EFFECT OF IRRIGATION WATER AND ORGANIC FERTILIZER RATES ON WATER USE EFFICIENCY AND CROP YIELD

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ABSTRACT

Two Field experiments were carried out in a farm at El Gharbeia Governorate during winter season 2013 /2014 and summer season 2014 to study the effects of two irrigation water discharge (1.5 and 3 l/s) and four compost levels (0 , 1 , 2 , and 3 ton / fed) on water use efficiency and yield components of onion and maize crops. The experiments were laid down in split plots design with three replicates. Data show that the increase of irrigation water discharge significantly increased marketable and total yield of onion by 10 .86 and 9. 95 % ,and increased total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M. %) by 5.2 and 4.63 % , while decreased significantly culls yield (Mg / fed) by 10. 04 %. ,bulb diameter(cm)and bulb weight (gm) by5.19 and 5.49 %, for onion crop. The same trend was observed for maize crop. Increasing discharge rates significantly increased by 8.41 , 4.20 , 9.75 and 2.44 % respectively of average diameter, length of ear ,number of rows /ear and grains / row of maize crop. Grain yield affected significantly increased by 9.70 %. Also compost levels effect on yield and yield components in both onion and maize crops. Increasing compost rates significantly increased marketable and total yield. Whereas marketable yield (Mg/ fed) was obtained by compost 3 ton / fed., the highest by 4.31, 7.60 and 16.19 %. And total yield (Mg / fed) increased by 3.66, 5.89 and 13.26 % compared to 2 , 1 , and 0 ton / fed respectively for onion crop. For maize when increased from 0 to 1 , 2, and 3 ton / fed. Compost levels significantly increased the diameter, length, number of rows / ear and number of grains /row. Grain yield was increased by 4.91, 9.11 and 11.16 % with regard increase compost levels from 0 to 1 and 2 and 3 ton /fed respectively. Moreover the water relation affected by discharge rates and compost levels in both onion and maize crops . Water decreased by 5.71 % due to increase discharge rate and by4.86 ,11.14 and 15.21 % for onion crop. Meanwhile, water decreased by 6.97 %due

to increased discharge and by 5.58, 10.55 and 14.79 %due to increase compost levels from 0 to 1 and 2 and 3 ton /fed. for maize crop . Moreover, water use efficiency increase by increasing discharge rates and compost levels for both onion and maize crops. The interactions between discharge rates and compost levels were significant increase for yield components and yield in both onion and maize crops. Interactions between discharges rate 3 l /s and compost level 3 ton / fed. Could be recommended to obtain the best results of onion and maize yield.

Keywords: ***discharge rates , compost levels , irrigation water , yield and WUE***

INTRODUCTION

Water resources in Egypt have become limited in view of the necessity to reclaim new lands ,which are located in arid and semi-arid regions. Surface irrigation is still the most common method for distributing the water to the cultivated field. The improved management of water on the farm may conserver, labor and soil and may increase yield of crop . Onion is considered as one of the most important vegetable crops in Egypt. It is the third vegetable crop in total cultivated area after tomatoes and potatoes. Onion is grown as summer crop in the Delta region, while its grown as winter crop in Middle and Upper Egypt Zones. Moreover good irrigation practices improve onion yield, quality and storage ability.

Crop water productivity is a quantitative term used to define the relationship between crop produced and the amount of water involved in crop production. It is a useful indicator for quantifying the impact of irrigation scheduling decisions with regard to water management (FAO, 2003). It is well known that crop water productivity for maize (*Zea mays* L.) is higher than wheat (*Triticum aestivum* L.). However, under Egyptian conditions, the situation is reverse; it is higher for wheat than maize as a result of the higher amount of applied irrigation water for maize.

El- Sharkawy et. al (2006) revealed that , discharge rate were no significant on crop yield . Using the discharge rate of 6 l/s saved about 5 % of applied water comparing with the discharge rate of 3 l/s.

Abou El-Hassan (2004) found that, the amounts of applied water delivered decreased with the increase of irrigation discharge ,the plant

height was increased as irrigation discharge increased and increase the mean value of spikes number /m^2. El-mowlelhi et al (1995) mentioned that as irrigation discharge decreased the amount of irrigation water delivered increased .

El-Mowelhi (1999) indicated that irrigation discharge of 6 L/s achieved the highest values of water distribution efficiency followed by 4 L/s while the lowest values were achieved by irrigation discharge of 2 L/s.

