4-RESULTS AND DISCUSSION

There are many purposes should be achieved in this study. They are the effect of different organic sources and their rates either with mineral fertilizer at a percent of recommended doze or without on soil chemical, soil nutrients and nutrients concentration of plant wheat. The study includes three factors. They are organic sources, their rates and mineral fertilizer rates. The analyses of variance reveal the effect of individual, di-interaction and tri-interaction effects. The previous discussion will deal with individual and di-interaction effect. While it is in van to discuss tri-interaction in all measured parameters because they are non-significant effects

4.1.Effect of treatments on some soil properties:

Data of soil pH, EC and OM content are shown in Table (2) and depict in Figs.(1-3). Enrich poudrette (EPD) resulted relatively lower pH values than other organic sources in the three experiments. It resulted higher OM content than others in the two field experiments. Similar results were reported by Havlin et al (1990) and Sikora and yakovchenko (1996). Enrich town refuse (ETR) resulted higher EC values in both field experiments while enrich poudrette resulted in the pot one. The highest rate of organic sources or mineral fertilizer was the lower pH values but the highest OM content. Similar results were obtained by Gregorich et al (1997). While the highest EC values were recorded at zero rate of both organic sources and mineral fertilizer.

Table (2a): Effect of used organic sources and their rates on soil pH, EC and organic matter content of the three experiments.

Organic Sources	Rate Ton/ Fed	Pot exp.			Field exp.I			Field exp.II		
		pH	EC dS/m	OM %	pH	EC dS/m	OM %	pH	EC dS/m	OM %
EFW	0	7.76	3.30	0.05	7.88	3.48	0.39	7.85	1.89	0.65
	5	7.57	3.04	0.16	7.70	3.15	0.46	7.61	1.79	0.91
	10	7.53	2.56	0.34	7.62	2.98	0.62	7.47	1.67	0.95
	20	7.50	2.23	0.53	7.66	2.87	0.85	7.34	1.62	1.04
	Mean	7.59	2.78	0.27	7.72	3.12	0.58	7.57	1.74	0.89
EPD	0	7.76	3.30	0.05	7.88	3.48	0.39	7.85	1.89	0.65
	5	7.55	3.32	0.36	7.61	2.93	0.63	7.42	1.65	0.94
	10	7.48	2.38	0.44	7.53	2.75	0.86	7.36	1.46	1.06
	20	7.23	2.35	0.93	7.23	2.39	0.96	7.13	1.46	1.24
	Mean	7.51	2.84	0.45	7.56	2.89	0.71	7.44	1.62	0.97
ETR	0	7.76	3.30	0.05	7.88	3.48	0.39	7.85	1.89	0.65
	5	7.72	3.15	0.48	7.76	3.29	0.51	7.67	1.84	0.78
	10	7.70	2.44	0.94	7.64	3.10	0.58	7.53	1.72	0.95
	20	7.61	2.26	1.00	7.69	2.93	0.71	7.50	1.70	1.00
	Mean	7.70	2.79	0.62	7.74	3.20	0.55	7.64	1.79	0.85
LSD at 5%										
OS			ns	0.02		0.06	0.02		0.02	0.01
OS x Rate			ns	0.04		0.13	0.04		0.10	0.04

OS = organic source
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

4-RESULTS AND DISCUSSION

There are many purposes should be achieved in this study. They are the effect of different organic sources and their rates either with mineral fertilizer at a percent of recommended doze or without on soil chemical, soil nutrients and nutrients concentration of plant wheat. The study includes three factors. They are organic sources, their rates and mineral fertilizer rates. The analyses of variance reveal the effect of individual, di-interaction and tri-interaction effects. The previous discussion will deal with individual and di-interaction effect. While it is in van to discuss tri-interaction in all measured parameters because they are non-significant effects

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	10	7.70	2.44	0.94	7.64	3.10	0.58	7.53	1.72	0.95
	20	7.61	2.26	1.00	7.69	2.93	0.71	7.50	1.70	1.00
	Mean	7.70	2.79	0.62	7.74	3.20	0.55	7.64	1.79	0.85
LSD at 5%										
OS			ns	0.02		0.06	0.02		0.02	0.01
OS x Rate			ns	0.04		0.13	0.04		0.10	0.04

OS = organic source
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

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	Mean	7.70	2.79	0.62	7.74	3.20	0.55	7.64	1.79	0.85
LSD at 5%										
OS			ns	0.02		0.06	0.02		0.02	0.01
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	10	7.53	2.56	0.34	7.62	2.98	0.62	7.47	1.67	0.95
	20	7.50	2.23	0.53	7.66	2.87	0.85	7.34	1.62	1.04
	Mean	7.59	2.78	0.27	7.72	3.12	0.58	7.57	1.74	0.89
EPD	0	7.76	3.30	0.05	7.88	3.48	0.39	7.85	1.89	0.65
	5	7.55	3.32	0.36	7.61	2.93	0.63	7.42	1.65	0.94
	10	7.48	2.38	0.44	7.53	2.75	0.86	7.36	1.46	1.06
	20	7.23	2.35	0.93	7.23	2.39	0.96	7.13	1.46	1.24
	Mean	7.51	2.84	0.45	7.56	2.89	0.71	7.44	1.62	0.97
ETR	0	7.76	3.30	0.05	7.88	3.48	0.39	7.85	1.89	0.65
	5	7.72	3.15	0.48	7.76	3.29	0.51	7.67	1.84	0.78
	10	7.70	2.44	0.94	7.64	3.10	0.58	7.53	1.72	0.95
	20	7.61	2.26	1.00	7.69	2.93	0.71	7.50	1.70	1.00
	Mean	7.70	2.79	0.62	7.74	3.20	0.55	7.64	1.79	0.85
LSD at 5%										
OS			ns	0.02		0.06	0.02		0.02	0.01
OS x Rate			ns	0.04		0.13	0.04		0.10	0.04

OS = organic source

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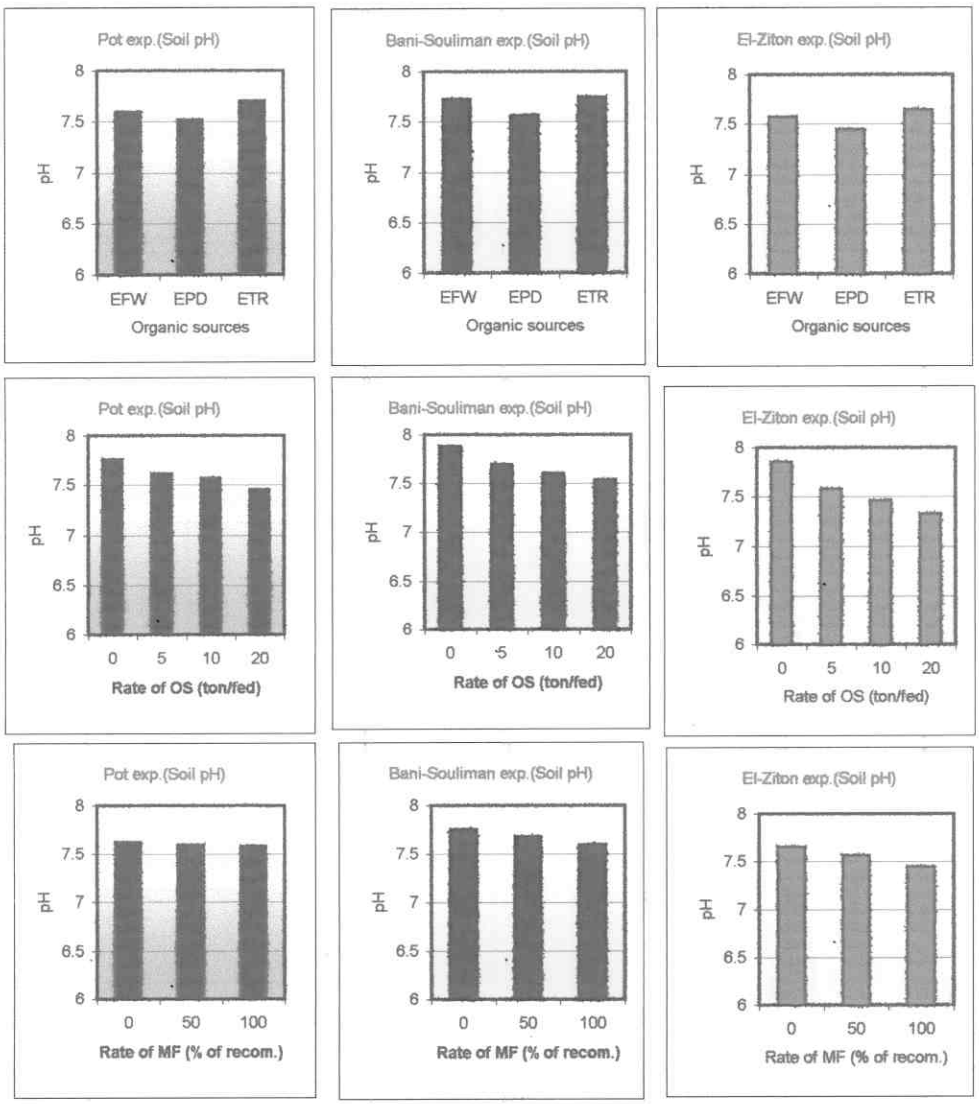

Fig.(1): Effect of organic sources, rate of organic sources and fertilizer rate on soil pH, after harvest.

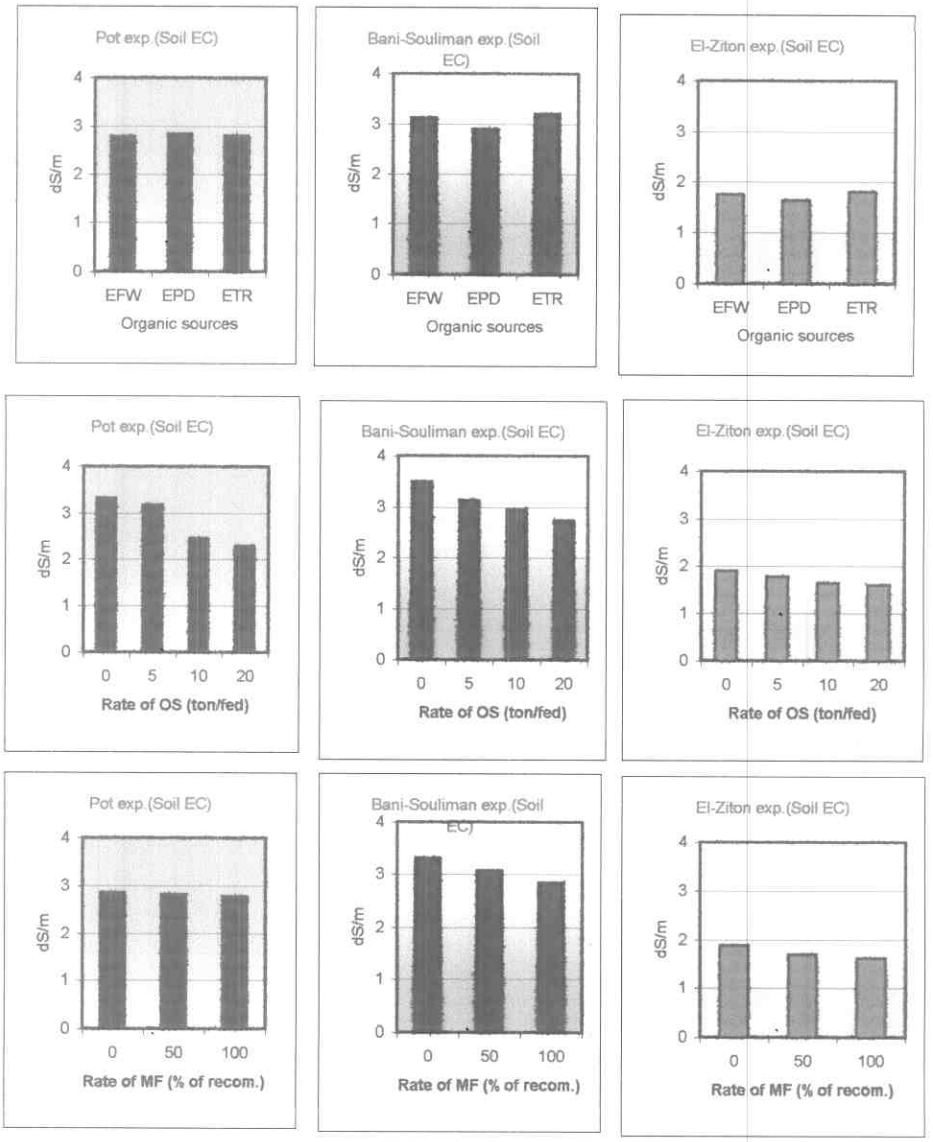

Fig.(2): Effect of organic sources, rate of organic sources and fertilizer rate on soil EC (dS/m), after harvest.

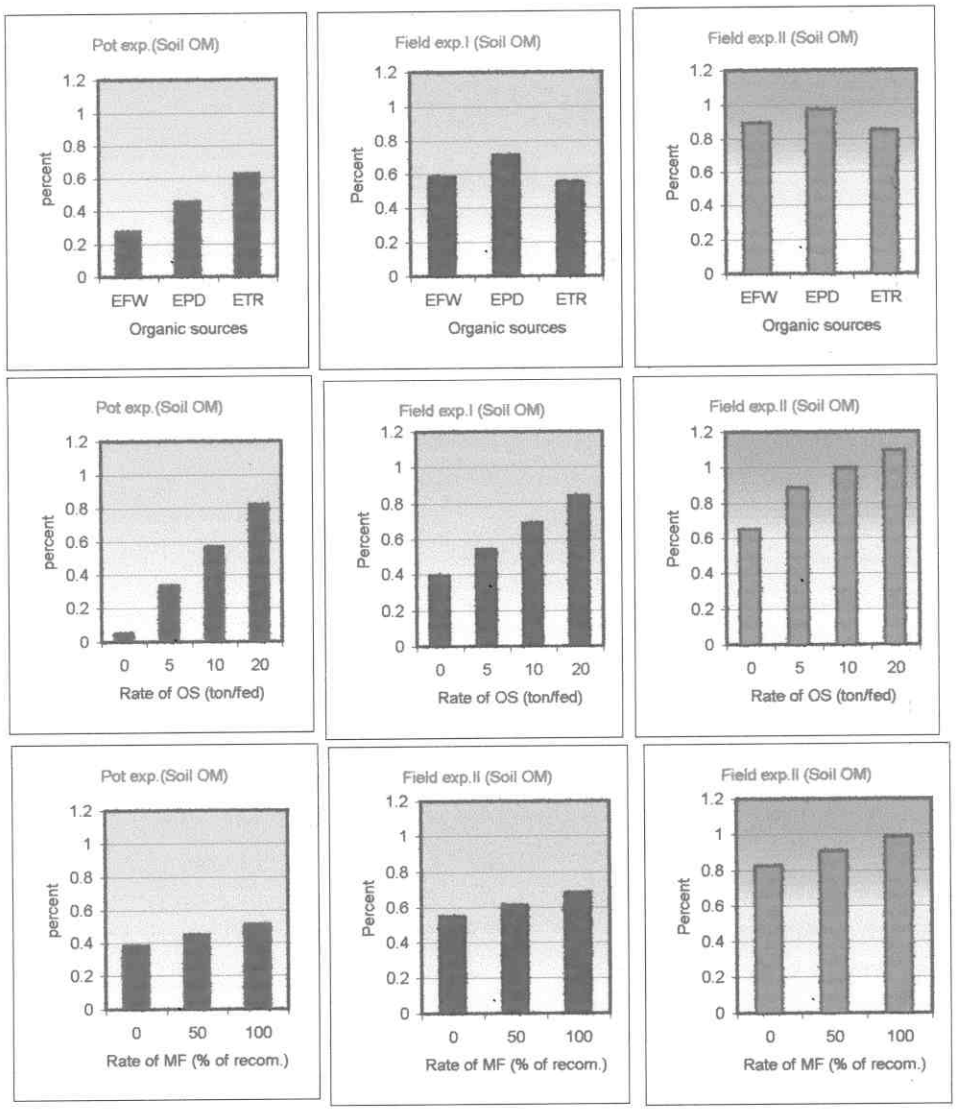

Fig.(3): Effect of organic sources, rate of organic sources and fertilizer rate on soil organic matter content (OM)(%), after harvest.

increased EC values and OM content in the three experiments. Relatively increasing has been happened for pH when using this di-interaction in all experiments.

4.2.Effect of treatments on soil nutrients:

Data of total nitrogen ($\mu g.g^{-1}$) and available nutrients (P, K, Fe, Zn and Mn ($\mu g.g^{-1}$)) of soils cultivated with wheat plants in pot exp. (sandy clay loam), field exp.I (sandy loam) and field exp.II (clay loam) under the individual and di-interaction effects of different organic sources (enrich farm waste (EFW), enrich poudrette (EPD) and enrich town refuse (ETR)), their rates (0, 5, 10, 15 ton/fed) and mineral fertilizer rates (0, 50 and 100%) at 70 and 150 days after cultivation are shown in Tables (3-5) and depicted in figs (4 - 9).

4.2.1.Total nitrogen:

Data of organic sources (Tables 3-5) showed significant effect on total nitrogen at 70 and 150 days after cultivation with enrich poudertte priority in the three experiments. The values of soil total nitrogen successively increased with increasing either the organic source rate or mineral fertilizer rate, where the highest rate was the highest value of total nitrogen. Similar results were obtained by Ahmed et al (1992), Hassan (1999) and Taha (2000). Data in table (6) revealed the relative increments of total nitrogen compared with initial. They showed that the highest individual effects of organic sources, their rates and mineral fertilizer rates on total soil nitrogen were most pronounced in field exp.II at 70 days, while the lowest effects were in pot exp. at 150 days. Fig. (4) depicted that the values of total nitrogen are higher at 70 days than 150 days.

Organic sources with their rates significantly increased soil total nitrogen at 70 days after planting in field exp.II and at 150 days in the three experiments, while they were non significant effect at 70 days in both pot exp. and field exp.I. Enrich poudrette at 20 ton/fed was the best effect on soil total nitrogen. Similar results were obtained by Hadas and Portony (1994).

