International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 3S, 2025
https://www.theaspd.com/ijes.php

Effect of adding Bio-humic fertilizer and planting date on vegetative and chemical growth characteristics of onion *Allium cepa* L.

[1]Nasser J. Kashash; [2]Laila T. Fadala; [3]Basem K. Hassan
[1,2]Department of Horticulture and Landscape Engineering, College of Agriculture and Marshlands, University of Thi Qar, Iraq.
[3]Department of Field Crops, College of Agriculture and Marshlands, University of Thi Qar, Iraq
Naser.post.2022@utq.edu.iq lailaturky8@utq.edu.iq basim@utq.edu.iq

Abstract

The experiment was carried out in Dhi Qar Governorate - Nasiriyah City - Al-Mustafawiyah area, for the agricultural season 2023/2024 in one of the open plastic houses affiliated with the Agricultural Research Station for the fields of the Department of Horticulture and Landscape Engineering - College of Agriculture and Marshes, University of Dhi Qar. In a sandy loam soil to studying the effect of adding Bio-humic fertilizer and planting date on the vegetative growth characteristics and chemical characteristics of plant onion Allium cepa L. The experiment was carried out using a Randomized Complete Block Design (R.C.B.D). The experiment included four treatments for adding biohumic fertilizer - control treatment (spraying with distilled water only), concentration (3) kg. ha-1, concentration (6) kg. ha-1, concentration (9) kg. ha-1 and three treatments for planting dates - the first date 10.20.2023, 01.11.2023 and the third date 10.11.2023. The addition of biofertilizer at a concentration of 6 kg.ha-1 was superior in giving the highest plant height, number of leaves, weight of the vegetative group, chlorophyll content of the leaves, and carbohydrate content of the leaves if it reached 91.67 cm, it reached 15.22 leaves, and the onion reached 38.54 g. 89 mg-1.100 g dry weight 29.00 mg.g-1 dry weight respectively, and the first date (10/20) was superior in plant height, number of tubular leaves, diameter of the onion neck, and dry weight of the vegetative group.

Keywords; Onion plant; Bio-humic fertilizer; planting date; chlorophyll; carbohydrates.

INTRODUCTION

Onions (*Allium cepa* L.) are considered one of the most important plants of the Alliaceae family and are one of the most important winter vegetable crops in the world. They play an important role in human nutrition, as an individual needs to consume 7-10 kg of onions annually. The nutritional value of every 100 grams of onions is 92.5 g of water, 1.3 g of protein, 0.1 g of fat, 4.3 g of carbohydrates, 0.9 mg of fiber, 60 mg of vitamin C, 6 mg of vitamin A, 0.004 vitamin B1, 0.006 vitamin B2 (Tutova et al., 2022). Medically, onions are used to treat cough, asthma, bronchitis, and prevent neurological, cardiovascular and vascular diseases due to their content of anthocyanins and flavonoids, which act as antioxidants, in addition to their content of the active substance Allicin, which is responsible for most of the medicinal properties of the plant (Ani et al., 2021).

The productivity of bulbs per hectare in Iraq in 2017 was about 8262 kg. ha-1. This productivity is relatively low when compared to the productivity of other Arab countries such as Jordan 22660 kg. ha-1, Saudi Arabia 25304 kg. ha-1, and Egypt 31991 kg. ha-1 (Arab Organization for Agriculture and Development, 2008). Bio-organic fertilizers are defined as all bacterial, fungal and algal inoculants that are added to soil or seeds for the purpose of increasing soil fertility by increasing the availability of the necessary elements for plant growth

and thus increasing productivity (Tilak and Reddy, 2006). Biofertilizers have economic importance in the agricultural field, as they increase the availability of some nutrients and increase the speed of decomposition of organic waste. They play a role in the secretion of some enzymes, growth regulators, and plant hormones, and they are important in biological control, in addition to reducing costs (Al-Ghazi, 2006).

