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EMPACT OF RICE STRAW, FYM AND N FERTILIZER RATES ON WHEAT YIELD AND SOIL FERTILITY

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ABSTRACT

To evaluate the effect of rice straw, farmyard manure and N fertilizer rates on vegetative growth, yield components and chemical composition of wheat crop (*Triticum aestivum L*.) grown on an alluvial soil and then study the effect of aforementioned factors on soil quality during the successive season of 2005/2006 a pot experiment was performed out at Meniat El-Nasr district, Dakahlia Governorate, Egypt. Treatments were representing all combination of organic waste sources (control, rice straw (RS) and mixture of rice straw + farmyard manure (RS + FYM) were applied at the rate of 20 m^3 fed^{-1} and N fertilizer rates (0, half and all of recommended rate as sulfate, 20.5% N) in presence of the used soils collected after cotton and the other collected after rice in split- split plot design with three replicates.

The obtained results could be summarized as follows:

- Statistical analysis shows that the highest mean values of fresh and dry weights of wheat plant were occurred for the treatment of 20 m^3 fed^{-1} of RS with FYM (W2) + 37.5 kg N fed^{-1} (N2 half nitrogen dose) at the 1st and the 2nd soil.
- Results reveal that means of N, P and K-uptake (g pot^{-1}) by wheat shoot of wheat were increased significantly with increasing of organic wastes rates (W0, W1 and W2) and nitrogen rates (N0, N1 and N2) at two soils under studied. The highest means of N, P and K -uptake at the 1st and 2nd soil respectively, produced from the additional of W2 (RS+FYM) at a rate of 20 m^3 fed^{-1} with N2 (37.5 kg N fed^{-1} half dose).
- Data show that the effect of rice straw (RS), rice straw RS with farmyard manure FYM and N fertilizer rates had a significant and an insignificant effect on grain weight (g pot^{-1}) and weight of 100 grains (g), respectively.
- Application of (rice + FYM) mixture + 37.5 N kg fed^{-1} had a positive effect on residual soil-N, P and K (mg kg $soil^{-1}$) as well as organic matter (%) at two alluvial soils. The highest mean values of residual soil-N, P, K (mg kg $soil^{-1}$) and organic matter (%) obtained from plots that received 37.5 kg n fed^{-1} (half n dose) plus (RS + FYM) mixture at a rate of 20 m^3 fed^{-1} were at the 1st and 2nd soil.

Keywords: Previous crop, organic wastes, N-fertilizer, wheat crop

INTRODUCTION

Organic farming systems that are based on three practical pillars ;(1) the maintenance and increase of soil fertility by the use of farmyard manure ;(2) the omission of synthetic fertilizers and synthetic pesticides; (3) the lower use of high energy consuming g feedstuff (FlieBbach, *et al.,* 2006).

El-Zahar *et al.,* (2001) and Soliman *et al.,* (2001) and Rodd *et al.,* (2002) concluded that the addition of FYM increased grain yield of both wheat and maize.

In addition, several workers reported that the efficiency of organic wastes in the combined with N fertilization (Shehata *et al.,* 2004; Saddik *et al.,* 2004 and Wafaa *et al.,* 2004) they indicated that the yield tended to increase

as a result of mineral fertilizer treatment as compared to other treatments. Also, they showed that, the highest nitrogen, phosphorus and potassium percentages in leaves and stems were found in plants fertilized with NPK + chicken manure + compost at (1/3 + 1/3+1/3). Therefore, the aim of the investigation was to study the interactive effect of organic wastes and nitrogen fertilizer rates on plant growth, yield and quality and nutrient contents of wheat plants as well as soil fertility of studied soil under alluvial soil conditions.

MATERAILS AND METHODS

A pot experiment was performed out at Meniat El-Nasr district, Dakahlia Governorate, Egypt to evaluate the effect of some organic residues (rice straw and farmyard manure) on vegetative growth, yield components and chemical composition of wheat crop (*Triticum aestivum L*.) grown on an alluvial soil during the successive season of 2005/2006 and residual effect of applied treatments on soil fertility.

Table 1: Some physical and chemical properties for the investigated soils.