Table (6): The relative increments in soil total nitrogen values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	34	6	51	13	64	29
EPD	43	27	57	37	69	52
ETR	36	18	45	4	63	51
Mineral fertilizer rate (MF)						
0%	22	5	42	9	62	38
50%	39	16	52	22	66	47
100%	46	29	57	28	68	50
Organic source rates						
0 ton/fed	17	0	11	0	30	0
5 ton/fed	30	14	48	13	67	47
10 ton/fed	42	30	59	30	70	53
20 ton/fed	50	37	63	41	73	57

Relative increments = ((value – initial) ÷ value) × 100

Di-interaction effects of organic sources with mineral fertilizer rates were insignificant on soil total nitrogen at 70 and 150 days in the three experiments. Di-interaction of organic sources rate with mineral fertilizer rate significantly increased total soil nitrogen in the pot exp. at 70 and field exp.II at 70 and 150 days.

4.2.2. Available phosphorus:

Organic sources, in generally, increased available phosphorus at 70 and 150 days in the three experiments. Enrich poudertte as an organic source resulted the highest amount of available phosphorus. The values of available phosphorus values successively were increased with increasing either the organic source rate or mineral fertilizer rate, where the highest rate of either resulted in the highest value, (Table 3-5 and fig. 5). Similar results were obtained by Sadik et al (1987), Fresquez et al (1991), Folley et al (1995) and Tsadilas et al (1995) and Fine

and Mingelgrin (1996), who found that addition of sewage sludge increased available phosphorus .

Data in Table (7) revealed that the relative increments of available phosphorus compared with initial were higher in pot exp. at 70 than at 150 days for individual effect of organic sources, their rates and mineral fertilizer rates, as well as higher than other experimen

Generally, the combined effect of organic sources with their rates significantly increased available phosphorus at 70 and 150 days in the three experiments. Enrich poudrette at the rate of 20 ton/fed resulted the highest available phosphorus. Organic sources with mineral fertilizer rates resulted non-significant effect on available phosphorus in the three experiments except at 70 days in the pot exp. and at 150 days in the field exp.I, where the increase in available phosphorus were significant. Both rates of organic sources and mineral fertilizers significantly

Table (7): The relative increments of soil available phosphorus values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	48	23	35	23	34	23
EPD	53	25	38	29	41	31
ETR	46	18	32	25	35	32
Mineral fertilizer rate (MF)						
0%	44	13	29	17	29	19
50%	49	22	35	25	38	31
100%	54	29	40	32	42	34
Organic source rates						
0 ton/fed	43	3	1	0	12	0
5 ton/fed	43	20	34	25	34	32
10 ton/fed	54	28	43	35	42	38
20 ton/fed	57	31	49	42	48	42

increased available phosphorus at 70 and 150 days in the three experiments, except at 150 days in the pot exp. and the field exp.II, where the relation were insignificant. The highest rate of both organic sources and mineral fertilizers resulted the highest available phosphorus. Similar results were obtained by Abdel-Salam et al (1996).

4.2.3. Available potassium:

Data presented in Tables (3-5) revealed that available potassium significantly increased with different organic sources, increasing their rates and mineral fertilizer rates at 70 and 150 days after cultivation in the three experiments. Enrich poudrette was the highest organic sources in its effect on the soil available potassium, where the used organic sources could be arranged according to their effect on potassium availability in the following ascending order; enrich farm waste < enrich town refuse < enrich poudrette. Also, the highest rate of either organic sources or mineral fertilizers resulted the highest available potassium. The available potassium depicted in fig. (6) supports this trend. Similar results were obtained by Borhamy (1998) and Malhi et al. (1992).

The relative increments of available potassium values at 70 and 150 days in the three experiments in relation to their initial content were presented in Table (8). The values at 70 days were similar to those at 150 for the three factors; organic sources, their rates and mineral fertilizer rates in both field experiments, while the values at 70 days were more than those at 150 for the three factors in the pot exp..

The combined effect of organic sources with mineral fertilizer rates significantly increased available iron at 70 and 150 days in pot exp. whereas it was insignificant in both field experiments. The values of available iron at 70 and 150 days in the pot exp. and at 150 days in the field exp.I significantly increased with combined effect of both rates of organic source and mineral fertilizer. The highest rate of organic sources with the highest

rate of mineral fertilizer achieved the highest available iron. Similar results were obtained by Amer (1999) .

Table (8): The relative increments of soil available potassium values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	18	1	14	15	17	18
EPD	20	7	17	20	24	26
ETR	17	5	15	18	20	19
Mineral fertilizer rate (MF)						
0%	13	0	11	13	15	17
50%	19	5	15	18	20	22
100%	22	11	19	22	25	27
Organic source rates						
0 ton/fed	8	0	0	0	2	0
5 ton/fed	17	2	16	21	17	22
10 ton/fed	22	11	19	24	24	28
20 ton/fed	24	18	24	28	32	37

The values of available potassium significantly increased with increasing the applied rates of any organic sources at the two sampling dates (70 and 150 days) in the three experiments. A rate of 20 ton/fed enrich poudrette resulted the highest value of available potassium. The combined effect of organic sources with mineral fertilizer rate on available potassium was non significant in the two sampling dates in the pot and the two field experiments. The highest rate of organic sources (20 ton/fed) with the highest rate of mineral fertilizer (100%) significantly achieved the highest values of available potassium at 70 and 150 days in the pot exp. and at 70 days in field exp.I.

4.2.4. Available iron:

Generally, data presented in Tables (3-5) and depicted in fig. (7) revealed that the organic sources significantly affect the soil available iron at 70 and 150 days after planting in the three experiments. Enrich poudrette was the pest organic source affecting the available iron. The values of available potassium significantly increased with either organic source rates or mineral fertilizer rates, where the highest rate of either resulted the highest available iron. These results are in good agreement with those obtained by El-Ghazoli (1998), Borhamy (1998) and Amer (1999).

The relative increments of available iron (Table 9) at 150 days after planting in the pot exp. as well as at 70 and 150 days in both field experiments were similar and higher than those of the pot exp. at 70 days, for the three factors; organic sources, their rates and mineral fertilizer rates. It is noticed that the relative increment of available iron at 150 days is more than that at 70 days in the three experiments.

The combined effect between organic sources with their rates on available iron was significant at 70 and 150 days in the three experiments. In the pot exp., enrich town refuse with 20 ton/fed were significantly superior to the other rates at 70 and 150 days. The highest values of available iron were achieved with enrich poudrette at 20 ton/fed in both field experiments. Similar results were obtained by Fahmy (1995), El-Ghazoli (1998), and Taha (2000).

The combined effect of organic sources with mineral fertilizer rates significantly increased available iron at 70 and 150 days in pot exp. whereas it was insignificant in both field experiments. The values of available iron at 70 and 150 days in the pot exp. and at 150 days in the field exp.I significantly increased with combined effect of both rates of organic source and mineral fertilizer. The highest rate of organic sources with the highest rate of mineral fertilizer achieved the highest available iron. Similar results were obtained by Amer (1999) .

Table (9): The relative increments of soil available iron values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	16	46	55	59	61	63
EPD	36	54	65	68	66	67
ETR	40	54	59	63	62	64
Mineral fertilizer rate (MF)						
0%	20	45	53	58	57	60
50%	31	50	69	64	63	64
100%	43	58	66	68	67	68
Organic source rates						
0 ton/fed	7	37	33	30	33	17
5 ton/fed	29	47	59	63	59	64
10 ton/fed	42	56	64	67	69	71
20 ton/fed	45	60	70	74	72	80

4.2.5. Available zinc:

The values of available zinc in the soil at 70 and 150 days in the three experiments are presented in the Tables (3-5) and depicted in fig. (8). These values were significantly affected by organic sources. The ascending order is enrich town refuse > enrich farm waste > enrich poudrette. The successive increasing rates of organic source or mineral fertilizer rates significantly increased available zinc in two sample dates (at 70 and 150 days) at the three experiments, where the highest rate of each gave the highest available zinc. These findings agree with those of Askar (1988), Kaqur and Kanwar (1989), Awad (1991), Cavalaro et al (1993), and Goto and Chino (1996),

The relative increments of available zinc values at 70 and 150 days in the field exp.I were similar and higher than those of the pot exp. and the field exp.II, for the three factors; organic sources, their rates and mineral fertilizer rates, (table 10). It is

noticed that the relative increments of available iron at 70 days were more similar to those at 70 days in the three experiments.

The combined effects between organic sources with their rates significantly affected on the available zinc at 70 and 150 days in the pot exp. As for field exp.I and field exp.II, the effect was significant at 150 days in the field exp.I and at 70 days in the field exp.II. The high significant value of available zinc upon using enrich poudrette resulted at a rate of 20 ton/fed at 70 and 150 days.

Table (10): The relative increments of soil available zinc values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	45	30	64	67	43	49
EPD	54	44	68	70	46	49
ETR	37	22	66	70	43	46
Mineral fertilizer rate (MF)						
0%	31	10	59	63	36	39
50%	48	35	67	70	39	46
100%	54	46	71	73	51	53
Organic source rates						
0 ton/fed	0	0	33	14	21	0
5 ton/fed	42	27	65	68	39	49
10 ton/fed	55	45	71	76	46	55
20 ton/fed	61	53	75	78	53	59

The interaction between the organic sources either with their rates or with mineral fertilizer rates revealed no significant effects on the available zinc in both sampling dates in the three experiments.

4.2.6. Available manganese:

Data in Table (3-5) revealed that organic sources significantly affected the available manganese values in the soil at 70 and 150 days in the three experiments, where enrich poudrette represented the superior one. The successive increasing rates of organic sources or mineral fertilizer rates significantly increased available manganese in the two sampling dates at the three experiments, where the organic sources at a rate of 20 ton/fed or mineral fertilizer at a rate of 100% gave the highest available zinc, (fig. 9). These findings are harmonizing with those of Mohamed (1990), Fahmy (1995) Borhamy (1998), and Amer (1999).

Table (11): The relative increments of soil available manganese values at 70 and 150 days compared with their initial content (%).

Treatments	Pot exp.		Field exp.I		Field exp.II	
	70	150	70	150	70	150
Organic sources (OS)						
EFW	39	28	21	27	24	29
EPD	44	37	37	42	31	39
ETR	37	25	32	39	29	35
Mineral fertilizer rate (MF)						
0%	27	18	21	30	19	24
50%	40	28	30	37	27	33
100%	49	42	37	44	37	44
Organic source rates						
0 ton/fed	20	8	5	0	8	0
5 ton/fed	33	24	27	35	24	31
10 ton/fed	47	36	35	44	31	42
20 ton/fed	52	44	44	51	44	51

The relative increments of available manganese at 70 and 150 days in the pot exp. and in both field exp.I and II are shown in table (11). They were more or less similar for the three factors; organic sources, their rates and mineral fertilizer rates.

The combined effects between organic sources with their rates significantly affected on the available manganese at the two sampling dates in the three experiments. The highest significant value of available manganese upon using enrich poudrette resulted at a rate of 20 ton/fed at 70 and 150 days. The interaction between organic sources either with their rates or with mineral fertilizer rates revealed no significant effects on the available manganese in both sampling dates in the three experiments. However, there was an exception for combined effects of organic sources with mineral fertilizer rates at 150 days in the field exp.II, which affected significantly available manganese content. Also, organic sources with mineral fertilizer rates in the field exp.I at 150 days and the field exp.II at 70 days achieved significant effects. Similar results were obtained by Fahmy (1995) and Amer (1999) .

4.3.Effect of treatments on plant dry weight and nutrients at 70 days:

The values of dry weight, also, concentration and uptake of N, P, K, Fe, Zn and Mn of wheat plants grown in pot exp. (sandy clay loam) and field exp.I (sandy loam) and field exp.II (clay loam) under the individual and di-interaction effects of different organic sources (enrich farm waste, enrich poudrette and enrich town refuse), their rates (0, 5, 10, 15 ton/fed) and mineral fertilizer rates (0, 50 and 100%) at 70 days after cultivation are shown in tables (12-14) and depict in figs(10-22).

Table (3a): Effect of used organic sources and their rates on soil total N and soil available nutrients (pot exp.).

Organic Sources	Rate Ton/ Fed	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	126	3.36	233.1	1.69	0.72	2.01	70	2.14	177.8	2.84	0.58	1.73
	5	145	3.52	257.3	2.20	1.30	2.34	113	2.61	210.5	2.82	1.03	1.96
	10	167	4.38	270.4	2.24	1.76	3.04	132	2.84	228.5	3.68	1.40	2.47
	20	194	4.80	277.3	2.48	2.02	3.02	132	3.07	250.0	3.89	1.60	2.69
	Mean	158	4.01	259.5	2.15	1.45	2.61	112	2.67	216.7	3.31	1.15	2.21
EPD	0	126	3.36	233.1	1.69	0.72	2.01	70	2.14	177.8	2.84	0.58	1.73
	5	172	4.04	266.8	2.57	1.73	2.41	144	2.77	225.9	3.84	1.36	2.30
	10	206	4.93	279.1	3.42	2.07	3.18	167	3.03	248.0	4.31	1.73	2.81
	20	237	5.31	295.8	3.53	2.40	3.92	191	3.13	272.9	4.74	2.04	3.36
	Mean	185	4.41	268.7	2.80	1.73	2.88	143	2.77	231.1	3.94	1.43	2.55
ETR	0	126	3.36	233.1	1.69	0.72	2.01	70	2.14	177.8	2.84	0.58	1.73
	5	132	3.37	248.3	2.84	1.09	2.37	109	2.37	216.9	3.56	0.87	2.04
	10	171	4.23	268.9	3.69	1.51	2.79	152	2.73	242.5	4.24	1.26	2.17
	20	202	4.43	275.4	3.87	1.73	3.03	179	2.82	264.1	5.00	1.42	2.53
	Mean	158	3.85	256.4	3.02	1.26	2.55	127	2.52	225.3	3.91	1.03	2.12
LSD at 5%													
OS		9.7	0.13	4.9	0.13	0.09	0.14	8.9	0.09	4.6	0.13	0.09	0.14
OS x Rate		Ns	0.26	9.7	0.25	0.18	0.28	17.8	ns	9.2	0.28	0.18	0.28

OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (3b): Effect of used organic sources and mineral fertilizers on soil total N and soil available nutrients (pot exp.).

Organic Sources	M.F % of R	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	128	3.70	247.0	1.82	1.16	2.18	96	2.42	196.5	2.88	0.84	1.84
	50	160	4.01	259.5	2.20	1.51	2.65	111	2.66	218.1	3.32	1.22	2.18
	100	188	4.26	272.0	2.44	1.68	2.98	128	2.91	235.4	3.73	1.40	2.62
EPD	0	151	3.90	254.2	2.33	1.37	2.38	125	2.52	211.8	3.52	1.08	2.07
	50	181	4.19	269.7	2.58	1.78	2.88	137	2.76	233.5	3.69	1.45	2.46
	100	217	5.13	282.2	3.50	2.05	3.38	166	3.03	248.1	4.60	1.75	3.13
ETR	0	124	3.42	239.4	2.60	0.97	2.04	108	2.24	206.6	3.43	0.75	1.79
	50	171	3.96	258.7	3.02	1.33	2.52	128	2.56	226.9	3.85	1.03	2.03
	100	179	4.16	271.1	3.45	1.50	3.09	146	2.75	242.5	4.45	1.30	2.53
Mean	0	134	3.67	246.9	2.25	1.16	2.20	110	2.39	205.0	3.28	0.89	1.90
	50	173	4.08	262.6	2.60	1.54	2.68	125	2.66	226.1	3.62	1.23	2.22
	100	194	4.52	275.1	3.13	1.74	3.15	147	2.90	242.0	4.26	1.48	2.76
LSD at 5%													
MF		9.7	0.13	4.9	0.13	0.09	0.14	8.9	0.09	4.6	0.13	0.09	0.14
OW x MF		Ns	0.22	ns	0.22	Ns	ns	ns	ns	Ns	0.22	Ns	ns

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse
OS = organic sources

Table (3c): Effect the rate of used organic sources and rate of mineral Fertilizers on soil total N and soil available nutrients (pot exp.).

Rate of OS ton/fed	MF % of R	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	75	2.97	208.0	1.47	0.40	1.67	47	1.75	137.8	2.20	0.27	1.30
	50	148	3.41	232.3	1.53	0.77	2.03	70	2.19	191.1	2.53	0.60	1.80
	100	155	3.70	258.0	2.07	1.00	2.33	93	2.48	204.5	3.80	0.87	2.10
	Mean	126	3.6	233.1	1.69	0.72	2.01	70	2.14	177.8	2.84	0.58	1.73
5	0	119	3.44	245.3	2.03	0.99	1.99	101	2.40	208.4	3.09	0.72	1.74
	50	152	3.50	259.1	2.67	1.49	2.37	124	2.53	217.8	3.42	1.16	2.06
	100	179	3.99	268.0	2.91	1.64	2.77	140	2.82	227.2	3.71	1.38	2.50
	Mean	150	3.64	257.5	2.54	1.37	2.37	122	2.59	217.8	3.41	1.09	2.10
10	0	160	3.99	262.4	2.73	1.51	2.49	140	2.63	225.0	3.79	1.23	2.11
	50	183	4.51	276.0	2.91	1.80	3.00	140	2.90	237.0	3.98	1.47	2.38
	100	202	5.04	280.0	3.71	2.02	3.52	171	3.07	257.2	4.47	1.69	2.96
	Mean	152	4.51	272.8	3.12	1.78	3.00	150	2.87	239.7	4.08	1.46	2.48
20	0	183	4.30	271.7	2.76	1.76	2.67	152	2.79	248.7	4.03	1.36	2.44
	50	210	4.90	283.0	3.29	2.09	3.32	167	3.02	258.7	4.54	1.71	2.66
	100	241	5.34	293.7	3.83	2.31	3.99	183	3.21	279.2	5.06	2.00	3.48
	Mean	211	4.85	282.8	3.29	2.05	3.33	167	3.01	262.2	4.54	1.69	2.86
LSD at 5%													
Rate		11.2	0.15	5.6	0.15	0.11	0.16	10.3	0.11	5.3	0.15	0.11	0.16
Rate x MF		19.4	0.26	9.7	0.25	ns	ns	Ns	ns	9.22	0.25	Ns	ns

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic source,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (4a): Effect of used organic sources and their rates on soil totla N and soil available nutrients (field exp.I).

