a positive relationship between the content of chlorophyll in leaves and nitrogen, as it enters into the composition of the molecule and this is consistent with what was reached (Farida et al. (2003) and Mostafa (2002) and Abu-Hussein et al. (2002) and Qurbanly et al. (2006). The table also showed that the binary interaction between the cultivars and the organic fertilizers had a significant effect, as the treatment O_3 of the variety A gave the highest values amounted to 74.729 mg 100 g^{-1}, while the plants of the treatment O_0 of the variety A gave the lowest values amounted to 60.058 mg 100 gm^{-1}.The same table also shows that the bilateral interaction between cultivars and biofertilizers had a significant effect, as the treatment BC(*Azo*.+*Pse*.) gave the highest values amounted to 72,996 mg 100 g^{-1}, while the treatment plants AO_0 gave the lowest values amounted to 65.410 mg 100 g^{-1}.The same table showed the bilateral interaction between organic and biofertilizers with a significant effect, as the treatment plants O_3C(*Azo*.+*Pse*.) gave the highest values amounted to 77.065 mg 100 g^{-1}, while the control plants gave the lowest values amounted to 57,282 mg 100 g^{-1}. As for the triple interaction between the experimental factors, it was significant, as the overlapping treatment A*O_3*C(*Azo*.+*Pse*.) excelled in obtaining the highest values, reaching 77.745 mg 100 gm-1, while the plants of the treatment A*O_0*O_0 gave less The values were 55,627 mg 100 g^{-1} .

Effect of organic fertilizer levels and types of biofertilizer and their interactions for the two okra cultivars on the chlorophyll content of leaves (mg 100 gm^{-1}).

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Classمعدل	التداخل بين C*O	Bacterial C(*Azo.*+*Pse.*)	B (*Pse.*)	A (*Azo.*)	O(0)	Organic Kg.Experi.. mental Unit	Class
68.544	60.058	63.644	60.035	60.927	55.627	O_0	A
	67.489	71.889	67.797	64.883	65.387	O_1(2.5)	
	71.900	75.181	73.421	70.083	68.913	O_2(5)	
	74.729	77.745	75.690	73.767	71.714	O_3(7.5)	
69.615	62.667	67.621	63.227	60.884	58.937	O_0	B
	69.114	72.128	70.076	67.652	66.601	O_1(2.5)	
	72.800	75.848	73.892	71.549	69.912	O_2(5)	
	73.879	76.385	74.448	72.636	72.047	O_3(7.5)	
L.S.D$_{0.05}$ C	L.S.D$_{0.05}$ O	72.555	69.823	67.798	66.142	Rate Bacterial	L.S.D$_{0.05}$ B
0.2576	0.3643						0.3643
						0.5152	L.S.D$_{0.05}$ C*O
						1.0303	L.S.D$_{0.05}$ C*O*B

L.S.D$_{0.05}$ C*B	C	B	A	O	Class
0.5152	72.115	69.236	67.415	65.410	**A**
	72.996	70.411	68.180	66.874	**B**

L.S.D$_{0.05}$ O*B	C	B	A	O	Organic
0.7286	65.632	61.631	60.905	57.282	**O_0**
	72.009	68.937	66.267	65.994	**O_1**
	75.515	73.657	70.816	69.413	**O_2**
	77.065	75.069	73.201	71.880	**O_3**

B-Leaves content of total soluble carbohydrates (mg 100 g^{-1}).

It was shown in Table (3) that the leaves content of total soluble carbohydrates was significantly superior to the Husseinawi okra variety A over the Petra okra variety B, with an increase of 1.111%. The reason for this is due to the genetic variation between the cultivated varieties responsible for the chemical components of the plant, including carbohydrates (Mahdi, 2016).The same table showed that adding different levels of organic fertilizer had a significant effect on the amount of dissolved carbohydrates at levels 2.5, 5, and 7.5 kg experimental unit. The rates of type A Husseinawi were 12,072, 12.968, 14.104 mg 100 g^{-1}, respectively, and the rates of class B Petra 11.686. 13.257, 14.394 mg 100 g^{-1}, compared to the comparison treatment 10.650, 9.908 mg 100 g^{-1}, and the value of the treatment increased by increasing the level of addition due to the role of the added organic matter in increasing the growth capacity of the roots and the absorption of nutrients, especially potassium, which is one of the important elements in Stimulating the photosynthesis process and the transfer of its products, as well as the formation of ATP responsible for filling the phloem tissue with the materials resulting from the photosynthesis process of carbohydrates and their transfer to the places they are stored in the fruits by the phloem (Viro, 1974). The

