THE EFFECTS OF SOIL MOISTURE REGIME AND ORGANIC AND IN-ORGANIC NITROGEN FERTILIZERS RATES ON SOME SOIL PHYSICAL PROPERTIES, WHEAT YIELD AND SOME NUTRIENTS UPTAKE

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ABSTRACT

A field experiment was carried out in loamy sand of Isimailia Agricultural Research Station (ARC) during winter season 2010-2011. Wheat plants (*Triticum aestivum* L.), Giza 168 variety were sown. The used treatments were include two factors, (A) three levels of soil moisture regime; 75%(W1), 60%(W2) and 45%(W3) of field capacity); (B) five organic treatments (chicken manure) and mineral (ammonium sulfate) nitrogen rates; (control (T1), 120 kg N ChK (T2), 65 kg N ChK + 55kg N mineral (T3), 50 kg N ChK+70 kg N mineral (T4), 35 kg N Chk+85 kg N mineral (T5). The experiment design as randomized complete block design for factor A with B split plot on A in three replicates. After harvest, grain and straw yield were recorded, NPK uptake of the grain and straw, soil properties (Bd, VR, TP, HC, Pores and moisture constant) were determined. The results were summarized as follow;

Data revealed that effect of moisture regime W1, W2 and W3 were insignificant on soil physical properties. Significantly changes in bulk density and soil porosity due to the use of different application rates of both chicken manure and inorganic fertilizers as ammonium sulfate, where BD decreased and VR and TP increased with nitrogen rates. Relative decreased in QDP and FCP while increasing SDP and WHP for T2, T3, T4 and T5 compared to control. Hydraulic conductivity significantly decreased by applying chicken manure. The maximum decreases were 35.41, 21.12, 23.40 and 11.05 for T2, T3, T4 and T5 respectively. Also, WHC, FC and AW increased, while WP decreased with the previous treatments compared to control.

Soil moisture regime of W1 and W3 at the root zoon resulted in a significant decrease and W2 increased on yield of wheat grain and straw. Regardless the effect of nitrogen level, decreasing the moisture content in the root zone decreasing the grain and straw of wheat yield and the values could be arranged in descending order as follows W1>W2>W3 for grain, and W2.>W1>W3 for straw. The maximum and minimum values of wheat grain and straw yield were 3.211, 0.487, at (T4W2), (T1W3) for grain yield 5.099, 0.952 ton/fed after, (T4W2) and (T1W3) for straw.

Soil moisture regime of W2 as well as T4 was the highest effect on N-uptake of grain and straw. Nitrogen treatments increased N uptake in both grain and straw. It could arrange the mean values of N-uptake in descending order as T4 > T5> T3 for both grain and straw.

Soil moisture regime of W1 for grain and W2 for straw as well as T4 for both were the highest effect of P-uptake in the grain and straw.

Increase inorganic-N increased K–uptake in both grain and straw. It could arrange the mean values on descending order as follows T4 > T3> T5 respectively. The same trend was observed in case of the effect of water regime on the K uptake. Water regime treatment of W2 and nitrogen treatments of T4 have pronounced on the K–uptake in grain and straw.

Kay ward: Moisture regime, chicken manure, nitrogen rate, wheat, yield, soil properties.

INTRODUCTION

Agriculture sector in Egypt consumes about 90% of water resources. Consequently agriculture sector should have the trend towards growing low water requirement crops. Water is considered an economical scare resource in many areas of the world especially in arid and semi arid regions like Egypt. Wheat is one of the most important cereal food crops in the world. In Egypt, its production doesn't meet the current demand. The Egyptian government is doing more efforts to reduce the imported percentage to be less than 50% from the total consumption. Wheat production is affected by different factors such as climatic condition, irrigation and soil fertility. The new reclaimed areas are continuously increasing and water irrigation is being the limiting factor. Irrigation and fertilization and their interactions are considered one of the most important factors for increasing production. **Ghouhun (1991.)** and **Heggy *et al* (1994.)** pointed out that irrigation of wheat at long intervals decreased yield than the irrigation at short intervals. **Elemery *et al* (1994)** indicated that the increase in water supply decreased element of wheat grain. **Sushila and Gajendra (2000)** indicated that application of farmyard manure (FYM) increased the growth, yield and water use efficiency of wheat under limited water supply. Addition of N fertilizer tended to produce high grain and straw yield, regardless of quantity or distribution of water **(Sardana *et al* 2002**.and **Camara *et al* 2003). Wang *et al* (2001)** stated that low inorganic N applications (0 or 31 kg ha^{-1}) resulted in low yields even at a high level of organic fertilizer (corn stover + cattle manure > 4500 kg) and the yield was also limited by lack of organic fertilizer application even at an inorganic fertilizer rate of 105 kg ha^{-1}. The recommended ratio of organic fertilizer N to inorganic one was about 1:2. **Zhang *et al* (2005)** stated improvement in both grain and straw production was associated with many factors such as improved cultivars and production practices Application of farmyard manure had positive effects on growth and yield. The application of chicken manures at the rate of 8 ton/ha produced the highest marketable yield of potato **(Al-Moshileh and Motawei, 2007).** Addition of poultry manure into the soil increased both of total and available nitrogen, phosphorous and potassium in soil and plant **(El-Tantawy *et al.* (2009). Shaaban (2006)** reveled that increasing or decreasing the irrigation water (80% and 40%) of soil water holding capacity (WHC) at the root zone resulted in a significant decrease in yield of grain and straw of wheat plant. **Reddy and Shastry (1983)** attributed uptake P and K under restricted moisture supply to their reduced mobility at low moisture level. **Pariher and Tiwari (2003)** found that N concentration decreased While P and K content increased with the increase in number of irrigation. **Shaaban**

