



The Effect of Irrigation Methods and Discharge on Growth and Yield of Green Onion

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ABSTRACT

An experiment was conducted in one of the fields of the University of Baghdad in 2015 In sandy loam soil to evaluate the effect of irrigation methods and discharge on growth and yield of green onion .The research using two factors included Subsurface irrigation system and drip irrigation system as main plot and three levels discharge included 2.5, 3.0 and 3.5 L/hr as secondary plot. Soil bulk density of the soil, distribution uniformity, the plant height, number of onion plant leaves and plant yield. were measured in this study. Nested design under randomized complete block design (CRBD) with three replications were used in this experiment. Least significant differences (L.S.D) at 0.05 levels were used to compare the mean of treatments. The results showed Soil bulk density in drip irrigation system reached 1.351 mg /m³,and uniformity distribution for subsurface irrigation system reached 88.7% compared with the drip irrigation system which reached 86.8% ,for the plant characteristics , subsurface irrigation exceeded generally in the plant characteristics, and the maximum of leaves number in subsurface irrigation system in one plant reached 10.6 and the average of plant height reached 65.6 in subsurface irrigation system. It's obvious through the results the exceeding of subsurface irrigation system in increasing, Leaves number average and the height of plant while the values of soil bulk density and the uniformity distribution were close between the two system. The successful of using subsurface irrigation system for planting good growing onion.

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Introduction

The green onions (*Allium cepa L.*) which belong to the Amaryllis family is one of the green crops which is mostly used .and its importance comes from its inclusion of carbohydrates which contains sugar and Albetans, as well as the amounts of vitamins (B1,B2 ,PP,A,C) It also contains a lot of salt specially calcium. AL-Rkabi and Abd aljabar,(1981) which used for medicinal purposes and stimulate the heart and rheumatic diseases(Morsi and Nimet, 1973).

The subsurface irrigation systems and drip irrigation system are one of modern irrigation systems which are characterized by reducing in amount of water 23.8 to 26.7 % compared to traditional irrigation methods.(Laryshin, 2009). as well as the fertilizers and pesticides can be added to irrigation water and irrigation water could easily be controlled . Subsurface irrigation system is characterized by a lack of subsurface soil preparation operations and the lack of water loss by evaporation (Al-Taie, et al .1986). and plant response for this type of irrigation system is good. Beside that these two ways are characterized by reducing the amount of using water . Green onions were cultivated on 26 \ 10 \ 2015 are bulbs medium-sized local verity . of damaged bulbs was 3.40 and 3.21%,Mehta,(2011). And at distance lines between them 60 cm and the distance among the drippers 20 cm(EL-Sharkawy et al .2006).

The purpose of this study is to know the possibility of the cultivation green onions crop under modern irrigation systems subsurface irrigation and drip irrigation and their effect on the improvement growth and yield.

Materials and Methods

An experiment was conducted in the field of the University of Baghdad in 2015 In sandy loam soil . Nested design under randomized complete block design(CRBD) with three replications were used in this experiment Least significant differences (L.S.D) at 0.05 levels were used to compare the mean of treatments. The experimental unit length reached 30 meters, with leaving a distance of 15 meters before of each duplicate to get a fixed speed for the tractor. The treatment were randomly distributed with in experimental unite and the main plot included installation factor of subsurface irrigation pipes and drip irrigation pipes and the secondary plot included discharge factor of three levels included 2.5 ,3.0,3.5 L/h. New Holland TD-80 hp Tractors model 2010 of Turkish origin with the combine implement was used in this experiment.

Table 1. soil physical and chemical properties.

Property	Value s	Unites
Soil bulk density	1.6	Mg
Moisture content	20.15	m3
Soil slant	1.3	%
PH	7.25	Ds cm
Capron	619	Mg l
Colored	390	Mg l
Soil Texture	Sandy loam	
Soil analysis components	Sand	67.6
	Silt	17.5
	Clay	14.9

1-Bulk density: mica gram\ m3
Bulk density is calculated by using the following equation proposed by Black,. At al (1986).

$$bp = MS / Vt$$

bp: bulk density , mica gram\ m3

ms: mass soil , mica gram

vt: volume soil, m3

2-Moisture distribution uniformity %

Moisture Distribution uniformity is calculated by using the following equation proposed by Christiansen,(1942).

$$\left\{ 1 - \frac{\sum |X_i|}{m \times n} \right\} \times 100 \% = CU$$

Cu: distribution uniformity %

$\sum X$: The amount of numerical deviation of the depth of water on the average water depths within the irrigated area.

M: average discharge drips (mm)

N: number of drips

Results and Discussion

Table(2) shows the effect of the subsurface irrigation system and drip irrigation in the soil bulk density, as the table showed the superiority of a drip irrigation system to get the highest bulk density reached 1.351 Mg / m 3, and while soil bulk density for subsurface irrigation system reached 1.333 mg /m3, These results are consistent with that reached by(Al-Rawshdie,2014).Table (2) also showed the effect of the discharge in bulk density , as the table showed that the superiority discharge 3.5 L / h in getting highest bulk density reached 1.355 mg /m3 and while soil bulk density in discharge 2.5 L / h reached 1.325 mg /m3.Also Table(2) showed The effect of interaction between irrigation methods and discharge 3.5 liters / hour and a drip irrigation system got soil bulk density amounted to 1.361 mg / m 3, while soil bulk density between subsurface irrigation system and discharge 2.5 L / h amounted 1.313 mg / m3.

