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RESPONSE TWO APPLE TRANSPLANTS TO ADDITION VERMICOMPOST FERTILIZERS AND SPRAYING WITH ASCORBIC ACID ON SOME VEGETATIVE GROWTH CHARACTERISTICS.

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ABSTRACT

In order to investigate effects of vermicompost fertilization and ascorbic acid spray on some distinctive vegetative growth of two apple transplants (Ibrahimi A_1 and Sharabi A_2) grown in plastic bags of 29cm diameter, experiment was carried out at research station in College of Agricultural Engineering Sciences, University of Baghdad, during the growing season of 2022. 162 transplants were used in investigation, which also included fertilizing the soil with vermicompost at three different rates (0, 1, and 2 kg per transplant), and spraying the transplants with ascorbic acid at three different rates (0, 150, and 300 mg/L). The treatments were allocated romly based on the Roomized Complete Block Design (RCBD), and the experiment was designed in the split plot order of three replicates. Results showed the stem diameter was the only typical vegetative property where the two apple types did not significantly vary, with variety A_2 being superior by a given stem diameter of 3.83mm. Vermicompost fertilization at a level of 2 kg per transplant^{-1} was preferable for all attributes examined, and for ascorbic acid spray treatments, a concentration of 300 ml was used. L^{-1} performed better at growing plant height, stem diameter, shoots number, and vegetative growth dry weight.

Keywords: Ascorbic acid, Vermicompost, plant's height, Shoots Length.

استجابة صنفين من شتلات التفاح لإضافة سماد الفيرميكومبوست والرش بحامض الأسكوربيك في بعض صفات النمو الخضرية

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الخلاصة

من اجل معرفة تأثير التسميد العضوي الـ Vermicompost ورش حامض الاسكوربك في بعض صفات النمو الخضري لصنفين من شتلات التفاح (الإبراهيمي A_1 والشرابي A_2) والمزروعة في سنادين بلاستيكية بقطر 29 سم، بعمر سنتين أجريت التجربة في محطة الأبحاث في كلية علوم الهندسة الزراعية ـ جامعة بغداد خلال موسم النمو 2022 ، تم استخدام 162 شتلة، أيضا تضمنت تسميد التربة بسماد Vermicompost بثلاث مستويات (0 ، 1 ، 2 كغم شتلة$^{-1}$) ورش الشتلات بالـ Ascorbic acid بثلاث تراكيز (0 ، 150 ، 300 ملغم لتر$^{-1}$). صممت التجربة وفق نظام الألواح المنشقة (Split-Plot Design) بواقع ثلاث مكررات ووزعت المعاملات عشوائياً باستخدام تصميم القطاعات التامة التعشية RCBD. أظهرت النتائج ان قطر الساق الصفة المتفوقة بينما لا يوجد فروقات معنوية بين صنفي الدراسة في اغلب الصفات الخضرية الأخرى، حيث تفوق الصنف A_2 بإعطائه قطر ساق بلغ 3.83 mm. كان إضافة سماد Vermicompost للتربة بمستوى 2 كغم شتلة$^{-1}$ متفوقة في جميع الصفات قيد الدراسة، وعن معاملات الرش

* **The research is taken from a master's thesis by the first researcher.**

Ascorbic acid فكان الرش بتركيز 300 ملغم لتر$^{-1}$ متفوقاً بإعطائه أعلى زيادة في ارتفاع النبات وقطر الساق وعدد الافرع والوزن الجاف للأجزاء الخضرية.

الكلمات المفتاحية: حامض الاسكوربيك، الفيرميكومبوست، ارتفاع النبات، طول الافرع.

INTRODUCTION

Apple, *Malus domestica* of the family *Rocaceae*, is one of the most famous and widespread One of the most well-known and ubiquitous varieties of deciduous fruit trees is the apple, which is successfully cultivated around world, particularly in the temperate and warm temperate zones between latitudes 33° and 60° **(Bramlage 2001)**. Approximately 2,632,229 apple trees are cultivated in Iraq generating 79,413 tons of apples on average (30.17 kg per tree), with the majority of these trees located in the northern and center parts of the nation **(central Statistical Organization 2021)**.