Saied (1992) Showed that, crop yield was affected significantly as a result of water discharge rates .The highest yield was obtained by using the water discharge rate 1 m^3 /min. Ibrahim and El-kassas (2011) found that, increasing irrigation water levels decreased both dry matter percentage (DM %) ,and total soluble solids (T.S.S.%) in onion Kumar et al (2007 b) obtained higher total marketable , jumbo size and colossal yield with watered treatments . Deficit (or regulated deficit) irrigation is one way of maximizing water use efficiency (WUE) for higher yield per unit of applied irrigation water. Compost (artificial organic manure) is the rich source of nutrients with high organic matter content. Physical and chemical properties of soil can be improved by using compost, which my ultimately increase crop yields.

Gharib et al (2008) illustrated that , the application of compost and bio-fertilizers to improve soil structure ,fertility and consequently development and productivity of mariorram plants has received little attention .

Piquerres et al (2006) found that , organic fertilizers (compost) become the alternative solution for reducing the chemical fertilizers . Keeping on higher plant uptake minerals and saving environment. In the other side compost amendments maintain and enhance the fertility and productivity of agricultural soil, allowing asustainable land use.

Spaccini et. Al (2002) stated that ,soil organic matter increases agricultural production by improving soil physical , chemical and biological properties, application of organic residues could increase soil aggregate stability and enhance water retention capacity .

Alam et al (2007) who mentioned that the vegetative growth and yield increased gradually and significantly with increasing the used of

vermicompost levels (2.5 ,5,10 ton/ha)to reach the highest yield at10 ton/ha.

The main objective of this work was to study the effect of the discharge rates and compost levels on the amount of the applied water, the yield components, total yield and the water use efficiency in both onion and maize crops.

MATERIALS AND METHODS

Two field experiments were executed during winter 2013/2014 and summer 2014 seasons at a private farm in Gharbia governorate, to study the effect of two discharge rates(1.5 and 3 l/s) ,and four levels of compost (0 , 1, 2 ,and 3 ton /fed) on growth, yield and quality of onion and maize crops and water utilization as well. The experimental soil is clay in texture as shown in Table(1)

Table (1:): Mechanical analysis and some soil moisture contents(average values of the profile)

Partical size distribution				Texture Class	Soil moisture content			Bulk density gm/cm^3
Coarse sand %	Fine sand %	Silt %	Clay %		F.C %	W.P %	Available water %	
3.89	18.92	38.15	39.04	Silt clay	45.0	20.80	24.20	1.25

The experiments were carried out in a split – plot design with three replications .The main plots were irrigated with discharge rates (1.5and 3 l /s)) , the sub –plots were treated with compost levels (o , 1 , 2 and 3 ton /fed) . The area of each sub-plot was 21 m^2, i. e 5 ridges * 0,60 m apart * 7 m length in both onion and maize .The common agricultural practices for growing onion and maize crops according to recommendations of Ministry of Agricultural were followed except the factors under study.

Onion

Onion (Giza 20), in a randomized complete block design with three replicates. Onion was planted on 21th November in winter season. Harvest was done in the 3rd week of April .At harvesting time; ten guarded plants of one square meter were randomly selected for onion Bulbs characters:

Average bulb diameter (cm) ,average bulb weight (gm.) total soluble solids percentage (T.S.S. %)and dry matter percentage (D.M.%).Total yield were calculated from weight each plot.

Maize

Maize hybrids (TWC 324) were planted in a randomized complete block design with three replicates. Sowing was done on the 19th June in summer season. Harvest was done in the second week of October at harvest time selected ten plants to determined , diameter and length of ear (cm) , number of rows / ear and number of grains / row . Grain yield (Mg /fed.) calculated by harvesting plants in one square meter taken from each sub plot and were left to dry and grains were weighted.

Water calculation:

The irrigation water was supplied to plots through a circular orifice of 10 cm diameter and its discharge rate was measured for traditional irrigation by using the equation of immersed orifice according to James (1988) as follows :

$$Q = 0.61\ KAH^{1/2}$$

Where,

Q = orifice discharge (l/s).

A = the area of orifice opening (cm^2).

H = head, over the orifice center (m).

K= Unit constant (K=0.443 for Q in L/sec, A in cm^2,and H in m).

Water Use Efficiency (WUE):

Water use efficiency for crop is the weight of grain yield produced per volume unit of applied water expressed as cubic meters of water (Michael, 1978).

