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EFFECT OF HUMIC ACID AND EM1 FERTILIZERS ON GROWTH AND YIELD OF TWO CUCUMBER CULTIVARS (*CUCUMIS SATIVUS* L.) UNDER PLASTIC HOUSE CONDITIONS.

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ABSTRACT

This experiment was conducted in the plastic house at the vegetable research farm of Directorate of Agricultural Extension and Scientific Research of Dohuk, Kurdistan region/ Iraq, during the growing Seasons of 2018-2019, to investigate the effects of Humic acid, (0.8 g.l^{-1} and 1.6 g.l^{-1}) and EM1 (3 ml.l^{-1} and 6ml.l^{-1}) in addition to the Control on growth and yield of two Cucumber cultivars (Falcon star and Sayfi F1). The results shows that Falcon star was superior over to Sayfi F1 in plant length and chlorophyll in leaves in fall season (2.91cm and 51.76SPAD), while Sayfi Fi overcome to Falcon star on chlorophyll in leaves, fruit diameter in spring season (47.40SPAD and 2.90cm). No significant effect of fertilizers had been seen in vegetative characters. But the yield characters had significant effects, the 3ml.l^{-1} of EM had higher value of Fruit weight 111.71g in spring season, while 6ml.l^{-1} of EM had higher (Plant yield 5.36Kg and Total yield 139.51 ton.ha^{-1}) in fall season. Control treatment had higher fruit length and diameter (17.01cm and 2.91cm) in spring season.

KEY WORD:- Humic acid, EM1 fertilizers, Cultivar, Cucumber.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is an important vegetable and is considered as one of the most popular members of the Cucurbitaceae family (Lower and Edwards, 1986 and Thoa, 1998). Origen is a native of China and India, and cucumbers growing season is short (3-4 months) since it is not able to bear high temperature during summer further than affecting by low temperature during winter. So, cucumber plants are usually cultured twice in two seasons: spring (early April) and fall (middle August) (Mattlob *et al.*, 1989).The excessive use of agrochemicals has polluted the environment to a great extent and the food produced under such a farm management may not be safe or of a good quality. Public awareness of these problems has shifted the approach towards some alternative measures (Shaxson, 2006). The problems of Iraqi soils that characterized with the basic nature and its poor in organic matter and what is associated with it of nutrient elements fixation and then affect on yield of crops, so it is necessary to search for other ways for plant nutrition like the use of bio- and organic fertilizers. Some substances affect plant growth and its physiological activities and one of them is humic acid which enhances plant growth and soil microorganisms (Leonard, 2008). Al-madhagi (2019) humic at 100 mg.l^{-1} alone increased the yield about 14.88%. Kazemi (2013), found that foliar spray of hmic acid on cucumber plant has a significant effect in increasing average of plant yield. The cucumber plant spray with humic acid leading to a significant increase in the sum per plant and total yield (El-Nemr *et al*; 2012). The addition of humic acid foliar to cucumber plant with level 20ml.L^{-1} achieved a significant increase in the total yield (Unlu *et al* ;2011). Yousif (2011) showed a significant increase when adding humic foliar or through soil

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on cucumber plant in the percentage of chlorophyll, the total yield and the sum per plant. Bayoumi and Hafez (2006) showed that using organic fertilizers foliar with different concentration led to a significant increase in the properties of vegetable growth which reflected on the increase of yield.