Organic Sources	Rate Ton/ Fed	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	315	2.90	207.8	2.10	0.90	2.00	214	2.30	190.9	2.00	0.70	1.70
	5	529	4.40	242.8	3.10	1.53	2.30	311	3.80	260.5	3.30	1.70	2.40
	10	649	5.00	251.5	3.50	2.00	2.50	346	4.30	266.9	3.80	2.40	2.70
	20	778	5.50	273.4	3.90	2.27	2.80	416	4.70	285.1	4.30	2.50	3.30
	Mean	568	4.50	243.9	3.10	1.68	2.40	322	3.80	250.9	3.40	1.80	2.60
EPD	0	315	2.90	207.8	2.10	0.90	2.00	214	2.30	190.9	2.00	0.70	1.70
	5	607	4.60	263.6	3.60	1.93	2.90	373	4.10	276.2	4.20	2.10	3.30
	10	801	5.40	269.7	4.60	2.13	3.20	552	4.80	288.8	4.90	2.40	3.90
	20	858	6.00	286.3	5.60	2.56	3.80	642	5.30	306.8	6.50	2.80	4.50
	Mean	645	4.70	256.9	4.00	1.88	3.00	445	4.10	265.2	4.40	2.00	3.30
ETR	0	315	2.90	207.8	2.10	0.90	2.00	214	2.30	190.9	2.00	0.70	1.70
	5	478	4.10	251.9	3.50	1.60	2.60	280	3.80	269.4	3.80	1.90	3.00
	10	595	4.80	261.4	3.60	2.16	3.00	303	4.40	280.1	4.10	2.50	3.50
	20	661	5.40	244.5	4.50	2.36	3.40	373	5.00	294.0	5.30	2.80	4.00
	Mean	512	4.30	248.9	3.40	1.75	2.80	293	3.90	258.6	3.80	2.00	3.10
LSD at 5%													
OS		42.3	0.09	2.4	0.12	0.11	0.12	15.16	0.12	4.2	0.14	0.11	0.09
OS x Rate		ns	0.18	4.8	0.24	ns	0.23	30.3	0.25	8.4	0.28	0.21	0.18

OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (4b): Effect of used organic sources and mineral fertilizers on soil total N and soil available nutrients (field exp.I).

Organic Sources	M.F % of R	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	484	4.10	233.7	2.60	1.40	2.20	280	3.60	234.7	2.90	1.40	2.30
	50	572	4.50	242.8	3.10	1.70	2.30	327	3.70	251.9	3.40	1.90	2.60
	100	648	4.90	255.0	3.70	2.00	2.70	359	4.10	265.0	3.80	2.20	2.90
EPD	0	507	4.30	245.4	3.50	1.60	2.70	.385	3.70	254.5	3.80	1.70	3.00
	50	690	4.70	257.1	4.00	1.90	3.00	458	4.10	265.1	4.40	2.00	3.30
	100	750	5.10	268.1	4.60	2.20	3.30	493	4.60	277.4	5.10	2.30	3.80
ETR	0	458	3.80	239.2	3.00	1.40	2.50	260	3.30	245.3	3.30	1.70	2.70
	50	508	4.30	247.5	3.30	1.80	2.80	298	4.00	258.4	3.90	2.10	3.10
	100	572	4.80	260.1	4.00	2.00	3.00	321	4.30	272.2	4.30	2.30	3.50
Mean	0	483	4.10	239.4	3.00	1.45	2.40	308	3.50	244.8	3.30	1.60	2.70
	50	586	4.50	249.2	4.50	1.79	2.70	361	3.90	258.5	3.90	2.00	3.00
	100	656	4.90	261.1	4.10	2.07	3.00	391	4.30	271.9	4.40	2.20	3.40
LSD at 5%													
MF		42.3	0.09	2.4	0.12	0.11	0.12	15.2	0.12	4.2	0.14	0.11	0.09
OS x MF		ns	ns	ns	ns	ns	ns	ns	0.21	ns	ns	ns	ns

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (4c): Effect the rate of used organic sources and mineral Fertilizers on soil total N and Soil available nutrients (field exp.I).

Rate of OS ton/fed	MF % of R	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	210	2.30	199.8	1.60	0.50	1.80	152	1.80	173.7	1.50	0.40	1.50
	50	315	2.80	205.2	2.10	0.90	1.80	245	2.00	188.2	2.20	0.70	1.60
	100	420	3.70	218.7	2.60	1.30	2.40	245	3.10	210.8	2.50	1.00	2.10
	Mean	315	2.90	207.8	2.10	0.90	2.00	214	2.30	190.9	2.00	0.70	1.70
5	0	506	4.00	238.4	3.00	1.30	2.20	288	3.50	254.8	3.30	1.50	2.60
	50	537	4.40	252.5	3.30	1.80	2.70	323	3.90	269.2	3.80	1.90	2.90
	100	572	4.80	267.4	3.90	2.00	2.90	354	4.20	282.0	4.20	2.30	3.30
	Mean	538	4.40	252.8	3.40	1.69	2.60	322	3.90	268.7	3.80	1.90	2.90
10	0	595	4.70	252.1	3.40	1.80	2.70	366	4.00	268.9	3.80	2.10	3.00
	50	677	5.20	261.5	3.90	2.20	2.90	401	4.60	279.4	4.40	2.50	3.50
	100	774	5.30	268.9	4.40	2.40	3.20	436	4.80	287.5	4.70	2.80	3.70
	Mean	682	5.10	260.9	3.90	2.10	2.90	401	4.50	278.6	4.30	2.50	3.40
20	0	621	5.30	267.4	4.20	2.20	3.00	428	4.80	281.9	4.70	2.40	3.60
	50	817	5.70	277.4	4.60	2.40	3.40	474	5.00	297.0	5.30	2.70	3.80
	100	859	6.00	289.3	5.30	2.60	3.70	529	5.20	307.2	6.10	3.00	4.40
	Mean	766	5.70	278.0	4.70	2.39	3.40	477	5.00	295.3	5.40	2.70	3.90
LSD at 5%													
Rate		48.8	0.11	2.8	0.14	0.13	0.14	17.5	0.14	4.8	0.16	0.12	0.11
Rate x MF		ns	0.18	4.8	ns	ns	ns	ns	0.25	ns	0.28	ns	0.18

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic source,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (5a): Effect of used organic sources and their rates on soil total N and soil available nutrients (field exp.II).

Organic Sources	Rate Ton/ Fed	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	898	3.70	276.3	3.00	1.30	2.40	622	2.50	235.3	2.40	0.84	2.00
	5	1851	4.70	320.4	4.70	1.70	2.70	844	4.30	336.8	5.40	1.90	2.90
	10	1972	5.30	339.9	6.00	1.90	3.10	996	4.70	360.5	6.40	2.30	3.30
	20	2199	5.80	366.8	6.70	2.20	3.40	1079	5.00	390.4	7.20	2.50	4.10
	Mean	1730	4.90	325.8	5.10	1.80	2.90	885	4.20	330.8	5.40	2.00	3.10
EPD	0	898	3.70	276.3	3.00	1.30	2.40	622	2.50	235.3	2.40	0.84	2.00
	5	2170	5.50	331.9	5.40	1.90	3.10	1276	5.10	354.0	5.90	2.10	3.60
	10	2403	6.00	376.1	7.20	2.00	3.20	1528	5.50	403.2	7.40	2.30	4.20
	20	2687	6.90	431.5	7.80	2.30	4.20	1797	5.80	465.6	8.20	2.60	4.80
	Mean	2040	5.50	354.0	5.90	1.90	3.20	1306	4.70	364.5	6.00	2.00	3.60
ETR	0	898	3.70	276.3	3.00	1.30	2.40	622	2.50	235.3	2.40	0.84	2.00
	5	1762	4.60	321.9	4.60	1.70	2.80	1423	4.90	347.1	5.40	2.10	3.20
	10	1929	5.60	355.3	5.90	2.10	3.10	1524	5.50	368.3	6.80	2.40	3.90
	20	2147	6.20	396.3	7.20	2.10	4.00	1544	6.00	428.7	7.60	2.40	4.60
	Mean	1684	5.00	337.5	5.20	1.80	3.10	1279	4.80	344.9	5.60	1.90	3.40
LSD at 5%													
OS		49.7	0.12	4.6	0.22	ns	0.12	43.6	0.10	4.3	ns	ns	0.12
OS x Rate		99.3	0.24	9.3	0.44	0.22	0.23	87.2	0.20	8.7	ns	ns	0.24

EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse, OS = organic sources

Table (5b): Effect of used organic sources and mineral fertilizers on soil total N and soil available nutrients (field exp.II).

Organic Sources	M.F % of R	After 70 days						After 150 days					
		$\mu g.g^{-1}$			$\mu g.g^{-1}$			$\mu g.g^{-1}$			$\mu g.g^{-1}$		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	1558	4.30	304.0	4.40	1.50	2.60	753	3.70	310.7	4.70	1.80	2.80
	50	1730	5.00	323.9	5.20	1.70	2.90	916	4.20	329.3	5.40	1.90	3.00
	100	1902	5.20	349.6	5.80	2.10	3.30	988	4.50	352.4	6.00	2.10	3.40
EPD	0	1838	4.90	333.6	5.10	1.70	2.70	1132	4.20	341.6	5.40	1.70	3.00
	50	2048	5.60	353.8	5.90	1.80	3.30	1353	4.80	364.9	5.90	2.00	3.60
	100	2234	6.00	374.5	6.60	2.10	3.80	1432	5.20	387.0	6.70	2.30	4.30
ETR	0	1534	4.40	316.8	4.40	1.60	2.70	1152	4.20	321.8	4.80	1.70	2.90
	50	1700	5.00	335.9	5.20	1.70	3.00	1304	5.00	342.6	5.60	1.90	3.30
	100	1818	5.60	359.6	5.90	2.00	3.60	1380	5.10	370.2	6.20	2.20	4.00
Mean	0	1643	4.60	318.1	4.60	1.60	2.70	1012	4.00	324.7	5.00	1.70	2.90
	50	1826	5.20	337.9	5.40	1.70	3.00	1191	4.70	345.6	5.60	1.90	3.30
	100	1984	5.60	361.2	6.10	2.10	3.50	1266	4.90	370.0	6.30	2.20	3.90
LSD at 5%													
MF		49.7	0.12	4.6	0.22	0.11	0.12	50.3	0.10	4.3	0.24	0.19	0.12
OS x MF		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.20

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (5c): Effect the rate of used organic sources and mineral fertilizers on soil total N and soil available nutrients (field exp.II).

Rate of OS ton/fed	MF % of R	After 70 days						After 150 days					
		µg.g^{-1}			µg.g^{-1}			µg.g^{-1}			µg.g^{-1}		
		N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	478	3.30	250.6	2.30	1.10	1.90	315	2.00	209.4	1.70	1.00	1.50
	50	1027	3.90	273.8	3.00	1.10	2.30	723	2.60	236.6	2.30	0.80	1.90
	100	1190	3.90	304.4	3.70	1.50	3.00	828	3.00	260.0	3.10	1.10	2.60
	Mean	898	3.70	276.3	3.00	1.30	2.40	622	2.50	235.3	2.40	0.94	2.0
5	0	1789	4.40	305.0	4.20	1.50	2.70	1073	4.40	324.5	4.80	1.60	2.80
	50	1902	5.00	325.0	5.00	1.60	2.80	1221	4.90	341.6	5.60	2.10	3.00
	100	2092	5.40	344.0	5.50	2.10	3.20	1248	5.10	371.7	6.30	2.30	3.70
	Mean	1928	4.90	324.7	4.90	1.70	2.90	1181	4.80	345.9	5.60	2.00	3.20
10	0	2034	5.00	338.2	5.50	1.70	2.90	1276	4.70	357.9	6.30	2.10	3.20
	50	2038	5.70	358.3	6.40	2.00	3.10	1361	5.40	379.1	6.80	2.40	3.80
	100	2232	6.20	374.9	7.20	2.20	3.50	1412	5.60	395.1	7.60	2.50	4.30
	Mean	2101	5.60	357.1	6.40	2.00	3.20	1349	5.20	377.4	6.90	2.30	3.80
20	0	2271	5.50	378.7	6.50	2.00	3.20	1384	5.00	407.0	7.10	2.20	4.00
	50	2338	6.40	394.4	7.30	2.20	3.90	1458	5.80	425.0	7.80	2.50	4.40
	100	2423	7.00	421.5	7.90	2.40	4.50	1577	6.00	452.7	8.20	2.90	5.00
	Mean	2344	6.30	398.2	7.20	2.20	3.90	1473	5.60	428.2	7.70	2.50	4.50
LSD at 5%													
Rate		57.3	0.14	5.3	0.25	0.13	0.14	50.3	0.11	5.0	0.28	0.21	0.14
Rate x MF		99.3	0.24	Ns	ns	ns	0.23	87.2	ns	ns	ns	ns	ns

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

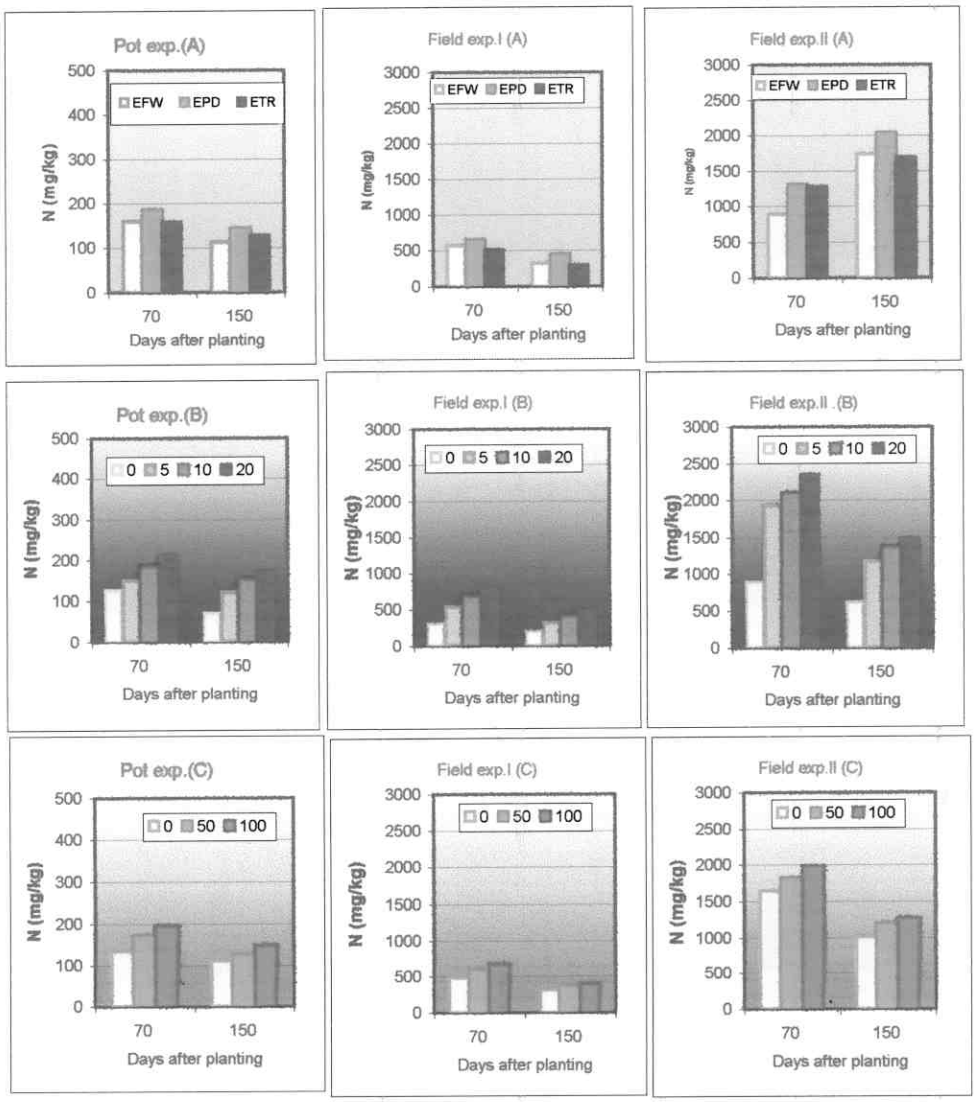

Fig.(4): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on Total soil nitrogen (mg/kg).

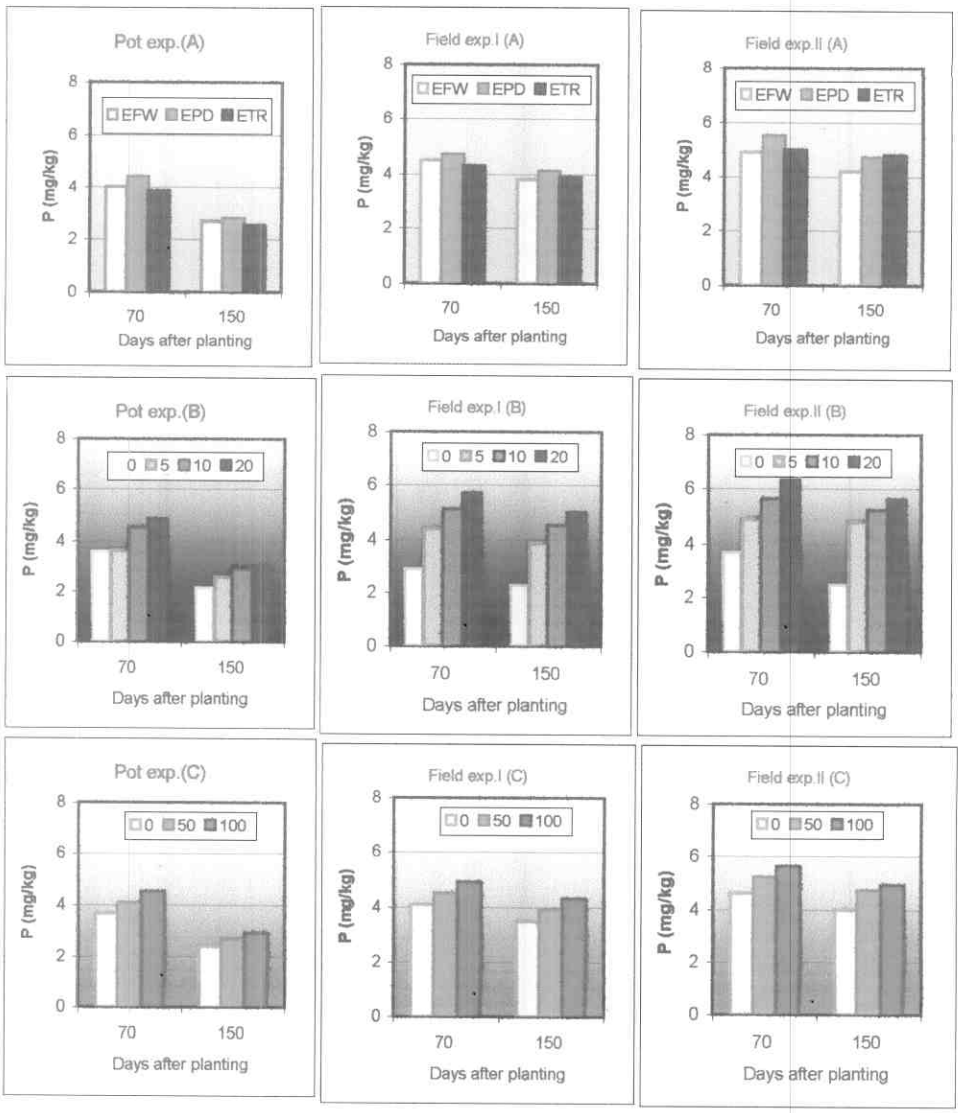

Fig.(5): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on soil available phosphorus (mg/kg).

