Effect of humic acid and Bio20 nutrient solution on growth and yield of green onions.

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Abstract

The study was conducted at the Agricultural Research and Experiments Station, College of Agriculture, University of Kirkuk for the autumn agricultural season 2019/2020, To study the effect of adding Magic Leon organic fertilizer at levels 0-300 kg/ha to the soil and spraying with the nutrient solution Bio20 at concentrations of 2-0 ml/L three times every 15 days, and in three cultivars of onions: local white cultivar, local red cultivar, white cultivar(Syrian). The factor experiment (3 x 2 x 2)using the Randomized Complete Block Design (RCBD), with three replicates. The most important results obtained can be summarized. Magic Leon fertilizer gave a significant increase in the length of the longest leaf, number of leaves, leaf area, chlorophyll index, bulb length, bulb diameter, bulb neck thickness. The spraying with the nutrient solution Bio20 significantly increased the length of the longest leaf, leaf area, chlorophyll index, bulb length, bulb diameter, bulb neck thickness, which reached 62.78 cm, 152.86 cm2, CCI 16.73, 12.11 cm, 2.45 cm, 26.06, 2.23. cm respectively. The results showed significant differences in the total yield when adding Magic Leon organic fertilizer, while the effect of spraying with the nutrient solution was not significant on the total yield. As for the effect of the cultivars, the local white cultivar significantly excelled the local white cultivar in the number of leaves, leaf area, bulb length, bulb diameter, bulb neck thickness, total yield, which amounted to 7.33 leaves. Plant -1, 170.20 cm2, 12.27 cm, 2.86 cm, 2.59 cm The local red cultivar gave a significant increase in the length of the longest leaf, chlorophyll index, which reached 63.97 cm, CCI 16.75, respectively.

Key words: Organic fertilizer, cultivar, green onion, organic farming, Magic Leon, Bio 20.

تأثير حامض الهيومك والمحلول المغذي Bio20 في نمو وحاصل البصل الاخضر. هيرو احمد رحيم¹ عبدالرحيم سلطان محمد² دلشاد رسول عزيز³ هيرو احمد رحيم^{1,3} جامعة الموصل/كلية الزراعة والغابات

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الخلاصة

نفذت الدراسة في محطة البحوث والتجارب الزراعية /كلية الزراعة / جامعة كركوك للموسم الزراعي الخريفي 2020/2019، لدراسة تأثير اضافة السماد العضوي Magic Leon بمستويين 0-300 كغم/ ه الى التربة والرش بالمحلول المعذي Bio20 وبتراكيز 0-2مل / لتر ولثلاث مرات كل 15 يوم، وفي ثلاثة اصناف من البصل: صنف ابيض محلي، صنف احمر محلي، صنف ابيض (سوري). تجربة عامليه 2×2×3 باستخدام تصميم القطاعات العشوائية الكاملة RCBD وبثلاثة مكررات. ويمكن تلخيص اهم النتائج التي تم الحصول عليها اعطى السماد العماد لموفي ، طول المول ورقة، عدد الاوراق ، المساحة الورقية، دليل كلوروفيل ، طول البصلة ، قطر البصلة، سمك عنق البصلة، وأدى الرش بالمحلول المغذي Bio 20 الى زيادة معنوية في طول اطول ورقة، المساحة الورقية، دليل الكلوروفيل، طول البصلة، قطر البصلة، سمك عنق البصلة ، والتي بلغت Bio 20 سم، Bio 20 سم²، CCI 16.73، 12.11 سم، 2.45 سم، 2.86 سم²، 2.23 سم، 2.45 LTM مه، 2.45 LTM مه، 2.45 LTM مه، 2.45 مم، 2.45 مم، 2.45 LTM مه، 2.45 مم، 2.45 LTM مه، 2.45 مم، 2.45 LTM مه، 2.45 مم، 2.45 LTM مه، 2.45 مم، 2.45 مم، 2.45 للما للكلي عند اضافة السماد العضوي 2.45 مم، 2.45 Magic Leon الكلي عند اضافة السماد العضوي AMGIC Leon ممنوية في الحاصل الكلي عند اضافة السماد العضوي معنوية الموردة الحمن الكلي عند اضافة السماد العضوي معنوية الموردة المعنوي على التوالي والخور بلغذي غير معنوي على الحاصل الكلي. بالنسبة الى تأثير الاصناف فقد تفوق بصورة معنوية الصنف الابيض المحلي في عدد الاوراق، المساحة الورقية، طول البصلة، قطر البصلة، سمك عنق البصلة، الحاصل الكلي والتي معنوية الصنف الابيض المحلي في عدد الاوراق، المساحة الورقية، طول البصلة، قطر البصلة، سمك عنق البصلة، الحاصل الكلي والتي معنوية الصنف الابيض المحلي في عدد الاوراق، المساحة الورقية، طول البصلة، قطر البصلة، سمك عنق البصلة، الحاصل الكلي والتي معنوية الصنف الابيض المحلي في عدد الاوراق، المساحة الورقية، طول البصلة، 2.57 من 2.57 من 2.57 من 2.50 معنوي المعنوي الحملي ريادة معنوية في طول اطول ورقة، دليل كلوروفيل، بلغت 3.57 ومنه منه 2.55 مم، 2.50 الته، وعلى التوالي الحملي الحملي ريادة معنوية في طول اطول ورقة، دليل كلوروفيل، بلغت 3.57 مم، 2.50 الته، وعلى التوالي الحملي الحملي الحملي إلى منه معنوية الحملي زيادة معنوية في طول اطول ورقة، دليل كلوروفيل، بلغت 3.57 مم، 2.50 الته والي الحملي الحملي الحملي الحملي الحملي الحملي زيادة معنوية ألى الول ورقة، دليل كلوروفيل، بلغت 3.57 المه، 2.50 المه، 2.50 مما مي التوالي الحملي الحملي الحملي مي التوالي ا

