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EFFECT OF BIO-FERTILIZERS AND HUMIC ACID ON THE GROWTH OF RANUNCULUS (*RANUNCULUS ASIATICUS*) PLANT

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Abstract

The experiment was conducted in the lath house of the Department of Horticulture and Landscape Garden, College of Agriculture, Al Qasim Green University for the autumn season 2018-2019, To study the effect of biofertilizer type and the method of adding humic acid on the growth of Ranunculus plant. The tuberous roots of *Ranunculus asiaticus* L. (Red cultivar) produced by Flower Holland company were cultivated after soaking in water them for 8 hours in a 22 cm diameter pots contains agricultural medium consisting of 3: 1 loamy sand and Peat moss, respectively. After the addition of biofertilizers (Trichoderma, mycorrhiza, Bacillus bacteria) and their interaction, the second factor is the method of fertilization with humic acid (in adding to soil 5 ml.L $^{-1}$, foliar spray 3 ml.L $^{-1}$) in addition to the control treatment. The experiment was conducted as a factorial experiment within the Complete Randomized Blocks design with three replicates and the averages were compared according to the least significant difference test (L.S.D) within a probability level of 0.05%. The results showed that the biofertilizers in their interaction improved most of the studied traits, The treatment of (Trichoderma + Micorrhiza + Basils) was characterized by giving the best average for the traits of flowering and vegetative growth. where the use of humic acid to improve the growth of Ranunculus and characterized by the ground addition on the spraying leaves to increase an average of studied traits, also helped the interaction between fertilizers and humic acid to improve the growth of Ranunculus plant and the production of flowers and increase vase life

Introduction

Ranunculus asiaticus L. belongs to the Ranunculaceae family. It has numerous names such as: constantinopolitanus, Persian Buttercup, and celery flower (Rickard, 2011). It is a winter annual flowering bulbs of dicotyledoneae, its preferably areas with moderate temperatures, the Mediterranean region is original home to it, also is spreading cultivation in Eastern of Europe, some regions of Africa, Asia, Syria and Iran also grows well in some parts of Iraq (Badr *et al.,* 2008, Lehnebach, 2010). Its economic importance comes because of its flowers suitable for commercial cutting, especially type of *Ranunculus asiaticus*. Flowers are used mainly in the flower bouquets either individually or in combination with other flowers (Bernstein, *et al.*, 2011). The optimal use of microorganism's activity and soil biological activity is an environmentally safe alternative to the availability of essential nutrients compared to chemical fertilizers (Al-Haddad, 1998). The use of biofertilizers, known as Bio farming or Natural Agriculture, is one of the most advanced agricultural techniques because it plays an important role in improving the natural, chemical and biological traits of soil, Nitrogen fixation, increasing the availability and absorption of nutrients such as phosphorus, potassium and microelements, thus improving plant growth and production (Al Jubouri, 2013). Humic acid also plays an important role in plant growth as it works to transport nutrients within the plant and increases the level of photosynthesis and increases the absorption of nutrients and dry matter in the plant, as well as stimulate the plant to resistance to stress conditions, as a source of nutrients and thus increases the soil fertility (Tan, 2003). In view of the aesthetics and importance of Ranunculus flowers and the lack of studies on them despite the suitability of the Iraqi environment for cultivation and multiplication of the research, The aim of this research is to determine the best biological vaccine (Mycorrhiza, Trichoderma, Basils) and the combination of them to improve the traits of vegetative and flowering growth and Tuberous roots production of Ranunculus. Determination of the best method of fertilizing with humic acid (spraying on the leaves or ground addition) to improve the traits of

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vegetative, flowering and tuberous growth of Ranunculus.

Materials and Methods

The experiment was conducted in the lath house of the Department of Horticulture and Landscape Garden, College of Agriculture, Al Qasim Green University for the autumn season 2018-2019 to study the effect of biofertilizer type and the method of adding humic acid on the growth of Ranunculus plant. The tuberous roots of *Ranunculus asiaticus* L. (Red cultivar) produced by Flower Holland company were cultivated after soaking in water them for 8 hours on 8/11/2018 in a 15 cm diameter pot plant containing agricultural medium consisting of 3: 1 loamy sand and Peat moss, respectively.

