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IMPACT OF MINERAL FERTILIZATION LEVELS, ORGANIC MANURE SOURCES AND ITS INTERACTION ON YIELD AND CHEMICAL COMPOSITION OF WHEAT

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ABSTRACT

A field experiment was conducted in the Experimental Farm of Faculty of Agric., El-Mansoura Univ. during the winter season of 2014-2015 to study the effect of mineral fertilization levels (0, 50, 75 and 100% from the recommended doses of NPK), organic manure sources (FYM, compost rice straw (CRS), compost town refuse (CTR) and chicken manure (ChK)) and enrichment organic manure as well as their interaction on yield and chemical composition of wheat plant in complete randomize block design with 3 replicates.

Results indicated that; the mean values of all parameters under study fresh and dry weight, chlorophyll content, yield and yield component; weight of 100 seeds, no. of grains/spike, spike length as well as chemical composition were significantly increased as the level of NPK fertilizers was increased. The highest yield and chemical composition of wheat was realized at the rate of 100% NPK. Within the sources of organic manures studied; a superiority effect was realized for the plants treated with ChK, following with CRS, FYM and lastly CTR for increasing the average values of the previously mentioned traits as compared to the control treatment. Enrichment the sources of organic manure with the mixture of micronutrients (Zn, Fe and Mn) had a positive effect on the mean values of all the aforementioned traits. Such effect was more pronounced due to the combination between NPK levels (50 or 75% RD) and enrichment organic manure sources. The best quality and the highest mean values of growth parameters, yield and its components and chemical composition of wheat plant were realized for the plants treated with enrichment chicken manure combined with 75% NPK (RD).

Keywords: mineral fertilization levels, organic manure sources, enrichment organic manure and wheat.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most important cereal crop as the main food stable for the Egyptian public. It is not only the most widely cultivated crop but also the most consumed food crop all over the world. Improving the productivity of this crop is a main task due to its short supply which mandated improving about 50% of the needed wheat grain from outside the country (FAO, 2000 and Agamy *et al*., 2012).

Mineral nutrition alone with the essential plant nutrient would be the single most important factor limiting crop yields, especially in developing countries. The continuous use of high levels of chemical fertilizers is adversely affecting the sustainability of agricultural production and causing environmental pollution.

Addition of soil organic manures is a favorable way for improving soil properties by providing a favorable soil structure, enhancing cation exchange capacity, increasing the quality and availability of plant nutrients and providing the substrate of microbial activities. The use of organic fertilization and compost in agriculture are widely practiced in Egypt. Therefore, the technology for recycling farm wastes, particularly wide C/N ratio materials, under intensive cropping system should be developed to increase the crop yield and to maintain soil fertility level (El-Etr *et al.,* 2004 and Böhme and Böhme, 2006).

In integrated nutrient management system, the nutrient needs of plants have to be met through application of organic sources *viz*. farmyard manure (FYM), compost rice straw (CRS), muncible solid wastes (MSW), and/or poultry manure refuse (PM) in conjunction with chemical fertilizers. Several researchs have demonstrated the beneficial effect of combined use of chemical and organic fertilizers to mitigate the deficiency of many secondary and micronutrients, in filed that continuously received only N, P and K fertilizers (Dhaliwal *et al*., 2012 and Ahmad, 2013).

Dutta *et al*., (2003) reported that the use of organic fertilizers together with chemical fertilizers had a higher positive effect on microbial biomass and hence soil health. Kaur *et al*., (2005) stated that balanced fertilization using both organic and chemical fertilizers is important for maintenance of soil organic matter content and long term soil productivity in the tropics where soil organic matter content is low.

Although, micronutrient elements are needed in relatively very small quantities for adequate plant growth and production, their deficiencies cause a great disturbance in the physiological and metabolic processes in the plant. A balanced fertilization program with macro and micronutrients in plant nutrition is very important in the production of high yield with high quality products. Micronutrients such as iron, manganese and zinc have important roles in plant growth and yield of plants (Hussain *et al.,* 2006 and Abd El-Wahab, 2008).

