

Interactive comment on “Effect of polluted water on soil, sediments and plant contamination by heavy metals in El-Mahla El-Kobra, Egypt” by E. Mahmoud and A. M. Ghoneim

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Attached is the revised manuscript after taking into consideration of the most of referee #1 comment

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/se-2015-34/se-2015-34-SC2-supplement.pdf>

Interactive comment on Solid Earth Discuss., doi:10.5194/se-2015-34, 2016.

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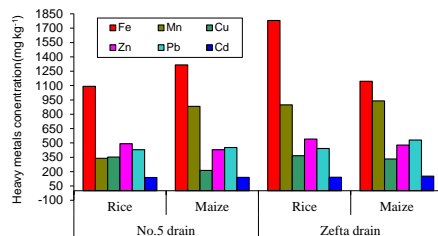


Fig.1

Fig. 1. Figure 1. Concentration of heavy metals in maize and rice grown in soils irrigated of drains (Zefta and No.5)

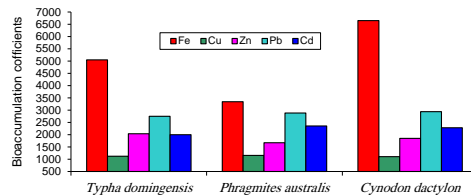


Fig.2

Fig. 2. Figure 2. Bioaccumulation coefficients of heavy metals in *Typha domingensis*, *Phragmites australis* and *Cynodon dactylon* grown in Zefta drain.

Table 1. Total concentrations of heavy metals in soils irrigated by water from Zefra drain, drain No.5 and Baher EL Mlah.

Parameters	Units	Soils around of			Upper limit of background total heavy metals (Chen et al.1992)
		No. 5 drain	Zefra drain	Baher EL Mlah	
pH	-	8.05	8.15	7.3	-
CaCO ₃	%	6.15	4.51	4.1	-
Fe	mg kg ⁻¹	3108	3274	933	-
Zn	mg kg ⁻¹	145	317	54	120
Mn	mg kg ⁻¹	571	513	264	-
Cu	mg kg ⁻¹	125	255	60	35
Cd	mg kg ⁻¹	21	27	11	3
Pb	mg kg ⁻¹	70	68	53	120
Ni	mg kg ⁻¹	94	136	31	60

*average

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Fig. 3. Table 1. Total concentrations of heavy metals in soils irrigated by water from Zefra drain, drain No.5 and Baher EL Mlah.

Table 2 Bioconcentration factors of heavy metals in maize and rice grown in soils irrigated of drains (Zefta and No.5) and limits of heavy metals

Elements	No. 5 drain		Zefta drain		Limits of heavy metals * mg kg ⁻¹
	Rice	Maize	Rice	Maize	
Fe	0.29	0.35	0.54	0.34	-
Mn	3.40	2.97	1.71	1.51	300 - 500
Cu	0.59	1.54	1.75	1.83	20 - 100
Zn	2.82	1.71	1.44	1.32	100 - 400
Pb	6.73	6.83	5.26	5.66	30 - 300
Cd	6.14	6.45	6.55	2.26	5 - 30

* Kabata - Pendias and Pendias (1992)

Fig. 4. Table 2 Bioconcentration factors of heavy metals in maize and rice grown in soils irrigated of drains (Zefta and No.5) and limits of heavy metals

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Table 3. The chemical analysis waters of drains Zefta and No.5. and Baher El Mlah.

Parameters	Units	No. 5 drain	Zefta drain	Baher EL Mlah	Water criteria for irrigation water (a)
pH		9.8	12.2	7.2	6.5-8.4
TDS	mg l ⁻¹	1016	1130	334	2000
SAR		17.3	18.2	6	6-12
BOD ₅	mg l ⁻¹	632	537	-	40 *
COD	mg l ⁻¹	1592	1712	-	60 *
Fe	mg l ⁻¹	0.09	0.56	0.01	5.00
Zn	mg l ⁻¹	0.02	0.037	-	2.00
Mn	mg l ⁻¹	0.68	2.91	0.03	0.20
Cu	mg l ⁻¹	0.15	0.28	0.12	0.20
Cd	mg l ⁻¹	0.03	0.07	0.001	0.01
Pb	mg l ⁻¹	1.05	0.18	0.05	5.00
Ni	mg l ⁻¹	0.12	0.31	0.02	0.20

* E.C.S (48/1992)

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Fig. 5. Table 3. The chemical analysis waters of drains Zefta and No.5. and Baher El Mlah.

Table 4. Average of heavy metal concentrations, contaminant factor and distribution coefficients (Kd) in sediments of drain No.5 compared with toxicological reference Value (US EPA, 1999)

Elements	Conc. (mg kg ⁻¹)		Cf	Kd (L kg ⁻¹)
	Mean ± SD	Et		
Zn	647.5 ± 36.7	110	6.25	32375.0
Mn	2125.0 ± 74.3		12.67	3125.0
Cu	425.0 ± 12.4	16	4.25	2833.3
Cd	97.5 ± 4.6	0.6	9.55	3250.0
Pb	145.0 ± 4.5	31	4.8	138.1
Ni	195.0 ± 9.8		7.33	1625.0

Et: US EPA Toxicity reference value
Cf: Contaminant factor
Kd: Distribution coefficients (L kg⁻¹)

Fig. 6. Table 4. Average of heavy metal concentrations, contaminant factor and distribution coefficients (Kd) in sediments of drain No.5 compared with toxicological reference Value (US EPA, 1999)