All data of each experiment were statistically analyzed as described by Snedecor and Cochran (1980)

RESULTS AND DISCUSSION

Onion crop yield characters:

Bulb diameter (cm), bulb weight (gm.), total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M. %) affected significantly by irrigation discharge rates and compost levels. Data in table (2) showed that ,by increasing irrigation water discharge rates significantly decreased

the average bulb diameter and bulb weight by5.19 and 5.49 % respectively. Meanwhile, significantly increased the average total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M. %) by 5.2 and 4.63 % respectively .The obtained results were confirmed with those reported by Ibrahim and El- Kassas (2011) .

Data, also, illustrated that, the average values of bulb diameter and bulb weight significantly decreased by about 3 , 6 ,10 % under the compost levels 1 , 2 and 3 ton /fed. , respectively, comparing with non- compost treatment. Meanwhile the average bulb weight are decreased significantly, with about 2, 4, 8 % under the compost levels of 1, 2 and 3 ton / fed respectively. On the contrary, total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M. %) ,increased significantly by 4.85 , 9.61, 14.20 and 5.77, 10.96 , 15.44% respectively, when compost levels regarded at 1 , 2 , 3 ton /fed. comparing with non-compost These reduce the losses in the required storage period.

Table (2) : Average values of Bulb diameter, bulb weight, total soluble solids (T.S.S. %) and dry matter(D.M. %)) of onion crop affected by discharge rates and compost levels application.

Treatments	Bulb diam.(cm)	Bulb weight(gm.)	T.S.S%	D.M.%
Discharge rates l/s				
1.5	6.54	123.7	14.04	13.60
3	6.20	116.9	14.81	14.26
LSD0.05	0.10	0.80	0.15	0.08
Compost levels ton / fed.				
0	6.69	124.9	13.35	12.76
1	6.49	122.1	14.03	13.53
2	6.29	119.6	14.77	14.33
3	6.02	114.6	15.56	15.09
LSD0.05	0.14	1.14	0.22	0.12

Data in Table (3) showed that bulb diameter, bulb weight, total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M.%) are affected significantly by interaction between irrigation water discharge rates and compost levels, where ,by increasing irrigation water discharge rates accompanied with increasing compost levels significantly decrease

both bulb diameter(cm)and bulb weight (gm.). The lowest values were 5.83 cm and 112.30 gm. resp. under combined 3 l/s with 3 ton / fed. compost. On the contrary, total soluble solids percentage (T.S.S. %) and dry matter percentage (D.M.%) significantly increased due to interaction between irrigation water discharge rates and compost levels , the highest values were 15.95and 15 .47 %.

Table (3): Average values of bulb diameter, bulb weight, total soluble solids (T.S.S. %) and dry matter(D.M.%)) of onion crop affected by interaction between discharge rates and compost levels application .

Discharge rates l/s	Compost Levels ton / fed.	Bulb diam.(cm)	Bulb weight(gm.)	T.S.S%	D.M.%
1.5 l/s	0	6.87	128.3	12.93	12.45
	1	6.60	125.5	13.62	13.21
	2	6.47	123.8	14.44	14.01
	3	6.20	116.9	15.16	14.71
3 l/s	0	6.50	121.2	13.76	13.07
	1	6.37	118.6	14.43	13.85
	2	6.11	115.4	15.10	14.65
	3	5.83	112.3	15.95	15.47
LSD0.05		0.16	0.31	1.61	0.20

Yield and yield components of onion crop:

Table (4) and Fig .1. showed the average yield components (Mg / fed) of onion crop were affected by irrigation water discharge rates and the compost levels . Data indicated that increasing discharge rates significantly increased marketable and total yield by 10 .86 and 9. 95 % , while significantly decreased culls yield (Mg / fed) by 10. 04 % . These results may be due to reduce the percolation losses and optimum soil moisture content so produce higher percentage of both marketable yield and total yield these harmony with Olalla et al .(2004).

Table(4): Average values of yield components and yield of onion crop affected by discharge rates and compost levels application .