The organic manure enrichment technique appears to be an extreme need and helpful tool for avoiding the obstacles of using the organic manure as a naturally organic ligands, increasing the micronutrient use efficiency, decreasing the use of micronutrient chemical fertilizer, reducing the input costs for resource-poor farmers and maintaining the soil fertility as well as the sustainable agriculture. The enriched organic manure not only enhances the rate of decomposition, but also improves the nutrient status. The use of iron, zinc and manganese enriched organic manure has to be encouraged due to their positive effect on the yield of wheat plant (Jadhav *et al*., 2003 and Mansour, 2012)

The present investigation was carried out to evaluate the effects of organic manure sources, mineral fertilization levels, enrichment organic manures and their interaction on chemical composition, yield and its component of wheat plant.

MATERIALS AND METHODS

A field experiment was conducted in a clayey soil at the Experimental Farm of Faculty of Agriculture, Mansoura University during the winter season of 2014-2015 to study the effect of mineral fertilization levels, organic manure sources and enrichment organic manure on chemical composition, yield and yield component of wheat plant. Some properties of the experimental soil are presented in Table (1).

Table (1): Some properties of the experimental soil.

Soil characters		2014-2015
	Coarse sand	4.65
	Fine sand	19.82
Mechanical analysis (%)	Silt	29.63
	Clay	45.90
	Texture class	Clayey
E.C. $dS.m^{-1}$(paste ext.)		4.09
pH (1:2.5)		7.89
S.P. %		62.3
O.M. %		1.78
T. $CaCO_3$ %		3.68
	N	51.6
Available (mg/kg)	P	5.13
	K	185.6
	Fe	4.09
DTPA extractable (mg/kg)	Zn	0.88
	Mn	2.76

28 treatments were arranged in complete randomize block design with 3 replicates as follows; four rates of N, P and K fertilizers; control, 50, 75 and 100% of the recommended by the Ministry of Agriculture (90, 75 and 48 $Kg.fed^{-1}$) for N, P_2O_5 and K_2O, respectively. Four sources of organic manure; farmyard manure (FYM), compost rice straw (CRS), compost town refuse (CTR) and chicken manure (ChK), respectively. Each source of organic manure was studied six times; a) single form, b) enrichment form, c) single form+50% NPK, d) single form+75% NPK, e) enrichment form + 50% NPK and f) enrichment + 75% NPK. Thus, the total number of the experimental plot were 84 plot.

Mineral fertilizer used in this investigation were ammonium nitrate (33.5% N), calcium super phosphate (15.5% P_2O_5) and potassium sulphate (48% K_2O). N fertilizer was added in 2 equal doses directly before the first and second irrigation, while the P fertilizer was added during soil preparation for sowing and K fertilizer was given before the first irrigation.

Composted rice straw was prepared in the site of the experiment according to the method of El-Hammady *et al*., (2003), Rip farmyard manure and chicken manure were taken from the station of Animals and chicken production, Fac. of Agric., Mans. Univ. Composted town refuse was taken from Mansoura Manufactory for organic manure. All organic manure sources were used at the rate of 15 $m^3.fed^{-1}$. The quantities of organic manures were accounted to be 9.3, 5.2, 8.4 and 5.6 $kg.plot^{-1}$ (4.5 m^2). For FYM, CRS, CTR and ChK, respectively. Enriched organic manure was prepared by physical mixing the mixture of $FeSO_4$ (20% Fe), $MnSO_4$ (26% Mo) and $ZnSO_4$ (33% Zn) at the ratio of 1:1:1. The mixture of micronutrients was mixed with the quantities of organic manure at the rate of 5 $kg.fed^{-1}$. Then, the enrichment organic manures were incubated for 15 days before an addition to the experimental plots. Chemical properties of organic manure used are presented in Table (2).

Table (2): Some chemical properties of organic manure sources.

Organic manure properties	FYM	CRS	CTR	ChK
$m^3.kg^{-1}$	577	326	520	350
15 $m^3.kg\ fed^{-1}$	8655	4890	7800	5250
15 m3. $Kg\ plot^{-1}$	9.3	5.2	8.4	5.6
1:20 $mix.g^{-1}$	465	260	420	280
pH 1:5	6.33	5.97	6.98	5.87
EC (1:10)(dSm^{-1})	3.96	3.66	4.24	4.52
Organic matter (%)	35.60	36.62	22.98	51.78
Organic carbon (%)	20.7	21.3	13.36	30.10
Total nitrogen (%)	1.35	1.51	0.73	2.84
C/N ratio	15.3	14.1	18.3	10.6
Total Phosphorus (%)	0.38	0.47	0.41	0.65
Total Potassium (%)	0.63	0.76	0.67	0.59
Available micronutrients. ($mg\ kg^{-1}$)				
Extractable Iron	94.2	89.9	72.4	82.1
Extractable Manganese	41.6	78.8	37.9	59.4
Extractable Zinc	4.42	2.97	8.87	15.39

FYM : farmyard manure CRS: compost rice straw
CTR: compost town refuse ChK: chicken manure

Each experimental plot was mixed with FYM, CRS, CTR and ChK in single and enrichment forms and irrigated up to saturation percentage. Then plots were left for two weeks to elucidate the damage on seedling and their roots resulted from the heat of decomposition and toxic effect of some formed compounds.