Soil Properties		Soil 1	Soil 2
Physical analysis	**Clay**	43.10	36.30
	Silt	39.13	35.82
	Sand	10.39	19.94
	Texture	**Silty clay**	**Clay loam**
Chemical Analysis	**$_{P}$H**	7.7	7.5
	$CaCO^{-}_{3}$	4.9	6.25
	EC (dSm^{-1})	1.71	0.92
Avialable Nutrients (mg kg $soil^{-1}$)	**N**	122.5	131.3
	P	105.3	81.9
	K	487.2	266.8
Cations (meq100 g $soil^{-1}$)	**Ca^{+2}**	2.31	1.21
	Mg^{+2}	2.49	1.38
	Na^{+}	3.85	2.07
	K^{+}	0.10	0.05
Anions (meq100 g $soil^{-1}$)	**$CO^{=}_{3}$**	0.00	0.00
	HCO^{-}_{3}	2.24	1.96
	Cl^{-}	6.11	1.22
	$SO^{=}_{4}$	0.41	1.53

The experiment was conducted out in plastic containers measuring 50 cm in height and 40 cm in diameter. Each container was filled with twenty kg of soil. Soil samples were collected from the surface layer (0-30 cm) collected after cotton cultivation to represent the 1st soil, meanwhile the other, collected after rice cultivation to represent the 2nd soil.

Soil is considered a clay loam in texture (alluvial soils). Some physical and chemical properties were shown in Table 1.

The experimental design was split–split plot design. Main plots were assigned to the two previous crops (collected after cotton cultivation to represent the 1st soil, meanwhile the other, collected after rice cultivation to

represent the 2nd soil. While, the three organic wastes (OW) treatments were arranged in the sub-plots and the three treatments of nitrogen (N) were the sub-sub plots. Hence, the total number of present trial was 2 treatments (previous crops) × 3 sources (OW) × 3 rates (N) = 18 treatments. Each treatment was replicated 3 times to give a total number of 54 experimental units.

1. The first factor (2 treatments): The used soils collected as follows;
   The 1st soil collected after cotton and the 2nd soil collected after rice.
2. The second factor (2 treatments): Three sources of organic wastes were applied at the rate of 20 m^3 fed^{-1}as follows:

W_0; Control (without addition), W_1; Rice straw (RS) and W_2; Mixture of rice straw + farmyard manure (RS + FYM).Some chemical analyses of rice straw and farmyard manure are shown in Table 2.

Table 2: Some chemical analyses of rice straw and (Rice straw + FYM) Mixture farmyard manure.

Sources	Total nutrients (%)			O.M %	C %	C/N ratio	pH
	N	P	K				
Rice straw	0.54	0.027	0.55	9.81	43.0	79.6	6.5
(Rice straw + FYM) Mixture	1.12	0.29	2.00	25.17	14.0	12.5	7.8

3. The third factor (3 N rates): nitrogen was applied in the form of ammonium sulfate (20.5 % N) and ammonium nitrate (33.5 % N) at three rates 0, half and all recommended rates (75 N kg fed^{-1}) of nitrogen as the following:-

N_0; Control (Without addition).

N_1; Half recommended rate (37.5 N kg fed^{-1}) equal 0.15 g pot^{-1} (0.69 g of ammonium sulfate + 0. 85 g of ammonium nitrate to wheat) and

N_2; All recommended rate (75 N kg fed^{-1}) equal 0.30 g pot^{-1} (1.38 g of ammonium sulfate + 1. 69 g of ammonium nitrate to wheat).

Organic wastes were incorporated into the soil and then soil was irrigated and left for 15 days before sowing. Three wheat seedlings were placed in the center of each pot and water was applied to the pots to maintain the soil water potential near available moisture.

Also, the nitrogenous fertilizer was added at three equal doses; the first and two doses were added after 20 days from transplanting and at the beginning of flowering and fruit set (45 days after transplanting). While the third dose was added after fruit setting stage (65 days after transplanting). With exception of the studied treatments, other cultural practices for wheat were used according to the recommendations of Agriculture Ministry.