Treatments	Marketable yield (Mg/ fed.)	Culls yield (Mg/fed.)	Total yield (Mg/fed.)
Discharge rate l/s			
1.5 l/s	13.981	0.757	14.738
3 l/s	15.685	0.681	16.366
LSD 0.05	0.23	0.12	0.29
Compost levels ton / fed			
0	13.482	0.939	14.421
1	14.866	0.779	15.645
2	15.395	0.621	16.016
3	16.088	0.537	16.625
LSD0.05	0.33	0.17	0.41

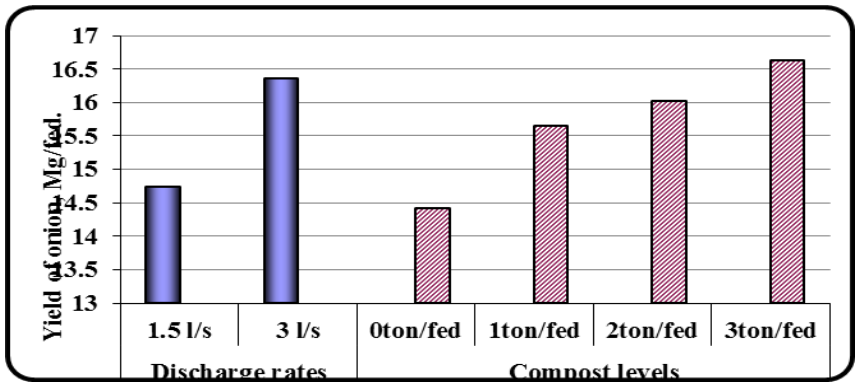

Fig. 1 : Average values of onion yield affected by discharge rates and compost levels.

Also , increasing the compost levels from o to 3 ton / fed. , increased the average marketable and yield of onion from13.482 to 16.088Mg /fed. and from 14.421 to 16.625 Mg /fed respectively . Meanwhile, it decreased the average culls yield from 0.939to 0.537 Mg / fed. These results are due to improve the soil physical ,. Chemical and biological properties and those

agreement with Alam et al (2007) who mentioned that the vegetative growth and yield increased gradually and significantly with increasing the used of vermicomposting levels (2.5 , 5, 10 ton / ha .) to reach the highest yield at 10 ton / ha. .

The effect of interaction between the discharge rate and the compost level on the yield components of onion are shown in Table (5). Results showed that the lowest values of marketable and total yield of onion were 12.67 and 13.66 Mg / fed respectively under the treatment of the discharge rate 1.5 l/s and compost level 0 ton /fed. .Meanwhile gave the highest value of culls yield was (0. 988 Mg / fed . On the contrary, the yield and yield components received combination of irrigation water discharge rate 3 l/s and compost level 3 ton/ fed. , gave the highest values of marketable and total yield (16.088 and 16.625 Mg / fed respectively) and the lowest value of culls yield was 0. 537 Mg / fed..

Table (5): Average values of yield components and yield of onion crop affected by interaction between discharge rates and compost levels application .

Discharge rates l/s	Compost Levels ton/fed	Marketable yield (Mg/ fed.)	Culls yield (Mg/ fed.)	Total yield (Mg/ fed.)
1.5 l/s	0	12.672	0.988	13.66
	1	13.530	0.820	14.35
	2	14.527	0.653	15.18
	3	15.195	0.565	15.76
3 l/s	0	14.291	0.889	15.18
	1	15.205	0.738	15.94
	2	16.262	0.588	16.85
	3	16.981	0.509	17.49
LSD0.05		0.46	0.25	0.58

Crop water relations:

Irrigation water of onion:

Fig. 2 . showed the average irrigation water of onion crop affected by irrigation water discharge rates and compost levels. Data in showed that, by increasing compost levels decreased irrigation water by 4.86 ,11.14 and 15.21 %at compost levels 1, 2 and 3 ton /fed comparing to non-compost . Moreover, results showed that the average irrigation water decreased by about 5.7 % due to increase the discharge rate 1.5 l /s to 3 l/s. These due to application of organic residues could increase soil aggregate stability and enhance water retention capacity.