Bio fertilizers play a very important role in improving soil fertility by fixing atmospheric nitrogen, both in association with plant roots and without it, solubilize insoluble soil phosphates and produce plant growth substances in the soil (Venkatashwarlu, 2008). Sangakkara and Higa (1991) found that EM and organic matter promoted the growth of Cucumber. Hanna *et al.*, (2005) stated that application of bio fertilizers (Azotobacter + Azospirillum) significantly increased vegetative growth, early and total yield of cucumber. Gharib (2001) found that inoculated cucumber plants with Azotobacter plus phosphate dissolving bacteria (PDB) led to significant increases in early and total yield of cucumber. Omar and El-Kattan (2001) who conducted an experiment to evaluate the effect of bio fertilization on the yield of some vegetables as Cucumber and Sweet Pepper recorded that bio fertilization of vegetables gave positive effect on yield of both Sweet Pepper and Cucumber. Yousif (2011) reported that applying EM1 to Cucumber plants caused significant increase in most of vegetative growth characteristics plant length, branch number, leaves area, leaves number, chlorophyll percentage. Since a limited research studies have been carried out in this regard in Iraq in general and especially in Kurdistan region, this experiment was conducted to study the effect of humic acid, Biofertilizers (EM-1) on the growth and yield characters of two cucumber Hybrid Falcon star and Sayf F1.

MATERIALS AND METHODS

The experiment was carried out in plastic house (500 m^2), (10 × 50) m^2, the plastic house was located at the Vegetable Research Farm, Duhok, Kurdistan region/Iraq, during two seasons of 2018-2019. The seeds of two cucumber hybrids were taken (Falcon star and Sayfi F1). The seeds were sown in plastic pots (72) cavity, 1:1mixture of sandy soil : peat moss were preparative for planting. The seeds were planted in two growing seasons Spring and Fall season in (2^{ed} February and 9^{th}July). The transplanting done after 30 days in plastic house. All cultural practices including fertilizing, weeding, soil softening around transplants and protective spraying were done to all treatments and the plants irrigated as those of cucumber farm. The humic acid and bio fertilizers EM were sprayed with vegetative growth, four times. The first one was at fruit set, and it was repeated four times every one weeks between sprays. The surfactant agent Tween-80 was added to all solutions at a rate of 0.01% to reduce the surface tension of the solution and the control treatment spray by distilled water contain Tween-80. The experiment comprised the effect of two hybrids Falcon star and Sayfi F1, two concentrations of Humic acid (0.8 and 1.6) $g.l^{-1}$ and two concentrations of EM (3and 6) $ml.l^{-1}$ and with control, the treatments was randomly arranged in a factorial experiment in a Randomized Complete Block design (RCBD). The number of experimental units were (2 × 5 = 10) with three replicates, the number of experiment was (30) units and the results were analyzed statistically by using Duncan test at 0.05% level to verify the differences between mean of treatments (SAS, 2007).

A random sample of five plants from each exprement were taken for determination of vegetative growth, i.e., plant height, number of leaves, chlorophyll content in leaves and leaf area (cm2). And the yield characters i.e. Number of fruits/plant, plant yield (kg), fruit weight (g), total yield (ton.ha-1). All fruits harvested from each treatment through harvesting period were weighted to calculate the total yield per hectar. The random sample of ten fruits were taken for determination the fruits length (cm) and fruit diameters (cm).

RESULTS

Plant Height:-

Data in table (1) shows that no sgnificant effect of cultivars on plant height in spring season, while significant effect has been done on plant high in fall season and falcon star had higher height (2.91cm) compared to sayfi F1 (2.66cm). Regarding the effect of fertilizers, no significant effect occurred on plant height on spring, but in fall season 6 $ml.l^{-1}$Em had a higher height of plant compared to other treatments. The interaction between cultivars and organic fertilizers in spring season had no significant effect, while in fall had

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significant effect and the highest value (3.03cm) was observed between falcon star and 6ml.l^{-1} EM as compared to others.

Table (1):- Effect of Humic acid and EM on plant height (cm) of two Cucumber Cultivars, in Spring and Fall season.

Spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	2.47 a	2.51 a	2.71 a	2.38 a	2.55 a	2.53 a
Sayfi F1	2.35 a	2.24 a	2.42 a	2.35 a	2.38 a	2.35 a
Means of Fertilizer	2.41 a	2.38 a	2.57 a	2.37 a	2.46 a	

Fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	2.64 ab	2.99 a	2.93 a	2.95 a	3.03 a	2.91 a
Sayfi F1	2.24 b	2.58 ab	2.89 a	2.77 ab	2.80 ab	2.66 b
Means of Fertilizer	2.44 b	2.78 ab	2.91 a	2.86 a	2.92 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

NUMBER OF LEAVES PER PLANT

Table (2) revealed that no significant effect of cultivars and organic fertilizers on No. of leaves per plant in two growing seasons.

As the interaction effects had slightly significant effect and falcon star with 1.6 g.l^{-1} humic acid gave the highest No. of leaves on spring season, but no significant effect of interaction on fall season.

Table (2):-Effect of Humic acid and EM on No. of leaves of two Cucumber Cultivars, in Spring and Fall season.

Spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	36.67b	41.67 a	42.00 a	38.33 ab	40.67 ab	39.87 a
Sayfi F1	38.33 ab	39.33 ab	38.33 ab	36.00 b	38.67 ab	38.13 a
Means of Fertilizer	37.50 a	40.50 a	40.17 a	37.17 a	39.67 a	

Fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	42.00 a	46.11 a	47.56 a	46.45 a	46.11 a	45.65 a
Sayfi F1	43.23 a	41.97 a	43.75 a	44.75 a	44.45 a	43.63 a
Means of Fertilizer	42.61 a	44.04 a	45.65 a	45.60 a	45.28 a	

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Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

Chlorophyll content in leaves (SPAD):-

Table (3) shows that significant effect of cultivars on chlorophyll content in leaves and the higher effect (47.40%) in sayfi F1 cultivars in spring season, while in fall season falcon star (51.76%) had overcome to sayfi F1 cultivar. The effect of fertilizers had no significant effect on chlorophyll content in leaves in two seasons. The interaction between cultivars and fertilizers had significant effect and the interaction between sayfi F1 and control treatment gave the maximum chlorophyll content in leaves (49.42%) compared to other interaction on spring season, while in fall season the interaction between falcon star and 1.6 $g.l^{-1}$ humic acid gave the highest value (53.33%) compared to other interaction.

Table (3):-Effect of Humic acid, EM on Chlorophyll content in leaves of two Cucumber Cultivars, in Spring and Fall season.

Spring

Cultivars	**organic fertilizer**					**mean of cultivar**
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	42.24 b	46.22 ab	43.64 ab	44.27 ab	44.38 ab	44.15 b
Sayfi F1	49.42 a	46.96 ab	47.45 ab	49.15 ab	44.01 ab	47.40 a
Means of Fertilizer	45.83 a	46.59 a	45.55 a	46.71 a	44.19 a	

Fall

Cultivars	**organic fertilizer**					**mean of cultivar**
	control	Humic 0.8g.l-1	Humic 1.6g.l-1	EM 3ml.l-1	EM6ml.l-1	
Falcon star	52.93 ab	52.80 ab	53.33 a	51.30 abc	48.43 abc	51.76 a
Sayfi F1	49.60 abc	46.87 abc	49.93 abc	45.10 c	46.67 bc	47.63 b
Means of Fertilizer	51.27 a	49.83 a	51.63 a	48.20 a	47.55 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

No. of fruits per plant (f.plant^{-1}):-

Results in table (4) shows that no significant effect of cultivars and two fertilizers on the No. of fruit per plant in spring and fall seasons. While, in the interaction between them had significant effect, falcon star sprayed with 0.8g.l gave the highest number of fruit (42.97 and 53.02 f.plant^{-1}) compared to other interaction in spring and fall seasons respectively.