الكلمات المفتاحية: سماد عضوي ، صنف ، بصل اخضر ، زراعة عضوية ، Bio 20 ، Magic Leon .

Introduction

Onion(Allium cepa L.), belongs to the Amaryllidaceae family. It is an important winter vegetable crop in Iraq and the world due to its high nutritional value, frequent uses and medicinal benefits (Hassan, 2000)It is believed that his place of origin is the region extending from Palestine to India from the Asian continent (Matlab et al., 1989), Onions are a biennial herbaceous plant that completes its life cycle in two seasons, Where it grows vegetative in the first season of cultivation, in which plants are active in the formation of leaves and roots and then the formation of the onion. Onion cultivars differ from each other in shape, color, and storage traits, and their needs for light periods necessary for the formation of bulbs.

Onions are grown for cultivars of purposes, including using them fresh as green, cooked, pickled, or dried onions, as well as onion salt and onion oil (Hassan, 2000). Among the characteristics of good cultivar is the availability of resistance to insects, consistency and roundness of bulbs, quality of color, an abundance of yield, and crop tolerance for storage. Organic fertilizers are known as materials originally produced from plant residues and animal wastes and are considered (Humic acid), It is one of the components of organic materials where it is one of the commercial and economic products, which is widely used at the present time and is effective quickly and is harmless to humans and plants (Anonymous, 2005), Humic acid contains many nutrients that increase plant growth and yield (Lee and Bartlette, 1979). It is used to reduce the harmful effect of mineral fertilizers on the soil (Hartwigson and Evans, 2000). It also works to increase plant tolerance of harsh conditions such as salinity, drought and high temperatures (Fathy et al., 2010). It acts as a store for many nutrients needed by the plant. The aim the study of this study is to know the effect of adding humic acid and spraying with organic fertilizer on three local cultivars of onions and avoiding the harms of using chemical fertilizers because of their negative effects on public health and the environment.