1. Agronomic characters:-

One sample was taken after cultivation to determine the following;

1.1. Growth attributes:-

- Fresh weight (g/pot). - Dry weight (g/pot).
- Chlorophyll was measured by a Minolta SPAD chlorophyll meter (Yadova, 1986).

1.2. Yield:-

At maturity, after 180 days from planting season, the grain samples were removed to measure the following attributes:-

- **Weight of 100 grains (g/pot)**

Also, grains and straw were carefully taken from plants before harvesting and available soil-N, P and K were estimated as mentioned by Cottenie *et al.,* (1982).

2. Soil sampling:-

The representative soil samples were taken from the two soils before addition of any treatments and after harvesting of wheat to determine soil-available N, P and K (mg kg $soil^{-1}$) and organic matter % as mentioned by (Hesse, 1971).

All data were statistically analyzed according to the technique of analysis of variance (ANOVA) and the least significant differences between the treatment means were compared as published by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1. Fresh, dry shoot and chemical composition:-

Data in Table 3 reveal that fresh, dry weights (g pot^{-1}) and nutrients uptake (mg pot^{-1}) of wheat plant as affected by the application of rice straw (RS), rice straw RS with farmyard manure FYM) mixture and N-fertilizer rates in two alluvial soils during 2005/2006 season.

Table 3 clearly appears that the additional of rice and (rice + FYM) mixture and N fertilizer rates had an insignificant effect on fresh and dry weights (g pot^{-1}) of wheat plant under studied soils.

Also, Table 3 reveal that the highest mean values of fresh and dry weights were (6.78 and 3.44 g pot^{-1}) at the soil collected from rice cultivation occurred with the treatment of 20 m^3 fed^{-1} of RS with FYM (W2) + 37.5 kg N fed^{-1} (N2 half nitrogen dose), respectively. Whereas, the lowest mean values of total fresh and dry weights were (4.45 and 1.21 g pot^{-1}) occurred with the untreated soil (control), respectively.

As shown in the same Table, data reveal that mean values of N, P and K-uptake (mg pot^{-1}) by shoot of wheat plants was increased significantly with added organic wastes rates W0 (control), W1(RS) and W2 (RS + FYM), and N rates; N0 (control), N1(all dose) and N2 (half dose) at two alluvial soils. The increase in dry weight per plant due to nitrogen fertilization may be attributed to the role of nitrogen in encouraging cell elongation, cell division and consequently increasing vegetative growth and activation of photosynthesis process and metabolic which reflected increases in dry weight, EL-Zehery (2003).

Regarding the effect of rice straw (RS), rice straw RS with farmyard manure FYM) and N fertilizer rates on absorbed N and K nutrients, Data presented in Table 3 reveal that the maximum mean values of these characters were (74.40 and 69.41 21.35 g pot^{-1}) produced from the application 20 m^3 fed^{-1} of (RS + FYM) mixture and half N dose (37.50 kg N fed^{-1}) at the collected soil from rice cultivation, respectively. While, the minimum mean values of N and K nutrients were (14.79 and 12.71mg pot^{-1}) occurred with the untreated soil (control), respectively.

On the other hand, the same Table shows that the highest means of P-uptake by shoot were (21.35 mg pot^{-1}) produced from the interaction of W2 (FYM + rice straw) at a rate of $20m^3$ fed^{-1} and 37.50 kg N fed^{-1} (half N dose) of N fertilizer in the 1st soil that collected from rice cultivation. Meanwhile, the lowest mean of the P-uptake were (0.48 mg pot^{-1}) occurred with the check treatments (control). Noufal *et al.,* (2005) found that all organic materials increased availability of N, P and, K in the soil as well as the dry matter yield of barley plants.

2. Grains weight:-

Data in Table 4 show the effect of rice straw (RS), rice straw RS with farmyard manure FYM and N fertilizer rates had a significant and an insignificant effect on grain weight (g pot^{-1}) and weight of 100 grains (g) during 2005/2006 season, respectively.

Table 4: Means of grain yield (g pot^{-1}) and weight of 100 grains of wheat crop as affected by rice straw, FYM and N fertilizer rates after 2005/2006 season.