Table (4):- Effect of Humic acid, EM and their interaction on No. of fruits f.plant^{-1} of two Cucumber Cultivars, in Spring and Fall season.

spring

Cultivars	**organic fertilizer**					**mean of cultivar**
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	33.72 c	42.97 a	40.35 abc	40.46 abc	41.50 ab	39.80 a
Sayfi F1	34.60 bc	39.67 abc	37.37 abc	39.85 abc	36.89 abc	37.67 a

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Means of Fertilizer	34.16 b	41.32 a	38.86 a	40.15 a	39.19 a	

fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	48.75 ab	53.02 a	49.66 ab	47.13 ab	50.90 ab	49.89 a
Sayfi F1	46.74 ab	49.97 ab	42.90 b	46.54 ab	47.47 ab	46.73 a
Means of Fertilizer	47.75 a	51.49 a	46.28 a	46.84 a	49.18 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

Plant yield (Kg.plant^{-1}):-

Data in table (5) revealed that no significant effect of cultivars and fertilizers on plant yield of cucumber in spring season and no significant effect of cultivars in fall season, while significant effect of fertilizers had been observed and the 6ml.l^{-1} of EM gave the highest value (5.36kg) compared to control (4.65kg). As the interaction effect, the interaction between falcon star and 3ml.l^{-1}of EM gave the highest value (7.38kg) compared to lower value (4.55kg) between falcon star and control treatment in spring season, but in fall season the interaction between falcon star and 6ml.l^{-1}EM gave the highest significant yield (5.58kg) compared to others.

Table (5):- Effect of Humic acid, EM on Plant yield Kg.plant^{-1} of two Cucumber Cultivars, in Spring and Fall season.

Spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	4.55 d	7.07 ab	7.27 ab	7.38 a	6.49 ab	6.55 a
Sayfi F1	5.02 cd	6.19 abc	6.43 abc	6.51 ab	5.90 bcd	6.01 a
Means of Fertilizer	4.785 b	6.63 a	6.85 a	6.95 a	6.19 a	

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	4.69 bcd	5.27 abc	5.06 a-d	5.35 ab	5.58 a	5.19 a
Sayify F1	4.60 cd	5.33 ab	4.51 d	5.06 a-d	5.14 a-d	4.93 a
Means of Fertilizer	4.65 c	5.30 a	4.79 bc	5.21 ab	5.36 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

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Fruit Weight (g):-

Results in table (6) shows that no significant effect of cultivar, fertilizers and their interaction in fruit weight on spring season and cultivars in fall season, while the effect of fertilizers in fall season had significant effect and the maximum value occurred in 3ml.l^{-1} EM (111.70g) compared to minimum value (96.55g) in control treatment. The interaction effect in fall season showed that no significant effects in fruit weight of cucumber.

Table (6):- Effect of Humic acid, EM on Fruit weight g of two Cucumber Cultivars, in Spring and Fall season.

spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	139.86 a	165.00 a	180.36 a	183.02 a	157.69 a	165.19 a
Sayfi F1	150.35 a	156.14 a	171.57 a	164.53 a	159.46 a	160.41 a
Means of Fertilizer	145.10 a	160.57 a	175.97 a	173.77 a	158.57 a	

Fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	96.55 a	100.08 a	102.21 a	113.76 a	109.71 a	104.46 a
Sayfi F1	98.48 a	106.79 a	105.75 a	109.64 a	108.23 a	105.78 a
Means of Fertilizer	97.51 b	103.44 ab	103.98 ab	111.70 a	108.97 ab	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

Total yield (ton.ha^{-1}):-

Table (7) revealed that no significant effect of cultivar and fertilizers in total yield on spring season and cultivars in fall season, while significant effect of fertilizer in fall season and the highest result (139.51 ton.ha^{-1}) when sprayed cucumber with 6ml.l^{-1} EM compared to control treatment (121.10 ton.ha^{-1}). The interaction effect on total yield had significant effect, the interaction between falcon star and 3ml.l^{-1}EM gave the highest value (192.26ton.ha^{-1}) in spring, while in fall season the interaction between falcon star and 6ml.l^{-1}EM which gave the highest value (145.18ton.ha^{-1})