One of the most important procedures for apple orchards is the use of various organic fertilizers. They are also very important for improving the physical, chemical, and biological characteristics of the soil by loosing the heavy soil granules and improving the soil aeration, as well as enhancing the soil's ability to retain water, especially in light-textured soils like say **(AL-Hchami *et al.*, 2019; Al-Halfi & Al-Azzawi 2022; Al-Mafrajee & EL-Rubaee, 2022; Calvo *et al.*, 2014;)**. This is in addition to their nutritional benefit, as they provide the soil with many nutrient elements necessary for apple plants. Vermicompost is one of the organic fertilizers created when worms, particularly Eudriculus eugeniac or Eisenia fetida, and several types of helpful microbes break down organic materials **(AL-Haideri *et al.*, 2023; Chaudhuri *et al.*, 2016; Nardo, 2020;)**. Vermicompost was observed to boost the vegetative growth and yield metrics, particularly the plant height, fruit length, fruit weight, crown diameter, and total yield, in aresearch done by **(Ameri *et al.*, 2012)**. Additionally, results from an experiment on marin transplants at the age of four that examined the effects of adding varying amounts of nitrogen and vermicompost fertilizer (at 0, 10, 15, and 20 kg plant^{-1}) revealed that transplants treated with vermicompost fertilizer at the concentration of 20 kg plant^{-1} exhibited an increase in the traits of plant height, shoots length, shoots diameter, number of shoots, and number of leaves **(Pareek *et al.*, 2017)**. Vermicompost fertilization of orange trees improved the transplants' vegetative development features, which demonstrated had a favorable impact on the plants **(Nardo, 2020)**.

Spraying ascorbic acid onto the fruit transplants' shoot system is another crucial step in promoting and enhancing plant growth. One of the sweet acids, in fact. C6H8O6 is its chemical symbol. Ascorbic acid is a growth-regulatory-like antioxidant with a variety of uses in plant tissues, including promoting vegetative growth and fruit output in fruit transplants and trees. In addition to its involvement in the electron transport system and the protection of chloroplasts from oxidation, it regulates cell development and division, promotes respiration, and boosts the efficiency of several enzymes. Additionally, it plays a significant part in protecting cell constituents from photooxidation, particularly chlorophyll (**Barth *et al.*, 2006; Smirnoff, 1995; Smirnoff & Wheeler, 2000; Khattab *et al.*, 2019**). **(Al-A'areji & Alalaf, 2012)** discovered that spraying bitter orange transplants with ascorbic acid at various doses resulted in a rise in the number of leaves, leaf area, and chlorophyll content in the leaves. Results from an experiment in which ascorbic acid was sprayed on transplants of the apricot variety Labib at three different concentrations (125, 250, and 375 mg) L^{-1} confirmed that the spray significantly increased the transplants' vegetative growth, particularly when the concentrations and number

of sprays were increased, as in the two treatments of 250 and 375 mg. The great advantage of L^{-1} and four times of spraying is seen in the expansion of all the researched vegetative growth features **(Al-Douri, 2014)**.

Thus, study's goal was to find out how two apple transplants cultivars (Ibrahimi and Sharabi) responded to organic vermicompost fertilization and ascorbic acid spraying in terms of certain distinctive vegetative development.