Table 2. Effect of Irrigation Methods and Discharge on Bulk density mg / m3 .

Indicators	Soil bulk density m g /m3			Irrigation Method's Average
	Discharge L / h			
Irrigation Methods	2.5	3.0	3.5	
Subsurface Irrigation	1.313	1.337	1.349	1.333
Drip Irrigation	1.338	1.355	1.361	1.351
LSD	0.028			0.019
Discharge Average	1.325	1.346	1.355	
LSD	0.029			

Table(3) The results showed the effect of the subsurface irrigation system and drip irrigation on the moisture distribution uniformity %, as the table showed the superiority of a subsurface irrigation system to get the highest distribution uniformity reached 88.7 %,and compared with distribution uniformity for drip irrigation system reached 86.8 %, The reason was the subsurface irrigation system retains moisture better compared to drip irrigation system , which is exposed to evaporation and plant uptake of water in a large irrigation system These results are consistent with that reached by(Al-Janabi and Al-Hdithi,2010).Table3 a showed the effect of the discharge on distribution uniformity , the superiority of discharge 3.5 L / h in getting higher distribution uniformity reached 91.5 % and compared with distribution uniformity of discharge 2.5 L / h reached 83.7 %.Also Table(3) showed The effect of interaction between irrigation methods and

discharge 3.5 L/h ways the and subsurface irrigation system got higher moisture distribution uniformity amounted to 92.5 %, compared with the interaction between drip irrigation system and discharge 2.5 L / h which amounted 84.9 % .

Table3. Effect Irrigation Methods and Distribution uniformity%.

Indicators	Distribution uniformity %			Irrigation Method's Average
	Discharge			
Irrigation Methods	2.5	3.0	3.5	
Subsurface Irrigation	84.9	88.7	92.5	88.7
Drip Irrigation	82.5	87.5	90.5	86.8
LSD	0.52			0.52
Discharge Average	83.7	88.1	91.5	
LSD	0.40			

Table(4) A shows the effect of the subsurface irrigation system and drip irrigation in the leaves numbers of plant onions ,as the table showed the superiority of a subsurface irrigation system to get the higher of leaves numbers reached 10.6 ,while of leaves numbers drip irrigation system reached 9.5 .The reason was Soil keep the moisture in the subsurface irrigation system for a long time, which provides the best for the growth in general, including Of the leaves numbers, These results are consistent with that reached by (Khalil, 2013).Table (4) showed the effect of the discharge in leaves numbers , the superiority discharge 3.5 L \ h in higher leaves numbers reached 11.1 ,compared with leaves numbers in discharge 2.5 L \ h reached 9.05 ,Also Table(4) showed The effect of interaction between irrigation methods and discharge ways the received the higher leaves numbers between the discharge 3.5 liters \ hour and a subsurface irrigation system amounted to 11.4, compared with the interaction between drip irrigation system and discharge 2.5 L \ h amounted 8.1 .

Table 4. Effect Irrigation Methods and Discharge in leaves Number.

Indicators	Number of Securities			Irrigation Method's Average
	Discharge			
Irrigation Methods	2.5	3.0	3.5	
Subsurface Irrigation	10	10.6	11.4	10.6
Drip Irrigation	8.1	9.6	10.8	9.5
LSD	0.012			0.015
Discharge Average	9.05	10.1	11.1	
LSD	0.02			

Table(5) A shows the effect of the subsurface irrigation system and drip irrigation in the higher plant onions ,as the table showed the superiority of a subsurface irrigation system to get the higher plant reached 65.6 cm ,and while higher plant in drip irrigation system reached 59.6 cm . Because irrigation subsurface Living situation provides more favorable for plant growth compared to the drip irrigation system ,These results are consistent with that reached by(Akoun,2004), Table (5) a showed also the effect of the discharge in higher plant , as the table the superiority discharge 3.5 L \ h in higher plant reached 71 cm ,and while higher plant in discharge 2.5 L \ h reached 56.5 cm , Table(5) showed The effect interaction between irrigation methods and discharge ways the received the higher plant between the discharge 3.5 liters \ hour and a subsurface irrigation system amounted to 75 cm compared

with the higher plant on interaction between drip irrigation system and discharge 2.5 L/h amounted 54 cm.

Table 5. Effect Irrigation Methods and Discharge in Plant height cm.

Indicators	Plant height cm			Irrigation Method's Average
	Discharge			
	2.5	3.0	3.5	
Subsurface Irrigation	59	63	75	65.6
Drip Irrigation	54	58	67	59.6
LSD	0.028			0.042
Discharge Average	56.5	60.5	71	
LSD	0.075			

From the results, application, subsurface irrigation system got higher number of plant, good average of leaves numbers, good decrease in distribution uniformity, compared with drip irrigation system, and total yield 1365kg /acres, values of soil bulk density comparable between the two systems.

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