J. Soil Sci. and Agric. Engineering, Mansoura Univ.,Vol.1 (9):921 - 930 ,2010

SOIL AND WATER MANAGEMENT FOR WHEAT PRODUCTION IN THE GEMMEIZA AREA

El-Arqan, M. Y. S.[*] ; H. A. Meshref [*] ; S. A. Abdel – Hafiz[**] and M. I. Badawi [**]

*** Soil. Dept., Faculty of Agric., Mansoura University.**

**** Soil, Water and Environment Res. Inst., A.R.C., Giza, Egypt.**

ABSTRACT

A field experiments was carried out at EL-Gemmeiza Agricultural Research Station, Gharbia Governorate during 2005/2006 and 2006/2007 seasons to study the effects of organic matter, irrigation levels and their interaction on yield and its components of wheat crop and some crop water relations.

To achieve these objectives, two organic matter levels, i.e. O1: Without addition of Farm Yard Manure (OFYM) and O2 With FYM at the rat of 20 m^3 fed^{-1}. Three irrigation regimes, i.e. irrigation at (I_1): 100%, (I_2):70% and (I_3):50% of water requirements. The treatments were arranged in a split- plot design with three replications.

The main obtained results as follows:

1-The addition of the farmyard manure m^3 fed^{-1} resulted in highly significant effect on straw yield and number of grains $spike^{-1}$, of wheat crop during season 2005/2006 and straw yield, number of spikes m^{-2}, number of grains $spike^{-1}$, grain weight $spike^{-1}$ in 2006/2007 season.

2-The addition of the farmyard manure (20 m^3 fad^{-1}) resulted in significant effect on grain yield, number of spikes m^{-2}, grain weight $spike^{-1}$ in 2005/2006 and grain yield, and 1000 grain weight (g) in season 2006/2007.

3-The addition of the organic mater resulted in increasing water consumption use and water use efficiency.

4-The results demonstrate clearly that, irrigation regime at 100% I.W.R. leads to significant increases in most of the characters studied; grain yield and straw yield, , number of grains $spike^{-1}$, number of spikes m^{-2}, grain weight $spike^{-1}$ and 1000 grain weight (g) of wheat crop during the two growing seasons.

5-There is significant interaction between the organic matter and irrigation regime where this interaction viewed in number of spikes m^{-2} and grain weight $spike^{-1}$ in 2005/2006 season.

6-There is no significant interaction between the organic matter and irrigation regime where this interaction viewed in grain yield and straw yield, number of grains $spike^{-1}$ and 1000 grain weight (g) both two seasons.

7-This study concluded that the best combination treatment was addition of organic matter 20 m^3 fad^{-1} and the irrigation regime 100% I.W.R.

Keywords: Wheat, Yield, Yield component, Water consumptive use (C.U), Water use efficiency (W.U.E.).

INTRODUCTION

Wheat (*Triticum aestivum*, L.) is one of the main cereal crops all over the world and one of the most important winter crops in Egypt. Nowadays, great efforts are exerted in order to increase the agricultural production mainly wheat production to minimize the gap between production and consumption. Therefore any efforts to increase wheat yield to face the increasing gap between wheat production and consumption is highly

appreciated. This could be achieved by applying recommended cultural practices push as using bio and chemical fertilizers El-Zeky, (2005).

The organic matter content of Egyptian soils is usually less than 2%in cultivated area. Frequent and high applications of organic manure are necessary to maintain soil fertility. In Egypt farmyard manure is usually used as organic fertilizer, while sheep, poultry manure, water hyacinth and industrial organic residues are slightly used in soil fertilization. These organic fertilizers vary greatly in their composition. Generally, soil organic matter is considered as an important factors for improving physical, chemical and, biological properties of soil *Abd-el.moez et al.* (1999).

