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THE EFFECT OF BLACK PLASTIC MULCH USE AND SUPER ABSORBENT POLYMER WATER ON GROWTH AND WATER USE PETUNIA

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ABSTRACT

Drought stress is one of the most important problems in arid and semi-arid plants such as Iran. The use of additives such as superabsorbent polymers and mulch can be scattered rainfall and limited water resources to preserve and store water in the soil and by improving soil physical conditions, such materials can prevent water stress in arid and semiarid. In this study, the effect of three irrigation intervals (3, 6, 9 days) and four of super absorbent polymer (zero, 3, 6, 9 grams per kilogram of soil) And mulch (with and without application) on vegetative and reproductive traits were studied Petunia. Based on the results obtained from irrigation reduced plant height was increased. Also mulch resulted in reduced plant height. In the short term for irrigation (3 and 6 days) combined with the use of high levels of superabsorbent (6 and 9 grams per kilogram of soil), the use of plastic mulch will reduce the number of branches per plant. Most of leaf mulch and irrigation 3 days without use 6 and 9 grams of superabsorbent obtained without the use of mulch. The use of plastic mulch at all Super absorbent surfaces (zero, 3, 6, 9 g) significantly reduced the fresh weight and flower seeds Irrigation mulch at low speeds, such as 3 days and 6 days Day as well as with application rates of 6 and 9 grams of superabsorbent polymer, drastically reduces the efficiency of irrigation water. It is advised to rising growth As well as water efficiency of SAP and black plastic mulch can be used.

Keywords: Super Absorbent, Mulch, Water Restrictions, Vegetative, Reproductive

INTRODUCTION

Iran is the world's arid and semi arid areas. Average rainfall in 250 mm, 600 mm and world 840 meters at the Asian mm of rainfall in about Half of Asia and the third world. Of this amount, about 90 percent less water is used in agriculture, including green space. Unfortunately, the loss of water in the agricultural sector more than average Half of Asia and the third world. Of this amount, about 90 percent less water is used in agriculture, including green space. Unfortunately, the agricultural sector's water loss is more than the global average, according to reports by the amount of water loss Iran is in the agricultural sector more than the global average, according to reports in the rate of water loss is 28 to 30% Water use green spaces for plants and their maintenance is remarkable. The amount of water the plant species, the method of production and plant growing season depends. Only in greenhouses to produce transplants water Needs (Bailey et al., 1996), the amount of water to 20 liters per day per meter square cover estimated greenhouse. (Fornes, 2007) estimated that on average 100-350 kg of water to produce one kilogram of matter drying is required. Water use green spaces for plants and their maintenance is remarkable. The amount of water the plant species, the method of production and plant growing season depends. Only water is needed to produce seedlings in greenhouses (Bailey et al., 1996), the amount of water to 20 liters per day coverage per square meter Greenhouse estimated. (Fornes, 2007) estimated that on average 350-100 kg of water to produce one kilogram of dry matter it is needed. Given the scarce water, green space faced with the threat of drought and reduced growth in per capita green space in urban areas are facing with regard to the importance Clean air and the human emotional need for peace in the bustling modern cities require to optimize and enhance the efficiency of irrigation water, not only The conservation and sustainable use of modern methods of irrigation of green spaces cold but can also be spread per capita green space. One way to increase irrigation efficiency and savings Tips superabsorbent polymers and the use of plastic mulch is black.

Superabsorbent polymers can absorb water from irrigation and rainfall, and store water and prevent water loss from absorption of chemical fertilizers from leaching and availability Out of it and also to prevent the contamination of groundwater (Judy, 2007). In general polymers as a soil improver, to improve soil structure, increasing growth, decreasing Water and wind erosion and increase water retention are (Darabi, 1995). The super absorbent polymer to reduce waste of water and

nutrients used in agriculture. The polymer material Add soil to attract and retain water and nutrients and soil Cell cultures have been favorable to plant growth and reducing water loss and the cost of water will help. (Ganji Khorram Dell, 2002). The use of plastic mulch reduces water soil, resulting in reducing the frequency of irrigation and also reduce light penetration black plastic mulch, especially with reduced weed problems (wish. Hassanzadeh. Babalar. Lisani, 1998). Baker said the mulch Plastic increase in temperature and soil moisture storage, the development of the use of fertilizers and water, reduce nutrient leaching, reducing soil erosion and wind, higher performance and more precocity and growth. (Baker, 1998). Kremer beneficial effects of plastic mulch is used to store and maintain water and soil aggregation Hasl- soil fertility, reduce evaporation from the soil and increase the carbon dioxide around the plant said. (Kremer, 1982).