Vegetable crops grow in areas suitable for their cultivation, and this depends mainly on the appropriate environmental conditions that determine the success of growing the crop in that area rather than others. Among the conditions for the success of vegetable crops in a place are the availability of appropriate climatic conditions represented by temperature, humidity, lighting, ventilation, and appropriateness for the crop, (Fadala, 2022), as vegetables are affected by temperatures and whether they are ideal for crop growth (Borras et al., 2012). Devendra et al., (2018)) indicated when studying Azotobacter bacteria and their effect on onion plants for six doses (T0: NPK, T1: 33 g/m2, T2: 66 2 g/m2, T3: 99 2, g/m2, T4: 132, g/m2, T5: 166, g/m2, T6: 199 2 g/m2). The results showed a significant increase in plant height T6 (57.3 cm), number of leaves, (T6 (11.4 chlorophyll a T6 (0.86 mg / g chlorophyll b 0.47) mg / g. The study conducted by Saleh, et al., 2021 at the College of Agriculture, University of Anbar, showed the effect of humic acids and phosphorus on the growth and yield of onions irrigated with water of different salinity. Using irrigation water of different electrical conductivity (1.1, 3.00, 5.00 and 7.00) dS m-1, three levels of humic acids were used, namely 0, 20 and 40 kg. ha-1, respectively, and three levels of single superphosphate fertilizer were used, namely 0, 100 and 150 kg. ha-1. The results showed an increase in onion plant height, leaf area, stem diameter and total yield, and an increase when adding acid levels Al-Dabalia. Between Khalil (2013) in a study conducted at the Technical Agricultural College / Mosul on the effect of organic fertilization on the growth and yield of green onions Allium cepa L. local white variety. The experiment included six treatments, which are chemical fertilization (65 kg / donum urea + 65 kg / donum superphosphate + 50 kg / donum potassium sulfate), poultry manure at a rate of 15 m3 / donum, sheep manure at a rate of 20 m3 / donum, and three treatments of manufactured poultry manure (Italpollina) at a rate of 20, 30 and 40 kg / 100 m2. The results showed the superiority of manufactured poultry manure added at a rate of 40 kg / 100 m2 in some vegetative growth characteristics (number of leaves per plant 27.62, fresh weight of leaves 93.23 g, and dry weight of leaves 11.53 g).

The study aims to know the effect of biohumic fertilizer on the vegetative and chemical growth characteristics and to know the effect of planting date on the vegetative and chemical growth characteristics of onion plant.

MATERIALS AND METHODS

3-1 Experimental site

The experiment was carried out in Dhi Qar Governorate, Nasiriyah City, Mustafawiyya area, for the agricultural season 2023/2024 in one of the open plastic houses affiliated with the Agricultural Research Station for the fields of the Department of Horticulture and Landscape Engineering, College of Agriculture and Marshes, University of Dhi Qar. In a loamy sand soil to study the effect of adding Bio-humic fertilizer and planting date on the vegetative growth characteristics and chemical characteristics of onion *Allium cepa* L.

3-1-2 Soil and irrigation water analysis

An analysis of the plastic house soil was conducted by taking random samples from different locations of the field soil at a depth of (30) cm. The samples were mixed and air-dried for (72 hours) and ground and sieved with a sieve with (2 mm) holes, then chemical analysis processes were carried out at the Shatra Institute. While part of the soil remained unground and unsifted

to conduct some physical analyses of the soil. Table (1) shows some chemical and physical properties of field soil.

Table (1) some chemical and physical properties of field soil

No.	Analysis Type	Value	Unit
1	EC	1.3	ds/m
2	PH	7.35	/
3	CEC	19.5	mg/L
4	(OM) Organic matter	7.4	mg/L
5	($CaCo_3$) Calcium carbonate	203.2	m mole/kg-1
6	Ca^+	4.3	m mole/kg-1
7	Mg^+	2.7	m mole/kg-1
8	Na^+	7.3	m mole/kg-1
9	K^+	0.8	m mole/kg-1
10	Cl^-	2.6	m mole/kg-1
11	SO_4	6.3	m mole/kg-1
12	CO_3	/	m mole/kg-1
13	HCO_3	0.98	m mole/kg-1
14	N	12.7	mg/kg m
15	P	6.3	mg/kg m
16	K	38.8	mg/kg m
17	Sand	226	mg/L
18	Loam	450	mg/L
19	Clay	324	mg/L

