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Impact of Date Residues, Humic Acid and The Level of Irrigation in Growth and Yield of Onions (*Allium cepa* L.)

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Abstract. A field experiment was carried out in Anbar Governorate, Heet city, during December 2018 to May 2019 in sandy clay loamy soil. The experiment included three factors: Date residues were added at two levels (0 and 5%) of soil weight mixed with the soil, Humic acids were added to the soil in three levels (0, 15 and 30 kg ha⁻¹), The amount of irrigation 100% and 50% of the net irrigation depth calculated from the measurements of the American type A evaporation basin were added. Study factors were distributed according to the split-split plot design within RCBD with three replications. The results showed that the study parameters had a significant effect on the values of plant height, fresh weight of leaves, number of leaves, average bulb weight and total bulbs yield. The highest values of plant height, number of tube leaves, average weight of bulb, and total bulbs yield were 78.3 cm, 25.0, 85.0 gm and 30.82 ton ha⁻¹ respectively when adding 5% of date residues and the humic level was 15 kg ha⁻¹ and irrigation water 100% compared to 27.1 cm and 3.0, 26.1 gm and 2.0 ton ha⁻¹ when date residues are not added, and a humic level of 0 kg ha⁻¹ and the amount of irrigation water 50%. The bilateral and triple interaction between the three factors also show a significant effect on some plant traits.

1- Introduction

The onion (*Allium cepa* L.), which belongs to the Alliaceous family, is one of the most important strategic crops in Iraq and the world. Which is of great importance as it is an antioxidant and anticancer [1]. Therefore, various countries have sought to pay attention to its cultivation and increase the cultivated areas of it to raise the level of production. The yield per hectare in Iraq of bulbs for 2007 is about 8262 kg ha⁻¹. This productivity is relatively low when compared to that of other Arab countries such as Jordan 22660 kg ha⁻¹ and Saudi Arabia 25304 kg ha⁻¹ and Egypt 31991 kg ha⁻¹ [2]. Many researchers have been interested in studying the effect of organic fertilizers in plant growth and yield, which is one of the factors affecting the availability of plant nutrients and then positively affecting plant growth and development [3]. The addition of date residues is an effective strategy in reducing the effect of water stress and increasing plant tolerance by improving the distribution of soil pores, increasing the ability to hold water and aeration, and improving root secretions such as organic acids that regulate soil pH [4]; [5] found that adding date palm residues and rice residues to the soil had a significant effect on the yield of cucumber, as the treatment of date palm with 100%, increase plant height, and plant yield [6] showed that adding organic nitrogen at a rate of 9.5 ton ha⁻¹ with potassium and phosphorous from natural sources led to an increase in plant height, number of leaves, length, diameter and weight of the bulb, as well as the elements of nitrogen, potassium, phosphorus,



copper, manganese, zinc and iron in the plant tissues. Gambo[7] found a significant increase in onions yield when adding farm fertilizer at a level of 30 ton ha⁻¹ with 75 kg of nitrogen ha⁻¹. Normally, adding humic acid to the soil is associated with an increase in the availability of nutrients. Also the addition of these acids have a significant role in the soil–plant relationship by transform many nutrients into formulas available for absorption by the Plant [8]; [9]. Water is one of the most important determinants of agricultural production, and the demand for it is increasing, so rationalizing the use of water in irrigation of crops is necessary. Iraq suffers from water scarcity due to the shortage of annual water supplies of the Tigris and Euphrates[10]. Many methods have been adopted to reduce water needs and by innovative scientific methods, including insufficient irrigation, by adding quantities of water less than the actual water needs[11]. The study aimed to find out the role of date residues and humic acid water demand in the growth and yield characteristics of onions.