(2006) stated that application of irrigation treatment (60% of soil water holding capacity) resulted in the highest yield. The organic residues improved bulk density, total porosity, macro and micro pores, soil water retention and soil hydraulic conductivity compared with untreated soil. The mixture of chicken manure (60kg organic N /fed) + sun flower residue (60kg organic N/fed) (Ch2+Sf2) were more effect than those of chicken manure or sun flower residue alone at 60 or 120 unit organic N rates. The interaction between irrigation regime and fertilization significantly increased grain and straw yield. Irrigation treatments 80%, 60% and 40 %of soil water holding capacity had no significant effect on soil physical properties. The aim of this investigation to study the effect of soil moisture regime 75% (W1), 60% (W2) and 45% (W3) of Water holding capacity %, chicken manure alone or mixture with three levels of in organic nitrogen N (25, 45 and 60 kg /fed were applied. on some physical properties in sandy soil cultivated by wheat plant., yield of grain and straw of wheat and NPK uptake by grain and straw of wheat plant.

MATERIAL AND METHODS

A field experiment was carried out in loamy sand of Isimailia Agricultural Research Station (ARC) during winter season 2010-2011 to study the effect of soil moisture regime and nitrogen sources (organic and minerals) on some soil physical properties, wheat production and nutrients uptake. Wheat plants (*Triticum aestivum* L.), Giza 168 variety were sown in **15 November** using 60 kg seed/fed. The used treatments include two factors, (A) three levels of soil moisture regime; (B) five rate of combined organic and mineral nitrogen sources, these as follow;

Factor A: Level of moisture Regime

1- 75% of field capacity (W1)
2- 60% of field capacity (W2)
3- 45% of field capacity (W3)

Factor B: level of organic and mineral nitrogen applications

1- Control (T1)
2- Chicken manure at rate 120 kg N/fed (T2)
3- 65 kg N (Chicken manure) + 55 kg N/fed (ammonium sulfate) (T3)
4- 50 kg N (Chicken manure) + 70 kg N/fed as (ammonium sulfate) (T4)
5- 35 kg N (Chicken manure) + 85 kg N/fed (ammonium sulfate) (T5)

The combined nitrogen sources of chicken manure and mineral nitrogen should be equal 120 kg N/fed. Some of sandy soil analyses and chicken manure analyses were listed in table (1).

The experimental plot area was 1/400 feddan (10.5 m^2) and design as randomized complete block design for factor A with factor B a split plot on A with three replicates. The above rate of chicken manure was thoroughly mixed with 0-20 cm of the surface before sowing. Three levels of nitrogen 55, 70, 85 kg N/fed as ammonium sulfate were added three weeks after sowing. Plots of all treatments were fertilized with 30 kg P_2O_3/fed as super phosphate 15.5% and 50 kg K_2O/fed as potassium sulfate 48% before sowing. At maturity stage ,wheat plant were harvested. Grain and straw yield were recorded. Plant and soil samples were collected and determined NPK according **Cottenie *et al* (1982)**. Soil particle size distribution, bulk density (BD) (g/cm^3), pore size distribution, hydraulic conductivity (HC), and total porosity (TP) according to

Majumdar and Singh (2000) Soil moisture rigeme according Klute .(1986). Data were statistically analysis after **Snedecor and Cochran (1980).**

Table (1): Some physical and chemical properties of the studied soil and chemical analyses of chicken manure

Loamy sandy soil analyses		Chicken manure analyses	
Sand (%)	81.13	Total K	0.41
Silt (%)	12.90	Total P	0.63
Clay (%)	5.97	Total N %	3.35
Texture class	Loamy sand	Organic carbon	34.07
Water holding capacity(WHC) (%)	27.36	P H (1:10)	7.40
Field capacity(FC) (%)	12.74	EC d S/m	3.78
Wilting point (WP) (%)	4.84	OM %	58.60
Available water(AW) (%)	7.90		
Organic matter (%)	0.68		
Available N (ppm)	36.00		
Available P (ppm)	14.00		
Available K (ppm)	66.00		
CEC (mg/100 g soil)	7.10		
P H	7.79		
EC (dS/m)	0.36		
$CaCO_3$ (%)	2.50		