Material and Methods

The study was conducted at the Agricultural Research and Experiments Station of the College of Agriculture / University of Kirkuk for the autumn agricultural season 2019/2020, and the research included studying the effect of adding humic acid to the soil and spraying with the nutrient solution BIO20 on the growth and yield of three cultivars of onions:

Add humic acid at two levels (0-300) kg/hectare (B1, B2) and spraying with the nutrient solution Bio20 at concentrations of (2-0) ml / L (C1, C2) and three cultivars of onion, first cultivars, local white onion (A1), second type, onions Local red (A2) third cultivar Syrian onion (A3), The experiment was conducted according to the Randomized Complete Block Design (RCBD), with three replicates in each replicate, with 12 experiment units, and these cultivars were cultivated on 1/11/2019.

Studies traits:

1- the length of the Longest leaf (cm/plant):

Plant height measurements were taken from the disc stem up to the longest tube leaf, using a metric tape measure.

The number of leaves for each plant was counted a week before harvest.

3- The leaf area (cm^2) :

Measure the length of the leaf and its circumference (at a distance of 25% from the base of the leaf) with a tape measure of six plants from each experimental unit and take the average for one leaf and extract the area of one leaf according to the following equation: -

A=-93.1+1.83L+38.6C25

whereas

A = leaf area (cm)

L =leaf length (cm)

C25 = the circumference of the leaves at a distance of 25% from its base

According to Gamiely et al, (1991)

4- Index of total chlorophyll content in green leaves (tubular):

The index of total leaf chlorophyll content was measured in the field a week before the extraction by using the field hand-held device (Chlorophyll meter SPAD-502) by taking ten readings on the leaves for each experimental unit in the field and then finding the average of the number of readings taken in terms of the CCI.

5- Bulb length (cm):

It was measured directly after uprooting the plants using (Vernier) and on (6) plants for each

experimental unit. The length of the bulb included the distance from the disc stem to the beginning of the bulb's neck, then the average was taken for it.

6- Bulb Diameter (cm):

The measurement of this characteristic was taken on the same headers from the previous paragraph, where it was measured at the width of the bulb using (Vernier).

7- Bulb neck thickness (cm):

It was measured using (Vernier) at a height of 3 cm from the tip of the bulb as an average of six bulbs, and then the average was taken.

8 - The yield :

Total yield ton/ha It was estimated by calculating the total yield of the experimental unit and then extracting the total yield.

Results and discussion:

1- The length of the longest leaf (cm / plant).

The results in Table (1) show that there are significant differences between the cultivars, the levels of humic acid and levels of the nutrient solution, where it significantly excelled of the local red onion variety and gave the highest average of 63.97 cm, while the Syrian onion cultivar gave the lowest average of 57.30 cm. The second level 300 kg.ha⁻¹ of humic acid significantly excelled and gave the highest average for the trait was 62.24 cm compared to the first level (0) kg.ha⁻¹ for the acid, which gave the lowest average for the trait of 60.40 cm. while the second level (2) ml/L of the nutrient solution significantly excelled and gave the highest average for the trait was 62.78 cm on the first level (0) ml/L of the nutrient solution, which gave the lowest average for the trait of 59.85 cm.

	B × C		Cultivars(A)		nutrient solution	humic acid
		A3	A2	A1	(C)	(B)
	59.85 b	51.58 h	63.08 bcd	64.91 b	(0) C1 ml / L	D1 (0) $k_{\alpha} k_{\alpha}^{-1}$
	60.96 b	60.49 ef	58.66 f	63.74 bc	(2) C2 ml / L	DI (0) Kg.na
	59.88 b	55.08 g	63.74 bc	60.83 def	(0) C1 ml / L	P1(300) kg hg ⁻¹
	64.60 a	62.08 cde	70.41 a	61.33 de	(2) C2 ml / L	Б1 (300) кg.na
59.87 b	average	53.33 d	63.41 ab	62.87 b	(0) C1 ml / L	
62.78 a	(C)	61.28 c	64.53 a	62.53 bc	(2) C2 ml / L	$\mathbf{A} \times \mathbf{C}$
60.40 b	Average	56.03 e	60.87 c	64.32 b	B1	
62.24 a	(B)	58.58 d	67.07 a	61.08 c	B2	A×B
		57.30 c	63.97 a	62.70 b	avera	age (A)

Table (1) The effect of adding humic acid and spraying with nutrient solution and the cultivars and the interaction between them on the trait of the length of the Longest leaf (cm/plant)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

2- The number of leaves per plant (leaf. Plant ⁻¹)

Table (2) shows that there are significant differences between the cultivars, where it is noticed that the local white onion cultivar has the highest average of 7.33 leaf. Plant ⁻¹ compared to

the Syrian onion cultivar, which gave the lowest average for the trait of 6.50 leaf. Plant ⁻¹.It is evident from the same table that there were no significant differences between the treatments of adding humic acid and spraying with the nutrient solution.