2- Materials and Methods

A field experiment was carried out in Anbar Governorate, Heet city, during the period from December 2018 to May 2019 in sandy clay loamy soil. The physical and chemical properties of the soil were estimated according to the methods mentioned in[12]. The volumetric moisture at saturation, field capacity, and permanent wilting point were estimated[13];(Table 1). Date residues were mixed with the soil in to level without added and added 5 % of soil weight Humic acids was added to the soil in three levels (0, 15 and 30) kg ha⁻¹.The amount of irrigation water 100 % and 50 % of the net irrigation depth calculated from the measurements of the American type A evaporation basin were added.

Scheduling of Irrigation

All treatments irrigated as 20 mm deep for germination. Irrigation then scheduled to compensate vaporized water from the American evaporation class A pool using 50 % and 100 % NDI. The NDI computed after that by the following equations [14]:

$$ET_0 = K_p \times E_{pan} \quad (1)$$

Where:

ET₀: evapotranspiration potential (mm.day⁻¹).

E_{pan}: evapotranspiration measured in the pan (mm.day⁻¹).

K_p: evaporation pan's specific coefficient, that differs according to pan's type, vegetative cover surrounding the pan, and soil surface nature, as mentioned in [15]. The value 0.8 was depended here depending on meteorological conditions of study area according to the method mentioned by [16].

Actual evaporation was calculated according to the following equation:

$$ET_a = K_c \times ET_0 \quad (2)$$

Where:

ET_a: actual evapotranspiration (mm.day⁻¹).

K_c = Crop coefficient .

Values 0.75, 1.025, 0.875 and 0.80 that are listed in [17] were desired to represent crop coefficient values for the durations (5/01 – 26/02), (27/02 – 20/03), (21/03 – 20/04) and (21/04 – 1/05) successively.

Water balance equation was based on the calculation of water consumption:

$$ET_a = (P + I_r) - (D + R + I_n + \Delta s) \quad (3)$$

Where:ET_a is water consumption (ml), P is water quantity, D is deep percolation, R is superficial flow, I_n is water blocked by plant, ΔS is soil moisture difference; and if we suppose that both superficial flows, water blocked by plant and deep percolation are zero, then; the equation becomes as follows:

$$ETa = (P + Ir) - \Delta s \quad (4)$$

Table 1. Some of the Physical and Chemical Characteristics of Farm Soil

Soil properties	Units	Value
Hydrogen potential Ph	---	7.5
Electrical Conductivity (I : I)	dS m ⁻¹	1.6
Available Nutrients	Nitrogen	51
	Phosphorus	31
	Potassium	156
Organic Matter		8.7
CaSO ₄	gm kg ⁻¹	30
CaSO ₃		115
Soil Separates	Sand	528
	Silt	232
	Clay	240
Soil Texture		Sandy Clay Loam
Volumetric Moisture at Saturation		44.88
Volumetric Moisture at Field Capacity	%	29.40
Volumetric Moisture at Wilting Point		14.00
Bulk Density	Mgm.m ⁻³	1.26

Study parameters were distributed according to the split - split plot design within RCBD with three replications. Date residues treatments were placed in the main plots, and each main plot was divided into three secondary plots, in which the humic acid levels were distributed randomly. Each secondary plot was divided into two plots, in which the irrigation depth levels were randomly distributed, the number of treatments was $2 \times 3 \times 2 = 12$ treatments

Field preparation and agriculture

The land was plowed, leveled, and divided into three sectors, and each sector was divided according to the experimental design. Dab fertilizer 46% P 2O₅ was added at a rate of 260 kg P₂O₅.ha⁻¹ and potassium sulfate fertilizer 41.5 % K at a rate of 200 kg K₂O ha⁻¹ before planting and urea fertilizer 46% N at a rate of 200 kg ha⁻¹ added twice times the first one after two months of planting and the second one month after the first according to the recommendation of the Ministry of Agriculture [18]. The onion bullets of a local variety was planted in the field on 22/12/2018 on a single line in the middle of the ridge at a distance of 20 cm between plants. Each experimental unit included three ridges 40 cm width with an area of 4.8 m² with the space 1 m. The number of plants in the experimental unit was 60 plants, so the plant density is 125,000 plants ha⁻¹. Plant height, length of the longest tubular leaf, number of tube leaves and weight of both fresh and dry tubular leaves were measured. Average number of onion bulbs, an individual bulb weight, bulb diameter and the total bulbs yield were calculated and expressed in hectare. The results were statistically analysis according to the statistical analysis system (SAS) and compared with the means by Duncan multiple rang test at 0.05 level [19].

