Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.7, No.10, 2017

Impact of Magnetic Water Irrigation for Improve Growth Parameters of Two Onion Cultivars Allium cepa L.

Abbas Fadhil Ali[1] Hussei Ali Salim[2] Majida Hadi Mahdi Alsaady[3]
1.College of Agriculture, University of Diyala
2.Directorate of Diyala Agriculture, Ministry of Agriculture
3.College of Science, University of Baghdad

Abstract
A field experiment was carried out during 2015-2016 in the Bqubah nursery that belongs to Directorate of Diyala agriculture to study the effect of magnetized irrigation water on growth parameters of two onion cultivars viz. Texas early white 1012 and Texas munerva 1013. The experimental design was split plot with four replications. Results were revealed that significant differences between Texas early white 1012 and Texas munerva 1013, magnetic and non magnetic water and also interaction of two varieties x magnetic and non magnetic water in all tested growth parameters. Texas munerva 1013 was surpassed on Texas early white 1012 and magnetic water was surpassed on non magnetic water in all studied growth parameters such as bulb diameter , Bulb height , Bulb weight without leaves , Number of green leaves and Weight of green leaves.
Keywords: Onion, Texas early white 1012, Texas munerva 1013 and magnetic water

1. Introduction

Onions (*Allium cepa* L.) belong to the family Alliaceae, Onion is one of the most important vegetable crops grown in the world (Faostat ,2010; Purseglove ,1972) .Onions are the fourth most consumed vegetable in Iraq after tomatoes, potatoes and cucumbers (USAID-IRAQ, 2012). Onions are grown primarily for their use as food, adding flavours to food and taste as well as being used for processing such as pickling, freezing, dehydration, oil extraction (Gagopale,2012). Onions are not grown only for consumption but are useful for medicinal purposes such as prevention and treatment of blood and heart diseases (Van der Meer, 1997; Cheema *et al* ., 2003). Onions are also a source of Vitamin C and E (Made *et al*., 1994; Tabor *et al* ., 2004; Block, 2005;). All these characteristics of onions have been found to contribute to the high demand for onions.

Magnetic water is considered one of the several physical factors affects plant growth and development. Magnetic water fields are induced biochemical changes and use as a stimulator for growth, the treated water by a magnetic device called magnetic water, when water is magnetized, some chemical and physical properties changed that may be causing changes in plant characteristics, growth, and production (Hameda, 2014). The irrigation with magnetic water proved to be a good technology to enhance growth, yield and quality of onion when compare with non-magnetized water (El Sagan and El Baset , 2015). Magnetic irrigation improves the early seedling growth and nutrient contents of pea and chickpea seedlings (Grewal and Maheshwari, 2011).

The magnetized water increased the chemical constituents such as total carbohydrates, protein, total amino acids, proline contents, total indole, total phenol, and inorganic minerals K+, Ca+2 ,P+3 contents and chlorophyll a and b, carotenoids in all plant parts of broad bean and pepper plants (El Sayed, 2015; Rawabdeh et al, 2014). Irrigation with magnetized water stimulated significant effect on growth parameters, chemical ingredients and productivity of chickpea (Mahmoud and Amira, 2010). Also, it was increased significantly plant height, number of leaves per plant, fresh and dry weight, N and P % than those irrigated by non- magnetized water on pear seedlings Osman et al, (2014). Also, magnetized water increases radish plant metabolism in terms of photosynthesis and water uptake (Yano et al., 2004), as well as, stimulation of synthesis and transport of hormones and enzymes metabolism and increase the final plant yield. Esitken (2003).magnetized water improved plant tolerance to salt stress conditions Lihua and Jixun (2001), the aim of the present work for evaluate study the effect of irrigation by magnetized water on growth parameters of two cultivars of Onions *Allium cepa* L. cv. Texas early white 1012 and Texas munerva 1013 under field conditions.