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nutritional status of the plant and the transfer of carbohydrates from the places of manufacture of leaves to the places of consumption of fruits to meet the requirements of growth, which leads to an increase in the content of these carbohydrates in accordance with Matto Link to it (Al-Ibrahimi, 2011) and (Nemati and Jaafar, 2013).The same table also showed that the addition of bio-fertilizers had a significant effect on the leaves' content of total soluble carbohydrates, as the treatment of the mixture of nitrogen-fixing and phosphorous-solvent bacteria C (*Azo.*+*Pse.*) outperformed, as it gave the highest rate of carbohydrate content of leaves, as it reached an average of 13.117 mg 100 g^{-1} compared with the measurement treatment, which amounted to 10,683 mg 100 g^{-1}, due to the role of Azotobacter and phosphorous-dissolving bacteria in improving the dry matter characteristics of the plant and the carbohydrate content of leaves (Mahendran and Kumar, 1998), in addition to the role of added bacteria in Increasing vegetative growth, photosynthesis, and transportation of manufactured materials from places of manufacture to places of storage (Yazdani et al., 2009).The table also showed that the binary interaction between the cultivars and the organic fertilizers had a significant effect, as the treatment O_3 of the class B gave the highest values amounted to 14.394 mg 100 gm^{-1}, while the plants of the treatment O_0 of the class B gave the lowest values of 9.908 mg $100gm^{-1}$.The same table also shows that the bilateral interaction between cultivars and biofertilizers has a significant effect, as treatment A C(*Azo.*+*Pse.*) gave the highest values amounted to 13.878 mg 100 g^{-1}, while treatment plants BO_0 gave the lowest values amounted to 10.670 $mg100g^{-1}$.The same table showed the bilateral interaction between organic and biofertilizers, which had a significant effect, as the treatment plants O_3C(*Azo.*+*Pse.*) gave the highest values of 15.722 mg 100 g^{-1}, while the control plants gave the lowest values of 8.740 mg 100 g^{-1}. As for the triple interaction between the experimental factors, it was significant, as the interaction of the treatment plants A*O_3*C(*Azo.*+*Pse.*) excelled in reaching the highest values, as it reached 15.740 mg 100 gm^{-1}, while the plants of the treatment B*O_0*O_0 gave the lowest values. It reached 8.538 mg 100 g^{-1}.

Effect of organic fertilizer levels and types of biofertilizer and their interactions for the two okra cultivars on the total soluble carbohydrates content of leaves (mg 100 gm^{-1}).

Class معدل	التداخل بين C×O	Bacterial				Organic Kg.Experi.. mental Unit	Class
		C(*Azo.*+*Pse.*)	B(*Pse.*)	A(*Azo.*)	O(0)		
12.448	10.650	12.148	11.219	10.291	8.942	O_0	A
	12.072	13.109	12.970	11.971	10.239	O_1(2.5)	
	12.968	14.516	13.920	12.262	11.174	O_2(5)	
	14.104	15.740	14.760	13.486	12.430	O_3(7.5)	
12.311	9.908	11.004	10.477	9.615	8.538	O_0	B
	11.686	13.147	12.342	11.139	10.116	O_1(2.5)	
	13.257	14.095	14.273	13.357	11.303	O_2(5)	
	14.394	15.705	14.973	14.173	12.725	O_3(7.5)	
L.S.$D_{0.05}$C	L.S.$D_{0.05}$ O	13.683	13.117	12.037	10.683	Rate Bacterial	L.S.$D_{0.05}$B
0.0399	0.0564						0.0564
					0.0798	L.S.$D_{0.05}$C*O	

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				0.1597	L.S.D$_{0.05}$ C*O*B
L.S.D$_{0.05}$ C*B	C	B	A	O	Class
0.0798	13.878	13.217	12.002	10.696	A
	13.488	13.016	12.071	10.670	B
L.S.D$_{0.05}$ O*B	C	B	A	O	Organic
0.1129	11.576	10.848	9.953	8.740	O_0
	13.128	12.656	11.555	10.177	O_1
	14.305	14.096	12.809	11.238	O_2
	15.722	14.866	13.830	12.577	O_3

C-The content of the leaves of carotene (mg 100 g^{-1}).