3 . Results and Discussion

We notice from Tables 2 and 3 that adding the date residues to the soil at a rate of 5 % led to a significant increase in plant height and the length of the longest leaf and gave 58.15 and 53.51 cm compared to the non-addition treatment that gave 41.53 and 35.48 cm, as well as irrigation at a rate of 100 % show a significant increase than the irrigation by 50 %, while the best level of humic acid was 15 kg ha⁻¹ and gave a plant height of 64.77 cm, while the concentration of 30 kg ha⁻¹ gave the longest leaf length 47.00 cm, with a significant superiority. In the bilateral combination between date residues and irrigation, we find that the highest plant height and the length of the longest leaf was from the

interaction treatment between adding the date residues 5 % and irrigation at a rate of 100%, with a significant superiority over the rest treatments, while the lowest plant height and leaf length was from the interaction treatment between adding zero date residues and irrigation 50%.

In the bilateral combination between the date residues and the humic, we find that the highest plant height was 75.40 cm and the longest leaf 72.65 cm from the interaction treatment between the addition of the date residues 5% and humic 15 kg ha⁻¹ and the lowest height of plant 28.95 cm and length of the leaf 22.65 cm from the the interaction treatment between zero date residues and zero humic. In the bilateral interaction between irrigation and humic, we noticed that the interaction treatment between irrigation 50% and the addition of humic 30 kg ha⁻¹ was significantly superior than the rest

Table 2. Effect of date residues, humic acid and the level of irrigation in plant length (cm.)

Date residues(D)	Irrigation level (I)	Humic acids kg / ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	27.1 h	52.0 e	40.5 f	39.86 d	41.53 b	47.43 b
	100%	30.2gh	56.3 de	43.1 f	43.20 c		52.25 a
5%	50%	33.5 g	72.5 b	59.0 d	55.00 b	58.15 a	
	100%	38.4 f	78.3 a	67.2 c	61.30 a		
(D)*(H)	0%	28.65 f	54.15 c	41.80d			
	5%	35.95 e	75.40 a	63.10 b			
(I)*(H)	50%	34.30 e	30.30 f	67.30 a			
	100%	62.25 b	55.15 c	49.75 d			
(H) means		32.30 c	64.77 a	52.45 b			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

Table 3. Effect of date residues, humic acid and the level of irrigation in the longest leaf of plant. (cm.)

Date residues(D)	Irrigation level (I)	Humic acids kg / ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	21.10 j	45.40 e	34.50 fg	33.66 d	35.48 b	42.00 b
	100%	24.20 ij	50.50 d	37.20 f	37.30 c		47.00 a
5%	50%	28.50 hi	70.30 b	52.20 d	50.33 b	53.51 a	
	100%	30.10 fg	75.00 a	65.00 c	56.70 a		
(D)*(H)	0%	22.65 f	47.95 c	35.85 d			
	5%	29.30 e	72.65 a	58.60 b			
(I)*(H)	50%	27.15 e	24.80 e	62.75 a			
	100%	57.85 b	51.10 c	43.35 d			
(H) means		25.97 c	47.22 b	60.30 a			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

treatments in plant height and length of the longest leaf and gave 67.30 and 62.75 cm, while the lowest plant height was 30.30 cm and the lowest leaf length was 24.80. cm from the interaction between irrigation 50% and the addition of humic 15 kg ha⁻¹. We note from the triple interaction that the highest plant height 78.30 cm and the longest leaf length 75.00 cm was from the interaction treatment between the date residues of 5%, irrigation of 100 % and humic, 15 kg ha⁻¹, with a

significant superiority over all treatments, while the lowest plant height was 27.10 cm and less leaf length 21.10 cm from interaction between zero date residues , 50 % irrigation, and zero humic.