Traditional agriculture systems are based on the use of chemical fertilizers to promote growth, and pesticides to control diseases and insects attacking the crops, besides herbicides to fight herbage. Although the importance of these chemical nutrients as intensive energy for production, there is a beneficial role of organic ones in improving the physical, chemical, and biological properties of soil. Organic matter also provides considerable part of macro and micronutrients for plant growth *Fanous et al.* (2003).

Yilong, *et al.* (2005) found that water-use efficiency for biomass and grain yield also increased with increasing irrigation. Which intern decreased water-use efficiency for biomass and grain yield *Mugabe and Nyakatawa (2000)* found that the irrigation regimes used were supplying irrigation water according to the crop water requirements, supplying three quarters of the crop water requirements and half of the crop water requirements at each irrigation day. Applying three quarters and half of the crop water requirements resulted in a yield decrease of 12 and 20% in 1996 and 7 and 20% in 1997 season, respectively. This investigation aims at to studying the effects of organic matter, irrigation levels and their interaction on yield and its components of wheat crop and some crop water relations.

MATERIALS AND METHODS

A field experiment was conducted on wheat crop during two successive seasons 2005/2006 and 2006/2007 at EL-Gemmeiza Agriculture Research Station, Gharbia Governorate to study the effect of organic matter, irrigation levels and their interaction on grain and straw yield of wheat plant and physical properties of soil. The soil of the experimental site is clayey in texture, with water table more than 150 cm and some of its water constants are shown in Table 1.

The adopted experimental treatments were arranged in a split plot design with three replications. The main plots represented organic matter as follows:

1- Without Farm Yard Manure (OFYM).
2- With Farm Yard Manure (FYM) at the rat of 20 $m^3 fed^{-1}$.

The sub-plots represented three levels of irrigation regime:

1- (I1) Irrigation of 100 % water requirements.
2- (I2)Irrigation of 70 % water requirements.
3- (I3)Irrigation of 50 % water requirements.

Table 1: Average of soil moisture constants and bulk density of the experimental field.

Soil depth (cm)	Field capacity %wt/wt	Wilting point % wt/wt	Available soil Moisture % wt/wt	Bulk density (g cm^{-3})
00 - 15	45.15	23.21	21.94	1.23
15 - 30	41.35	22.28	19.07	1.33
30 - 45	38.50	20.14	18.36	1.39
45 - 60	36.80	19.60	17.20	1.42
Average	**40.45**	**21.30**	**19.14**	**1.34**

The two experiments were sown on the 9 and 11 November in 2005 and 2006, respectively.

Irrigation water was delivered to the plots through a circular orifice and total water applied was measured using the formula of immersed orifice

According to James (1988) as follows:-

$$Q = 0.61 \times 0.334 A\sqrt{h}$$

Where**:**

Q = quantity of irrigation water, L sec^{-1}.

A = Area of the orifice, cm^2.

h = effective water head over the orifice center (m).

An irrigation quantity of applied water is shown in Table 2.

Soil samples were collected just before and two days after each irrigation, as well as at harvesting time, to calculate the soil moisture depletion (S.M.D.) and water Consumptive use. Furthermore, soil moisture was monitored after each irrigation at 2 day intervals until it reached the percentage of soil moisture in which irrigation should be given. In each irrigation, water was given sufficient amounts, to raise the soil moisture in the upper 60 cm, of the soil profile to its field capacity plus 20 % of this amount for good distribution in the plot area, *Daniel (1980).* The quantity of irrigation water and accumulated water applied (mm) under different irrigation regimes Table 2. The quantity of water consumed for each irrigation was calculated using the following formula, Israelsen and Hansen (1962):

$$Cu = Q2 - Q1/100 \times Bd \times D$$

Where: **C.U.** = actual evapotranspiration (Consumptive use) cm depth.

Q1 = the percentage of soil moisture before next irrigation.

Q2 = the percentage of soil moisture two days after irrigation.

Bd = bulk density of soil (g /cm^3).

D = the irrigation soil depth, cm.

