

( )

\*

( / / : / / : )

( )

/

(Nardi et al., 2002)

(*Gerbera jamesonii* L.)

(Nardi et al., 2002; Zheng et al., 2004)

(Chen & Aviad, 1990; Sanchez-Sanchez et al.,  
2002)

(Zheng et al., 2004)

(2008) Nikbakht et al. (Atiyeh et al., 2002)

(2003) Tejada & Gonzalez

( / )  
 : ( / )  
 ( / ) : ( / )  
 ( / ) ( / ) ( / ) ( / )  
 ( ) ( ) ( / ) ( / )  
 ( ) ( / ) ( )  
 ( ) Fe-EDDHA  
 / pH / /  
 / )  
 /  
 ( /

(1996) Fernandez-Escobar et al.

Yildirim .

(2007)

(Nielsen& Starkey, 1999)

(Hepler, 2005)

(Gerasopoulos &

.Chebli, 1999)

( / )  
 ( / )  
 ±  
 ± / / ± /  
 / ±

(Michalczuk, 1989; Volpen & Elad, 1991)

نتائج

±

:

ICP

vanadomolybdophosphoric acid

(Mills & Jones, 1996)

± ( ) ±  
( )  
( )

/

×

( ) /

(Bates, 1973)

(EC<sub>1</sub>)

EC

(EC<sub>T</sub>)

EC

(Nardi et al., 2002)

(Zhang et al., 2006)

/ :

$$\frac{EC_1}{EC_T} \times =$$

%

( / )

)

( )

(

: ( .

/

G250

1. Coomassie brilliant blue

(Poovaiah, 1979)

.( )

%

%

.( )

G250

( )

( )

G250

SAS

:

.(Nikbakht et al., 2008)

LSD

.(Nardi et al., 2002)

Fe N  
(Sanchez-Conde &

( )

)

.Ortega, 1986)

(

.( )

Fe .(Fernandez-Escobar et al., 1996)

.( )

.(Nikolic et al., 2003)

.( )

(Nikolic et al.,

.( )

.2003)

.( )

.(White & Chaney, 1980)

- 
1. Shimadzo UV 2401 PC
  2. Albumin bovine

...

:

\*

( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	**
/ b	/ b	/ b	/ ab	/ a	/ a	/ a	/ b	/ b	/ b	/ b	/ ab	
/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ b	
/ b	/ a	/ b	/ b	/ a	/ a	/ a	/ c	/ c	/ b	/ ab	/ a	HA
/	/	/	/	/	/	/	/	/	/	/	/	LSD
/	/	/	/	/	/	/	/	/	/	/	/	CV

LSD

\*

/ : \*\*

:

/ :HA

\*

( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	**
/ a	/ a	/ a	/ a	/ a	/ b	/ ab	/ a			
/ a	/ a	/ a	/ a	/ b	/ a	/ b	/ a			
/ a	/ a	/ a	/ a	/ a	/ ab	/ a	/ a			HA
/	/	/	/	/	/	/	/			LSD
/	/	/	/	/	/	/	/			CV

LSD

\*

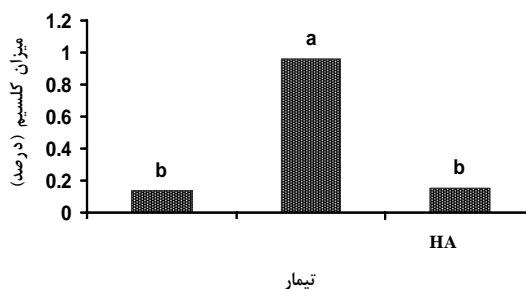
/ : \*\*

:

/ :HA

(Turkmen et al., 2004)

EC



(Nardi et al., 2002)

(Torre et al., 2001)

(2003) Tejada & Gonzalez (Ding et al., 2001)

کار تینوئید

(Zhang et al., 2003)

(Zhang & Ervin, 2004)

(Redman et al., 2002)

(Nardi et al., 2000)

(Chen et al., 2004)

(2004) Zhang & Ervin (2002) Nardi et al.

(2002) Atiyeh et al.

( )

(Hepler, 2005)

(Gerasopoulos & Chebli, 1999; Nikbakht et

al., 2008)

## REFERENCES

1. Atiyeh, R. M., Lee, S. & Edwards, C. A. (2002). The influence of humic acids derived from earthworm-processed organic wastes on plant growth. *Bioresearch Technology*, 84, 7-14.
2. Bates, L. S., Waldren, R. P. & Teare, L. D. (1973). Rapid determination of free proline for water-stress studies. *Plant and Soil*, 39, 205-207.
3. Chen, Y. & Aviad, T. (1990). *Effects of humic substances on plant growth*. In P. MacCarthy et al. (ed.) *Humic substances in soil and crop science: Selected readings*. P. 161-186. SSSA and ASA, Madison, WI.
4. Chen, Y., Clapp, C. E. & Magen, H. (2004). Mechanisms of plant growth stimulation by humic substances: The role of organo-iron complexes. *Soil Science and Plant Nutrition*, 50 (7), 1089-1095.
5. Ding, G. W., Mao, J. D. & Xing, B. S. (2001). Characteristics of amino acids in soil humic substances. *Communications in Soil Science and Plant Analysis*, 32(13-14), 1991-2005.
6. Fernandez-Escobar, R., Benlloch, M., Barranco, D., Duenas, A. & Guterrez Ganan, J. A. (1996). Response of olive trees to foliar application of humic substances extracted from leonardite. *Scientia Horticulture*, 66, 191-200
7. Gerasopoulos, D. & Chebli, B. (1999). Effects of pre- and postharvest calcium applications on the vase life of cut gerberas. *Journal of Horticultural Science and Biotechnology*, 74(1), 78-81.