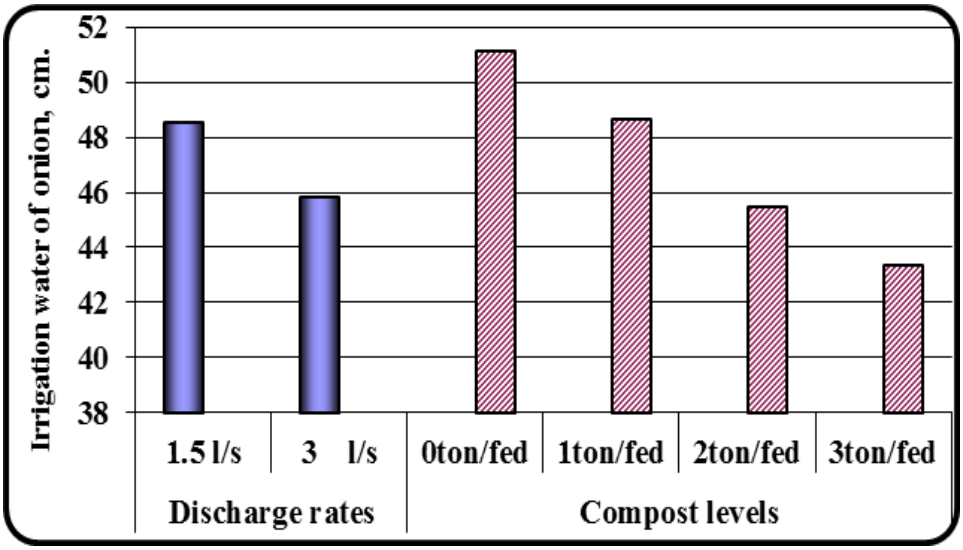

Fig. 2 : Average values of irrigation water affected by discharge rates and compost levels .

Data in Table (6) showed that, irrigation water significantly affect by interaction between irrigation water discharge rates and compost levels, and its highest value (52.50cm) was occurred at the interaction between irrigation water discharge rate 1.5 l / s with compost level 0 ton / fed . While the lowest value (42.02cm) under combined irrigation water discharge rate 3 l/ s with compost level 3 ton / fed.

Table (6): Average values of Irrigation water and water use efficiency (WUE)of onion crop affected by interaction between discharge rates and compost levels application.

Discharge rates	Compost levels ton /fed	Yield (Mg/ fed.)	Irri. Water (cm)	WUE (kg/m^3)
1.5 l/s	0	13.660	52.50	6.20
	1	14.350	50.00	6.83
	2	15.180	46.91	7.70
	3	15.760	44.76	8.34
3 l/s	0	15.180	49.86	7.25
	1	15.940	47.38	8.01
	2	16.850	44.05	9.11
	3	17.490	42.02	9.91
LSD0.05		0.580	2.92	0.28

Water use efficiency (WUE):

Water use efficiency affected significantly increased by increasing the irrigation water discharge rates and compost levels. Fig.3. show under discharge 3 l/ s WUE increased by 15.18 % compared to discharge 1.5 l/fed . In the same trend water use efficiency increased by 12.29, 20.02 and 26.43 % respectively at compost levels 1 ,2 and 3 ton /fed respectively. Comparing with on- compost treatment.

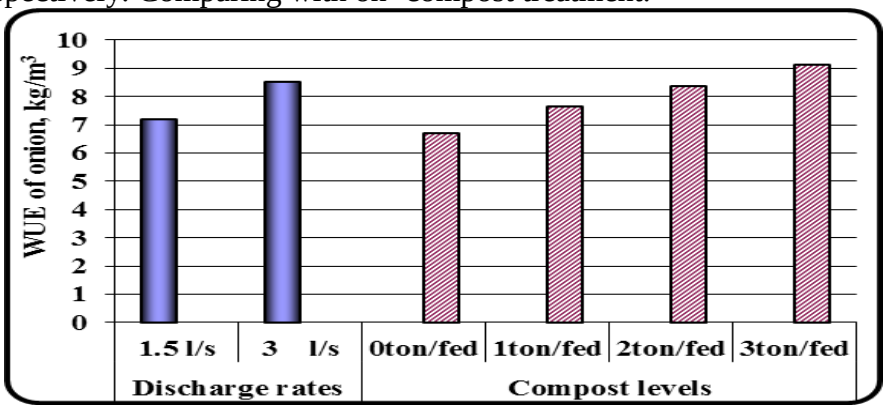

Fig. 3 : Average values of water use efficiency affected by discharge rates and compost levels.

Water use efficiency affected by interaction between discharge rates and compost levels, data in Table (6) reveal that, it significantly increased with regard irrigation discharge rate combined and compost level. The lowest value (6.20 kg / m^3) was occurred combined discharge rate 1.5 l/s with compost level 0 ton /fed , while the highest value (9.91kg /m^3)was under at the combined discharge rate 3 l/ s and compost level 3 ton /fed.