Water use efficiency (W.U.E.):

The efficiency of water use were calculated by dividing the total weight of grain yield (kg fed^{-1}) by the amount of seasonal Consumptive use (m^3 fed^{-1}) Talha *et al.* (1980).

$$\textbf{W.U.E (Kg m}^3\textbf{)} = \frac{\textbf{Grain yield (kg fed.}^{-1}\textbf{)}}{\textbf{Seasonal E.T. (m}^3\textbf{fed.}^{-1}\textbf{)}}$$

Table 2: The quantity of irrigation water and accumulated water applied (m^3) under different irrigation regimes in 2005/2006 and2006/2007 seasons.

F.Y.M	*Irrigation regimes		Sowing irrigation	1 st irrigation	2 nd irrigation	3 rd irrigation	4 th Irrigation	Accum-ulation Water applied
	2006 season							
Without FYM	I1	**Q,m^3**	665.8	430.6	510.1	532.9	417.9	2557.5
	I2	**Q,m^3**	665.8	430.6	357.1	371.2	292.5	2117.4
	I3	**Q,m^3**	665.8	430.6	255.1	271.5	220.8	1844.0
With FYM	I1	**Q,m^3**	665.8	430.6	505.9	553.5	458.5	2614.5
	I2	**Q,m^3**	665.8	430.6	354.1	387.4	321.0	2159.2
	I3	**Q,m^3**	665.8	430.6	252.9	276.7	229.2	1855.5
	2007 season							
Without FYM	I1	**Q,m^3**	565.4	464.2	490.5	543.1	441.8	2505.1
	I2	**Q,m^3**	565.4	464.2	343.3	380.2	309.2	2062.5
	I3	**Q,m^3**	565.4	464.2	245.2	271.5	220.8	1767.4
With FYM	I1	**Q,m^3**	565.4	464.2	502.1	571.4	477.9	2581.2
	I2	**Q,m^3**	565.4	464.2	351.5	400.1	334.5	2115.7
	I3	**Q,m^3**	565.4	464.2	251.0	285.7	238.9	1805.4

*** I1, I2 and I3 are 100, 70 and 50% of crop water requirements, respectively.**

RESULTS AND DISCUSSION

Yield and yield components:

Grain yield (ton fed^{-1}):

The results in Table 3 reveal that addition of farmyard manure (FYM) had a significant effect on grain yield in both seasons. The addition of farmyard manure (FYM) significantly increased grain yield in 2006 season from 2.531 to ٢.٦٢٨ ton fed^{-1} and in 2007 from 2.697 ton fed^{-1} to 2.845 ton fed^{-1}, respectively. The increment of the grain yield may be attributed to the improvement action of FYM on the soil physical properties as well as nutrients status in the soil. These results could be confirmed by the results of *Almasian, et al., (2006),* ***Herencia*** *et al (2007), Sarma., et al. (2007) and Rehana et al., (2008).* The results in Table 3 show that grain yield was significantly affected by irrigation regime treatments in both seasons. The highest grain yield, i.e. ٢.٩١٠ and 3.043 ton fed^{-1} in 2006 and 2007 seasons, respectively, were resulted from 100 % I.W.R treatment. On the contrary, irrigation 50 % I.W.R treatment gave the lowest averages of grain yield, i.e. 2.160 and 2.430 ton fed^{-1} in the two successive seasons, respectively. Value of 2.669 and 2.840 ton fed^{-1} was recorded for 70 % I.W.R respectively treatment in both seasons. These results are attributed to the increasing of the available moisture content in root zone of the plant. These results could be recorded by the results of Radder, *et al.* (2008) and Behera and Panda (2009).