Petunia

Flowers hospitalized due to a large variety of colors is an important element of green space in the city. Petunia plants stay green space is one of the most important. It is very versatile and flowers in a wide range of colors is available. Plants stay an important part of urban public spaces and private gardens make up. However, it is not always fully irrigated and drought damage may be (Chylinski, et al, 2007). Super absorbent and can be up to 50% of water and fertilizer consumption as much as 30 percent, depending on various conditions deteriorate. Super absorbent can be chemical fertilizers, herbicides and pesticides are mixed and no negative interactions with each other are used.

Studies on the use of mulch

Dostak et al (1979) Effect of mulching with straw mulch on the rows of trees and grass complete with fresh skin beneath some tree species and Shrub seedlings have studied and concluded the seedlings that had been used straw as mulch fully the growth rate was several times higher than other treatments. Farias et al. (1994) examined the effect of polyethylene mulch and planting cucumbers investigated and concluded that the clear plastic mulch Installed in the seed bed of cucumber fruit product performance compared to treatment without mulch increased while white and black mulch had the same effect. Pawar (1990) in their study to investigate the effect of mulch to increase soil water-holding capacity and performance of their pistachio trees and came to the conclusion that the use of plastic as the covering soil in the semi-arid climate Reduce water consumption by up to fifty percent without any reduction in the product.

Gorzskyez (1978) examined the effect of different irrigation and mulch on the Rose Supreme gladiola traits and concluded that the use of mulch on the plant results in stability, soil temperature, soil moisture and soil water content will increase . Moradinejad (2000) to evaluate the performance of different types of mulch as ground cover planting strawberry seedlings and cuttings concluded that chemicals from Mulch decomposition also has allelopathic properties that are effective in reducing competition between the plants.

Elahi Nia (1993) to evaluate the effect of planting date and polyethylene mulch on the fly Minozberg cucurbit vegetables and internal mildew in cucumber cultivation short tunnel and concluded that the delay in payment of Put plastic mulch on sowing and planting in beds have been built to reduce the amount of pollution cucumber mildew disease. Jalota (1993) examined the effect of polyethylene mulches and organic irrigation intervals on morphological characteristics and yield of sunflower seeds, and concluded that 40 to 70 percent of waste water in the arid regions of Soil surface evaporation, which can be prevented by covering material and the soil of the plant.

Studies on the use of super absorbent polymers

Great Plains (2010), in effect at the same time composted cow manure levels, and superabsorbent on water soil studies and Water retention curves can be drawn. Analysis of the data showed a greater impact than the superabsorbent polymer light textured soil fertilizer for a significant increase in water retention capacity of the soil. Behbahani et al (2009) showed that the application of polymer Stacosorb improve some physical properties of soil, so increased levels of saturated hydraulic conductivity and soil moisture and reduce soil bulk density. The use of 3/0% by weight of the polymer in the soil than other treatments. Bungee-Shafi'i (2000) Large polymer impact absorbing increasing the soil moisture, fertilizer efficiency, growth and Panicum examined. This study is based on the 3/0% by weight of the polymer mentioned three types of soil (Light, medium, heavy) and four replications and three irrigation (4, 8, 12 days) in soil with and without polymer treatment was performed and showed that soil treatments And irrigation impact on the production of dry polymer plant to be fully seen. Methods

The study weather conditions Baghbahadoran position (city: Baghbahadoran longitude: 51 ◦13ó E longitude: N 32 ◦22ó N) in 1393 as the impact of using plastic mulch black and super absorbent polymer water on growth

and water use petunia species (petunia x hybrida was performed).

Factorial experiment in a randomized complete block design (because testing was done outdoors in the operating environment is not the same pots) and super absorbent polymer water treatments include 4 levels of A100 (0, 3, 6, 9) grams per kilogram of soil with irrigation levels 3, 6 and 9 of mulch and mulch with three replications. (Plant water requirement of field capacity is calculated based on the difference between the amount of water the soil at field capacity and wilting point, respectively) Factorial experiment in a randomized complete block design (for the testing was done outdoors in an open environment and environmental factors are not the same for all the pots) and super absorbent polymer treatments include 4 levels of water A100 (0, 3, 6, 9) grams per kilogram of soil with irrigation levels 3, 6 and 9 of mulch and mulch with three replications. (Plant water requirement is calculated based on the difference of field capacity, soil water content at field capacity and wilting point, respectively).

The test consists seedlings were planted in each pot outdoors and after the establishment of the plant and return the plant to keep their freshness was the most powerful and the rest were eliminated.