Treatments			grains weight (g pot^{-1})	Weight of 100 grains (g)
Rice	W0	N0	3.45	4.80
		N1	3.89	5.00
		N2	4.03	4.92
	Means		**3.79**	**4.91**
	W1	N0	3.62	5.06
		N1	4.10	5.32
		N2	4.33	5.44
	Means		**4.02**	**5.27**
	W2	N0	3.77	5.18
		N1	4.58	5.50
		N2	5.04	5.63
	Means		**4.46**	**5.44**
Average			**4.09**	**5.21**
Cotton	W0	N0	2.64	4.85
		N1	3.48	4.96
		N2	3.49	4.94
	Means		**3.20**	**4.92**
	W1	N0	2.95	5.31
		N1	3.81	5.44
		N2	4.22	5.53
	Means		**3.66**	**5.43**
	W2	N0	3.40	5.42
		N1	4.09	5.65
		N2	5.73	5.73
	Means		**4.41**	**5.60**
Average			**3.76**	**5.32**
LSD at 0.05			**0.56**	**NS**

With respect to grains weight (g pot^{-1}) of wheat plant, data in Table 4, reveal that, As well as, the plants treated with 20 m^3 fed^{-1} (FYM + RS) mixture gave the highest mean values of fresh weight were (4.46 and 4.41g pot^{-1}) at the 1st and 2nd soil, respectively. Whereas, the lowest mean values of this attribute were (3.79 and 3.20 g pot^{-1}) at 1st and 2nd soil respectively, obtained from the untreated treatments (without organic application).

As shown in Table 4, the highest mean values of grains weight were (5.04 and 5.73 g pot^{-1}) at the 1st and the 2nd soil occurred for the treatment of 20 m^3 fed^{-1} of RS with FYM (W2) + 37.5 kg N fed^{-1} (N2 half nitrogen dose). Whereas, the lowest mean values of grains weight were (3.45 and 2.64 g pot^{-1}) at the 1st and 2nd soil respectively occurred for the untreated soil (control). The obtained increases are due to the high content of organic matter in these organic residues Abdel Aal *et al.,* (2003)

Regarding the effect of rice straw (RS) with farmyard manure (FYM) and N fertilizer rates on weight of 100 grains (g), Table 4 reveals that weight of 100 wheat grains had a with addition of organic waste rates from 0 (W0) up to 20 m^3 fed^{-1} RS (W1) and RS + FYM (W2). The highest mean values of weight of 100 wheat grains were (5.44 and 5.60 g) at the 1st and 2nd soil respectively, occurred with added a rate of 20 m^3 fed. Moreover, the plots that received from 20$m^3$$fed^{-1}$ of (RS + FYM) mixture (W2) at a rate of 37.50 kg N fed^{-1} (half dose; N2) achieved the highest weight of 100 wheat grains (5.63 and 5.73 g pot^{-1}) at the 1st and 2nd soil respectively. Meanwhile, the lowest values residual soil-N content were (4.80 and 4.85 g) at the 1st and 2nd soil respectively, produced from untreated plots (control).

3. N, P and K uptake by grains of wheat crop:-

Table 5 shows that the mean values of N , P and K uptake (g pot^{-1}) by wheat grains were significantly affected with the additional of rice, (rice + FYM) mixture and N fertilizer rates under both of the studied soils during a season 2005/2006.

Data presented in Table 5 reveal that the highest mean values of N uptake was (86.10 g pot^{-1}) at 2nd soil collected from cotton cultivation produced from the additional of W2 (FYM + rice straw) mixture at a rate of 20m^3 fed^{-1} and N fertilizer at a rate of 37.50 kg N fed^{-1} (half N dose). While, the lowest values were (18.82 g pot^{-1}) produced from the untreated treatment (control).

In the contrary, the same Table refers that the highest mean values of P and K uptake were (15.26 and 27.95 g pot^{-1}) at the 1st soil collected from the rice cultivation, respectively, obtained from added (RS + FYM) mixture at a rate of 20 m^3 fed^{-1} (W2) with N fertilizer at a rate of 37.5 kg N fed^{-1} (half dose N2). Meanwhile, the lowest mean value of P and K uptake were (5.45 and 4.65 g pot^{-1}) at the 1stsoil, respectively occurred without addition of previous treatment (control).