Study factors

1. Biofertilizers

Three types of biofertilizers were added that produces in the laboratories of the Agricultural Research, Ministry of Science and Technology,Include:-

- *Trichoderma* Spp.
- Mycorrhiza (*Glomus mosseae*)
- *Bacillus sabtilus* bacteria

Fertilizer treatments in the experiment and their combinations

1) control(without adding fertilizer),which is symbolized B0
2) Trichoderma fungi, which is symbolized B1
3) Mycorrhiza fungi, which is symbolized B2
4) Bacillus bacteria, which is symbolized B3
5) Trichoderma fungi + Mycorrhiza mushroom, which is symbolized B4
6) Trichoderma + Bacillus, which is symbolized B5
7) Bacillus + mycorrhizal, which is symbolized B6
8) Trichoderma + Mycorrhiza + Bacillus bacteria, which is symbolized B7

Humic acid

Plants were treated with humic acid in the first two ways by spraying on the leaves until the complete wetness was repeated and spraying process every (20) days during the plant growth period (except the flowering stage), and the second addition is ground for the agriculture medium and repeat the addition every (20) days during the plant growth period (Except the flowering stage). As follows:

1. control (add half fertilizer recommendation of liquid chemical fertilizer NPK),which is symbolized by H0.
2. Fertilization with humic acid foliar spraying (3 ml.L $^{-1}$), which is symbolized by H1.
3. The addition of humic acid to the agriculture medium (5 ml.L $^{-1}$), which is symbolized by H2.

3. Experimental design

The experiment was conducted as a factorial experiment (3× 8) according to Randomized Complete Blocks Design (R.C.B.D), with three replicates, each one of them containing 24 treatments with four flowers per experimental unit, and the averages were compared to according to the test of less significant difference (L.S.D) under 5% probability level (Al Sahoki *et al.,* 1990). Data were analyzed using the ready statistical program (Genstat).

Results and Discussion

Plant height (cm)

The results in table 1 indicate that the biofertilizers had a significant effect in increasing the height of the plant Ranunculus. The results showed that the biofertilizer treatment of (Bacillus + Mycorrhiza) was significant which gave the highest plant height amounted to 36.18 cm compared to the control treatment (without addition) which gave the lowest plant height mounted to 29.20 cm. The method of using humic acid has a significant effect in increasing the plant height of Ranunculus, The treatment of ground additives (5 ml.L $^{-1}$) significantly excelled by giving it the highest plant height amounted to 35.41 cm, while the foliar spraying treatment (3 ml.L $^{-1}$) gave the plant height which amounted to 31.46 cm, while the control treatment gave the lowest of plant height amounted to 30.97 cm. The results of the same table showed that the interaction between the biofertilizers and humic acid had a significant effect in increasing the plant height of Ranunculus plant. The interaction treatment [Bacillus + Mycorrhiza + 5 ml.L $^{-1}$] achieved the highest plant height of the Ranunculus amounted to 39.45 cm compared to the control treatment which gave the lowest plant height amounted to 24.10 cm.

The percentage of carbohydrates in leaves (%)

The results in table 2 indicate that the biofertilizers had a significant effect in increasing carbohydrates in Ranunculus leaves. where The results showed that the biofertilizers (Trichoderma + Bacillus) was significantly excelled and gave the highest The percentage of carbohydrates amounted to 0.61%. , Compared with the control treatment which gave the lowest percentage of carbohydrates amounted to 0.40%. The method of using humic acid has a significant effect in increasing the carbohydrate content of the plant. Where the treatment of ground additives 5 ml.L $^{-1}$significantly excelled by giving

Table 1: Effect of bio-fertilizers type, humic acid and their interaction on plant height of Ranunculus.