Table (7):- Effect of Humic acid, EM on Total yield ton.ha^{-1} of two Cucumber Cultivars, in Spring and Fall season

spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	118.43 d	184.08 ab	189.24 ab	192.26 a	168.88 ab	170.57 a
Sayfi F1	130.75 cd	161.27 abc	167.29 abc	169.49 ab	153.61 bcd	156.48 a
Means of Fertilizer	124.59 a	172.68 a	178.26 a	180.87 a	161.24 a	

Fall

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Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l-1	Humic 1.6g.l-1	EM 3ml.l-1	EM6ml.l-1	
Falcon star	122.19 bcd	137.21 abc	131.62 a-d	139.40 ab	145.18 a	135.20 a
Sayfi F1	119.83 cd	138.75 ab	117.52 d	131.71 a-d	133.83 a-d	128.33 a
Means of Fertilizer	121.10 c	137.98 a	124.57 bc	135.56 ab	139.51 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

Fruit diameter (cm):-

Table (8) shows that significant effect of cultivar on fruit diameter in spring season and the sayfi F1 had higher diameter than falcon star (2.90, 2.79cm) respectively. While no significant effect between two cultivars in fall season.

The effect of fertilizers on fruit diameter had significant effect in spring season and the control gave the highest value (2.91cm), while in fall season had no significant effect. The inter action between cultivars and fertilizers had no significant effects on fruit diameter of cucumber.

Table (8):- Effect of Humic acid, EM on Fruit diameter cm of two Cucumber Cultivars, in Spring and Fall season.

spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	2.87 a	2.70 b	2.84 ab	2.82 ab	2.70 b	2.79 b
Sayfi F1	2.95 a	2.83 ab	2.87 a	2.92 a	2.93 a	2.90 a
Means of Fertilizer	2.91 a	2.77 b	2.85 ab	2.87 ab	2.82 ab	

Fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	2.92 a	2.92 a	2.97 a	2.95 a	2.93 a	2.94 a
Sayfi F1	2.91 a	2.92 a	2.92 a	3.00 a	2.98 a	2.95 a
Means of Fertilizer	2.92 a	2.92 a	2.95 a	2.98 a	2.96 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

Fruit length (cm):-

Data in table (9) shows that no significant effect of cultivar on fruit length in spring and fall and seasons and fertilizers in fall season, while significant effect of fertilizers in spring season and the control and 1.6g.l^{-1}humic had highest value (17.01 and 16.83cm) respectively. The inter action between cultivars and fertilizers had significant effects on fruit length of cucumber.

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Table (9):- Effect of Humic acid, EM on Fruit length cm of two Cucumber Cultivars, in Spring and Fall season.

spring

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	17.12 a	15.62 c	16.86 a	16.51 ab	16.02 bc	16.43 a
Sayfi F1	16.89 a	16.67 ab	16.79 ab	16.65 ab	16.44 ab	16.69 a
Means of Fertilizer	17.01 a	16.15 b	16.83 a	16.58 ab	16.23 b	

Fall

Cultivars	organic fertilizer					mean of cultivar
	control	Humic 0.8g.l^{-1}	Humic 1.6g.l^{-1}	EM 3ml.l^{-1}	EM 6ml.l^{-1}	
Falcon star	14.37 c	15.02 abc	15.43 a	15.16 ab	15.02 abc	15.00 a
Sayfi F1	15.00 abc	14.61 bc	14.73 abc	14.87 abc	14.74 abc	14.79 a
Means of Fertilizer	14.69 a	14.81 a	15.08 a	15.01 a	14.88 a	

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 0.05% level.

THE EFFECT OF SEASON:-

Table (10) shows that effect between two seasons on all parameters of growth and yield, in spring the parameters (Plant yield Kg, Total yield ton.ha^{-1}, Fruit length cm) had higher value (6.28kg, 16kg.53ton.ha^{-1}, 16.56 cm)respectively compared to fall season, while in fall season the parameters (Length of plant cm, No. of leaves, Chlorophyll content in leaves, No. of fruits f.plant^{-1} and Fruit diameter cm) gave the highest value (2.78cm, 44.64 leaves, 49.70%, 48.31f. plant^{-1} and 2.94cm) respectively. While no significant effect of seasons on fruit weight g of cucumber.