RESULTS AND DISCUSSION

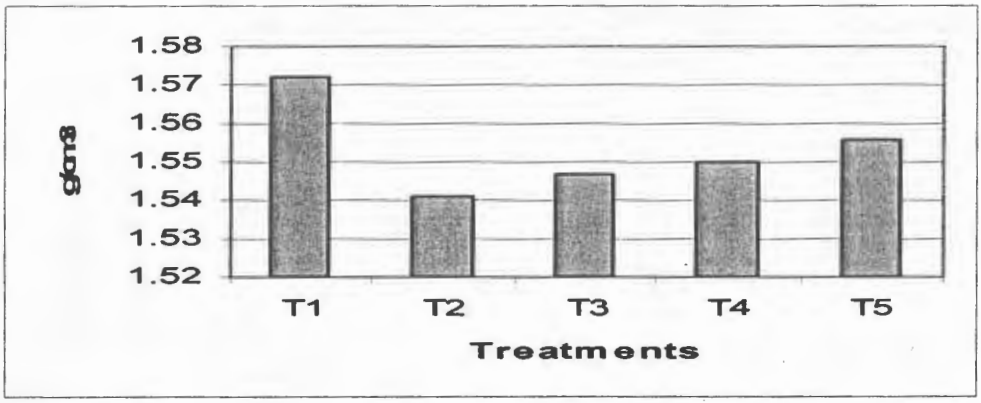
1-Effect of treatments on some physical properties of the studied soil:

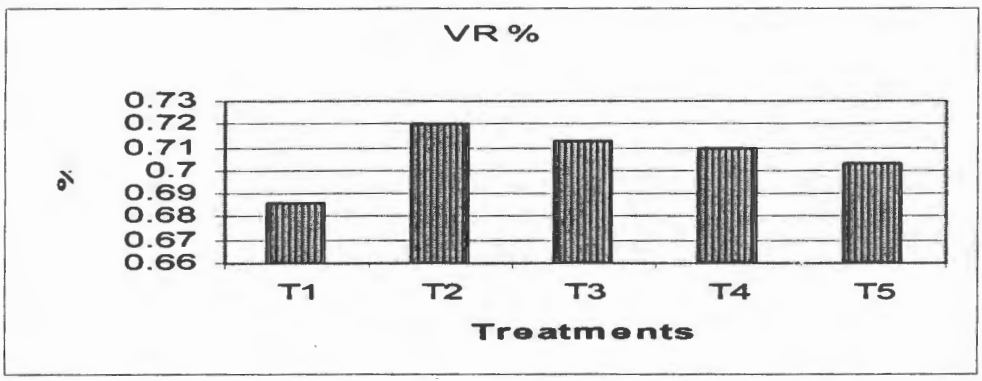
1-1. Bulk density (BD), void ratio(VR) and total porosity (TP):

Significantly changes in bulk density, void ratio and soil porosity due to the use of different application rates of both organic and inorganic fertilizers are indicated in table (2) and fig (1). Data showed a slight decline in soil bulk density with increasing of addition as compared with control. It was lower than of control 1.97, 1.59, 1.40 and 0.98% for T2, T3, T4 and T5 respectively. While it was lower that of control at T2 treatment. On the other hand, values of void ratio and total porosity were took an opposite trend of bulk density, where the relative increments were 4.91, 3.95, 3.46 and 2.40% for void ratio, 2.87, 2.32, 2.04 and 1.42% for total porosity, for T2, T3, T4 and T5 treatments, respectively.

Table (2) the effect of treatments on some physical properties of studied soil.

Treat Ment	BD g/cm^3	VR %	TP %	QDP >28u	SDP 28-6.8u	WHP 8.6-0.19	FCP <0.19	HC cm/hr	WHC %	FC %	WP %	AW %
T1	1.572	0.686	40.69	50.93	49.07	31.45	17.62	26.42	27.52	13.5	4.85	8.65
T2	1.541	0.720	41.86	43.08	56.92	42.58	14.34	19.51	35.53	20.22	5.09	15.13
T3	1.547	0.713	41.52	44.36	55.64	41.03	14.61	20.84	34.65	19.27	5.06	14.21
T4	1.550	0.710	41.27	44.78	55.22	40.47	14.75	21.64	34.16	18.86	5.04	13.82
T5	1.556	0.703	41.38	47.79	52.21	36.47	15.73	23.50	31.85	16.63	5.01	11.62
LSD at 5%	0.003	0.003	0.06	0.82	0.71	0.31	0.08	0.02	0.06	0.18	0.02	0.19