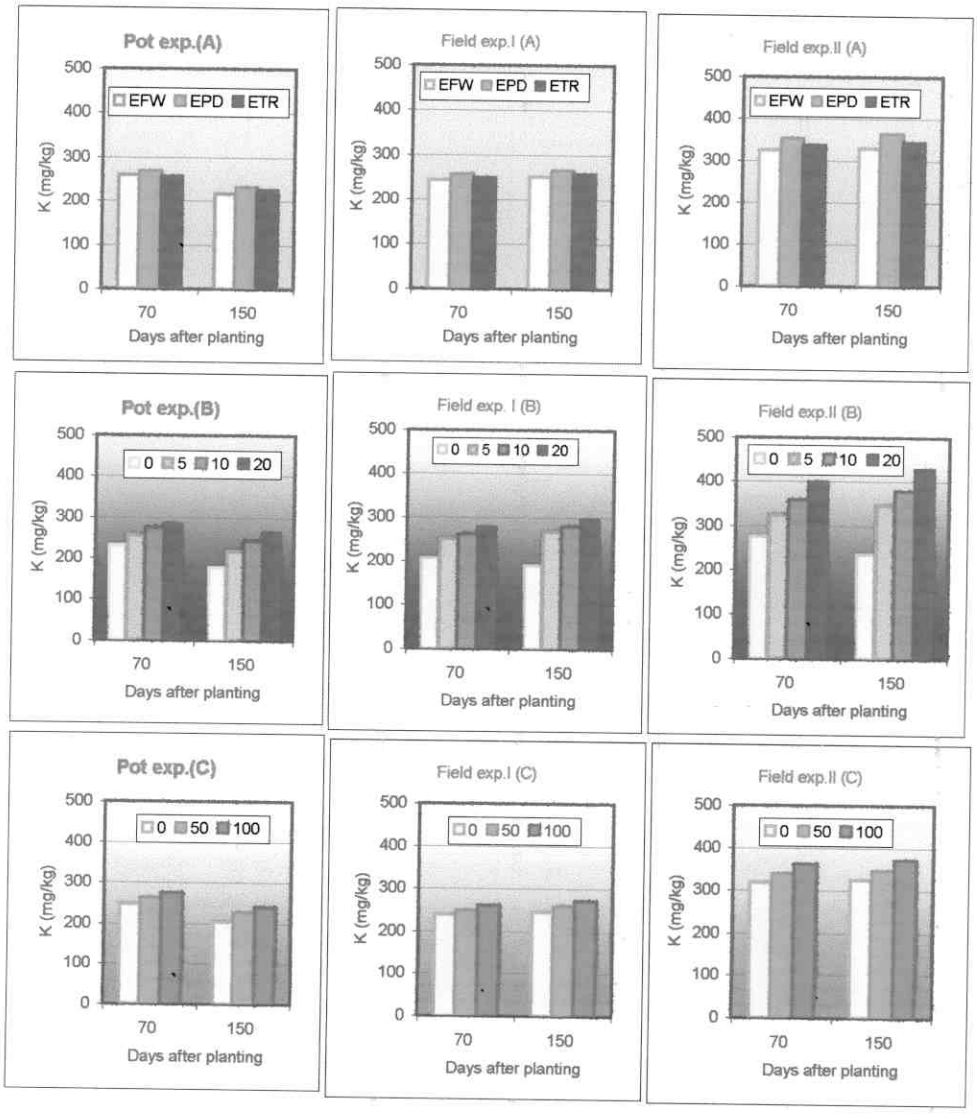

Fig.(6): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on soil available potassium (mg/kg).

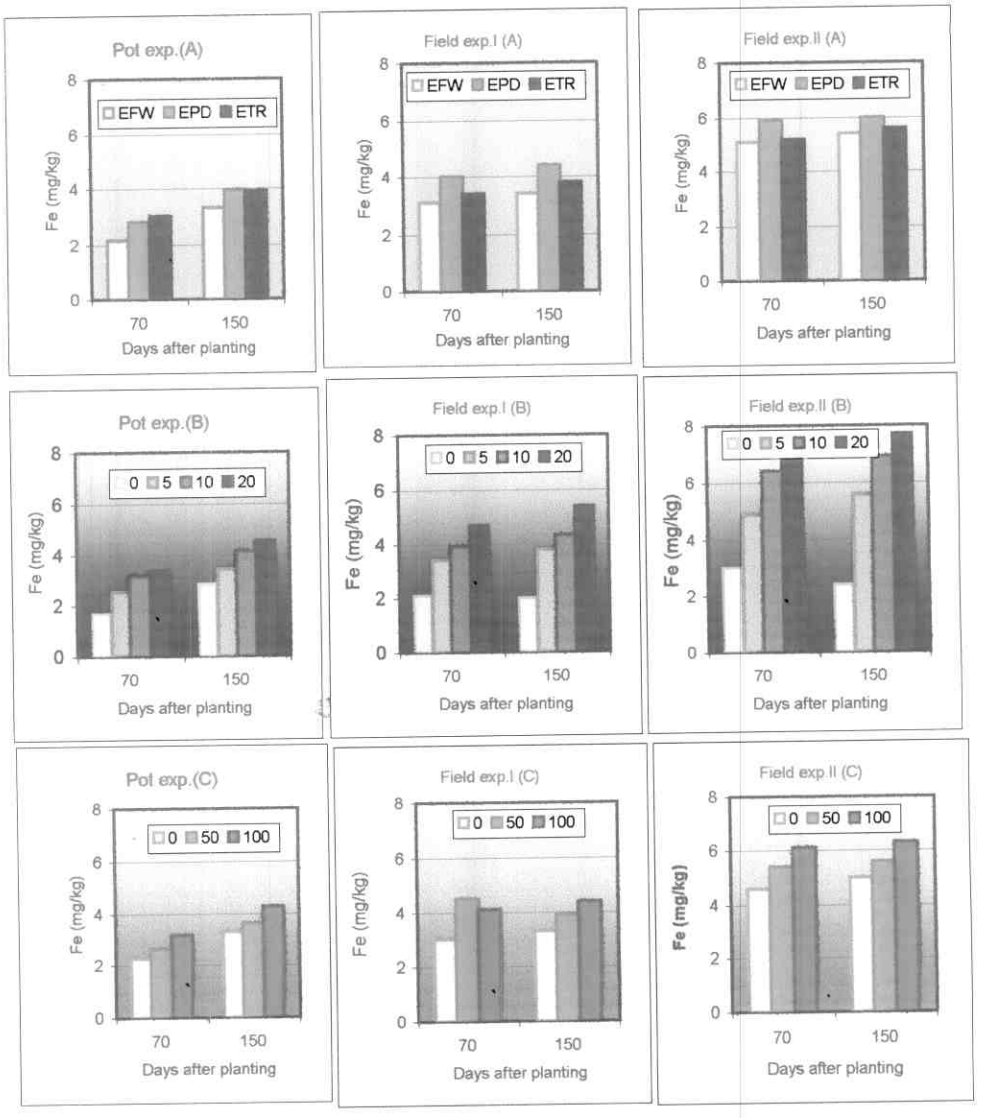

Fig.(7): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on soil available iron (mg/kg).

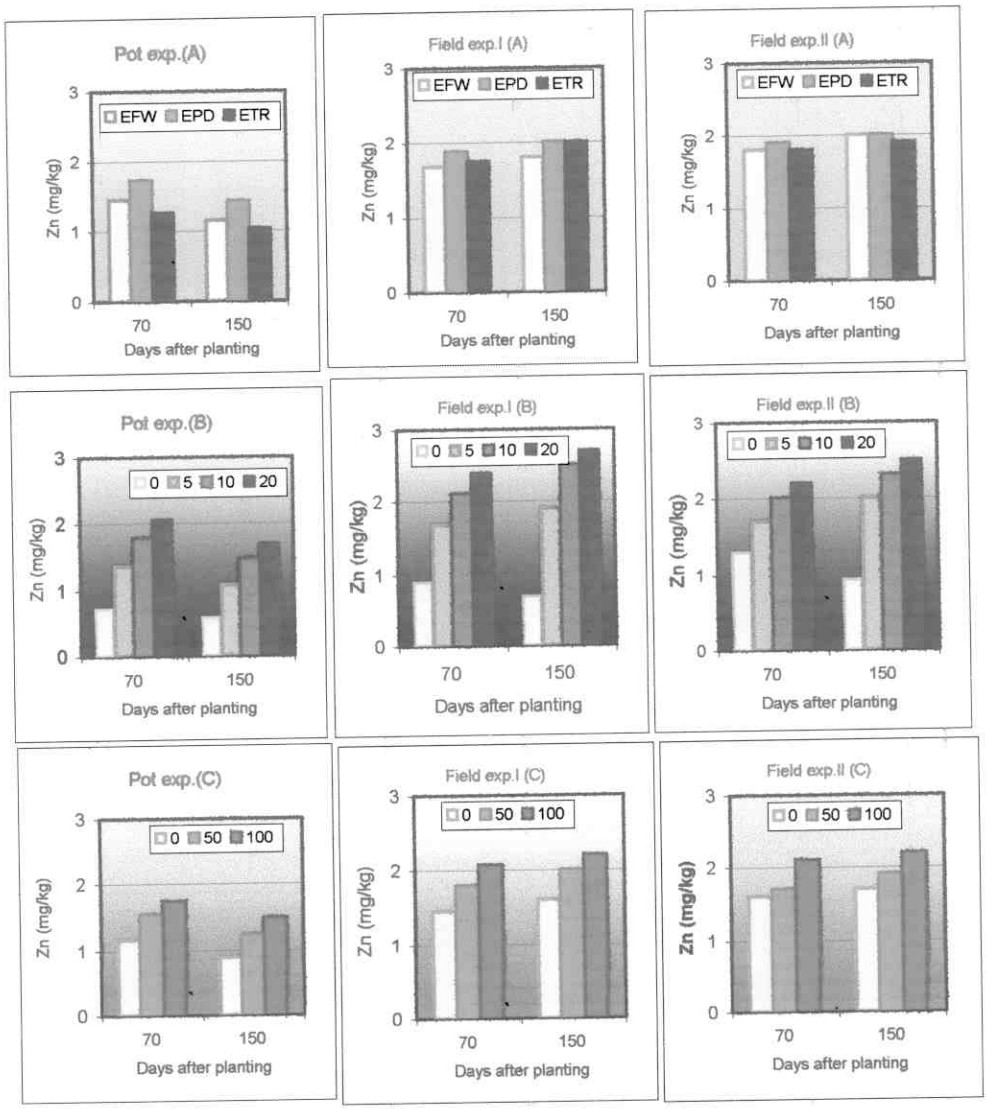

Fig.(8): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on soil available zinc (mg/kg).

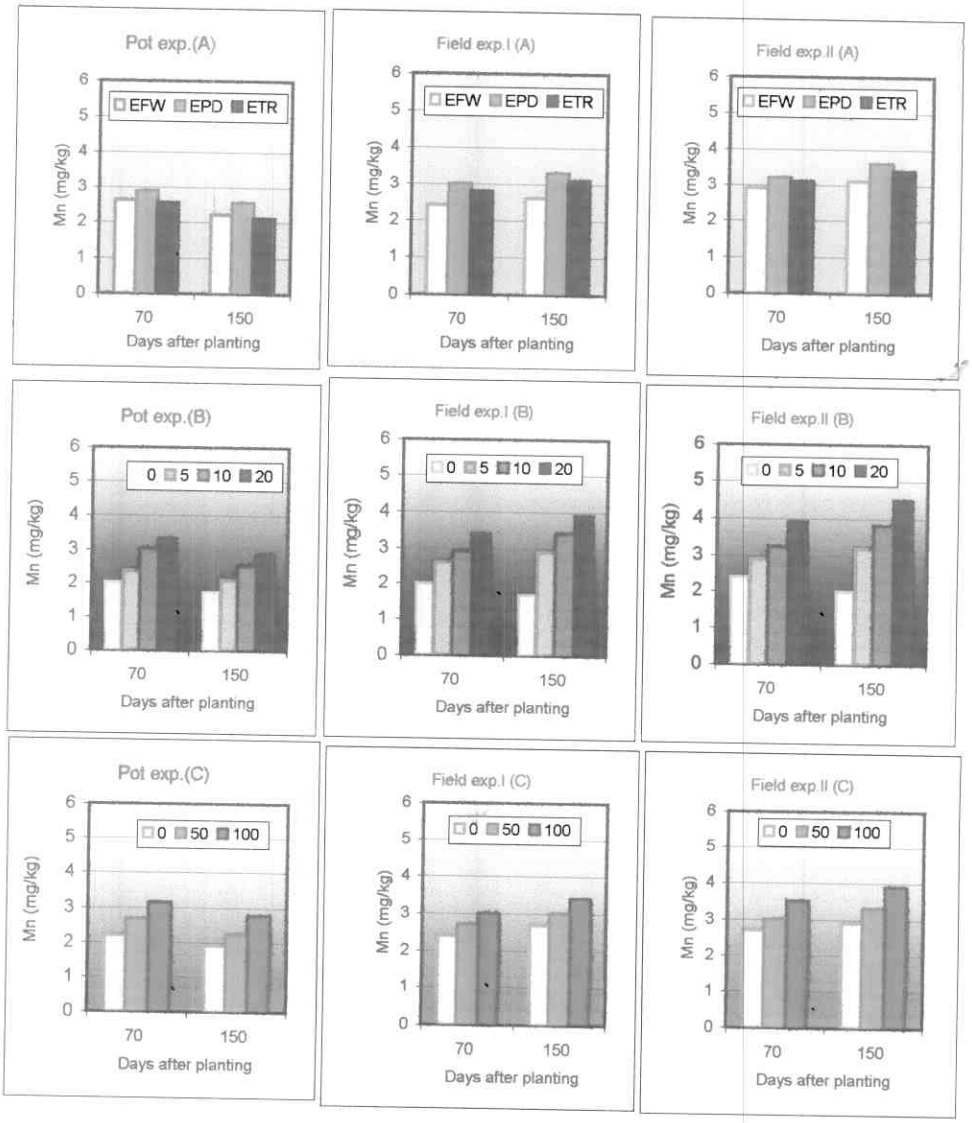

Fig.(9): Effect of organic sources (A), rate of organic sources (B) and fertilizer rate (C) on soil available manganes (mg/kg).

4.3.1.Wheat plants dry weight (g/plant):

Data in tables (12-14) showed that the effects of organic sources, their rates and mineral fertilizer rates increased wheat dry weight in the pot exp. and the field exp.I and exp.II. The successive increasing order of dry weight in the three experiments as affected by organic sources was enrich town refuse < enrich farm waste < enrich poudrette. As for the rates, either of the organic sources or mineral fertilizers successively and significantly increased the dry weight in all the three experiments, (fig. 10). Similar results were reported by Borhamy for poudrette and El-Emam (1999) for farm weste and Saker et al (1992) for town refuse .

Di-interaction effect of enrich farm waste at a rate of 20 ton/fed, enrich farm waste with 100% fertilizer, and 20 ton/fed of any organic sources with 100% fertilizer rate in the pot exp. contributed to the highest values of dry weight (g/plant), while in both field exp.I and exp.II, enrich poudrette either at a rate of 20 ton/fed or with fertilizer rate at 100% as well as at a rate of 20 ton/fed of any organic sources with 100% mineral fertilizer were resulted the highest dry weight (g/plant).

4.3.2.Nitrogen concentration (%) and uptake (mg/plant):

The effects of organic sources, their rates and fertilizer rates significantly increased nitrogen concentration and uptake of wheat plant in the three experiments. Enrich poudrette was of the the superior effect on plant nitrogen concentration and uptake, followed by the enrich farm waste then the enrich town refuse, (Tables 12-14). The highest rate of three organic sources, as individual effect, had significantly the highest effect on increasing nitrogen concentration and uptake of wheat plants in

the three experiments, (figs. 11-12). Similar results were obtained by Saker et al (1992).

Generally, the effect of organic sources with their rates, organic sources with mineral fertilizer rates and rate of organic sources with rate of mineral fertilizers significantly increased nitrogen concentration and uptake of wheat plants in the pot exp. Also, in general, the previous di-interaction effect significantly increased nitrogen uptake of wheat plants but there was no significant effect on nitrogen concentration in both field exp.I and exp.II. Similar results were achieved by Faiyed (1994) and Hassan (1999) .

4.3.3.Phosphorus concentration (%) and uptake (mg/plant):

Organic sources, their rates or mineral fertilizer rates as individually affected significantly phosphorus concentration and uptake of wheat plant in the three experiments. Enrich poudrette represented the superior organic sources affecting plant concentration and uptake, followed by enrich farm waste then enrich town refuse (Tables 12-14). The highest rate of the average values of three organic sources showed the highest effect on increasing phosphorus concentration and uptake by wheat plants in the three experiments (figs. 13-14). Similar results were obtained by Allam (1999) .

Generally, phosphorus concentration in wheat plants was significantly affected by rates of organic sources and with the rates of the applied mineral fertilizers, while uptake was significantly affected by organic sources with their rates in the pot exp. In the field exp.I, di-interaction effect of organic sources with their rates, organic sources with mineral fertilizer

rates and the rates of organic sources with the rates of mineral fertilizers significantly increased phosphorus uptake of wheat plants. Phosphorus concentration had been significantly affected only under organic sources with their rates, whereas no significant could be attained with other previous di-interactions. Concerning the field exp.II, phosphorus uptake and concentration were significantly increased by all the used di-interaction effect, except for application of organic sources with fertilizer rates. This may be attributed to the role of organic sources in retaining phosphorus in non-available form up to 70 days of cultivation.