2. Materials and methods

The experiment was conducted in the Bqubah nursery that belongs to Directorate of Diyala agriculture during 2015-2016 to study the response of onion plants Texas early white 1012 and Texas munerva 1013 to magnetized irrigation water application, Two treatments were used viz magnetic water (MW), and non magnetized water (NMW) with four replications. The seeds were obtained from Agricultural Equipment Company, Ministry of Agriculture and transplanted in the soil with Ec 1.3 dsm at 3\10\2015 after treat the soil with fungicide to control wilting diseases, after 60 days the seedlings were transferred to the plots at 1\12\2015,area of plot was 100 cm width and 150 cm length that conclude five lines with 30 cm among lines and 10 cm among seedlings, The plots were fertilized with DAP fertilizer (Diammonium phosphate) at the rate of 300 kg\ hectare and Urea 300 kg\ hectare. It used a drip irrigation system, at harvesting stage on 15\5\2016, ten plants of each replicate were

randomly taken from each plot for recording vegetative growth characteristics, (*i.e.,* diameter of the bulb, Bulb height, Bulb weight without leaves, Number of green leaves and Weight of green leaves). A local water magnetized device was used under the supervision of the Agricultural Researches Authority of the Ministry of Science and Technology and the magnetic flood of the device is 2.5 Tesla. The experiment was conducted in split plot Design and the data was analyzed by one way analysis of variance (ANOVA) (Fisher and Yates, 1968).

3. Results and discussion

Data presented in Table (1) showed that there were significant differences between Main Treatments (Texas early white 1012 and Texas munerva 1013), Sub Treatments (magnetic and non magnetic water) and also interaction (main treatments x sub treatments) in all tested growth parameters. Texas munerva 1013 was surpassed on Texas early white 1012 in bulb diameter (32.9, 31.8 cm), Bulb height (28.1, 25.4 cm), Bulb weight without leaves (1027.4, 839.8 g), Number of green leaves (29.7, 25.2) and Weight of green leaves (219.2, 114.8 g) respectively, whereas magnetic water was surpassed on non magnetic water in all prior growth parameters (34.5, 30.2 cm), (27.6, 25.9 cm),(1072.4, 794.8 g),(28.5, 26.4) and (193.6, 140.4 g) respectively, while the results were different in interaction between main treatments x sub treatments.

These results are agreed with El Sagan and El Baset , 2015 showed that irrigation with magnetized water induced positive significant effect on plant height and weight, and number of leaves/plant, bulb diameters, bulb weight, total yield and marketable yield percentage of onion variety Giza Red,

Otsuka and Ozeki ,(2006); Amiri and Dadkhah ,(2006) reported that Magnetic water changes some of the physical and chemical properties of water, mainly hydrogen bonding, polarity, surface tension, conductivity, pH and solubility of salts, these changes in water properties may be capable of affecting the growth of plants .

4. Conclusion

Results of the current study showed the positive impacts of Texas munerva 1013 and magnetic water on all studied growth parameters such as bulb diameter, Bulb height and Bulb weight without leaves, Number of green leaves and weight of green leaves as compared with Texas early white 1012 and non magnetic water. Generally using magnetic water treatment could be a promising technique for agricultural improvements but extensive research is required on different crops.

Table (1): Effect of onion cultivar, magnetic and non magnetic water and interaction between them on growth parameters of onion plants

Main Treatments	Bulb diameter (cm)	Bulb height (cm)	Bulb weight without leaves (g)	Number of green leaves	Weight of green leaves (g)
Texas 1012	31.8	25.4	839.8	25.2	114.8
Texas 1013	32.9	28.1	1027.4	29.7	219.2
CD (0.05)	**1.3**	**0.9**	**82.2**	**0.6**	**14.3**
Sub Treatments					
MW	34.5	27.6	1072.4	28.5	193.6
NMW	30.2	25.9	794.8	26.4	140.4
CD (0.05)	**0.4**	**0.3**	**38.8**	**0.8**	**11.4**
Main x Sub					
Texas 1012 × MW	8.7	6.8	258.9	6.6	34.6
Texas 1012 × NMW	7.1	5.9	160.9	5.9	22.8
Texas 1013 × MW	8.5	7.0	277.2	7.6	62.2
Texas 1013 × NMW	7.9	7.0	236.4	7.2	47.4
CD (0.05)	**0.6**	**0.5**	**54.9**	**1.1**	**16.1**

References

Amiri MC, Dadkhah AA. (2006). on reduction in the surface tension of water due to magnetic treatment. Colloids Surf A Physicochem Eng. Aspects.; 278:252–255.