Table 5: Means of N, P, and K uptake (g pot^{-1}) by grains of wheat crop as affected by rice straw, FYM and N fertilizer rates after 2005/2006 season.

Treatments			Nutrients uptake (g pot^{-1})		
			N	P	K
Rice	W0	N0	18.22	5.45	4.65
		N1	37.70	6.21	6.42
		N2	40.30	6.50	6.73
	Means		**32.07**	**6.05**	**5.93**
	W1	N0	20.90	5.89	12.18
		N1	44.20	12.06	17.06
		N2	45.90	12.88	17.51
	Means		**37.00**	**10.28**	**15.58**
	W2	N0	22.31	5.99	12.56
		N1	57.25	14.61	27.86
		N2	**66.40**	**15.26**	**27.95**
	Means		**48.65**	**11.95**	**22.79**
Average			**39.24**	**9.43**	**14.77**
Cotton	W0	N0	15.93	5.19	11.19
		N1	35.11	6.57	18.25
		N2	46.25	6.97	18.90
	Means		32.43	6.24	16.11
	W1	N0	39.45	5.78	11.78
		N1	64.90	7.12	19.45
		N2	66.80	8.79	20.15
	Means		**57.05**	**7.23**	**17.13**
	W2	N0	31.30	6.11	12.62
		N1	76.33	14.22	23.31
		N2	86.10	15.20	25.99
	Means		**64.58**	**11.84**	**20.64**
Average			**51.35**	**8.44**	**17.96**
LSD at 0.05			**8.59**	**3.00**	**5.69**

4. Soil fertilty:-

The results in Table 6 show the effect of rice straw individually or combined of FYM and N fertilizer rates vigorously affected on N, P and N contents (mg kg soil^{-1}) during 2005/2006 season.

As shown in Table 6,the highest mean values of soil-N contents (mg kg soil^{-1}) were (91.88 and 142.19 mg kg soil^{-1}) at the 1st and 2nd soil respectively, obtained from plots that received 37.5 kg N fed^{-1} (half dose) with the combined effect of added (RS + FYM) mixture at a rate of 20 m^3 fed^{-1}. Meanwhile, the lowest mean values of residual N contents (mg kg soil^{-1}) were (65.62 and 52.50 mg kg soil^{-1}) at the 1st and 2nd soil respectively, produced from the untreated plots.

It is worthy to note that the additional of organic wastes may be improving soil physical and biological properties, which are reflected

generally, on soil fertility status and thus the dynamic changes of (NH^+_4 +NO^-_3)-N in the upper 30 cm of soil could be influenced, to a great extent (Lee-ChangHoon *et al.,* 2004).

Table 6 refers that the application of rice straw, FYM and N rates individually or combination of them caused a pronounced effect on residual soil-P (mg kg $soil^{-1}$) at two alluvial soils. The highest mean value of residual soil-P were (111.15 and 122.85 mg kg $soil^{-1}$) at the 1st and 2nd soil, respectively, obtained from (RS + FYM) mixture at a rate of 20 m^3 fed^{-1} at a rate of 37.5 kg N fed^{-1}. Meanwhile, the lowest mean values of available soil-P were (58.50 and 87.75 mg kg $soil^{-1}$) at the 1st and 2nd soil, respectively occurred with check treatments (control). The combined application of chemical fertilizers and compost could be an effective method to increase the plant availability of P in soils by promoting microbial activity continuous fertilization increased the total and inorganic P contents in plough layers. In NPK, inorganic P fraction did not change with time, but organic P content increased significantly. Moreover, long-term application of chemical fertilizer together with compost accelerated the decrease in the organic P fraction. Increase in total, inorganic and extractable P with time may be closely related to the increase in the availability of accumulated P for rice growth (Lee-ChangHoon *et al.,* 2004).

Table 6: Soil fertility as affected by rice straw, FYM and N fertilizer rates after wheat crop cultivation 2005/2006 season.