4.3.4.Potassium concentration (%) and uptake (mg/plant):

The organic sources, their rates or mineral fertilizer rates as individual factors significantly increased potassium concentration and uptake of wheat plant in the three experiments. Enrich poudrette was the superior organic sources affecting plant concentration and uptake, followed by enrich farm waste, then enrich town refuse (Tables 12-14). The highest rate of the average values of the three organic sources had the highest effect on increasing potassium concentration and uptake in wheat plants in the three experiments (figs. 15-16). Similar results were by attained by Mahmoud (1996).

Generally, di-interaction effect of organic sources with their rates, organic sources with mineral fertilizer rates and rate of organic sources with rates of fertilizer significantly increased potassium uptake of wheat plants in the pot exp., field exp.I and field exp.II, but did not affect significantly potassium concentration in the three experiments, except of organic sources rates with mineral fertilizer rates in the pot exp. and field exp.II

which significantly affected the potassium concentration. Similar results were by Hassan (1999) for farm weste and Saker et al (1992) for poudrette and town refuse .

4.3.5.Iron concentration (µg/g) and uptake (µg/plant):

The organic sources, their rates or fertilizer rates significantly increased iron concentration and uptake of wheat plant in the three experiments, (Tables 12-14). Enrich poudrette was the organic sources of the superior effect on plant concentration and uptake, followed by enrich farm sources, then enrich town refuse in the pot exp. and field exp.I. On the other hand, enrich town refuse was the superior organic source followed by enrich poudrette, then enrich farm waste in the field exp.II. The average values of iron concentration in wheat plant under enrich poudrette in pot exp., field exp.I and field exp.II were 557, 361 & 408 µg/g respectively, whereas for uptake they were 2654, 4307 and 6450 µg/plant. Iron concentrations in the pot exp. under enrich poudrette wass higher than those of the two field experiments, but lower in iron uptake than the two field experiments. The highest rate of the average values of the three organic sources as individual effect showed the highest effect on increasing iron concentration and uptake by wheat plants in the three experiments, (fig. 17-18). Similar results were obtained by Khalifa et al (1993).

Generally, di-interaction effect of organic sources with their rates, organic sources with mineral fertilizer rates and the rates of organic sources with the rates of mineral fertilizer significantly increased iron uptake of wheat plants in the pot exp. and just the field exp.I. Also, organic sources with their rates significantly increased iron uptake in the field exp.II but iron

4.3.6.Zinc concentration (µg/g) and uptake (µg/plant):

Data in tables (12-14) showed that the organic sources, their rates or mineral fertilizer rates significantly increased zinc concentration and uptake of wheat plant in the three experiments. Enrich poudrette represented the superior organic source affecting plant concentration and uptake, followed by enrich farm waste, then enrich town refuse in the three experiments. There was no significant difference between enrich farm waste and enrich poudrette on zinc concentration and uptake in the pot exp. and field exp.I and concentration in the field exp.II. The highest rate of the average values of the three organic sources as well as the highest rate of mineral fertilizer exerted the highest effect on increasing zinc concentration and uptake by wheat plants in the three experiments, (figs. 19-20). Similar results were achieved by Faiyed (1994) and Borhamy (1998) for poudrette and Ahmed (1994) for farm waste .

Di-interaction of organic sources with their rates had achieved significant differences of zinc concentration and uptake in the three experiments. On the other hand, di-interaction of used organic sources with fertilizer rates showed no significant effect on zinc concentration or uptake in the three experiments. As for di-interaction of organic sources with fertilizer rates, it achieved significant differences just in zinc uptake of the pot exp. and the field exp.II.

4.3.7.Manganese concentration (µg/g) and uptake (µg/plant):

Data in tables (12-14) showed that organic sources, their rates or mineral fertilizer rates increased significantly the manganese concentration and uptake of wheat plant in the three experiments, except for the organic sources in the pot exp. Which did not achieve significant differences in manganese concentration and uptake. Enrich poudrette was the superior organic sources effecting on plant concentration and uptake, followed by enrich farm sources, then enrich town refuse in both field exp.I and field exp.II. The highest rate of the average values of the three organic sources as well as the highest rate of mineral fertilizer gave the highest effect on increasing manganese concentration and uptake of wheat plants in the three experiments, (figs. 21-22). Similar results were obtained by Ahmed (1994) for farm waste and Borhamy (1998) for poudrette.

The three kinds of di-interaction had achieved no significant differences on manganese concentration and uptake by wheat plant grown in the pot experiment. Similar trend was noticed in the field exp.I, except for the organic sources with their rates which resulted in significant differences on manganese uptake. As for the field exp.II, organic sources with their rates showed significant effect on concentration and uptake by wheat plants, and organic sources rates with fertilizer rates showed significant effect on uptake. Similar results were obtained by Duraisamy et al (1988) for farm waste and Mekail (1998) for poudrette with mineral fertilizer rate .

Table (12a): Effect of used organic sources and their rates on plant dry weight, concentration and uptake of wheat plant nutrients (pot exp.) after 70 days.

Organic Sources	Rate Ton/ fed	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	3.31	1.87	0.17	2.42	172	18	28	65.7	5.6	83.3	620	62	94
	5	4.54	2.70	0.17	3.10	422	36	52	128.6	8.0	142.0	1992	168	636
	10	4.63	3.37	0.22	3.18	500	43	58	163.1	10.2	148.4	2360	202	269
	20	5.28	4.05	0.29	3.32	700	47	70	215.0	15.2	175.4	3715	246	374
	Mean	4.44	3.00	0.21	3.01	449	36	62	143.1	9.8	137.3	2172	170	343
EPD	0	3.31	1.87	0.17	2.42	172	18	28	65.7	5.6	83.3	620	62	94
	5	4.57	3.24	0.20	3.26	528	40	52	152.2	9.0	148.7	2714	189	240
	10	4.84	4.03	0.24	3.23	678	41	61	198.9	11.6	156.8	3323	199	297
	20	4.90	4.74	0.31	3.43	800	50	74	235.5	15.1	168.3	3959	245	369
	Mean	4.40	3.47	0.23	3.08	557	37	54	163.1	10.4	139.3	2654	174	250
ETR	0	3.31	1.87	0.17	2.42	172	18	28	65.7	5.6	83.3	620	62	94
	5	3.55	2.25	0.17	3.16	322	32	44	82.2	6.1	112.0	1182	117	159
	10	3.99	2.86	0.22	3.12	544	33	51	119.4	8.7	125.8	2213	135	208
	20	4.87	3.56	0.27	3.27	644	41	66	178.1	13.1	160.0	3192	204	324
	Mean	3.96	2.63	0.21	2.99	421	31	47	111.3	8.4	120	1802	129	196
LSD at 5%														
OS		0.18	0.12	0.01	0.07	34.3	3.1	Ns	8.5	0.5	6.4	183	15	ns
OS x Rate		0.35	0.25	ns	Ns	68.6	6.2	Ns	17.0	1.0	12.9	365	29	ns

DW = dry weight of wheat plant, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (12b): Effect of used organic sources and mineral fertilizers rates on plant dry weight, concentration and uptake of wheat plant nutrients (pot exp.) after 70 days.

Organic Sources	M.F % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	3.80	1.93	0.19	2.68	342	28	46	79.0	7.4	105.8	1449	117	185
	50	4.42	2.78	0.22	3.01	458	38	51	127.1	9.8	135.6	2175	173	237
	100	5.10	4.28	0.24	3.33	546	42	59	223.2	12.2	170.5	2892	219	608
EPD	0	3.70	2.38	0.21	2.86	442	31	45	94.3	7.9	109.5	1781	122	174
	50	4.65	3.41	0.23	3.03	558	34	53	166.5	11.0	144.0	2804	166	256
	100	4.86	4.60	0.25	3.36	671	47	65	228.6	12.2	164.3	2278	233	-319
ETR	0	3.47	1.68	0.18	2.74	300	25	39	59.8	6.3	95.4	1118	91	139
	50	3.81	2.55	0.21	2.96	442	31	46	100.4	8.3	114.0	1798	121	182
	100	4.59	3.68	0.23	3.28	521	38	57	173.8	10.6	151.3	2490	176	268
Mean	0	3.66	2.00	0.19	2.76	361	28	43	77.7	7.2	103.5	1449	110	166
	50	4.29	2.91	0.22	3.00	486	34	50	131.3	9.7	131.2	2259	153	225
	100	4.85	4.19	0.24	3.32	579	42	60	208.5	11.7	162.1	2920	209	398
LSD at 5%														
MF		0.18	0.12	0.01	0.07	34.3	3.09	3.59	8.5	0.5	6.4	183	15	166
OS x MF		0.30	ns	Ns	Ns	ns	Ns	Ns	14.7	Ns	ns	317	ns	ns

DW = dry weight of wheat plant, OS = organic sources
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (12c): Effect the rate of used organic sources and mineral fertilizers on plant dry weight, concentration and uptake of wheat plant nutrients (pot exp.) after 70 days.

Rate of OS Ton/fed	MF % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			Mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	2.81	0.93	0.13	1.77	100	10	23	24.9	3.6	48.2	281	27	62
	50	3.18	1.87	0.18	2.45	133	20	27	59.6	5.6	78.0	427	64	85
	100	4.05	2.79	0.19	3.05	283	23	33	112.7	7.7	123.8	1152	94	135
	Mean	3.35	1.87	0.17	2.42	172	18	28	65.7	5.6	83.3	620	62	94
5	0	3.33	1.85	0.16	3.12	311	26	43	61.6	5.4	104.0	1036	86	144
	50	4.45	2.73	0.18	3.13	456	36	49	123.7	8.2	139.6	2093	159	220
	100	4.87	3.60	0.19	3.26	556	47	57	127.7	9.5	159.1	2760	229	671
	Mean	4.22	2.73	0.18	3.17	441	36	50	121.0	7.7	134.2	1963	158	345
10	0	3.88	2.32	0.21	2.97	444	36	57	91.1	8.0	116.0	1751	138	195
	50	4.51	3.02	0.23	3.13	611	39	50	140.1	10.6	141.7	2764	176	244
	100	5.06	4.91	0.24	3.42	667	43	53	250.3	12.1	173.3	3382	221	337
	Mean	4.49	3.42	0.23	3.18	574	39	57	160.5	10.2	143.7	2632	179	258
20	0	4.60	2.88	0.26	3.18	589	41	57	133.3	11.7	146.0	2729	189	263
	50	5.03	4.01	0.28	3.29	744	42	70	202.0	14.4	165.6	3751	213	352
	100	5.41	5.44	0.32	3.55	811	54	83	293.3	17.4	192.0	4386	294	450
	Mean	5.02	4.11	0.29	3.34	715	46	70	209.5	14.5	168	3622	232	355
LSD at 5%														
Rate		0.20	0.14	0.01	0.08	39.6	3.6	4.2	9.8	0.6	7.4	211	17	191
Rate x MF		0.35	0.25	0.02	0.15	ns	6.2	ns	17.0	ns	12.9	365	29	ns

DW = dry weight of wheat plant, OS = organic sources,
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (13a): Effect of used organic sources and their rates on plant dry weight, concentration and uptake of wheat plant nutrients (field exp.I) after 70 day.

Organic Sources	Rate Ton/ fed	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			Mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	5.80	3.62	0.16	2.96	211	56	54	212.8	9.7	173.9	1253	333	328
	5	8.00	4.41	0.29	3.57	267	72	62	353.6	23.6	285.4	2135	580	501
	10	10.60	5.19	0.36	3.77	367	84	79	556.3	38.4	403.4	3935	911	852
	20	12.90	4.80	0.38	3.88	389	87	81	627.4	49.0	505.4	5128	1134	1055
	Mean	9.30	4.51	0.30	3.55	306	75	69	437.5	30.2	342.0	3113	739	684
EPD	0	5.80	3.62	0.16	2.96	211	56	54	212.8	9.7	173.9	1253	333	328
	5	9.40	4.80	0.36	3.71	322	82	61	453.0	33.7	348.9	3060	776	579
	10	11.80	5.17	0.38	3.86	422	88	81	611.6	45.4	456.5	5018	1042	963
	20	14.90	5.67	0.40	4.14	489	91	87	849.2	60.3	616.8	7898	1363	1297
	Mean	10.50	4.82	0.33	3.67	361	79	71	531.7	37.3	399.0	4307	878	791
ETR	0	5.80	3.62	0.16	2.96	211	56	54	212.8	9.7	173.9	1253	498	328
	5	6.00	4.37	0.27	3.30	222	66	52	266.2	17.0	200.8	1394	408	324
	10	8.20	5.00	0.34	3.56	267	69	66	410.3	27.8	292.4	2206	573	537
	20	8.80	5.21	0.36	3.78	311	78	72	463.1	32.8	335.9	2759	695	645
	Mean	7.20	4.55	0.29	3.40	253	67	61	338.1	22	251	1903	544	459
LSD at 5%														
OS		0.21	0.18	0.02	0.12	35.5	4.3	5.2	18.6	1.3	13.8	378	81	53
OS x Rate		0.41	0.36	0.03	ns	ns	8.5	ns	37.1	2.6	27.6	756	162	106

DW = dry weight of wheat plant, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (13b): Effect of used organic sources and mineral fertilizers rates on plant dry weight, concentration and uptake of wheat plant nutrients (field exp.I) after 70 days.

Organic Sources	M.F % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	8.20	3.90	0.26	3.20	233	58	55	330.6	23.8	271.2	2149	511	488
	50	9.30	4.60	0.31	3.59	325	76	66	439.9	30.6	344.0	3248	750	644
	100	10.50	5.10	0.31	3.85	358	90	87	542.1	36.2	410.9	3941	956	919
EPD	0	9.50	4.20	0.30	3.36	283	67	60	430.2	31.3	336.4	3035	685	631
	50	10.40	4.90	0.33	3.69	342	77	67	536.2	36.9	396.1	3796	849	738
	100	11.40	5.30	0.37	3.96	458	94	86	628.6	43.5	464.5	6091	1101	1005
ETR	0	6.30	4.00	0.24	3.05	192	51	48	264.8	16.5	196.5	1293	454	323
	50	7.00	4.60	0.29	3.42	275	63	59	328.3	21.0	243.0	1956	446	423
	100	8.30	5.00	0.32	3.72	292	88	76	421.1	28.0	312.7	2460	731	630
Mean	0	8.00	4.06	0.27	3.20	236	59	54	341.9	23.9	268.1	2159	550	481
	50	8.90	4.72	0.31	3.57	314	72	64	434.8	29.5	327.7	3000	682	602
	100	10.10	5.10	0.34	3.84	369	91	83	530.6	35.9	396.0	4164	930	852
LSD at 5%														
MF		0.21	0.18	0.02	0.12	35.5	4.3	5.2	18.6	1.3	13.8	378	81	53
OS x MF		0.37	ns	Ns	Ns	ns	Ns	ns	ns	2.2	23.9	655	ns	ns

DW = dry weight of wheat plant, OS = organic sources
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (13c): Effect the rate of used organic sources and mineral fertilizers on plant dry weight, concentration and uptake of wheat plant nutrients (field exp.I) after 70 days.

Rate of OS Ton/fed	MF % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	4.80	3.00	0.12	2.50	122	37	33	148.8	5.8	119.0	315	336	163
	50	5.70	3.80	0.17	2.98	233	50	50	213.1	9.8	171.1	1307	289	282
	100	6.80	4.10	0.20	3.39	267	80	80	276.6	13.5	231.6	1839	538	538
	Mean	5.80	3.62	0.16	2.96	207	56	54	212.8	9.7	173.9	1253	388	328
5	0	7.20	3.90	0.26	3.25	189	60	44	281.7	19.6	236.0	1440	448	326
	50	7.70	4.70	0.32	3.57	278	71	56	360.4	24.9	276.7	2151	556	431
	100	8.50	5.00	0.35	3.76	344	89	76	430.8	29.9	322.4	2998	760	648
	Mean	7.80	4.53	0.31	3.53	270	73	59	357.6	24.8	278.4	2196	588	468
10	0	9.10	4.70	0.34	3.41	300	67	69	426.5	31.0	312.6	2784	619	639
	50	9.90	5.20	0.36	3.80	344	79	72	513.8	35.8	378.8	3509	799	722
	100	11.50	5.50	0.39	3.98	414	96	84	637.9	44.7	460.9	4866	1107	991
	Mean	10.20	5.12	0.36	3.73	352	80	75	526.1	37.2	384.0	3720	842	784
20	0	11.00	4.60	0.35	3.65	333	71	71	510.6	39.1	404.6	3797	797	796
	50	12.30	5.30	0.38	3.92	400	87	78	652.0	47.5	484.3	5033	1083	970
	100	13.40	5.80	0.41	4.23	456	98	91	777.2	55.5	569.2	6954	1313	1230
	Mean	12.20	5.23	0.38	3.93	396	85	80	646.6	47.4	486.0	5262	1064	999
LSD at 5%														
Rate		0.24	0.21	0.02	0.14	41.0	4.9	6.0	21.4	1.5	15.9	437	94	61
Rate x MF		0.41	ns	Ns	ns	ns	Ns	ns	37.1	2.6	27.6	756	ns	ns

DW = dry weight of wheat plant, OS = organic sources,
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (14a): Effect of used organic sources and their rates on plant dry weight, concentration and uptake of wheat plant nutrients (field exp.II) after 70 day.