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	24.10	27.80	35.70	29.20
Trichoderma (B1)	27.30	29.95	34.80	30.68
Mycorrhiza (B2)	34.30	29.80	33.65	32.58
Bacillus (B3)	31.80	31.65	34.65	32.70
Mycorrhiza + Trichoderma (B4)	30.10	34.95	37.30	34.12
Bacillus+ Trichoderma (B5)	29.60	29.60	36.55	31.92
Bacillus+Mycorrhiza (B6)	35.95	33.15	39.45	36.18
Trichoderma++ MycorrhizaBacillus (B7)	34.65	34.80	31.15	33.53
The average Humic acid	30.97	31.46	35.41	
L.S.D 0.05	H*B: 2.09	H:0.74	B:1.21	

Table 2: Effect of bio-fertilizers type, humic acid and their interaction on The percentage of carbohydrates in leaves (%).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	0.32	0.42	0.45	0.40
Trichoderma (B1)	0.46	0.68	0.57	0.57
Mycorrhiza (B2)	0.49	0.43	0.43	0.45
Bacillus (B3)	0.35	0.50	0.70	0.52
Mycorrhiza + Trichoderma (B4)	0.50	0.34	0.42	0.42
Bacillus+ Trichoderma (B5)	0.40	0.53	0.89	0.61
Bacillus+Mycorrhiza (B6)	0.47	0.44	0.55	0.49
Trichoderma++ MycorrhizaBacillus (B7)	0.59	0.50	0.40	0.50
The average Humic acid	0.44	0.48	0.55	
L.S.D 0.05	H*B: 0.22	H:0.07	B:0.11	

Table 3: Effect of bio-fertilizers type, humic acid and their interaction on The Flowering date (day).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	130.45	133.18	128.13	130.59
Trichoderma (B1)	139.02	143.54	137.60	140.05
Mycorrhiza (B2)	135.93	137.67	78.43	117.34
Bacillus (B3)	116.48	123.12	121.35	120.52
Mycorrhiza + Trichoderma (B4)	130.90	128.12	130.50	129.84
Bacillus+ Trichoderma (B5)	120.92	126.07	117.95	121.65
Bacillus+Mycorrhiza (B6)	126.75	128.25	131.27	128.76
Trichoderma++ MycorrhizaBacillus (B7)	124.05	129.92	128.92	127.63
The average Humic acid	128.06	131.31	121.77	
L.S.D 0.05	H*B: 15.10	H:4.01	B:8.60	

it the highest carbohydrate content of Ranunculus plant amounted to 0.55 %,while the foliar spray treatment 3 ml.L $^{-1}$ gave The percentage of carbohydrates in leaves amounted to 0.48 %, while control treatment gave the lowest The percentage of carbohydrates amounted to 0.44%. The results of the same table showed that the interaction between biofertilizers and humic acid had a significant effect in increasing the carbohydrate content of Ranunculus. The interaction of (Trichoderma + Bacillus) + ground addition of 5 ml.L $^{-1}$)achieved the highest carbohydrate content of Ranunculus plant amounted to 0.8 %, compared to the control treatment which gave the lowest the percentage of carbohydrates amounted to 0.32 %.

Flowering date (day)

The results of table 3 indicate that the biofertilizers had a significant effect on the early flowering date of the Ranunculus plant. Where the results showed that the biofertilizers (Mycorrhiza) was significantly excelled which gave the early flowering date amounted to 117.34 days. Compared with the treatment of biofertilizer (Trichoderma) which gave the late date for flowering amounted to 140.05 days, while the humic acid application has a significant effect in improving the flowering date of Ranunculus plant. The foliar spraying treatment of 3 ml.L $^{-1}$ significantly increased by giving the highest average of flowering date amounted to 131.31 days, while the control treatment gave a flowering date amounted to 128.06 days. While the ground

Table 4: Effect of bio-fertilizers type, humic acid and their interaction on The number of flowers (flower. Plant -1).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	6.94	4.84	5.09	5.63
Trichoderma (B1)	5.64	5.66	6.82	6.04
Mycorrhiza (B2)	8.70	8.15	10.66	9.17
Bacillus (B3)	10.50	14.57	12.85	12.64
Mycorrhiza + Trichoderma (B4)	9.63	9.27	9.33	9.41
Bacillus+ Trichoderma (B5)	9.75	13.80	10.86	11.47
Bacillus+Mycorrhiza (B6)	5.40	11.75	16.66	11.27
Trichoderma+ + MycorrhizaBacillus (B7)	8.76	10.84	16.77	12.13
The average Humic acid	8.17	9.86	11.14	
L.S.D 0.05	H*B: 1.67	H:0.59	B:0.96	