Maize crop yield characters:

Table (7) showed the average diameter, length of ear, number of rows /ear, grains / row of maize crop affected by discharge rates and compost levels. Data indicated that increasing discharge rates significantly increased the average diameter, length of ear, number of rows /ear, grains / row by 8.41 , 4.20 , 9.75 and 2.44 % respectively of maize crop due to decrease nutrient loess with percolation so improve yield components .Also increasing compost levels from 0 to 1 and 2 and 3 ton / fed significantly increased by 5.06 , 9.12 ,12.39 of diameter , 2.05 , 4.91 , 6.77 of length , 5.22 , 8.78 , 13.14 of number of rows /ear and 1.10, 2.88 and 4.25 % number of grains /row respectively.

Table (7): Average values of diameter, length of ear, number of rows/ear, number of grains /row and grain yield of maize crop affected by discharge rates and compost levels application.

Treatments	Diameter (cm)	Length of ear (cm)	No of rows/ear	No of grains /row	Yield Mg/fed
discharge rates l/s					
1.5	5.01	19.83	12.41	45.08	3.360
3	5.47	20.70	13.75	46.21	3.721
LSD0.05	0.11	0.08	0.53	0.73	0.067
Compost level ton/fed					
0	4.88	19.56	12.16	44.84	3.311
1	5.14	19.97	12.83	45.34	3.482
2	5.37	20.57	13.33	46.17	3.643
3	5.57	20.98	14.00	46.83	3.727
LSD0.05	0.16	0.11	0.75	1.03	0.095

Fig. 4. Showed by increasing discharge rate the average grain yield increased by 9.70 % . Also increase grain yield by 4.91, 9.11 and 11.16 % with regard increase compost levels from 1, 2 and 3 ton /fed. respectively, comparing to non-compost. This result may be improving yield components.

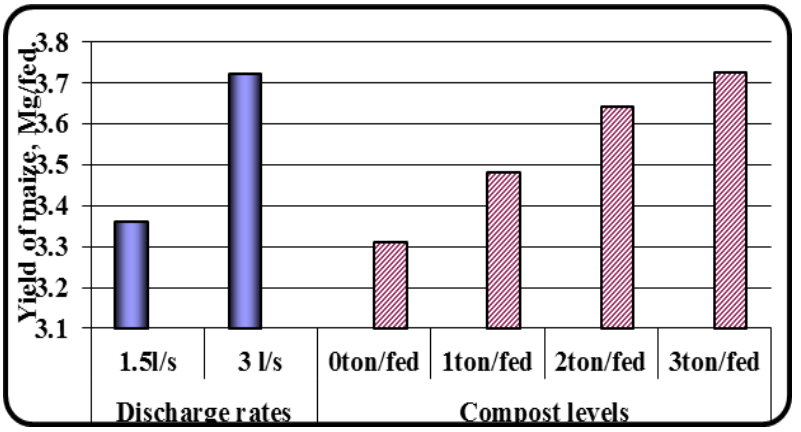

Fig. 4 : Average values of yield affected by discharge rates and compost levels.

The effect of interaction discharge rates and compost levels on the average diameter and length of ear (cm) , number of rows / ear , number of grains / ear and grain yield(Mg/fed) of maize crop are shown in Table (8).

Table (8) : Average values of diameter , length of ear , number of rows / ear , number of grains / row and grain yield of maize crop affected by interaction between discharge rates and compost level application .

Discharge rates l/ s	Compost. Levels ton/fed	Diameter of ear (cm)	Length of ear (cm)	No of rows/ear	No of grains /row	Yield Mg/ fed
1.5	0	4.77	19.10	11.66	44.00	3.153
	1	4.90	19.46	12.00	44.67	3.300
	2	5.10	20.13	12.66	45.67	3.453
	3	5.27	20.63	13.30	46.6	3.532
3	0	5.00	20.00	12.66	45.67	3.468
	1	5.37	20.48	13.66	46.00	3.663
	2	5.63	21.00	14.00	46.67	3.833
	3	5.86	21.33	14.66	47.00	3.921
LSD0.05		0.23	0.16	1.06	1.46	0.135

Results showed that the lowest values (4.77, 19.10, 11.66, 44.00 and 3.153) respectively under the treatment of the discharge rate of 1.5 l/s and compost level 0 ton /fed. Meanwhile, the highest values(5.86 , 21.33 , 14 .66, 47 and 3.921) respectively under the treatment the discharge rate 3 l/s and compost level 3 ton /fed .

Crop water relations:

Water irrigation:

Fig. 5. showed that, irrigation water decreased by 6.97 % due to increased irrigation water discharge rate .Also irrigation water decreased by 5.58 , 10.55 and 14.79 %respectively due to increase compost levels from0 to1 and 2and 3 ton / fed.