Straw yield (ton fed^{-1}):

The results in Table 3 reveal that addition of farmyard manure (FYM) had a significant effect on Straw yield in both seasons. The addition of farmyard manure (FYM) significantly increased Straw yield in 2006 season from 3.057 to 3.186 ton fed^{-1} and in 2007 from 3.497 ton fed^{-1} to 4.178 ton fed^{-1}, respectively. The increment of the straw yield may be attributed to the improvement action of FYM on the soil physical properties as well as nutrients status in the soil. These results could be enhanced by the results of *Almasian, et al.* (2006) *and Sarma. et al.* (2007). The results in Table 3 show that straw yield was significantly affected by irrigation regime treatments in both seasons. The highest straw yield, i.e. 3.263 and 4.234 ton fed^{-1} in 2006 and 2007 seasons, respectively, were resulted from 100 % I.W.R treatment. On the contrary, irrigation 50 % I.W.R treatment gave the lowest averages of grain yield, i.e. 2.978 and 3.390 ton fed^{-1} in the two successive seasons, respectively. On the other hand, the value of 3.124 and 3.888 ton fed^{-1} was recorded for 70 % I.W.R treatment in both seasons. These results are attributed to the increasing of the available moisture content in root zone of the system of the plant. These results could be confirmed by the results of Almasian, *et al.* (2006)**,** Yassen*, et al.* (2006) **and** Behera and Panda (2009).

Number of spikes m^{-2}:

The results of Table 3 reveal that the highest values were obtained by the addition of the organic matter (farmyard manure 20 m^3 fed^{-1}) treatment which recorded 282.51 and 285.93 spikes/m^2 in 2006 and 2007 seasons, respectively. On the other hand the value of 242.20 and 240.37 spikes m^{-2} was recorded by the treatment without FYM (0) in the two successive seasons, respectively. These results are in accordance with the results of *Almasian, et al.* (2006). The trait of spikes m^{-2} in both seasons as affected by irrigation regime treatments. The results show that irrigation treatments significantly affected number of spikes m^{-2} in both seasons. The largest numbers of spikes m^{-2} were obtained under sufficient irrigation (100 % I.W.R) as compared with (70 % I.W.R) and (50 % I.W.R) ones. These results could be confirmed by the results of Almasian *et al.* (2006) and Buchong *et al. (2006).*

Number of grains spike^{-1}:

Data of Table 3 emphasize that the best results were achieved by the addition of the organic matter (farmyard manure 20 m^{3}fed^{-1}) which recorded 50.48 and 51.49 likewise the value of 43.03 and 43.88 was recorded under treatment without FYM (0) in both seasons respectively**.** These results are in accordance with Almasian *et al.* (2006).

Data of Table 3 prove that irrigation treatments significantly affected number of grains spike^{-1} in the two seasons. The highest number of grains spike^{-1} (55.29 and 56.40) was obtained under the irrigation regime treatment 100 % I.W.R. as compared to other irrigation regimes of 70 % I.W.R. and 50 % I.W.R. which recorded the value of (46.22 and 47.15) and (38.74 and 39.51), in first and second seasons respectively. These results could be confirmed by the results of Almasian *et al.* (2006) *and* Buchong *et al.* (2006).

Table 3: Effect of organic matter and irrigation and their interaction on wheat yield and yield component in both seasons.

Treatments	2006					
	Grain yield ton fed^{-1}	Straw Yield tonfed^{-1}	Number of spikes m-^{2}	Number of grains spike^{-1}	grain weight spike^{-1}	1000 grain weight(g)
(A) Organic matter						
Without FYM (0)	2.531	3.057	242.20	43.03	2.368	38.46
With FYM (20 m^3 /fed)	2.628	3.186	282.51	50.48	2.778	44.95
F. test	*	* *	*	**	*	*
(B) Irrigation levels						
100% I.W.R	2.910	3.263	322.60	55.29	2.940	46.18
70% I.W.R	2.669	3.124	261.83	46.22	2.468	41.10
50% I.W.R	2.160	2.978	202.64	38.74	2.311	37.83
F. test	* *	* *	* *	* *	* *	* *
L.S.D. at 5%	0.069	0.054	10.547	3.734	0.145	3.062
L.S.D. at 1%	0.101	0.073	15.346	5.434	0.211	4.456
Sig. Interaction A x B	N.S	N.S	* *	N.S	*	N.S
Treatments	**2007**					
	Grain yield ton fed^{-1}	Straw Yield ton fed^{-1}	Number of spikes/m^2	Number of grains spike^{-1}	grain weight spike^{-1}	1000 grain weight (g)
(A) Organic matter						
Without FYM (0)	2.697	3.497	240.37	43.88	2.385	38.79
With FYM (20 m^3 /fed)	2.845	4.178	285.93	51.49	2.822	46.01
F. test	* *	* *	* *	* *	**	*
(B) Irrigation levels						
100% I.W.R	3.043	4.234	319.05	56.40	2.953	46.45
70% I.W.R	2.840	3.888	263.73	47.15	2.501	41.92
50% I.W.R	2.430	3.390	206.68	39.51	2.357	37.83
F. test	* *	* *	* *	* *	* *	* *
L.S.D. at 5%	0.059	0.184	17.112	3.808	0.164	3.802
L.S.D. at 1%	0.086	0.268	24.899	5.541	0.238	5.533
Sig. Interaction A x B	N.S	N.S	N.S	N.S	N.S	N.S