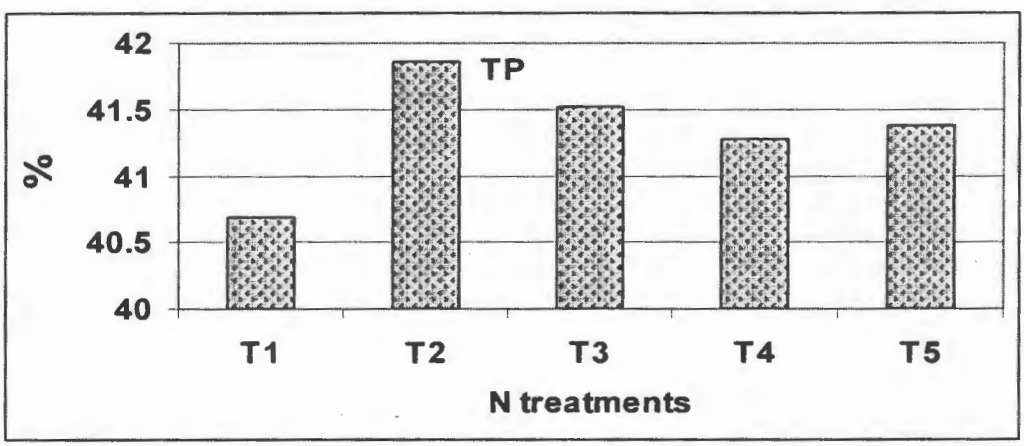


Fig (1) The effect of treatments on bulk density, void ratio and total porosity of the studied soil

1-1-2. Pore size distribution:

Data in table (2) and fig (2) showed pore size distribution (QDP, SDP, WHP and FCP) and indicated that relative decreased in quickly drainable pores >28μ were 15.41, 12.90, 12.08 and 6.17 for T2, T3, T4 and T5 respectively. While it was lower that of control at T2 treatment. On the other hand, values of slow drainable pores were took an opposite trend to that of quickly drainable pores. The increase relative to the soil control reached 35.41,

30.48, 28.70 and 15.99 for WHP and 16, 13.39, 12.53 and 6.40% for SDP, under various treatments of T2, T3, T4 and T5 respectively.

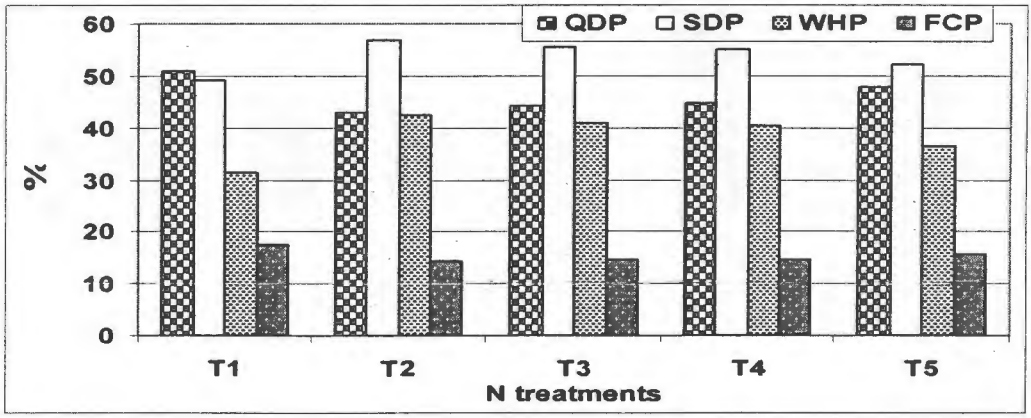


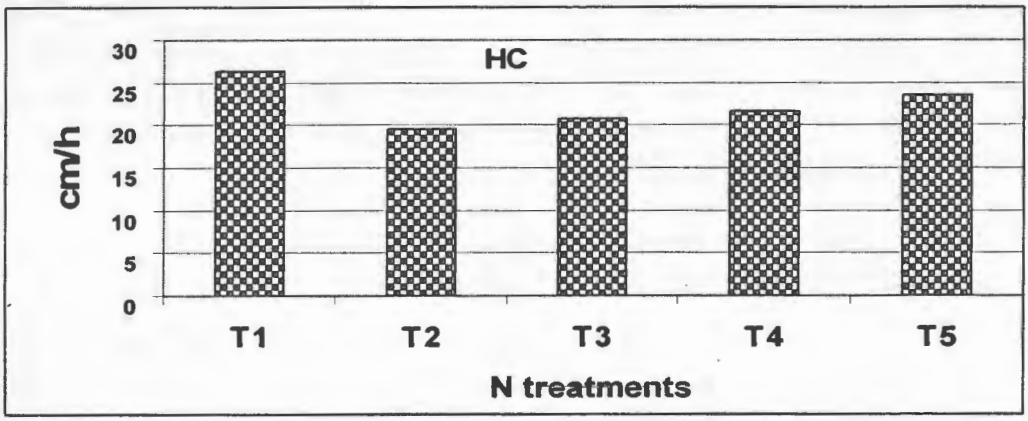
Fig (2) The effect of different used treatments on pore size distribution of loamy sand soil

Generally ,it appears from the previous data that the application of chicken manure to sandy soil significantly changed bulk density and soil pore size distribution especially water holding pores in positive direction towered maximizing the ability of sandy soil to retain and conserve irrigation water against rapid loss by percolation . The previous result are in agreement with the finding **Shaaban (2006).**

1-1-3. Saturated hydraulic conductivity (HC) and Soil water constant:

Soil water constant (WHC, FC, WP and AV) and hydraulic conductivity (HC) of sandy soil treated with chicken manure are present in table (2) and fig (3). Addition of chicken manure to sandy soil gradually increased soil water retention at water holding capacity (WHC), field capacity (FC) and wilting point (WP)%, respectively. Water holding capacity of the soil increased by 29.08, 25.88, 24.11 and 15.72% and of the control for T2, T3, T4 and T5. in sequence .On the other side, data in table (2) and fig (1) indicated that significant increases in soil water content at FC% and WP% were achieved in all treatments. These increments relative to the control were 49.74, 42.73, 39.67 and 23.13 for FC% and 5.02, 4.33, 3.85, and 3.30% for WP % of the control for T2, T3, T4 and T5 respectively. Values for available water percentage were 74.81, 64.25, 59.75 and 34.24% of the control treatment, for T2, T3, T4 and T5 respectively. It has been found that chicken manure treatments modified soil pores especially the micro ones .This behavior is positively reflected on soil water retention. The results were well agreed with those obtained by **Kay 1998.**

Decreased saturated hydraulic conductivity HC of sandy soil is desirable under arid condition as result of better physical condition for plant growth. Data in table (2) fig (3) showed that hydraulic conductivity significantly decreased by applying chicken manure. The maximum decreases were 35.41, 21.12, 23.40 and 11.05 for T2, T3, T4 and T5 respectively.



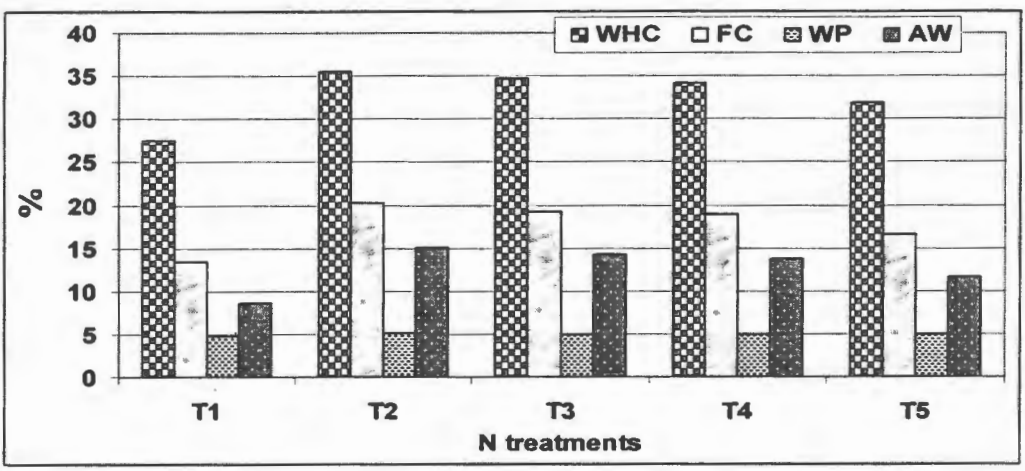


Fig. (3) Effect of different used treatments on soil hydraulic conductivity and Soil water constant:

2-<u>Effect of applying treatments on yield of wheat.</u>

Data in table (3) and figs (4 & 5) showed that moisture regime of W1 and W3 at the root zoon resulted in significant decrease on yield of grain and straw. Moisture regime of W_2 increased grain and straw yield of wheat. These results attributed the decline in yield by decreasing soil moisture content to a loss in turgidity and disturbance of physiological process. Similar results were obtained by **Yassen (1993).** As far interaction between irrigation and nitrogen treatment the data in table (3) and figs (4 & 5) clearly shown that grain and straw yield increased significantly with different N treatment compared with control under W1, W2 and W3. These increases in grain and straw yield may be attributed to enhancement of vegetative growth and yield. These results are in a good agreement with those obtained by **Yassen et al (2006).** Also, data in the mentioned Table and figs showed the effect of used chicken manure and N levels on wheat grain and straw yield under different water regime. Data on the other hand revealed that decreasing application rate of dependant organic N and accompanied with increase level led to increase in wheat grain and straw yield under different studied moisture regime condition.

According to the different N level decreasing rate of chicken manure and increasing nitrogen level increased wheat grain and straw yield by about 87.9 , 139.9 , 171.1 and 141 % for grain and 38.1 , 73.9 , 101.8 and 85.5 % for straw as compared with control.

Table (3): The effect of soil moisture regime and nitrogen fertilizer treatments on grain and straw yield of wheat.