MATERIALS AND METHODS

In order to study the effects of fertilizing with soil fertilization, vermicompost, and foliar sprays of ascorbic acid on the transplants of two apple varieties (Ibrahimi and Sharabi) at the age of two years, homogeneous in growth as much as possible, grafted on the seed apple stock, and planted in 29 cm bots fil, the research was conducted at the research station (B) affiliated with the College of Agricultural Engineering Sciences/University of Baghdad during A total of 162 transplants (for both types) were used in the experiment after 81 transplants from each variety were chosen and divided among three replicates, each of which had nine experimental treatments and three transplants per experimental unit. The study included three components: first, two apple transplant types (Ibrahimi and Sharabi); second, soil fertilization with three concentrations of vermicompost (0, 1, and 2 kg/transplant); and third, foliar spray with three concentrations of ascorbic acid (0, 150, and 300 mg/transplant). The transplants received the experimental treatments at r&om. Using a hand sprayer with a 10 L capacity, the spraying operation was carried out to complete wetness every two weeks for five months commencing on January 1, 2020.

1. V_0C_0: Control treatment
2. V_0C_1: Soil application Vermicompost 0 kg transplant $^{-1}$ + Spraying Ascorbic acid 150 mg L^{-1}
3. V_0C_2: Soil application Vermicompost 0 kg transplant $^{-1}$ + Spraying Ascorbic acid 300 mg L^{-1}
4. V_1C_0: Soil application Vermicompost 1 kg transplant $^{-1}$ + Spraying Ascorbic acid 0 mg L^{-1}
5. V_1C_1: Soil application Vermicompost 1 kg transplant $^{-1}$ + Spraying Ascorbic acid 150 mg L^{-1}
6. V_1C_2: Soil application Vermicompost 1 kg transplant $^{-1}$ + Spraying Ascorbic acid 300 mg L^{-1}
7. V_2C_0: Soil application Vermicompost 2 kg transplant $^{-1}$ + Spraying Ascorbic acid 0 mg L^{-1}
8. V_2C_1: Soil application Vermicompost 2 kg transplant $^{-1}$ + Spraying Ascorbic acid 150 mg L^{-1}
9. V_2C_2: Soil application Vermicompost 2 kg transplant $^{-1}$ + Spraying Ascorbic acid 300 mg L^{-1}

The treatments were dispersed romly, and the experiment was constructed using the Split-Plots order with three repetitions, based on the Raomized Complete Block Design (RCBD). The subplots included fertilizing with vermicompost and applying ascorbic acid spray, while the varieties made up the main plots. The means were compared using the Least Significant Difference (L.S.D.) at the probability threshold of 0.05 and the data were statistically analyzed using Genstat **(Elsahoki & Wahib, 1990)**.Rate of increase Plant height (cm), Rate of increase stem diameter (mm), Rate of increase number of branches (branch transplant^{-1}), Rate of increase branch length (cm), and vegetative part dry weight (gm) were among the parameters that were measured for the study.

RESULTS AND DISCUSSION

Rate of increase plant's height (cm)

Results in (Table, 1) refer to there were no significant differences in the rate of increased in plant high. Fertilization with Vermicompost was showed significantly affected in this trait where the treatment V_2 gave the highest increased in plant high amounting to 17.44 cm, while treatment V_0 showed a low increased in plant high reaching 10.94 cm. For the treatments of spraying Ascorbic acid, the treatment C_2 was superior in this trait, giving 17.22 cm, compared to C_0, which gave the lowest increased in plant high 10.78 cm. The interaction between the studied varieties and fertilization with Vermicompost affected the trait positively, as the interaction treatment, A_2V_2, gave the highest increased in plant high, reaching 19.22 cm, vs. the lowest increased in plant high came from the interaction treatment A_2V_0 being 10.00 cm. Concerning the effect of the interaction between ascorbic acid and the varieties, the interaction treatment A_1C_2 was distinguished by the highest increased in plant high of 17.44 cm compared to A_1C_0, which gave the lowest increased in plant high of 9.78 cm. The interaction between the treatments of Vermicompost fertilization and spraying Ascorbic acid also had a significant effect on increasing the plant high, as the interaction treatment V_2C_2 gave the highest increased in plant high reaching 19.83 cm, whereas the interaction treatment V_0C_0 showed the lowest increased for this trait reaching 7.50 cm. Regarding the triple interaction between the two study varieties with the fertilization treatments, results listed in the table referred to the superiority of the interaction treatment $A_2V_2C_2$ giving the highest increased in plant high reached to 20.67 cm compared to the lowest increased came from the interaction treatment $A_1V_0C_0$ was 6.67 cm.