Grain weight spike^{-1}:

The results of Table 3 reveal that the highest values were obtained by the addition of the organic matter (farmyard manure 20 m^3 fed^{-1}) treatment which recorded 2.778 and 2.822 grain weight spike^{-1} in both seasons, respectively**.** On the other hand the value of 2.368 and 2.385 grain weight spike^{-1} was recorded by the treatment without FYM (0) in the two successive seasons, respectively**.** These results are in accordance with Almasian, *et al*., (2006). Data in Table 3 indicted an increasing in grain weight spike^{-1} with sufficient irrigation (100 % I.W.R.), compared to the other two treatments (70% I.W.R. and 50 % I.W.R.) as exposing the plants to drought stress and the effects was significant in 2006 and 2007 seasons. grain weight spike^{-1} at full irrigation increased 2.940 and 2.953, compared with (50 % I.W.R.) treatment and from 2.468 and 2.501 with (70% I.W.R.) treatment in the first and second seasons, respectively**.**

This character is linked to the other yield components .i.e. number of grains weight spike^{-1} and 1000-grain weight to obtained grain yield/fad similar results were obtained by the results of Gharti and Lales (1990) who reported that grain weight spike^{-1} was significantly correlated with soil moisture content. These results could be enhanced by the results of Almasian, *et al. (2006).*

1000 grain weight (g):

Data of Table 3 show that the best results were achieved by the addition of the organic matter (farmyard manure 20 m^{3}fed^{-1}) which recorded 44.95 and 46.01(g). Likewise the value of 38.46 and 38.79 (g) was recorded under treatment without FYM (0) in both seasons respectively. These results could be confirmed by the results of the results of Almasian*, et al.* (2006). Data in Table 3 reveal that 1000 grain weight (g) was influenced significantly by irrigation treatments in both seasons. Increasing irrigation water (100% I.W.R.) had significant highest value of 1000 grain weight. The treatment (100 % I.W.R.) achieved the highest value (46.18 and 46.45) followed by treatment 70 % I.W.R (41.10 and 41.92) and 50 % I.W.R (37.83 and 37.83) in the two seasons. These results could be confirmed by the results of Almasian, *et al.* (2006).

Table 4: Effect of organic matter and irrigation on water consumptive use (m^3 fed^{-1}) and water use efficiency (kg m^{-3}) in both seasons.

Season		2006		2007	
Organic Matter	*Level of Irrigation	C. U. (m^{3}fed)$^{-1}$	W. U. E. (kg.m)$^{-3}$	C. U. (m^{3}fed)$^{-1}$	W. U. E. (kg.m)$^{-3}$
Without FYM (0)	I1	1951.23	1.467	1949.28	1.522
	I2	1745.65	1.483	1743.45	1.586
	I3	1400.14	1.529	1438.46	1.635
Average		1699.01	1.493	1711.78	1.581
With FYM (20m3/fed)	I1	2001.52	1.477	2014.58	1.546
	I2	1833.64	1.499	1829.68	1.590
	I3	1423.12	1.531	1514.55	1.656
Average		1752.76	1.502	1786.25	1.597
Over all		1752.89	1.497	1749.02	1.589