Table (10):- Effect of two season on growth and yield of cucumbers

Parameters	Seasons	
	Spring	Fall
Length of plant cm	2.44 b	2.78 a
No. of leaves	39.00 b	44.64 a
Chlorophyll content in leaves	45.77 b	49.70 a
No. of fruits f.plant^{-1}	38.74 b	48.31 a
Plant yield Kg	6.28 a	5.06 b

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Total yield ton.ha^{-1}	163.53 a	131.73 b
Fruit diameter cm	2.84 b	2.94 a
Fruit length cm	16.56 a	14.90 b
Fruit weight g	162.80 a	105.12 b

DISCUSSION

Preceding study and research confirmed that humic substances had a beneficial effects on plant physiology. It was noted that it had direct effects on cell membrane permeability, respiration, nucleic acid, biosynthesis, ion absorption, hormone and enzyme activity (Chen and Schnitzer, 1978). Humic acid was reported to increase plant height. Humic acid plays a vital role to provide minerals, nutrient (nitrogen, potassium and phosphorous) uptake, necessary for plant growth. In addition, it is acting as a source of plant growth regulators, carbohydrates, amino acids, and vitamins. Abbas (2013) reported that humic acid led to increase the level of endogenous substances i.e; cytokinin, gibberellins, and auxin. Additionally, it can also be used as a carrier for trace elements and growth regulators. Thus, increases in nutrient uptake enhanced the vegetative growth of the plant, stimulates plant growth hormones and increasing cell division (Atiyeh *et al*., 2002). In the current study, the application of the humic acid increased the yield of cucumber. Moreover, the role of the humic acid in terms of increasing yield probably due to increase the average of single fruit weight as found by Ekİncİ *et al*. (2015), found that humic acid treatments applied at different rates positively affected the total marketable yield, average fruit weight, fruit diameter, fruit length of tomato and cucumber. While in the current study, yield was recorded according to the market needed (20-25 fruits Kg^{-1}).

The EM1 leads to the activation of photosynthetic processes (which increases the formation of chlorophyll, protein and the activity of a number of enzymes, and particularly, increases peroxide activity) in plants (Winget and Gold, 2007). This is an important factor for promoting the growth and development of plants. EM1 is able to increase the formation chlorophyll-green pigment in plants, which takes part in the processes of absorption of solar energy, carbon dioxide and other substances and supports the growth and developments of plants. The enhancement of flowering and yield of tomato by EM1 may be attributed to the role of EM1 that promoted yield and photosynthesis by enhancing root development and activity. The significant beneficial effects of EM1 could be due to either the interactions between beneficial organisms, the organic matter and metabolic substances included in EM1 or its capacity to produce these growth promoters subsequently (Yamanda *et al.,* 1996). The increased yield from the application of EM1 may have been caused by the production of growth –enhancing compounds such as indol acetic acid and gibberellins which may have positively influenced the plant growth and yield (Rao, 1986). As the seasonal effect the spring season overcome to fall season on characters (Plant yield Kg, Total yield ton.ha-1, Fruit length cm and Fruit weight g), while fall season superior to spring season on character (Length of plant cm, No. of leaves, Chlorophyll content in leaves, No. of fruits f.plant-1 and fruit diameter cm).