Organic Sources	Rate Ton/ Fed	DW g/ Plant	Concentration						Uptake					
			%			µg.g^{-1}			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	8.64	2.74	0.16	2.56	222	58	43	240.8	13.7	222.9	1962	505	382
	5	13.93	3.34	0.20	2.96	223	63	53	471.4	28.8	415.1	3335	908	770
	10	14.34	3.59	0.26	3.10	344	69	69	518.0	38.0	445.3	5010	1002	999
	20	15.10	4.11	0.32	3.24	422	73	73	624.0	48.7	480.0	6428	1119	1118
	Mean	13.00	3.45	0.24	2.96	306	66	60	463.6	32.3	390.8	4184	883	817
EPD	0	8.64	2.74	0.16	2.56	223	58	43	240.8	13.7	222.9	1962	505	382
	5	15.71	3.81	0.22	3.17	367	72	56	602.8	35.5	499.4	5906	1151	902
	10	16.39	4.00	0.28	3.32	489	78	76	662.1	45.8	546.6	8045	1291	1245
	20	17.73	4.57	0.34	3.38	556	83	83	813.5	60.1	601.0	9888	1486	1484
	Mean	14.62	3.78	0.25	3.11	408	73	64	579.8	38.8	467.5	6450	1108	1003
ETR	0	8.64	2.74	0.16	2.56	222	58	43	240.8	13.7	222.9	1962	505	382
	5	11.65	3.20	0.21	3.07	522	56	40	376.8	24.4	357.7	6152	662	482
	10	12.52	3.34	0.26	3.18	656	60	59	419.3	32.3	399.1	8305	761	745
	20	12.77	3.72	0.31	3.10	789	67	66	477.1	39.6	396.9	10143	864	843
	Mean	11.40	3.25	0.23	2.98	556	60	52	378.5	27.5	344.2	6641	698	613
LSD at 5%														
OS		0.18	0.14	0.01	0.06	39.0	4.5	4.9	17.2	1.5	9.4	468	56	64
OS x Rate		0.35	ns	0.02	ns	77.9	8.9	9.9	34.4	2.9	18.9	937	111	128

DW = dry weight of wheat plant, OS = organic sources
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (14b): Effect of used organic sources and mineral fertilizers rates on plant dry weight, concentration and uptake of wheat plant nutrients (field exp.II) after 70 days.

Organic Sources	M.F % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
EFW	0	11.47	2.85	0.20	2.70	225	51	45	343.1	24.4	317.2	2758	599	549
	50	13.38	3.53	0.23	2.98	308	64	58	486.7	32.6	394.1	4274	869	800
	100	14.16	3.96	0.27	3.21	383	83	77	561.0	39.9	461.3	5519	1183	1103
EPD	0	12.93	3.13	0.20	2.91	333	60	53	432.7	28.3	389.0	4794	811	743
	50	14.99	3.79	0.25	3.10	417	72	62	592.2	39.8	473.2	6653	1101	975
	100	15.95	4.41	0.29	3.32	475	87	79	714.5	48.1	540.2	7904	1412	1291
ETR	0	10.40	2.75	0.20	2.78	458	44	38	296.8	21.5	293.8	4822	465	407
	50	11.45	3.29	0.23	3.00	550	57	52	381.6	27.2	345.7	6588	657	606
	100	12.34	3.72	0.27	3.16	658	78	67	457.1	33.9	393.0	8511	973	826
Mean	0	11.60	2.91	0.20	2.80	339	52	45	357.5	24.7	333.3	4125	625	566
	50	13.27	3.54	0.24	3.03	425	64	57	486.8	33.2	404.3	5838	876	794
	100	14.15	4.03	0.28	3.23	506	83	74	577.5	40.6	464.8	7311	1189	1073
LSD at 5%														
MF		0.18	0.14	0.01	0.06	39.0	4.5	4.9	17.2	1.5	9.4	468	56	64
OS x MF		0.30	Ns	Ns	Ns	ns	Ns	ns	29.8	2.5	16.4	ns	ns	ns

DW = dry weight of wheat plant, OS = organic sources
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (14c): Effect the rate of used organic sources and mineral fertilizers on plant dry weight, concentration and uptake of plant nutrients (field exp.II) after 70 days.

Rate of OS Ton/fed	MF % of R	DW g/ Plant	Concentration						Uptake					
			%			$\mu g.g^{-1}$			mg/plant			Ug/plant		
			N	P	K	Fe	Zn	Mn	N	P	K	Fe	Zn	Mn
0	0	8.01	1.59	0.12	2.11	133	40	23	127.5	9.6	186.8	801	321	187
	50	8.90	2.71	0.16	2.73	233	60	40	240.9	14.5	242.6	2080	533	356
	100	9.02	3.92	0.19	2.85	333	73	67	354.0	16.8	257.4	3006	662	602
	Mean	8.64	2.74	0.16	2.56	233	58	43	240.8	13.7	222.9	1962	505	382
5	0	11.68	3.02	0.19	2.98	289	50	32	356.1	22.2	347.6	3302	594	384
	50	13.99	3.54	0.21	3.07	389	61	47	499.2	29.4	430.9	5322	869	661
	100	15.63	3.79	0.24	3.15	444	80	70	595.6	37.2	493.6	6768	1257	1109
	Mean	1376	3.45	0.21	3.07	374	64	50	483.7	29.6	424.1	5131	907	718
10	0	12.67	3.28	0.24	3.09	422	57	60	416.5	29.9	392.3	5313	726	769
	50	14.81	3.63	0.27	3.07	500	63	67	542.1	40.0	454.7	7328	952	1002
	100	15.77	4.01	0.29	3.44	567	87	77	640.8	46.3	544.1	8718	1375	1218
	Mean	14.42	3.64	0.27	3.20	496	69	68	533.1	38.7	463.7	7120	1018	996
20	0	14.03	3.75	0.26	3.01	511	60	64	529.8	37.1	424.5	7083	857	925
	50	15.40	4.27	0.32	3.23	578	73	74	665.0	49.0	489.2	8622	1148	1156
	100	16.17	4.39	0.38	3.48	678	90	83	719.7	62.2	564.2	10753	1463	1363
	Mean	15.20	4.13	0.32	3.24	589	74	74	638.2	49.5	492.6	8819	1156	1148
LSD at 5%														
Rate		0.20	0.16	0.01	0.07	45.0	5.2	5.7	19.8	1.7	10.9	541	64	74
Rate x MF		0.35	0.28	0.02	0.13	ns	Ns	9.9	ns	2.9	18.9	ns	111	128

DW = dry weight of wheat plant, OS = organic sources,
M.F. % of R = mineral fertilizers as percent of recommended dose for wheat,
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

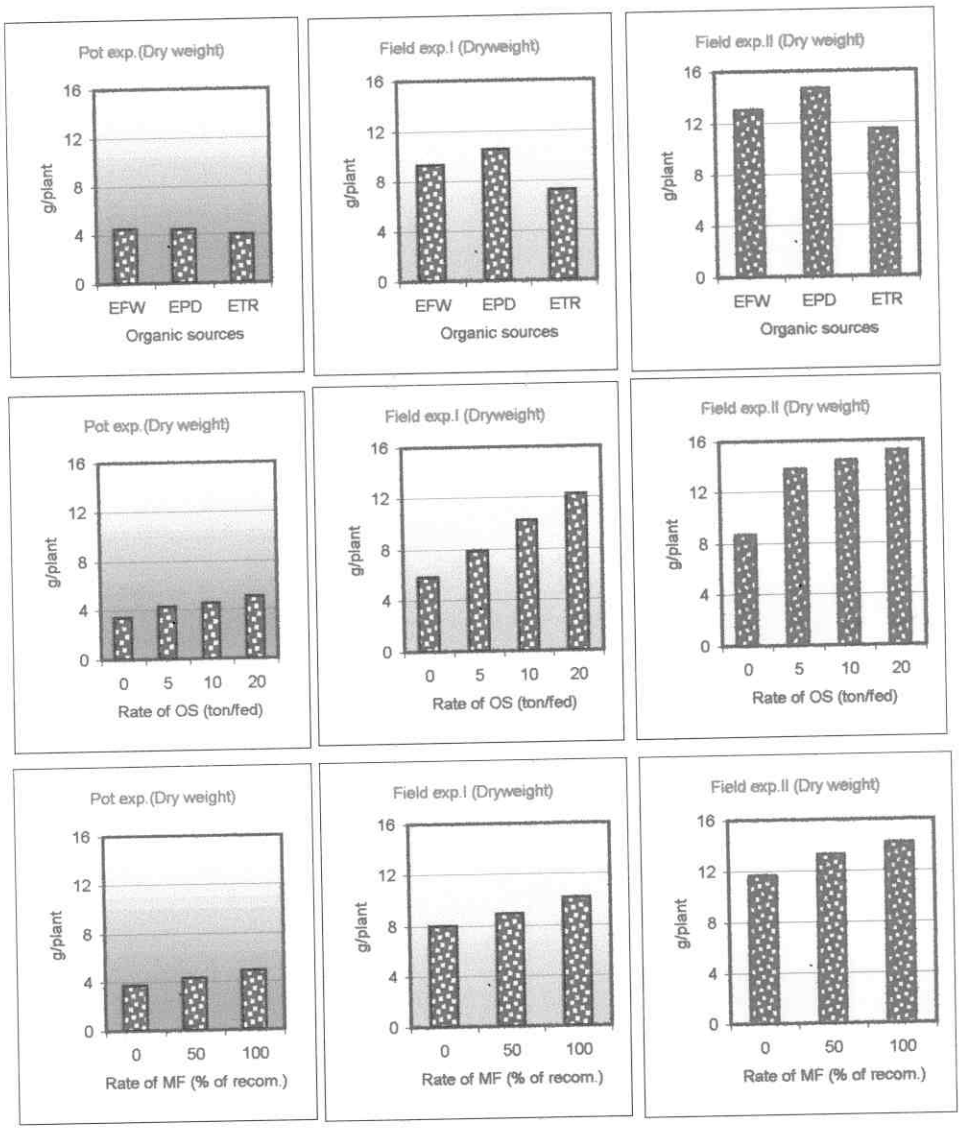

Fig.(10): Effect of organic sources, rate of organic sources and fertilizer rate on plant dry weight (g/plant) at 70 days.

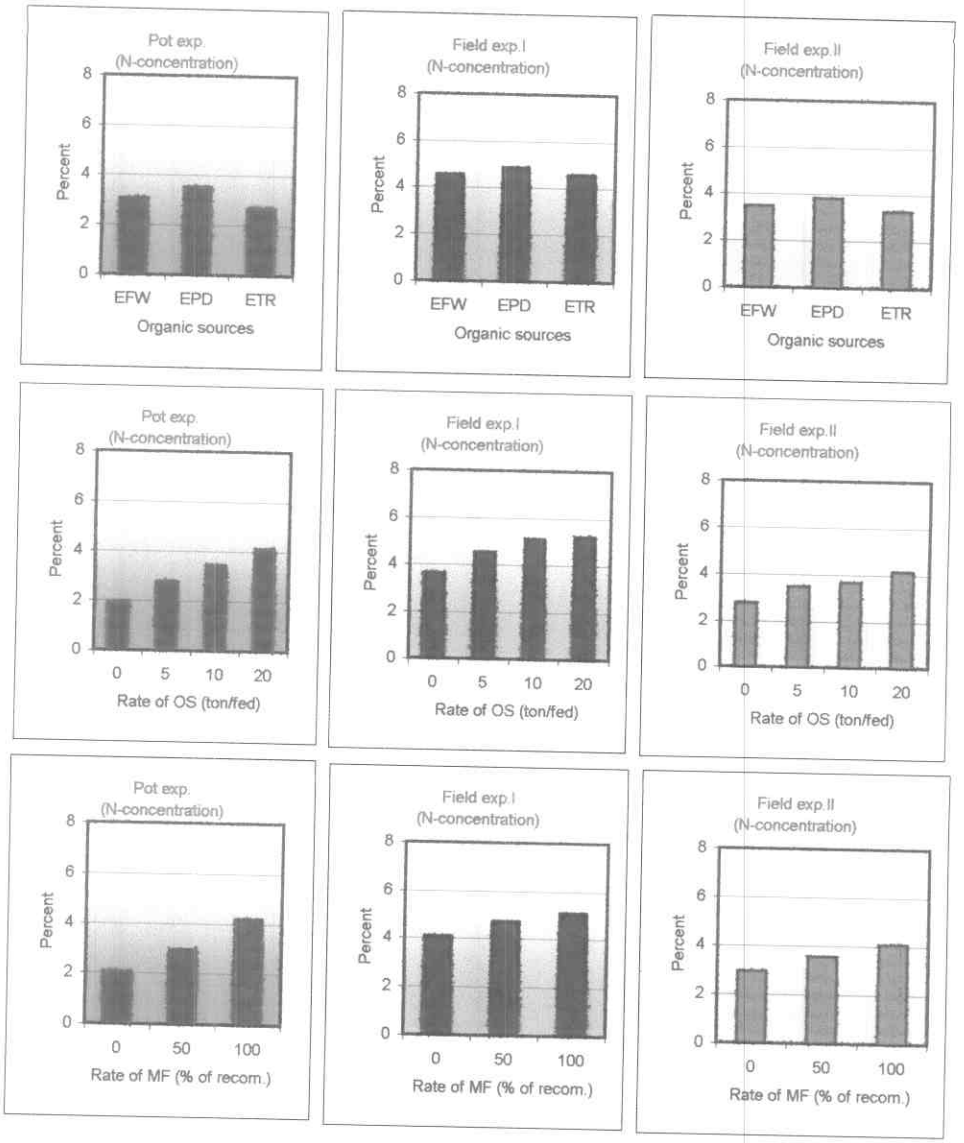

Fig.(11): Effect of organic sources, rate of organic sources and fertilizer rate on plant nitrogen concentration (%), at 70 days.

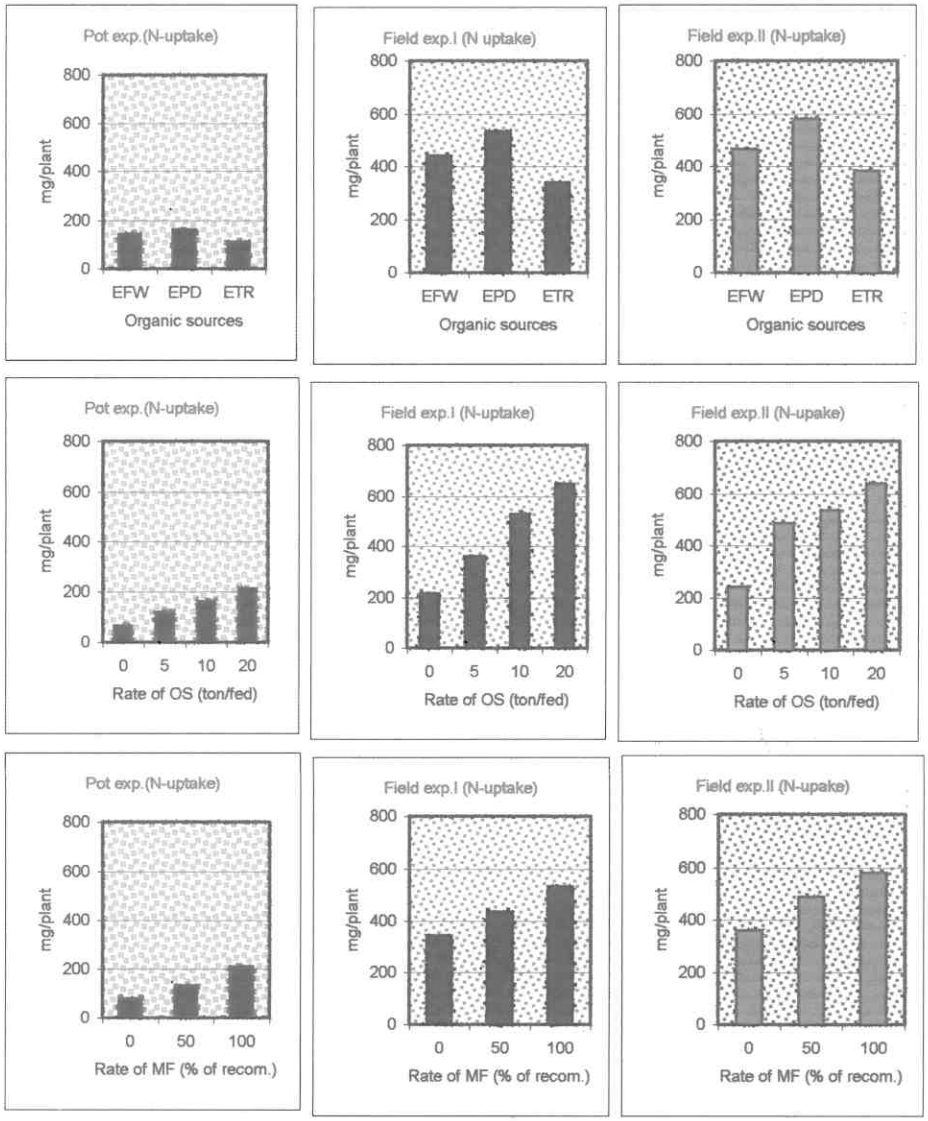

Fig.(12): Effect of organic sources, rate of organic sources and fertilizer rate on plant nitrogen uptake (mg/plant), at 70 days.

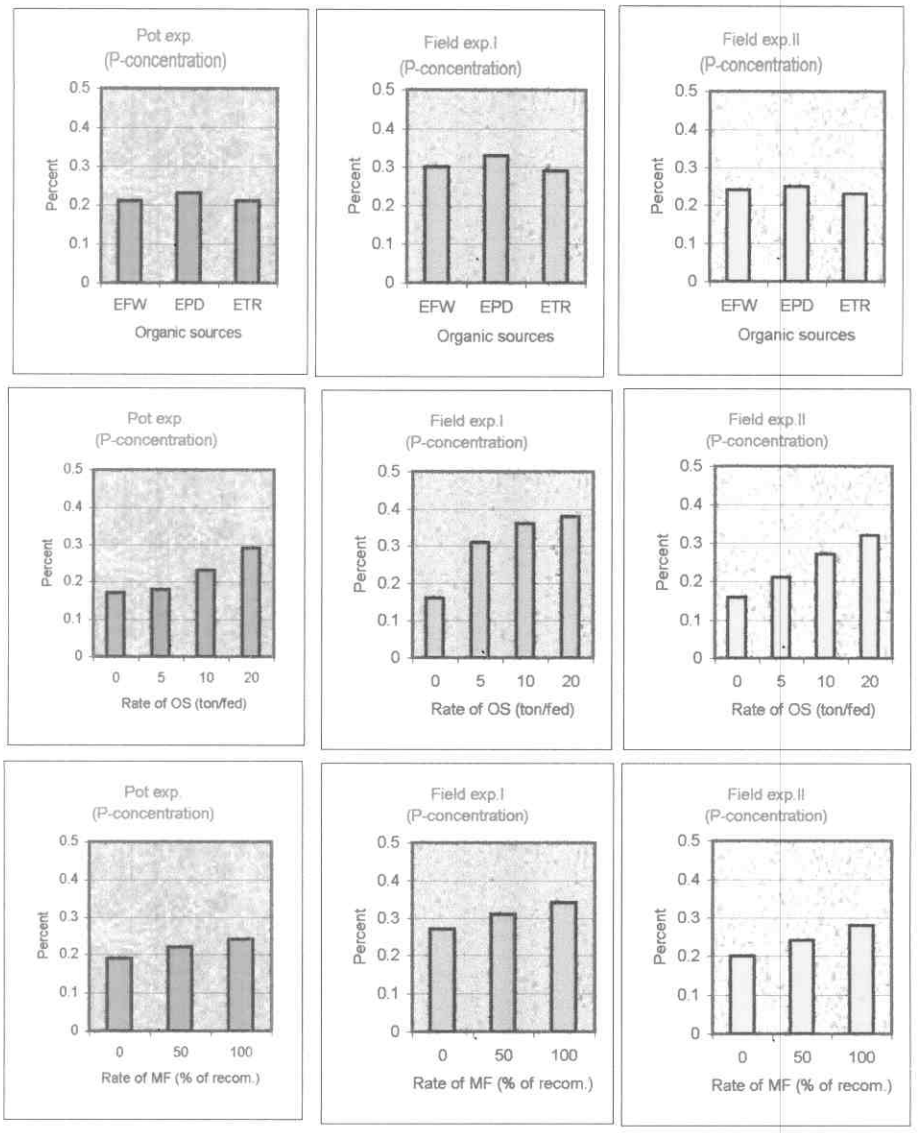

Fig.(13): Effect of organic sources, rate of organic sources and fertilizer rate on plant phosphorus concentration (%) at 70 days.