- ...
- :
8. Hepler, P. K. (2005). Calcium: A central regulator of plant growth and development. *The Plant Cell*, 17, 2142-2155.
  9. Michalczyk, B., Kowalczyk, W. & Nowak, J. (1989). Effects of calcium nitrate and tannins on ethylene production and senescence of cut carnation flowers. *Acta Horticultura*, 251, 59-63.
  10. Mills, H. A. & Jones, J. B. (1996). Plant analysis handbook II. Athens, USA: Micromacro publishing.
  11. Nardi, S., Pizzeghello, D., Gessa, C., Ferrarese, L., Trainotti, L. & Casadoro, G. (2000). A low molecular weight humic fraction on nitrate uptake and protein synthesis in maize seedlings. *Soil Biology and Biochemistry*, 32(3), 415-419.
  12. Nardi, S., Pizzeghello, D., Muscolo, A. & Vianello, A. (2002). Physiological effects of humic substances on higher plants. *Soil Biology and Biochemistry*, 34 (11), 1527-1536.
  13. Nielsen, B. & Starkey, K. R. (1999). Influence of production factors on postharvest life of potted roses. *Postharvest Biology and Technology*, 16, 157-167.
  14. Nikbakht, A., Kafi, M., Babalar, M., Xia, Y. P., Luo, A. & Etemadi, N. (2008). Effect of commercial humic acid on plant growth, nutrients uptake and postharvest life of gerbera. *Journal of Plant Nutrition*, 31, 2155-2167.
  15. Nikolic, M., Cesco, S., Romheld, V., Varanini, Z. & Pinton, R. (2003). Uptake of iron (Fe-59) complexed to water-extractable humic substances by sunflower leaves. *Journal of Plant Nutrition*, 26 (10-11), 2243-2252.
  16. Poovaiah, B. W. (1979). Increased levels of calcium in nutrient solution improves the postharvest life of potted roses. *Journal of American Society for Horticultural Science*, 104(2), 164-166.
  17. Redman, P. B., Dole, J. M., Manes, N. O. & Anderson, J. A. (2002). Postharvest handling of nine specialty cut flower species. *Scientia Horticulture*, 92, 293-303.
  18. Sanchez-conde, M. P. & Ortega, C. B. (1986). *Effect of humic acid on the development and the mineral nutrition of the pepper plant.* p. 745-755. In Control de la fertilizacion de las plantas cultivadas. 2nd Coloquio Evr. Medit. Cent. Edafol. Biol. Aplic. Cuarto, Sevilla, Spain.
  19. Sanchez-Sanchez, A., Sanchez-Andreu, J., Juarez, M., Jorda, J. & Bermudez, D. (2002). Humic substances and amino acids improve effectiveness of chelate FeEDDHA in lemon tress. *Journal of Plant Nutrition*, 25(11), 2433-2442.
  20. Savvas, D. & Gizas, G. (2002). Response of hydroponically grown gerbera to nutrient solution recycling and different nutrient cation ratios. *Scientia Horticulture*, 96, 267-280.
  21. Tejada, M. & Gonzalez, J. L. (2003). Influence of foliar fertilization with amino acids and humic acids on productivity and quality of asparagus. *Biological Agriculture & Horticulture*, 21(3), 277-291.
  22. Torre, S., Fjeld, T. & Gisleterod, H. R. (2001). Effect of air humidity and K/Ca ratio in the nutrient supply on growth and postharvest characteristics of cut roses. *Scientia Horticulture*, 90, 291- 304.
  23. Turkmen O., Dursun, A., Turan, M. & Erdinc, C. (2004). Calcium and humic acid affect seed germination, growth, and nutrient content of tomato (*Lycopersicon esculentum* L.) seedlings under saline soil conditions. *Acta Agrivulturae Scandinavica Section B-Soil and Plant Science*, 54(3), 168-174.
  24. Volpen, H. & Elad, Y. (1991). Influence of calcium nutrition on susceptibility of rose flowers to Botrytis blight. *American Phytopathological Society*, 81, 1390-4.
  25. White, M. C. & Chaney, R. L. (1980). Zinc, cadmium and manganese uptake by soybean from two zinc and cadmium amended coastal plain soil. *Soil Science Society of America Journal*, 44, 308-313.
  26. Yildirim, E. (2007). Foliar and soil fertilization of humic acid affect productivity and quality of tomato. *Acta Agriculturae Scandinavica Section b-Soil and Plant Science*, 57(2), 182-186.
  27. Zhang, X. Z. & Ervin, E. H. (2004). Cytokinin-containing seaweed and humic acid extracts associated with creeping bentgrass leaf cytokinins and drought resistance. *Crop Science*, 44(5), 1737-1745.
  28. Zhang, J. H., Liu, Y. P., Pan, Q. H., Zhan, J. C., Wang, X. Q. & Huang, W. D. (2006). Changes in membrane-associated H<sup>+</sup>-ATPase activities and amounts in young grape plants during the cross adaptation to temperature stresses. *Plant Science*, 170, 768-777.
  29. Zhang, X. Z. & Ervin, E. H. (2004). Cytokinin-containing seaweed and humic acid extracts associated with creeping bentgrass leaf cytokinins and drought resistance. *Crop Science*, 5, 1737-1745.
  30. Zhang, X. Z., Ervin, E. H. & Schmidt, R. E. (2003). Physiological effects of liquid applications of a seaweed extract and a humic acid on creeping bentgrass. *Journal of American Society for Horticultural Science*, 128(4), 492-496.
  31. Zheng, Y., Graham, T., Richard, S. & Dixon, M. (2004). Potted gerbera production in a subirrigation system using low-concentration nutrient solutions. *Hort Science*, 39(6), 1283-1286.