Table 5: Effect of bio-fertilizers type, humic acid and their interaction on The duration of flowers on the plant (day).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	7.30	6.30	7.30	6.97
Trichoderma (B1)	6.87	6.63	7.73	7.08
Mycorrhiza (B2)	6.33	7.87	8.50	7.57
Bacillus (B3)	6.63	7.87	6.53	7.01
Mycorrhiza + Trichoderma (B4)	8.07	6.17	6.90	7.04
Bacillus+ Trichoderma (B5)	7.77	9.03	6.30	7.70
Bacillus+Mycorrhiza (B6)	7.23	7.63	6.80	7.22
Trichoderma+ + MycorrhizaBacillus (B7)	6.53	7.07	7.93	7.18
The average Humic acid	7.09	7.32	7.25	
L.S.D 0.05	H*B: 0.89	H:0.12	B:0.51	

Table 6: Effect of bio-fertilizers type, humic acid and their interaction on The Number of tuberous roots of Ranunculus plant (root . plant -1).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	76.00	102.00	81.00	86.30
Trichoderma (B1)	83.00	89.00	130.00	100.70
Mycorrhiza (B2)	93.00	126.00	134.00	117.70
Bacillus (B3)	100.00	166.00	121.00	129.00
Mycorrhiza + Trichoderma (B4)	178.00	154.00	119.00	150.30
Bacillus+ Trichoderma (B5)	84.00	142.00	207.00	144.30
Bacillus+Mycorrhiza (B6)	96.00	104.00	125.00	108.30
Trichoderma+ + MycorrhizaBacillus (B7)	203.00	105.00	209.00	172.30
The average Humic acid	114.13	123.50	140.78	
L.S.D 0.05	H*B: 24.68	H:8.73	B:14.25	

adding of treatment gave the lowest average of flowering date of Ranunculus plant amounted to 121.77 days. The results of the same table also showed that the interaction between biofertilizers and humic acid had a significant effect on the flowering date of Ranunculus plant.The interaction between (Mycorrhiza + 5 ml.L^{-1} achieved the best flowering date of Ranunculus amounted to 78.43 days, compared to the control treatment of biofertilizer (Trichoderma), which gave a flowering date amounted to of 143.54 days.

The number of flowers (flower. Plant $^{-1}$)

The results in table 4 showed that biofertilizers had a significant effect in increasing the number of flowers of Ranunculus plant, as the results showed that the biofertilizer (Bacillus) was significant differences among them and gave the highest number of flowers of the plant amounted to 12.64 flower. Plant $^{-1}$. The method of using humic acid has a great effect in increasing the number of flowers of the Ranunculus plant, the treatment of the ground addition (5 ml.L $^{-1}$) significantly excelled by giving the highest number of flowers of the Ranunculus plant amounted to 11.14 flower. Plant $^{-1}$,while the treatment of foliar spraying 3 ml.L $^{-1}$ gave which gave The number of flowers amounted to 9.86 flower. Plant $^{-1}$, while the control treatment gave the lowest number of flowers for the Ranunculus plant amounted to 8.17 flower. Plant $^{-1}$. The results of the same table showed that the

Table 7: Effect of bio-fertilizers type, humic acid and their interaction on The number of cloves the roots of the Ranunculus (cloves .root-1).

Biofertilizers (B)	(H) Humic acid			The average Biofertilizer
	0	foliar spraying 3 ml.L^{-1}	ground addition 5 ml.L^{-1}	
Control (B0)	3.00	3.00	5.00	3.67
Trichoderma (B1)	4.00	3.00	5.00	4.00
Mycorrhiza (B2)	4.00	6.00	9.00	6.33
Bacillus (B3)	3.00	6.00	5.00	4.67
Mycorrhiza + Trichoderma (B4)	3.00	3.00	6.00	4.00
Bacillus+ Trichoderma (B5)	5.00	4.00	6.00	5.00
Bacillus+Mycorrhiza (B6)	4.00	5.00	5.00	4.67
Trichoderma+ + MycorrhizaBacillus (B7)	4.00	4.00	5.00	4.33
The average Humic acid	3.75	4.25	5.76	
L.S.D 0.05	H*B: 2.48	H:0.88	B:1.43	

interaction between biofertilizers and humic acid had a significant effect in increasing the number of flowers of Ranunculus plant. while the interaction between [(Trichoderma + Mycorrhiza + Bacillus) + ground addition 5 ml.L $^{-1}$]gave the highest number of flowers amounted to 16.77 flower. Plant $^{-1}$. Compared to the control treatment which gave the number of flowers amounted to 4.84 flower. Plant $^{-1}$.