Table (1): Effect Vermicompost and spraying Ascorbic acid on Rate of increase plant's height (cm) of two apple transplants cultivars.

Varieties	Vermicompost	Ascorbic acid			A × V	Average A
		C_0	C_1	C_2		
A_1	V_0	6.67	12.33	16.67	11.89	14.22
	V_1	11.67	17.00	16.67	15.11	
	V_2	11.00	17.00	19.00	15.67	
A_2	V_0	8.33	10.00	11.67	10.00	14.81
	V_1	9.67	17.33	18.67	15.22	
	V_2	17.33	19.67	20.67	19.22	
Average C		10.78	15.56	17.22	L.S.D 0.05 A × V 1.67	L.S.D 0.05 A N.S
L.S.D 0.05 A×V×C		3.31				
A × C	A_1	9.78	15.44	17.44	L.S.D 0.05 1.67	
	A_2	11.78	15.67	17.00		
V × C	V_0	7.50	11.17	14.17	10.94	Average V
	V_1	10.67	17.17	17.67	15.17	
	V_2	14.17	18.33	19.83	17.44	
L.S.D 0.05						
V × C		C			V	
2.47		1.43			1.43	

Rate of increase Stem Diameter (mm)

Results illustrated in (Table, 2) refer to significant differences between the two studied varieties in increased stem diameter, where the superiority of the variety Sharabi (V2) in increasing the stem diameter by 3.83 mm compared to the variety Ibrahimi (V1) which gave 2.33 mm. while the Vermicompost fertilization the trait significantly as the treatment V_2 gave the highest increased in stem diameter reaching 4.08 mm, and the treatment V_0 gave a low diameter that was 2.00 mm. Regarding the Ascorbic acid treatments, C_2 was the superior treatment in this trait which gave 3.47 mm, compared to C_0, which gave the lowest increased in stem diameter was 2.53 mm. The interaction between the two studied varieties and the Vermicompost fertilization affected this trait positively. The treatment A_2V_2 recorded the highest increased in stem diameter reaching 4.61 mm, compared to the lowest increased in stem diameter, 1.22 mm at the interaction treatment A_1V_0. Concerning the effect of spraying the transplant with Ascorbic acid and the interaction between them, the treatment A_2C_2 was distinguished, recording the highest increased in stem diameter, amounting to 4.17 mm compared to the treatment A_1C_0, which gave the lowest increased in stem diameter of 1.83 mm. and the interaction between the Vermicompost fertilization treatments and spraying Ascorbic acid showed a significant effect on the stem diameter, The interaction treatment V_2C_2 recorded the highest increased in stem diameter, reaching 4.67mm, while the interaction treatment V_0C_0 showed the lowest value of the trait reaching 1.42mm. For the triple interaction between the two studied varieties and the fertilization treatments, the results in the table referred to the superiority of the interaction treatments $A_2V_2C_2$, giving the highest increased in stem diameter reached 5.17mm compared to the lowest value recorded by the interaction treatment $A_1V_0C_0$ was 0.67mm.

Table (2): Effect Vermicompost and and spraying Ascorbic acid on Rate of increase Stem Diameter (mm) of two apple transplants cultivars.

Varieties	Vermicompost	Ascorbic acid			A × V	Average A
		C_0	C_1	C_2		
A_1	V_0	0.67	1.33	1.67	1.22	2.33
	V_1	2.00	2.17	2.50	2.22	
	V_2	2.83	3.67	4.17	3.56	
A_2	V_0	2.17	3.00	3.17	2.78	3.83
	V_1	3.33	4.83	4.17	4.11	
	V_2	4.17	4.50	5.17	4.61	
Average C		2.53	3.25	3.47	**L.S.D 0.05 A × V 0.043**	**L.S.D 0.05 A 0.036**
L.S.D 0.05 A×V×C		0.080				
A × C	A_1	1.83	2.39	2.78	**L.S.D 0.05 0.043**	
	A_2	3.22	4.11	4.17		
V × C	V_0	1.42	2.17	2.42	2.00	**Average V**
	V_1	2.67	3.50	3.33	3.17	
	V_2	3.50	4.08	4.67	4.08	
L.S.D 0.05						
V × C		**C**			**V**	
0.059		0.034			0.034	