Table (2)	The effect o	f adding humic acid and spraying with nu	itrient solution a	nd the cultivars		
(and the interaction between them on the trait of the number of leaves (leaf. Plant ⁻¹)						
		Cultivore(A)	nutriont			

	B × C		Cultivars(A)		nutrient	humic acid
	D × C	A3	A2	A1	solution (C)	(B)
	6.86 ab	6.72 abc	6.88 abc	6.99 abc	(0) C1 ml / L	P1 (1) kg ha ⁻¹
	6.43 b	5.99 c	6.33 bc	6.99 abc	(2) C2 ml / L	D1 (0) Kg.na
	6.77 ab	6.27 bc	6.55 abc	7.49 ab	(0) C1 ml / L	P1(300) kg ha ⁻¹
	7.32 a	7.05 abc	7.05 abc	7.88 a	(2) C2 ml / L	D1 (300) Kg.na
6.81 a	average	6.49 a	6.71 a	7.24 a	(0) C1 ml / L	
6.88 a	(C)	6.52 a	6.69 a	7.43 a	(2) C2 ml / L	$\mathbf{A} \times \mathbf{C}$
6.64 a	Average	6.35 b	6.60 b	6.99 ab	B1	
7.05 a	(B)	6.66 b	6.80 ab	7.68 a	B2	АХВ
		6.50 b	6.70 b	7.33 a	avera	age (A)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

3- The leaf area (cm²).

Table (3) indicates that there are significant differences between the cultivars and the levels of humic acid and the nutrient solution, where the local white onion cultivar significantly excelled the local white onion and gave the highest average for the trait of 170.20 cm^2 compared to the Syrian onion cultivar, which gave the lowest average for the trait of 132.68 cm^2 , while the level of (300). Kg.ha⁻¹ of humic

acid was significantly excelled and gave the highest average for the trait amounted to 147.82 cm^2 , at the level of (0) kg.ha⁻¹ of humic acid, which gave the lowest average for the trait, which was 143.02 cm². The level (2) ml / L of the nutrient solution was significantly higher, as it gave the highest average for the trait, which reached 152.86 cm², than the level (0) ml / L of the nutrient solution, which gave the lowest average for the trait of 137.98 cm^2

	B × C		Cultivars(A)		nutrient	humic acid
		A3	A2	A1	(C)	(B)
	135.53 с	110.53 e	108.22 e	187.84 a	(0) C1 ml / L	B1 (0) kg ha ⁻¹
	150.51 b	145.01 cd	133.88 d	172.66 ab	(2) C2 ml / L	D1 (0) Kg.na
	140.44 с	113.55 e	144.28 cd	163.49 b	(0) C1 ml / L	D1 (200) $\log \log^{-1}$
	155.21a	161.65 b	147.16 dc	156.82 bc	(2) C2 ml / L	DI (300) Kg.lla
137.98 b	average	112.04 d	126.25 с	175.66 a	(0) C1 ml / L	
152.86 a	(C)	153.33 b	140.52 b	164.74 a	(2) C2 ml / L	$\mathbf{A} \times \mathbf{C}$
143.02 b	Average	127.77 cd	121.05 d	180.25 a	B1	
147.82 a	(B)	137.60 с	145.72 b	160.15 b	B2	A × B
		132.68 b	133.38 b	170.20 a	ave	rage (A)

Table (3) The effect of adding humic acid and spraying with nutrient solution and the cultivars and the interaction between them on the trait of the leaf area (cm2)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

4- Total chlorophyll in green leaves

1

Table (4) shows the presence of significant differences between the cultivars, where the local red onion cultivar gave the highest average for the trait, reaching 16.75 CCI, while the Syrian onion cultivar gave the lowest average for the trait, which was 15.44 CCI. It is evident from the table that there were no significant differences between the levels of humic acid addition. As for the spraying with the nutrient solution, it significantly excelled the level (2) ml / L and gave the highest average amounted to 16.73 CCI and the lowest average for the trait was 15.53 CCI at the level of (0) ml / L.