The duration of flowers on the plant (day)

(Table 5) showed that the biofertilizers had a significant effect in increasing the vaselife of Ranunculus plant. The results showed that the biofertilizer (Trichoderma) was significantly excelled and gave the highest vase life amounted to 7.36 days, in addition to the biofertilizer (Mycorrhiza) and (Trichoderma + Bacillus) with equal values of 7.27 days which achieved the second-highest value compared to the treatment of Trichoderma +Mycorrhiza.) Which gave the minimum vase life amounted to 6.53 days, The method of using humic acid has a significant effect in increasing the vase life of Ranunculus flowers, the treatment of the ground addition 5 ml.L $^{-1}$ significantly excelled by giving the longest vase life of Ranunculus flowers amounted to 7.44 days, while the treatment of foliar spraying 3 ml.L $^{-1}$ gave 6.95 days, while the control treatment gave the minimum the duration of flowers amounted to 6.91 days, the results of the same table showed that the biofertilizer and humic acid had a significant effect on increasing the duration of flowers, where the interaction between Trichoderma + addition of ground 5 ml achieved the highest The duration of flowers was 8.00 days compared to the interaction between the biofertilizers (Trichoderma + Mycorrhiza) which gave The duration of flowers amounted to 6.00 days.

Number of tuberous roots of Ranunculus plant (root. plant $^{-1}$)

(Table 6) indicate that the biofertilizers had a significant effect in increasing Number of tuberous roots, where the results showed that the biofertilizer combination of (Trichoderma + Mycorrhiza+ Bacillus) significantly excelled and gave the highest number of tuberous roots amounted to 172.30 root. plant $^{-1}$ The control treatment that gave the lowest number of tuberous roots amounted to 86.30 root. plant $^{-1}$, The method of using humic acid has a great effect in increasing the number of tuberous roots of the plant where the treatment of the ground addition 5 ml.L $^{-1}$ significantly excelled by giving the highest number of tuberous roots of the plant amounted to 140.78 root. plant $^{-1}$, while the treatment of foliar spraying 3 ml.L $^{-1}$. the number of roots reached 123.50 root. plant $^{-1}$, while the control treatment the minimum number of roots of the plant reached 114.13 root. plant $^{-1}$. The results of the same table showed that the interaction between biofertilizers and humic acid had a significant effect without significant differences among them in increasing the number of roots of the plant, where the interaction treatment [Trichoderma +Mycorrhiza+ Bacillus + ground addition 5 ml.L $^{-1}$] The highest number of roots of the Ranunculus plant amounted to 209.00 root. plant $^{-1}$, compared to the control treatment which gave the number of roots of the plant amounted to 76.00 root. plant $^{-1}$.

The number of cloves the roots of the Ranunculus (cloves.root^{-1})

The results in table 7 showed that the biofertilizers had a significant effect in increasing the Number of cloves the roots, where the results showed that the biofertilizers (Mycorrhiza) significantly excelled and gave the highest number of cloves the roots of the plant amounted to 6.33 cloves.root^{-1}.Compared to the control treatment (without addition) which gave the minimum number of cloves of the plant amounted to 3.67 cloves.root^{-1}. The method of using humic acid has a significant effect in increasing the number of cloves of Ranunculus plant, where the treatment of ground additives 5 ml.L $^{-1}$ significantly excelled by giving the highest number of cloves of the Ranunculus plant amounted to 5.76 cloves.root^{-1}, while the treatment of foliar spraying 3 ml.L^{-1} gave the number

of cloves amounted to 4.25 cloves.root$^{-1.}$ while the control treatment gave the minimum number of cloves to the root of the plant Ranunculus reached 3.75 cloves.root$^{-1.}$ The results of the same table showed that the interaction between the biofertilizers and humic acid had a significant effect in increasing the number of cloves of the root, The interaction treatment [Mycorrhiza + ground adding 5 ml.L $^{-1}$] achieved the largest number of cloves of the Ranunculus plant amounted to 9.00 cloves.root^{-1}, compared to the control treatment which gave the lowest number of cloves of the Ranunculus root amounted to 3.00 cloves.root^{-1}.