Table (2) Chemical and physical analysis of irrigation water in the field

No.	Analysis Type	Value	Unit
1	PH	7.25	/
2	EC	1.3	ds/m
3	TDS	910	mg/g
4	T.H	201	mg/g
5	HCO_3	12.3	mg/g
6	CO_3	0	mg/g
7	Ca^{+2}	37.4	mg/g
8	Mg^{+2}	12.4	mg/g
9	Na^+	103	mg/g
10	K^+	5.2	mg/g
11	NO_3	0.11	mg/g
12	P	0.12	mg/g
13	CL^-	200	mg/g
14	SO_4	310	mg/g
15	TSS	740	mg/g

3. Field soil preparation and cultivation:

The field soil preparation process was carried out by ploughing it twice in a perpendicular manner, smoothing it, leveling it and planning it. The land was divided into three sectors, each sector consisting of three lines, the length of the line was 20 m and its width was 50 cm, and the distance between the two lines was 40 cm. The line was dug to a depth of 30 cm and was first filled with compost for a distance of 20 cm, then a layer of decomposed animal manure

was added on it at a rate of 10 kg dun-1, and DAP fertilizer was added on it at a rate of 50 kg/dunum-1 (Matloub et al., 1989), then peat moss was added at a rate of 5 kg dun-1, then the holes were leveled with the soil surface and the drippers were extended and covered with black nylon (Mulching). Each line was divided into 4 experimental units, the length of the unit was 4 m, then plant holes were dug at a distance of 20 cm between holes alternately and on both sides of the line so that the number of plants in the experimental unit was 40 plants. The land was irrigated two days before planting the bulbs (small bulbs) to moisten the soil. The damaged and infected bulbs were sorted and disposed of, and the weights of the good bulbs were standardized to approximately 1.5 g (Matloub et al., 1989). The bulbs (Red granex variety) were planted on 10.20.2022 and were irrigated immediately after planting and then at a rate of one irrigation per week. After the temperature dropped, irrigation was carried out every 15 days. The patching process was carried out by replacing the failed bulbs with new bulbs 10 days after planting. All service operations were carried out, including weeding and weed removal, and the chemical fertilizer NPK high phosphorus 10-52-10 was added at a rate of 1 kg/ton of water-1 two weeks after planting. Urea was fertilized on 10.11.2023 by adding it with irrigation water at a rate of 100 gm urea 46% nitrogen. 100 liters of water-1, and the high potassium fertilizer 20-10-10 was added in two batches on 05.12 and 20.12.2023. The experiment was completed on 05.04.2024. The experiment was implemented using a Randomized Complete Block Design (R.C.B.D). The experiment included three treatments for planting dates and four treatments for adding biohumic fertilizer, with three replicates and 36 experimental units, as a factorial experiment with two factors. The treatments were randomly distributed to the experimental units for each of the three replicates. The data were analyzed using the Genstat 2011 program, and the averages were compared using the least significant difference (L.S.D) test to compare the averages at a probability level of (0.05) (Al-Sahouki and Wahib 1990).

Experimental treatments: The experiment included two factors: four concentrations of bio-organic fertilizer: - Control treatment (spraying with distilled water only) - concentration (3) kg. ha-1 - concentration (6) kg. ha-1 - concentration (9) kg. ha-1 and three planting dates - the first date 20.10.2023. - the second date 01.11.2023. - the third date 10.11.2023.

The studied characteristics:

1_ Plant height (cm)

Ten plants were selected from the experimental unit, their height was measured using a measuring tape from the soil surface level to the highest peak of the plant, and then the average was taken.

2- Number of leaves (leaf plant-1).

The number of tubular leaves for ten plants in each experimental unit was calculated and their average was extracted.

3- Dry weight of the vegetative group (g plant-1).

Ten plants were taken at the end of the season and randomly from each experimental unit to measure the dry weight of the vegetative group (leaves and bulb stalks), then they were washed well with water and dried in an electric oven at a temperature of 70 C for 72 hours and weighed until the weight stabilized using a sensitive balance and according to the dry weight average of the vegetative group (Al-Sahaf, a1989).