Table (4) The effect of adding humic acid and spraying with nutrient solution and the cultivars (and the interaction between them on the trait of leaf chlorophyll index (CCI)

	B × C		Cultivars(A)		nutrient solution humic acid	
		A3	A2	A1	(C)	(B)
	16.27 b	14.42 b	18.99 a	15.40 b	(0) C1 ml / L	
	15.40 bc	15.00 b	15.58 b	15.63 b	(2) C2 ml / L	B1 (0) kg.ha
	14.80 с	14.16 b	14.74 b	15.51 b	(0) C1 ml / L	$P_1(200) = h_2^{-1}$
	18.07 a	18.21 a	17.72 a	18.29 a	(2) C2 ml / L	B1 (300) kg.na
15.53 b	average (C)	14.29 b	16.86 a	15.45 ab	(0) C1 ml / L	
16.73 a		16.60 a	16.65 a	16.96 a	(2) C2 ml / L	A×C
15.83 a		14.71 c	17.28 a	15.51 bc	B1	A v D
16.43 a	Average (B)	16.18 ab	16.23 ab	16.90 ab	B2	A × B
		15.44 b	16.75 a	16.20 ab	avera	age (A)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

5. Bulb length (cm)

Table (5) shows the presence of significant differences between the cultivars and notes the significant excelled of the local white onion cultivar, where it gave the highest average for the trait, which reached 12.27 cm, compared with the Syrian onion cultivar, which gave the lowest average for the trait of 11.52 cm. The

table shows that there are no significant differences between acid levels. Significant differences were found between the levels of the nutrient solution, where it significantly excelled the level of (2) ml / L and gave the highest average for the trait of 12.11 cm compared to the level of (0) ml / L, which gave the lowest average for the trait of 11.51 cm.

 Table (5) The effect of adding humic acid and spraying with nutrient solution and the cultivars and the interaction between them on the trait of Bulb length (cm)

	B × C		Cultivars(A)		nutrient solution	humic acid
		A3	A2	A1	(C)	(B)
	11.07 с	10.52 e	11.44 cde	11.26 cde	(0) C1 ml / L	D1 (0) $\ln 2 \ln 2^{-1}$
	12.40 a	13.14 ab	11.53 cd	12.52 ab	(2) C2 ml / L	D1 (0) kg.na
	11.95 ab	11.09 de	12.17 bc	12.61 ab	(0) C1 ml / L	D1 (200) kg ha ⁻¹
	11.84 b	11.35 cde	11.45 cde	12.72 a	(2) C2 ml / L	Б1 (300) кg.na
11.51 b	average (C)	10.80 d	11.80 bc	11.93 bc	(0) C1 ml / L	
12.11 a		12.24 ab	11.49 с	12.62 a	(2) C2 ml / L	$A \times C$
11.40 a	A reamon (D)	11.83 bc	11.48 bc	11.89 b	B1	
11.89 a	Average (D)	11.22 c	11.81 bc	12.66 a	B2	A × D
		11.52 b	11.64 b	12.27 a	aver	age (A)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

6. Bulb diameter (cm)

Table (6) indicates that there are significant differences between the cultivars and the levels of humic acid and the nutrient solution. The local white onion cultivar excelled, where it gave the highest average trait amounted to 2.86 cm compared to the Syrian onion cultivar, which gave the lowest average of the trait amounted to 2.07 cm, significantly excelled the level of (300) kg.ha⁻¹ humic acid,

As it gave the highest average for the trait was 2.42 cm compared to the level of (0) kg. ha⁻¹, where it gave the lowest average for the trait of 2.27 cm, The significant excelled of the level of (2) ml/L of the nutrient solution, was noted, which gave the highest average for the trait of 2.45 cm over the level of (0) ml/L, where it gave the lowest average for the trait of 2.25 cm.