The Data in Tables 4 and 5 indicate that adding the date residues to the soil at a rate of 5 % led to a significant increase in number of leaves per plant and the fresh weight and gave 16.66 and 75.65 gm compared to the non-addition treatment that gave 10.66 and 57.93 gm, as well as irrigation at a rate of 100 % show a significant increase than the irrigation by 50 %, while the best level of humic acid was 15 kg ha⁻¹ and gave 19.75 for leaves number and 82.45 gm for fresh weight , with a significant superiority. In the bilateral combination between date residues and irrigation, we find that the highest number of leaves per plant and fresh weight was from the interaction treatment between adding the date residues 5% and irrigation at 100 % rate with a significant superiority over the rest treatments, while the lowest number of leaves per plant and fresh weight of plant was from the interaction treatment between adding zero date residues and irrigation 50 % In the bilateral combination between the date residues and the humic, we find that the highest number of leaves per plant and fresh weight of plant was 24.00 and 92.70 gm from the interaction treatment between the addition of the date residues 5 % and humic 15 kg / h and the lowest number of leaves per plant and fresh weight 4.00 and 40.75 gm from the interaction treatment between zero date residues and zero humic. In the bilateral interaction between irrigation and humic, we noticed that the interaction treatment between irrigation 50 % and the addition of humic 30 kg ha⁻¹ was significantly superior than the rest treatments in number of leaves per plant and fresh weight , while the lowest number of leaves per plant and fresh weight was from the interaction between irrigation 50 % and the addition of humic 15 kg ha⁻¹. We note from the triple interaction that the highest number of leaves per plant 25.0 and fresh weight 94.30 gm was from the interaction treatment between the date residues of 5%, irrigation of 100 % and humic, 15 kg ha⁻¹, with a significant superiority over all treatments, while the lowest number of leaves per plant and fresh weight was from interaction between zero date residues , 50% irrigation, and zero humic.

Table 4. Effect of date residues, humic acid and the level of irrigation in number of leaves per plant

Date residues(D)	Irrigation Depth (I)	Humic acids kg / ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	3.0 h	15.0 de	11.0 ef	9.66 c	10.66 b	12.50 b
	100%	5.0 gh	16.0 cd	14.0 de	11.66 c		14.83 a
5%	50%	6.0 gh	23.0 ab	17.0 cd	15.33 b	16.66 a	
	100%	9.0 fg	25.0 a	20.0 bc	18.0 a		
(D)*(H)	0%	4.0 f	15.5 c	12.5			
	5%	7.5 e	24.0 a	18.5 b			
(I)*(H)	50%	7.00 d	4.50 d	20.50 a			
	100%	19.00 ab	17.00 b	14.00 c			
(H) means		5.75 c	19.75 a	15.50 b			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

Table 5. Effect of date residues, humic acid and the level of irrigation in fresh weight (gm.)

Date residues(D)	Irrigation Depth (I)	Humic acids kg / ha-1 (H)	(D)*(I)	(D) means	(I) means
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		0	15	30			
0%	50%	38.3 i	70.1 d	57.5 f	55.30	57.93 b	64.70 b
	100%	43.2 h	74.3 c	64.2 e	60.56 c		68.88 a
5%	50%	50.0 g	91.1 a	81.2 b	74.10 b	75.65 a	
	100%	53.0 g	94.3 a	84.3 b	77.20 a		
(D)*(H)	0%	40.75 f	72.20 c	60.85 d			
	5%	51.50 e	92.70 a	82.75 b			
(I)*(H)	50%	48.10 e	44.15 f	84.30 a			
	100%	80.60 b	74.25 c	69.35 d			
(H) means		46.12 c	82.45 a	71.80 b			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

