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Response of Wheat Yield to Irrigation Scheduling Program under Egyptian Sandy Soil Conditions

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ABSTRACT

Two field experiments were performed in EL-Busily region, EL-Behira governorate under the condition of sandy soil during 2009/2010 and 2010/2011 seasons, to study the impact of three amount of water irrigation (60, 70 and 90% from evapotranspiration rate (1216 m^3) and three compost rates (2, 4 and 6 ton/fed.) on some growth, yield and its components of two wheat varieties (sakha 93 and Gemmieza 9). In both of seasons, the treatments were arranged in split split design in three replicates. Results of the two seasons showed that, by increasing the water irrigation amount from 60 to 70 or 90 % of the evapotranspiration (1216 m^3) that led to gradually significant increases for (leaf area (cm^2) /plant, dry weight (g) /plant) and yield and yield components (No. spikes/ m^2, weight of grains /spike, no of grains/spike, weight of 1000 grains, economic yield (kg/fed) and harvest index). Compost rates had significant impacts on previous characteristics, during the two experimental seasons. The best compost rate was (6 ton/fed) which gave the best results for these traits. As compared with the lowest rate of 2 ton/fed. Results revealed that, Gemmieza 9 wheat variety exiled sakha 93 wheat variety significantly for above mentioned measurements during the two seasons. As for the first and second order interactions between the tested factors, results in the two trial seasons showed that, most of the interactions had significant effects on that character. It wealthy mentions that significant interaction effect was found between water irrigation amount with compost rates and wheat varieties was found during the two seasons. The highest values for previous characters were obtained by sowing Gemmieza-9 with adding irrigation quantity of 90% from evapotranspiration and practicing 6-ton compost per Fadden.

Keywords: irrigation-scheduling, compost, wheat, quantity, varieties, sandy soil

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1. Introduction

Wheat is the most important cereal crop as staple food grain in Egypt, where the local production is not sufficient to supply the annual demand of the increasing population. This caused gap between production and consumption. Hence, increasing wheat production is the most important possibility for reducing the wheat gap and reach self-sufficiency of wheat production. To achieve the obvious aim, it could be realized by two ways: First: expanding the area sown second: improving the yield per unit area sown. Wheat areas in sandy soils have gradually increased over the last few years, due to the limitation of agricultural land in the old valley. Sandy soils are very much considered in the plain of horizontal expansion in Egypt. Such soils are characterized by their bulk density and low values of native nutrient content and the high leaching losses of applied fertilizers, and water irrigation. [1]. To improve water use efficiency (WUE) on the basis of increasing crop yields there must be a proper irrigation scheduling strategy [5]. Scheduling irrigation have been well studied and widely practiced for improving crop yield and/or increasing irrigation water use efficiency, IWUE [2 & 10]. Several studies on winter wheat showed that crop yield and water use efficiency in sprinkler-irrigated fields was higher than that in surface irrigated fields [2, 4 & 9].To overcome the sandy soils problem, it requires great efforts to improve its hydro-physical properties, as well as its productivity. The application compost as organic matter to such soil is desperately needed. To increase soil fertilizer and minimize nutrient loss due to leaching, as well as improve moisture holding capacity of sandy soil

The current research is an attempt to find further ways to solve water scarcity in sandy soils in Egypt to increase water use efficiency for wheat, through optimizing water irrigation supply. Recycling plants residues by converting them to compost that improves the physical, chemical and biological properties of sandy soils are needed. [7]. this may protect the new reclaimed land from the problems of pollution resulted from applying chemical fertilizers intensively for high production. This investigation was carried out, to find out the effect of water irrigation quantity and organic fertilizer rats (compost) on growth, yield and yield components as well as water relationships for some wheat cultivars. Also, an important objective is finding out the best varieties which can be adapted under such desert environment conditions.

2. Materials & Methods

Tow field experiments were carried out during two successive growing seasons of 2009/2010 and 2010/2011 at EL Busily area – Rosetta center, EL Behera governorate, Egypt to study the effect of irrigation quantity and compost rates on growth and yield of two wheat cultivars under the condition of fixed sprinkler irrigation system in sandy soil. The varieties of wheat (*Tritium aestivum)* tested in this study were two high-yielding wheat cultivars; sakha-93 and jemmieza9 Experimental field included eighteen treatments which were the combination of three levels of water irrigation quantity, three rates of compost fertilizer and two wheat varieties.