Rate of increase Shoots number (Shoots transplant^{-1})

Results in (Table, 3) refer to no significant difference between the two varieties in increased the number of Shoots, while the Vermicompost fertilization had a significant effect on this trait. Treatment V_2 gave the highest increased in number of Shoots reaching 3.03branch transplant^{-1}, and treatment V_0 gave a low increased in number of Shoots was 1.46branch transplant^{-1}. At the ascorbic acid treatments, C_2 was superior in increased the number of Shoots, giving 3.01 branch transplant^{-1}, compared to C_0, which gave the lowest Shoots, was 1.62branch transplant^{-1}. The interaction between the varieties and the Vermicompost fertilization affected the trait positively, as the interaction treatment A_1V_2 showed the highest increased in number of Shoots of 3.06 branch transplant^{-1} compared to the lowest number of Shoots of 1.33branch transplant^{-1} given by the interaction treatment A_1V_0. Concerning the effect of spraying the varieties with Ascorbic acid and the interaction between them, the interaction treatment A_2C_2 was superior, giving the highest number of Shoots reaching 3.08branch transplant^{-1} compared to the treatment A_1C_0 that gave the lowest number of Shoots reaching 1.61branch transplant^{-1}. The interaction between the treatments of Vermicompost fertilization and Ascorbic acid spray also had a significant effect on increasing the number of Shoots to 4.17branch transplant^{-1} given by the interaction treatment V_2C_2 while the lowest number of Shoots, 1.07 branch transplant^{-1}, was obtaining by the interaction treatment V_0C_0. Regarding the triple interaction between the two apple varieties and the fertilization treatments, the results of the table indicated the superiority of the two-interaction treatment $A_1V_2C_2$ & $A_2V_2C_2$ which gave the highest number of Shoots reaching 4.17 branch transplant^{-1} compared to the interaction treatment $A_1V_0C_0$ giving the lowest number of Shoots of 1.00 branch transplant^{-1}.

Table (3): Effect Vermicompost and spraying Ascorbic acid on Rate of increase number of Shoots (branch transplant^{-1}) of two apple transplants cultivars.

Varieties	Vermicompost	Ascorbic acid			A × V	Average A
		C_0	C_1	C_2		
A_1	V_0	1.00	1.17	1.83	1.33	2.24
	V_1	1.50	2.67	2.83	2.33	
	V_2	2.33	2.67	4.17	3.06	
A_2	V_0	1.13	1.47	2.17	1.59	2.37
	V_1	1.93	2.70	2.90	2.51	
	V_2	1.83	3.00	4.17	3.00	
Average C		1.62	2.28	3.01	L.S.D 0.05 A × V 0.48	L.S.D 0.05 A N.S
L.S.D 0.05 A×V×C		0.83				
A × C	A_1	1.61	2.17	2.94	L.S.D 0.05 0.48	
	A_2	1.63	2.39	3.08		
V × C	V_0	1.07	1.32	2.00	1.46	Average V
	V_1	1.72	2.68	2.87	2.42	
	V_2	2.08	2.83	4.17	3.03	
L.S.D 0.05						
V × C		C			V	
0.59		0.34			0.34	

Rate of increase Shoots Length (cm)