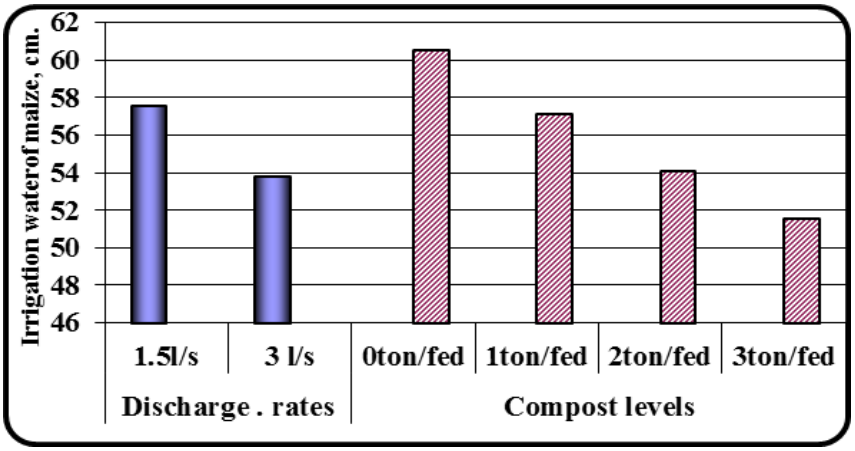

Fig.5 : Average values of irrigation water affected by discharge rates and compost levels .

Irrigation water affected by interaction between irrigation water discharge rates and compost levels. Significantly decreased with regard to interaction between irrigation water discharge rates and compost levels .Table (9) showed that, highest value of irrigation water (62.39cm) due to combined discharge rate 1.5 l/s with compost level 0 ton / fed . Meanwhile lowest value (49.37cm) as result of interaction irrigation water discharge rate3l/s and compost level3 ton/fed.

Table (9) : Average values of Irrigation water and water use efficiency (WUE) of maize crop affected by interaction between discharge rates and compost levels application .

Discharge rates l/s	Compost levels. ton/fed	Yield kg/ fed.	Irr. water (cm)	WUE kg/m^3
1.5 l/s	0	3153	62.39	1.203
	1	3300	59.01	1.331
	2	3453	56.27	1.461
	3	3532	53.77	1.564
3l /s	0	3468	58.65	1.408
	1	3663	55.28	1.451
	2	3833	52.00	1.755
	3	3921	49.37	1.891
	LSD.05	135.24	0.52	2.33

Water use efficiency (WUE):

Water use efficiency(kg /m^3) affected by irrigation water discharge rates and compost levels ,Fig. 6. show increased by 14.51 % of water use efficiency due to increase discharge rate. Also significantly increased by 13.30 , 25.0 ,and 30.21 % due to regard increase of compost levels from 0 to 1 and 2 and 3 ton / fed. respectively.

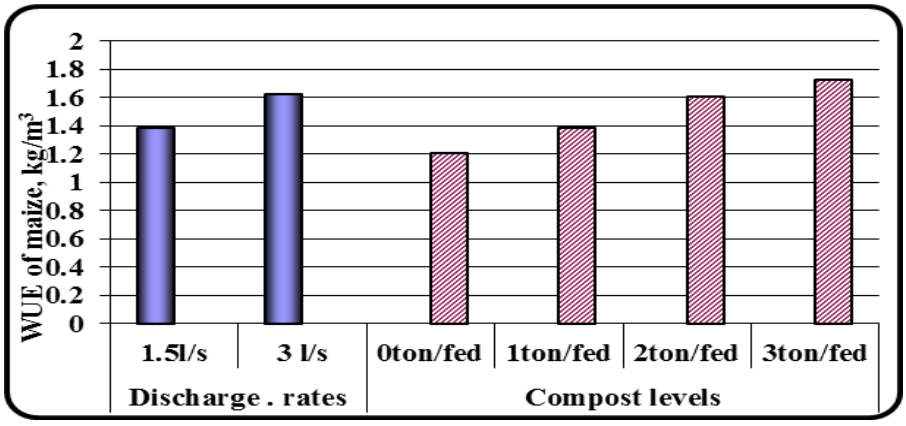

Fig. 6 : Average values of water use efficiency affected by discharge rates and compost levels.

Data in Table (9) showed that , interaction between irrigation water rates and compost levels effect of Water use efficiency (WUE) significantly increased, the lowest value (1.203)due to combined discharge rate 1.5 l/s with compost level 0 ton /fed .highest value (1.891) under interaction between discharge rate 3 l/s and compost level 3 ton/fed.