The Agricultural Treatments Tasted:

A – Water irrigation quantity: 60, 70 and 90 % from evapotranspiration rate.

B – Compost fertilizer rates: 2, 4 and 6 tons per Fadden.

C – Wheat varieties: 1- Sakha-93 2 – Gemmieza-9

Soil samples were collected at experimental site to depth of 30,60 and 90 cm. before sowing for mechanical and chemical analysis which recorded in table (1 and 2) respectively. While Chemical analyses for compost fertilizer are given in table (3).

A split- split design with three replicates was used. The main plots were randomly devoted to the irrigation quantity treatments. The sub plots were randomly devoted to the compost fertilizer rates. The sub-sub plots were randomly assigned to the two wheat varieties. Seeding rate was 60 kg. /Fadden and space planting was 20 cm between rows. The experimental plot area was $7m^2$ (1x7m), while the experimental main plot area was 59.5 m^2 (7x8.5). There were 33 rows in each plot spaced 20 cm apart. Calcium super phosphate (15.5% P_2O_5) was added before sowing at rate150 (kg/fed) As well as, potassium was added as potassium sulphate (48-52%) at rate of 100 kg/fed. while ammonium added as ammonium sulfate (20.6 %) at rate of 360 (kg/fed) In five equal portions throw the irrigation system. The first, second, third, fourth and fifth portion were added after (19, 29, 52, 66 and 73) respectively from sowing date. The plots were irrigated at each 7 days' interval as spring irrigation.

Table (1): Chemical analysis of soil in El Beheira site.

Location	Depth cm	PH 1 : 2.5)	EC ppm	Total N ppm	ORGANIC MATTER OM (%)
El Beheira	30	7.22	112.3	46	0.23
	60	7.59	112.3	39	0.72
	90	7.50	131	31	0.75

Table (2): Mechanical analysis of soil in El Beheira site.

Location	Sample Depth cm	% clay	% sand	% silt	Texture
El Beheira	30	8.88	8	83.12	Loamy sand
	60	6.88	6	87.12	Sand
	90	4.88	6	89.12	sand

Table (3): Chemical analyses for compost fertilizer sample.

Micronutrients(ppm)				Macronutrients (%)		
Fe	Mn	Zn	Cu	N	P	K
77 6	53 4	52	18	0.7 6	0.11	1.1 4
O.C%		O.M%		C/N		
9.7		16.7		12.76		

Characteristics Studied:

A. Growth Characteristics:

1. Leaf area index (L.A.I) which taken at 90 days after sowing for two wheat variety. (L.A.I) was calculated as follows formula: L.A = leaf area per plant (cm^2) /Ground area per plant (cm^2).

2. Dry weight (g) per plant was recorded as the mean of 10 plants.

B. Yield and yield components:

1. Number of spikes per m^2 was determined from a random sample of one m^2 taken from each plot.

2. Grain yield (kg/Fed) which determined from all plants in each plot.

3. Harvest index was calculated as: HI = Economic yield (kg/fed) /Total Biological yield (kg/fed) *100.

4. 1000-grain Weight (g) was obtained from the weight of 1000 kernels taken at random from each plot.

5. Weight of grains (g) per spike.

6. No. of grains/spike: was recorded from a sample of 10 main spikes collected from 10 randomly selected plants in each plot.

Statistical Analysis:

Statistically analysis was done following analysis of variance techniques as outlined by [6]. In both of seasons, the treatments were arranged in split-split design in three replicates. The main plots were randomly devoted to the three levels of water irrigation quantity, the sub plots were randomly devoted to the three rates of compost fertilizer, the sub-sub plots were randomly assigned to the two wheat varieties. The mean values were compared at 5% level of significance using least significant differences (L.S.D) test.

3. RESULTS

♦ SINGLE EFFECTS:

A-Effect of irrigation treatments:

The results presented in tables (4,5,6 & 7) indicated that irrigation treatments had significant effect on all growth, yield and its components tasted during the experimental seasons of 2009/2010 and 2010/2011.