Results in (Table, 4) show no significant differences between the two varieties in the Shoots length. The fertilization with Vermicompost showed a significant effect on this trait where the treatment V_2 had the highest Shoots length rate, reaching 11.82 cm, and the lowest value was 8.09 cm recorded by the treatment V_0. Regarding the treatment of spraying Ascorbic acid, treatment C_2 was superior in Shoots length showing 11.67cm, compared to treatment C_0, which gave the lowest Shoots length rate of 8.72cm. The effect of the interaction between the studied varieties and the Vermicompost fertilization was positive on this trait that the interaction treatment A_1V_2 had the highest Shoots length rate of 11.88cm, compared to the lowest rate of 7.76cm achieved by the interaction treatment A_1V_0. For the effect of spraying the varieties with Ascorbic acid and the interaction between them, the treatment A_1C_2 was superior in the Shoots length rate of 12.01 cm compared to the interaction treatment A_1C_0 which gave the lowest Shoots length rate of 8.59 cm. The interaction between the fertilization treatments of Vermicompost and Ascorbic acid spray affected this trait significantly. The interaction treatment V_2C_2 gave the highest rate of 13.82 cm, while the interaction treatment V_0C_0 showed the lowest Shoots length rate of 6.93cm. Regarding the triple interaction between the two study varieties and the fertilization treatments, the results in the table showed the superiority of the interaction treatment $A_1V_2C_2$ giving the highest Shoots length rate amounting to 14.03 cm compared to treatment $A_1V_0C_0$ which had the lowest rate amounting to of 6.40 cm.

Table (4): Effect Vermicompost and spraying Ascorbic acid on Rate of increase Shoots Length (cm) of two apple transplants cultivars.

Varieties	Vermicompost	Ascorbic acid			A × V	Average A
		C_0	C_1	C_2		
A_1	V_0	6.40	7.67	9.20	7.76	10.14
	V_1	9.50	10.10	12.80	10.80	
	V_2	9.87	11.73	14.03	11.88	
A_2	V_0	7.47	8.87	8.97	8.43	10.22
	V_1	9.07	10.90	11.43	10.47	
	V_2	10.03	11.63	13.60	11.76	
Average C		8.72	10.15	11.67	**L.S.D 0.05 A × V 2.01**	**L.S.D 0.05 A N.S**
L.S.D 0.05 A×V×C		2.37				
A × C	A_1	8.59	9.83	12.01	**L.S.D 0.05 2.01**	
	A_2	8.86	10.47	11.33		
V × C	V_0	6.93	8.27	9.08	8.09	**Average V**
	V_1	9.28	10.50	12.12	10.63	
	V_2	9.95	11.68	13.82	11.82	
L.S.D 0.05						
V × C		**C**			**V**	
1.42		0.82			0.82	

Vegetative growth dry weight (gm)

Results in (Table, 5) refer to the no significant differences between the two varieties in the Vegetative growth dry weight. Fertilizing with Vermicompost showed a significant effect for this trait, represented by the treatment V_2 giving the highest Vegetative growth dry weight reaching 125.5 gm, while the treatment V_0 gave a low dry weight, reaching 101.8 gm. Among the Ascorbic acid spray treatments, C_2 was superior in Vegetative growth dry weight, giving

125.3 gm., compared to treatment C_0, which gave the lowest dry weight of (101.6 gm). The interaction between the two varieties and the Vermicompost fertilization affected this trait positively, as the interaction treatment A_2V_2 gave the highest Vegetative growth dry weight, reaching 130.2 gm vs. the lowest dry weight was 96.2 gm., gotten from the interaction treatment A_2V_0. Regarding the effect of the interaction between the varieties and spraying them with Ascorbic acid, treatment A_2C_2 gave the highest Vegetative growth dry weight amounting to 128.2 gm, compared to treatment A_2C_0 giving the lowest dry weight reaching 96.6 gm. The interaction between the fertilization with Vermicompost and spraying Ascorbic acid had a significant effect on increasing the nitrogen percentage in the Shoots, as the treatment V_2C_2 gave the highest value, reaching 143.7 gm while the interaction treatment V_0C_0 showed the lowest value of the trait, reaching 83.2 gm. Concerning the triple interaction between the studied varieties and the fertilization treatments, according to the results, in the table, the interaction treatment $A_2V_2C_2$ achieved the highest Vegetative growth dry weight, reaching 152.3 gm compared to the lowest dry weight was 69.0 gm, obtained by the interaction treatment $A_2V_0C_0$.