4- Total chlorophyll content of leaves (mg/100 gm-1 fresh weight)

Total chlorophyll in leaves was calculated using the extraction method described by Goodwin (1976) by taking random samples from five plants for each treatment, washing them and leaving them to dry in the air.

1- 0.5 g was taken from each sample and 10 ml of acetone 80% concentration was added to it.

2- The tissue was crushed and mashed using a ceramic mortar and placed in a test tube.

3- It was placed in a Center Fuge centrifuge at 3000 rpm for 15 minutes to separate the sediment from the filtrate.

4- The light absorption was measured using a Spectrophotometer, model UV-1700, at two wavelengths, chlorophyll A at a wavelength of 645 nm and chlorophyll B at a wavelength of 663 nm, and the total chlorophyll was calculated according to the following equation:

Total Chlorophyll (mg.L) = 20.2*D (645 nm) + 8.02*D (663 nm) ×(V/W1000×)

Where:

D: represents the optical density reading of the extracted chlorophyll

V: Volume of the final extract (ml)

W: Weight of fresh tissue (g)

5_ Total soluble carbohydrate content of leaves (mg g-1 dry matter)

The total soluble carbohydrate content of leaves was estimated by the Modification of the phenol-sulphuric acid Colorimetric Method described by Dubois et al. (1956)

Which is summarized as follows:

1- Take 0.5 g of the dry ground plant sample for each experimental unit and place it in a glass tube.

2- Add 70 ml of distilled water, then close the tube tightly and heat it in a water bath at 90 °C for an hour, then leave it to cool at room temperature.

3- Filter the solution using filter paper take 5 ml of the filtrate and add 25 ml of distilled water.

4- Take 1 ml of it add 1 ml of 5% phenol and 5 ml of concentrated sulfuric acid and leave it to cool at room temperature.

5- The absorbance was measured using a photometer at a wavelength of 490 nm.

6- The total dissolved carbohydrates were estimated using the standard glucose curve.

Carbohydrates were calculated according to the following equation.

Total dissolved carbohydrates (mg g-1) = Carbohydrates in the standard curve × Final volume of extract (ml) × Dilutions / Sample weight (g)

RESULTS AND DISCUSSION

1. Plant height (cm)

Table (2) shows that the study factors and their interaction have a significant effect on plant height, as adding biofertilizer at a concentration of 6 kg.ha-1 outperformed giving the highest plant height of 91.67 cm over other additions at a concentration of 9 kg.ha-1, 3 kg.ha-1 which amounted to 87.16 and 71.15 cm respectively. While the treatment without addition gave the lowest plant height of 69.33 cm.

The results in the same table show significant differences in planting dates, as the first planting date 10/20/2023 outperformed giving the highest plant height of 83.05 cm, while the date 11/10/2023 was lower and gave the lowest plant height of 69.47 cm.

As for the interaction between the two study factors, it was significant, as the two-way interaction between the fertilizer treatment at a concentration of 6 kg.ha-1 and the first date 10/20/2023 showed the highest plant height of 97.32 cm, compared to the lowest height of 64.51 cm on the date 11/10/2023 and the comparison treatment.

Table (2). effect of adding biofertilizer, planting date and their interaction on plant height (cm)

planting dates	biohumic fertilizer				planting dates average
	Without adding	Concentration (3)kg.h^{-1}	Concentration (6)kg.h^{-1}	Concentration (9)kg.h^{-1}	
20.10.2023	73.10	76.38	97.32	85.40	83.05
01.11.2023	70.40	72.20	95.17	83.11	80.22
10.11.2023	64.51	64.87	82.53	65.97	69.47
biohumic fertilizer average	69.33	71.15	91.67	78.16	Interaction
L.S.D (0.05)	planting dates		biohumic fertilizer		3.226
	1.613		1.863		

2. Number of leaves

Table (3) shows that the study factors and the interaction between them had a significant effect on the number of leaves, as the addition of biofertilizer at a concentration of 6 kg.ha-1 outperformed the other additions in giving the largest number of leaves, reaching 15.22 leaves. While the treatment without adding gave the lowest number of leaves per plant, reaching 10.11 leaves.