Wheat leaf area (cm^2) /plant , dry weight (g) /plant, No. spikes/ m^2 ,weight of grains/spike , No of grains/spike , weight of 1000 grains, economic yield (kg/fed) and harvest index were increased significantly by (12.82% and 20%), (75.5% and 58.1%), (28.7% and 17.0%), (19.7% and 20.1%), (11.1% and 9.3%), (16.2% and 13.3%), (65.82% and 43.45%), and (22.2% and 28.94%) respectively by adding water irrigation at the level of 90% from evapotranspiration (ET) as compared with the application of 60% from E.T.P. which awarded the lowest values for that treats during 2009/2010 and 2010/2011 season respectively.

B-Effect of compost fertilizer rates:

The statistical analysis for data recorded in the previous tables during the two seasons of the study, showed that, wheat traits studied as affected by compost fertilizer rates (2,4 & 6 tones/fed.) as organic matter, results revealed that adding the organic matter as compost at the rate of 6 ton/fed. Led to increase all the values of the previous studied characters, significantly during the two experimental seasons, as compared with the lowest rate of 2 ton/fed. For example, in 2009/2010 season adding 6 ton/fed. Led to gain the greatest values for leaf area /plant (298 cm^2/plant), dry weight /plant (9.71 g), No. of spikes/m^2 (447.8), No. of grains/spike (84.8), economic yield (2458 kg. /fed.) and harvest index (0.43).

C-Variance between varieties:

Results presented in tables (4.5.6. & 7) revealed that wheat varieties (sakha 93 and Gemmieza 9) were differed significantly in its leaf area/plant, dry weight/plant, No. of spikes/plant, grain weight/plant, No. of grains/spike, 1000 grain weight, economic yield/fed. And harvest index during the two seasons. Results revealed that Gemmieza 9 wheat variety exiled sakha 93 wheat variety for most above mentioned measurements during the two seasons.

♦ THE FIRST ORDER INTERACTION EFFECTS:

A- The interaction effect between irrigation and compost:

According to data recorded in tables (4.5.6. & 7) shows the second order interaction effect between Irrigation level and compost rates treatments on wheat traits under study. Results cleared that, Irrigation level x compost rates interaction had significant effect on leaf area/plant, dry weight/plant, No. of spikes/plant, grain weight/plant, No. of grains/spike, 1000 grain weight, economic yield/fed., and harvest index in both of 2009/2010 and 2010/2011seasons. In addition, all above mentioned measurements increased gradually by increasing the quantity of water irrigation from 60% to 70 % and 90% of evapotranspiration rate of wheat and by increasing the compost level from 2 tons to 4 and 6 ton/fed. Improved of utilization of the high quantity of water irrigation which reflected to increase the above mentioned traits.

B- The interaction effect between irrigation and varieties:

Results clarified that, wheat varieties tested differed significantly under the irrigation levels tested. Gemmieza 9 wheat variety scored the greatest values for the above mentioned characters through all irrigation levels as compared with sakha 93 under the effect of the same irrigation treatments during the two seasons. As for compost levels x wheat varieties interaction effect.

C- The interaction effect between compost and varieties:

Results in tables 4, 5, 6 and 7 show significant measured characters during the two seasons. Gemmieza 9 wheat variety showed its superiority under the condition of each of 2 or 4 and 6-ton compost /fed.

♦ THE SECOND OLDER INTERACTION EFFECTS:

Regarding to the second order interaction irrigation x compost x wheat varieties. Results in tables 4, 5, 6 and 7, indicated that, Gemmiza 9 wheat plants utilized the greatest amount of water irrigation at the level of 90 % of transpiration rate under the condition of 6 ton /fed. Compost get the significant greatest values of leaf area/plant, dry weight/plant, No. of spikes/plant, grain weight/plant, No. of grains/spike, 1000 grain weight, economic yield/fed. And harvest index as compared with the other treatments during the two experimental seasons.

Table (4): Quantity of water irrigation and compost levels affecting No. of grains per spike and Weight of1000 grains (g) for (sakha93, jemmieza9) Wheat varieties at harvest stage in 2009/2010 and 2010/2011 at El busily experiment.