The experimental area was divided into plots 4.5 m^2 (3x1.5 m). Wheat grains cv Sakha 93 were obtained from the Agric. Res. Center and sown handly in rows 20 cm apart at the rate of 60 kg $grains.fed^{-1}$ on the 1st week of November 2014. The normal of cultural practices for growing wheat were applied as recommended.

At boating stage (80 days after sowing) six plants were randomly taken from each plot to determine fresh weight and chlorophyll content in plant foliage. Plant samples were oven dried at 70°C tell constant weight was reached, then dry weight was calculated. The dried plant samples were thoroughly ground and stored for chemical analysis of N, P and K. At harvesting stage (150 days after sowing), representative sample of wheat

plant were randomly taken from each plot, separated into grains and straw. Then the parameters of yield components (No. of grains per spike, spike length, weight of 1000 grains). Also, grain and straw yield were determined in $m^2.plot^{-1}$ and calculated as $kg.fed^{-1}$. In addition, grain and straw sample were wet digested to determine N, P, K, Zn, Fe and Mn.

Methods of Analysis:-

Soil particles analysis was determined by standerd international pipette method (Dewis and Feritas, 1970). Soil pH, EC, Available N, P and K were determined by the standered procedures (Jackson, 1967).

For determining DTPA-extractable Zn, Fe and Mn; the concentration of these elements were measured on an atomic absorption spectrometer (Lindsay and Norvell, 1978).

For plant analysis methodology; chlorophyll content was extracted using aceton 90% and determined cloromitrically in fresh leave samples at wave length 663, 648 and 470 nm according to Lichtenthaler, (1987). Total N, P and K in dry weight basis in plant organs and organic manure were estimated according to the methods of Pregle (1945), Jackson, (1967) and Black (1965), respectively. For estimating Zn, Fe and Mn; plant samples were estimated using the method of microwave digestion and analyzed by electro thermal atomic absorption spectrometer; perkin elmer Model 5100 as described by Kumpulainen *et al*., (1983).

Statistical analysis:

All data were statistically analyzed according to the technique of analysis variance (ANOVA) and the least significant difference (LSD) method was used to compare the differences between the means of treatment values according to the method described by Gomez and Gomez, (1984).

RESULTS

- **Fresh and dry weight as well as chlorophyll content in wheat plant at boating stage:-**

Data in Table (3) indicate the effect of mineral fertilization levels, organic manures and enriched organic manures as well as its combination on fresh, dry weight and chlorophyll concentration of wheat plant foliage at boating stage. It can be observed that; all the studied parameters were significantly increased by all treatments in comparison to the control treatment. Such data show that, an application of mineral fertilizers at all rates significantly increased all the aformention traits, specially the full dose (100%) which scored great values in comparison to the control treatment. Data of the same Table detected that; within the organic manure sources under study a superiority effect was realized for the plants treated with chicken manure following with CRS, FYM and lastly CTR for increasing the mean values of all these parameters as compared to the control treatments.

Table (3): Fresh and dry weight as well as chlorophyll concentration of wheat plant foliage at boating stage as affected by mineral fertilization levels, organic manures, enrichment of organic manures and their interactions.