The results of Table (4) show that there are significant differences between the cultivated cultivars in the leaf content of carotene, where the Petra okra cultivar B significantly outperformed the Husseinawi okra cultivar A significantly, with an average of 1.882, 2.043 mg 100 gm^{-1}, respectively, with a decrease of 8.55 % . The reason for this is due to the nature of the resulting genetic differences between the varieties and the impact of their response to this trait (Aktas et al., 2009). The same table showed that the addition of different levels of organic fertilizer had a significant effect on the amount of carotene at levels 2.5, 5, and 7.5 kg experimental unit, as the rates of class B Petra were 2.253, 1.585, 0.951 mg 100 gm^{-1}, respectively, and the rates of class A Husseinawi reached 2.289, 1.736, 0.993 mg 100 g^{-1} compared to the control treatment 2.738, 3.152 mg 100 g^{-1}, and the amount of decrease increased by increasing the level of addition, for the organic matter to reduce the pH value and increase the availability of nutrients (Khalil, 2009). As well as increasing the vital activities that help cell division (Maheshbabu et al., 2008) and thus increase the products of carbon metabolism. The same table showed the effect of adding bio-fertilizer, which led to significant differences, where the percentage of decrease was superior to when treating the mixture (nitrogen-fixing bacteria and phosphorous-dissolving bacteria) reaching 0.974 mg 100 g^{-1}, compared to the comparison treatment 3.059 mg 100 g^{-1}, due to the reason for this To increase the absorption of phosphorous by the roots due to the phosphorous-dissolving microorganisms, which increases the density of the root system and its absorption, as well as providing the plant with its needs of water and other nutrients (Tisdale, 1997 and Al-Mandalawi, 2002), in addition to the contribution of phosphorous-dissolving bacteria to increase the plant's ability to increase the presence of phosphorus. Al-Karaki and Raddad, 1997, and (Govedarica et al., 1995) show that Azotobacter bacteria secrete growth regulators such as indole, gibberellin, phenol, which encourage vegetative and root growth from which it becomes able to absorb nutrients. Mohandes, 1987 and Bashir, 2004) showed that the combined addition of nitrogen-fixing and phosphorous-dissolving bacteria increases the concentration of phosphorous element.The table also showed that the bilateral interaction between the cultivars and the organic fertilizers had a significant effect, as the treatment O_3 of the class B gave the highest decrease of 0.951 mg 100 g^{-1},

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while the plants of the treatment O_0 of the class A gave the lowest decrease of 0.951 mg 100 gm^{-1}.The same table also shows that the bilateral interaction between cultivars and biofertilizers had a significant effect, as treatment B C (*Azo*.+*Pse*.) gave the highest decrease of 0.762 mg 100 g^{-1}, while treatment plants AO_0 gave the lowest decrease, amounting to 3.220 mg 100 g^{-1}. The same table showed the bilateral interaction between organic and biofertilizers, which had a significant effect, as the treatment plants O_3C(*Azo*.+*Pse*.) gave the highest decrease, amounting to 0.297 mg 100 gm^{-1}, while the control plants gave the lowest decrease, amounting to 4.421 mg 100 gm^{-1}. As for the triple interaction between the experimental factors, it was significant, as the interaction of the B*O_3*C(*Azo*.+*Pse*.) overlap was superior in reaching the highest decrease, as it reached 0.211 mg 100 g^{-1}, while the plants of the treatment A*O_0*O_0 gave less The decrease amounted to 4.807 mg 100 g^{-1}.

Effect of organic fertilizer levels and types of biofertilizer and their interactions for the two okra cultivars on the carotene content of leaves (mg 100 gm^{-1}).