We note from Table 6 that there was no significant effect of date residues and irrigation levels on the dry weight of the plant, while adding humic to the soil at a concentration of 15 and 30 % led to a significant increase in the dry weight of the plant. Also, the bilateral interaction between date residues and irrigation had no significant effect on dry weight. In the bilateral interaction between date residues and humic, we find that the highest dry weight of the plant was 11.40 gm from the interaction treatment between adding date residues 5 % and humic 15 kg ha⁻¹ and the lowest dry weight 6.65 gr. from the interaction between zero date residues and zero humic. In the bilateral interaction between irrigation and humic, we notice that the interaction treatment between irrigation 50% and the addition of humic 30 kg ha⁻¹ was significantly superior to some treatments in plant dry weight, while the lowest dry weight of the plant from the interaction between irrigation 50 % and humic 15 kg ha⁻¹. We find from the triple interaction that the highest dry weight of the plant 11.50 gm was from the interaction treatment between the date residues 5 %, irrigation 100 %, and humic 15 kg ha⁻¹, with a significant superiority over some treatments, while the lowest dry weight 6.30 gm of the overlap was between zero date residues and 50 %. Water and Zero Humic.

Table 6. Effect of date residues, humic acid and the level of irrigation in dry weight(gm.)

Date residues(D)	Irrigation level (I)	Humic acids kg / ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	6.3 b	9.0 ab	8.6 ab	8.06 a	8.36 a	8.95 a
	100%	7.0 ab	10.0 ab	9.0 ab	8.66 a		9.41 a
5%	50%	7.50 ab	11.30 a	10.70 ab	9.83 a	10.00 a	
	100%	8.00 ab	11.50 a	11.00 ab	10.16 a		
(D)*(H)	0%	6.65 c	9.65abc	8.80 abc			
	5%	7.75 bc	11.40 a	10.85 ab			
(I)*(H)	50%	7.50 ab	6.90 b	10.75 a			
	100%	10.30 a	10.00 ab	9.65 ab			
(H) means		7.20 b	10.52 a	9.82 a			

From data in Table 7 it was found that there was no significant effect of date residues and irrigation levels on the number of bulbs per plant, while adding humic to the soil at a concentration of 15 and 30 % led to a significant increase in the number of bulbs per plant. Also, the bilateral interaction between date residues and irrigation had no significant effect on the number of bulbs. In the bilateral interaction

between date residues and humic, we find that the highest number of bulbs per plant was 5.00 from the interaction treatment between the addition of the date residues 5 % and humic 15kg ha-1 and the lowest number of bulbs per plant 1.00 from the interaction between zero date residues and zero humic.

In the bilateral interaction between irrigation and humic, we notice that the interaction treatment between irrigation 50 % and the addition of humic 30 kg ha-1 was significantly superior to some treatments in the number of plant bulbs, while the lowest number of plant bulbs from the interaction between irrigation 50 % and the addition of humic 15 kg ha-1. We notice from the triple interaction that the highest number of bulbs per plant 5.00 was from the interaction treatment between the date residues 5%, irrigation 100%, and humic 15 kg ha-1, with a significant superiority over some treatments, while the lowest number of bulbs 1.00 was from the interaction between zero date residues and 50 % irrigation, and zero humic.

Table 7. Effect of date residues, humic acid and the level of irrigation in the number of bulbs.