Char. / Treat.	Fresh weight (g/plant)	Dry weight (g/plant)	Chlorophyll a (mg/g F.W)	Chlorophyll b (mg/g F.W)	Chlorophyll a+b (mg/g F.W)
Control	81.2	21.11	0.588	0.409	0.997
50% RD	86.5	22.42	0.630	0.436	1.066
75% RD	98.9	24.95	0.705	0.469	1.174
100% RD	109.7	27.48	0.791	0.554	1.345
FYM	83.5	21.69	0.608	0.420	1.028
FYM + 50%	94.1	23.91	0.677	0.451	1.128
FYM + 75%	102.7	25.92	0.736	0.502	1.238
FYMM	88.9	22.93	0.644	0.445	1.089
FYMM+ 50%	100.1	25.19	0.715	0.480	1.195
FYMM+ 75%	108.8	27.07	0.776	0.541	1.317
CRS	84.4	21.93	0.618	0.424	1.042
CRS+ 50%	95.2	24.15	0.683	0.454	1.137
CRS+ 75%	104.1	26.20	0.747	0.511	1.258
CRSM	90.3	23.16	0.650	0.432	1.082
CRSM +50%	101.0	25.43	0.722	0.485	1.207
CRSM +75%	109.1	27.26	0.785	0.550	1.335
CTR	82.3	21.45	0.597	0.415	1.012
CTR + 50%	92.2	23.66	0.669	0.447	1.116
CTR + 75%	97.6	24.69	0.698	0.461	1.159
CTRM	87.6	22.66	0.637	0.440	1.077
CTRM+50%	102.5	25.71	0.730	0.43.	1.223
CTRM+75%	105.8	26.59	0.761	0.425	1.286
Chk	85.6	22.17	0.624	0.431	1.055
Chk + 50%	96.7	24.41	0.691	0.458	1.147
Chk + 75%	104.9	26.40	0.753	0.516	1.269
ChkM	91.4	23.41	0.658	0.440	1.098
ChkM+50%	107.2	26.83	0.770	0.533	1.303
ChkM+75%	110.8	27.65	0.798	0.563	1.361
$LSD_{at\ 5\%}$	2.21	0.56	0.008	0.005	0.022

RD: Recommended dose
FYM: farmyard manure
CRS: compost rice straw
CTR: compost town refuse
Chk: chicken manure
FYMM: FYM + (Zn, Fe, Mn)
CRSM: CRS + (Zn, Fe, Mn)
CTRM: CTR + (Zn, Fe, Mn)
ChkM: Chk + (Zn, Fe, Mn)

Micronutrients enrichment technique in organic manure source showed a greatest increase on the mean values of these parameter comparing with those obtained from the single addition of organic manure sources or the same values of control treatment.

Moreover, mineral fertilization at 50 or 75% from the recommended doses of NPK in the presence of organic manure sources either in a single form or as enrichment manure significantly increased the mean values of the all previously mentioned traits than those obtained from the other treatments and recorded the highest values for the treatment of enrichment chicken manure (ChKM) + 75% RD NPK.

- **Yield and yield components:**

Yield and its components of wheat plant as effected by mineral fertilization levels, organic manures, enrichment organic manure and its interactions are presented in Table (4). Data show that the application of mineral fertilizer (NPK) at all rates significantly increased yield and its components particularly the treatment of 100% NPK solely which induced significant increases surpassed the control by 38.5% in number of grains per spike, 107.6% in spike length, 42.8% in weight of 1000 grain, 47.9% in grain weight Kg.fed^{-1} and 47.7% in straw weight Kg.fed^{-1}. Data in Table (4) appear highly significant effects of application of organic manures investigated on yield and its components of wheat plant. Likewise, the results appeared that, the highest values of yield and its components were connected with the treatment of chicken manure as compared to the other source of organic manures studied. The same data, also declare that there is a positive effect on the average values of yield and its component due to the enrichment organic manures with micronutrients (Zn, Fe & Mn).

The positive effect was reflected on the higher rates of yield and its component for the enriched manure than those obtained for the addition the organic sources in single form. The results of variance analysis showed that application of NPK fertilizers in combination with organic manure sources had positive effect on the mean values of yield and its components and such effect was more pronounced for the enrichment organic manure sources. In this respect, the highest mean values of yield and its components, were associated with the plants treated with enriched chicken manure and NPK at 75% RD.

Table (4): yield and its components of wheat plant as affected by mineral fertilization levels, organic manures, enrichment of organic manures and their interactions.