Character		**No. of grains per spike**						**Weight of1000 grains (g)**					
Treatments		**First season 2009/2010**			**Second season 2010/2011**			**First season 2009/2010**			**Second season 2010/2011**		
Irrigation	**Compost**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**
	(2 ton) C1	62.0	67.0	64.5	65.0	70.0	68.0	32.9	40.0	36.5	36.0	41.0	38.5
I 1 (60%)	**(4 ton) C2**	68.0	74.0	71.0	72.0	78.0	75.0	40.0	45.2	42.6	42.5	45.7	44.1
	(6 ton) C3	77.0	79.0	78.0	81.0	83.0	82.0	41.5	47.7	44.6	46.2	48.5	47.4
Mean		**69.0**	**73.3**	**71.2**	**73.0**	**77.0**	**75.0**	**38.1**	**44.3**	**41.2**	**41.6**	**45.1**	**43.3**
	(2 ton) C1	65.0	67.0	66.0	68.0	70.0	69.0	43.3	48.9	46.1	42.6	45.3	44.0
I 2 (70%)	**(4 ton) C2**	71.0	71.0	71.0	74.0	80.0	77.0	45.2	47.5	46.4	41.3	45.3	43.3
	(6 ton) C3	80.0	91.0	85.5	83.0	94.0	89.0	45.5	47.7	46.6	46.8	50.5	48.7
Mean		**72.0**	**76.3**	**74.2**	**75.0**	**81.0**	**78.0**	**44.7**	**48.0**	**46.4**	**43.6**	**47.0**	**45.3**
	(2 ton) C1	68.0	71.0	69.5	70.0	73.0	72.0	48.0	45.4	46.7	46.3	48.5	47.4
I 3 (90%)	**(4 ton) C2**	76.0	78.0	77.0	79.0	81.0	80.0	47.0	48.8	47.9	48.0	49.5	48.8
	(6 ton) C3	86.0	96.0	91.0	88.0	98.0	93.0	45.7	52.2	49.0	48.8	53.5	51.2
Mean		**76.7**	**81.7**	**79.2**	**79.0**	**84.0**	**82.0**	**46.9**	**48.8**	**47.9**	**47.7**	**50.5**	**49.1**
G.M. V.		**7[illegible].6**	**77.1**	**74.8**	**76.0**	**81.0**	**78.0**	**43.2**	**47.0**	**45.1**	**44.3**	**47.5**	**45.9**
G.M. V x C													
	(2 ton) C1	**65.0**	**68.[illegible]**	**66.7**	**67.7**	**71.0**	**69.0**	**41.4**	**44.8**	**43.1**	**41.6**	**44.9**	**43.3**
	(4 ton) C2	**71.7**	**74.3**	**73.0**	**75.0**	**79.7**	**77.0**	**44.1**	**47.2**	**45.6**	**43.9**	**46.8**	**45.4**
	(6 ton) C3	**81.0**	**88.7**	**84.8**	**84.0**	**91.7**	**88.0**	**44.2**	**49.2**	**46.7**	**47.3**	**50.8**	**49.1**
LSD at 5%													
	I =	**3.1**			**3.10**			**0.69**			**2.43**		
	C=	**2.4**			**2.45**			**0.71**			**1.99**		
	V =	**1.4**			**1.43**			**0.77**			**0.82**		
	I x C =	**4.2**			**4.24**			**1.23**			**3.44**		
	I x V =	**2.5**			**2.48**			**1.33**			**1.42**		
	C x V =	**2.5**			**2.48**			**1.33**			**1.42**		
	I x C x V	**4.3**			**4.29**			**2.31**			**2.45**		

Table (5): Quantity of water irrigation and compost levels affecting No. spikes per m^2 and Weight of grains (g) per spike for (sakha93, jemmieza9) Wheat varieties at harvest stage in 2009/2010 and 2010/2011 at El busily experiment.