Date residues(D)	Irrigation level (I)	Humic acids kg ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	1.00 c	3.00abc	3.00abc	2.33 a	2.33 b	2.83 a
	100%	1.00 c	3.00abc	3.00abc	2.33 a		3.00 a
5%	50%	2.00 bc	5.00 a	3.00abc	3.33 a	3.50 a	
	100%	2.00 bc	5.00 a	4.00 ab	3.66 a		
(D)*(H)	0%	1.00 c	3.00 b	3.00 b			
	5%	2.00 bc	5.00 a	3.5 ab			
(I)*(H)	50%	1.50 b	1.50 b	4.00 a			
	100%	4.00 a	3.50 a	3.00 ab			
(H) means		1.50 b	4.00 a	3.25 a			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

We notice from Table 8 that adding the date residues to the soil at a rate of 5 % led to a significant increase in the average weight of the bulb and gave 64.30 gm compared to the non-addition treatment that gave 44.71 gm. Also, irrigation at a rate of 100 % led to a significant increase over irrigation at a rate of 50%. While the best level for humic acid was 15 kg ha-1 and it gave 70.25 gm.

In the bilateral interaction between Date residues and irrigation, we find that the highest weight of the bulb was 66.06 gm from the treatment of the interaction between adding the Date residues and irrigation at a rate of 100 %, with a significant superiority over the rest of the treatments, while the lowest weight of the bulb was 42.03 gm from the treatment of the interaction between not adding the date residues and irrigation was 50 %. In the bilateral interaction between date residues and humic, we find that the highest weight of the bulb was 83.25 gm from the interaction treatment between adding the date residues 5 % and humic 15 kg ha-1, and the lowest bulb weight was 28.65 gm from the interaction treatment between zero date residues and zero humic. In the bilateral interaction between irrigation and humic, we notice that the interaction treatment between irrigation 50 % and the addition of humic 30 kg ha-1 was significantly superior to the rest of the treatments in the average weight of the bulb and it gave 73.00 gm, while the lowest weight of an bulb was 31.05 gm from the interaction between irrigation 50 % and the addition of humic 15 kg /ha. We note from the triple nitration that the highest weight of the bulb 85.00 gm was from the interaction treatment between the date residues

5%, irrigation 100 % and humic, 15 kg ha⁻¹, with a significant superiority over all treatments, while the lowest weight of the bulb was 26.10 gm from the interaction between zero date residues, 50 % irrigation, and zero humic.

Table 8. Effect of date residues, humic acid and the level of irrigation in the average weight of bulb.

Date residues(D)	Irrigation level (I)	Humic acids kg / ha ⁻¹ (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	26.10 i	53.50	46.50	42.03	44.71 b	52.28 b
	100%	31.20 h	61.00 c	50.00	47.40 c		56.73 a
5%	50%	36.00 g	81.50 a	70.10 b	62.53 b	64.30 a	
	100%	40.00 f	85.00 a	73.20 b	66.06 a		
(D)*(H)	0%	28.65 f	57.25 c	48.25			
	5%	38.00	83.25 a	71.65 b			
(I)*(H)	50%	35.60	31.05 f	73.00 a			
	100%	67.50 b	61.60 c	58.30			
(H) means		33.32 c	70.25 a	59.95 b			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

We notice from Table 9 that adding the date residues to the soil at a rate of 5 % led to a significant increase in the total yield of the bulbs and gave 18.770 ton ha⁻¹ compared to the no addition treatment that gave 9.966 ton ha⁻¹. Also, irrigation at a rate of 100% led to a significant increase over irrigation at a rate of 50%. While the best level for humic acid was 15 kg ha⁻¹ and it gave 22.630 ton ha⁻¹.

In the bilateral interaction between Date residues and irrigation, we find that the highest yield of the bulbs was 20.073 ton ha⁻¹ from the treatment of the interaction between adding the Date residues and irrigation at a rate of 100%, with a significant superiority over the rest treatments, while the lowest yield of the bulbs was 9.100 ton ha⁻¹ from the treatment of the interaction between not adding the date residues and irrigation at 50 %. In the bilateral interaction between date residues and humic, we find that the highest yield of the bulbs was (29.060 Ton/ha.) from the interaction treatment between adding the date residues 5% and humic 15 kg / ha, and the lowest bulbs yield was 2.500 ton ha⁻¹ from the interaction treatment between zero date residues and zero humic.