Treatments			N (mg kg^{-1})	P (mg kg^{-1})	K (mg kg^{-1})	O.M. %
Rice	W0	N0	65.62	58.50	156.20	2.22
		N1	65.63	70.20	168.20	2.57
		N2	65.63	70.20	168.20	2.87
	Means		**65.63**	**66.30**	**164.20**	**2.55**
	W1	N0	80.94	76.05	174.00	2.87
		N1	80.94	76.05	174.00	3.02
		N2	85.31	81.90	185.60	3.18
	Means		**82.40**	**78.00**	**177.87**	**3.02**
	W2	N0	85.31	81.90	208.80	3.33
		N1	89.69	105.30	208.80	3.48
		N2	91.88	111.15	220.00	3.48
	Means		**88.96**	**99.45**	**212.53**	**3.43**
Average			**79.00**	**81.17**	**184.87**	**3.00**
Cotton	W0	N0	52.50	87.75	150.80	1.82
		N1	78.15	87.75	197.20	2.12
		N2	98.44	96.52	243.60	2.12
	Means		**76.36**	**90.67**	**197.20**	**2.02**
	W1	N0	98.44	96.52	261.00	2.42
		N1	100.62	107.23	266.80	2.42
		N2	131.25	108.22	272.60	3.21
	Means		**110.10**	**103.99**	**266.80**	**2.68**
	W2	N0	133.44	108.22	278.40	3.33
		N1	133.44	114.07	324.80	3.33
		N2	142.19	122.85	336.40	3.48
	Means		**136.36**	**115.05**	**313.20**	**3.38**
Average			**107.61**	**103.24**	**259.07**	**2.69**

As well as, Table 6 indicates that, the highest mean values of residual soil-K were (212.53 and 313.20 mg kg soil^{-1}) recorded in the 1st and 2nd soil, respectively occurred with presence of (RS + FYM) mixture at 20 m^3 fed^{-1}. While, the lowest mean values of residual-K were (164.20 and 197.20 mg kg soil^{-1}) produced the check treatment. Data listed in the Table 6 reveal that the maximum mean values of residual soil-K content were (220.00 and 336.40 mg kg soil^{-1}) achieved in the presence of 20 m^3 fed^{-1} (FYM + RS) mixture with 37.5 kg N fed^{-1} (half N dose) at the 1st and 2nd soil, respectively. Meanwhile, the minimum mean values of residual soil-K content were (156.20 and 150.80 mg kg soil^{-1}) occurred at the 1st and 2nd soil, respectively occurred without addition of previous treatment (control). In general, it can be noticed that the contents of soil-N, P and K (mg kg soil^{-1}) reached its maximum value under the combined effect of (FYM + RS) mixture at a rate of 37.5 N kg fed^{-1} (half dose) in two alluvial soils. It might be attributed to the effect of several organic acids produced during organic matter decomposition which might have also increased nutrients availability.

Looking at the mean values of organic matter (%), data illustrated in Table 6 reveal that application rate from 0 up to 20m^3 of rice straw or/and FYM markedly increased means of organic matter from (2.55 to 3.02 and 3.43 %) at the 1st soil, as well as at the 2nd soil means of organic matter were increased from (2.02 to 2.68 and 3.38 %) due to the same treatments previous, respectively.

After harvesting, data in Table 6 reveal also that the highest mean values of organic matter were (3.48 and 3.48 %) produced from 20 m^3 fed^{-1} rate of FYM + RS with 37.5 N kg fed^{-1} at the 1st and 2nd soil, respectively. Meanwhile, the lowest mean values of organic matter were (2.22 and 1.82 %) at the 1st and 2nd soil, respectively produced from the check treatment, respectively during the season of 2005/2006. It might be attributed to the effect of several organic acids produced during organic matter decomposition which might have also increased nutrients availability.

It could be concluded that application a rate of 20m^3 fed^{-1} (RS + FYM) mixture and 37.5 kg N fed^{-1} (half dose) led to increasing the yield and nutrients uptake by wheat plants and then improving the soil fertility under alluvial soil conditions.

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أثرإضافة قش الأرز والسماد البلدي ومعدلات التسميد النتروجيني على محصول القمح وخصوبة التربة

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أقيمت تجربة أصص خلال موسمي 2006/2005 م بمركزمنية النصر- محافظة الدقهلية- وذلك لدراسة تأثيراضافة بعض المخلفات العضوية (مخلفات قش الأرز، ومخلفات حيوانات المزرعة) والتسميد النيتروجيني بمستويات مختلفة لنوعين من الأراضي الرسوبية النهرية علي محصول القمح .