The results in the same table show significant differences in planting dates, as the first planting date 10/20/2023 outperformed in giving the highest number of leaves, reaching 14.67 leaves, while the date 10.11.2023 gave the lowest number of leaves, reaching 11.33 leaves.

As for the interaction between the two study factors, it was significant, as the two-way interaction between the fertilizer treatment at a concentration of 6 kg.ha-1 and the first date 20.10.2023 gave an effect of the number of leaves amounting to 18.33, compared to the lowest number of leaves, which was on the date 10.11.2023 and the comparison treatment, which amounted to 9.00 leaves.

Table (3). effect of adding biofertilizer, planting date and their interaction on levies number (levies plant-1)

planting dates	biohumic fertilizer				planting dates average
	Without adding	Concentration (3)kg.h^{-1}	Concentration (6)kg.h^{-1}	Concentration (9)kg.h^{-1}	
20.10.2023	11.67	13.33	18.33	15.33	14.67
01.11.2023	9.67	12.33	15.00	14.00	12.75
10.11.2023	9.00	12.00	12.33	12.00	11.33
biohumic fertilizer average	10.11	12.56	15.22	13.78	Interaction
L.S.D (0.05)	planting dates		biohumic fertilizer		2.063
	1.032		1.191		

3- Dry weight of the vegetative shoot (g)

Table (4) shows that the study factors and the interaction between them have a significant effect on the dry weight of the vegetative group, as the addition of biofertilizer at a concentration of 6 kg.ha-1 outperformed the other additions in giving the highest dry weight of the vegetative group of the onion, which amounted to 38.54 g. While the treatment without adding gave the lowest dry weight of the vegetative group, which amounted to 19.54 g. The results in the same table show significant differences in planting dates, as the first planting date 20.10.2023 outperformed in giving the highest dry weight of the vegetative group, which amounted to 38.00 g, while the date 10.11.2023 gave the lowest weight of the vegetative group of the onion, which amounted to 24.22 g.

As for the interaction between the two study factors, it was significant, as the two-way interaction between the fertilizer treatment at a concentration of 6 kg.ha-1 and the first date 20.10.2023 gave the highest dry weight of the green mass of the onion, reaching 48.88 g, compared to the lowest dry weight of the green mass, which was at the date 10.11.2023 and the comparison treatment, which reached 17.00 g.

Table (4). effect of adding biofertilizer, planting date and their interaction on Dry weight of the vegetative shoot (g)

planting dates	biohumic fertilizer				planting dates average
	Without adding	Concentration (3)kg.h^{-1}	Concentration (6)kg.h^{-1}	Concentration (9)kg.h^{-1}	
20.10.2023	22.68	36.83	48.88	43.58	38.00
01.11.2023	18.93	30.95	38.62	33.77	30.57
10.11.2023	17.00	25.03	28.13	26.73	24.22
biohumic fertilizer average	19.54	30.94	38.54	34.69	Interaction
L.S.D (0.05)	planting dates		biohumic fertilizer		1.679
	0.839		0.969		

4_ Chlorophyll ratio mg per 100 g fresh weight

Table (5) shows that the study factors and the interaction between them had a significant effect on the chlorophyll ratio, as the addition of biofertilizer at a concentration of 6 kg.ha-1 outperformed the other additions in giving the highest chlorophyll ratio of 14.89, while the treatment without addition gave the lowest ratio of 7.12. The results in the same table show significant differences in planting dates, as the first planting date 20.10.2023 was superior in giving the highest percentage of chlorophyll, which amounted to 12.74, while the date 10.11.2023 was lower in giving the lowest percentage, which amounted to 10.90. As for the interaction between the two study factors, it was significant, as the two-way interaction between the fertilizer treatment at a concentration of 6 kg.ha-1 and the first date 20.10.2023 gave the highest percentage of chlorophyll, which amounted to 16.73, compared to the lowest percentage that was on the date 10.11.2023 and the comparison treatment, which amounted to 7.40.