Character		No. spikes per m^2						Weight of grains(g) per spike					
Treatments		First season2009/2010			Second season 2010/2011			First season 2009/2010			Second season 2010/2011		
Irrigation	Compost	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
	(2 ton) C1	263.0	284.0	273.5	334.0	380.0	357.0	3.95	4.63	4.29	4.20	5.13	4.67
I 1 (60%)	(4 ton) C2	300.0	384.0	342.0	412.0	443.0	427.5	4.20	5.05	4.63	4.27	5.38	4.83
	(6 ton) C3	395.0	405.0	400.0	428.0	460.0	444.0	4.35	5.12	4.73	4.53	5.38	4.96
Mean		**319.3**	**357.7**	**338.5**	**391.3**	**427.7**	**409.5**	**4.17**	**4.93**	**4.55**	**4.33**	**5.30**	**4.82**
	(2 ton) C1	361.0	377.0	369.0	376.0	380.0	378.0	4.17	4.92	4.54	4.42	5.60	5.01
I 2 (70%)	(4 ton) C2	402.0	448.0	425.0	451.0	470.0	460.5	4.88	5.58	5.23	4.93	5.98	5.46
	(6 ton) C3	423.0	466.0	444.5	468.0	493.0	480.5	4.92	6.07	5.49	5.10	6.40	5.75
Mean		**395.3**	**430.3**	**412.8**	**431.7**	**447.7**	**439.7**	**4.66**	**5.52**	**5.09**	**4.82**	**5.99**	**5.41**
	(2 ton) C1	371.0	390.0	380.5	405.0	409.0	407.0	5.00	5.13	5.07	5.03	5.62	5.33
I 3 (90%)	(4 ton) C2	418.0	437.0	427.5	482.0	500.0	491.0	4.93	6.18	5.56	5.17	6.61	5.89
	(6 ton) C3	493.0	505.0	499.0	534.0	546.0	540.0	5.17	6.27	5.72	5.32	6.98	6.15
Mean		**427.3**	**444.0**	**435.7**	**473.7**	**485.0**	**479.3**	**5.03**	**5.86**	**5.45**	**5.17**	**6.40**	**5.79**
G.M. V.		**380.7**	**410.7**	**395.7**	**432.2**	**453.4**	**442.8**	**4.62**	**5.44**	**5.03**	**4.77**	**5.90**	**5.34**
G.M. V x C													
	(2 ton) C1	**331.7**	**350.3**	**341.0**	**371.7**	**389.7**	**380.7**	**4.37**	**4.89**	**4.63**	**4.55**	**5.45**	**5.00**

	(4 ton) C2	**373.3**	**423.0**	**398.2**	**448.3**	**471.0**	**459.7**	**4.67**	**5.61**	**5.14**	**4.79**	**5.99**	**5.39**
	(6 ton) C3	**437.0**	**458.7**	**447.8**	**476.7**	**499.7**	**488.2**	**4.81**	**5.82**	**5.31**	**4.98**	**6.25**	**5.62**
LSD at 5%												
	I =		2.89			1.75			0.18			0.18	
	C=		4.56			2.98			0.24			0.31	
	V =		2.90			3.71			0.13			0.19	
	I x C =		7.91			5.17			0.42			0.53	
	I x V =		5.02			6.42			0.22			0.33	
	C x V =		5.02			6.42			0.22			0.33	
	I x C x V		8.70			11.12			0.38			0.58	

Table (6): Quantity of water irrigation and compost levels affecting economic yield (kg/fed.) and harvest index for (sakha93, jemmieza9) Wheat varieties at harvest stage in 2009/2010 and 2010/2011 at El busili experiment.