Table 1: physical and chemical characteristics of A100 super absorbent polymer

Superabsorbent hydrogel	**Specifications**
Super Water A100	
White beans	**Appearance**
7-5	**Moisture%**
No	**Odor and toxicity**
/4-1/51	**Density (g / cm3)**
7-6	**pH aqueous solution**
Insoluble	**Solubility in water**
150-50	**Particle size (µm)**
5	**Maximum stability (years)**
180	**Actual capacity to absorb water: g / g**
203	**Actual capacity to absorb water: g / g**
40	**Actual capacity to absorb the 0 percent sodium chloride solution 9: g / g**
76	**0 to 63 time of the adsorption equilibrium (s)**
3-2	**Maximum soluble fraction (percent by weight)**

Data analysis

Data Software SAS 9. 1 in factorial arrangement on a randomized complete block analysis and mean comparison with Duncan's test was conducted at the level of five percent. Excel software charts were drawn.

RESULTS

Table 2: Map experimental design with 3 replications

S0	**S0**	**S0**	**S3**	**S3**	**S3**	**S6**	**S6**	**S6**	**S9**	**S9**	**S9**	**S0M**	**SOM**	**SOM**	**S3M**	**S3M**	**S3M**	**S6M**	**S6M**	**S6M**	**S9M**		
												S9M	**S9M**										
I3	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**	**I3**	**I6**	**I9**

S0 I3	S0 I6	S0 I9	S3 I3	S3 I6	S3 I9	S6 I3	S6 I6	S6 I9	S9 I3	S9 I6	S9 I9	S0M S9M I6	SOM S9M I9	SOM I3	S3M I6	S3M I9	S3M I3	S6M I6	S6M I9	S6M I3	S9M I6	S9M I9	
S0 I3	S0 I6	S0 I9	S3 I3	S3 I6	S3 I9	S6 I3	S6 I6	S6 I9	S9 I3	S9 I6	S9 I9	S0M S9M I3 I6	SOM S9M I6 I9	SOM I9	S3M I3	S3M I6	S3M I9	S6M I3	S6M I6	S6M I9	S9M I3		

S: the super absorbent; M: mulch cover; I: irrigation

Table 3: Analysis of variance effect of different treatments on the mean-square

Flower	Leaf dry weight	Wet leaves	Dry weight category	Degrees of freedom	The source changes
$0/01^{ns}$	$0/002^{ns}$	$0/01^{ns}$	$0/23^{ns}$	2	**Block**
$0/12^{ns}$	$0/005^{ns}$	$0/02^{ns}$	$^{**}2/08$	2	**Irrigation**
$0/22^{*}$	$0/006^{ns}$	$0/01^{ns}$	$^{**}1/23$	3	**Super absorbent**
$0/54^{**}$	$^{*}0/02$	$^{**}0/89$	$^{**}8/79$	1	**Mulch**
$0/17^{*}$	$0/002^{ns}$	$0/02^{ns}$	$0/23^{ns}$	6	**Irrigation * super absorbent**
$0/38^{**}$	$0/005^{ns}$	$0/02^{ns}$	$^{**}5/97$	2	**Irrigation * Mulch**
$0/60^{**}$	$0/003^{ns}$	$0/03^{ns}$	$^{**}1/89$	3	**Super absorbent * Mulch**
$0/11^{ns}$	$0/005^{ns}$	$0/04^{ns}$	$^{*}0/42$	6	**Irrigation * * super absorbent mulch**
0/05	0/004	0/04	0/43	46	**Error**
13/47	28/09	26/88	21/65	-	**The coefficient of variation (c. V)**
**** Significant at one percent, * significant at the level of five percent, ns no significant difference**					

Table 4: Comparison of the effects of different treatments according to Duncan's multiple range test

Life of Flower	Number of Flower	Leaf dry weight	Wet leaves	Dry weight category	Levels	Treatment
	$10/64^{a}$	$0/06^{a}$	$0/62^{a}$	$5/08^{a}$	**3**	**Irrigation (days(**
	$8/94^{a}$	$0/05^{a}$	$0/54^{a}$	$3/66^{a}$	**6**	
	7/29	0/04	0/51	$2/30^{b}$	**9**	
	$8/20^{ab}$	$0/04^{a}$	$0/53^{a}$	$2/26^{c}$	**0**	**Super absorbent (kg soil(**
	$11/49^{a}$	$0/04^{a}$	$0/50^{a}$	$3/32^{bc}$	**3**	
	$10/36^{a}$	$0/06^{a}$	$0/55^{a}$	$4/93^{a}$	**6**	
	$9/95^{b}$	$0/06^{a}$	$0/64^{a}$	$4/22^{b}$	**9**	
	$11/14^{a}$	$0/06^{a}$	$0/72^{a}$	$5/17^{a}$	**No mulch**	**Mulch**
	$6/85^{b}$	$0/05^{b}$	$0/39^{b}$	$2/19^{b}$	**To mulch**	
Similar letters mean is the lack of significant difference.						