Char. / Treat.	No. of grains / spike	Spike length (cm)	Weight of 1000 seeds g (gm)	Grain yield (kg.fed^{-1})	Straw yield (kg.fed^{-1})
Control	46.5	9.2	71.3	1869.0	3547.3
50% RD	49.6	11.1	77.2	2028.6	3854.2
75% RD	56.8	15.6	88.1	2352.0	4460.6
100% RD	64.4	19.1	101.8	2763.6	5239.8
FYM	47.6	9.9	73.5	1932.0	3284.5
FYM + 50%	54.1	13.8	83.9	2209.2	3755.2
FYM + 75%	59.5	17.5	92.8	2490.6	4231.9
FYMM	51.2	12.2	79.6	2091.6	3347.6
FYMM+ 50%	57.3	16.1	89.3	2377.2	3998.5
FYMM+ 75%	63.1	18.8	99.1	2675.4	4275.4
CRS	48.3	10.4	74.7	1965.6	3146.3
CRS+ 50%	54.7	14.2	84.5	2242.8	3589.2
CRS+ 75%	60.3	17.8	93.9	2515.8	4027.5
CRSM	51.9	12.5	80.8	2129.4	3196.3
CRSM +50%	58.1	16.4	90.4	2415.0	3627.1
CRSM +75%	63.9	18.9	100.5	2725.8	4081.6
CTR	47.1	9.5	72.2	1902.6	3425.4
CTR + 50%	53.3	13.3	83.4	2192.4	3941.8
CTR + 75%	56.2	15.2	86.9	2314.2	4159.9
CTRM	50.7	11.6	78.5	2058.0	3501.6
CTRM+50%	58.9	16.9	91.7	2461.2	4180.7
CTRM+75%	61.7	18.3	96.5	2595.6	4405.3
Chk	49.1	10.7	76.1	2003.4	3009.7
Chk + 50%	55.6	14.8	85.8	2276.4	3418.8
Chk + 75%	61.1	18.1	95.2	2566.2	3852.5
ChkM	52.8	12.9	82.1	2158.8	3025.7
ChkM+50%	62.4	18.6	97.9	2633.4	3691.6
ChkM+75%	65.2	19.4	104.1	2809.8	3937.9
$LSD_{at\ 5\%}$	0.95	0.25	1.48	39.41	29.41

- **N, P and K concentrations:**

The different comparisons between the mean values of N, P and K% in flag leaf at boating stage and grains of wheat as influenced by mineral fertilization, organic manures and their interactions are presented in Table (5). It could be observed that, the mean values of

such traits were significantly increased as the level of N, P and K was increased and realized the highest mean values for the treatment of 100% NPK. Such effect was the same for the flag leaves and grains of wheat plant. Regarding the effect of organic manure sources, data of the same Table appear a stimulation effect on the average values of N, P and K% in flag leaves and grains of wheat was happened due to the addition of any sources of organic manures investigated as compared to the control treatment. In this respect, the highest mean values of such traits was realized for the treatment of chicken manure following in descending order by CRS, FYM and lastly CRT. This trend was true for flag leaves and grains of wheat plant. In addition, using enrichment organic manure technique was more effecting for increasing the mean values of N, P and K% in flag leaves and grains of wheat plant than those obtained due to the addition of the same organic manures in single form. Moreover, adding of NPK fertilizers at the rates of 50 or 75% RD in combination with organic manure sources either in single or enrichment form significantly increased the average values of the aforementioned trait. The highest mean values of N, P and K% in flag leaf and grains of wheat plant was associated with the treatment of enrichment chicken manure +75% NPK.

Table (5): N, P and K% in flag leaves and grains of wheat plant as affected by mineral fertilization levels, organic manures, enrichment of organic manures and their interactions.

Char.	Flag leaves			Grains		
Treat.	**N %**	**P %**	**K %**	**N %**	**P %**	**K %**
Control	2.87	0.284	3.09	2.38	0.319	1.73
50% RD	3.05	0.315	3.34	2.62	0.348	1.91
75% RD	3.51	0.368	3.81	3.10	0.410	2.33
100% RD	4.06	0.439	4.35	3.78	0.481	2.79
FYM	2.92	0.295	3.17	2.47	0.329	1.78
FYM + 50%	3.29	0.346	3.60	2.92	0.385	2.19
FYM + 75%	3.67	0.389	3.98	3.30	0.430	2.53
FYMM	3.12	0.325	3.44	2.71	0.363	2.01
FYMM+ 50%	3.54	0.371	3.85	3.13	0.414	2.40
FYMM+ 75%	3.95	0.423	4.26	3.64	0.465	2.72
CRS	2.96	0.302	3.22	2.51	0.336	1.82
CRS+ 50%	3.35	0.351	3.63	2.95	0.390	2.23
CRS+ 75%	3.72	0.395	4.01	3.36	0.439	2.57
CRSM	3.17	0.331	3.46	2.77	0.369	2.05
CRSM +50%	3.58	0.376	3.90	3.18	0.421	2.44
CRSM +75%	4.01	0.430	4.28	3.69	0.472	2.76
CTR	2.89	0.288	3.12	2.42	0.324	1.75
CTR + 50%	3.26	0.339	3.55	2.85	0.381	2.13
CTR + 75%	3.45	0.360	3.74	3.06	0.402	2.30
CTRM	3.09	0.319	3.37	2.68	0.355	1.97
CTRM+50%	3.63	0.382	3.92	3.25	0.426	2.51
CTRM+75%	3.82	0.409	4.13	3.47	0.451	2.66
Chk	3.01	0.308	3.28	2.56	0.342	1.87
Chk + 50%	3.41	0.356	3.70	2.99	0.397	2.25
Chk + 75%	3.77	0.402	4.07	3.41	0.445	2.60
ChkM	3.23	0.335	3.49	2.80	0.374	2.11
ChkM+50%	3.87	0.416	4.19	3.52	0.459	2.70
ChkM+75%	4.09	0.458	4.38	3.86	0.488	2.82
$LSD_{at\ 5\%}$	0.08	0.005	0.07	0.07	0.005	0.11