CONCLUSION

The objective of this research is to study the effect of discharge rates and compost levels on onion and maize yield and yield components, water irrigation and water use efficiency. When increase discharge rate and compost level ,for onion and maize crops , marketable, total yield , total soluble solids (T.S.S. %), dry matter (D.M. %)) and water use efficiency were increased ,while irrigation water was decreased Moreover, interaction between discharge rates and compost levels gave highest value due to combined discharge rate 3 l/ s and compost level 3 ton / fed of both onion and maize crops.

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الملخص العربى

تأثير معدلات مياه الرى والتسميد العضوى على كفاءة استخدام المياه والانتاجية

أمال فتوح الشرقاوى

أقيمت تجرنتان حقليتان فى محافظة الغربية خلال موسمى شتاء 2013/2014 وصيف 2014 لدراسة تأثير معدلان للتصرف (1.5 لتر / ثانية و 3 لتر / ثانية) و أربع مستويات للكمبوست (صفر و1و 2 و 3طن كمبوست / فدان) على المحصول ومكونات المحصول وكفاءة استخدام المياه لكلا من محصولى البصل والذرة و أستخدم تصميم القطع المنشقة فى ثلاث مكررات ويمكن تلخيص أهم النتائج فيما يلى:

أدت زيادة التصرف الى زيادة كلا من الانتاج القابل للتسويق والانتاج الكلى والنسبة المئوية للمواد الصلبة الذائبة الكلية والنسبة المئوية للمادة الجافة بنسب 10,86% و9,95% و 5,2% و 4,63 % على التوالى , ونقص الانتاج الغير قابل للتسوق وقطر ووزن البصلة بنسب 10,04 و 5,19و% 5,49لمحصول البصل.

كما ادى زيادة التصرف لمياة الرى الى زيادة مكونات المحصول وكذلك الانتاجية فى محصول الذرة وكانت نسب الزيادة لقطر وطول الكوز وعدد الصفوف لكل كوز وعدد الحبوب لكل صف وكذلك الانتاجية هى8,41 و4,20 و 9,75و % 2,44 و % 9,70 على التوالى.

كما ادى زيادة مستويات الكمبوست الى زيادة مكونات المحصول والمحصول الكلى فى كلا من البصل والذرة ففى البصل و نتيجة اضافة 3 طن كمبوست/ فدان كانت نسب زيادة الانتاج القابل للتسويق هى 4,31 و 7,60 و % 16,19 والانتاج الكلى هى 3,66 و 5,89 و % 13,26 مقارنة بمستويات 2 و 1وصفر طن كمبوست/ فدان على التوالى

أما فى الذرة فأن زيادة مكونات المحصول مثل قطر وطول الكوز و عدد الصفوف لكل كوز وكذلك عدد الحبوب فى كل صف وذيادة الانتاجية نتيجة اضافة 3 طن كمبوست / فدان, أدى الى زيادة الانتاجية بحوالى 4,91 و 9,11 و 11,16% مقارنة باضافة2 و1 و صفر طن كمبوست / فدان.

وتأثرت العلاقات المائية بزيادة التصرف و مستويات الكمبوست فى كلا من البصل والذرة.

أوضحت النتائج أن كمية مياه الرى قلت بنسبة 5,71% و 6,97 % نتيجة زيادة التصرف فى البصل والذرة على التوالى كذلك قلت كمية الميا ه بزيادة مستويات التسميد بحوالى 4,86 و 11,14و% 15,21 فى البصل وتقل كمية المياه بحوالى 5,58 و10,55 و % 15,21 فى محصول الذرة نتيجة اضافة 3 طن كمبوست / فدان مقارنة ب 2 و 1 وصفر طن كمبوست / فدان على التوالى .

وأظهرت النتائج زيادة كفاءة استخدام المياه فى كلا من محصولى البصل والذرة نتيجة زيادة كلا من معدلات التصرف ومستويات الكمبوست. وأعطى التفاعل بين معدل التصرف 3 لتر / ثانية و اضافة 3 طن كمبوست/ فدان اقل كمية مياه للرى وأعلى كفاءة استخدام المياه فى محصولى البصل والذرة

لذلك نوصى تحت ظروف التجربة و للحصول على اعلى انتاجية واعلى كفاءة استخدام للمياه استخدام معدل تصرف 3 لتر / ثانية واضافة الكمبوست بمعدل 3 طن / فدان .