	B × C		Cultivars(A)		nutrient	humic acid
		A3	A2	A1	(C)	(B)
	2.14 c	1.86 f	1.80 f	2.78 b	(0) C1 ml / L	$P1(0) log log ^{-1}$
	2.41 b	2.27 d	2.10 e	2.86 b	(2) C2 ml / L	ы (0) кд.па
	2.35 b	1.92 f	2.43 c	2.72 b	(0) C1 ml / L	D1(200) kg ha ⁻¹
	2.50 a	2.23 de	2.20 de	3.09 a	(2) C2 ml / L	Б1 (300) кg.na
2.25 b	average	1.89 e	2.11 d	2.75 b	(0) C1 ml / L	
2.45 a	(C)	2.25 c	2.15 cd	2.97 a	(2) C2 ml / L	$\mathbf{A} \times \mathbf{C}$
2.27 b	Average	2.06 c	1.95 d	2.82 a	B1	
2.42 a	(B)	2.07 c	2.31 b	2.90 a	B2	АХВ
		2.07 b	2.13 b	2.86 a	aver	age (A)

Table (6) The effect of adding humic acid and spraying with nutrient solution and the cultivarsand the interaction between them on the trait of Bulb diameter (cm)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

7. Bulb neck thickness (cm)

Table (7) shows that there are significant differences between the cultivars and the levels of humic acid and the nutrient solution, and it appears that the local white onion cultivar was significantly excelled and gave the highest average for the trait of 2.59 cm, while the lowest average for the trait of the Syrian onion cultivar was 1.86 cm, the level of (300 kg.ha⁻¹ of humic

acid was significantly excelled and it gave the highest average for the trait, which was 2.17 cm, while the average for the trait was at a level of (0) kg.ha⁻¹ of humic acid, which reached 2.06 cm. The nutrient solution level of (2) ml/L of had the highest average for the trait, which was 2.23 cm, and was significantly excelled while the lowest average for the trait was 2.00 cm at a level of (0) ml/L of the nutrient solution.

	B × C		Cultivars(A)		nutrient	humic acid
		A3	A2	A1	(C)	(B)
	1.95 b	1.71 e	1.64 e	2.50 b	(0) C1 ml / L	$P1(0) ka ka^{-1}$
	2.18 a	2.04 c	1.94 cd	2.57 b	(2) C2 ml / L	D1 (0) Kg.na
	2.06 b	1.74 de	1.95 cd	2.50 b	(0) C1 ml / L	P1(300) kg hg ⁻¹
	2.29 a	1.95 cd	2.11 c	2.81 a	(2) C2 ml / L	D1 (300) Kg.na
2.00 b	average	1.72 d	1.79 d	2.50 ab	(0) C1 ml / L	
2.23 a	(C)	1.99 c	2.02 c	2.69 a	(2) C2 ml / L	$\mathbf{A} \times \mathbf{C}$
2.06 b	Average	1.87 c	1.79 с	2.53 a	B1	A v D
2.17 a	(B)	1.84 c	2.03 b	2.65 a	B2	A × B
		1.86 b	1.91 b	2.59 a	aver	age (A)

Table (7) The effect of adding humic acid and spraying with nutrient solution and the cultivars
and the interaction between them on the trait of Bulb neck thickness (cm)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

The effect on the traits of vegetative growth can be due to the suitability of the climatic conditions, in addition to the influence of the ground factors, where the availability of the nutrients in the soil increases with the addition of organic fertilizers, which leads to the improvement of the chemical, physical and biological properties. Also, organic fertilizers provide balanced nutrition for the plant, where it releases nutrients slowly and because it contains many nutrients that help the plant to grow and perform the physiological activities of the plant optimally (Salman, 2000 and Hawqa, 2004 and Al-Aswad, 2011) . The effects of organic fertilizers may be due to their role in increasing the soil's ability to retain moisture, as well as its content of nutrients, in addition to improving the physical, chemical and biological properties of the soil (Al-Zoubi et al, 2007, Al-Sahaf, Wa'ati, 2007, and Ali and Al-Gozi, 2010), As for the

differences between the cultivars under study, they may be due to the difference of genetic factors as well as the influence of environmental conditions, in addition to the influence of the interaction between genetic factors and environmental factors.