Discussion

Biofertilizers play an important and effective role in increasing the studied traits, where The results showed that biofertilizer treatments significantly excelled on the control treatment in studied traits, This excelled is due to the role of mycorrhiza in penetrating the roots as they arise, forming a Hypha of fungi in the soil, facilitating the absorption of nutrients and activating enzymes for the formation of proteins, thus stimulating growth processes and accelerating the detection of buds, the emergence of vegetative and the emergence of seedlings (Martinez – Medina *et al.,* 2011). Mycorrhiza also has the ability to secrete growth-stimulating substances such as Auxin, which increase cell division and expansion and elongation of plant tissues (El-soyed, 2006). The increased absorption of nutrients due to the role of bio-fertilizers and their accumulation in leaves. The plant then transfers its products to the growth areas and form a strong vegetative total. Mycorrhiza also has an effect on plant growth by secreting growth-stimulating substances and indirectly by improving soil composition through the release of Glomalin, which keeps soil minutes and increases water retention (Adelek, 2010). As well as the role of azotobacter in the stabilization of nitrogen and its entry in different bioprocesses important to the plant. The role of mycorrhizae in the efficient absorption of the key elements necessary for growth, leading to increased cell division, elongation and increase the height of the plant and the number of leaves and leaves area and increase the ability of the plant to manufacture food and increase the accumulation in flowers as flowers are sources of attraction for materials manufactured in the plant (Abdul Latif, 2006) Increasing the activity of the root and total vegetative is reflected in the cycle of flowering, so the biofertilizers increase the plant's ability to manufacture food and accumulate it in flowers and become centres for receiving and attracting nutrients (Sirin, 2011). Which leads to increased studies traits, Mycorrhiza works to increase the accumulation and its important role in the manufacture of DNA and RNA, as well as in the composition of energy compounds, which leads to increase the efficiency of photosynthesis and increase the division and elongation of cells and increase the manufacture of food compounds such as proteins and carbohydrates (Patrick *et al.,* 2001) These results agree with many previous studies, including Prasad *et al.*, (2012) In their studies on *Chrysanthemum morifolium* plant, Sirin (2011) at inoculation of Lilium with Mycorrhiza fungi, and with the results of Karishma *et al*., (2011) on the *Chrysanthemum indicum* L. Valid (2015) at inoculation of *Gladiolus grandiflorus* L. with Mycorrhizal fungus *G. mosseae*, and with the experience of Garmendia and Mangas (2012) on the rose hybrida plant. Humic also plays an important role in physiological processes through improving soil fertility, provide nutrients and increase the availability and absorption by the plant, which affect the diffrent bioactivities such as the division of cells and the formation of tissues of Meristematic tissues elongation and the construction of proteins and nucleic acids and thus the formation of good vegetative growth and encourages humic work Enzymes and the transfer of carbon metabolites (Fawzy *et al.,* 2007). Humic acid has an effect on the speed of growth, development of plants and on the readiness of micro and macro elements. Humic acid makes nutrients more readily available to the plant and promotes the absorption of potassium, calcium and manganese (Asli and Neumann, 2010). Increased vegetative growth and high efficiency in the manufacture of food and the role of humic acid in improving the traits of flowering growth because of its high content of organic matter, allowing the plant to form a good radical addition to the organic matter is an important source of ions necessary for the growth of the plant, such as nitrogen, which is involved in many processes It works on cell division (Hartman, 2002 and Sonmez *et al.,* 2013) which increase building outputs and thus increase studied traits. This is results agree with Nikbakht et al. (2008) found on Gerbera, Boogar *et al.*, (2014) on Petunia hybrid L, and Baldotto and Baldotto (2013) when humic acid was sprayed on Gladiolus

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