Class معدل	**التداخل بين C*O**	**Bacterial C (*Azo.+Pse.*)**	**B (*Pse.*)**	**A (*Azo.*)**	**O(0)**	**Organic Kg.Experi.. mental Unit**	**Class**
2.043	3.152	1.741	2.541	3.521	4.807	O_0	**A**
	2.289	1.564	1.790	1.867	3.937	O_1(2.5)	
	1.736	1.060	1.392	1.755	2.738	O_2(5)	
	0.993	0.384	0.977	1.212	1.400	O_3(7.5)	
1.882	2.738	1.193	2.091	3.632	4.035	O_0	**B**
	2.253	0.987	1.987	2.851	3.188	O_1(2.5)	
	1.585	0.656	1.232	1.591	2.860	O_2(5)	
	0.951	0.211	0.912	1.174	1.507	O_3(7.5)	
L.S.D$_{0.05}$ C	L.S.D$_{0.05}$ O	0.974	1.615	2.200	3.059	Rate Bacterial	**L.S.D$_{0.05}$ B**
0.0763	0.1079						**0.1079**
						0.1527	**L.S.D$_{0.05}$ C*O**
						0.3053	**L.S.D$_{0.05}$ C*O*B**

L.S.D$_{0.05}$ C*B	C	B	A	O	**Class**
0.1527	1.187	1.675	2.089	3.220	**A**
	0.762	1.555	2.312	2.897	**B**

L.S.D$_{0.05}$ O*B	C	B	A	O	**Organic**
0.2159	1.467	2.316	3.576	4.421	**O_0**
	1.275	1.889	2.359	3.562	**O_1**
	0.858	1.312	1.673	2.799	**O_2**
	0.297	0.945	1.193	1.453	**O_3**

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D-Proline content in the leaves (µg g-1).

The results of Table (5) show that there are significant differences between the cultivated cultivars in the trait of proline in the leaves, where the Petra okra cultivar B significantly outperformed the Husseinawi plant cultivar A with a decrease.The reason for this is due to the nature of the resulting genetic differences between the varieties and the impact of their response to this trait (Aktas et al., 2009).The same table showed that adding different levels of organic fertilizer had a significant effect on the proline content at levels 2.5, 5, and 7.5 kg as an experimental unit. The rates of Petra B class were 200.2, 159.5, 142.9 micrograms g^{-1}, respectively, and the rates of class A Husseinawi were 248.5, 179.9, 164.3 µg g^{-1} compared to the measurement treatment 257.5, 248.4 µg g^{-1} for both cultivars and the amount of proline decreased with the increase in the level of addition, the external additions of organic fertilizers led to a decrease in the proportion of proline. Proline plays a role in the osmotic adjustment, which reduces the fertilizer concentration of proline as it works to reduce the tension on the plant. So that the rise in proline is a result of the osmotic effort of the cell tissue, which increases the absorption of water, because proline stores the metabolic materials in the cell and thus balances between the vacuole and the cytoplasm (Parson et al., 1979 and Hasegawa et al., 1984). The same table showed that the addition of biofertilizers had a significant effect on the significant decrease in the proline content in treatments A, B, and C, the rates were 213.8, 172.3, 156.7 µg g^{-1} compared to no addition, which amounted to 257.8 µg g^{-1}. As it works to dissolve insoluble phosphorous compounds, as well as its role in competition for adsorption sites, with high energy, this is consistent with (Bashir, 2004). The table also showed that the binary interaction between the cultivars and the organic fertilizers had a significant effect, as the treatment O_3 of the B class gave the highest decrease in values amounting to 142.9 µg g^{-1}, while the plants of the O0 treatment of the B class gave the lowest decrease in values amounting to 257.5 µg g^{-1}. The same table also shows that the bilateral interaction between cultivars and biofertilizers had a significant effect, as the treatment BC(*Azo.*+*Pse.*) gave the highest decrease in values, amounting to 136.2 µg g^{-1}, while the treatment plants AO_0 gave the lowest decrease in values amounting to 259.8 µg g^{-1}.The same table showed the bilateral interaction between organic and biofertilizers, which had a significant effect, as the treatment plants O_3C(*Azo.*+*Pse.*) gave the highest decrease in values, amounting to 121.6 µg g^{-1}, while the control plants gave the lowest values of 352.5 µg g^{-1}.As for the triple interaction between the experimental factors, it was significant, as the overlapping treatment A*O_3*C(*Azo.*+*Pse.*) excelled in reaching the highest decrease in values, as it reached 137.9 µg g^{-1}, while the treatment plants B*O_0*O_0 gave less A decrease of 342.1 micrograms g^{-1}.