تم تصميم التجربة فى قطع منشقة مرتين في قطاعات كاملة العشوائية حيث كانت القطع الرئيسية تمثل نوعين من الأراضي (تربة مابعد زراعة القطن، تربة مابعد زراعة الأرز)، والقطع تحت الرئيسية تمثل المخلفات العضوية فى مستويين (كنترول، ومخلفات قش الأرز، ومخلوط مخلفات قش الأرز+ مخلفات حيوانات المزرعة)، بينما كانت القطع تحت تحت الرئيسية تشمل النتروجين فى 3 مستويات (كنترول، 2/1 المعدل الموصى به، وكل المعدل الموصى به في صورة نترات نشادر وسلفات النشادر)، **وفيما يلى عرض لملخص النتائج المتحصل عليها :**

- أظهرت النتائج أن متوسطات قراءات الكلوروفيل والوزن الطازج والوزن الجاف للمجموع الخضري زادت معنوياً تحت تأثير كل من إضافة المخلفات العضوية (مخلفات قش الأرز، ومخلفات حيوانات المزرعة) مقارنة بالكنترول ، كما زادت أيضاً بزيادة معدلات التسميد النتروجيني تحت كلا الأرضين المزروعتين. وكانت أعلى قيم لمتوسطات المجموع الخضري تحقق عندما أضيف إليها مخلف عضوي (مخلف حيواني + قش الأرز) بمعدل 20 م^3/فدان + 37.5 كجم نتروجين/فدان (2/1 المعدل الموصى به) في كلا الأرضين.
- أوضحت البيانات أن النيتروجين والفوسفور والبوتاسيوم الممتص بواسطة المجموع الخضري (مجم/إصيص) يزداد معنوياً باضافات المخلفات العضوية تحت ظروف الأراضي الرسوبية.
- كما أشارت النتائج أن النيتروجين والفوسفور الممتص بواسطة العرش (مجم/إصيص) لم يتأثرمعنوياً فيما عدا البوتاسيوم تحت تأثير التفاعل بين اضافات المخلفات العضوية وزيادة معدلات التسميد النتروجيني تحت ظروف الأراضي الرسوبية.
- كما أن الأراضي التي أضيف إليها مخلف عضوي (مخلف حيواني + قش الأرز) بمعدل 20 م^3/فدان أعطت أعلى متوسطات لوزن الحبوب في كلا الأرضين. ولكن وجد أن التفاعل الثلاثي بين عوامل الدراسة لم يؤثرمعنوياً على هذه وزن 100 حبة تحت ظروف الأراضي الرسوبية النهرية.
- كما أشارت النتائج أن النيتروجين الممتص في الحبوب (مجم/إصيص) تأثرمعنوياً تحت تأثير التفاعل بين اضافات المخلفات العضوية وزيادة معدلات التسميد النتروجيني تحت ظروف الأراضي الرسوبية.
- ولقد أوضحت النتائج أن أعلى قيم للنتروجين والفوسفور الممتص (مجم/إصيص) كان نتيجة اضافة 37.5 ن/فدان مع المخلفات العضوية (قش الأرز + مخلف حيواني) بمعدل 20 م^3/فدان تحت ظروف الأرض المزروعة أرز. ولكن وجد أن إضافة المخلفات العضوية (قش الأرز + مخلف حيواني) والتسميد النتروجيني (37.5وحدة ن /فدان) أدي إلى الحصول على أعلى متوسط للبوتاسيوم والفوسفور الممتص في حبوب القمح في الأراض المزروعة قطناً.
- كما أشارت النتائج أن أعلى تركيزلقيم النيتروجين والفوسفوروالبوتاسيوم (مجم/كجم تربة) والمادة العضوية (%) في التربة كان تحت تأثير التفاعل بين اضافات المخلفات العضوية وزيادة معدلات التسميد النتروجيني تحت ظروف الأراضي الرسوبية.

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