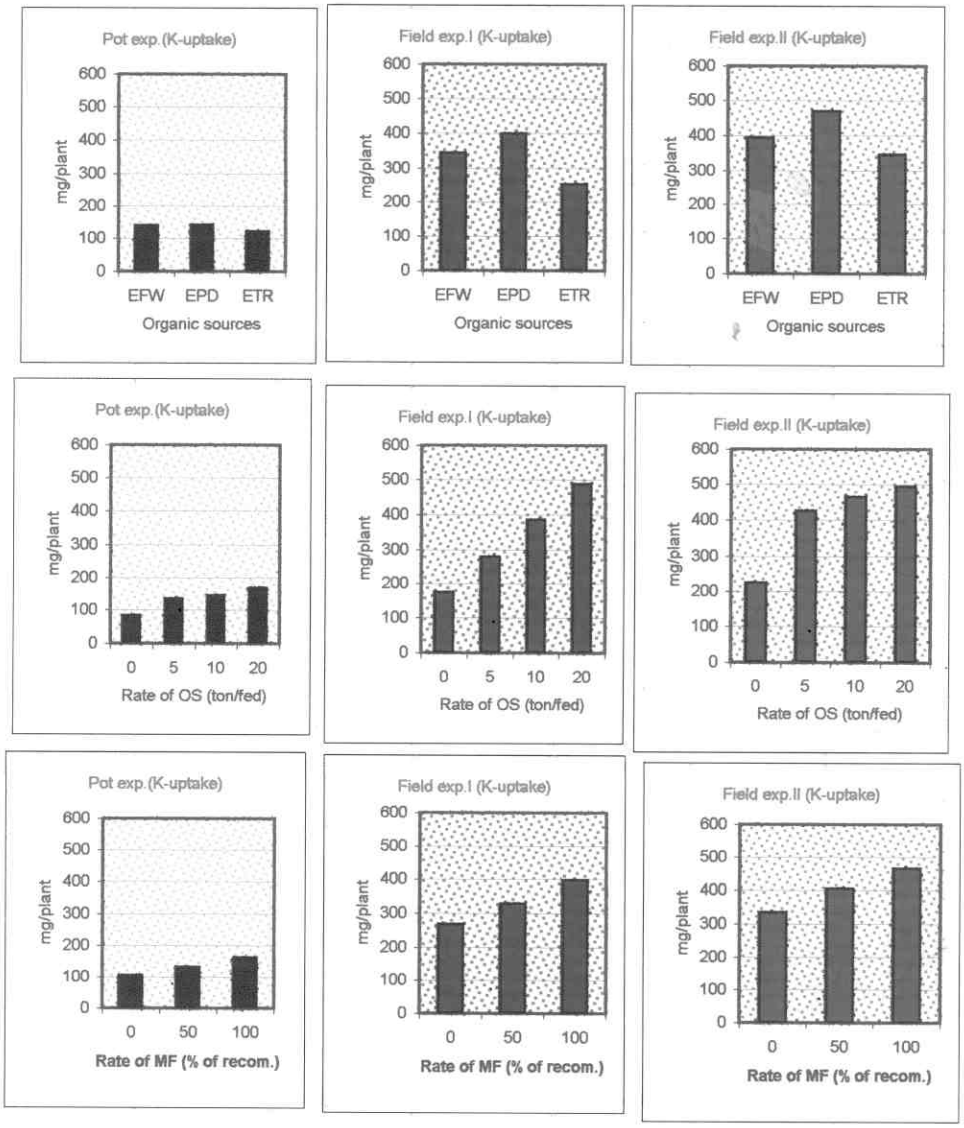

Fig.(16): Effect of organic sources, rate of organic sources and fertilizer rate on plant potassium uptake (mg/plant) at 70 days.

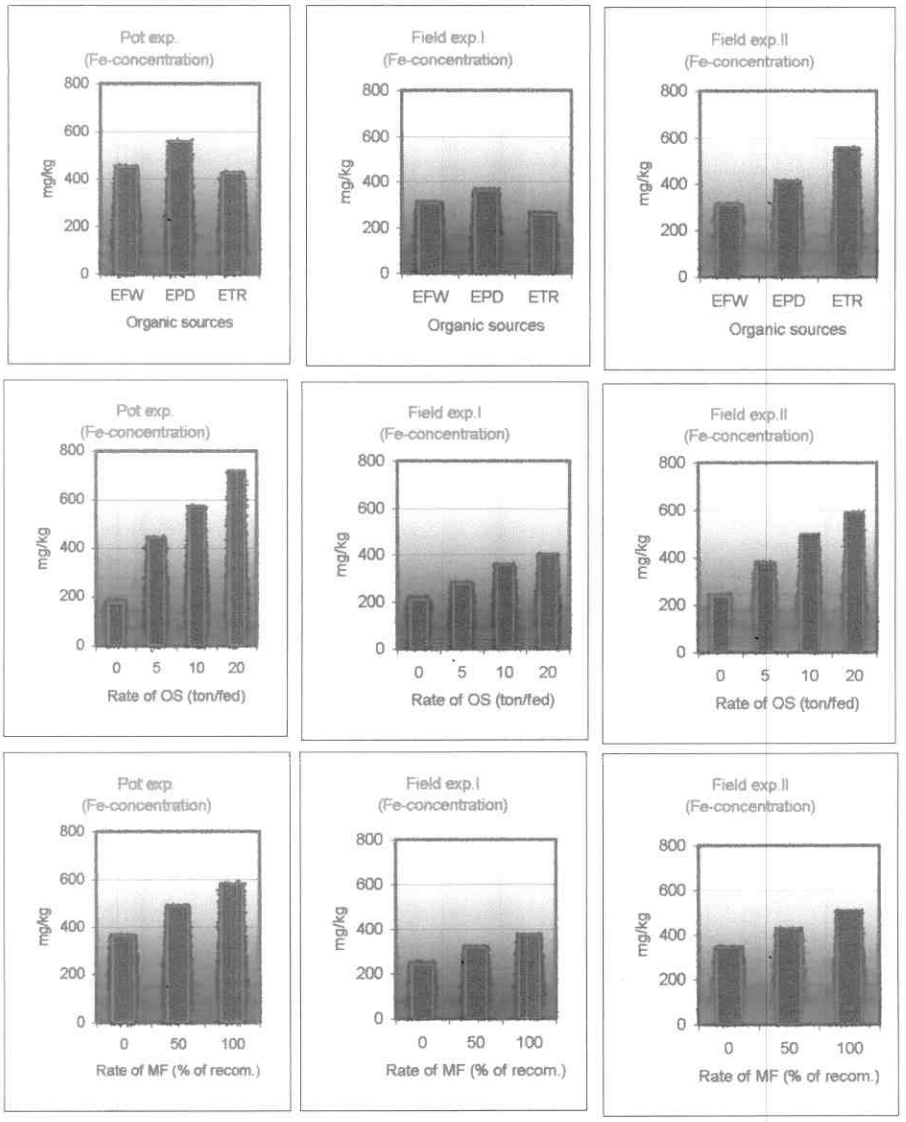

Fig.(17): Effect of organic sources, rate of organic sources and fertilizer rate on plant iron concentration (mg/kg) at 70 days.

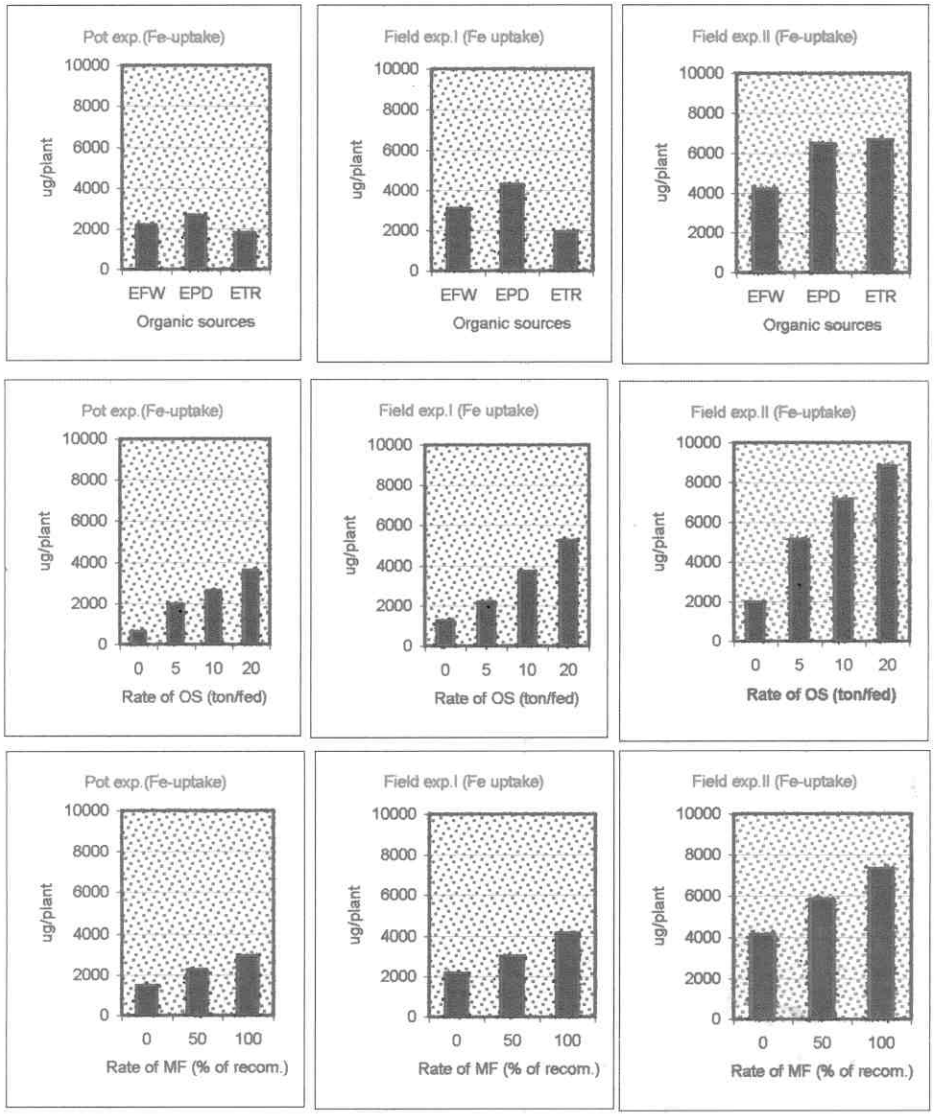

Fig.(18): Effect of organic sources, rate of organic sources and fertilizer rate on plant iron uptake (ug/plant) at 70 days.

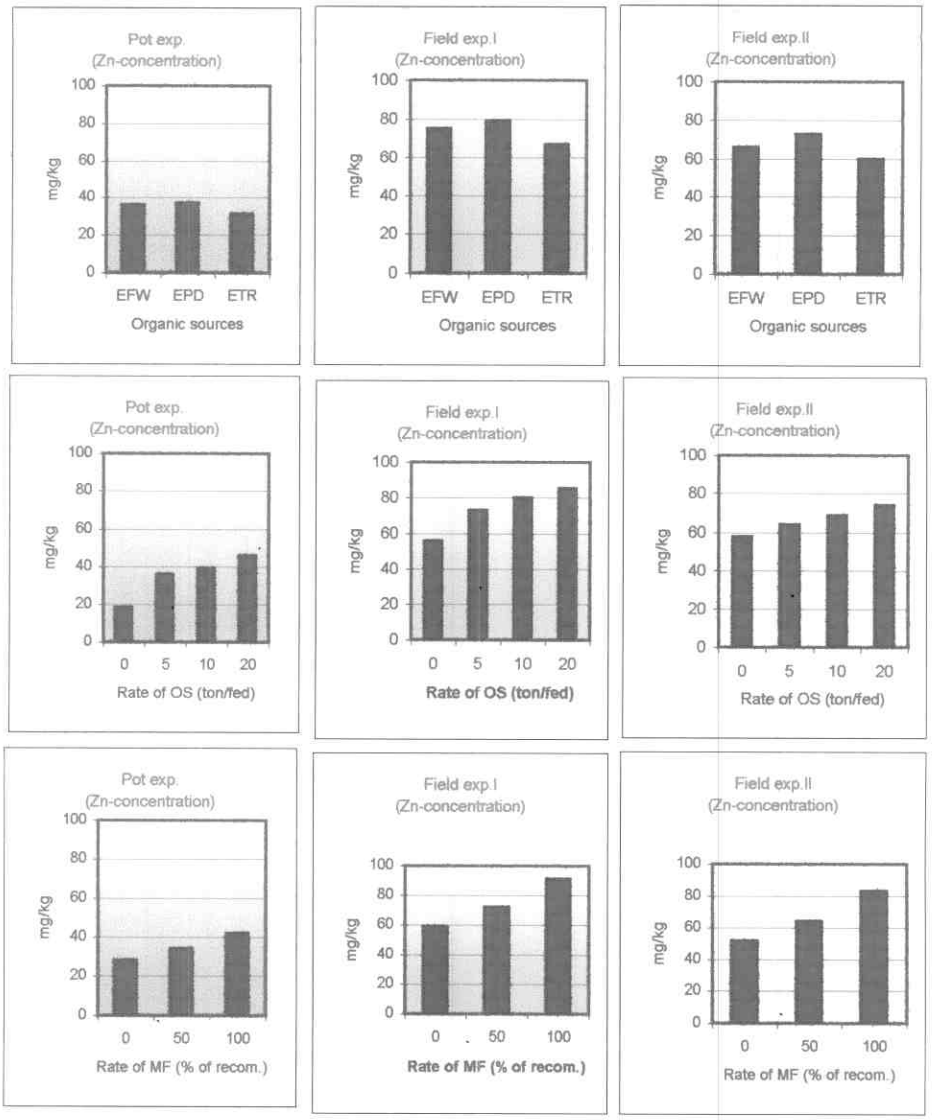

Fig.(19): Effect of organic sources, rate of organic sources and fertilizer rate on plant zinc concentration (mg/kg) at 70 days.

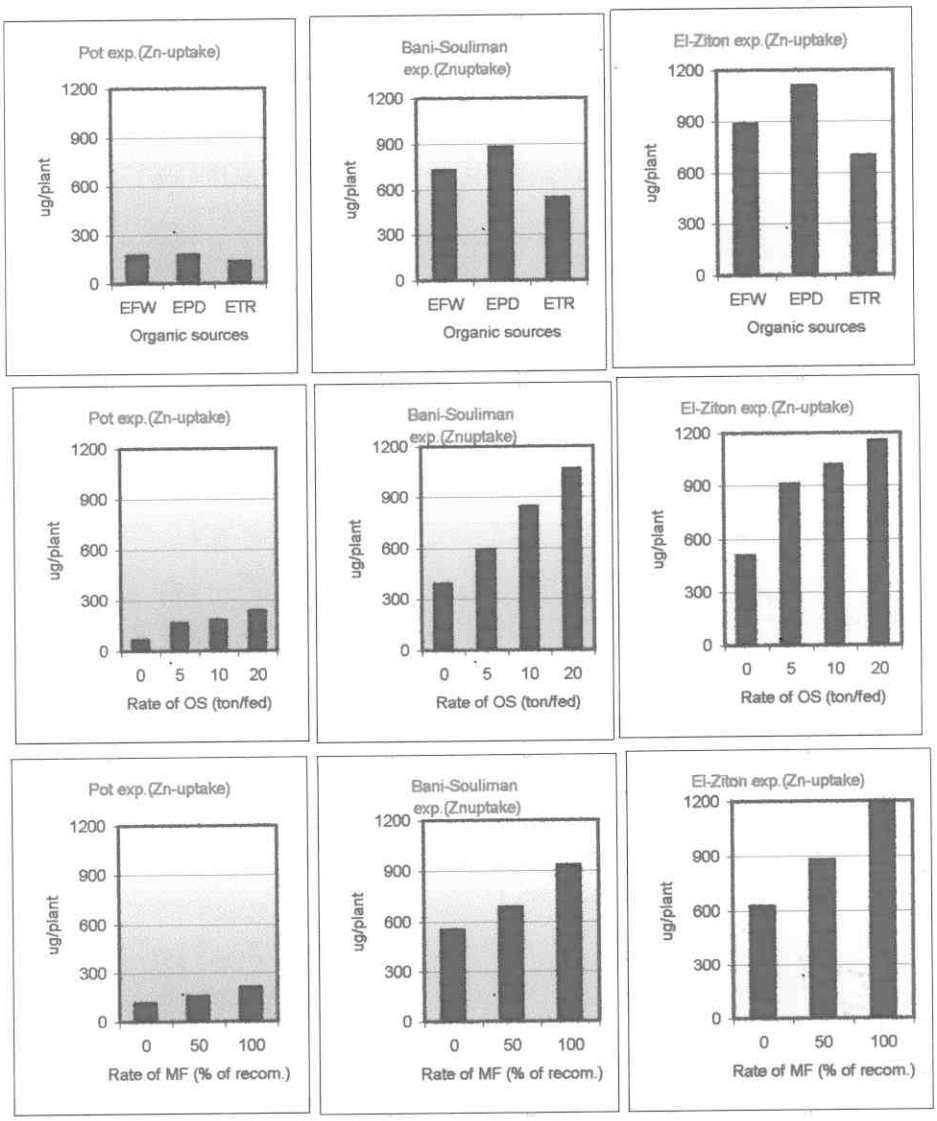

Fig.(20): Effect of organic sources, rate of organic sources and fertilizer rate on plant zinc uptake (ug/plant) at 70 days.