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Effect of organic fertilizer levels and types of biofertilizer and their interactions for the two okra cultivars on .(the leaf content of proline (µg g^{-1}).

Classمعدل	التداخل بين C*O	C (*Azo.+Pse.*)	B (*Pse.*)	A (*Azo.*)	O(0)	Organic Kg.Experi.. mental Unit	Class
		Bacterial					
210.3	248.4	185.4	156.8	288.5	362.9	O_0	**A**
	248.5	224.4	241.8	245.6	282.2	O_1(2.5)	
	179.9	161.1	165.3	192.5	200.7	O_2(5)	
	164.3	137.9	146.2	179.4	193.5	O_3(7.5)	
190.0	257.5	183.9	235.7	268.2	342.1	O_0	**B**
	200.2	137.1	162.1	204.9	296.6	O_1(2.5)	
	159.5	118.4	144.3	175.5	200.0	O_2(5)	
	142.9	105.4	125.8	155.6	184.7	O_3(7.5)	
L.S.D$_{0.05}$ C	L.S.D$_{0.05}$ O	156.7	172.3	213.8	257.8	**Rate Bacterial**	**L.S.D$_{0.05}$ B**
6.73	9.52						9.52
						13.47	**L.S.D$_{0.05}$ C*O**
						26.93	**L.S.D$_{0.05}$ C*O*B**

L.S.D$_{0.05}$ C*B	C	B	A	O	**Class**
13.47	177.2	177.6	226.5	259.8	**A**
	136.2	167.0	201.0	255.9	**B**

L.S.D$_{0.05}$ O*B	C	B	A	O	**Organic**
19.04	184.7	196.3	278.3	352.5	**O_0**
	180.7	202.0	225.3	289.4	**O_1**
	139.7	154.8	184.0	200.3	**O_2**
	121.6	136.0	167.5	189.1	**O_3**

E-Phenols in fruits (%).

Table (6) shows that okra cultivars showed a significant increase in phenols in the fruits, where the A-Hussainawi cultivar outperformed the Petra B-cultivar with an increase of 4.36% for the ability of the Hussainawi cultivar to absorb nutrients from the soil more than it was in the Petra variety, and that the plant variety had an optional trait. And the genetic trait in absorbing the ready-made form of the element and its quantity from the medium (Abu Dahi and Younes 1988).The same table showed that the addition of different levels of organic fertilizers (2.5, 5, and 7.5 kg experimental units) had a significant effect on the phenols in the fruits, as the rates of the Husseinawi variety gave 1.942, 2.340, 2.742 % compared to the treatment of no addition, which amounted to 1.505 %, and for the variety Petra okra 1.750, 2.182, 2.527 % compared to the measurement treatment amounted to 1.711 %. The reason for the increase is that adding organic fertilizers to the soil works to increase the plant's absorption of nutrients, thus

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improving the photosynthesis process, thus increasing the accumulated manufactured materials inside the plant, which is reflected in the improvement Specific characteristics of the fruits (Yildirim, 2007).The same table showed that the addition of bio-fertilizers had a significant effect on this trait, as the rate of phenols in the fruits of the plant reached 1.969, 2.214, 2.534 % and for the treatments (A, B, C) compared to the comparison treatment amounted to 1.632 % . Addition is due to the fact that the added microorganisms have better growth compared to not adding, thus it is characterized by obtaining an early crop with good quality characteristics. The nutritional status of the plant (Al-Samarrai, 2006) also found (Mahendran and Kumar, 1998) that the addition of *Azotobacter* and phosphorous-dissolving bacteria improves the growth characteristics of plants.The table also showed that the binary interaction between the cultivars and the organic fertilizers had a significant effect, as the treatment O_3 of the class A gave the highest values, amounting to 2.742%, while the plants of the treatment O_0 of the class A gave the lowest values, which amounted to 1.505%.The same table also shows that the bilateral interaction between cultivars and biofertilizers has a significant effect, as the treatment A C(*Azo.*+*Pse.*) gave the highest values, amounting to 2.576%, while the treatment plants AO_0 gave the lowest values, which amounted to 1.615%.The same table showed the bilateral interaction between organic and biofertilizers, which had a significant effect, as the treatment plants O_3C(*Azo.*+*Pse.*) gave the highest values, which amounted to 3.408%, while the comparison plants gave the lowest values, which amounted to 1.338%. As for the triple interaction between the experimental factors, it was significant, as the overlapping treatment A*O_3*C(Azo.+Pse.) excelled in reaching the highest values, which amounted to 3.597%, while the plants of the treatment A*O_0*O_0 gave the lowest values, which amounted to 1.321%. .