Table (5). effect of adding biofertilizer, planting date and their interaction on Chlorophyll ratio mg per 100 g fresh weight

planting dates	biohumic fertilizer				planting dates average
	Without adding	Concentration (3)kg.h^{-1}	Concentration (6)kg.h^{-1}	Concentration (9)kg.h^{-1}	
20.10.2023	6.50	12.63	16.73	15.10	12.74
01.11.2023	7.47	10.23	14.50	14.27	11.62
10.11.2023	7.40	11.07	13.43	11.70	10.90

biohumic fertilizer average	7.12	11.31	14.89	13.69	Interaction
L.S.D (0.05)	planting dates		biohumic fertilizer		1.348
	0.674		0.778		

5 - Total carbohydrate content of leaves mg.g dry matter

Table (6) shows that the study factors and the interaction between them had a significant effect on the carbohydrate percentage, as the addition of biofertilizer at a concentration of 6 kg.ha-1 outperformed the other additions in giving the highest carbohydrate percentage of 29.00 over the other additions. While the treatment without addition gave the lowest percentage of 21.83. The results in the same table show significant differences in planting dates, as the first planting date 20.10.2023 was superior in giving the highest percentage of carbohydrates, reaching 29.44, while the lowest date 10.11.2023 gave the lowest percentage, reaching 23.88. As for the interaction between the two study factors, it was significant, as the two-way interaction between the fertilizer treatment at a concentration of 6 kg.ha-1 and the first date 20.10.2023 gave the highest percentage of carbohydrates, reaching 34.30, compared to the lowest percentage that was on the date 10.11.2023 and the comparison treatment.

Table (6). effect of adding biofertilizer, planting date and their interaction on Total carbohydrate content of leaves mg.g dry matter

planting dates	biohumic fertilizer				planting dates average
	Without adding	Concentration (3)kg.h^{-1}	Concentration (6)kg.h^{-1}	Concentration (9)kg.h^{-1}	
20.10.2023	21.33	29.97	34.30	32.17	29.44
01.11.2023	21.90	25.50	28.37	25.67	25.36
10.11.2023	22.27	25.90	24.33	23.00	23.88
biohumic fertilizer average	21.83	27.12	29.00	26.94	Interaction
L.S.D (0.05)	planting dates		biohumic fertilizer		2.489
	1.244		1.437		

Tables 2, 3, 4 and 5 show that there are significant differences between planting dates, as the first date (20.10) was superior in plant height, number of tubular leaves, diameter of the bulb neck and dry weight of the vegetative group. The reason for the increase in plant height when planting on the first date may be due to the length of the vegetative growth period and the suitability of environmental conditions, as the increase in the vegetative growth period means exposure to a longer period of lighting and increased photosynthesis and the materials resulting from it, and thus this is reflected in the increase in plant height and number of leaves (Ahmed, 2001), while the short duration of vegetative growth and light period leads to a decrease in plant height and number of leaves (Al-Hasani, 2001). These results are consistent with Prasad et al. (2017). The reason for the increase in the diameter of the bulb neck on the first date (10/20) may be due to the increase in chlorophyll (Table 9), which was positively reflected in the increase in the diameter of the bulb neck. The reason for the increase in the dry weight of the vegetative group on the first date (20.10) and its decrease when the planting date is delayed may be attributed to the length of the plant growth period and the hours of lighting that The plant needs it and the temperature is suitable, which gives the leaf a greater opportunity to grow and expand its area (Al-Hasani, 2001 and Al-Jabouri and Al-Jumaili, 2008). In addition,

increasing the height of the plant (Table 2) and the number of leaves (Table 3) for the first date led to an increase in the dry weight of the vegetative shoot.