Treatments	Grain ton/fed				Straw ton/fed			
	W1	W2	W3	Mean	W1	W2	W3	Mean
T1	1.076	1.164	**0.487**	**0.909**	2.244	2.613	**0.952**	**1.936**
T2	2.182	2.029	0.912	**1.708**	3.070	3.614	1.337	**2.674**
T3	2.503	2.893	1.147	2.181	3.940	4.551	1.607	3.366
T4	2.931	**3.211**	1.211	**2.451**	4.807	**5.099**	1.816	3.907
T5	2.609	2.971	1.011	2.197	4.111	4.866	1.796	3.591
Mean	2.26	2.45	0.95	1.89	3.63	4.15	1.50	3.09
LSD at 5%								
W	0.18				0.21			
T	0.23				0.26			
W X T	0.20				0.23			

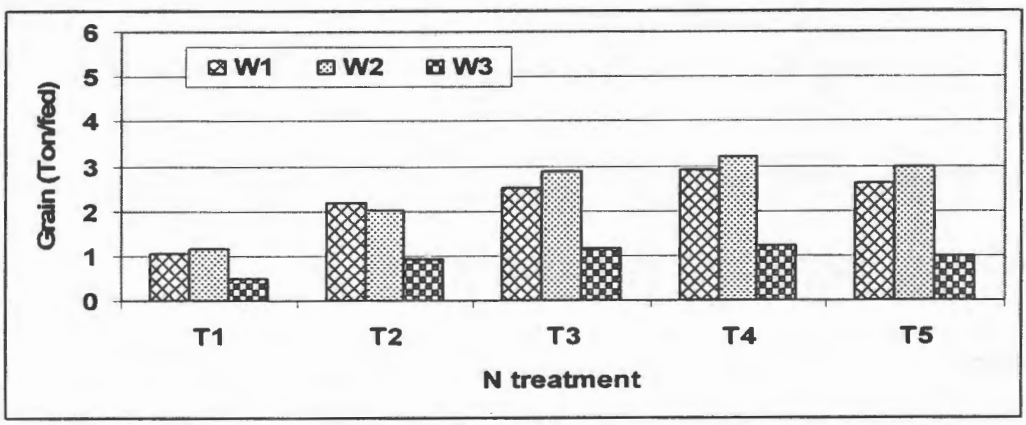


Fig (4) The effect of moisture water regime and nitrogen treatments on grain yield ton/fed of wheat

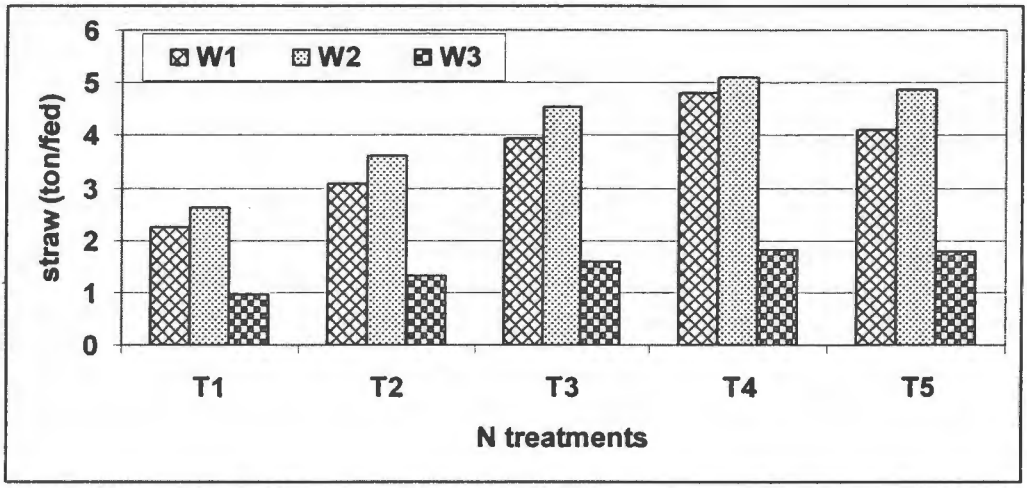


Fig (5): The effect of soil moisture regime and nitrogen treatments on straw yield ton/fed of wheat

Regardless the effect of nitrogen level decreasing moisture content in root zone, moisture regime level decreasing in grain wheat yield after using chicken manure were take place and values could be arranged in descending order as follows W1 > W2 > W3 but in case of straw yield the trend was W2 > W1 > W3 in descending order.

The maximum and minimum values of wheat grain and straw yield were 3.211, 0.487 ton/fed at (T4W2), (T1W3) for grain yield 5.099, 0.952 ton/fed after, (T4W2) and (T1W3) application. These results corroborate the finding of **Camara et al (2003).** When wheat plant received all N requirement from chicken manure, grain and straw yield increased by 89, 38 %, respectively. While decreasing chicken manure and increase nitrogen level increased the wheat yield by 169.6, 101.6 % for grain and straw yield respectively.

3-Effect of applying treatments on N, P and K uptake by yield of wheat

Data in table (4-A) show that irrigation at W2 give slight increase of nitrogen uptake in grain and straw followed by W3 and W1 respectively. The decreasing of nutrients in wheat plant at W3 may be due to redacting the solubility. Decreasing the soil moisture content of mineral in the soil films are thin and path length of movement increase hence movement of cations to root is reduced. High tension exerts a physiological effect on the root, elongation, turgidity and number of root hairs decrease with increasing tension. The decrease nutrients uptake by water stress also has been supported by **Nelson (1982).** On the other hand, the decrease in the nutrients uptake at high W1 may be attributed to the decrease in aeration caused by filling all pores with water, which W2 increasing anaerobic respiration conditions. Hence this phenomenon affects on root physiology functions in water and material consequence reduction in dry mater content is expected.