Table (6): Effect of organic fertilizer levels and types of biofertilizer and their interactions for the two okra cultivars .(%) on phenols in fruits

Classمعدل	**التداخل بين C*O**	**Bacterial**				**Organic Kg.Experi.. mental Unit**	**Class**
		C (*Azo.*+*Pse.*)	**B (*Pse.*)**	**A (*Azo.*)**	**O(0)**		
2.132	1.505	1.473	1.722	1.504	1.321	O_0	**A**
	1.942	2.330	2.101	1.840	1.498	O_1(2.5)	
	2.340	2.902	2.529	2.256	1.672	O_2(5)	
	2.742	3.597	2.933	2.467	1.970	O_3(7.5)	
2.043	1.711	2.125	1.790	1.573	1.355	O_0	**B**
	1.750	1.964	1.827	1.703	1.505	O_1(2.5)	
	2.182	2.660	2.121	2.138	1.809	O_2(5)	
	2.527	3.218	2.690	2.275	1.927	O_3(7.5)	
L.S.D$_{0.05}$ C	**L.S.D$_{0.05}$ O**	2.534	2.214	1.969	1.632	**Rate Bacterial**	**L.S.D$_{0.05}$ B**
0.0632	0.0893						0.0893
						0.1263	**L.S.D$_{0.05}$ C*O**
						0.2526	**L.S.D$_{0.05}$**

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					C*O*B
L.S.D$_{0.05}$ C*B	C	B	A	O	**Class**
0.1263	2.576	2.321	2.017	1.615	**A**
	2.492	2.107	1.922	1.649	**B**
L.S.D$_{0.05}$ O*B	C	B	A	O	**Organic**
0.1786	1.799	1.756	1.539	1.338	**O_0**
	2.147	1.964	1.772	1.501	**O_1**
	2.781	2.325	2.197	1.740	**O_2**
	3.408	2.811	2.371	1.949	**O_3**

IV. **CONCLUSIONS.**

The results of the study confirmed the importance of organic fertilizer and types of biofertilizer for the production of okra varieties within the farming systems, and from this we conclude the following:

1- The Husseinawi variety of good quality and quantity can be adopted.

2- The fourth level of organic fertilizer (O_3(7.5 kg experimental unit)) can be adopted in the characteristics of vegetative growth, chemical content of leaves, flowering and production characteristics, and qualitative characteristics of fruits.

3- The fourth level of bio-fertilizer (C(*Azo.* +*Pse.*)) can be adopted, a mixture of *Azotobacter* and *Pseudomonas* bacteria in the characteristics of vegetative growth, the content of the leaves of chemicals, the characteristics of flowering and production, and the qualitative characteristics of the fruits.

V. CONCLUSION

Based on the results of the study, we recommend the following:

1- Conducting more studies on other varieties suitable for cultivation under greenhouse conditions.

2- The use of organic matter at the level of (o3) 7.5 kg of different experimental units to improve the physical and chemical properties of the soil, as it is positively reflected on the yield, both quantitative and qualitative.

3- Increasing the farmer's awareness of the use of bio-fertilizer (C(Pse.+Azo.) because it provided the necessary elements and the appropriate nutritional needs for the okra plant, and because of its positive effects, so it is preferable to apply it in various vegetable crops.

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4- A study of organic agriculture for the economic feasibility of various organic vegetable crops compared to the cultivated vegetable crops resulting from traditional agriculture.

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