Character		**Economic yield (kg. /fed.)**						**Harvest index**					
Treatments		**First season 2009/2010**			**Second season2010/2011**			**First season 2009/2010**			**Second season2010/2011**		
Irrigation	**Compost**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**
	(2 ton) C1	1310	1348	1329	1650	1965	1808	0.30	0.34	0.32	0.33	0.35	0.34
I 1 (60%)	**(4 ton) C2**	1553	[illegible]	1605	1915	2049	1982	0.32	0.40	0.36	0.36	0.42	0.39
	(6 ton) C3	1624	2267	[illegible]	2008	2643	2326	0.38	0.40	0.39	0.38	0.42	0.40
Mean		**1496**	**1757**	**1627**	**1858**	**2219**	**2039**	**0.33**	**0.38**	**0.36**	**0.36**	**0.40**	**0.38**
	(2 ton) C1	1401	1792	1597	1969	2803	2386	0.35	0.38	0.37	0.35	0.38	0.37
I 2 (70%)	**(4 ton) C2**	1934	2278	[illegible]	2014	2841	2428	0.37	0.40	0.39	0.39	0.45	0.42
	(6 ton) C3	2250	2435	2343	2730	2957	2844	0.40	0.43	0.42	0.44	0.46	0.45
Mean		**1862**	**2168**	**2015**	**2238**	**2867**	**2553**	**0.37**	**0.40**	**0.39**	**0.39**	**0.43**	**0.41**
	(2 ton) C1	2155	2641	2398	2328	3050	2689	0.36	0.45	0.41	0.37	0.45	0.41
I 3 (90%)	**(4 ton) C2**	2445	2774	2610	2516	3176	2846	0.39	0.47	0.43	0.46	0.58	0.52
	(6 ton) C3	3058	3112	3085	3120	3360	3240	0.45	0.53	0.49	0.48	0.61	0.55
Mean		**2553**	**2842**	**2698**	**2655**	**3195**	**2925**	**0.40**	**0.48**	**0.44**	**0.44**	**0.55**	**0.49**

G.M. V.	**1970**	**2256**	**2113**	**2250**	**2760**	**2505**	**0.37**	**0.42**	**0.40**	**0.40**	**0.46**	**0.43**
G.M. V x C												
(2 ton) C1	**1622**	**1927**	**1775**	**1982**	**2606**	**2294**	**0.34**	**0.39**	**0.36**	**0.35**	**0.39**	**0.37**
(4 ton) C2	**1977**	**2236**	**2107**	**2148**	**2689**	**2419**	**0.36**	**0.42**	**0.39**	**0.40**	**0.48**	**0.44**
(6 ton) C3	**2311**	**2605**	**2458**	**2619**	**2987**	**2803**	**0.41**	**0.45**	**0.43**	**0.43**	**0.50**	**0.47**
LSD at 5%												
I =		29.1			41.2			0.005			0.005	
C=		22.3			28.3			0.003			0.005	
V =		15.5			8.2			0.002			0.003	
I x C =		38.6			49.1			0.007			0.008	
I x V =		26.8			14.3			0.003			0.005	
C x V =		26.8			14.3			0.003			0.005	
I x C x V		46.4			24.7			0.006			0.009	

Table (7): Quantity of water irrigation and compost levels affecting leaf area (cm^2) and Dry weight (g) per plant for (sakha93, jemmieza9) Wheat varieties at harvest stage in 2009/2010 and 2010/2011 at El busily experiment.

Character		**Leaf area (cm^2) per plant**						**Dry weight (g) per plant**					
Treatments		**First season 2009/2010**			**Second season 2010/2011**			**First season 2009/2010**			**Second season 2010/2011**		
Irrigation	**Compost**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**	**V1**	**V2**	**Mean**
	(2 ton) C1	256	262	259	354	360	357	5.71	6.65	6.18	5.95	10.05	8.00
I 1 (60%)	**(4 ton) C2**	273	269	271	370	366	368	5.96	7.86	6.91	7.78	9.93	8.86
	(6 ton) C3	283	293	288	381	390	386	5.96	8.20	7.08	8.61	12.30	10.46
Mean		**271**	**275**	**273**	**368**	**372**	**370**	**5.88**	**7.57**	**6.72**	**7.45**	**10.76**	**9.10**
	(2 ton) C1	262	305	283	371	413	392	5.83	9.81	7.82	9.35	13.97	11.66
I 2 (70%)	**(4 ton) C2**	283	293	288	392	402	397	6.05	8.21	7.13	10.95	14.78	12.87
	(6 ton) C3	286	301	293	394	410	402	9.93	7.55	8.74	11.45	15.30	13.38
Mean		**277**	**300**	**288**	**386**	**408**	**397**	**7.27**	**8.52**	**7.90**	**10.58**	**14.68**	**12.63**
	(2 ton) C1	293	310	302	429	446	438	10.18	11.08	10.63	12.10	14.92	13.51
I 3 (90%)	**(4 ton) C2**	293	326	310	429	456	440	10.58	12.33	11.46	12.35	15.80	14.08
	(6 ton) C3	307	320	314	443	462	455	11.06	15.56	13.31	13.33	17.82	15.58