Table 5: Comparison of irrigation interaction in multi-earned super absorbent according to Duncan test

Number of Flower	Leaf dry weight	Wet leaves	Dry weight category	Super absorbent	Irrigation (days)
$7/39^{b}$	0/05	0/63	2/68	**0**	**3**
$18/25^{a}$	0/04	0/44	5/18	**3**	
$11/89^{ab}$	0/09	0/63	6/05	**6**	
$7/43^{b}$	0/07	0/77	6/43	**9**	
$9/18^{ab}$	0/04	0/52	2/20	**0**	**6**
$9/14^{ab}$	0/04	0/62	2/76	**3**	
$7/16^{b}$	0/05	0/50	5/57	**6**	
$9/57^{ab}$	0/06	0/51	4/12	**9**	
$8/10^{b}$	0/04	0/43	1/90	**0**	**9**
$8/71^{ab}$	0/04	0/43	2/03	**3**	
$12/71^{ab}$	0/04	0/52	3/17	**6**	
$2/66^{c}$	0/05	0/65	2/10	**9**	
Similar letters mean is the lack of significant difference.					

Table 6: Comparison of irrigation in super absorbent mulch interaction based on multiple range test

Number of Flower	Leaf dry weight	Wet leaves	Dry weight category	Mulch	Super absorbent	Irrigation
$8/00^{a}$	$0/05^{a}$	$0/87^{a}$	$3/73^{def}$	**No mulch**	0	3
$6/80^{a}$	$0/04^{a}$	$0/39^{a}$	$1/62^{fghj}$	**To mulch**		
$25/68^{a}$	$0/05^{a}$	$0/41^{a}$	$7/82^{bc}$	**No mulch**	3	
$12/55^{a}$	$0/03^{a}$	$0/47^{a}$	$2/51^{efgh}$	**To mulch**		

16/13 [a]	0/06 [a]	0/81 [a]	10/73 [ab]	**No mulch**	6	
8/55 [a]	0/13 [a]	0/45 [a]	1/38 [ghj]	**To mulch**		
31/66 [a]	0/10 [a]	1/27 [a]	12/49 [a]	**No mulch**	9	
0/75 [a]	0/03 [a]	0/28 [a]	0/36 [j]	**To mulch**		
12/05 [a]	0/05 [a]	0/64 [a]	2/29 [fgh]	**No mulch**	0	6
6/85 [a]	0/03 [a]	0/41 [a]	2/11 [fgh]	**To mulch**		
9/01 [a]	0/05 [a]	0/76 [a]	4/01 [def]	**No mulch**	3	
9/25 [a]	0/04 [a]	0/48 [a]	1/51 [fghj]	**To mulch**		
5/37 [a]	0/07 [a]	0/73 [a]	7/70 [bc]	**No mulch**	6	
9/37 [a]	0/04 [a]	0/28 [a]	3/44 [defg]	**To mulch**		
12/28 [a]	0/08 [a]	0/69 [a]	5/95 [cd]	**No mulch**	9	
7/34 [a]	0/04 [a]	0/34 [a]	2/30 [efgh]	**To mulch**		
6/97 [a]	0/04 [a]	0/51 [a]	1/52 [fghj]	**No mulch**	0	9
9/34 [a]	0/03 [a]	0/35 [a]	2/28 [fgh]	**To mulch**		
5/60 [a]	0/04 [a]	0/58 [a]	1/21 [hj]	**No mulch**	3	
13/00 [a]	0/05 [a]	0/28 [a]	2/86 [efgh]	**To mulch**		
11/34 [a]	0/05 [a]	0/65 [a]	1/82 [fgh]	**No mulch**	6	
6/94 [a]	0/04 [a]	0/39 [a]	4/52 [cde]	**To mulch**		
6/67 [a]	0/05 [a]	0/69 [a]	2/81 [efgh]	**No mulch**	9	
0/75 [a]	0/05 [a]	0/61 [a]	1/38 [hj]	**To mulch**		
Similar letters mean is the lack of significant difference.						

DISCUSSION

The results of this study showed that the use of super absorbent can be as a way to increase water use efficiency and conserving soil moisture is practical application.