8- Total yield (tons.h⁻¹)

Table (8) shows that there are significant differences between the cultivars and the levels of humic acid, where the local white onion cultivar was significantly excelled and gave the highest average for the trait of 25.17 tons.h⁻¹, while the Syrian onion cultivar gave the lowest average for the trait amounted to 19.01 tons.h⁻¹, gave the level of (0) kg.ha⁻¹ of humic acid, the highest average for the trait was 22.84 tons.h⁻¹ and the level (300) kg.ha⁻¹ of humic acid was the lowest average for the trait amounted to 19.93 tons. There was no significant difference between the levels of the nutrient solution.

	$\mathbf{B} \times \mathbf{C}$	C	ultivars(A)	nutrient solution	humic acid
		A3	A2	A1	(C)	(B)
	21.33 b	23.12 cd	15.60 f	25.27 с	(0) C1 ml / L	D1 (0) L = L = 1
	24.35 a	13.58 f	31.89 a	27.59 b	(2) C2 ml / L	B1 (0) kg.ha ⁻
	21.36 b	19.60 e	11.21 g	33.28 a	(0) C1 ml / L	P1 (200) kg ha ⁻¹
	18.50 c	19.76 e	21.20 de	14.55 f	(2) C2 ml / L	DI (300) Kg.na
21.34 a	average (C)	21.36 c	13.40 e	29.27 a	(0) C1 ml / L	
21.42 a		16.67 d	26.54 b	21.07 с	(2) C2 ml / L	A×C
22.84 a		18.35 c	23.74 b	26.43 a	B1	
19.93 b	Average (B)	19.68 c	16.20 d	23.91 b	B2	$\mathbf{A} \times \mathbf{B}$
		19.01 b	19.97 b	25.17 a	averag	ge (A)

Table (8) The effect of adding humic acid and spraying with nutrient solution and the cultivarsand the interaction between them on the trait of Total yield (ton.ha⁻¹)

*The different letters between the treatments and their interaction indicate the presence of significant differences between the study factors according to the Duncan polynomial test at a probability level of 0.05

The effects caused by the organic fertilizers used may be due to the aforementioned through their role in influencing the chemical and physical properties of the soil as well as its content of nutrients. Humic acid plays an important role in improving cell division and elongation, in addition to its effect on photosynthesis, respiration and protein synthesis (Khalil, 2013). In addition, its effect is similar to that of plant hormones and thus leads to an increase in the average of plant growth (Kulikura et al., 2003). Also, organic fertilizers encourage microorganisms. It also increases microbial activity and thus increases the activity of microbial enzymes, Nitrogenase, Urease and Dehydrogenase (Mohammed et al., 1999). Al-Sahaf and Aati (2007) indicated that the decomposition of organic fertilizers produces some amino and organic acids that play an important role in the bioprocesses of plants. Among the results of our study, it is noted that

some of the traits of vegetative growth have increased, which was reflected in the yield.It was mentioned (Faust, 1998) that organic fertilizers increase the availability of the nutrients in the soil by modifying the soil interaction (PH) and making the nutrients more available for absorption by the plant as well as the organic fertilizers contain some nutrients available for absorption, which It reflects on the physiological state and thus improves the quantitative yield traits, Through the results of this study, it was found that the cultivars under study differed significantly in most of the studied traits, including the yield traits, which is the most important characteristic, and that the successful variety is the one that is characterized by the high yield. The results showed that the local white cultivars surpassed other cultivars, where it gave the highest total yield of 25.17 tons/hectare. It should be noted that studies and scientific reports have stated that the local white

onion cultivar is the best for producing green onions. Also, the difference between the cultivars may be due to the differences between the cultivars in the genetic factors, in addition to the influence of environmental conditions and the interaction between genetic and environmental factors, which result in the effect on plant growth.

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