Mean	**298**	**319**	**308**	**434**	**455**	**444**	**10.61**	**12.99**	**11.80**	**12.59**	**16.18**	**14.39**
G.M. V.	**282**	**298**	**290**	**396**	**412**	**404**	**7.92**	**9.69**	**8.81**	**10.21**	**13.87**	**12.04**
G.M. V x C												
(2 ton) C1	**271**	**292**	**282**	**384**	**406**	**395**	**7.24**	**9.18**	**8.21**	**9.13**	**12.98**	**11.06**
(4 ton) C2	**283**	**296**	**290**	**397**	**404**	**397**	**7.53**	**9.47**	**8.50**	**10.36**	**13.50**	**11.93**
(6 ton) C3	**292**	**305**	**298**	**406**	**425**	**418**	**8.98**	**10.44**	**9.71**	**11.13**	**15.14**	**13.14**
LSD at 5%												
I =		13.27			16.54			0.78			2.01	
C=		14.27			17.54			0.59			3.01	
V =		15.27			18.54			0.34			4.01	
I x C =		16.27			19.54			0.95			5.01	
I x V =		17.27			20.54			0.51			6.01	
C x V =		18.27			21.54			0.51			7.01	
I x C x V		19.27			22.54			0.82			8.01	

4. Discussion

Results recorded in tables (4,5,6, &7) shows most of wheat traits under study were increased significantly by adding water irrigation at the level of 90% from evapotranspiration (ET) as compared with the application of 60% from E.T.P. which awarded the lowest values for that treats during 2009/2010 and 2010/2011 season respectively. These results may be due to water defect during either of vegetative and pre-flowering stages which led to decrease water supply and nutrients which led to decrease leaf area /plant and dry weight/plant furthermore containing of water lack starting from developing flowers primordial till ovules fertilization may be led to the low appearance of florets primordial and decrease fertile flowers which in turn reduced No. of grains/spike and economic yield /fed., and harvest index but under the condition of 90% of ET may be increased nutrient uptake and adequate supply of them to wheat plants for proper growth and metabolic process. Similar results confirmed by [4], who found that wheat production and water productivity under irrigated conditions are low and subject to substantial year to year fluctuation due to erratic rainfall and poor irrigation and agronomic management. Deficit irrigation can be considered as a key strategy for increasing on-farm water productivity in water-scarce dry areas. [4], reported that the deficit irrigation strategy allows one to apply 40–70% less irrigation water for a grain-yield loss of only 13%. Similarly, [8], reported that deficit irrigation averaging 64% of full irrigation was found to be economically equivalent to full irrigation when water was the limiting factor, and deficit irrigation in which only 30% of full irrigation was applied was found to be equivalent to full irrigation in land-limiting cases.

As for compost fertilizer, my results may be attributed with increase the addition of compost rate to 6 ton/fed. Increased the exchangeable capacity of sandy soil, also may be led to increase the collecting of soil particles to improve its water holding capacity and its action exchange capacity. Similar results were obtained by [7], investigated the impact of organic manure and compost on productivity of wheat (*Triticum aestivum* L.) in sandy clay loam soil. They found that, Organic amendments had positive but variable effects. The organic manures application increased the wheat yield by 11.13 (105 %) to 13.53 (128 %) g per pot, relative to the control. The wheat plant height, number of tillers, spike length, straw yield, grain yield and 1000-grain weight all were statistically different from that of control. The findings of the trial suggested that crop productivity may be improved significantly by the application of various organic manures for longer time. Hence, instead of using inorganic chemical fertilizer alone, the integrated use could be more effective and sustainable for environment and agriculture.

5. Conclusion

My results concluded that all above mentioned wheat measurements increased gradually by increasing the quantity of water irrigation from 60% to 70 % and 90% of evapotranspiration rate of wheat and by increasing the compost level from 2 tons to 4 and 6 ton/fed. Improved of utilization of the high quantity of water irrigation which reflected to increase the above mentioned traits.

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