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کارتێکرنا زبلێ ترشێ هیومیك و EM1 لسەر کەشەکرنا وبەرهمێ دوو چورێن خیاری (Cucumis sativus L.) لبن کاودانێت خانیی پلاستیکی

پوختە

ئەف ڤەکولینە یاهاتیە ئەنجامدان ل خانیێ پلاستیکی لزفیێن زرزەواتی یا بەرەف رێڤەبەریا شیرەتتکاریین چاندنێ و ڤەکولینین زانستی یا دهوکی -هەرێما کوردستان- عراق. بو سالا خاندنێ 2018-2019.بو دیارکرنا کارتیکرنا زبلێ ترشێ هیومیك (0.8 غم.لتر-1 و 1.6 غم.لتر-1) و 3) EMمل.لتر-1 و 6 مل.لتر-1) و دکەل کونترولی لسەر گەشەکرنێ وبەرهەمێ دوو چورێن خیاری (سەیفی F1 و ڤالکون). ئەنجام هاتنە دیارکرن ب سەرکەفتنا چورێ فالکون بشێوەکێ بەرجاڤ لسەر چورێ سەیفی F1 ب سالوخەتێن درێژیا رروەکی و نسبا کلوروفیلی د بەلگادا ل وەرزێ پایزێ (2.91سم و SPAD51.76) , بەلێ چورێ سەیفی بسەرکەفت لسەر چورێ فالکون د سالوخەتێن نسبا کلوروفیلی د بەلگاداو و درێژیا فێقی خیاری د وەرزێ بهارێ (SPDA 47.40 و 2.90 سم). زبلێ ترشی هیومیك و EM چ ئەنجامێت بەرچاف نەبوون دسالوخەتێن گەشەکرنێ. بەلی رەشاندن ب EM1 ب رێژەیا 3مل.لتر-1 زیدەترین کیشەیا فێقی دا ب (111.71 غم) دوەرزێ بهاری دا, بەلێ رەشاندنا خیاری ب زبلێ 6 EMمل.لتر-1 بو ئەگەرێ زیدبوونا بەرچاف یا بەرهەمێ د رووەکی دا.5.36کغم و بەرهمی د دونەمی دا 139.51 تن.دونم-1 د وەرزێ پایزێ دا, بێ رەشاندن (کونترول) بو ئەگەرێ زیدەبوونا درێژی و فرەهی یا فێقیێ خیاری (17.01 سم, و2.91 سم) دوەرزێ بهارێ دا.

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تاثير تسميد الهيوميك اسيد و EM1 على نمو وحاصل صنفين من الخيار (Cucumis sativus L.) النامي تحت ظروف البيت البلاستيكى

الخلاصة

اجريت التجربة داخل البيت البلاستيكى لحقول الخضراوات التابع لدائرة الارشاد الزراعي والبحث العلمي في دهوك- كردستان – العراق. خلال الموسم الزراعي 2018-2019 لبيان تاثيرالرش ب هيوميك اسيد بتراكيز (0.8 و 1.6 مل.لتر$^{-1}$) و EM1 بتراكيز (3 و6 مل.لتر$^{-1}$) مع معاملة المقارنة على نمو وانتاجية صنفين من الخيار (سيفي F1 و فالكون). بينت النتائج بتفوق صنف فالكون على صنف سيفي في صفات طول النبات ونسبة الكلوروفيل في الاوراق (9.21سم وSPAD51.76) على التوالى في موسم الخريفي, ولكن تفوق صنف سيفي على صنف فالكون في صفات نسبة الكلوروفيل في الاوراق و طول الثمرة (SPDA 47.40 و 2.90 سم) على التوالى في الموسم الربيعي. لم يكن لمعاملات التسميد تاثير معنوي على صفات النمو, ولكن كان للتسميد تاثير معنوى على بعض الصفات الحاصل, الرش ب 3مل.لتر$^{-1}$ EM1 اعطى اعلى وزن ثمرة (111.17غم) في الموسم الربيعى, رش الخيار ب 6 مل.لتر$^{-1}$ EM1 اعطى اعلى حاصل النبات (5.36 كغم.نبات$^{-1}$) و حاصل الكلي (139.51 طن.دونم$^{-1}$) في الموسم الخريفي, اما معاملة الكنترول ادى الى زيادة معنوية في صفات طول و قطر الثمرة (17.01سم و 2.91 سم) في الموسم الربيعى.

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