- **Micronutrients contents in grains:**

Iron, zinc and manganese $mg.kg^{-1}$ in the grains of wheat plant as effected by NPK fertilization, organic manures and their interactions are shown in Table (6). Mineral fertilization of wheat plant significantly increased the average values of Fe, Zn and Mn $mg.kg^{-1}$ in grains compared with the control treatment, the maximum value achieved at 75% RD. Within the sources of organic manure used in single form, the highest values of Fe, Zn & Mn $mg.kg^{-1}$ in wheat grains were realized for the plants treated with ChK, while the lowest level was detected for the treatments of CRS. Enrichment the sources of organic manure used with micronutrient sharply and significantly increased the mean values of these micronutrients as compared to those obtained from the single forms of organic manure. Such effect was more pronounced due to the addition of NPK fertilizer at the rates of 50 or 75% RD in combination with any form of organic sources either in the presence or absence of enrichment technique. In this connect; the heights mean values of Fe, Zn and Mn $mg.kg^{-1}$ were realized for the plants treated with enrichment chicken manure combined with 75% RD from NPK fertilizers.

Table (6): Micronutrients in the grains of wheat as affected by mineral fertilization levels, organic manures, enrichment of organic manures and their interactions.

Char. / Treat.	Fe mg.kg^{-1}	Zn mg.kg^{-1}	Mn mg.kg^{-1}
Control	57.6	21.9	28.3
50% RD	58.1	22.3	28.8
75% RD	58.9	23.2	29.6
100% RD	58.5	22.7	29.1
FYM	61.2	24.6	31.2
FYM + 50%	61.8	24.9	31.6
FYM + 75%	62.7	25.4	32.1
FYMM	73.1	31.6	38.8
FYMM+ 50%	74.8	32.8	39.6
FYMM+ 75%	76.5	33.9	40.5
CRS	59.4	23.6	29.9
CRS+ 50%	59.9	3.9	30.4
CRS+ 75%	60.6	24.3	30.7
CRSM	67.2	28.4	35.6
CRSM +50%	68.9	29.1	36.4
CRSM +75%	70.3	29.7	37.3
CTR	63.1	25.6	32.4
CTR + 50%	63.7	25.9	32.9
CTR + 75%	64.2	26.3	33.2
CTRM	78.4	35.8	41.7
CTRM+50%	80.1	36.5	42.8
CTRM+75%	81.6	37.3	43.5
Chk	64.5	26.5	33.7
Chk + 50%	65.1	26.8	34.2
Chk + 75%	65.7	27.2	34.5
ChkM	84.4	38.9	46.1
ChkM+50%	85.8	39.6	47.6
ChkM+75%	86.4	40.3	48.8
LSD $_{at\ 5\%}$	0.65	0.30	0.33

DISCUSSION

Results of the previously mentioned traits indicate that, application of organic manures under investigation in single form gave less vigor plant growth parameters, yield and its components of wheat plant as compared to the application of N, P and K fertilizers at 100%, from the recommended doses. These results could be explained on the basis of in-organic fertilizers are soluble form of soil nutrients, which can be transported much more mobilized and readily than organic manure. Organic manure like FYM, CTR, CRS and ChK release its nutrients very slowly to the plant. Therefore, are unable for supply excess required amount of nutrient in the critical period of plant growth. This may be probable reason for the higher yield produce by the inorganic fertilizer applied for wheat plant. These results are in agreement with those obtained by Das *et al*., (2001), Zahran *et al.*, (2002), Salantur *et al*., (2006), Agamy *et al.*, (2012) and Ahmad, (2013).