With respect to the effect of water regimes combined with fertilizers addition, data indicated that N–uptake concern the grain and straw increased sharply with N application as compared with the control. The increase in N uptake values was obtained with W2 as compared with the control. The increase in N uptake values was obtained with W2 as compared to W1 and W3.

According to the effect on N-fertilizer treatment, increasing inorganic N increased N uptake in both grain and straw under chicken manure. It could arrange the mean values of the N fertilizer treatment in descending order as T3 > T5 > T4. The same trend was found in the case of water regime on N uptake

These results indicated that chicken manure and ammonium sulphate increased the capacity of the wheat plant to absorbing nutrients. This might be through the increase in the root surface per unit of soil volume and the rate of nutrients uptake or may be cause by the high capacity of the plants supplied with N fertilizer in building metabolites, which might contribute much to the increase of the dry matter content.

Data also revealed that N uptake and content of straw was much lower than those of grain for all treatments under study. It was noticed that application of organic matter with inorganic N levels gave an increase in N uptake and content in grain and straw as compared to chicken manure added at W1, W2 and W3. This result agreed with **Ravindra and Garwal (2004)**

The values of phosphorus uptake (table 4-B) was decreased by decreasing soil moisture level at W3 compared with soil moisture level at W1 and W2 in grain and straw of wheat plant. Regarding to the effect of water regime combined with fertilizer treatments on P uptake. It is obvious that, high level of W1 with N fertilizer gave high increase in P uptake as compared with W2 and W3 in grain and straw. This may suggest that increasing soil moisture increased P uptake. Possibly the soluble phosphorus is leached under the effect of sufficient water, particularly if CO_2 from the root respiration is increased, this may be an agent for solublization of P salt. Furthermore, the effect of reduced soil moisture content included an increase in the solution concentration of non absorbed nutrients and that of exchangeable cations which tend to reduce the concentration of absorbed anions like phosphate.

According to the effect of N–fertilizer treatment, increasing inorganic N increased P-uptake in both grain and straw yield respectively. W2 gave the highest P uptake with the other all moisture regimes in grain and straw.

According to the effect of N–fertilizer treatment, increase inorganic N increased K–uptake in both grain and straw. It could arrange the mean values of N fertilizer treatment on descending order as follows T4 > T3 > T5 respectively. The same trend was observed in case of the effect of water regime on the K uptake. Water regime treatment W2 had pronounced on the K–uptake in grain and straw.

Table (4): The effect of soil moisture regime and nitrogen fertilizer treatments on nutrient uptake of wheat grain and straw.

(A): Nitrogen uptake by wheat grain and straw

Treatments	N uptake in grain				N uptake in straw			
	W1	W2	W3	Mean	W1	W2	W3	Mean
T1	8.72	10.24	3.70	7.553	7.40	7.89	2.47	5.920
T2	20.02	29.42	11.49	20.310	13.20	16.26	4.81	11.423
T3	40.55	48.89	16.17	35.203	22.06	29.13	8.36	19.850
T4	50.71	59.08	19.01	42.933	30.28	34.67	10.79	25.247
T5	43.05	50.80	15.06	36.303	25.48	34.54	9.88	23.300
Mean	32.61	39.69	13.09	28.46	19.68	24.50	7.26	17.15
LSD at 5%								
W	3.45				3.87			
T	4.24				7.12			
W x T	4.52				5.12			

(B): Phosphorus uptake by wheat grain and straw

Treatments	P uptake in grain				P uptake in straw			
	W1	W2	W3	Mean	W1	W2	W3	Mean
T1	3.55	3.37	1.21	2.710	1.91	4.70	1.33	3.95
T2	10.69	7.30	3.01	7.000	8.90	8.67	2.80	10.13
T3	18.02	16.78	4.93	13.243	12.60	12.74	4.18	15.90
T4	21.92	20.22	7.25	16.463	16.34	15.80	5.21	20.35
T5	17.21	15.71	5.26	12.727	12.74	14.11	5.02	16.62
Mean	14.28	12.68	4.33	10.43	10.50	11.20	3.71	13.39
LSD at 5%								
W	1.23				0.07			
T	2.56				0.16			
W x T	1.76				0.09			

(C): Potassium uptake by wheat grain and straw

Treatments	K uptake in grain				K uptake in straw			
	W1	W2	W3	Mean	W1	W2	W3	Mean
T1	5.38	6.75	2.04	4.723	51.16	55.39	19.09	44.134
T2	12.02	12.76	5.02	9.933	97.30	125.77	36.63	91.551
T3	16.02	21.70	5.28	14.333	154.45	193.42	45.63	137.700
T4	19.34	25.37	6.00	16.903	220.64	243.32	79.27	188.710
T5	15.13	21.09	5.26	13.827	168.55	212.64	71.48	157.250
Mean	13.58	17.534	4.72	11.944	138.42	166.11	50.42	123.90
LSD at 5%								
W	1.98				2017			
T	2.15				30.25			
W x T	2.01				23.6			