Tables 6, 7, 8 and 9 show that there are significant differences between planting dates. The first date was superior in the content of chlorophyll, nitrogen, phosphorus and potassium in the leaves. This may be attributed to the effect of environmental conditions, especially the temperatures to which the plants were exposed in the first date, as temperatures play an important and major role in increasing enzymatic activity and vital processes responsible for cell division and elongation, especially the process of photosynthesis, which depends directly on temperatures. Suitable temperatures in the first date (01.12) increased the formation of chlorophyll (Table 3). Chlorophyll is one of the means of increasing the products of photosynthesis. Increasing the chlorophyll content of plants means an increase in the rate of photosynthesis, assuming that light and carbon dioxide (CO2) are distributed uniformly on the leaves. Chlorophyll is the direct center for harvesting light energy, which converts it into vital energy in the plant (Al-Sahaf et al., 2003). The increase in the dry weight of the plant is due to the increase in the characteristics of vegetative growth, such as high Plant and number of leaves (Table 3, 4), perhaps the reason for the superiority of the first date plants in the percentage of nitrogen, phosphorus and potassium is due to the relatively long growth period (compared to the third date) as it gave the plant a greater opportunity to absorb nitrogen, phosphorus and potassium and increase its percentage in the plant leaves (Al-Shukri, 2002). This fertilizer improves the physical and chemical properties of the soil and its content of various nutrients, and organic fertilizer contains humic substance (humic) as humic acid is produced from the decomposition of humus and plays an important role in improving cell division and cell elongation as well as affecting the processes of photosynthesis, respiration and protein synthesis. Its effect is similar to the effect of plant hormones and causes an increase in the growth rate of the plant (Kulikuva et al., 2003). Organic fertilizer also encourages the activity of microorganisms and increases microbial activity and thus increases the activity of microbial enzymes such as Nitrogenase, Urease and Dehydragenase (Mohamed et al., 1999). Al-Sahaf and Aati (2007) also indicated that the decomposition of organic fertilizers produces some amino and organic acids, all of which play an important role in the vital processes in the plant and led to an increase in some vegetative growth characteristics (number of leaves per plant - Table 2 - and fresh and dry weight of leaves - Table 3), which was reflected in the characteristics of the yield, as the average weight and diameter of the bulb and the yield of a single plant increased, and thus the total yield of the bulbs increased. These results are consistent with what was found by Salman (2000); Abdelrazzag (2002); Akoun (2004); Magdi (2009); Al-Khafaji (2010); Hamoud (2011)

CONCLUSIONS

1_We conclude that the biofertilizer at a concentration of 6 kg.ha gave a significant superiority in most vegetative and chemical characteristics.

2_We conclude that the first date on 10/20/2023 was superior in most vegetative andchemical characteristics.

Acknowledgements

I would like to extend my sincere thanks to the Deanship of the Faculty of Agriculture and the Head of the Department of Horticulture and Landscape Engineering for helping me work in the laboratories of the Department of Horticulture and completing field work..

REFERENCES

Kulikuva , N. A., A. D. Dashitsyrenora , I. V. Perminova , and G.F. Lebedeva 2003 Auxin-like activity of different fractions of coal humic acids. Bulgarien J. Ecolog. Sci. 2(3-4) 55-56.

Magdi , A. , A. Mousa and F.M. Mohamed. 2009. Enhanced yield and quality of onion (Allium cepa L. cv. Giza 6) produced using organic fertilization Assuit Univ. Bull. Environ. Res. 12(1):9-19..

Mohamed F. I., F. A. Hallal and R. A. El- Shabraway.1999.A comparative study on the effect of bread yeast and folige nutrients application on the productivity and quality of two pea cultivars . Egypt J. Appl. Sci. 14 (10):284-299. : 284-299.

Singh, H. M., & Singh, S. 2019. Effect of different Spacing and Transplanting Dates on Growth and Yield of Onion (Allium cepa. L) var. Agrifound Light Red:. Journal of AgriSearch, 6(Special) Issns, 64-67.

Tilak, K.V.B.R. and B.S. Reddy. 2006. B. cereus and B. circulansnovel inoculants for crops. Curr. Sci., 5: 642-644.

Tutova, T. N.; T. E. Ivanova; E. V. Sokolova and L. A. Nesmelova (2022). Influence of seed onion planting time on productivity and

Ani, I. F.; T. Alfa and A. S. Kupoluyi (2021). Nutrients and antioxidant properties of red, yellow and white onions (Allium cepa L) in Ibadan, Oyo State, Nigeria. Journal of Dietitians Association of Nigeria (JDAN), 12: 45-51.

Dubois, M. K.; Crilles, K. A; Hamiltor, J. K.; Rebers, D. A. and Smith, F. (1956). Colorimetric method for determination of Sugars and related Substances Anal. Chem. 28: 350 -365.

Goodwin, T. W. (1976). Chemistry and bio Chemistry of plant Pigments. Academic Press.