Block, E., (2005). Biological activity of allium compounds: recent results. Acta Hort . 688, 41-57.

Cheema, K.L., Saeed, A. & Habib, M., (2003). Effect of sowing date on set size in various cultivars of onion (Allium cepa L.). Int. J. Agric. Biol . 5, 185-187. Chem.; 110:1509–1512.

El Sagan, M. A. M., Abd El Baset A.(2015). Impact of magnetic on metal uptake, quality and productivity in onion crop, Journal of Agriculture and Veterinary Science, Volume 8, Issue 9 Ver. II , PP 43-50.

El Sayed, H. A. El Sayed (2015). Impact of Magnetic Water Irrigation for Improve the Growth, Chemical Composition and Yield Production of Broad Bean (Vicia faba L.) Plant Nature and Science;13(1) .

Esitken, A. (2003). Effects of magnetic fields on yield and growth in strawberry 'Camarosa'. Journal of

Horticultural Science & Biotechnology, 78 (2): 145– 147.
Faostat, (2010). An on-line and multilingual databases currently containing over one million time-series records covering international statistics
Fisher, R. A. and Yates, (1968). Statistical method for research workers. Oliver and boyd ltd. *Edinburgh and London*, 10.
Gagopale , B.,(2012). Response of onion (*Allium cepa* L.) to sowing date and plant population, Ms.C thesis, department of soil, Faculty of Natural and Agricultural Sciences, University of the Free State Bloemfontein.
Grewal HS, Maheshwari BL,(2011). Magnetic treatment of irrigation water and snow pea and chickpea seeds enhances early growth and nutrient contents of seedlings. Bioelectromagnetics. 32:58-65.
Hameda El Sayed Ahmed El Sayed,(2014). Impact of Magnetic Water Irrigation for Improve the Growth, Chemical Composition and Yield Production of Broad Bean (*Vicia faba* L.) Plant, American Journal of Experimental Agriculture 4(4): 476-496, 2014.
Lihua, X. and G. Jixun (2001). Effect of magnetic seed treatment on growth and saline-alkali tolerance of Leymus chine-nsis. Acta Prataculturae Sinica. 10(1): 58-63 (c.f. Cab. Abst. 2002-2003).
Made, J.M., Wright, B.S. & Maramba, P., (1994). Onion production and constrains in Zimbabwe: with specific reference to the agricultural development authority (ADA). Acta Hort . 358, 349-351.
Mahmoud H. and A. MSAQ. (2010). Irrigation with magnetized water enhances growth, chemical constituent and yield of chickpea (Cicerarietinum L.).Agric. And Bio. J. of North Am., 14: 671-676.
Osman E.A. M., Abd El-Latif K.M, Hussien S.M. and A.E.A. Sherif (2014). Assessing the effect of irrigation with different levels of saline magnetic water on growth parameters and mineral contents of pear seedlings.Glob. J. Sci. Res., 2 (5): 128-136, 2014.
Otsuka I, Ozeki S. (2006). Does magnetic treatment of water change its properties?. J. Phys.
Purseglove, J. W. (1972). Tropical Crops Monocotyledons, Longman Group Ltd, London. pp 38-50.
Rawabdeh, H., Safwan S.and S. Rida (2014). The Effect of Irrigation by Magnetically Water on Chlorophyll and Macroelements uptake of Pepper (Capsicum annuum L.). Jordan Journal of Agricultural Sciences, Volume 10, No.2.
Tabor, G., Getahun, D. & Zelleke, A., (2004). Influence of storage duration on field sprouting, maturity and yield of some garlic (*Allium sativum* L.) cultivars at Debre Zeit, Ethiopia. J. Hortic. Sci. Biotechnol . 79, 871-876.
USAID-IRAQ, (2012). Onion Production: Planting Through Harvest
Van der meer, Q.P., (1997). Old and new crops within edible allium. Acta Hort . 433, 17- 31.
Yano, A., Ohashi, Y., Hirasaki, T. and K. Fujiwara (2004). Effects of 60 Hz magnetic field on photosynthetic uptake and early growth of radish seedlings. Bioelectromagnetics, 25(8): 572-581.