Table (5): Effect Vermicompost and spraying Ascorbic acid on Vegetative growth dry weight (gm) of two apple transplants cultivars.

Varieties	Vermicompost	Ascorbic acid			A × V	Average A
		C_0	C_1	C_2		
A_1	V_0	97.3	117.3	107.3	107.3	117.7
	V_1	120.0	130.0	125.0	125.0	
	V_2	102.3	125.0	135.0	120.8	
A_2	V_0	69.0	112.3	107.3	96.2	115.3
	V_1	110.7	122.3	125.0	119.3	
	V_2	110.0	128.3	152.3	130.2	
Average C		101.6	122.6	125.3	L.S.D 0.05 A × V 14.25	L.S.D 0.05 A N.S
L.S.D 0.05 A×V×C		27.82				
A × C	A_1	106.6	124.1	122.4	L.S.D 0.05 14.25	
	A_2	96.6	121.0	128.2		
V × C	V_0	83.2	114.8	107.3	101.8	Average V
	V_1	115.3	126.2	125.0	122.2	
	V_2	106.2	126.7	143.7	125.5	
L.S.D 0.05						
V × C		C			V	
20.70		11.95			11.95	

It is noticed from the tables above, the superiority of the Vermicompost fertilization treatment at the level of 2 kg. transplants^{-1}. The reason for this may be due to the nutrient content in Vermicompost fertilizer and to its role in improving the soil's physical properties, which contributes to enhancing plant absorption of nutrients and increasing them in plant leaves, which in turn enhances the photosynthesis efficiency and increases the speed of cell division and elongation, which reflected positively on the plant growth in general. The increase characteristic vegetative may be due to the mineralization of organic matter, the decline in the soil pH by organic acids, and the increase in the formation of the microelements complexes resulting from the Vermicompost decomposition as well as the increase in the effectiveness of

living organisms growing in the area of the roots, provided by Vermicompost **(Taiz & Zeiger, 2010; AL-Hchami *et al.*,2019; Esmaielpour *et al.*, 2020; Al-Khafaji *et al.*, 2022)**. These results are consistent with **(Al-Obaidi & Abdul-Ratha, 2021; Al-Khafaji & Al-jubouri, 2023; Al-Silmawy & Abdul-Ratha, 2023)**.

It is also observable that spraying Ascorbic acid at the concentration of 300mg.L-1 increased all studied traits significantly, which may be due to its role in inducing the growth and construction processes through its action as a co-enzyme for several enzymes responsible for the metabolism of carbohydrates and proteins. It also regulates the processes of cell division and expansion and increases the photosynthesis process resulting in increasing the carbohydrate content in the leaves and enhancing the vegetative growth of the transplants. The increase in the traits above also may be due to the fact that spraying Ascorbic acid increased the chlorophyll content in the leaves as a result of increasing the nitrogen content and protecting the constituted chlorophyll against photo- and thermal oxidation as an anti-oxidation factor Which was reflected positively in increasing vegetative growth and increasing plant height, stem diameter, which resulted in an increase in the number and length of Shoots, and the reflection of this increase on the dry weight of the vegetative growth **(Al-Douri, 2014; Blokhina *et al.*, 2003)**.

CONCLUSION

The different varieties did not significantly affect the studied traits, and the fertilization with Vermicompost showed a remarkable superiority in all traits, especially the concentration of 2 kg transplants^{-1}, and the results also showed that spraying the transplants with Ascorbic acid at a concentration of 300 mg L^{-1} had a positive and significant effect in improving the characteristic vegetative. The interaction between Vermicompost fertilizer and Ascorbic acid spraying effected significantly of increased plant height, stem diameter, number of Shoots, branch length, and dry weight, especially with V_2C_2 treatment.

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