Potassium uptake by grain and straw in Table (4-C) were affected by chicken manure and inorganic N level under different water regime. Results showed the increase uptake by wheat plant compared with the control. The highest values was obtained when applied chicken manure with inorganic N at

T4 in both water regime for grain and straw. This result agree with **Yassen *et al* (2006).**

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تأثير المحتوى الرطوبى ومعدلات التسميد النتروجين العضوى والمعدنى على بعض خصائص التربة الطبيعية ومحصول القمح وامتصاص بعض العناصر

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أجريت تجربه فى ارض رملية طميية فى محطة البحوث الزراعية بالاسماعيلية (مركز البحوث الزراعية) خلال الموسم الشتوى (٢٠١٠/٢٠١١) على نبات القمح (صنف Triticum aestivum L. – جيزة ١٦٨)، لدراسة تأثير المحتوى الرطوبى عند ثلاث مستويات من الرطوبه W1 75% ، W2 60% ، W3 45% من السعة الحقلية وسماد الدواجن بمفرده او مختلطا مع ثلاث معدلات من سماد سلفات الامونيوم عند خمس ستويات وكانت المعاملا ت كالاتى

١- الكنترول (T1)
٢- سماد الدواجن بمعدل ١٢٠ كجم ن /فدان (T2)
٣- سماد الدواجن ٦٥ كجم ن /فدان + سلفات الامونيوم ٥٥ كجم ن / فدان (T3)
٤- سماد الدواجن ٥٠ كجم ن /فدان + سلفات الامونيوم ٧٠ كجم ن / فدان (T 4)
٥- سماد الدواجن ٣٥ كجم ن /فدان + سلفات الامونيوم ٨٥ كجم ن / فدان (T 5)

وكان تصميم التجربة قطاعات كاملة العشوائية لمستويات المحتوى الرطوبى وقطع منشقة لاضافات سماد الدواجن (العضوى)، سلفات الامونيوم (المعدنى) فى ثلاثة مكررات.

وبعد الحصاد قدر محصول الحيوب والقش وامتصاص العناصر NPK للحبوب والقش، كما قدرت الخواص الطبيعية وهى (الكثافة الظاهرية، نسبة الفراغات، المسامية الكلية، التوصيل الهيدروليكى، توزيع المسام، المحتوى الرطوبى).

اوضحت النتائج تاثير معاملا ت الرى الثلاثه كانت غير معنويه على الخواص الطبيعيه لهذة الاراضى تحت الدراسة وكان التاثير معنوى على الكثافه الظاهريه والمساميه الكليه نتيجه

اضافه كل من سماد الداواجن او عندما يكون مختلطا مع سلفات الامونيوم. وانخفاض فى الكثافة الظاهرية وزيادة كلا من نسبة الفراغات والمسامية الكلية بمعدلات النتيروجين . وانخفاض نسبيا فى المسام سريعه الصرف QDP ، المسام الشعرية FCP بينما زيادة SDP, WHP للمعاملات T2, T3, T4, T5 بالمقارنة بالكنترول ، والتوصيل الهيدروليكى انخفض معنويا باضافات سماد الدواجن وكان اكبر انخفاض هو ٣٥,٤١ ، ٢١,١٢ ، ٢٤,٤٠ ، ١١,٠٥ للمعاملات T2 , T3, T4, T5 على الترتيب. وايضا زيادة WHC , FC, AW بينما نقصت WP بالاضافات السابقة بالمقارنة بالكنترول .

كانت النتائج بالنسبة للمحتوى الرطوبى W1 , W3 عند منطقة الجذورمنخفضة معنويا، وايضا ادى المستوى W2 الى زيادة محصول الحبوب والقش لنبات القمح. ودون الأخذ فى الأعتبار تأثير مستوى النيتروجين، فأن نقص المحتوى الرطوبى فى منطقة الجذورأدى الى نقص المحصول والقش لنبات القمح وكانت القيم مرتبة تنازليا كالتالى: W1>W2>W3 للحبوب، W2 > W1>W3 للقش. وكانت اعلى واقل قيمة لمحصول الحبوب ٣,٢١١ ، ٠,٤٨٧ ولمحصول القش ٥,٠٩٩، ٠,٩٥٢ طن/فدان، وذلك عند المعاملة (T4W2)، (T1W3).

اعطى المحتوى الرطوبى W1 للحبوب، W2 للقش عند المعاملة T4 اعلى تأثير لامنصاص الفوسفور فى الحبوب والقش.

زيادة النيروجين العضوى يؤدى الى زيادة امتصاص البوتاسيوم لكلا من الحبوب والقش. وترتيب القيم تنازليا كما يلى T4 > T3 > T5 على الترتيب ، ولوحظ نفس الاتجاة لتأثيرالمحتوى الرطوبى على امتصاص البوتاسيوم. وان التأثير المشترك للمستوى الرطوبى W2 ومعاملات النيروجين T4 كان واضحا على امتصاص الحبوب والقش.