According to the study it can be concluded in the Adequate but under stress, in addition to the cost of buying it, the income increase performance.soil and Longevity super absorbent super absorbent enough in the soil can not only under irrigation The use of super absorbent and plastic mulch can be used as a tool to increase water use efficiency and the practical application is to maintain soil moisture. But with the use of super absorbent mulch is recommended that it be used to reduce the performance is super absorbent. The use of super absorbent and plastic mulch can be used as a tool to increase water use efficiency and the practical application is to maintain soil moisture. But with the use of super absorbent mulch is recommended that it be used to reduce the performance is super absorbent. - (In a short period of irrigation (3 and 6 days) combined with the use of super absorbent surfaces (6 and 9 grams per kilogram of soil), the use of plastic mulch will reduce the number of branches per plant. The highest number of leaves per plant irrigation 3 days without the use of mulch and use 6 and 9 grams of super absorbent obtained without the use of mulch.) - (Using plastic mulch super absorbent at all levels (zero, 3, 6 and 9 grams) can significantly reduce the weight of the foliage petunia. The highest wet foliage of use 6 g super absorbent without the use of mulch, respectively.) - (3 days

was the maximum length of roots in irrigation and the significant increase in irrigation was reduced from 3 days to 9 days.) - (irrigation in the short-term (3-day) using plastic mulch to reduce weight, in the medium term, while the 6-day no significant effect on long-term (9 days), use of mulch increases root weight. the use of plastic mulch used only 9 grams of super absorbent surfaces can lead to weight loss than root.) - (In the irrigation of 3 and 6 on the use of plastic mulch combined with the use of super absorbent at 3, 6 and 9 grams to reduce weight while increasing irrigation to 9 placed on the use of Super absorbent increased by 6 g dry weight category and in other cases significant impact on it.) The 3-day irrigation, the use of super absorbent at a rate of 3 g per kg of flowers per plant was significantly increased compared to control and the level of 9 grams, resulting in the largest number of flowers per plant. Use mulch to reduce the efficiency of irrigation water in such a short period of 3 days and 6 days is very impressive, while the 9-day use of mulch had no significant effect on the trait. Furthermore the use of mulch combined with the use of super absorbent surfaces (6 and 9 grams) significantly reduces the efficiency of water use.

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REFERENCES

[1] Banj Shafiee, Sh. and Rahbar, E. 2003. Assessment the efficiency of a kindpolymer absorbent in agriculture and natural resources, A-polymer affects ongrowing of Panicum. Tehran, J. Range. Desert Res. 10: 1. 111-129.

[2] Baker J.T. 1998. Interaction of poultry litter, polyethylene mulch and floating row covers on triploid watermelon

[3] Journal of the American Society Horticultural Science, 33(5):810-813

[4] Behbahani, SA. D. F. Mashhadi, the. Rahimi khob, AS. And Nazari Far, 1388. The effect of super absorbent polymer on wetting Astakvsvrb drip irrigation and soil. Journal of Irrigation and Drainage, 3 (1): 100-98.

[5] Chylinski KW, Lukaszewska A , Kutnik K. 2007. Drought response of two bedding plant. Acta Physiology Plant ,29:399-406.

[6] Cramer, G. R. , E. Epstein and A. Lauchli. 1990. Effects of sodium, potassium and calcium on salt-stressed barley. I. growth analysis. Physiol. Plant 80: 83- 88.

[7] Dasht Bozorg, AS. , Sayyad, Gh. , Kazemi Nejad, or. And Yazdani. Kachuei Yazdani. 2010. The effect of the absorbent material on the water holding capacity and potential in a sandy loam soil. The third national conference on the management of irrigation and drainage networks, Shahid Chamran University, Faculty of Water Science.

[8] Ganji Khorram Dell, n. 1381. Effects of super absorbent on soil physical properties, the second course - education - agricultural and industrial use of hydrogen and super absorbent, 28th Bahman 2002.

[9] Jalota, S. K., 1993. Evaporation Through a soil mulch in relation to characteristics and evaporativity. Aus. J. Soil Res. 31; 131-6.

[10] Kashi, AS. Hossein Zadeh S, Babalar, d. Lesani, c. 1998.asr black polyethylene mulch and calcium nitrate on growth, yield and Blossom End Rot Charleston Gray watermelon varieties. Journal of the science and technology of agriculture and natural resources 7 (4): 1-9.

[11] Pawar, H. K. 1990. Use of plastic as a mulch in scheduling of irrigation to ginger in semiarid climate. Proceeding of the 11 the in ternational congress on the use of plastics inagriculture, New Delhi India. 10/90-109.

[12] Tarddieo, F. 2005. Plant tolerance to water deficit: Physical limits and possibilities for progress. C.R. Geosience 337: 57-67.