*** I1, I2 and I3 are irrigation regimes of 100, 70 and 50% of crop water requirements, respectively.**

Water consumptive use:

Water consumptive use (C.U.) is defined as the water lost from the plants organs, specially leaves surface, and namely transpiration besides that evaporated from the soil surface during the entire growing seasons. Data in Table 4 reveal that the organic matter treatment was affected the water consumptive use of wheat crop. The addition of 20 m^3 fed^{-1} F.Y.M caused a slight increase in the values of water consumptive use of wheat crop. Average values of water consumptive use were (1752.76 and 1711.78) and (1699.01 and 1786.25) m^3 fed^{-1} for F.Y.M. 20 and 0 m^3 fed^{-1}, treatment in both seasons respectively, these results could be confirmed by the results of

Zhuang *et al.* (2008), *Rehana et al.* (2008) and Stoof, *et al.* (2009). The increasing % in C.U. values under I1 were more than those under I2 and I3 by 9.49 and 28.57 and 9.86 and 25.50 in 1st 2nd seasons respectively. These results were attributed to more available soil moisture, under I1 treatment, which enhanced both transpiration from plants leaves and evaporation from the soil surface. These results could be confirmed by the results of Hong *et al.* (2006), Buchong, *et al.* (2006), Radder, *et al.* (2008) and Lenka *et al.* (2009).

Water use efficiency:

Water use efficiency (W.U.E.) means kg of grains produced due to consumption of the unit of irrigation water m^3. Data in Table 4 indicated that, the addition of FYM is affected the water use efficiency. From the Table 4 the application of 20 $m^3 fed^{-1}$ of farm manure tended to increase the water use efficiency values for wheat crop, these results agreed with those of *Weill et al.* (1990). Data of Table 4 reveal that decreased irrigation regime treatment from 100 % I.W.R. to 70 and 50 % I.W.R. increased water use efficiency by wheat plants from (1.472 to 1.491 and 1.530) and (1.534 to 1.588 and 1.645) in 2006 and 2007 seasons respectively. This may be due to the addition of FYM increasing the dry matter yield in comparison with the grain yield as well as increasing E.T. These results could be confirmed by the results of *Jadhav et al.* (1994) and Jiotode *et al.* (2002) who reported that, increasing soil moisture stress increased water use efficiency by wheat plant**.**

REFERENCES

Abdel-Moez, M. R.; A. L.; Saleh and Sh. A H.; Wanas (1999): Influence of some organic composts on yield; nutrients uptake and consumptive use of fennel and coriander plants and some soil physical properties. J. Agric. Sci. Monsoura Univ., 24(10): 6237-6253.

Almasian, F; A. R. Astaraei,and M.N. Mahallati (2006): Effect of leachateand solid waste compost on yield and yield components of wheat. BIABAN-11(1): 89-98.

Behera, S.K. and R.K. Panda (2009): Integrated management of irrigation water and fertilizers for wheat crop using field experiments and simulation modeling. Agricultural Water Management. 96 (11): 1532-1540.

Buchong Z., M. L.Feng; H. Gaobao; C. Zi-Yong; and Z. Yanhong (2006): Yield performance of spring wheat improved by regulated deficit irrigation in an arid area. Agricultural Water Management, 79 (1): 28-42.

Daniel, Hillel (1980): "Applications of Soil Physics", Academic Press, New York, 385 pp.

El-Zeky, M. M. (2005): Response of wheat to biofertilizer inoculation under different levels of inorganic nitrogen. J. Agric. Sci. Mansoura Univ., 30 (1): 701-710.

Fanous, N. E.; Sh. M. Abd El-Rasoul and M. M. Hassan (2003): Sustainable peanut production through integration between bio, organic and chemical fertilizers. J. Agric Sci. Monsoura Univ. 28(5): 4243-42588.