Obtained result of this investigation indicated that; soil addition of organic manures in single form significantly increased the average values of growth parameters, yield and its components as well as chemical composition of wheat plant comparing with the control treatment. Such effect may be attributed to the role played by organic manure for improving soil properties by providing a favorable soil structure, enhancing soil cation exchange capacity, increasing the quantity and availability of plant nutrients and providing the substrate of microbial activities. These results are in accordance with the findings of Böhme and Böhme, (2006), Daei *et al.*, (2009), Abbas Zadeh *et al.*, (2010) and Shalaby *et al*., (2010).

Results, also showed that within the organic manure sources the best results were attained for wheat plant treated with chicken manure than the other organic manure sources. The superiority effect of chicken manure may be due to the best quality of this substance, specially C/N ratio and nitrogen content as shown in Table (2). The results also, have proved that enrichment of organic manures either in the presence or absence of mineral fertilization (NPK) at the rates of 50 or 75% RD significantly increased the mean values of all the aforementioned traits, which tended to be around that obtained from the treatment of 100% NPK RD.

Although micronutrient elements are needed in relativity very small quantities for adequate plant growth and production; their deficiencies cause a great disturbance in the physiological and metabolic processes in the plant. A balanced fertilization program with macro and micronutrients in plant nutrition is very important in the production of high yield with high quality products. These results are in harmony with those obtained by Sawan *et al*., (2001), Hussain *et al.*, (2006) and Abd El-Wahab, (2008) who reported that micronutrients especially Fe, Zn and Mn which act as metal components of various enzymes and are also associated with photosynthesis, protein in plant metabolism. So, they have important roles in growth and yield of plant.

CONCLUSION

Under the same condition of this investigation it can be recommended that; using of enrichment of organic manure sources with the mixture of micronutrients, especially chicken manure in the presence of 75% from the recommended doses of N, P and K fertilizer is considered as the most suitable treatment for producing the highest safe yield of wheat plant.

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تاثير مستويات التسميد المعدني، ومصادر الاسمده العضويه والتفاعل بينهما على المحصول و التركيب الكيماوي للقمح

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***قسم الأراضى - كليه الزراعه – جامعه المنصوره- مصر.**

****قسم بحوث تغذيه النبات - معهد بحوث الاراضى والمياه والبيئه- مركز البحوث الزراعيه – الجيزه – مصر.**

نفذت تجربه حقليه فى مزرعه كليه الزراعه جامعه المنصوره خلال الموسم الشتوى 2014-2015 لدراسه تاثير مستويات التسميد المعدنى (0، 50، 75، 100% من الموصي به من اسمده النيتروجين والفوسفور والبوتاسيوم) وكذلك مصادر التسميد العضوى (سماد المزرعه، كمبوست قش الارز، كمبوست قمامه المدن، سماد الدواجن) اضافه الى الصوره المخصبه لهذه الاسمده على المحصول والتركيب الكيماوي لنبات القمح.

وقد اظهرت النتائج ان متوسطات القيم (الوزن الطازج والجاف، محتوي الكلوروفيل، المحصول ومكوناته منها وزن 100 حبه و عدد الحبوب و طول السنبله بالاضافه الى المحتوي الكيماوي) قد زادت بزياده مستويات التسميد المعدني وتحققت اعلا القيم للمحصول والتركيب الكيماوي عند اضافه المعامله 100% من النيتروجين و الفوسفور و البوتاسيوم.

بالنسبه لمصادر التسميد العضوي المستخدمه اظهرت النتائج تفوق صورة سماد الدواجن عن جميع الصور الاخرى من التسميد العضوى فى تحقيق اعلا النتائج واظهرت جميع الاضافات زياده معنويه فى القيم موضوع الدراسه مقارنه بمعامله الكنترول.

خلط الاسمده العضويه بالعناصر اظهر تاثيرا ايجابيا بالنسبه لجميع المعاملات موضوع الدراسه وظهرت زياده ملحوظه فى قيم جميع الصفات عند التفاعل بين السماد العضوى المخصب ومستويات التسميد المعدني 75% من الموصى به من النيتروجين والفوسفور والبوتاسيوم.