In the bilateral interaction between irrigation and humic, we notice that the interaction treatment between irrigation 100% and the addition of humic 30 kg ha⁻¹ was significantly superior to the rest of the treatments in total yield of the bulbs 24.110 ton ha⁻¹ while the lowest yield of the bulbs was 3.550 Ton ha⁻¹ from the interaction between irrigation 50% and the addition of humic acid 15 kg ha⁻¹.

We note from the triple interaction that the highest yield of the bulbs was 30.820 ton ha⁻¹ from the interaction treatment between the date residues 5 %, irrigation 100% and humic, 15 kg ha⁻¹, with a significant superiority over all treatments, while the lowest yield of the bulb was 2.000 Ton ha⁻¹ from the interaction between zero date residues, 50 % irrigation, and zero humic.

Table 9. Effect of date residues, humic acid and the level of irrigation in total yield of bulbs .

Date residues(D)	Irrigation level (I)	Humic acids kg / ha-1 (H)			(D)*(I)	(D) means	(I) means
		0	15	30			
0%	50%	2.000 k	15.000 f	10.300 h	9.100 d	9.966 B	13.283 b
	100%	3.000 k	17.400 e	12.100 g	10.833 C		15.453 a
5%	50%	5.1000 j	27.300 b	20.000 d	17.466 b B	18.770 A	13.283 b
	100%	7.200 i	30.820 a	22.200 c	20.073 a A		
(D)*(H)	0%	2.500 f	16.200 c	11.200 b			
	5%	6.150 e	29.060 a	21.100 b			
(I)*(H)	50%	5.100 e	3.550 f	15.150 d			
	100%	21.150 b	17.150 c	24.110 a			
(H) means		4.325 c	22.630 a	16.150 b			

Means followed by the same letter are not significantly different according to Duncan multiple range test at the probability of $P \leq 0.05$ level.

It was found from the results that the studied factors had a significant effect on the growth and yield characteristics (plant height, length of the longest leaf, number of leaves, fresh and dry weight of the plant, number of bulbs, average weight of the bulb, and the total yield of the bulbs). The addition of date residues at a rate of 5 %, humic acid at a rate of 15 % and irrigation at a level of 100% led to the highest value of these characteristics .

This results in harmony with that found by [5] that adding date palm residues and rice residues to the soil had a significant effect on the yield of cucumber.

The addition of soil conditioners (organic wastes) positively affects the physical, chemical and biological properties of the soil, and works to improve soil properties such as water conductivity (water movement), moisture retention and reduction in bulk density, as well as increasing ventilation and the rate of diffusion of gases such as oxygen and carbon dioxide [20];[21]. The addition of date residues is an effective strategy in reducing the effect of water stress and increasing plant tolerance by improving the distribution of soil pores, increasing the ability to hold water and aeration, and improving root secretions such as organic acids that regulate soil Ph [4] .

Adding humic acid to the soil increases its absorption capacity for nutrients that are added in the form of fertilizer to the soil by chelating these elements or reducing the loss processes that these nutrients are exposed to, as well as the role of these acids in the process of transforming the formulas of many nutrients in the soil into formulas available for absorption by the Plant [8];[9].

4 . Conclusion

The results showed that the study parameters had an important effect on the values of plant height, fresh weight of leaves, number of tube leaves, average onion weight and total yield. This study indicated that the use of plants residues such as dates residues can affect soil characteristics. Therefore, utilization of these residues is essential not only for developing soil physical properties but also for increasing its productivity so it increase the total yield of the bulbs . Also adding humic acid to the soil increases its absorption capacity for nutrients an increase availability for absorption by the plant. It is very important to determinants the water demand to increase the yield.

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