Gharti, G. B., and J. S. Lales (1990): Effect of drought on yield and yield components of nine spring wheat cultivars at productive stage under tropical environmental conditions. Belgain J. of Botany, 123: 1-2, 19-26.

Herencia J. F. ; J. C. Ruiz-Porras; S. Melero; P. A. Garcia-Galavis; E. Morillo and C. Maqueda (2007): Comparison between organic and mineral fertilization for soil fertility levels, crop macronutrient concentrations, and yield. Agron J. 99:973-983.

Israelsen, O.W. and Hansen, V.E. (1962): Irrigation Principles and Practices, (Third edition).John Wiley and Sons, New York. London.

Jadhav, P.J., A.S. Jadhav, and S.M. Bachchhav. (1994): Effects of N, row spacing and plant densities on the yield and quality of soybean. J. Maharashtra Agric. Univ. 19: 75–77.

James, L. G. (1988): Principals of Farm Irrigation System Design.pp. 106-128.John Wily& Sons New York.

Jiotode, D. J. ; D. L. Lambe AND C. S. Dhawad (2002): Growth parameters and water use studies of maize as influenced by irrigation levels and row spacings. Crop Res. 24 (2) : 292-295.

Lenka S.; A.K. Singh; and N.K. Lenka (2009): Water and nitrogen interaction on soil profile water extraction and ET in maize–wheat cropping system Agricultural Water Management, 96, (2): 195-207. Mugabe F. T. and E. Z. Nyakatawa (2000): Effect of deficit irrigation on wheat and opportunities of growing wheat on residual soil moisture in southeast Zimbabwe. Agricultural Water Management. 46 (2): 111-119.

Radder, B. M.; P. L. Patil; Y. R. Aladakatti and S. G. Patil (2008): Response of Okra (*Abelmoschus esculentus* L.) to moisture regimes and micronutrients in vertisols of malaprabha Command, karnataka. Journal of the Indian Society of Soil Science. 56 (3): 974-981.

Rehana, R.; S.S. Kukal; and G.S. Hira (2008): Soil organic carbon and physical properties as affected by long-term application of FYM and inorganic fertilizers in maize–wheat system. Soil and Tillage Research.101 (1-2) 31-36.

Sarma, A.; H. Singh and R. K. Nanwal (2007): Effect of integrated nutrient management on productivity of wheat (Triticum aestivum) under limited and adequate irrigation supplies. Indian J. of Agro. 52 (2) : 680-685.

Stoof, C. R., C. J. Ritsema, K. Oostindie and L. W.Dekker (2009): The effect of soil texture and organic amendment on the hydrological behaviour of coarse-textured soils. Soil use and management. 25 (3): 274-283.

Talha, M.; Aziz, M.A. and El-Toni, E.M. (1980): The combined effect of irrigation intervals and cycocel treatments on Pelargonium graveolens L. II- Evapotranspiration and water economy. Egypt. J. Soil Sci., 20(2): 121.Weill, A.N., G.R. Mehuys, and E. McKyes. (1990): Effect of tillage reduction and fertilizer type on soil properties during corn production. Soil Tillage Res. 17: 63-67.

Yassen, A. A.; M. A. El-Hady and S. M. Zaghloul (2006): Replacement part of mineral N fertilizer by organic ones and its effect on wheat plant under water regime conditions. World-Journal-of-Agricultural-Sciences. 2(4): 421-428.

Yilong H.; C. Liding; F. Bojie; H. Zhilin; and J. Gong (2005): The wheat yields and water-use efficiency in the Loess Plateau: straw mulch and irrigation effects. Agricultural Water Management, 72, (3):209-222.

Zhuang, J.; J. F. McCarthy; E. Perfect; L. M. Mayer and J. D. Jastrow (2008): Soil water hysteresis in water-stable microaggregates as affected by organic matter. Soil Sci Soc Am J 72:212-220.