Prasad, B., Maji, S. and Meena, K.R. 2017. Effect of date of transplanting and mulching on growth, yield and quality of onion (Allium cepa L.) cv. Nasik Red. J. Appl. Nat. Sci., 9(1): 94 –101.

Hamoud, A. K,. (2011). Effect of organic fertilization and spraying with licorice extract on growth characteristics, yield and active compounds. Master's thesis. College of Agriculture. Tikrit University.

Al-Khafaji, A. M. H. (2010). Effect of organic fertilization from different sources on growth, productivity and quality of bulbs and seeds of onion plant. Master's thesis. College of Agriculture. University of Baghdad.

Salman, A. H. (2000). Effect of interaction between irrigation, water salinity and organic fertilizer on some soil characteristics and yield in onions. Master's thesis. Agricultural mechanism. University of Baghdad. Republic of Iraq.

Al-Sahaf, F. H., and Alaa S. A. (2007). Potato production by organic farming. 3- The effect of organic fertilization and whey on plant growth, tuber yield and quality characteristics. Iraqi Journal of Agricultural Sciences. 48(4): 65-82.

Bouras, M., Bassam A. T., and Ibrahim A. (2012). Theoretical vegetable production, Damascus University, Syria: 392 p.

Al-Sahaf, F. H. (1989). Applied plant nutrition. University of Baghdad. Ministry of Higher Education and Scientific Research

Matloub, A. N., and Ezz El-Din S. M., and Karim S. A. (1989). Vegetable production, part one. Ministry of Higher Education and Scientific Research/University of Mosul. p. 490.

Ahmed, S. A. (2001). Stages, growth characteristics, yield and genetic structures of yellow corn (Zea mays). Master's thesis. Department of Field Crops Sciences. College of Agriculture. University of Baghdad.

Al-Hasani, S. H. J. (2001). Effect of planting dates on growth characteristics, yield and its components of two varieties of white corn (Sorgum bicolor L.). Master's thesis. Department of Field Crops Sciences. College of Agriculture. University of Baghdad.

Al-Jubouri, K. A., and Majid A. H. A. (2008). Effect of spraying with nutrient solution (Al-Nahrain), planting date and heat accumulation on germination and growth of two

varieties of green peas (L. Pisum sativum). Al-Anbar Journal of Agricultural Sciences.:6 (1) 159-173.

Al-Ghazi, A. K. A. (2006). Effect of Ronstar pesticide on the growth of Azotobacter bacteria. Master's thesis. College of Agriculture. University of Baghdad\Iraq.

Khalil, A. S. (2013). Effect of organic fertilization on the growth and yield of green onions. Allium cepa L. Local white variety. Diyala Journal of Agricultural Sciences, 5(2):185-193, 2013.

Saleh, S. J. H., and Al-Hamdani, F. M. A., and Al-Hadith, Y. H. (2021). The effect of humic acids and phosphorus on the growth and yield of onions irrigated with water of different salinity. Iraqi Journal of Desert Studies 2021, 11(1): 29-41.

Fadala, L. T. (2022). The effect of some treatments on growth indicators and yield of two hybrids of hot pepper Capsicum frutescens L. and its storage properties and biochemical effectiveness. PhD thesis. College of Agriculture\University of Basra

Al-Moussawi, . (2020). The effect of bio- and organic fertilizers and levels of npk on some soil fertility properties and growth and yield of wheat Triticum aestivum L.. PhD thesis College of Agriculture\Al-Muthanna University. Iraq

laila Turki Fadalah, Ghufran Zaid Khalaf Al-Rikabi and Hadiah A. Atiyah(2023),Effect of adding Nano-NPK fertilizer and humic acid on some vegetative growthcharacteristics and active components of Myrtle Myrtus communis L. (J. Glob. Innov. Agric. Sci., 11(2):229-234

Laila Turki Fadala;Fatima Ali Hassan and Dhia Ahmed Taain;(2023)Role of humic acid and some spraying treatments in improving vegetative growth parameters, chemical components of leaves and yield of hot pepper plants (*Capsicum annuum* L.) planted in unheated plastic houses conditions *AIP Conf. Proc.* 2845, 1