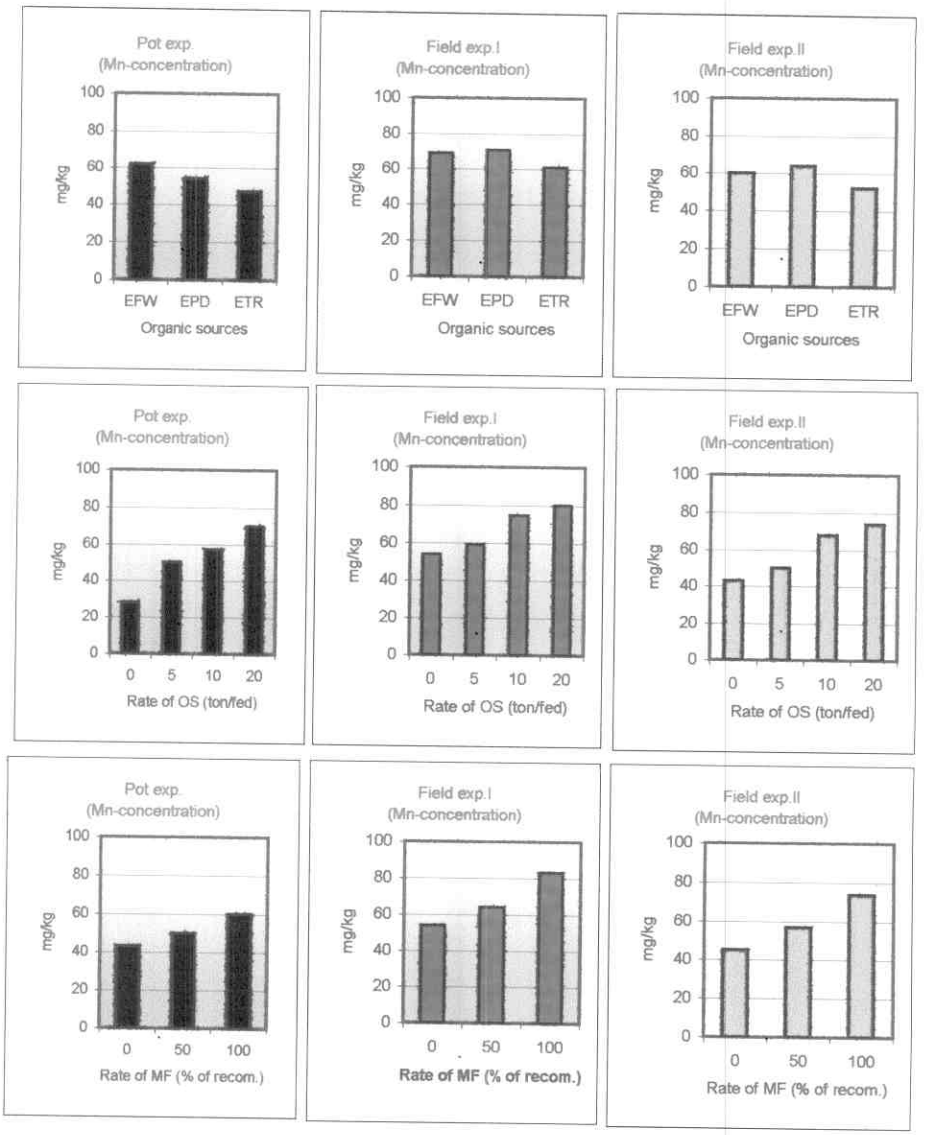

Fig.(21): Effect of organic sources, rate of organic sources and fertilizer rate on plant manganes concentration (mg/kg) at 70 days.

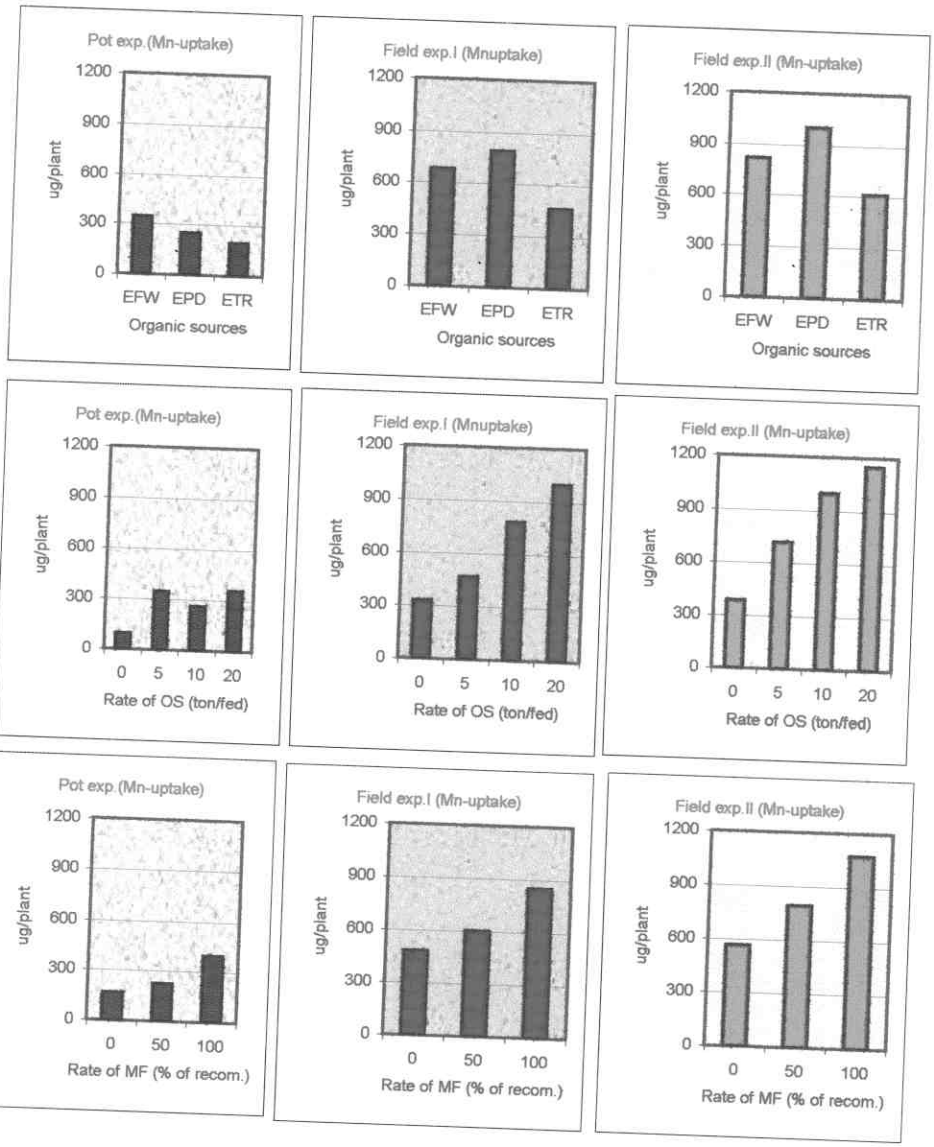

Fig.(22): Effect of organic sources, rate of organic sources and fertilizer rate on plant manganes uptake (ug/plant) at 70 days.

4.4.Effect of treatments on wheat grain and straw yield at harvest:

The values of grain and straw yields of wheat plants grown in pot exp. (sandy clay loam) and field exp.I (sandy loam) and field exp.II (clay loam) under the individual and di-interaction effects of different organic sources (enrich farm waste, enrich poudrette and enrich town refuse), their rates (0, 5, 10, 15 ton/fed) and mineral fertilizer rates (0, 50 and 100%) at harvest (at 150 days after planting) are shown in table (15) and depict in fig.(23).

4.4.1.Grain yield:

Data in table (15) showed that The organic sources, their rates or mineral fertilizer rates as individual factors significantly increased grains yield of wheat plants in the three experiments. The successive ascending order of grains yield in the three experiments as affected by organic sources is enrich town refuse < enrich farm waste = enrich poudrette. As for the rates, either of organic sources or mineral fertilizers, they successively increased grains yield up to the highest rate in all the three experiments, (fig. 23). Similar results were obtained by Bowman and Halvosson (1998) .

Organic sources types with their rates affected significantly the grains yield of wheat plants in the three experiments. Just, field exp.II showed that di-interaction of organic sources with mineral fertilizer rates was of significant effect on grains yield. On the other hand, the other two experiments showed insignificant effect. The interaction of organic sources with mineral fertilizer rates showed significant

effect on grains yield in the pot and field exp.II. Similar results were obtained by Derar and Eid (1996) .

{Note: grain yield of pot was modified to ton/fed by dividing the g/pot by 5}.

4.4.2.Straw yield:

The organic sources, their rates or mineral fertilizer rates affected significantly straw yield of wheat plants in the three experiments. The successive increasing order of straw yield in the three experiments as affected by organic sources was enrich town refuse < enrich farm waste = enrich poudrette. As for the rates, either of organic sources or fertilizers successively increased straw yield up to the highest rate in the field exp.I and field exp.II. As for the pot exp., similar behaviour has been shown on the straw yield at the highest two rates of the organic sources (10 and 20 ton/fed) as well as the highest two rates of the mineral fertilizer (50 and 100%) on the straw yield, where the effect of the two rates were insignificant (fig. 23).

Di-interaction of organic sources with their rates showed significant effect on straw yield of wheat plants, while organic sources with fertilizer rates showed non-significant effect in the three experiments. Just, the field exp.II showed that di-interaction between the organic sources rates and mineral fertilizer rates had significant effect on straw yield, while the other experiments showed non-significant trend.

{Note: straw yield of pot was modified to ton/fed by divided the g/pot by 5}.

4.4.3.Grain/straw percentage:

The percentage of grain/straw for pot exp., field exp.I and field exp.II were 15, 42 and 40% respectively. This means that the pot exp. yielded less grains for every straw unit than each of field experiments. The two field experiments were almost similar in their grain/straw ratio.

Table (15a): Effect of used organic sources and their rates on grain and straw yield of wheat crop of the three experiments.

Organic Sources	Rate Ton/ Fed	Pot exp.		Field exp.I		Field exp.II	
		Grain g/pot	Straw g/pot	Grain Ton/fed	Straw Ton/fed	Grain Ton/fed	Straw Ton/fed
EFW	0	1.34	19.29	0.56	2.41	0.83	2.99
	5	4.34	28.66	1.81	4.26	1.98	5.28
	10	6.34	29.70	2.21	5.26	2.29	6.00
	20	7.59	31.66	2.76	5.86	2.86	6.27
	Mean	4.74	27.33	1.83	4.44	1.99	5.13
EPD	0	1.34	19.29	0.56	2.41	0.83	2.99
	5	4.18	23.70	2.17	4.47	2.33	5.17
	10	6.06	32.90	2.49	4.91	2.62	5.69
	20	6.11	31.31	2.57	6.23	2.69	7.17
	Mean	4.42	26.80	1.94	4.50	2.12	5.25
ETR	0	1.34	19.29	0.56	2.41	0.83	2.99
	5	3.66	31.15	1.66	3.91	1.73	4.64
	10	4.53	33.09	1.66	3.69	1.69	4.47
	20	4.86	35.63	1.98	4.40	2.02	5.06
	Mean	3.60	29.79	1.46	3.60	1.57	4.29
LSD at 5%							
OS		0.40	Ns	0.14	0.20	0.12	0.32
OS x Rate		0.79	4.37	0.27	0.40	0.24	0.63

OS = organic source

EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (15b): Effect of used organic sources and mineral fertilizers on grain and straw yield of wheat crop of the three experiments.

Organic Sources	M.F % of R	Pot exp.		Field exp.I		Field exp.II	
		Grain g/pot	Straw g/pot	Grain Ton/fed	Straw Ton/fed	Grain Ton/fed	Straw Ton/fed
EFW	0	2.49	24.57	1.40	3.68	1.43	4.22
	50	4.49	26.70	1.83	4.60	2.00	5.25
	100	6.24	30.72	2.27	5.05	2.53	5.93
EPD	0	3.17	24.30	1.64	3.73	1.74	4.43
	50	4.20	27.09	1.93	4.68	2.10	5.28
	100	5.90	29.00	2.26	5.10	2.52	6.05
ETR	0	2.95	26.72	1.15	2.95	1.28	3.66
	50	3.23	31.81	1.44	3.56	1.52	4.23
	100	4.61	30.84	1.78	4.29	1.92	4.98
Mean	0	3.20	25.20	1.40	3.45	1.48	4.10
	50	3.97	28.53	1.74	4.28	1.87	4.92
	100	5.58	30.19	2.10	4.81	2.32	5.66
LSD at 5%							
MF		0.40	2.19	0.14	0.20	0.12	0.32
OS x MF		Ns	ns	ns	Ns	0.21	Ns

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic source
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

Table (15c): Effect the rate of used organic sources and mineral fertilizers on grain and straw yield of wheat crop of the three experiments.

Rate of OS Ton/fed	M.F % of R	Pot exp.		Field exp.I		Field exp.II	
		Grain g/pot	Straw g/pot	Grain Ton/fed	Straw Ton/fed	Grain Ton/fed	Straw Ton/fed
0	0	0.00	16.13	0.20	1.63	0.23	2.47
	50	0.00	19.45	0.40	2.50	0.60	2.50
	100	3.57	22.28	1.07	3.08	1.67	4.00
	Mean	1.19	19.29	0.56	2.41	0.83	2.99
5	0	2.82	24.59	1.44	3.48	1.61	3.97
	50	4.14	31.17	1.94	4.20	2.08	5.27
	100	5.02	27.75	2.24	4.96	2.36	5.86
	Mean	3.99	27.83	1.88	4.21	2.02	5.03
10	0	4.87	29.61	1.86	3.96	1.93	4.33
	50	5.29	31.35	2.11	4.71	2.22	5.77
	100	6.77	34.74	2.39	5.19	2.44	6.06
	Mean	5.64	31.90	2.12	4.62	2.80	5.39
20	0	5.13	30.46	2.10	4.75	2.16	5.64
	50	6.46	32.16	2.49	5.71	2.59	6.13
	100	6.98	35.98	2.71	6.03	2.82	6.71
	Mean	6.19	32.87	2.43	5.49	2.52	6.16
LSD at 5%							
Rate		0.46	2.53	0.16	0.23	0.14	0.36
Rate x MF		0.79	ns	ns	ns	0.24	0.63

M.F. % of R = mineral fertilizers as percent of recommended dose for wheat, OS = organic source
EFW = enrich farm waste, EPD = enrich poudrette, ETR = enrich town refuse

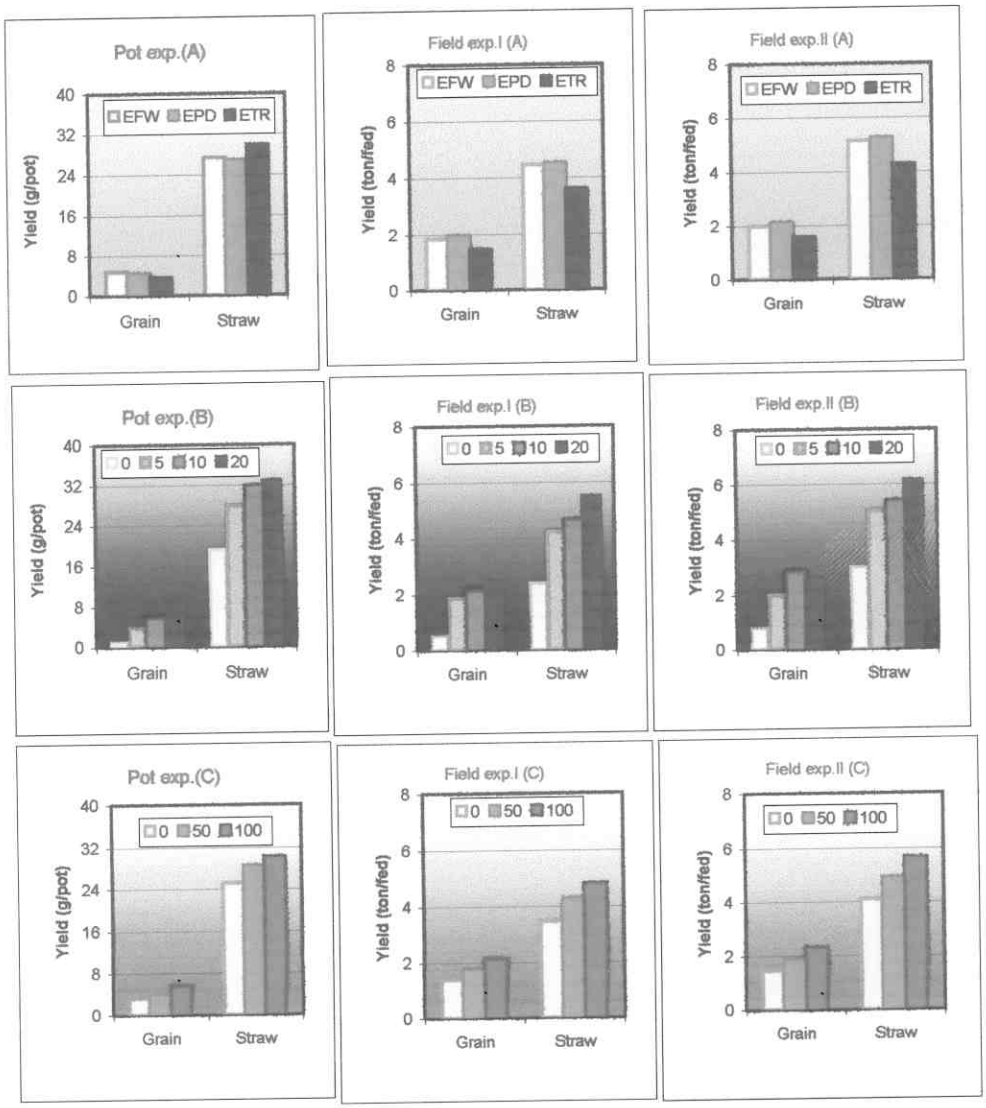

Fig.(23): Effect of organic sources (A), rate of organic source (B) and fertilizer rate (C) on grain and straw yield.