إدارة التربة والمياه لإنتاج القمح بمنطقه الجميزة

محمد يحي سيد العرقان* ، حسن عبد الله مشرف* ، سيد احمد عبد الحافظ و محمود إبراهيم بدوى****

*** قسم الأراضى - كلية الزراعة - جامعة المنصورة**

**** معهد بحوث الأراضي والمياه والبيئة- مركز البحوث الزراعية – الجيزة.**

أقيمت تجربتين حقليتين في مزرعة محطة البحوث الزراعية بالجميزة محافظة الغربية خلال موسمي ٢٠٠٥/٢٠٠٦,٢٠٠٦/٢٠٠٧م. وذلك لدراسة تأثير تطبيقات ومعاملات مختلفة من إضافة المادة العضوية، الري على نمو وإنتاجية محصول القمح وأهم علاقاته المائية. صممت التجربة في نظام القطع المنشقة ذو ثلاثة مكررات حيث اشتملت القطع الرئيسية علي مستويين من إضافة السماد العضوي هما:

١-عدم إضافة السماد العضوي (٠). ٢- إضافة السماد العضوي (بمعدل ٢٠ م٣/فدان).

واشتملت القطع المنشقة الأولى علي ثلاث مستويات من الري هي:١- الري عند ١٠٠% من الاحتياجات المائية.

٢-الري عند ٧٠% من الاحتياجات المائية. ٣- الري عند ٥٠% من الاحتياجات المائية.

ويمكن تلخيص أهم النتائج التي تم الحصول عليها في الآتي:-

١- أدت إضافة المادة العضوية بمعدل ٢٠ م٣ /فدان إلى زيادة عالية المعنوية في كل من محصول القش، عدد الحبوب/السنبلة، فى الموسم الأول و محصول القش، عدد السنابل/المتر المربع، وزن حبوب /السنبلة فى الموسم الثانى.

٢- أدت إضافة المادة العضوية بمعدل ٢٠ م٣ /فدان إلى زيادة معنوية في كل من محصول الحبوب، عدد السنابل/المتر المربع ، وزن حبوب /السنبلة، وزن ال١٠٠ حبة فى موسم ٢٠٠٦ محصول الحبوب، وزن ال١٠٠ حبة فى موسم ٢٠٠٧.

٣- إضافة المادة العضوية أدت إلى زيادة الاستهلاك المائى وذلك لزيادة قدرة التربة على الاحتفاظ بالماء وكذلك زيادة كفاءة استعمال واستخدام المياه .

٤- أدى الري عند ١٠٠ % من الاحتياجات المائية إلى زيادة معنوية في معظم صفات المحصول ومكوناته حيث أدى إلى زيادة معنوية فى محصول الحبوب، محصول القش، عدد السنابل/المتر المربع، عدد الحبوب/السنبلة، وزن حبوب /السنبلة، وزن ال١٠٠٠ حبة وذلك فى كلا الموسمين.

٥- أوضحت الدراسة وجود تفاعل معنوي بين إضافة السماد العضوي و مستويات الري على كل عدد السنابل/المتر المربع، وزن حبوب /السنبلة فى الموسم الأول.

٦- أوضحت الدراسة عدم وجود تفاعل معنوي بين إضافة السماد العضوي و مستويات الري على كل من محصول الحبوب ،محصول القش ،عدد الحبوب/السنبلة وزن ال١٠٠٠ حبة فى الموسم الأول ومحصول الحبوب ،محصول القش ،عدد السنابل/المتر المربع،عدد الحبوب/السنبلة، وزن حبوب /السنبلة ،وزن ال١٠٠٠ حبة.

٧- تعد أفضل المعاملات تحت الدراسة هي التي اشتملت على التسميد العضوي بمعدل ٢٠ م٣ / فدان والري عند ١٠٠ % من الاحتياجات المائية.

قام بتحكيم البحث

أ.د / خالد حسن الحامدى	**كلية الزراعة – جامعة المنصورة**
أ.د / حماده حسين عبد المقصود	**مركز البحوث الزراعية**